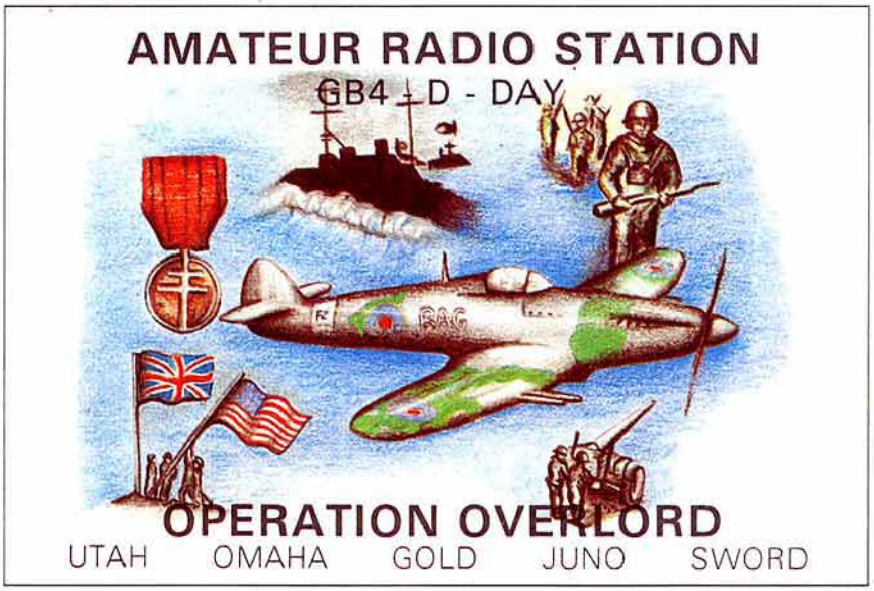
August 1984

RADio COMmunication

QSL CARDS RECENTLY RECEIVED AT RSGB HQ COMMEMORATING TWO UNIQUE OCCASIONS

ON RIGHT
The card of GB4DD through which messages were exchanged with HM The Queen, as featured on last month's cover

BELOW
The front and one inside page of the four-page card commemorating the first amateur radio operation in space



FLIGHT OF COLUMBIA
STS-9/Spacelab-1

Launched on November 28, 1983
and after 247 hrs, 47 min
landed at Edwards A.F.B. on December 8, 1983

- First launch of Spacelab (provided by the European Space Agency)
- Longest Orbiter flight to date
- First European crewmember
- First 'Payload Specialists' (non-career astronauts)
- First six-person spaceflight
- ★ First Amateur Radio station in space: W5LFL

Transceiver: modified Motorola MX-300 2-meter FM transceiver, hand-built by the Motorola Amateur Radio Club in Florida.
Antenna: directional ring radiator with cavity, designed to fit in the upper window of the spacecraft; built for NASA by volunteer employees of Lockheed.
Power: 4.5 watts
Mode: FM, CW (by keying carrier) All transmit and receive audio were tape recorded, which constitutes the station log.
Operating orbits: 40D, 56D, 62A, 71D, 91A, 96A, 97A&D, 110D, 111A&D, 112A, 113A, 129A, 130A, 134A, 134D, 135A&D, 144A&D, 145A&D, 146A, 149D and 150D.
Stations, 2-way contact: over 350
SWL: approximately 10,000 cards received
Countries: 23
Total operating time: about 4 hrs, 30 mins.

The following message is printed on page 3: *"I am happy you were able to receive my Amateur Radio 2-meter signals from space during the STS-9/Spacelab-1 mission between 28 Nov. 1983 and 8 Dec. 1983. 73, Owen (Owen K. Garriott, W5LFL)"*

Journal of the Radio Society of Great Britain

Amcomm of London

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At Amcomm, we believe we are here to do much more than sell boxes off the shelf. We are specialists in amateur radio equipment and our managment and staff are all amateur radio enthusiasts. We sell nothing else.

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HANDICAMP VISA

AUGUST 1984

VOLUME 60 No 8

RADio COMmunication

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

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88 Broomfield Road,
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Tel 0245 84938

Office hours: 0900 to 1700

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Advertisements, other than Members' Ads, should be sent to:

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RSGB Advertisement Officer,
PO Box 599,
Cobham,
Surrey KT11 2QE

Tel 037 284 3955

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

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Alma House,
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Herts EN6 3JW

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CONTENTS

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

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

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

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

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

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

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

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

London Lowe Electronics Ltd.
278 Pentonville Road, London N1 9NR
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4/5 Queen Margarets Rd, off Queen Margarets Drive, Glasgow.
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Tel: 0384 390063

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

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

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

TS430S £779.55 inc VAT (carr. £6)

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

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

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

TRIO

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

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

the TRIO **TM201A** & the TRIO **TM401A** rigs that will actually fit in your car!

It has always been a major problem to find sufficient space to fit an amateur radio transceiver in a car. Today the problem is more acute with the modern car becoming more compact as a result of energy saving measures and no provision is made other than for mobile music.

With this problem in mind TRIO have concentrated on the size of the transceiver and its relationship to performance. Certain brand new concepts in mobile transceiver design have emerged. The result is not one new transceiver but two. TRIO, with their by now well known attention to the demands of the enthusiastic amateur, have simultaneously produced the TM201A two metre transceiver and its seventy centimetre version, the TM401A.

Using the transceiver is simplicity itself; VFO A steps in 25KHz steps, VFO B in 5KHz steps, controlled either from the front panel knob or the up/down mike switch. Dual function front panel switches are provided giving 5 memory channels as well as specific rig functions.

Memory 1 holds the priority frequency memories 2 and 3 are standard memories and memories 4 and 5 hold receive and transmit frequencies independently.

The rig functions set by the six switches are: memory channel recall, memory scan, MHz changing, rig switching between VFO's A and B, initiating priority channel and finally frequency insertion in memory. A system of beep tones aids memory entry. Programmable scan is available using the frequency limits as set in memory 5 thus one can scan for example simplex frequencies between 145,200 and 145,575 and so avoid the rig locking on a repeater channel.

Of course all the standard repeater functions are available; 600KHz shift, 1750Hz tone burst and a locking reverse repeater shift. Both rigs have a bright yellow frequency display thus assuring maximum readability under mobile conditions.

An optional remote frequency controller (FC10) is available which connects to the TM201A/TM401A and gives in addition to frequency readout, control of the more important rig functions. The 2 metre TRIO TM201A gives 25 watts and the 70 centimetre TM401A 12 watts, both rigs giving 1 watt when switched to low power.

What more can I say? Just this, when I opened the first box in order to use the two rigs in my shack prior to putting together what you have just read, I was amazed! I thought that TRIO had forgotten to put the transceiver in the box. The rig is small, it is unbelievably small. The transceiver's dimensions are 5.6(41)W x 1.6(39.5)H x 7.3(183)D, inches(mm) and each rig weighs only 2.8lbs(1.25Kg).

How has this been achieved? TRIO have not only removed the internal speaker and included with the rig, as standard, a separate 77mm diameter speaker, but have totally designed the transceiver with size as a major consideration, the result, modern mobile perfection. The two new rigs are outstanding, a natural result of TRIO's high technology combined with the dreams of the enthusiastic amateur.

TM201A ..... **£279.00** inc VAT (carr. £6)
TM401A ..... **£310.32** inc VAT (carr. £6)

selected VHF and UHF accessories.

				Carr.
SP230	External speaker unit with switchable audio filters and provision for separate inputs from 2 rigs	£43.47	inc VAT	£2.50
MC60A	Deluxe desk microphone with built in pre amp and up/down shift switching, ideal for TS780 and TR9130 series	£59.48	inc VAT	£2.50
MC80	Electric desk microphone with UP/DOWN facilities	£38.98	inc VAT	£0.50
MC40S	Up/down fist microphone for TR9000/TS780	£13.98	inc VAT	£1.25
MC55	NEW mobile microphone with control box (up/down, timer, mic gain, etc)	£39.96	inc VAT	£2.00
SP70	External speaker unit for all TS700 series	£24.98	inc VAT	£2.50
BU1	Backup battery case	£8.39	inc VAT	£0.75
BO9A	Base plinth for TR9130	£49.46	inc VAT	£6.00
MA4000	2m/70cm dual band antenna with diplexer, suitable for mag or gutter mount	£35.00	inc VAT	£2.00
VS1	Voice synthesiser for TW4000A speaks either English or Japanese, other languages by request	£24.50	inc VAT	£0.75
FC10	Remote display for TM201A/TM401A with frequency control functions	£42.00	inc VAT	£1.25
SP40	Mobile speaker unit for all mobile rigs, intense audio penetrates car noise	£14.98	inc VAT	£1.00
SP50	Mobile speaker as used with the TM201A, heavy enclosure gives superb audio	£14.98	inc VAT	£1.50
MB2	Mobile mount for TR2300 and VB2300	£21.22	inc VAT	£2.00
RA1	Rubber flexible antenna for TR2300 or TR2200GX	£7.51	inc VAT	£0.50
RA3	Telescopic whip antenna for TR2500 or TR2400	£9.98	inc VAT	£0.50
RA4	Rubber flexible antenna for TR3500	£9.00	inc VAT	£0.50
RA5	Telescopic whip antenna for TR2500 TR3500	£13.98	inc VAT	£0.50
ST2	Base stand and quick charger	£54.98	inc VAT	£2.50
SC4	Soft case and belt hook. Ideal protection for a valuable rig	£14.49	inc VAT	£0.75
MS1	Mobile stand and power unit	£33.97	inc VAT	£2.00
SMC25	Speaker/microphone	£17.00	inc VAT	£1.00
PB25	Spare Ni-cad battery pack	£26.30	inc VAT	£1.00
LH2	Deluxe leather case	£25.48	inc VAT	£1.00
BT1	6 piece AA size manganese battery case	£5.99	inc VAT	£0.75
DC25	DC power supply for TR2500/3500 from 12 volts	£17.00	inc VAT	£1.00
PL1	Spare power/charge lead for TR2300/3200/2200 series	£1.30	inc VAT	£0.30
VC10	VHF converter for R2000 118-174MHz Adds a new dimension to your rig	£117.00	inc VAT	£2.00
HC10	Digital station world time clock	£71.96	inc VAT	£2.50
HS7	Miniature headphones with adaptors	£11.48	inc VAT	£0.75
HS6	Ultra light deluxe headphones	£17.49	inc VAT	£1.50
HS5	Deluxe headphones for all TRIO equipment	£24.48	inc VAT	£1.50
MJ-86	8/6 pin mic adaptor. Also MJ84, MJ68, MJ64, MJ48, MJ46	£5.00	inc VAT	£0.50
SWR100A	SWR/power meter 1.8-150 MHz	£37.97	inc VAT	£2.50
SWR100B	Mobile SWR/power meter 140-450 MHz	£37.97	inc VAT	£2.50
SW200A	SWR/power/pep meter 1.8-150MHz. The finest shack meter we have seen, optional additional heads complete perfection	£81.95	inc VAT	£2.50
SW200B	SWR/power/pep meter 140-450 MHz	£81.95	inc VAT	£2.50
SWC1	Optional coupler for SW200 1.8-150 MHz	£22.50	inc VAT	£1.00
SWC2	Optional coupler for SW200 140-250 MHz	£22.50	inc VAT	£1.00
AL1	Lightning and static protector 100w SO239 connector	£23.99	inc VAT	£1.00
AL1N	Lightning and static protector 100w N connector	£28.97	inc VAT	£1.00
AL2	Lightning and static protector 1Kw SO239 connector	£28.97	inc VAT	£1.00
PG3A	Mobile transceiver DC line filter	£7.51	inc VAT	£1.50

LOWE ELECTRONICS Ltd
CHESTERFIELD ROAD MATLOCK DE4 5LE TEL 0629 2430/2817

for all round reliability, a **DAIWA** rotator.

The Daiwa range of rotators has established itself as the most popular series on the market. There are some simple reasons why this is so, not least of which is the almost legendary reliability of Daiwa equipment. After all, when you have installed a rotator high up on a mast, you want it to stay up there, so it's foolish to buy anything less than Daiwa quality.

Here are a few of the more detailed advantages of the Daiwa rotator system:

UNIQUE CONTROLLERS
Since the controller scales can be set anywhere within their range of rotation, you can arrange the rotator end stop position to be in the most convenient direction to suit yourself. For example, in many rotators, the end of rotation is either South or North. This can be very inconvenient if you want to work DX from Africa and you find that in order to turn your beam from Kenya at about 170 degrees, to Capetown at about 185 degrees, you have to rotate all the way round the scale. With the Daiwa system, you can set the overlap point to the least favoured direction, for example 45 degrees and eliminate the problem. A really elegant idea to solve an annoying drawback of other rotator systems.

PRESET CONTROLLER ROUND CONTROLLER

SAFE OPERATION
Since the motor supply is only 24V ac split phase, there are no dangerous voltages being fed up the mast, unlike some other rotators on the market.

DEPENDABILITY
The rotator head units are housed in a weather sealed and factory lubricated die cast housing finished in a melamine/resin paint for corrosion protection. All external screws are of stainless steel, and a moulded plastic cover with a rubber gasket protects the connection terminals.

QUIET OPERATION
The reduction gear train has moulded hard nylon pinions and die cast spur gears which ensure smooth and quiet operation. The lower ratio gears are surface hardened for exceptionally long life.

EASY MAST ALIGNMENT
Calibration scales are cast into the upper and lower rotator housings, and both sides of the mast clamp are adjustable. This means that the rotator can be aligned exactly on the mast centre line with none of the mast skewing and binding which takes place in other types of rotator. Mast sizes from 38 to 63 mm can be used.

SUMMARY
The Daiwa rotators are the best we have ever found, and we searched for a long time. Their combination of top quality construction coupled to the unique controller system and their ability to withstand harsh treatment have made them the standard by which others are judged. The Daiwa DR7500 and 7600 rotators employ a servo indicating system which ensures really accurate indication of beam heading and fully automatic alignment of the controller and rotator.

The Daiwa rotators are designed to support and rotate the normal range of multi element HF beams used in amateur service. Detailed specifications are available on request, but as a general guide, the DR7500 will rotate up to and including a 3 element tribander such as a TA33 or TH3, whilst the DR7600 will take anything up to and including a two element 40 metre beam . . . and that's some aerial.

DR7500X.....	Preset Controller.....	**£142.98** inc VAT.
DR7500R.....	Round Controller.....	**£153.67** inc VAT.
DR7600X.....	Preset Controller.....	**£189.37** inc VAT.
DR7600R.....	Round Controller.....	**£213.41** inc VAT.

If I am absolutely honest,

I am not certain whether I own a NRD515 h
performance as a general coverage receiver
having and constantly admiring probabl
today.
Perhaps it comes down to the same thi
spoken to have all expressed the same f
a class of its own.
As a person not owning the receiver, you
above all the others. This is difficult to
when wandering over the crowded band,
selectivity can only really be appreciated by u
above reproach. JRC's manufacture and produ
to other items in the range are equally applied
other items referred to, only a small part of the
equipment, Marisat mobile terminal, Omega navi
sounder/fish finders, communication satellite eart
range of avionic beacons, radar and associated produ
of application of electronic and radio technology for l
You may be forgiven for associating such advanced tec
of operation, a piece of equipment that needs an opera
degree. However, this assumption is incorrect. The NRD5
the minimum of controls to ensure the operator really enjo
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 v
NRD515 has pass ban
600KHz to 1·6MH
To give real
keypa

assist with difficult band conditions the
he medium wave broadcast section to
ntrol to cope with crowded conditions.
troduced the NCM515 remote control
15 enables frequencies to be quickly
provided, two rates of frequency
MHz and finally the ability to add to
frequency step. Add the optional
unit and, as the other NRD515

.....	**£965.00** inc VAT
.....	**£264.00** inc VAT
.....	**£125.00** inc VAT
.....	**£34.50** inc VAT
.....	**£39.10** inc VAT
.....	**£64.00** inc VAT

The Directors and Staff of Lowe Electronics have pleasure in inviting you, your wife and family to their 1984 open day to be held on Saturday 18th August.

LOWE ELECTRONICS Access BARCLAYCARD VISA LOWE ELECTRONICS Access BARCLAYCARD VISA

EMPORIUM NEWS

Good Morning

What a month. The Company spent an enjoyable week at **Communications '84,** the venue, the NEC. Following **the successful Exhibition by the RSGB,** also at the NEC, I was a little apprehensive at the prospect of an even larger Exhibition. I need not have been, **all went well** and a good time was had by all. Many interesting discussions took place on the stand. I can hear you saying, **why were Lowe Electronics exhibiting at a major professional communications exhibition.** The reason is that we have recently been appointed UK distributors for the new range of Trio PMR equipment. Superb equipment it is too. Hand held and mobile, the rigs are extremely well made and of interest to the amateur. The die cast chassis construction, **no surprise to a Trio TW4000A owner** is a major feature of the new PMR mobiles. And to show the professional communicators the other side of the coin we took along the TS930S, R2000, R600 and the AR2001 amateur equipment.

The **TS930S, £1,950.00,** inc. VAT, carriage £6.00 attracted some attention as did the other receivers from Trio. The professionals were also surprised by the prices—pleasantly I might add. The AR2001 receiver covering 25 to 550MHz caused a stir and many leaflets were given out. The **R2000 is £436.75** inc. VAT, **the R600 £272.83** inc. VAT and the **AR2001 £345.00** inc. VAT, carriage on each item being £6.00, that's by Securicor.

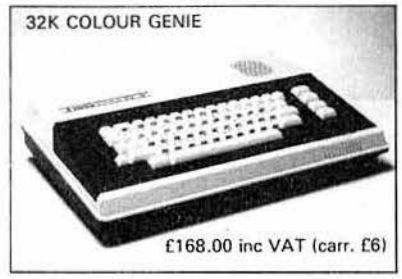
It is with great pleasure I can tell you that the **LONDON shop** and Andy, its manager are moving to **NEW premises.** The new location is **223/225 Field End Road, Eastcote.** As is usual with LOWE SHOPS, the new location is easy to find, DF is not required. We have taken over Eastcote tube station, well not exactly, we are in the buildings that form part of the station. Free street parking is available outside the shop and behind is a large car park (current cost for a day's parking 20p) which, when I have been in Eastcote, has been almost empty. The Pentonville Road branch closes on the 24th August, the new shop opens around the 13th September. The new shop telephone number of 01-429 3256.

LS202E

I am pleased to say that the LS202E SSB and FM hand portable transceiver is proving popular. Many new licensees want to get on 2 metres, both on SSB and FM. The rig costs **only £225,** inc. VAT, carriage £6.00 and comes as a basic rig. Not sold with batteries the amateur has a choice of dry cells, nicads or the special nicad packs NP6 at £26.90 and NP9 higher power pack at £36.94. Carriage cost on each item is £1.00. Two chargers are available—one for each nicad pack. References are CA910E for the NP6 and CA110E for the NP9. Both chargers cost £10.15 each, carriage being £1.50.

A date for your diary. Opposite is the invitation **to our 1984 Open Day.** For those who have been before we have the old favourites. A covered seating area is to be provided so that the **band music** may be enjoyed and friends may be met. Hopefully soft drinks will be sold. More space and tables are to be provided for **Mr Birkett and his bits** and **Practical Wireless** will also be in attendance. We have secured extra car parking space in the school below the office so there is no need to worry about coming by car. Also there are no car park charges!! **Strumech** will be with us and, of course, **a delegation from the RSGB** will **grace** the entrance. Conducted tours of the workshop will be as usual. For the family Matlock and its surroundings has a lot to offer. There are **parks, a zoo, riverside walks** and new since last year are the **cable cars** at Matlock Bath. I have yet to make my first contact whilst suspended over the Derwent River Valley but I am sure that someone soon will. The view from the **Heights of Abraham** is superb—it's also a better take off than the valley bottom. Those who came last time enjoyed themselves, one person even won the **free raffle.**

I have told you before of the **trials** and **laborious jobs** that I seem to get as advertising guy for the company. Again I have to report on a new rig from Trio . . . the new transceiver is called the **TS711E** and is a true base station rig for 2 metres. **25 watts** output on SSB, upper and lower, CW and FM. **The TS711E** has its own in-built power supply and is similar in size and style to the TS430S. Let me briefly tell you some of the features. You must appreciate that I have no handbook and after picking up the set at Manchester Airport yesterday have only used the rig one evening. Switched on just after 8.00 o'clock and switched off around 1.00 a.m. the following morning. **The TS711E** is, to use my favourite word, superb. It follows on from the highly regarded 700 series but with today's technology. **2 VFOS, 40 memory channels** which hold frequency and mode and, if required, shift information. The ability to take a frequency out of memory and put it in VFO. **Split frequency operation** and a button which puts both VFOs on the same frequency. How about this for convenience. There's a button on the mode part of the front panel marked **auto.** With this pushed and active, the rig, as you tune upwards from, 144MHz automatically selects the correct mode.



£168.00 inc VAT (carr. £6)

Of course the auto function can be overridden and **you too can transmit FM in the SSB part of the band.** For the **blind** a voice announcing the frequency is an optional extra. The switch to operate **"the voice"** shows Trio's attention to detail; it is located on the bottom left hand corner of the front panel, easy to find without catching other switches.

The rig also announces whether shift is engaged so I hear you ask, what about mode of operation? The **Trio TS711E** comes as standard with the following facility: when you press mode switch FM instead of a bleep the rig sounds quickly and quietly **the morse letter F,** press USB, the rig sound **U** CW; **C,** LSB; **L** and auto the letter **A.** In scan the transceiver will look at all 40 channels or search for frequencies by mode.

Finally, for the rig with everything what about an **in-built digital code squelch** accepting and storing ten different owner programmable codes. Included is a **call alert** which tells by a series of bleeps that you have been called. In today's crowded conditions a most useful feature and built in as part of the rig. Not only that, the TS711E can also be programmed to send your callsign in data form at the beginning and end of each transmission.

Anyway, that's about it for now. Must dash off home and get the **Trio TS711E** back on the air . . . . . .

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

David, 6861Y.

ICOM

FOR THE SWL...

IC-R70, £565.

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

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

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

IC-R71E, £649.

For those who like the easy life, the R71E has the option of an infra-red remote control unit, making it a very sophisticated rig indeed, here are some details.

100 KHz – 30 MHz all mode (with FM option). Quadruple conversion superhet. IF frequencies 70MHz,9MHz and 455KHz with continuous bandpass tuning and notch filter. Virtually immune from adjacent channel interference with 100db dynamic range. Adjustable AGC, noise blanker and switchable pre-amplifier. Direct keyboard into twin VFO's with 32 programmable memories. 5 year lithium memory backup cell. Memory and band scan with auto-stop. Tuning rates 10Hz, 50Hz and 1 KHz with 6 digit readout. AC mains operation. Auto squelch tape record function.

OPTIONS:- Synthesized voice readout, infra-red remote controller, 12 V DC kit, mobile mounting bracket, two CW filters 500 and 250 Hz, FM unit, computer interface, headphones.

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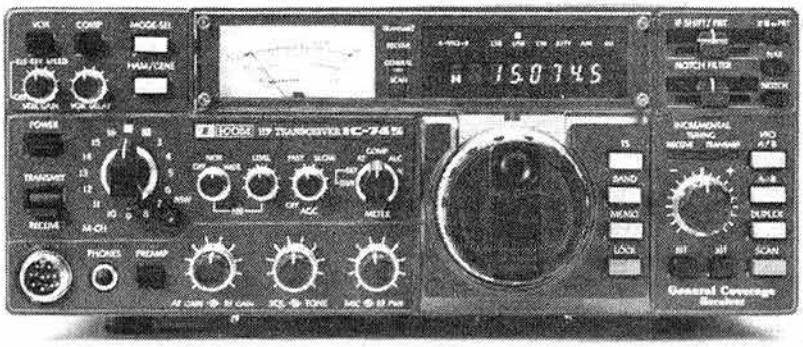
ICOM

FOR THE DX'er...

IC-745, £839.



ICOM's IC-745 is the all-in-one transceiver featuring an HF all band SSB, CW, RTTY, AM (receive only) ham transceiver, plus a general coverage receiver. Options for FM transceive and an internal power supply make the IC-745 the complete transceiver in an all-in-one package.

The receiver section features a 100KHz to 30MHz general coverage receiver, this allows access to all HF bands plus all the frequencies in between. The IC-745 has an adjustable AGC circuit and DFM (Direct Feed Mixer) giving a wide dynamic range of 103dB with an intercept point at + 18dBm. Exceptionally clean reception is achieved with a low noise PLL circuit and a 70MHz first IF.

The IC-745's features include IF shift, 16 programmable memories with lithium battery back-up, passband tuning, a noise blanker both wide and narrow, threshold level control, notch filter, receive audio tone control and an all mode squelch. Also available is a front end switchable receiver preamp providing 12dB gain. RIT has a ±1KHz range.

We could go on all day about the 745, get in touch with us and we will send you the full story.

IC-271H, £819.

The IC-271H is the most advanced 2 meter transceiver available today, it covers the spectrum from 144-146 MHz with FM, SSB, or CW using the most advanced 10Hz PLL system. The IC-271H is suitable for simplex, repeater operation, moonbouce or satellite work, and has features found on no other transceiver.

Some standard features include 32 tunable memories, a high visibility fluorescent display, RIT readout, scanning, 12V DC operation with optional AC power supply.

The 271H has a speech synthesizer that announces the displayed frequency, ideal for blind operators, this is an optional extra along with the SM6 desk microphone and 22 channel memory extension with scan facilities.

As you can see from this brief description the IC-271H, (and its 430-440MHz brother the IC-471H) are very versatile sets indeed. More detailed literature can be easily obtained from Thanet Electronics Limited.

ICOM

ON THE MOVE...

IC-27E, £319.

This must be the smallest, 2M, FM mobile available today, measuring only 38mm H x 144mm W x 177mm D. It has all the features that you probably require included in this microprocessor controlled unit. In addition, if you feel lonely and can't find anybody on the band, just press "speech" and the optional built in speech synthesizer will tell you the frequency you are tuned to. This is a boon to the blind operator or to those that tuck their rigs out of sight.

Brief features:- 25/1 Watt output, green LED readout, scanning (memories and programmable limit band scan), priority scan, programmable duplex splits, 25 and 5Khz tuning steps, 10 memory channels with lithium back up cell, normal and reverse repeater switch, dual VFO, internal speaker and optional speech synthesizer. Just ask for a leaflet and we'll be glad to send you one. Price £319 and £25 for the optional speech synthesizer.

IC-290D, £499.

290D is the state of the art 2 meter mobile, it has 5 memories and VFO's to store your favourite repeaters and a priority channel to check your most important frequency automatically. Programmable offsets are included for odd repeater splits, tuning is 5KHz or 1KHz.

The squelch on SSB silently scans for signals, while 2 VFO's with equalising capability mark your signal frequency with the touch of a button. Other features include: RIT, 1KHz or 100Hz tuning/CW sidetone, AGC slow or fast in SSB and CW, Noise blanker to suppress pulse type noises on SSB/CW.

You can scan the whole band between VFO's/scan memories and VFO's. Adjustable scan rate 144 to 146 MHz, remote tuning with optional IC-HM1 microphone. Digital frequency display, Hi/Low power switch. Optional Nicad battery system allows retention of memory. What a great little transceiver!

You can get what you want just by picking up the telephone. Our mail-order dept. offers you: free, same-day despatch whenever possible, instant credit, interest-free H.P., telephone Barclaycard and Access facility and a 24 hour answering service.

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ICOM FOR COMPUTERS

Tono 5000E, £799.

From the famous TONO stable comes the new THETA – 5000E now ready to send and receive AMTOR as well as CW, RTTY, and ASCII.

Features include:- 5" high resolution monitor displaying 400chr. x 16 lines x 2 pages, ARQ/FEC, time clock, Selcal (Selective calling), high speed RTTY demodulator – up to 300 bauds (600 baud using TTL level); 3 shifts (170,425 and 850 Hz) and two tones (2125 and 1275 Hz); manual or automatic Tx/Rx; Battery back-up memory (72 chars x 7 channels and 24 chars x 5 channels); type ahead correctable buffer memory; Morse code 5 – 100 wpm (variable weights) + autotrack on receive; CW practice feature with random generator; Automatic CR/LF with wrap around display; Automatic letters code insertion; Printer interface; Bargraph LED meter for tuning; TOR A, B and L – the list goes on and on..... Power requirements by the way are AC mains or 13.8v DC.

Tono 9100E, £699.

The famous TONO THETA 9000E has had AMTOR modes A, B and L added to its functions providing transmit and receive facilities with selective calling on AMTOR, RTTY (with 3 selective shifts and 2 tone pairs), CW with built in practice function and random generator, and ASCII with full Duplex facility. The 9000E requires an external VDU. The battery backed memory covers 256 characters x 7 channels with Channel 6 which is divided into 16 subsections of 16 characters each and Channel 7 into 8 subsections of 32 characters. Any of the subsections may be used individually and messages can be repeated 1 – 9 times from a keyboard command.

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

Please note that we now have a new retail branch at 95, Mortimer Street, Herne Bay, Kent. Give it a visit, BCNU.

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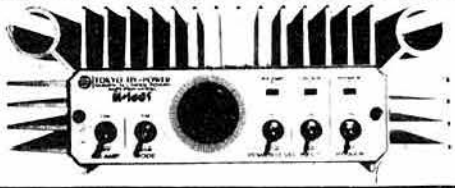


HL-160V VHF 160W linear £244·52 inc.

FEATURE: 160W output achieved with a pair of rugged MRF247 transistors. Drive requirement as low as 10W or 3W from hand-held. Selectable hi/lo output. Newly designed effective heat sink and high reliability one board construction.

SPECIFICATION: **Freq. Band:** 144-148MHZ (or 150-160MHZ), **Mode:** FM-SSB-CW, Supply **Voltage:** DC 13.8V neg. ground, 12-23A, **Output:** 160W, **RF Input:** 1-15W(or 0.5-3W), **Receive Pre-amp:** 12 dB gain with low-noise 2SK125 JFET, **In/Out Connectors:** SO-239 (50 ohm), **Built-in Circuitry:** COX, remote-control terminal, hi/lo output select, output power meter, reverse polarity protection, **Dimension:** 218W x82H x 299D(m/m), **Weight:** 3.5 kgs.

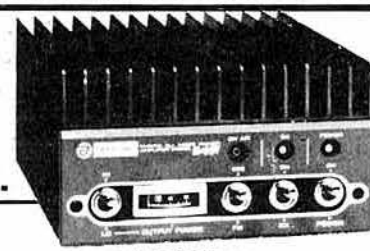
HL-82V VHF 85W linear

FEATURE: A compact 144MHZ band (or 154MHZ for commercial use) amp. with receive preamp and power output meter.

SPECIFICATION: **Freq. Band:** 144-148MHZ(or 150-160MHZ), **Mode:** FM-SSB-CW, **Supply Voltage:** DC 13.8V neg. ground, 13A max., **Output:** 35-85W, **RF Input:** 2-12W, **In/Out Connectors:** SO-239 (50 ohm), **Built-in Circuitry:** COX, remote control terminal, receive preamp (MOS FET 12dB gain), output power meter, output select (hi/lo), reverse polarity protection, **Dimension:** 152W x 92H x 217D (m/m), **Weight:** 1.8kgs.

£144·50 inc.

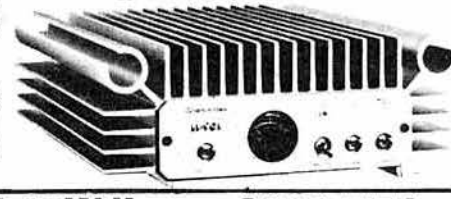
HL-160V25 25W input New model now in stock £209·73 inc.



HL-90U UHF 90W linear £263·59 inc.

FEATURE: 80W output achieved with a pair of rugged 2SC2783 transistors. Drive requirement as low as 10W. Selectable hi/lo output. Newly designed effective heat sink,and state of the art low-noise GaAs FET (3SK97) RX preamp.

SPECIFICATION: **Freq. Band:** 430-440MHZ, **Mode:** FM-SSB-CW, **Supply Voltage:** DC 13.8V neg. ground, 5-17A, **Output:** 80W, **RF Input:** 10W, **Receive Preamp:** 18 dB gain with low-noise 3SK 97 FET, **In/Out Connectors:** type N (50 ohm), **Built-in Circuitry:** COX, remote-control terminal, hi/lo output select, output power meter, reverse polarity protection, **Dimension:** 218W x 82H x 299D (m/m), **Weight:** 3.5 kgs.



HL-45U UHF 45W linear £152·77 inc.

FEATURE: A compact 430MHZ band linear amp with low-noise MOS FET receive preamp.

SPECIFICATION: **Freq. Band:** 430-440MHZ (or 450-465MHZ), **Mode:** FM-SSB-CW, **Supply Voltage:** DC 13.8V neg. ground, 5-7A, **Output:** 10-45W, **RF input:** 2-15W, **In/Out Connectors:** SO-239 (50 ohm), **Built-in Circuitry:** COX, receive preamp (12dB gain min.) reverse polarity protection, **Dimension:** 124W x 68H x 170D (m/m), **Weight:** 1.25 kgs.

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Carriage £4.00.

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Here's a very brief description of new products back in stock or just arriving. **DF-72C** 2m/70cm duplexer for mobile or base station £19.50: **DP-EL770E** dual band 2m/70cm aerial £19.95: **DP-GH72** 70cms 6dB base station aerial £35.75; **5 BAND DIPOLE**—the latest model from Sagant, the MT-240X covers the 5 bands 10-80m, superbly built 70' long complete with balun £54; **BASE STATION MICS**—the new Adonis base mics feature 2 models—AM303G with up-down and response switch £36.50 and the beautiful AM503G noise cancelling plus compressor £47.50: **MOBILE MICS.**—the new Adonis FS-3 is a deluxe mobile mic. that fits sun vizor roof mount—comprises boom mic, roof speaker and control box with up-down control £52: **ICOM OWNERS**—modern ICOM rigs only work with ICOM mics.—Adonis have come up with an 8 pin mic. adaptor plug that matches any mic. to your ICOM rig £10.95; **AR2001**—superb monitor receiver 26-512mHz £325: **BELCOM LS202E**—at last an all-mode 2m hand held £225. **ARRL HANDBOOK 1984**—£12.50: **AARL ANTENNA BOOK**—£7.95; **UNIVERSAL MAG MOUNT**—SO239 £7.95.

ROTATOR OFFER
AR200XL
£39.95

Carriage £2.50

Ideal for VHF arrays 3 core cable control box 2" mast clamps etc.

MAIL ORDER SLIP

To:—Waters & Stanton 18-20 Main Road, Hockley, Essex.

Name .....

Address .....

Items required .....

.....

Carriage:—Items under £10-£1.00; Over £10-£1.50; Larger aerials £4; Rigs £3; Securicor £6.

Communications Ltd.

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

AUTHORISED YAESU

'YAESU' FOR HF EQUIPMENT—'SMC' AT YOUR SERVICE

FT-ONE 'THE ULTIMATE'

FT ONE	Transceiver HF All Mode	£1569.00
KEYT901	Curtis Keyer	£28.50
DCT1	DC Power Cable	£10.85
RAMT1	Non volatile memory	£14.49
FMUT1	FM unit	£44.99

XF8·9K* Filter 300Hz or 600Hz or 6kHz. Each £19.35

FT77 THE IDEAL MOBILE

100W PEP
8 Band HF
SSB/CW/FM AM
£479!

SUPERB SIMPLICITY

FT77	8 Band Rx/Tx 100W output	£479.00
FT77S	8 Band Rx/Tx 10W output	£449.00
FP700	Matching AC PSU	£145.00
FC700	Matching antenna tuner	£103.85
FV700DM	Digital VFO unit	£209.00
MKT77	Marker unit	£10.85
FMUT77	FM unit	£28.55
AMUT77	AM unit	£24..00

FT102 THE "WORK HORSE" BASE

FT102	Transceiver 9 band	£719.00
SP102	External speaker	£55.50
FC102	Antenna coupler	£185.00
AMFMUT102	AM/FM unit option	£49.00

S* UPER VALUE—VALVE FINALS

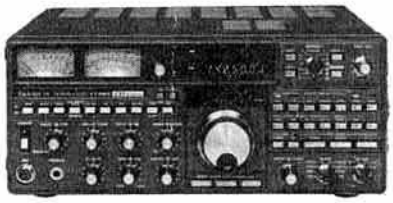
FT757GX THE BIGGEST SELLER

Every item normally sold as an extra is provided as standard, including AM and FM modes, a 600Hz narrow CW filter, iambic keyer with dot-dash memory, 25KHz marker generator, IF shift and width filters, effective noise blanker and AF speech processor . . . . all at no extra charge.

SUBSTANTIVE SUPERIORITY

FT757GX	Transceiver General Coverage Rx	£719.00
FC757AT	Automatic antenna tuner	£254.00
FP757GX	Switch mode PSU (50pc duty)	£145.00
FP757HD	Heavy duty PSU (100pc duty)	£179.00
FIF80	Computer interface for PC8001 NEC	£105.00
FIF65	Computer interface for Apple II	£54.00
FIF232C	Computer interface RS232C	£59.00

FT980 "COMPUTER COMPATIBLE"



FT980	Transceiver General Coverage Rx	£1329.00
SP980	Ext. speaker with audio filter	£61.55
XF455.8MCN	300Hz CW filter (455KHz 8 pole)	£49.00
XF8.9HC	600Hz CW filter	£29.50
XF8.9GA	6kHz AM filter	£29.50
FIF**	Computer interface (see FT757GX units)	
D410004	Interconnect lead FT980-FC757AT	£26.99
TST980	Technical Supplement FT980	£8.50

FRG7700 COMMUNICATIONS RX

FRG7700	Receiver 0.15-30MHz AM/CW/SSB/FM	£385.00
FRG7700M	Receiver c/w 12 channel memory	£455.00
MEMG7700	Memory option	£75.00
FRT7700	Antenna tuner/switch	£48.25
FRA7700	Active antenna	£43.95
FF5	Low pass filter 500kHz	£11.25
FRV7700	VHF Convertors, 8 models, each 3 bands	From £85-£95 each

AUTHORISED YAESU **REMEMBER**

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

BARCLAYCARD VISA

SOUTHAMPTON
SMC Ltd
36/38 Rumbridge Street,
Totton, Southampton
Southampton (0703) 867333
9-5.30 Mon-Sat

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

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

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

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

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

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

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

BARGAIN LIST

HF TRANSCEIVERS (AND ACCESSORIES)

FT77	S/S	100W 10-80M (Warc) }	
FP700	S/S	20A P.S.U. }	£525.00
FT-ONE	S/S	100W, 150KHz-30MHz	£1,449.00
FT980	S/S	100W, 150KHz-30MHz (Rx)	£1,199.00
FT102	S/S	100W, 160Mtrs-10Mtrs	£669.00
FT901DE	NEW	6 Band 100 Watt	£679.00
FT757	S/S	100W Tx/Rx 150KHz-30MHz	£650.00
FT102	S/S	100 + W 160Mtrs-10Mtrs	£650.00
FT980	S/S	100W 150KHz-30MHz (Rx)	£1100.00
FT707	S/S	100W 80Mtrs-10Mtrs	£350.00
FT707FM	S/S	100W 80Mtrs-10Mtrs inc FM	£375.00
FT101ZD	S/S	100W 160Mtrs-10Mtrs	£450

VHF TRANSCEIVERS (AND ACCESSORIES)

FTC740A	S/H	4M FM Mobile 12 Ch 40W	£175.00
MMT70/144	S/H	Transverter 4M to 2M	£79.00
MMT144/28	S/H	Transverter 2M to 10M	£79.00
MMT432/28	S/H	Transverter 10M to 70cm	£109.00
MMT432/28S	S/H	Transverter 10M to 70cm	£129.00
NC7	S/H	Base Charger '208 etc	£25.00
NAG144XL	S/S	2M 10W in 200W + out	£465.00
FT227RB	S/H	10W 2M FM Synth (c/w scanner	£179.00
FT290R	S/S	25W 2M Multimode	£249.00
KDK2030	S/S	25W 2M FM Synthesised	£165.00
FT726R	S/H	c/w 70cm board, duplex unit, mic	£900.00

RECEIVERS (AND ACCESSORIES)

FRG7700	S/H	150KHz-30MHz Dig	£259.00
DX-200	S/H	Gen. Coverage	£129.00
FRV7700E	S/H	Convertor, 3 bands	£49.00
FRV7700D	S/H	Convertor, 3 bands	£49.00

MISCELLANEOUS

SP4	S/S	RF Speech Processor	£59.00
PC1	S/S	Datong 2 mtr to Gen. Cov	£79.00
444	S/S	Desk Microphone, Shure	£29.00
1210	S/H	12VDC PSU 10A Zetagi	£55.00
12-04-06	S/S	12VDC (Mains) PSU 4A	£13.00
SUPER 6	NEW	Calscope Oscilloscope	£179.00

KEY: S/S—Shop soiled 12 month Warranty. Ex demo.
S/H—Second Hand 3 month Warranty.
A/S—As seen nil Warranty.
inc VAT—Carriage Paid (UK) Mainland

PUBLICATIONS

	£	P/P
I.P.C. (PRACTICAL WIRELESS)		
Out of Thin Air	1.25	0.75
Passport to Amateur Radio	1.50	0.75
Wires and Waves	3.00	0.90
Are the Voltages Correct	1.00	0.50
Introducing R.T.T.Y.	1.50	0.50
R.S.G.B.		
Teleprinter Handbook	11.65	1.35
Radio Communications Handbook	8.95	2.05
Test Equipment (Radio Amateurs)	4.70	1.30
Amateur Radio Techniques	4.75	1.35
HF Antennas for all Locations	4.75	1.35
Guide to Amateur Radio (Soft)	2.75	0.75
Radio Amateur Operators Manual	4.25	0.75
1983 Call Book (UK)	2.10	0.80
1984 Call Book (UK)	5.00	0.80
R.A.E. Manual (10th Edition)	2.75	0.75
T.V.I. Manual	1.50	0.50
Morse Code for Radio Amateurs	1.00	0.50
VHF/UHF Manual (3rd Edition)	4.25	2.00
VHF/UHF Manual (4th Edition)	8.50	2.00
Prefix Map	2.25	1.20
Great Circle Map	1.50	1.20
Amateur Radio Logbook	2.30	1.25
S.M.C.		
Countries List	0.35	1.20
O.R.A. Map (Special Coating)	1.50 }	1.20
Transparent Overlay 50Km Rings	1.00 }	
TAB BOOKS		
Hidden Limited Space Antennas	6.95	0.75
Complete Handbook (Transmitters)	6.95	0.75
Secrets of Ham Radio D.X.ing	5.60	0.75
Complete S.W.L. Handbook	9.95	0.85
S.W.L. Antenna Handbook	8.45	0.75
Guide to Scanners and Monitors	6.95	0.85
Radio Communications Receivers	11.75	0.90
Secret Shortwave Spectrum	6.50	0.75
UNIVERSAL ELECTRONICS INC.		
Clandestine Confidential S.W.	6.35	0.85
World Press Frequencies (RTTY)	6.35	0.85
RTTY Today, Modern Guide	6.35	0.85
MISCELLANEOUS PUBLISHERS		
Amateur Radio (Stokes/Budd)	8.95	1.30
Log Book (Jaybeam)	2.30	1.25
Log Book (Yaesu)	TBA	

Prices include V.A.T. at 15% (where applicable)
Postage extra. U.K. and B.F.P.O. rates for one-off items only shown.
N.B. For larger orders (any mix) p/p may be much lower than sum of individual charges.

JAY BEAM

			p/p
4 METRES			
4Y/4M	Yagi 4 element	7dBd	£29.90 £2.65
PMH2/4M	Phasing harness 2 way		£16.10 £1.65
2 METRES			
H0/2M	Halo head only	0dBd	£5.98 £1.50
HM/2M	Halo with 24" mast	0dBd	£6.55 £1.65
C5/2M	Colinear omni vert	4·8dBd	£54.62 £2.65
LW5/2M	Yagi 5 element	7·8dBd	£14.37 £2.65
LW8/2M	Yagi 8 element	9·5dBd	£17.82 £2.65
LW10/2M	Yagi 10 element	10·5dBd	£24.15 £2.65
LW16/2M	Yagi 16 element	13·4dBd	£35.07 £3.65
14Y/2M	Yagi 14 element	12·8dBd	£36.23 £3.65
PBM10/2M	10 ele Parabeam	11·7dBd	£44.85 £3.65
PBM14/2M	14 ele Parabeam	13·7dBd	£55.77 £3.65
Q4/2M	Quad 4 element	9·4dBd	£29.32 £2.65
Q6/2M	Quad 6 element	10·9dBd	£39.10 £2.65
Q8/2M	Quad 8 element	11·9dBd	£44.85 £2.65
D5/2M	Yagi 5 over 5 slot	10dBd	£25.30 £2.65
D8/2M	Yagi 8 over 8 slot	11·1dBd	£34.50 £2.65
5XY/2M	Yagi 5 ele crossed	7·8dBd	£28.17 £2.65
8XY/2M	Yagi 8 ele crossed	9·5dBd	£35.65 £2.65
10XY/2M	Yagi 10 ele crossed	10·8dBd	£46.00 £2.65
PMH2/C	Harness cir polarisation		£9.77 £1.65
PMH2/2M	Harness 2 way 144MHz		£12.65 £1.65
PMH4/2M	Harness 4 way 144MHz		£28.75 £1.65
70cm			
C8/70	Colinear Vertical	6·1dBd	£62.10 £2.65
D8/70	Yagi 8 over 8 slot	12·3dBd	£25.87 £2.65
PBM18/70	18 ele Parabeam	13·5dBd	£32.30 £2.65
PBM24/70	24 ele Parabeam	15·1dBd	£42.55 £2.65
LW24/70	Yagi 24 element	14·8dBd	£27.02 £2.65
MBM28/70	28 ele Multibeam	11·5dBd	£21.27 £2.65
MBM48/70	48 ele Multibeam	14·0dBd	£35.65 £2.65
MBM88/70	88 ele Multibeam	16·3dBd	£48.87 £2.65
8XY/70	Yagi 8 ele crossed	10dBd	£42.55 £2.65
12XY/70	Yagi 12 ele crossed	12dBd	£52.90 £2.65
PMH2/70	Harness 2 way		£10.35 £1.85
PMH4/70	Harness 4 way		£22.42 £1.85
23cm			
CR2/23CM	Corner reflector	13·5dBd	£40.25 £2.65
PMH2/23CM	Harness 2 way		£31.05 £1.65

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

10M FM CORNER

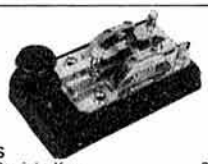
Join the many others who have found that operating 10M FM can be a pleasant alternative to the crowded 2M band. The SMC Oscar 2 10M gives you 40 channels, channel 1 being 29.310 MHz and channel 40 29.7 MHz, a power o/p of approximately 4 watts and a receive sensitivity of better than 0.3μV for 12db sinad. Also for your enjoyment when the band opens up, we have incorporated a — 100kHz repeater shift (by using the original panel Hi/Low power switch).

OSCAR 2 10M FM **£49.00 inc**

ACCESSORIES		INC	P/P
RSL28b	10M Mobile element (Yaesu)	10.65	2.65
SMC10SE	10M Mobile element (S.M.C.)	14.75	2.65
SMCGCCA	Gutter clip c/w 4 mtr cable	10.95	1.90
SMCTMCAS	Trunk mount c/w 4 mtr cable	9.95	1.90
HDTMCA	HD trunk mount c/w 5m cable	15.40	2.00
SMCSOWM	Adjustable wing mount	4.85	1.00
SMCSOCA	4m Cable assembly to SO239M	5.65	1.50
SMCSOCAL	6m Cable assembly to SO239M	5.95	1.50
SO-CALLR	As SMCSOCAL but long reach	T.B.A.	
SMCSM	Snap mount	T.B.A.	
SMCGCD	Gutter clip only. Deluxe	5.30	1.50
MX913/M	Dust cover, metric	0.46	0.56
SMCGP27	¼ λ vertical with radials	24.15	2.65
SMCVA27	½ λ vertical no radials	20.70	2.65
PA-10L/25	Linear 25W for 4W in (AKD)	25.00	1.30
SMCT3170L	Twin meter SWR bridge	16.50	FOC
SMC 53-30L	Mini SWR	8.80	FOC
WD202	FM Deviation/SWR/Power	13.50	FOC
SMC100LP30	Low pass filter	6.30	FOC
12-04-06	4 amp DC power unit	14.95	2.35
SP55	Extension L/S	16.00	FOC

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

MORSE EQUIPMENT



MORSE KEYS			
HK703	Straight Key	£28.00	£1.20
HK704	Straight Key	£19.25	£1.20
HK706	Straight Key	£15.90	£1.00
HK707	Straight Key	£15.00	£1.00
HK710	Straight Key	£39.70	£1.75
HK808	Straight Key	£49.70	£1.75
HK711	Key Mounting	£32.15	£1.50
BK100	Mechanical Bug	£24.25	£1.75
MK701	Single Lever Paddle	£27.50	£1.60
MK702	Single Lever Paddle	£28.85	£1.60
MK703	Squeeze Key	£28.30	£1.75
MK705	Squeeze Key	£24.65	£1.75
MK706	Squeeze Key	£21.25	£1.75
IKP60	Iambic	£9.95	FOC
HK802	de Luxe Brass Key	£85.85	£2.00
HK803	de Luxe Brass Key	£78.95	£2.00
HK804	de Luxe Brass Key	£74.25	£2.00
MHK831	Super de Luxe squeeze & straight key	£189.00	£3.00

MORSE EQUIPMENT			
KP100	Squeeze 230AC/13·8V	£77.05	£2.00
KP200	Memory 4096 Multi Ch Mem Back Up 230/13·8V	£165.62	£2.50
D70	Morse Tutor (Datong)	£56.35	FOC
MMS1	Morse Tutor (M/M)	£115.00	FOC
MMS2	Morse Tutor Advanced	£155.00	FOC

MICROWAVE MODULES—RRTY EQUIPMENT			
MM2001	RTTY to Video	£189.00	FOC
MM4001	RTTY Transceiver		FOC
MM4001KB	RTTY Tx/Rx c/w keybd	£299.00	FOC
MM1001KB	Morse Keyboard	£135.00	FOC
MM1000KB	ASCII CW conv cw keybd	£135.00	FOC

PRICES INCLUDE VAT at 15%
Carriage as shown

ROTATORS

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

FU200	Thro'	3 Core	Light Duty	£49.95
KR250	Bell	6 Core	Lighter Duty	£54.91
9502B	Offset	3 Core	Lighter Duty	£57.50
AR40	Bell	5 Core	Medium Duty	£98.90
KR400	Bell	6 Core	Matches KR500	£99.95
KR500	Thro	6 Core	Elevation	£126.50
AR50	Bell	5 Core	5 Position (AR40)	£113.85
KR400RC	Bell	6 Core	Medium Duty	£118.45
CD45	Bell	8 Core	Heavy Duty	£149.50
KR600RC	Bell	8 Core	Heavy Duty	£167.90
HAM IV	Bell	8 Core	Heavier Duty	£264.50
KR2000RC	Bell	8 Core	Heavier Duty	£333.50
T2X	Bell	8 Core	Very Heavy Duty	£332.35
H300	Bell	8 Core	Digital Readout	£546.25

Control Cable

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

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

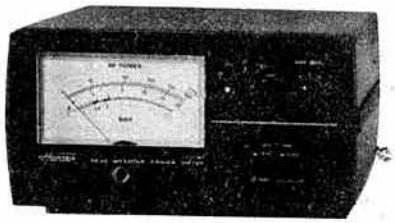
Head office
Mail orders
Service & Spares

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

POWER METERS

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

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



FS-500H

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

T3-170L

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

SMC-HS

HF, VHF, UHF ANTENNAS MOBILE VERTICALS

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

SMC 78F

GCD

SMC258

GCD

SMC-HS MOBILE PORTABLE ANTENNAS		£	P&P
SMC6P2T/PL	Telescopic 2M PL259 fitting ¼λ	5.75	0.85
SMCT144h	Telescopic 2M ¼ wave BNC	9.20	0.85
SMC6P2T/BNC	Telescopic 2M BNC fitting ¼λ	5.75	0.85
SMC2H/PL	Helical 2M PL259 fitting	5.75	0.85
SMC2H/BNC	Helical 2M BNC fitting	5.75	0.85
SMCHS430	70cm ¼ BNC fitting 2.5dB¼	7.30	0.65
SMC2QW	2M ¼ wave 0dB¼ 1.6'	2.53	1.85
SMC2NE	2M ½ wave fold 3.0dB¼ 4.3'	7.30	2.00
SMC2VF	2M ½ wave fold 3.0dB¼ 3.5'	12.65	2.00
SMC78F	2M ⅝ wave fold 4.5dB¼ 5.7'	14.95	2.50
SMC78B	2M ⅝ wave ball 4.5dB¼ 5.6'	14.95	2.59
SMC78SF	2M ⅝ wave short 4.7'	14.95	2.50
SMC88F	2M 8/8 wave 5.2dB¼ 6.5'	20.70	2.50
SMC118M	Colinear 2M 11/8 7dB¼ 9.7'	33.35	2.65
SMC25B	70cm 2 × ⅝ fold 5.5dB¼ 3.1'	13.80	2.00
SMC358	70cm 3 × ⅝ 6.3dB¼ 4.7'	18.40	2.00
SMC70N2M	Dual band 2M 2.7dB¼ 70cm 5.1dB¼ (½λ & 2⅝λ)	18.40	2.00
SMCHS770	144/432 Duplexer 50W	16.50	1.85
SMC20SE	20M 1.72M 100W PEP	19.15	2.50
SMC15SE	15M 1.72M 130W PEP	15.70	2.50
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SMC17SE	17M 1.915M 200W PEP	17.25	2.50
SMC12SE	12M 1.915M 200W PEP	15.35	2.50
RSL-28b	Yaesu 10M mobile whip	10.65	2.00
SMCGCCA	Gutter clip 4 mtrs cable	10.35	2.00
SMCSOCA	Cable assembly 4M	5.35	1.50
SMCSOCAL	Cable assembly 6M	5.75	1.50
SMCTMCAS	Trunk mount c/w 6M cable	9.20	2.00
SMCSOMM	Magnetic base c/w 4M cable	10.75	2.00
SMCSOWM	Adjustable wing mount base	4.60	0.90
SMCGCD	Gutter clip deluxe	5.00	1.50
SMCBSD	Bumper strap deluxe	9.60	1.50
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HS770

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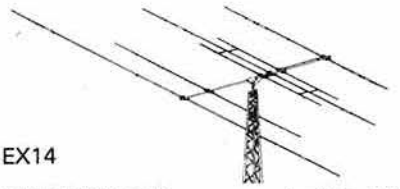

EX14

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

TB3

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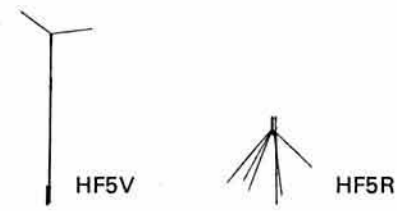
105BA	5 Ele Yagi 10m	£155.00	£3.95
153BA	3 Eli Yagi 15m	£95.00	£3.50
155BA	5 Ele Yagi 15m	£239.00	£5.90
203BA	3 Ele Yagi 20m	£179.00	£4.90
204BA	4 Ele Yagi 20m	£289.00	£7.30
205BA	5 Ele Yagi 20m	£399.00	£9.40
402BA	2 Ele Yagi 40m	£249.00	£6.50
18TD	Dipole Tape 10-80m		



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SMCTD/HP	High Power 10-80m	£45.00	£2.65
SMC TD/P	Portable inc coax	£65.55	£2.65
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Extra coils	For above to 160m	£6.90	£1.00
Flexiten	2, 10, 12, 17, 15, 20, 30, 40, 80M	£49.00	£2.35
Bases	For above	£6.10	£1.00

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RADIO SOCIETY OF GREAT BRITAIN

THE NATIONAL SOCIETY REPRESENTING ALL UK RADIO AMATEURS

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

PATRON: HRH PRINCE PHILIP, DUKE OF EDINBURGH, KG

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

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

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Region 9	*(Cornwall, Devon)*	*(To be announced)*
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Region 11	*(Clwyd, Gwynedd)*	B. H. Green, GW2FLZ. Tel 0492 49288.
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Region 13	*(Borders, Fife, Lothian)*	*(To be announced)*
Region 14	*(Central, Dumfries and Galloway, Strathclyde)*	T. G. Wylie, GM4FDM. Tel 0505 22749.
Region 15	*(Northern Ireland)*	J. T. Barnes, GI3USS. Tel 0247 3948.
Region 16	*(Essex, Norfolk, Suffolk)*	*(To be announced)*
Region 17	*(Isle of Wight, Channel Islands, Dorset, Hampshire, Wiltshire)*	T. M. Emery, G3KWU.
Region 18	*(Cleveland, Durham, Northumberland, Tyne & Wear)*	*(Post vacant)*
Region 19	*(Greater London N of Thames, Hertfordshire)*	*(To be announced)*
Region 20	*(Avon, Gloucester, Somerset)*	*(To be announced)*

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VHF manager: K. A. M. Fisher, G3WSN

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

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

RSGB QSL BUREAU

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

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

RSGB NEWS SERVICES

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

GB2RS Broadcasts
Sunday news broadcasts from stations throughout the UK using the callsign GB2RS on frequencies in the 3·5, 7 and 144MHz bands. Details of frequencies, locations and times were last published in the July 1984 *RSGB News Bulletin*.

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

EDITORIAL

THE ELECTION OF COUNCIL MEMBERS

This issue contains the call for nominations for the election of Council members to replace those who have either come to the end of their term of office or who have resigned. It hardly needs pointing out that the final responsibility for the effective running of the Society lies fairly and squarely with its elected Council. This obligation is imposed by the members who elect the Council, and it is also a legal duty under the Companies Acts.

A most relevant question to ask is: what sort of person does the Society need on its Council? Perhaps the easy answer is to describe the sort of person we do not need! This is somebody who has little direct experience of the Society (or a similar body) but who nevertheless believes that s/he is the much-needed new blood which will sort out all the problems of the RSGB at a stroke. What this naive view fails to recognize is that those already heavily involved in Society activities are painfully aware of the multitudinous practical problems which exist. What tends to be greatly underestimated is the sheer complexity of an institution such as the RSGB and all the constraints under which it has to operate. Of course, given unlimited skilled management, unlimited administrative and technical effort (both professional and volunteer), together with infinite financial resources, then most of the problems would be rather easier to solve. The real world is far from this ideal.

The primary function of Council is to monitor the whole of amateur radio and its relationship with the outside world, and to formulate policies which are necessary to safeguard its future. In other words, it must decide what needs to be done and make sure that it is done. Council can take action either directly through the efforts of individual members or working groups of its members, or, as is more usual, by interacting with the existing organization. It follows that any Council member wishing to make an effective contribution must be able to do two things. First, s/he must be able to fully brief her/himself on the specific topics in which s/he chooses to be involved, in order to gain a true appreciation of the problem to be solved. This requires many attributes, among which must be sheer skill, experience, patience, and the time available to devote to such work. Second, s/he must recognize that any changes made inevitably involve trade-offs: if s/he is honest in decision-making, then as much effort must be devoted to the counter-arguments against a change as to the arguments for it. To do this properly, s/he must be prepared to consider the likely impact of a change on all the other aspects of the Society; again, something that requires skill, experience, patience and time.

Obviously, Council members cannot be masters of all aspects of amateur radio. What the RSGB therefore seeks are people who are capable of forming an overview of amateur radio—with a good sense of vision of the future—and who also have relevant specialist knowledge or skills. In an ideal Council, the individual specialist skills would, of course, complement each other to provide a comprehensive source of expert knowledge.

The work of the central administration of the Society, represented by Council, its committees and its professional staff, can be divided into two. First, the essentially pure management of a business having a turnover of about £1m per annum, in which the problems do not necessarily involve amateur radio directly but are similar to those of any other businesses irrespective of the field of interest. Second, there is the organization of amateur radio itself. Obviously, sufficient expertise should be available to cover both aspects.

Unfortunately, it is an inevitable weakness of our type of organization that candidates will be elected primarily because of their amateur radio background, and not necessarily because of their wider experience which would enable them to interact with outside bodies and the Society's professional staff in the most positive way. It must be the responsibility of those who stand for Council, those who nominate candidates for Council, and those members who vote in Council elections, to bear all these considerations in mind during the election process.

D. A. Evans, G3OUF

Amateur Radio News

The future for Bands 1 and 3

The Green Paper on the future of Bands 1 and 3 has now been published ("Bands 1 and 3: A Consultative Document", Cmnd.9241, HMSO, £4.15). As is well known, these bands will cease to used for the 405-line monochrome television service from the end of 1984 and, in the words of the DTI's press release, "this . . . will create one of the largest single additions to the spectrum available for mobile radio in Great Britain". The Green Paper concentrates largely on Band 3 (ie 174-225MHz) since this is more attractive for conventional mobile radio services. It is stated that "It will be some time before an assessment can be made of the amount of spectrum available in Band 1. It can, however, be assumed that dual-frequency channels for land mobile use will be available and other low power services could be accommodated. Propagation characteristics in Band 1 differ somewhat from those in Band 3. Band 1 is likely to be more suitable for systems needing greater coverage: on the other hand the services may need to be restricted to low power to avoid interference to foreign broadcasting services. In addition certain channels in Band 1 will be more vulnerable to long range interference from a variety of foreign services than in Band 3 and this may restrict the number of dual frequency channels available in the band".

From the point of view of the radio amateur, the most pertinent part of the Green Paper is Section 68 in Part 5. This part deals with Band 1, and the relevant paragraph states:

"In practice the band that will be available to civil users will run from 47 to 68MHz. The band is already used between 47·45 and 47·55MHz by cordless telephone apparatus, and this use will persist after the 405-line television services close down. There are also certain broadcasting ancillary services currently operating within the band. In addition, a limited number of amateur radio operators have been permitted to carry out restricted transmissions within 50-52MHz under the authority of a special licence. The interim Merriman report recommended that, subject to the detailed planning of Band 1, the radio amateur service should be given an allocation in the 50-54MHz band. The size and location of any allocation to the amateur service will depend in large part upon the demands from other users for the band, but it seems probable that an allocation within 50-52MHz would be made. (It would be possible for any initial allocation to be larger than the long-term allocation to the radio amateurs given that the use of Band 1 would probably develop over a period)."

As is well known to radio amateurs, this part of the spectrum is notable for various forms of anomalous propagation, and it is obvious that frequencies around 50MHz would not be suitable for conventional private mobile radio applications. For this and other reasons the Society continues to be optimistic about the possibilities of a 50MHz allocation for UK radio amateurs. A reply to some points in the Green Paper has already been produced by the Society.

On the same subject, the new 50MHz beacon GB3NHQ at headquarters was commissioned on 31 May 1984 and has been air-tested for two authorized 5min periods. The beacon may be operational by the time this item is read: it is on 50·05MHz and sends its callsign and "Maidenhead" locator IO91QV.

QSL Bureau changes

QSL Bureau sub-managers for GU callsigns and the G4AAA-AZZ series have changed. The sub-manager for the GU prefix is now Mr S. T. Henry, GU4GNS, "The Hermitage", L'Ancresse, Vale, Guernsey; the sub-manager for the series G4AAA-AZZ is now Mr M. Cuckoo, G6ECM, 15 Fairoaks, Herne Bay, Kent CT6 6EU.

RAE Certificate

In order to avoid confusion with the Amateur Radio Certificate issued by the Secretary of State for Trade & Industry, the City & Guilds of London Institute has agreed to change the name of the award for the RAE to the "Radio Amateur's Examination Certificate" with immediate effect. It was previously known as the Radio Amateur's Certificate and this caused some misunderstanding in relation to the people permitted to operate an amateur radio station. Under Clause 1 (2) (c) of the licence (see also *Rad Com* June 1984, p470), people holding an Amateur Radio Certificate issued by the Secretary of State may operate a station in the presence of, and under the direct supervision of, the licensee. This certificate is issued with an Amateur Radio Licence A to people who have passed both the RAE and the morse test. The RAE pass slip will continue to be accepted by the Post Office with applications for a licence.

Survey forms reminder

The Society has been asked by the Department of Trade & Industry to remind all licensed radio amateurs who have received a document which requests them to fill in their personal details for the computerization of the amateur radio licence records, to return them to the Post Office as soon as possible. This exercise is intended to provide up-to-date and accurate details of all amateur licence records, and there is a risk that the computerization may be delayed if significant numbers fail to return the input document. If any licensed radio amateur has not yet received one of the Post Office survey forms from Chesterfield he is requested to contact the Amateur Radio Licensing Unit as a matter of urgency: the telephone number is Chesterfield (0246) 207555.

Technical articles addenda

The author of "Universal crystal oscillators", W6HPH, *Rad Com* May 1984, p397-9, advises that (a) L1 is 13 turns No16, 0·4in id, 1in long, airwound, tapped 4·5 turns from collector end; and (b) L2 is 1·7in No22 bare wire connecting S1A to stator of the tuning capacitor.

G2BKO, author of "A Droitwich-locked frequency reference for carrier frequencies of 200 and 198kHz", *Rad Com* June 1984, pp 487-9, advises that the TBA120 can be replaced by the TBA120B, obtainable from Bi-Pak, but the TBA120S cannot be used. The 74C14 can be replaced by the 40106.

The TBA120B is a quad in-line device but the outstanding pins can be straightened and rebent to return it to the dual in-line formation.

Area representatives

Nominations for the area representatives listed below were received after the closing date for the July election, and they should be added to the list of area representatives nominated to serve for the period July 1984-June 1987 published in *Radio Communication* June 1984, page 473.

North Cheshire	G. L. Adams, G3LEQ
Leyland & district	F. Harrison, G3XII
South & West Cumbria	E. A. Thorne, G3ART
Preston	G. Lancefield, G3DWQ
Greater Manchester (north-east)	A. B. Langfield, G3IOA
Isle of Man	R. J. B. Morgan, GD3KGC
Greater Manchester (south and west)	C. Barham, G4MYB
Hull	S. A. Berry, G4IWR
Mansfield	D. H. Lander, G4LQL
Derby & district	Mrs J. Shardlow, G4EYM
West Kent	J. C. Greenhow, G3PEY
Horsham, Crawley and Mid-Sussex	J. Brooker, G3JMB
Swale	B. Hancock, G4NPM
Medway towns	A. D. Ralph, G8XLH
Maidstone & district	G. D. Edy, G4AXD
Worthing & district	S. G. Williams, G3LQI
North Devon	H. G. Hughes, G4CG
Dwyfor	P. E. W. Allely, GW3KJW
Forfar & district	J. Robb, GM8YIL
Fort William & district	N. Baird, GM4JNB
Lothians	J. McVicar, GM8GEC
Stirling, Falkirk & Cumbernauld	G. L. Leishman, GM4MCB
County Down	H. M. Irvine, GI3TLT
Braintree & district	C. W. Weller, G4ONH
Colchester	F. R. Howe, G3FIJ
Salisbury	A. C. A. Newman, G2FIX
Jersey	A. D. Morrissey, GJ3YLI
Portsmouth	M. A. Lawrence, G4JXO
Watford	P. J. Marcham, G3YXZ
St Albans & district	B. Pickford, G4DUS

USA news

In an order released on 18 April 1984, the FCC dismissed three "Petitions for Rulemaking" related to the 1·8MHz band. One petition filed in January had requested that all frequency and power restrictions be removed from the segment 1,900-2,000kHz on the grounds that Canada no longer operated a Loran-A system in that part of the band: the petition further requested that the sub-band 1,800-1,875kHz be designated for exclusive radiotelegraphy. The American Radio Relay League filed a

petition in February which also requested elimination of the frequency and power restrictions between 1,900-2,000kHz in the light of the cessation of Loran-A operations from Canada, and another petition had requested the designation of the sub-band 1,800-1,825kHz exclusively for radiotelegraphy.

The FCC stated that the two requests for deletion of the frequency and power restrictions were moot, since it had already removed the geographical limitations on power in the 1,900-2,000kHz segment of the 1·8MHz band. The FCC formally removed the limits on 22 March 1984 in response to the ARRL request and promulgated the fact in an Order dated 27 March 1984.

The ARRL has asked the FCC to allow amateurs the use of 24·89-24·99MHz and 902-928MHz—the latter band forms a secondary allocation to the amateur service in Region 2 which was made at WARC 79. Discussions between the ARRL and the FCC appear to have indicated that sufficient reaccommodation of stations in the fixed service has taken place to allow amateurs in the USA immediate access to the 24MHz band, subject to non-interference to primary users.

A small piece of the USA will shortly be activated and should be audible in much of the UK on vhf and uhf! To coincide with the 23rd Olympic Games in Los Angeles, and also to celebrate the 20th anniversary of the gift of the Kennedy Memorial site at Runnymede to the people of the USA, the Chiltern DX Club will be using the callsign GK0JFK from the site between 3 and 5 August 1984. Activity will be on most hf and vhf bands.

Light-bulb rfi?

A new breed of rfi source has appeared in the USA, in the shape of an rf-excited light bulb. This appears to consist of a type of fluorescent lamp which is excited by a built-in low-frequency oscillator: in some versions the oscillator stops when the lamp is fully lit and in others the oscillator runs at all times. The broadcasting industry in the USA is very concerned by the potential for interference to medium-wave a.m. broadcast radio, and the Federal Aviation Administration is also understood to be considering the matter from the point of view of interference with non-directional beacons operating in the lf and mf range. The Federal Communications Commission has issued a "Notice of Enquiry" and has found that the devices produce ". . . very broadband . . . emissions, with measurable emanations ranging from 10kHz to 80MHz". For those with connections in the USA, the FCC Notice of Enquiry has the docket number GEN 83-806.

One of the Society's prime concerns is the matter of interference to frequencies in the amateur service from various sources. The home computer can be a prolific source of rfi, as can other equipment ranging from the line timebase circuitry in domestic television sets to large-scale industrial processes employing some form of rf heating. Light-bulb rfi in the UK is so far unknown to the Society, although various types of thyristor and triac-based dimmers for domestic lighting can cause local interference to mf and the lower hf bands if they have been inadequately designed from the point of view of radiation. The Society continues to monitor the situation, and would be interested to hear from members who may have come across the "light-bulb rfi" syndrome.

Another successful prosecution

Arthur Colin Taylor, of Sun Street, Shelton, Stoke-on-Trent, was fined a total of £500 with £150 costs and the confiscation of two transmitters valued at £1,200 at Stoke-on-Trent Magistrates' Court last May; the charges related to the use of frequencies near 6·6MHz. According to the defence, Mr Taylor was "blissfully unaware" of the significance of his actions. An appeal to the court to resist the application for forfeiture was rejected.

BTBS seeks volunteer aid

The British Talking Book Service for the Blind now has over 3,000 technical helpers looking after "Talking Books" but there are some 50,000 blind readers needing help, with 4,300 of them being over 90 years of age and about 150 over 100. Volunteer aid for the technical side of the service comes from a wide range of electrical and electronic engineers—including radio amateurs—and there is an urgent need for more. The time involved does not usually exceed more than about 1h/month, and each volunteer is able to look after 10 or more blind people. The blind are supplied with tape reading cassette-type playback units, and with tapes from a large library in London. Help is needed with the installation of these units, initially by fitting plugs etc, and the giving of guidance to blind listeners. Full technical information and circuitry is available for maintenance.

The British Talking Book Service for the Blind, which is administered by the Royal National Institute for the Blind, has asked the Society to publicise their urgent need for more assistance in these areas, and any member interested is asked to contact Mr D. Findlay-Maxwell, PhD, FTI, c/o John Gladstone & Co Ltd, Wellington Mills, Huddersfield HD3 3HJ.

Problems in Mauritius

Radio amateurs in Mauritius are concerned that several visitors to the country have operated with their own callsigns /3B8 or with fictitious 3B8 callsigns without prior authorization from the relevant authority. Operating permission for visitors to Mauritius must be obtained from the Department of Telecommunications, Telecommunications Headquarters, Edith Cavell Street, Port Louis, before any operation commences.

Sidebands

We regret to report the death of George Grammar, W1DF. George joined the technical staff of ARRL in 1929 and became technical editor of *QST* 10 years later. He retired as ARRL technical director in 1970,

Nominations for election to the 1985 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 1984 are as follows:

ORDINARY MEMBERS
Mr D. E. Baptiste, CBE, retiring immediate past-President.
Mr T. I. Lundegard, G3GJW, who is eligible and willing to accept nomination for re-election.

ZONAL MEMBERS
Zone B. Mr H. S. Pinchin, G3VPE, who is eligible and willing to accept nomination for re-election.
Zone C. Mr W. J. McClintock, G3VPK, who is eligible and willing to accept nomination for re-election.
Zone D. Mr L. N. G. Hawkyard, G5HD, who is not eligible for re-election under Article 26.
Zone E. Mr D. M. Thomas, GW3RWX, who was co-opted on to Council in 1984, and who is eligible and willing to accept nomination for election.
Zone F. Mr J. T. Barnes, GI3USS, who was co-opted on to Council in 1984, and who is eligible and willing to accept nomination for election.
Zone G. Mr F. D. Hall, GM8BZX, who is eligible and willing to accept nomination for re-election.

Nomination procedure
(Changes made since the last Council election notice are printed in bold type.)
The vacancies on the 1985 Council may be filled either by the re-election of retiring members of the Council who are eligible or by the election of any qualified Society member. In both cases a proper **signed** nomination must reach the RSGB secretary at RSGB HQ not later than 10 October 1984. A member who has been a corporate member of RSGB for not less than three years immediately prior to nomination is qualified to serve on Council. Members standing for election as zonal members must be resident in the appropriate zone, as must those who make zonal nominations. (See page 650 for the compositions of RSGB zones.)

At the Society's 1974 annual general meeting, changes were made to the Society's Articles of Association. One change concerned the period of office which Council Members could serve. More specifically, having been elected to Council for a three-year period, a Council member could only be re-elected once and would then be required to stand down from Council for one year prior to any further nomination.

The changes to Article 26 were not retrospective, and thus could only have taken effect from 1 January 1980. One member of Council is affected by Article 26 this year.

Any 10 or more fully paid-up corporate members may nominate any qualified member for election to Council by delivering, in one closed envelope, to the secretary of RSGB, the respective **signed** nomination in writing. (As a safeguard it is recommended that each candidate be nominated by more than 10 members.)
The nominations need not be on one piece of paper. Each must be signed by the nominator and should include the name of his/her town.

The nominated member must also enclose:
(i) Written, **signed** consent to accept office if elected.
(ii) If appropriate, a statement that s/he is over 70 years of age, or will become so during the term of office if elected. Under the Companies Acts, it is necessary for her/his election to be confirmed by the annual general meeting.
(iii) A statement saying if her/his nomination for Council is for ordinary or zonal membership.
(iv) A statement declaring any commercial interests in the field of amateur radio.
(v) A suitable **recent** black and white photograph (head and shoulders) if s/he wishes.

In order to assist the membership in voting, a candidate may also enclose a maximum of 200 words as a statement, describing pertinent experience, which will be circulated with the ballot forms. This must be confined to biographical facts. Clearly, involvement in 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 activities at local level. Bona fide statements will receive the minimum of editing consistent with good style and factual accuracy; however, statements exceeding the maximum may be cut to 200 words.

Completed nominations should be addressed to: Mr D. A. Evans, RSGB Secretary, Alma House, Cranborne Road, Potters Bar, Herts. EN6 3JW, and must arrive not later than 10 October 1984. Please mark your envelope "1985 Council nomination". All nominations received will be acknowledged by return of post.

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having written a great deal for *QST* and the *Radio Amateur's Handbook*.

Someone who had obviously not read the "Front Cover" item (*Rad Com* May 1984, p382) asked the Society why World Telecommunication Day was held on a weekday, Thursday 17 May, and whether this was a ". . . bureaucratic bungle". The reason is simply that the anniversary of the founding of the ITU happens to be 17 May, which, like Christmas Day, does tend to fall on different days in different years . . .

Has any member experienced a change to the rateable value of their property as a result of erecting an antenna for amateur radio? Comments, please, to the secretary/general manager at headquarters.

It appears that slow-scan television may be featured on the next shuttle mission if NASA permits Tony England, W0ORE, to operate during Mission 51F in 1985: some form of encoding device may be carried. W0ORE is expected to be in the UK later in the year—further information later.

Further to last month's news item on two-way royal traffic from GB4DD, the operators have asked us to announce that all contacts (including SWL reports) will be QSL'd via the bureau until cards run out! Some 1,300 contacts were made.

Amateur tv enthusiasts in Central Scotland who would be willing to participate in financial support or construction of a 1·3GHz atv repeater for the area are asked to contact Norrie, GM4BGU, 3 Townhill Road, Earnock, Hamilton ML3 9UX.

and finally

The *Radio Communication* editorial office in Chelmsford will be closed from 4 to 12 August 1984, inclusive.

Mobile Rallies Calendar

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

5 August—RSGB Mobile Rally, Woburn. Details in *Rad Com* July, p558.
12 August—27th Annual Derby Mobile Radio Rally. Lower Bemrose School, St Albans Road, Derby. Talk-in by GB3ERD on 144 and 432MHz. Free admission and parking, but not before 10.30am. All usual attractions including trade stands, prize draw, flea market, refreshments and "Derby junk sale" at 1.30pm. Ample accommodation if wet. Organized by the Derby & DARS. Details from G3SZJ, QTHR, tel 0332 556875.
19 August—RAIBC and Flight Refuelling Amateur Radio Society Hamfest '84, Flight Refuelling Social Club and Sports Ground, Merley, Wimborne, Dorset. Open 11am-5pm. Talk-in on 144 and 432MHz, callsign GB2FRH. Junk stall, bring & buy, tombola, creche etc. Parking available free. Details from E. K. Howard, 11B Chester Road, Poole, Dorset, or Bob Burrows, tel 0202 762828, daytime.
26 August—Preston ARS 17th Annual Mobile Rally. Lancaster University. Easy access, ample free parking on campus. Leave M6 at junction 33 and proceed north on A6 for two miles. Opens 11am, early admission for the disabled. Trade stands, bring & buy, licensed bar, cafeteria. RSGB stand and bookstall. Entry 50p by programme, with free prize draw. Talk-in on 144MHz S22 fm. Enquiries to G3DWQ, QTHR, tel Preston (0772) 53810.
26 August—Torbay Mobile Rally. STC Works, Old Brixham Road, Paignton. Talk-in on S22. Open 10am. Free admission and parking. Usual attractions. RSGB book stall. Trade stands. Refreshments available. Details fron sec Margaret Rider, 7 Kingston Close, Kingskerswell, Newton Abbot, S Devon TQ12 5EW, or G6GLP, QTHR.
26 August—BARTG Rally. Sandown Park Racecourse, Esher, Surrey. Open 1030-1700. Talk-in on S22. Entrance fee £1, 25p for xyls, children and oaps. Ample free parking. BARTG TU kits, components, data sheets and publications for sale. Further details from Ted Batts, G8LWY, 27 Cranmer Court, Richmond Road, Kingston-on-Thames, Surrey, tel 01-549 8253.
9 September—Telford Mobile Rally. Telford Shopping Centre, Telford, Shropshire. Open 11am (disabled from 10.30am). M54 now open all the way (junction 10A off the M6), or use A442 from N or S. Free admission, and parking. Town park adjacent to site for the family. Over 80 stands, plus club exhibits in fully enclosed venue. Restaurants and take-aways, plus the "Ironmaster" pub, all on site. Details from G8DIR, tel Shrewsbury 64273, G8UGL, tel Telford 584173, or G3UKV, tel Telford 55416, all QTHR.
16 September—Vange Mobile Rally. St Nicholas School, Nicholas Lane, Basildon, Essex. Open 10am to 5pm. Talk-in on 144MHz by GB4VMR. Details from G4IFD, QTHR.
16 September—Peterborough R&ES Mobile Rally. Wirrina Sports Stadium, Bishops Road, Peterborough. Open 10.30am until 5pm. Situated on the river embankment, good car parking, free on Sundays, caravans by arrangement. Food and bar meals in adjacent Gildenburgh Rooms, bar until 3pm. Details from D. T. Wilson, 4 Conway Avenue, Peterborough, tel Peterborough 76238.
22 September—Ballymena & DARC Annual Mobile Rally. Ballee High School. Open 12 noon-5pm. Talk-in on S22. Trade stands, bring & buy, RSGB bookstall, QSL Bureau, refreshments, raffle, free car parking. Further details from Jeffrey Clarke, club sec, GI4HCN, QTHR.
23 September—Lincoln Hamfest, organized by the Lincoln Shortwave Club, on the Lincolnshire Showground (4 miles north of Lincoln City on the A15). Opens 11am-5.30pm. Talk-in on 144MHz (S22) and 432MHz (SU8). Ample car parking, caravan and camping facilities, refreshments, licensed bar. More trade stands than in previous years, many attractions for junior ops. Facilities for the disabled. Further details from G8VGF, c/o City Engineers Club, Central Depot, Waterside South, Lincoln.
30 September—Harlow & DARS Annual Mobile Rally. Harlow Sports Centre, Hammarskjold Road. Open 10am. Talk-in on 144MHz (S22). Ample car parking. Refeshments and licensed bar. Bring & buy and usual features. Details from G4TLU and G6STB, c/o Harlow & DARS, The Barn, First Avenue, Harlow, Essex.
7 October—Great Lumley ARES Rally. Community Centre, Great Lumley, nr Chester-le-Street, Co Durham. Open 11am. Talk-in on S22. Usual attractions including bring & buy. Further information from Ian Blackman, G4OCQ, QTHR, tel 0385 40827.
3 November—Street & DARS/Lions Club of Glastonbury and Street Rally (proceeds to charity). Crispin Hall, Street, Somerset. Open 11am-4pm. Admission 50p, under 14 years free if accompanied by an adult. Talk-in on 144MHz (S22). Details from Bill Scriven, tel Street 42277.

18 November—Carmarthen ARS Rally. The West Wales Hospital Club, The Quay, Carmarthen. Open 11am to 5pm. Admission 50p. Trade stands, bookstall, bring & buy, craft and bric-a-brac, licensed bar, full catering. Ample space for visitors. Talk-in on S22. Free car parking. Details from M. Meredith, 50 Caecoed, Llandybie, Ammanford, Dyfed, tel 0269 850803.

Special Event Stations

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

4 August, GB2PYF
Abergavenny & Nevill Hall ARC will operate the station at the Pen-y-Fal Hospital Fete. Details from sec, tel 0873 78674.
4 August, GB2FAA
Yeovil ARC will be operating this station on behalf of RNARS from HMS *Heron*, Yeovilton, Somerset, at their open day and air display. Details from G3BEC, QTHR.
4-11 August, GB2EGL
The Carmarthen ARS will operate the station from the Welsh National Eisteddfod at Lampeter (Eisteddfod Genedlaethol Frenhinol Cymru Llanbedr Ponststeffan a'r Fro). Operation will be on hf and vhf and a special QSL card will be issued for each contact with the station. Details from Allan, GW4VPX, tel 055 934 434.
4-11 August, GB4FES & GB8FES
The stations will operate from Festival '84, a Christian family festival, at the County Showground, Stafford. Activity will be on all hf bands and 144MHz, phone and cw. Details from G4LOF, G6CZM or G6NIC, all QTHR.
8-12 August, GB2MRI
Ballymena & DARC annual expedition to Rathlin Island, QTH WP59c, to celebrate the 86th anniversary of Marconi's Rathlin to Ballycastle wireless link, will include this station. It will be active on as many bands and modes as possible, 1·8 to 432MHz, from Wednesday evening until Sunday lunchtime. For further details contact GI4OZT, or GI4HCN, both QTHR.
9-11 August, GB4SWN
Swansea ARS will be operating the station from Swansea Quadrant Shopping Precinct as part of the celebrations commemorating 800 years since Swansea received its charter. All QSOs will be confirmed by direct QSL cards, two Swansea books and a parchment giving the history of the Lords of Gower. Details from R. Williams, GW4HSH, QTHR.
11-12 August, GB2PC
Pembroke ARS will operate this station from Pembroke Castle from midday on 11 August to 5pm on 12 August. Details from Roger Baker, GW4RGI.
11-12 August, GB2YFT
The station will operate from the Yeovil Festival of Transport, Barwick Park, Yeovil, Somerset. Operation on 3·5 to 432MHz by Yeovil ARC. Details from sec G3GC, tel 0935 75533.
11-12 August, GB2OSS
Oldham ARC will operate this station at the Oldham Summer Show, Alexandra Park, Oldham. Operation will be on hf, vhf and uhf. Special QSL cards will be available. Details from sec F. Butterworth, G4SPX, tel 061-652 8862.
12 August, GB4YHA
The station will be operated to celebrate the 50th anniversary of the local YHA in Croydon. It will operate from the youth hostel, Radnor Lane, Holmbury St Mary, Dorking, Surrey. QSL cards will be available via the bureau. Operation will be on vhf (fm), and hf, cw QRP only, but other modes may be possible. Details from G4NPD, QTHR.
17-19 August, GB8JCZ
This station will be operated from Southport, Merseyside, to celebrate the 30th anniversary of the Jawa CZ Owners Club. Operation will be on 144 and 432MHz, and possibly wideband fm on 10GHz. Contact with fellow motorcyclists is especially sought. Details from Paul, G6MEN, QTHR, tel 0704 74792. QSL via RSGB or ISWL, quoting G16800, or direct.
18 August, GB2MSS
Yeovil ARS will operate the station from Mid-Somerset Show, Shepton Mallet, Somerset. Operation will be on 3·5 to 432MHz. Details from G3GC, tel 0935 75533.
18-19 August, GB4PFF
Swansea ARS will operate this station from Pontardawe Folk Festival. Details from R. Williams, GW4HSH, QTHR.
9 September, GB2SMW
A station will be set up by Swindon & DARC at the Science Museum Open Day at Wroughton, Wilts. The museum has exhibits of commercial aircraft and vehicles, space rockets, railway equipment, vintage machinery, hovercraft etc. Details from Ken, G8SFM, QTHR, tel 066689 307.
15 September, GB2AB and GB4RAF
The Oxfordshire members of RAFARS will be running the stations at RAF Abingdon for the Battle of Britain "At Home" Day. Operation will be on all bands 3·5 to 28MHz, mostly ssb, according to conditions, plus 144MHz, from 9.30am to 6.30pm. Details from Eric Palmer, G3FVC, QTHR.

Other Events

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

7-9 September—WACRAL Annual Conference. London Bible College, Northwood, Middx. Details from G3AGX or G4NPM, both QTHR.
8 September—Scottish Amateur Radio Convention, organized by West of Scotland ARS, Cardonald College, Glasgow. Details to follow.
30 September—Welsh Amateur Radio Convention, Oakdale Community College, Blackwood, Gwent. Details from R. B. Davies, GW3KYA, QTHR.
13 October—Midlands VHF Convention. British Telecom Training School, Stone, Staffs.
14 October—QRP Convention, Preston School, Monks Dale, Yeovil, Soms. Details from G3GC, QTHR.
20-21 October—27th Jamboree on the Air.
8 December—RSGB AGM, IEE, Savoy Place, London.
1985
13-14 April—RSGB National Convention, National Exhibition Centre, Birmingham.

RAE Courses 1984-5

(See also *Rad Com* July, p560)

Brighton. Brighton College of Technology, Pelham Street, Brighton BN1 4FA, tel 0273 685971. The course will commence in September. Details from R. A. Bravery, c/o the college.
Derby. Derby College of Further Education, Wilmorton, Derby DE2 8UG. Enrolment 10-11 September. Course commences 19 September. Details from F. Whithead, G4MLL, course tutor at the college.
Hemel Hempstead. Dacorum College, Marlowes, Hemel Hempstead. Enrolment 10 September. Classes Wednesdays, 6.30-9pm, and Tuesdays, 6.30-9pm, if there is enough demand, starting 26 September. Course tutor C. B. Burke, BSc, G3VOZ. Details from the college, tel 0442 63771.
Kirkcaldy. Balwearie High School, Balwearie Road, Kirkcaldy. Enrolment 17 September, 7.30-9pm. Details from course tutors: RAE, K. Horne, GM3YBQ, tel 265789; morse, J. Balfour, GM3PFQ, tel 54513.
London. Brixton College, Ferndale Road, London SW4. Wednesdays, 6.30 to 9pm commencing 12 September. Enrolment 3-6 September. Course fee to be announced. External candidates will be accepted for City & Guilds examination. Details from college on 01-737 2323.
London. De Beauvoir Evening Institute, Tottenham Road, Dalston, London N1. Course commences 24 September, 7.30pm. Enrolment week commencing 17 September, 7-9pm. Details from course tutor G4BZW, QTHR. tel 01-249 1843.
Princes Risborough. Adult Education Centre, Merton Road, Princes Risborough, Bucks. Course Wednesdays, 7.30-9.30pm, commencing 26 September. Instructor N. S. Lilley, G3INN. Details from the centre c/o Mrs S. Wallace, Head of Centre, tel Princes Risborough 4977.
Slough. Langley College of Further Education, Station Road, Langley, Slough SL3 8BY. Enrolment 11 September, 12-8pm; 12 September, 12.30-8pm. Classes Thursdays, 1730-1900, operating techniques; Thursdays, 1900-2030, morse; Wednesdays, 1900-2100, theory. The college has a fully-equipped station. Details from A. J. Parcell, G8BIX, c/o the college.
Turnford. East Herts College, Turnford, Herts. Mondays, 7-9pm, provisionally. Final details to be notified. Contact Jim, G3OJI, QTHR, tel Ware 4316, or the college, tel Hoddesdon 466451.

Morse courses

Birmingham. Smiths Wood School, Adult Education Centre, Chelmsley Wood, Birmingham. A beginners' morse course will commence on 25 September. Classes Tuesdays, 7.30pm. Enrolment 7.30pm, 18 September. Another course elsewhere in Birmingham may be organized. Details from B. Laniosh, tel 021-453 2880.
Bromley. Beginners' morse course. Beckenham Adult Education Centre. Enrolment by post, 28-31 August, from Bromley Adult Education Service. Aylesbury Road, Bromley, Kent, or in person, 4-5 September at the Beckenham Adult Education Centre, 28 Beckenham Road, Beckenham, Kent, tel 01-650 4208. Tutor Fred Herschel, G4USV. Course fee £40.
Cheshunt. It is hoped to start a cw class for beginners on a Thursday evening. Details to be finalized subject to demand. Contact Jim, G3OJI, QTHR. tel Ware 4316, as soon as possible.

OBITUARIES

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

Mr G. Dorling, G3PGA
George Dorling died on 25 March, aged 83. He became licensed after retiring from a successful career with the Post Office. He was one of the founder members of the South London Mobile Club, and later became vice-chairman. He was active on all bands and rarely missed the Sunday morning net.

Mr B. Evans, G3YYA
"Taff" Evans died on 27 April, aged 65. He had retired from the Radio Interference Service five years earlier. He had served in the Royal Navy as a wireless telegraphist, on Atlantic and Russian convoy work, and was known on the amateur bands as a very proficient cw operator.

Mr P. Lunken, G4UQT
Peter Lunken died on 11 May. He was chairman and a founder member of Fakenham Radio Club, and a deputy controller of Raynet in the Breckland area of Norfolk. He had gained his "A" licence in 1983.

Mr J. Reith, GM4HLQ
Jim Reith died on 17 April, aged 53. He joined the Aberdeen ARS in October 1978 and was elected to the committee in November 1981. Throughout his involvement with the hobby he was active in assisting others with their practical problems. A joiner by trade, he was instrumental in re-establishing the Aberdeen Society in new premises. He always put in more than he took out, and amateur radio in the north east of Scotland has suffered a great loss.

Lt Col P. N. G. Whitlam, OBE, TD, G6PW
Philip Whitlam died on 7 March. In 1920 he joined the staff of Warwick School as technician, and it was here that he inspired many boys to join the world of amateur radio. His shack, known as "Upper Signals", a title which still exists, was always open, and he trained many boys as competent signallers. In its early days, he assisted the Warwick & DRS in many ways, and loaned them his callsign on field days. The wireless club at Warwick School also got a number of Warwickshire operators started. He retained his radio equipment during the second world war, as he undertook classified frequency monitoring. Sadly, he had not been active for some years.

Also:
Mr F. Brunnick, EI8I, on 28 January;
Mr T. G. C. T. Hellyer, G1AIW, on 15 February;
Mr E. L. Lerpiniere, VK9AJ;
Mr D. W. Longhurst, G8IFE;
Mr J. D. Pinchbeck, G5DF, on 18 September 1983;
Mr E. W. V. Sheppee, G6IID, on 16 February:
Mr W. C. Smart;
Mr A. J. Whitehouse, RS51430;
Mr A. G. Winton, RS44578, on 8 December 1983;
Mr A. E. Young, G5AY, on 25 December 1983.

Members' Mailbag

GMs ON 144MHz

Sir—I can only say to those who complain of not hearing GMs on 144MHz, whatever mode: *turn your beams to the north.* I think one item that should be thought about is the terrain, both in Scotland and the northern part of England. Dorking is "flat" compared to many of these northern areas—and as for working OZ and SM, there are no hills in the North Sea.

I have lived in YS square and now in YP, and I can't consider myself inactive on 144MHz. while in YS square, the furthest south I worked on tropo was County Durham—please get out a map and measure some distances and look at the relief—it might surprise you! There is certainly activity in the north—we don't hear much from the deep south, and we could easily come to the conclusion that there is not much 144MHz activity south of Birmingham! I think the number of people in the various areas must also be considered—only about 10 per cent of the total population live north of the border, and this of course will be reflected in the number of amateurs.

GB3ANG is in a fairly good position for signals to come down the relatively flat eastern side of Britain. It would be interesting to know what would be heard in the south if a beacon was placed in the Glasgow area—I suspect, not much.

When in YS square, virtually all "lifts" were on an E-W route and Scandinavia could be worked on a "piece of wet string"; but to work south—oh no, just white noise.

I am sure anyone in the north would be willing to work to the south, alternatively come to the north for a holiday and listen for activity.

Clive Smith, GM4FZH

Point taken, and certainly we suspect that from the point of view of a 144MHz operator in the south of England, YS square is rare except possibly during aurora. Any other comments from the 144MHz dx fraternity?

SUGGESTION ACCEPTED

Sir—In *Rad Com* January you asked for suggestions aimed at "increasing the activity on any band". If we accept that "home-brewing" is, *per se*, a desirable end, then this aspect of the hobby should feature. I suggest therefore that the Society actively sponsor constructional articles on state-of-the-art transverters that would *(a)* enable large numbers of older transceivers to be used on top band and the WARC bands; and *(b)* give a new lease of life to under-used 144MHz equipment on 430MHz and/or 28MHz fm.

To overcome one of the main disincentives to any home-building activity, it would be essential for the Society to underwrite the initial costs associated with the provision (from a commercial source if appropriate) of top-quality pcbs. The ready availability of the necessary pcb, pre-tuned coils; prealigned filters (for 430MHz) and rugged power transistors would make the proposed project(s) suitable for all but totally novice constructors.

Ken Fraser, G4RVD

This is probably as good a forum as any to announce that the Society is, in fact, not far off achieving some of the aims which are outlined in Mr Fraser's letter. Projects for both the beginner and advanced amateur are currently being considered in headquarters, and the first one is expected to be featured in a forthcoming issue of Radio Communication. *Printed circuit boards and certain components will be obtainable from headquarters, and the aim is to make life as simple as possible for intending constructors. In the words of the cliche, "watch this space!".*

A CAUTIONARY TALE

Sir—Other RAE candidates may be tempted, as I was, by the advert from the Rapid Results College in *Rad Com* for a complete home tuition service offering as it does, among other things, "Self-contained courses, regularly updated for The City and Guilds Radio Amateur Exam". Just what I needed! I enrolled as quickly as possible and settled down to my studies. At first all went comparatively well. Then a chapter appeared on valves. However, it was "optional" reading, so I omitted it and pressed on. Imagine my dismay as I found that an increasing amount of the explanation related to valves. In some later parts of the course, transistors did not even get a mention.

After a number of frustrating weeks trying to understand transistors by reference to valve theory and an initial rebuff from the college, I have now obtained a full refund. Readers may be interested in the following extract from the letter from the college bursar:

"Briefly, the tutor accepts the complaint that you have made and agrees that the lectures are still biased towards valves rather than transistors. Certain elements of the course are, of course, entirely concerned with valves although it is readily admitted that the RAE syllabus no longer makes reference to valves."

I hope my experiences may serve as a cautionary tale for others thinking of enrolling on correspondence courses. Ensure that the proposed college can guarantee material that is current. The *Radio Amateur's Examination Manual* may be difficult for some of us to follow, but at least its contents are relevant.

Dr Patricia Pay

This is a point which, in the Society's experience, has not risen before: Dr Pay's penultimate sentence probably says all that is necessary.

Given the importance and relevance of thermionic devices in the context of amateur radio, and also from the point of view of the educational process, many would argue that valves and their techniques should never have been dropped from the RAE syllabus. The current edition of Radio Amateur's Examination Manual, *published by the Society, clearly states that it relates to the 1982/5 syllabus, and prospective purchasers may rest assured that it is fully up-to-date.*

SUBSCRIPTIONS

Sir—After reading the glowing tributes to all the achievements of the RSGB one could not help getting a feeling that someone was trying very hard to justify the current increase.

No mention of the fact that increases in licence fees can go on without any criticism from the Society, or of the huge increase in the cost of a morse test.

What has been done to stop Syledis ruining 430MHz for a lot of people; this "focus of interaction with the authorities" should never have let it get to the state it is now in.

If I get a 14 percent increase in my pension, I suppose it will soften the blow.

I. Cline, G3EMU

Unfortunately Mr Cline seems unaware of the real situation with regard to the 430MHz band, which is effectively allocated on a shared secondary basis to the amateur service in the UK, and has been for very many years. Much as the Society would criticise the Syledis system on technical grounds, the fact remains that it has every right to be operating in the 430MHz band, and indeed it will continue to do so for some time. However, we expect to see Syledis phased out in Europe in favour of satellite navigation and position-fixing systems, which appear to be more spectrum-efficient and less costly to operate. It would be naive to take the view that the Society could or should force Syledis out of the 430MHz band without accepting the fact that we stand to lose far more in the long-term than would be balanced by the short-term gain. Syledis has been discussed many times in the pages of this magazine. Some problems which are not of the Society's making can be solved by the RSGB: other problems, however, do not have a simple short-term solution and, as in this instance, require a more patient approach.

The reasons for the increases in licence fees and morse test fees were fully reported at the time, and whatever the faults and virtues of the RSGB these factors are essentially outside of our control. Mr Cline in effect asks the Society to proof its members against inflation: he will note that the recent RSGB subscription increase is **less than** *the rate of inflation, but we cannot assume the same control over the fees and charges associated with other bodies.*

Mr Cline does not refer in his letter to the vast amount of important work performed by the Society on behalf of the UK radio amateur.

THE NOVICE LICENCE

Sir—the current debate with respect to proposals for the introduction of a novice licence seems to presume that such a licence should form part of the amateur service, yet need this really be so? In my opinion, most supporters of the novice licence campaign seem either to come from, or be connected with, the ranks of cb in its various forms, and this might be a more appropriate area for such an experiment.

Following an elementary examination heavily weighted towards interference matters and such novice licence rules, regulations and stipulations as deemed necessary, a morse test at, say, no more than 8wpm, novices could be allowed a maximum of 10W dc input of F2A (mcw) within the existing 27 and 934MHz bands, except possibly on channels designated for emergency use and calling.

This proposition has the merit of not only allowing the use of existing equipment (simply modified by the use of a keyed audio tone inserted into the microphone socket), but also would prevent any further cluttering of the amateur bands by "lid" operators. In order to establish control over such a proposal, novices could be issued with callsigns, possibly with a GCB prefix, again avoiding clashes with true amateurs.

A possible time limit of four years maximum on novice licence before upgrading to full Class A licence status by passing the RAE and the 12wpm morse test, or alternatively spending a minimum of two further years on fm cb before re-passing the above examinations and starting again. Since we are told that many amateurs allow their licences to lapse after three years (and cb licensees, one year), the four-year limit would ensure that those continuing would be keen to further their interest in radio communication and techniques.

D. H. Lander, G4LQL

There appear to have been almost no letters which advocate the novice licence proposals which are now in circulation.

"Q v Q"—THE DEBATE GOES ON

Sir—I trust Mr Walters (*Rad Com* May) is not "tarring us all with the same brush" when he refers to the operating practice of G6 and G1 stations.

There are, and always will be operators who treat the amateur bands as a "cb" system, talking only to operators *they* want to talk to —which is all wrong and definitely not the amateur radio spirit. There are also amateurs who are new to the hobby, and forget the odd callsign here and there; fair enough, this is *amateur* radio, and we all make mistakes. A little guidance and good-natured "chivvying" from an experienced operator here does far more good than harm.

Many people are still introduced to the hobby as swls, who may "have a go" with cb, as I did; I see nothing wrong with this. As for the RAE, it was not *my* fault, or indeed any operator's fault that multiple-choice questions were introduced. I would have willingly sat any written exam, as I was determined to get my "ticket", and no doubt many other prospective amateurs feel the same. These feelings also hold for the morse test. At 12wpm I do not consider myself good enough just yet, though I am just as determined to pass the morse exam, which leads me to my final point . . .

While I am against a novice licence (largely on Mr Walters' grounds) I would like to see certain frequencies set aside to use cw with an

"A" class operator, so that verbal confirmation of morse passages can take place, as well as return sending, rather than the present one-way system where one can only listen. Surely it is not impossible to do this? I feel that this can only benefit amateur radio.

Russell W. Barnes, G6KGP

Sir—I fully agree with the comments of G4DFV. I do not know who introduced the multiple choice RAE, or why, but I think they certainly have a lot to answer for now. When I first came on 144MHz eight years ago it was very civilized, now it's a total shambles. When I first obtained my licence the knowledge of the average radio amateur was high, now it's practically in the gutter.

I used to be very keen on 144MHz; I used to talk to people who had manners about various topics in amateur radio. Now I ask myself, what is the difference between cb and 144MHz? . . . let's face it, not a lot. Just listen on the ssb calling channel: a station calls "CQ", then three or four other stations come on and call "CQ" on top of each other . . . and then they complain of QRM! During a recent tropo opening a European station called "CQ DX" and a G6/cber called this dx station two or three times and when he did not hear his call come back he called again two or three times, then another G6/cber thought this unfair so he called and so it continued.

I have a slight knowledge of German, and during one opening I heard two DL stations talking to one another in their own language complaining about this poor operating which only exists with G stations. I must confess the forthcoming sporadic-E season frightens me. When I have meteor scatter skeds I still get called by G6s. So unfortunately I have to admit defeat, and I am almost QRT on 144MHz now. I don't say that all G6s are like this; certainly not, but a great number are.

For most Class B operators with the right attitude, interest and enthusiasm, amateur radio now begins on 432MHz, but how long before it ends. I believe the multiple-choice has lowered technical standards and attitudes towards that of 27MHz.

I am a radio amateur and I took the real RAE and not the half-hearted one!

Dave Cox, G8OPR

These letters sum up two opposing points of view: how they are to be reconciled is an open question. The Society stands for high operating standards in the belief that this leads to the best possible use of the limited frequency allocations to the amateur service and the highest credibility of the hobby: this is backed up by as much publicity for matters such as band plans as possible. It is also fair to say that the Radio Amateur's Examination at present does not go overboard to test for practical or what could be called "operational" knowledge and ability. The hobby is indeed "amateur" radio but that does not imply that "amateurish" standards are required or that common courtesy and common sense are somehow not needed in amateur bands.

The fact that national societies in Region 1 meet regularly in order to discuss and formulate matters such as band plans is evidence that we believe in co-ordinating different modes and band usage in order that individuals may pursue whatever line of activity they wish, within the terms of their licence, without causing problems for others similarly engaged. Should we be doing more? No doubt the debate will continue, and this is all to the good, even though the author of the next letter does not agree!

Sir—Having just discussed the content of recent "Mailbags" with a few local amateurs, and in particular the highly provocative, inflammatory and insulting letter by G4DFV deriding all G1 and G6 stations, I feel I must write to query the good sense of the Society in printing this kind of letter.

Over the last six months, no issue of *Rad Com* has passed without its pages being sullied by some petty squabbling, mud-slinging, personal insults or downright bigotry of this kind. When I show copies of the magazine to my non-radio friends, I often get them handed back with a shake of the head and comments like "Well, if that's what radio hams are like, they look a pretty nasty bunch to me".

One month after another it's G4s insulting G6s, cw operators attacking 'phone men, ex-swls decrying ex-cbers and so on. Most of the time these letter-writing bigots appear to be the guilty parties in any case; for example, G4DFV's letter constantly denigrates the ex-cb type amateur for invading "his" hobby and being the reason that the bands are so crowded these days, and says they have no conception of the aims of amateur radio. His letter, however, makes it clear that it is he, in fact, who has lost sight of the aims of the hobby, ie promoting goodwill among people, helping others, and furthering interest in amateur radio.

This is where I feel the editor must, on such occasions, step in to safeguard the interests of radio amateurs in general, saving us from infighting, resentment, and the loss of the highly-respected position the hobby holds at present, by filing such nasty examples of ungentlemanly behaviour where they belong —in the dustbin.

P. D. Godolphin, G4XTA

The function of "Member's Mailbag" is simply to be a forum for the views and feelings of individual members. We would be failing in our duty if we simply published the polite, the anodyne, the reminiscent or the tolerant, because that would be to idealize amateur radio and to deprive it of life. If "infighting and resentment" form a small part of amateur radio, as they certainly do of every human endeavour, we must reflect that fact in order to bring them out into the open and make them matters for debate—pretending that they do not exist is not our way. It is essential that members have the opportunity of expressing opinions about things which concern them, and G4DFV is fully entitled to his opinion: it seems, in fact, that several members agree with it! Perhaps we should state clearly that the letters published in these pages in no way reflect the opinions of the Society with regard to the subject matter they contain, and that we would be doing members a disservice if we failed to publish those which might be felt to be provocative.

AMATEUR RADIO AFLOAT

Sir—I read with interest the letter of G2BQ in the May issue of *Radio Communication.* I whole-heartedly endorsed Mr Whatman's comments, particularly with regard to safety. Being an occasional net controller on the local 14,320kHz maritime mobile "breakfast show" (daily at midnight gmt), I can recall a significant number of instances involving private yachts where, had it not been for an amateur radio operator on board, there would almost certainly have been loss of or damage to the vessel and perhaps injury or even loss of life to the crew.

Readers will probably recall the case of *Siddartha*, the Singapore-based catamaran carrying a dxpedition to the Spratley Islands. Had it not been for the fact that one of the expedition members was actually in contact with a Singapore amateur operator at the time of the attack on the vessel, nothing would have been known of the atrocity until the survivors were rescued nine days later. Certainly, no air search (albeit unsuccessful) would have been launched.

There have been a number of occasions where injured crew members have been taken off by coastguard patrol boats and helicopters, overdue vessels being located, and stranded vessels salvaged from coral reefs and the like, all thanks to amateur radio. Being a yachtsman and maritime mobile operator myself, I can say there have been times when I have been thankful for amateur radio capabilities on board.

On the subject of meteorological information, one well-known Hong Kong-based yachtsman who lives on board his ketch is fortunate enough to have a weatherchart receiver. Weather information for the South China Sea area is thus made available daily on the "breakfast show" to interested parties. The South China Sea is notorious for its severe typhoons, and therefore such weather information is invaluable when route planning.

I believe it is a well-known fact that a number of cruising yachts operate unlicensed amateur radio stations with fictitious callsigns. While not condoning unlicensed operation, there is no doubt that this so-called pirate activity has resulted in the saving of lives and property.

Duncan M Fisken, G3WZD/9Z1UG

SATELLITE WORKING

Sir—I returned to satellite working a few months back, having got somewhat bored with the lack of tropo openings on vhf/uhf.

Oscar 10, I find, is a marvellous piece of equipment—all it is short of is a small astronaut who can throw a few switches to cancel out the alligator's signals. The vast majority of users seem to respect the rules of erp, but inevitably there are a few who must have the strongest signal on the satellite at the expense of the majority. I suspect that these anti-social types will always be with us, and I liken them to the repeater abusers. It is unfortunate that nothing much can be done about them.

The thing I don't quite understand is the thickness of the alligator's skin. He knows that he is radiating far too much power, and he also knows that others know the same thing, but he presses on regardless.

Monday is QRP day for Oscar 10, which means not more than 10W—this sets the spirit of the thing. Even on QRP day I find a well-known alligator with a Harrow postcode using 10W, he says, into a 4 x 88-element array. If that arrow works properly it should produce well over 20dB gain. So even with 10W that is 1kW erp. He rather spoilt it by telling the station he was working that his amplifier was peaking 7A. This probably results in 50W output—5kW erp?! No wonder, when I checked with my signal generator against my S-meter, his return was about 20dB up on the beacon. We are asked even on days other than Monday to keep our erp down to the level where the returned signal is no stronger than the beacon.

May I invite an alligator to explain to me why he does what he does—I would love to know.

Brian Armstrong, G3EDD

PROOF OF UNLICENSED USE NOT NECESSARY

Sir—Reference the item under the above heading (*Rad Com* June) from the report in *The Times* of 28 March 1984.

I feel I must say something on this subject as I feel it raises many unanswered and maybe unanswerable questions, eg:

(a) Commercial rigs being offered for sale to amateurs can, with slight modifications, be used for transmission purposes on any frequency for which the equipment was designed to receive.

(b) All amateur-band-only commercial rigs can be operated outside amateur-licensable frequencies.

(c) General coverage receivers could also be included in this as it is possible to receive military, aeronautical and nautical transmissions.

(d) Homebrew equipment: who would be a competent examiner to say that crystals and coils to be found in a constructor's shack would not make it possible for the equipment to be used illegally.

(e) Complaint to authorities by a neighbour of illegal operation (breakthrough?) by an amateur could result in prosecution if in possession of (a) to (d)?

I welcome any legislation which will give credence to prosecutions for illegal operation within amateur bands but I view the statement with some degree of trepidation as it could also work to our disadvantage if a prosecutor thought that an "offence had been established by the fact that the set was available for immediate use at any time".

G. Lucas, GM4EJI

The Society is still in intensive discussion with the DTI with regard to the points raised in Mr Lucas' letter as well as others. At present there are indeed various grey areas but the problems are fully recognized by the Society, and a full analysis of the situation will appear in Radio Communication *as soon as discussions have been completed.*

An introduction to DATA COMMUNICATION

by P. J. Cadman, G4JCP*

First licensed as G8HHK in 1973 after some three years as an swl, and as G4JCP since the end of 1979, the author is a graduate of Aston University. After spending a year with a company making electric arc furnaces he returned to Aston to do research on data transmission. During this period he became interested in the use of microprocessors, particularly their use in communications systems and associated equipment, and he still pursues this interest, but only as a hobby at the moment. For the last two years he has been working on the design of microprocessor-based equipment to replace traditional hard-wired logic units at Static Systems Group, in Wombourne, Wolverhampton. His current interests are amateur packet radio, computers, and getting away from the local QRM.

PACKET RADIO is a term which seems to be appearing regularly in connection with amateur radio and data transmission. As packet radio has its beginnings in the world of computer networks and high-speed data communication, the average amateur may be wondering what it is all about. The purpose of this article is to describe what is generally meant by the term "packet radio" and how it forms a logical progression from the more-widely-known forms of serial data communication.

Most data communication between computers and their input/output devices such as vdus takes place serially using an asychronous format. Here each character is transmitted one bit at a time. Fig 1 shows the bit pattern that represents the letter R sent asychronously in Ascii (American standard code for information interchange). The speed at which characters are sent is usually expressed in bauds. The baud rate is equal to the number of discrete changes in the signal that can take place each second. When the signal can only assume two states, as in Fig 1, the baud rate equates exactly to the bit rate in bits/second. If the signal can assume more than two discrete states then the bit rate can, in theory, be higher than the baud rate as now more than one bit of information can be represented by each state. There are preferred bit rates for asynchronous communications; namely 50, 110, 150, 300, 600, 1,200, 2,400, 4,800, 9,600 and 19,200 bits/s, but in principle there is no restriction placed on the bit rate providing, of course, both transmitter and receiver are in agreement.

Asynchronous transmission

Surrounding each character are extra bits which are necessary for asynchronous communication; these are called start and stop bits. There may also be an additional bit known as a parity bit. This bit is normally generated automatically by the transmitter and subsequently removed automatically by the receiver, and is used to check for errors in the received character. The logical state of the parity bit is chosen to make the total number of "1"s in the character plus parity bit either an odd number (odd parity), or an even number (even parity). When the transmitted character is received the state of the parity bit is once again calculated and compared with the received parity bit. If they are different then it is assumed that one bit in the character has changed during transmission. Of course the received parity bit itself may be in error but there is no way of deducing this at the receiver. Strictly, a single parity bit will detect any odd number of errors in a received character but not an even number of errors. Therefore a single parity bit should not be relied on when there is a significant probability of multiple errors occurring in a single character.

The start and stop bits added to the beginning and end of the character are for timing purposes. They, like the parity bit, will be added and removed automatically by the uarts at each end of the communications channel. A uart (universal asynchronous receiver/transmitter) is the dedicated communications device which performs all the formatting, timing and checking that serial data transmission requires. Each transmitted character begins with a single, logic zero, start bit and ends with either 1, 1·5 or 2, logic one, stop bits. The junction of the stop bit(s) of one character and the start bit of the following character form a one-to-zero transition which is present at the beginning of all transmitted characters. The timing circuits in the receiving uart synchronize to this edge in the following way.

In general a uart's synchronization circuitry is driven by a clock running at 16 times the bit rate. Initially the received signal is sampled each clock period, and as long as it remains in the "1" state (which is the "rest" state of the channel) the uart does nothing. As soon as the "0" state is detected the uart will wait another 7 or 7·5 clock periods and sample the signal again. If it is still in the "0" state the uart assumes it has found a valid start bit. The character is now shifted into the uart's receiving shift register one bit every 16 clock periods. The half-bit (eight clock periods) offset introduced ensures that the received signal is sampled (within a few per cent) at the centre of each bit period. When the entire character has been received it is checked for parity and for the presence of the correct number of stop bits. In the meantime the synchronization circuitry will have begun searching for the next start bit halfway through the first stop bit.

The great advantage of asynchronous communication is that only a single communications channel and a local 16-times clock are required. In addition, the hardware for both microprocessor and stand-alone use is very inexpensive, making it very popular for both commercial and amateur data communications in all but the more stringent applications. However, asynchronous transmission does have its limitations, one of which is speed. The 16-times clock means that the highest usable bit rate is only one-sixteenth of the maximum clocking frequency that the uart can cope with. Also, the addition of two or more extra bits per transmitted character reduces the efficiency of the communications channel. While this may not be a problem where the channel is a direct wired line, limited bandwidth

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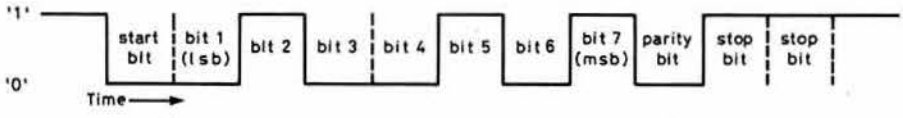

Fig 1. The letter "R" in Ascii with odd parity and two stop bits

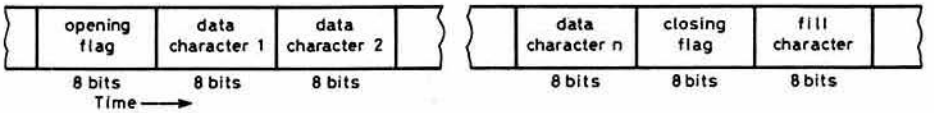

Fig 2. Synchronous transmission format using eight-bit flag and data characters

channels such as telephone circuits and narrow-band radio channels can have their potential data-carrying capacity reduced by 25 per cent or more. As has already been said, the error detection capability of asynchronous transmission is not good, making it totally unsuitable for communicating data which contains little or no natural redundancy. To give an example, plain text has natural redundancy and can, therefore, contain errors on reception which will be obvious (and correctable) by anyone reading the text. Other material may contain little or no natural redundancy. Computer programs and numeric tables are two examples that fall into this latter category. There is one further problem; asynchronous transmission is not suitable, as it stands, for multiple users who share a common communications channel. It has no inherent method of addressing multiple users, which means that some additional supervision of the received data is necessary.

Synchronous communication

Synchronous communication goes some way to overcoming the limitations of asynchronous communication. The most notable difference is that no start and stop bits are transmitted, the synchronization being provided by a clock transmitted with, but separate from, the data. This immediately reveals the major disadvantage of this type of transmission, in that two channels are now necessary. Over moderate distances this is usually acceptable and at least the usrt (universal synchronous receiver/transmitter) can transmit data at its maximum clocking frequency. Readers may have come across the term usart, which describes a programmable device which can handle both synchronous and asynchronous communications, though clearly not at the same time. The separate clock synchronizes the receiver on a bit-by-bit basis but not on a character basis. Indeed, all forms of synchronous receiver suffer from the inability to synchronize to a message if the starting sequence has been missed. This is due to the nature of the character/message synchronization used, as illustrated in Fig 2.

The beginning and end of the message or, more correctly, the frame (a message may consist of several frames), are marked by a special pattern of bits known as a flag. This flag may also be continuously transmitted when there is no data available, thereby not allowing the channel to remain in one state for any length of time. This is useful from a system integrity standpoint, as now any break in the channel will be detected immediately whether or not a frame is being transmitted. The absence of start and stop bits means that now almost all the channel capacity can be used for data, the only overhead being the flags surrounding the frame. However, there is still no method of checking the integrity of the received data save for the possibility of a single parity check bit, appended to each character, as in the case of asynchronous transmission. Any additional error checking would require external hardware (or software) to encode and decode the frame. Synchronous communication in itself is still not suitable for multi-user situations, as these would require more complex operations to be performed by the usrts. Such devices are now readily available and are known as high-level data link controllers.

Data link controllers

Synchronous communication techniques form the basis of networking systems, but when multiple users share a single data link a considerable amount of software and processor time is needed to manage the system. In addition, different groups of people are likely to end up with incompatible systems which can cause great problems when previously isolated groups wish to communicate. Fortunately any problems have, in the main, been resolved by a few large organizations (standards authorities and large computer companies) who have developed data-link protocols to handle multiple users and high-integrity communications. Most large integrated circuit manufacturers have produced high-level data link controllers that implement these protocols in hardware on a single chip. They are powerful enough to off-load from a microprocessor much of the work involved in managing high-level data link communications. These controllers are not stand-alone devices as are some uarts; they require a microprocessor and support circuits to operate and most make provision to interface to other microprocessor hardware (such as direct memory access controllers) to further automate data communications. It is the availability of these controllers at relatively low cost (about £11 to £40) and suitable microprocessor systems that makes amateur packet radio possible.

High-level data link protocols do vary one from another but all share a similar structure, so a brief description of a typical protocol will suffice to show what is involved. Fig 3 shows the make-up of a typical data frame; notice that now individual bits are no longer significant in themselves, but it is the pattern formed by successive bits which is important. The frame again begins with a flag but now it is fixed at "01111110". This pattern is most important for reasons which will become clear. Going back for a moment to basic synchronous communications, the flag which marks the beginning (and end) of a frame can be almost any bit pattern, take for example '01101010'. If a usrt is now instructed to look for this flag while data is in the process of being transmitted, a data character or combination of two data characters may accidentally form this pattern. The usrt will mistake it for a genuine flag and so incorrectly indicate the start of a frame. An example of how this may occur is shown in Fig 4. To prevent this happening in high-level data link communications, the pattern "01111110" is unique, hence it is not allowed to appear accidentally in the data stream. The link controller constantly monitors the transmitted data so that, following a run of five consecutive "1"s, a "0" is automatically inserted into the frame. The receiving controller also monitors the data, automatically removing a "0" which follows five consecutive "1"s.

Following the opening flag is an address field, this is usually the address of the station for which the data is intended, although it may also contain the address of the sender. This field is made up of one or more eight-bit characters. The automatic zero insertion just mentioned, also known as bit-stuffing, is enabled immediately following the opening flag so its operation may affect the address field. Because it occurs transparently its operation and effect on the transmitted data stream is ignored. Hence the length of the eight-bit characters of the address field is that before any bit-stuffing takes place. After the address field comes the control field, consisting of one or two eight-bit characters. These are, to a large extent, user definable and will typically indicate control functions relating to the system hardware and to the data link's operation. The data field itself follows the control field. It may contain any number of bits, including zero bits, and need not be a multiple of a fixed-length character although this would normally be the case. In amateur applications and personal computer local area networks the data field will typically consist of eight-bit characters simply because this matches the data word length used by eight- and sixteen-bit microprocessors. Immediately preceding the closing flag, again "01111110", there is a frame check sequence (fcs) of 16 bits generated by the transmitter from all the bits in the frame except for the flag bits. It can be viewed as the equivalent of the parity bit in asynchronous transmissions but is far more secure. An fcs is generated by the receiver from the received data bits, and once the closing flag is detected the receiver's fcs is checked

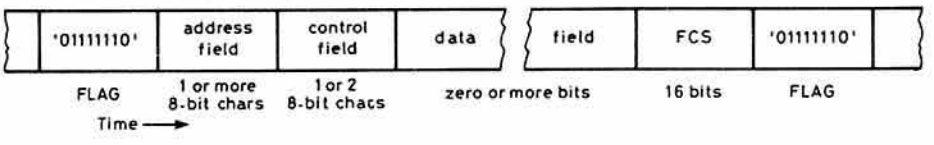

Fig 3. HDLC frame

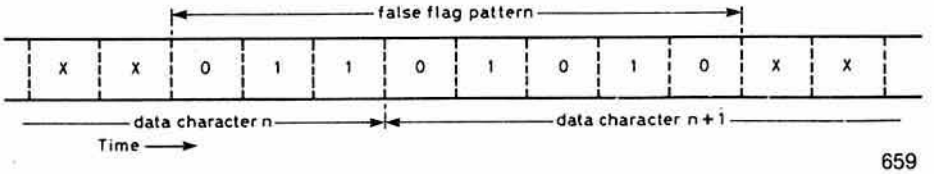

Fig 4. False flag recognition

against the expected result. If any number of bits were corrupted during transmission it would be extremely unlikely that the correct fcs would be formed. In addition to the opening/closing flag there are a few other bit patterns which have six or more consecutive "1"s, and they all have special meanings: for example, "01111111" means go-ahead, and seven (or more) "1"s within a frame means abort the current frame.

One thing not covered so far is: how does the clock necessary for synchronous communications get transmitted with the data over a single channel? To get around this problem at low bit rates at least, a "trick" known, perhaps a little incorrectly, as non-return-to-zero inverted (nrzi) encoding is used. A phase-locked-loop clock in the receiver running at 32 times the bit rate is synchronized to the incoming data bits by transitions in the data stream. To prevent long runs of "0"s (which can occur) causing the pll to become sufficiently out of step with the received data stream to cause errors, nrzi encoding causes a transition in the bit stream to represent a "0" and no transition, at the appropriate time, to represent a "1". Remember that runs of more than five consecutive "1"s are not normally permitted, so "0"s, and therefore transitions in the bit stream, are guaranteed to occur often enough to keep the pll in synchronism. Although this technique does severely limit the maximum bit rate, it is adequate for use over narrow bandwidth channels.

Terminal node controller

Amateur packet radio is closely related to the high-level data link protocol just described. It differs only in detail, such as extending the frame's address field to include the callsigns of both the sending and receiving stations. Although a personal computer can form the basis of a packet radio terminal node controller (tnc), the incorporation of a data link controller into the machine may cause problems and void any manufacturer's warranty. Most people will, therefore, prefer to buy or construct a dedicated tnc, a representative block diagram of which is shown in Fig 5. The choice of cpu/ram/eprom/uart and general purpose i/o port is largely up to the individual, any of the popular microprocessor families can be used with equal results. Indeed, the deciding factor is likely to be the individual's own experience with a particular family and if any packet radio software for a particular microprocessor is available. Where the choice is more open the microprocessor which has the best high-level language support should be used. Buying an off-the-shelf tnc naturally by-passes these problems. The choice of high-level data link controller, which in its single chip form will be referred to by the term hdlc, is not so open-ended. Not all hdlcs support nrzi encoding, current devices that do (to the author's knowledge) are the Intel 8273, the Western Digital WD1933/1935, the Texas TMS9903 and the SGS/ZILOG Z8530. All are established products except for the SGS device, which has only recently been introduced and hence it is somewhat of an unknown quantity. Notable among them is the TMS9903 which is specifically designed to interface with the TMS9900 series of microprocessors and is, consequently, not really suitable for use with other microprocessor families. It does have some advantages over the others, not least of which is its small size, 20-pin dil as opposed to 40-pin dil for the others, and it can also operate asynchronously. The SGS Z8530 appears, from its data sheet, to be a powerful device incorporating two independent full-duplex usarts in one 40-pin package. It supports Z80-style vectored interrupts, making it suitable for use in Z80/Z800, Z8000 and MC68000 series systems. Of the Intel 8273 and WD1933, the 8273 is slightly more expensive than the WD1933. The WD1933 is more difficult to interface than the 8273 and is less easy to obtain, which detracts somewhat from its lower cost. The uart in the tnc allows communication with either a vdu for stand-alone operation, or with a personal computer. The use of a pc greatly enhances the capabilities of the tnc, particularly if the pc has a printer and disk drives. Battery-backed-up ram (or eeprom) is almost a necessity if only a vdu is used, allowing system parameters (callsigns, bit rates etc) to be saved when the tnc is switched off. With a pc attached such parameters can be down-loaded from the pc on power-on and so non-volatile data memory within the tnc will not be necessary. The remaining part of the system is the modem. Short for modulator/demodulator, it is worthy of an entire article in its own right so discussion of it here will necessarily have to be very limited.

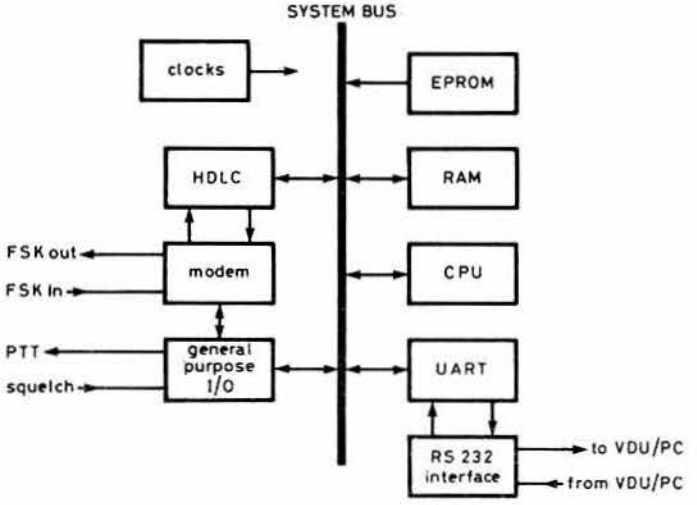

Fig 5. Block diagram of a typical terminal node controller

The modem is the device which converts the logic (voltage) levels output by the hdlc into signals suitable for transmission over the communications medium, in our case a radio channel. As most voice radio channels have some similarity to telephone channels, particularly in terms of frequency response and, to a lesser extent, noise, modified telephone data transmission techniques can be used quite successfully. The availability of telephone modems and their component parts at reasonable cost makes their use attractive. In the UK the adoption of 1,200Hz/2,400Hz fsk signalling has advantages, one of which is the compatibility this gives with both Uosat 1 and Uosat 2. The demodulator part of the modem is far more complex than the modulator, so most circuits that exist for demodulating the telemetry data from the Uosats could be used, saving time and hardware. As 1,200Hz/2,400Hz fsk is also part of the c.u.ts tape-recording standard used to record computer programs on cassette tape, again existing circuits can be used. The output of the modem is fed (after attenuation) into the microphone or phone-patch socket of a radio transceiver, while the headphone or phone-patch output will be suitable for feeding into the modem. However, a small amount of filtering may, in some cases, be beneficial at this point to compensate for any gross deviations the channel has from a flat overall frequency response and to restore a near linear phase response. An fm (or a.m.) transceiver is preferable to an ssb transceiver so as not to introduce any frequency/phase shifts in the received signals. SSB techniques which allow the re-inserted carrier to be correct in both frequency and phase may be of great assistance if data communication over hf channels becomes allowed within the terms of the amateur licence. Whatever method is chosen the better the modem then the more efficient will be the system, particularly at low snrs and in the presence of interference. Until recently data demodulators have always used some analogue circuitry and have required some sort of setting-up. With the introduction of signal processing microcomputers, such as the Texas TMS320, high performance demodulators using nothing more than a passive low-pass filter, an analogue to digital converter and a single-chip microcomputer may be within the financial reach of most amateurs fairly soon.

Amateur packet radio

Having decided on a common hardware specification, a common operating protocol needs to be adopted. The adoption of a common protocol is at least as important as the hardware specification, for unless all stations follow the same protocol satisfactory communication will not be possible. So just what is this protocol? All the hardware protocols already described achieve nothing more than the transmission and reception of single frames or packets of data. The response of both the transmitting and receiving stations following the transmission of a packet must cover the possibility of the packet being received with no detectable errors, being received with errors, or being completely lost. In the last two cases a retransmission will be necessary, so the receiver must be able to request such a retransmission and the transmitting station must recognize the request as such. If there is no response at all from the receiving station the transmitter should repeat the packet; how long the transmitter waits before doing so has to be decided in advance, as does the transmitter's action if several repeats fail to generate a reply. When there are more than two stations operating on one channel the operating protocol must now be capable of directing each station's access to the channel to prevent mutual interference. Clearly there must be one basic protocol to which all stations must adhere. However, it is quite permissible for some stations to have enhancements to the basic protocol as long as all stations behave similarly at the packet transmission level. A possible, much simplified, protocol might operate as follows—note that this assumes that all stations can achieve direct communication with each other so that no intermediate repeater stations are used:

Imagine station "A" wishes to pass several packets (which form a complete message) to station "B". "A" will first listen on the channel; if any other station is transmitting, "A" will wait for that station to finish. Once the channel becomes available "A" will transmit a short packet to "B", the control field of which will effectively ask "B" whether it is "on-line". "B" will respond with a similar packet which will (hopefully) say "yes". From now on "A" can send packets to "B", waiting between each one for an acknowledgement from "B". This form of operation is commonly known as automatic request repeat (arq). Once the entire message has been passed "A" will transmit a close down packet, thus freeing the channel for other stations to use. As with all shared channels there is always the possibility of two (or more) stations transmitting simultaneously. This can happen in this example following "A" 's close-down transmission if two other stations are waiting to pass messages. Both will transmit at the same time and so both packets will probably be lost. If both stations now wait the same length of time before trying again, the same thing might happen and this stalemate situation may continue for some time! To prevent this, following an unacknowledged packet the station should wait for a random length of time before it next transmits, thereby reducing the chance of further simultaneous transmissions. Should two-way communication be broken during the transmission of a message, both stations will close down and wait for some period of time before trying to resume communication; the packets that were successfully passed before contact was broken will not need to be repeated.

In a real situation the example protocol would only be usable over a single channel, and even then only if the overall channel usage was fairly low. The efficiency of all shared channels can fall dramatically as the channel occupancy approaches 100 per cent unless the operating protocol has specific provisions for high occupancy operation. The simple reason for this is because as the number of packets being transmitted increases then the probability of simultaneous transmissions increases (packets "collide"). Each collision reduces the effective channel capacity and so aggravates the situation. Ultimately the number of collisions may be so great that only a few packets are transmitted successfully, the net channel utilization dropping to a fraction of its optimum value. To cover most eventualities any protocol has to be comprehensive, resulting in some considerable programming of the tnc. To make the writing and maintenance of the protocol software quicker and easier, most of the programming should be done in a high-level language. The choice of language may be important as the program should, preferably, be portable from one microprocessor family to another. Suitable languages include compiled Basic (interpreted Basic will be too slow for all but very simple protocols), Fortran, BCPL, Modulo 2, C and Pascal. Compilers for both the latter languages are available at reasonable cost for most microprocessor families. Some parts of the program will have to be written in assembly code (for reasons of execution speed and to interface with specific hardware), and the ease with which this assembly code can be interfaced with the main program will also be important in the choice of high-level language. If the program is to be run on a dedicated tnc, the chosen compiler should be capable of producing "romable" code (code that is split up into at least two memory areas): one for the actual program, stored in rom; and one for the data the program uses and generates, which is located in ram. The program should also be complete in itself, making no calls to an external operating system.

Packet radio possibilities

While offering a method of communicating data reliably over local radio (and other voice) channels, packet radio has many other possibilities. Imagine a repeater station operating on two simplex frequencies: one would be the local channel, say 432MHz, and the other 1·3GHz. The antennas for the 1·3GHz channel would be high gain types directed at other nearby packet repeaters. A station wishing to pass a message to another station, possibly some hundreds of miles distant, would first pass the message to the repeater over the local channel. The repeater would, after ascertaining the area in which the destination station was situated, pass the message on to another repeater closer to that area. Once the message reached the destination station's local repeater it would be transmitted on the local frequency. Hopefully the message would then be passed successfully to the destination station. An acknowledgement of this last action would be passed back to the originating station. These repeaters could store any messages they could not pass on for, say, 12 to 24h. Although this is hardly what many people would term amateur radio, the benefits of such a system would be great to the increasing number of amateurs involved in various scientific studies and who, therefore, need to communicate data reliably to others. Maybe such repeater stations should operate on the microwave bands entirely, where the larger bandwidths available would allow high data rates and so make real-time multi-user packet communications possible.

Modification of a standard 144MHz Europa or Europa B to cover 70MHz

by M. GIBBINGS, G3FDW*

NO MAJOR ALTERATIONS to the Europa circuit are necessary for this modification, other than replacement of three variable capacitors in the receiver converter and replacement of self-supporting coils in the local oscillator chain and transmitter chain, plus the fitting of three or four new components. In addition to normal hand tools, a gdo for setting-up tuned circuits, covering 30-80MHz, is necessary. Before any modification is carried out, it is suggested that the unit is checked for satisfactory operation on 144MHz to ensure that all is well with the transverter to be modified.

Carry out the modifications step by step, in the order shown. First, the receiver converter is modified, followed by the local oscillator chains and the transmitter chain. On completion you will have an efficient and stable transverter which will give excellent results on the 70MHz band.

The following components and materials are required:

Three 3-30pF variable capacitors, large "piston" type similar to those fitted in receiver converter but with "red" or "pink" ceramic insulation.
Two 2-22pF variable capacitors. RS Components 125.654.
One 2·7pF ceramic capacitor.
One 4·7Ω, 1W resistor (non-inductive).
One 2·7kΩ 1/4 resistor.
One 0·25in ferrite bead, FX1115.
One 42·000MHz crystal HC18.
Wire, enamelled copper, 20swg and 22swg.
Wire, silver plated, 14swg and 18swg (for L1 and L11).
Wire, ptfe, insulated, tinned-copper 20swg (L12).

Details of coils to be replaced

L1: 11·5t close-wound 18swg silver plated wire, pull out to 1in length. Antenna tap at 3·5t.G1 of mosfet tap at 7·5t.
L2: 7·5t close-wound with 22swg enamelled-copper wire.
L3: 7·5t close-wound with 22swg enamelled-copper wire.
L5: 8t close-wound with 20swg enamelled-copper wire.
L6: 22t close-wound with 20swg enamelled-copper. Tap at 11t.
L7: 14t close-wound with 20swg enamelled-copper. Tap at 7t.
L8: 8t close-wound with 20swg enamelled-copper. Tap at 4t. Pull out to 1in long.
L9: 14t close-wound with 20swg enamelled-copper. Tap at 7t.
L11: 8t 14swg silvered-copper wire. Coil length overall to be 1·37in with 0·37in gap at 4t for ct and loading coil.
L12: 2t ptfe-insulated 20swg. Twist coil ends together over a length of 2·5in.

NOTE. All coils L1-L9 are wound on a 0·25in diameter drill or rod. L11 and L12 are wound on 0·75in diameter rod.

Make up all coils one by one and replace coils in turn as detailed, noting length of end connections and position relative to other components. All coils fit easily into space occupied by previous 144MHz coils.

Receiver modification

1. Remove antenna changeover relay and coaxial cable to series link variable capacitor. Disconnect capacitor to "output" circuit. Note connections carefully. Remove valves from transmitter.
2. Note how L1, L2 and L3 are mounted. Remove L1, L2 and L3.
3. Remove C1 and its back-to-back diodes, C2 and C3—these will need to be unsoldered and unbolted. Two of these capacitors are needed for the transmitter modification.
4. Fit new C1, C2 and C3 and resolder to top of printed circuit board.
5. Refit back-to-back diodes across C1.
6. Resolder mixer mosfet G1 to C3.
7. Fit a 0·25in ferrite bead to rf amplifier mosfet G2.
8. Make up and fit L3.
9. Make up and fit L2.
10. Make up and fit L1.
11. Solder 2·7kΩ resistor from G2 of mosfet mixer to ground (underside of printed circuit board).

NOTE. Refit L1-3 as noted in **2**. Mount L2 and L3 to have 0·19in gap between coils.

Local oscillator modification

1. Remove Q4 transistor.
2. Remove link from output of local oscillator chain to base of Q3 (via capacitor and four-turn coil). Leave capacitor and coil in circuit.
3. Remove red wire, of red/black twisted pair to mixer mosfet, from connection to o/p from original local oscillator chain. Connect this red wire to connection on printed circuit board from which link coil removed in **2**.

*"Glannaventa", Sturton-le-Steeple, Retford, Notts.

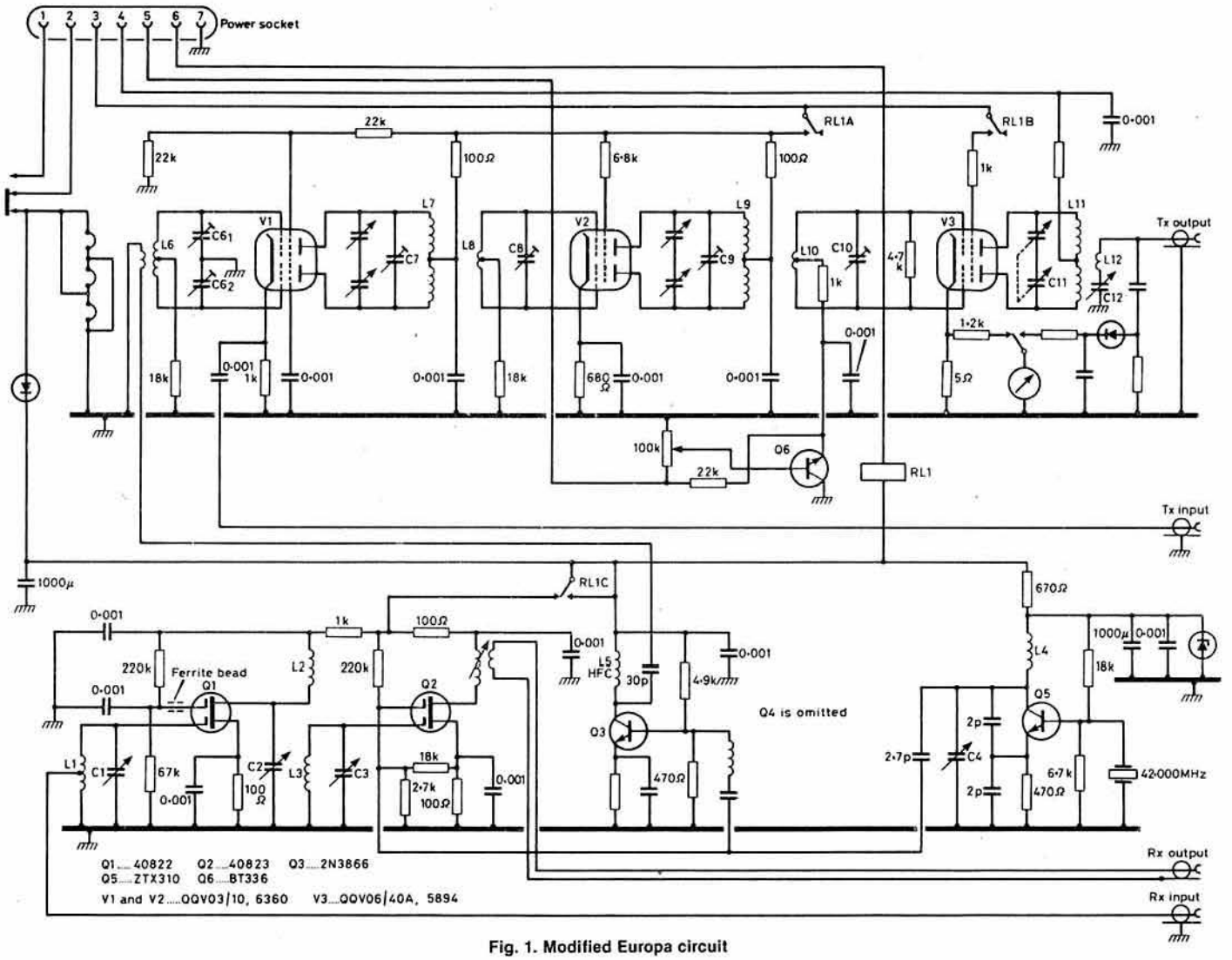

Fig. 1. Modified Europa circuit

4. Connect 2·7pF capacitor between collector of Q5 and "red wire" connection on printed circuit 3.
5. Remove L5 and fit new L5.
6. Short out n/o contact of relay RL1C which supplies +12V to Q3, so that +12V is always connected to local oscillator chain.
7. Fit 42·000MHz crystal in place of 36·666MHz crystal.
8. Lift out two-turn link coil from centre of L6. Remove L6. Fit new L6, resolder 18kΩ to c/t of L6. Refit two-turn link and position in centre of L6.

Transmitter modification

1. Cut off, flush to the pcb, L7, unsolder resistor to coil ct. Fit new L7 and resolder resistor to ct.
2. Remove link, L8, to V2 grids and replace with new L8. Space 0·12in from L7. Resolder 18kΩ resistor to ct. Solder a 2–22pF trimmer across the two grid pins on valve base connection on pcb.
3. Cut off, flush to the pcb, L9, unsolder resistor to ct, and replace with new L9. Resolder resistor to ct.
4. Solder one each of the small piston variable capacitors, removed from the receiver, across both mixer and amplifier anode tuning capacitors. Mount these clear of valves above variable capacitors (C7 and C9 in Fig 1).
5. Solder a 2–22pF trimmer capacitor across grid pins of pa valve. This is best fitted so that capacitor is fitted inside central hole in valve base. It will then clear the covers when fitted. Solder a 4·7kΩ 1W resistor across grid pins of V3.
6. Cut off L11 and fit replacement L11, bending and cutting coil ends to give correct fit.
7. Cut and fit L12 so that link is positioned in centre of L11. Solder one end to fixed plates of L12.
8. Replace antenna changeover relay (Europa Bs) and reconnect antenna connection from centre connection of coaxial lead to L12 and to L1, as noted in step 1 of receiver modification.
9. Refit valves and set up complete transverter.

Setting-up procedure, local oscillator and receiver

1. Connect the 12V ac supply to the Europa but ensure that both 300V and 750V ht lines are *not* energized. A temporary hook-up for 12V supply only will prove the safest method. Check valve heaters are ON.
2. Using a gdo on 42MHz, tune C4 for maximum output in L4.
3. Using a high impedance voltmeter (20,000Ω/V) across the 18kΩ resistor at ct of L6, tune C6.1 and C6.2 for maximum voltage. This should be between 6 and 9V. As C6.1 and C6.2 are separate capacitors, check that meshing of plates is the same for both capacitors to produce peak.
4. Connect receiver o/p to receiver tuned to 28·2MHz. Connect a suitable 70MHz antenna to transverter.
5. Tune C3, C2 and finally C1 for maximum noise o/p in receiver. Check receiver performance on one of the 70MHz beacons, and reset C1, C2 and C3 for best signal o/p.
6. Tune-in one of the identified beacon stations on 70MHz, say GB3BUX on 70·050MHz, and reset C4 to give correct frequency on receive (28,050kHz).
7. Disconnect temporary 12V supply.

Setting-up procedure, transmitter

Note. All supplies to be disconnected from the Europa.

1. Using a gdo on 70MHz coupled to L7, set mix anode tuning capacitor to two-thirds meshed. Adjust C7 to resonance.
2. Couple gdo to L8, set C8 to resonance.
3. Couple gdo to L9 and repeat procedure 1 for setting C9.
4. Couple gdo to L9/L10 and adjust C10 to resonance.

At this stage refit all covers.

Final setting up of transmitter

1. Plug-in all leads to psu/FT101 etc, transmitter drive, receiver o/p, antenna connection etc.
2. Switch Europa ON. Set input/output switch to INPUT.
3. Recheck that receiver operation is satisfactory.
4. Set-up 28MHz drive for cw with carrier drive at minimum.
5. With all supplies ON, key to "transmit" and check Europa switches to transmit. Check that pa standing current is 25–30mA. Adjust bias potentiometer to obtain this standing current.
6. On TRANSMIT, turn carrier input up and tune mixer and driver for maximum pa current. **Note:** reduce carrier input progressively to prevent pa current rising above 100mA. Tune pa for dip. Load with "load" capacitor and re-dip pa. (*Note,* do this quickly).
7. Test on ssb and set to give speech peaks of about 100–150mA *maximum.* □

DESIGN OF L-NETWORKS FOR MATCHING ANTENNAS TO TRANSMITTERS

by J. A. EWEN, CEng, MIMechE, G3HGM*

G3HGM was first licensed in 1947, as D2HN, while serving in Royal Signals in the British Zone of occupied Germany. After demobilization he returned to his native Scotland and obtained the callsign GM3HGM. He worked for the North British Locomotive Company in Glasgow until 1954 when he moved south of the border, changing his callsign to G3HGM. Since then he has worked in engineering with, first, Vauxhall Motors Ltd at Luton; and then in the National Health Service. He hopes that imminent early retirement will provide more time for operating, as opposed to construction and measurement which have been his predominant interests.

Introduction

The article "Measurement of antenna radiation resistance and reactance" by John Bazley, G3HCT, *Rad Com* June 1979, presented information on the construction of a most useful device for measuring complex impedances, slanted towards antenna systems. Unfortunately, it is my experience that most recently-licensed amateurs (and especially black-box operators, who are apparently willing and able to pay three-digit sums for commercial antenna matching units) and a goodly number of old-timers, would experience some difficulty in telling a complex impedance apart from a bull's foot. This article has been prepared in an attempt to help experimenters who "just cannot get my antenna to load up om", and especially to show how to translate into inductors and capacitors the information which can be obtained from G3HCT's device.

Basic principles

At the outset, it might be useful to explain simply one or two of the properties possessed by the components we employ in atus and transmitter tank circuits. These are resistors, capacitors and inductors.

(1) All three have resistance, denoted R. This is independent of frequency.

(2) In addition, capacitors have capacitive reactance which decreases with rising frequency and vice versa, and has the effect of causing the current flowing through a capacitor to lead in phase by 90° the voltage across it. Capacitive reactance is denoted as X_C and has a magnitude

$$\frac{1}{2\pi fC}$$

(3) In addition, inductors have inductive reactance which increases with rising frequency, and vice versa, and has the effect of causing the current flowing through an inductor to lag in phase by 90° the voltage across it. Inductive reactance is denoted by X_L and has a magnitude $2\pi fL$.

The combined effect of R and X_C in a capacitor, and R and X_L in an inductor, is known as impedance, and cannot be arrived at by simply adding the resistance and the reactance. Instead, a process known as vectorial addition is used, since allowance must be made for the fact that the currents in the reactances are out of phase with the voltages, and also with the currents in any resistance present. Vectorial addition is very simply done by means of a vector diagram, and the following examples will show how:

* 21 The Crescent, Caddington, Luton LU1 4HZ.

(a) Find the impedance of an inductor whose resistance is 3Ω and reactance at a given frequency is 4Ω (see Fig 1).

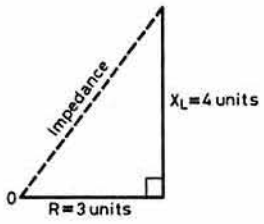

Fig 1. Vector diagram showing how the impedance of a combination of resistance (three units) and inductive reactance (four units) is arrived at. The vector representing inductive reactance is conventionally regarded as positive, and is therefore drawn upwards from the end of the resistance vector. In the resulting right-angled triangle, (impedance)$^2 = R^2 + X^2_L$, so impedance = $\sqrt{R^2 + X^2_L}$

Starting at 0, draw a horizontal line three units in length to represent the 3Ω resistance of the inductor. From its end draw a line vertically upwards and four units long to represent the inductive reactance. If the end of this line is now joined to 0, the length of the third line, to the same scale, will represent the impedance. A slight acquaintance with Pythagoras will tell one that, in this case, the answer is

$$\sqrt{3^2 + 4^2} = 5\Omega$$

(b) Find the impedance of a capacitor whose resistance is 1Ω and whose reactance at a given frequency is 3Ω (see Fig 2).

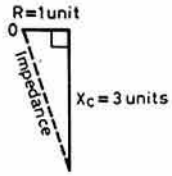

Fig 2. Vector diagram similar to Fig 1, but with the vector X_C drawn downwards, representing capacitive reactance. Impedance = $\sqrt{R^2 + X^2_C}$

The method is the same as in *(a)* except that the vector representing X_C is drawn downwards. This is mathematical convention, X_C being regarded as a negative vector, and X_L as positive. The numerical value of the impedance is, of course, unaffected by the direction of the vector representing the reactance, and in this case is

$$\sqrt{1^2 + 3^2} = \sqrt{10} = 3 \cdot 162\Omega$$

It must always be kept in mind that reactances, and the impedances of which they form part, are dependent on frequency. If the reader has seen the light so far, this may be a convenient point to look at the interesting special case of a circuit containing all three of the properties inductance, capacitance and resistance. This is shown in Fig 3.

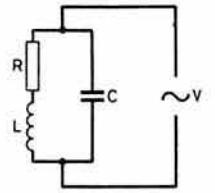

Fig 3. Tank circuit containing L, C and R. R is undesirable but is unavoidably present in the conductors of the coil and capacitor

Since X_C falls with rising frequency and vice versa, and X_L rises with rising frequency and vice versa, if an alternating voltage V is applied to the LC circuit shown, and then varied in frequency, it must be possible to find a setting at which $X_L = X_C$ and since X_L is positive and X_C is negative, they are mutually cancelling. This is the phenomenon known as resonance, and in this condition only the resistance present (in the wire of the inductor, the

connecting leads and the capacitor) limits the size of the current which flows. So next time you are tuning your pa tank for maximum dip, remember that what you are really doing is making $X_L = X_C$, and that the coil and connections are made of the thickest wire possible (maybe even silver-plated) to ensure that R is low and, as a result, current is maximized.

Once a little facility has been developed in thinking in the above terms, it will be possible to appreciate that very few antennas are likely to be purely resistive; ie possess no capacitive or inductive reactance. After all, the wire has inductance and distributed capacitance, plus capacitance to earth etc. This seems a pity, since transmitter power amplifiers are designed to work into a specific resistive load, and coaxial and other feeder cables also should ideally be terminated with a load having an impedance equal to the characteristic impedance of the cable. Fig 4 shows a fairly typical arrangement at the output end of a transmitter. From this, it can be seen that the job of the atu is to produce a situation where the combination of everything within the dotted enclosure (atu, long wire and earth system) presents 75Ω to the incoming coaxial cable from the transmitter.

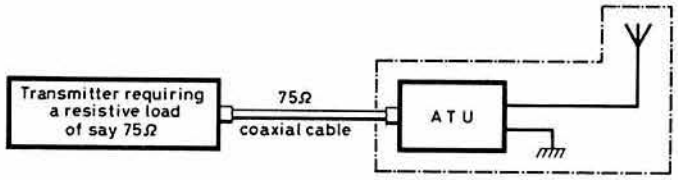

Fig 4. The atu is adjusted in such a way that the combination of atu + antenna + earth is resistive at the operating frequency, and equal to the characteristic impedance of the feeder

The problem, therefore, resolves itself into one of designing an atu capable of transforming the complex impedance (ie involving L, C and R) of an antenna/earth system into a resistive load to suit the transmitter output characteristics. Practically all design information for atus makes the quite unwarranted assumption that the antenna/earth system impedance is resistive. The following information will, it is hoped, show how to design L-networks capable of dealing with reactive loads, ie practically all antenna/earth systems.

Design considerations

One must, of course, start by measuring the resistive and reactive components of the radiating system, using the G3HCT device, at the frequency at which it is to be used. It should be noted that, if the installation is one in which a long wire antenna is to be worked against earth, the proposed permanent earth must be in use when the readings are taken.

L-networks come in two configurations (Fig 5). Note that the parallel element is at the high impedance end in both cases. Suppose that the parameters of your antenna/earth system have been measured, and that it has a resistance of 22Ω and a capacitive reactance of 7Ω. Mathematical shorthand is used to express this complex impedance as 22-j7. Had the reactance been inductive, of 7Ω, the impedance would have been written 22 + j7. The design of a network to match an antenna/earth system impedance of 22 − j7 to a transmitter requiring a 75Ω resistive load at 3600kHz is carried out as follows:

Table 1. Coil winding details

Inductance (μH)	Diameter (in)	Length (in)	SWG	TPI
2·2	0·75	2	18	8
2·9	0·75	2	18	10
3·05	1·0	3	18	6
5·1	1·0	3	18	8
6·85	0·75	2	20	16
7·1	1·25	5	16	6
7·5	1·0	3	18	10
9·6	1·5	5	16	6
11·9	1·75	5	14	6
12·25	1·25	5	16	8
14·0	0·75	2	22	24
15·25	2·0	5	14	6
16·75	1·5	5	16	8
18·25	1·25	5	16	10
21·12	1·75	5	14	8
23·1	2·5	5	14	6
25·25	1·5	5	16	10
27·12	2·0	5	14	8
28·0	0·75	2	24	32
33·7	1·75	5	16	10
41·0	2·5	5	14	8
42·3	2·0	5	16	10
45·5	1·25	5	20	16
62·25	1·5	5	20	16
64·0	2·5	5	16	10
72·0	2·0	3	24	32
84·48	1·75	5	18	16
108·47	2·0	5	18	16
164·0	2·5	5	18	16
185·0	1·25	5	24	32

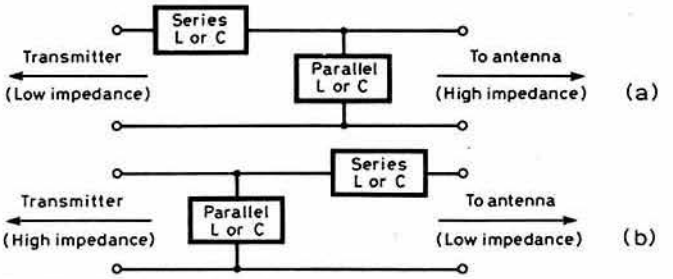

Fig 5. L-network layouts for matching: *(a)* an antenna system whose impedance is higher than the transmitter output impedance; *(b)* an antenna system whose impedance is lower than the transmitter output impedance

Case 1 (Resistive part of antenna/earth system less than desired transmitter load.) The use of the configuration in Fig 5(b) is required, and the network will look like Fig 6.

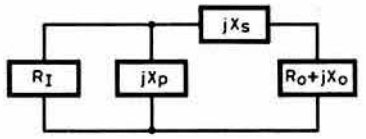

Fig 6. "Block" arrangement of elements if the resistive part of the antenna/earth system is less than the desired transmitter load

R_I = Transmitter load = network input resistance = 75Ω
R_o = Resistive part of antenna/earth system impedance = 22Ω
jX_o = Reactive part of antenna/earth system impedance = $-j7\Omega$

(1) $A = \sqrt{\frac{R_I - R_o}{R_o}} = \sqrt{\frac{75-22}{22}} = \sqrt{\frac{53}{22}} = \sqrt{2{\cdot}409} = 1{\cdot}552\Omega$

(2) $jX_s = -jX_o + jR_oA$
$= j7 + j(22)\,(1{\cdot}552) = j41{\cdot}146$

(3) Since jX_s is positive, the necessary reactance must be inductive.
The inductance required to give this reactance (41·146Ω) at 3,600kHz

$$L_s = \frac{X_s}{2\pi f} = \frac{41{\cdot}146}{2\times3{\cdot}14\times3{\cdot}6\times10^6}\text{henries} = 1{\cdot}819\times10^{-6}\text{henries} = 1{\cdot}819\mu\text{H}.$$

(4) $jX_p - j\frac{R_I}{A} = -j\frac{75}{1{\cdot}552} = -j48{\cdot}324$

(5) Since jX_p is negative, the necessary reactance must be capacitive.
The capacitance required to give this reactance (48·324Ω) at 3,600kHz is

$$C_P = \frac{1}{2\pi fXp} = \frac{1}{2\times3{\cdot}14\times3{\cdot}6\times10^6\times48{\cdot}324}\text{farads} =$$

$9{\cdot}15\times10^{-10}$ farads = 914pF.

This network would therefore take the form shown in Fig. 7.

In fact, alternative values of the reactances can be found by repeating the calculation, using the expression $jX_S = -jX_0 - jR_oA$ instead of that given at step **(2)**, and the expression $jX_p = j\frac{R_I}{A}$ instead of that given at step **(4)**.

This results in the following:
$jX_s = -j27{\cdot}144$ which is capacitive and requires 1,628 pF;
$jX_p = j48{\cdot}324$ which is inductive and requires 2·136 μH.
This network would be arranged as in Fig 8.

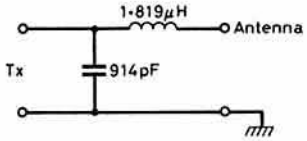

Fig 7. Circuit of Fig 6, with values of L and C required to match an antenna impedance of 22 − j7 to a transmitter output impedance of 75Ω, at 3,600kHz

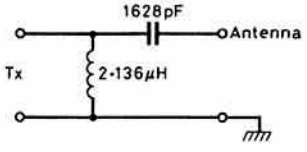

Fig 8. Alternative arrangement of reactances to give the same matching ability as Fig 7

Table 2. Summary of formulas used to calculate jX_s and jX_p

Resistive component of antenna/earth system less than required transmitter load	Resistive component of antenna/earth system greater than required transmitter load
$jX_s = -jX_o + jR_oA$	$jX_s = j\sqrt{Z_o^2\left(\frac{R_l}{R_o}\right) - R_l^2}$
and $jX_p = -j\frac{R_l}{A}$	and $jX_p = \frac{Z_o^2}{\left(\frac{R_o}{R_l}\right)\left(jX_s\right) + jX_o}$
OR	OR
$jX_s = -jX_o - jR_oA$	$jX_s = -j\sqrt{Z_o^2\left(\frac{R_l}{R_o}\right) - R_l^2}$
and $jX_p = j\frac{R_l}{A}$	and $jX_p = \frac{Z_o^2}{\left(\frac{R_o}{R_l}\right)\left(jX_s\right) - jX_o}$

If the antenna/earth system had had a resistance of, say, 92Ω and an inductive reactance of 12Ω, ie its impedance was 92 + j12, and it was desired to match this to a transmitter requiring a 75Ω resistive load at 3,600kHz, it would be necessary to proceed as follows:

Case 2 (Resistive part of antenna/earth system greater than desired transmitter load). The use of the configuration in Fig 5(a) is required, and the network will look like Fig 9.

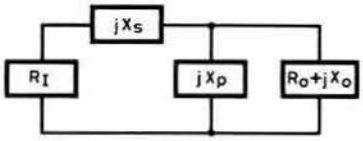

Fig 9. "Block" arrangement of elements if the resistive part of the antenna/earth system is greater than the desired transmitter load

R_l = transmitter load = network input resistance = 75Ω.
R_o = resistive part of antenna/earth system impedance = 92Ω.
jX_o = reactive part of antenna/earth system impedance = +j12Ω.

(1) $Z_o^2 = R_o^2 + X_o^2 = 92^2 + 12^2 = 8464 + 144 = 8,608$

(2) $jX_s = j\sqrt{Z_o^2\left(\frac{R_l}{R_o}\right) - R_l^2}$

$= j\sqrt{8608\left(\frac{75}{92}\right) - 75^2}$

$= j\sqrt{7017 - 5625} = j\sqrt{1392} = j37{\cdot}3$

(3) $L_s = \frac{X_s}{2\pi f} = \frac{37{\cdot}3}{2\times 3{\cdot}14\times 3{\cdot}6\times 10^6}$ henries $= 1{\cdot}65\times 10^{-6}$henries $= 1{\cdot}65\mu$H.

(4) $jX_p = \frac{Z_o^2}{\left(\frac{R_o}{R_l}\right)\left(jX_s\right) + jX_o} = \frac{8,608}{\frac{92}{75}\times j37{\cdot}3 + j12}$

$= \frac{8,608}{j45{\cdot}75 + j12} = \frac{8,608}{j57{\cdot}75}$

$= \frac{-j8,608}{57{\cdot}75}$ (multiplying top and bottom by $-j$) $= -j149$

(5) $C_P = \frac{1}{2\pi f X_P} = \frac{1}{2\times 3{\cdot}14\times 3{\cdot}6\times 149\times 10^6}$ farads $=$
$2{\cdot}97\times 10^{-10}$ farads $= 297$pF.

This network would take the form shown in Fig 10.

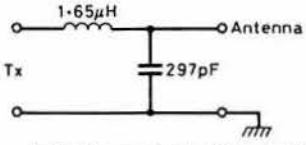

Fig 10. Circuit of Fig 9, with values of L and C required to match an antenna impedance of 92 + j12 to a transmitter output impedance of 75Ω, at 3,600kHz

As in the example using configuration 5(b), there are alternative values of the reactances which will give the same practical results, and these can be arrived at by using the expression

$$jX_s = -j\sqrt{Z_o^2\left(\frac{R_l}{R_o}\right) - R_l^2}$$

instead of that given at step (2), and the expression

$$jX_p = \frac{Z_o^2}{\left(\frac{R_o}{R_l}\right)\left(jX_s\right) + jX_o}$$

instead of that given at step (4).
This results in the following:
$jXs = -j37{\cdot}3$ which is capacitive and requires 1,186pF
$jXp = j149{\cdot}05$ which is inductive and requires $6{\cdot}59\mu$H.
This network would be arranged as in Fig 11.

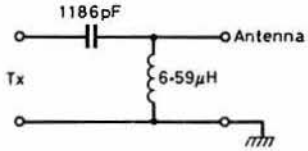

Fig 11. Alternative arrangement of reactances to give the same matching ability as Fig 10

Note that, upon occasion, both series and parallel elements may be capacitors. It is equally possible for both to be inductors.

Construction

The necessary design information is now to hand to enable an L-network to be constructed to solve your problems. The only remaining difficulty is the translation of the inductance values into actual coils. Table 1 gives details of 30 coils and, where the desired value does not appear, interpolation will give results of adequate accuracy.

If it is required to construct a multiband antenna matching unit, the characteristics of the antenna/earth system will need to be examined for each band, and the calculations carried out to determine the maximum and minimum limits required, in inductance and capacitance. The elements will require to be made variable. In the case of capacitors this may be done by incorporating switched fixed capacitors in parallel with a single variable capacitor. The fixed capacitors should preferably be air spaced, but, failing this, moulded mica is suitable for hf use. Inductors may be varied by switched taps, roller-coasters, variometers, or insertion and withdrawal of a suitable core.

In order to eliminate totally the tendency to work blind, the set-up of Fig 12 is recommended.

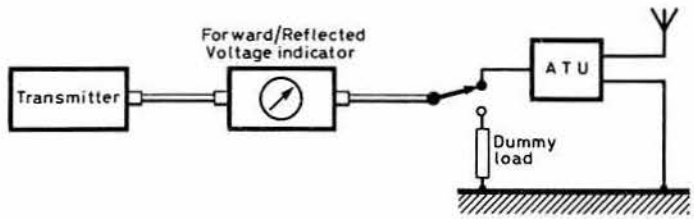

Fig 12. Convenient practical arrangement to permit fast and accurate tune-up

Setting up

The correct setting-up procedure is as follows:

(1) Connect dummy load of correct resistance in place of the atu/antenna combination.
(2) Adjust transmitter output loading and tuning until rated current is drawn at maximum dip.
(3) Adjust sensitivity of forward/reflected voltage indicator for full scale reading in the forward direction. Check the reflected voltage, which should be zero.
(4) Do not alter transmitter adjustments, but switch from dummy load to atu and adjust its controls until the pa anode current is the same as in step (2) and reflected voltage reading is zero.

The combination of the atu and the antenna/earth system is now resistive and of the correct magnitude. You are properly tuned up!

Acknowledgements

1. "L-Networks for Reactive Loads", Robert E. Gordon, W0KFI. *QST* September 1966.
2. Descriptive literature on "CODAR-QOILS". □

Table 3. Formulas used to calculate C_s, C_p, L_s and L_p once X_s and X_p are known

$C_s = \frac{1}{2\pi f X_s}$	$L_s = \frac{X_s}{2\pi f}$
$C_p = \frac{1}{2\pi f X_p}$	$L_p = \frac{X_p}{2\pi f}$

Units are: C in farads; L in henries; f in hertz; and X in ohms.

A TRANSCEIVER FOR THE HF BANDS

by Lorin Knight, MIEE, G2DXK*

Part Three

PARTS 1 AND 2 LOOKED in outline at the overall transceiver concept, and in detail at the circuitry for the basic receiver part of the transceiver. Part 3 now gives the constructional details necessary to build the basic receiver. It will be assumed that the constructor is including the facilities for both ssb and cw operation. However, should only one of these modes be required, he will be able to make some simplifications. The possible simplifications will not be detailed here as they are fairly self-evident.

The cabinet

After looking at all the cabinets available off-the-shelf it was felt that none was really suitable for this project and, somewhat reluctantly, it was decided to use a custom-built cabinet. Fig 12 shows this cabinet with its base and lid removed, and Fig 13 shows the component parts from which the cabinet is assembled. The undrilled metal work can be obtained fairly cheaply from H. L. Smith & Co Ltd, 287/289 Edgware Road, London W2.

The front, back, sides and chassis are assembled using 4BA by 0·25in (or M4 by 6mm) bolts and nuts. Panel-headed bolts are to be preferred as they give a neater appearance. Longer bolts should not be used because they might foul the pcbs. The lid and base are fixed with self-tapping screws. After assembly the cabinet can be given a couple of coats of paint from an aerosol can, and the front panel inscriptions done with Letraset stencils and a fine, nylon-tipped pen. A final protective spray of clear varnish can then be given, and one has a very presentable cabinet.

Fig 14 gives a top view of the cabinet showing how the major items are fitted. Each pcb is mounted on 0·375in-long 6BA tapped brass pillars, using a 0·25in 6BA bolt and a washer at each end of each pillar. The pillars also provide the earth connections for the pcbs. Suitable pillars can be obtained from Electrovalue.

The 4·433MHz filter (PCB1) and the bfo (PCB9) are each mounted inside an aluminium box, 3 by 2 by 1in. Such boxes are obtainable from many sources, but note that those marketed by Maplin Electronic Supplies have a different form of construction and are not suitable. The switch S1103 is mounted on the front of the bfo box, and the shaft needs extending to reach through the front panel. A suitable shaft coupler can be obtained from Electrovalue, and the bush for the front panel can be salvaged from an old volume control. Switch S1102 is mounted on a small aluminium plate, approximately 3 by 1in, which is bolted onto the flange of the chassis. This plate can be cut from the bfo box lid, which is not needed. The spindle of S1102 also needs extending. Adjacent to S1102 is a pillar holding the soldering tags used for earthing the coaxial cables that go to the switch.

The plastic tubes marked A, B and C are used to guide the various interconnection wires and enable the wiring to be kept tidy. They are about 0·625in long and have an internal diameter of something like 0·375in. They can be cut from an old felt-tip pen or an old fountain pen, and are fixed with Araldite to the flange of the chassis, or, in the case of tube C, to the switch-mounting plate.

Fig 15 shows the underside view of the cabinet. Mounted centrally on the chassis is the diecast box containing the vfo. The vfo amplifier (PCB2a) can be seen mounted on the side of this box.

Fig 16 shows the drilling template for the chassis. All the holes are on a 0·1in grid, and it is recommended that Fig 16 be copied out onto a suitable sheet of graph paper, which can then be glued to the chassis while the holes are drilled. Note that the template should be glued to that side of the chassis away from the flanges; this will be the underside of the chassis when it is fitted in the cabinet. Note also that the four holes labelled "C" are for fixing both the vfo box and the filter box, and that the three holes labelled "E" are for clearing screw heads on the bottom of the vfo box. The position of the vfo box, and hence of these seven holes, may need to be moved slightly forward or backward depending on the particular tuning capacitor and slow-motion drive being used. Be sure to check this before drilling these seven holes.

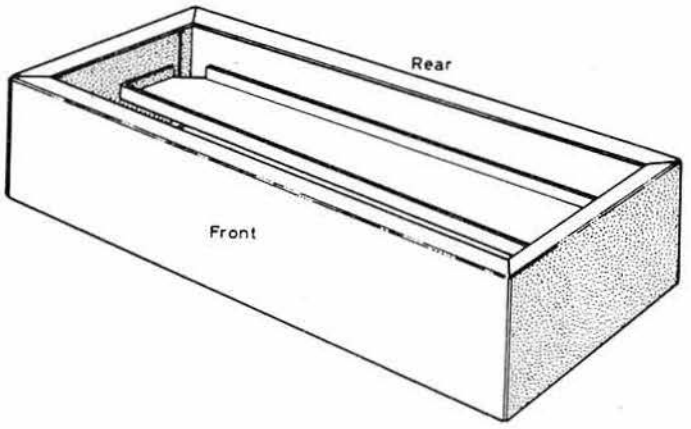

Fig 12. The cabinet without its removable lid and base

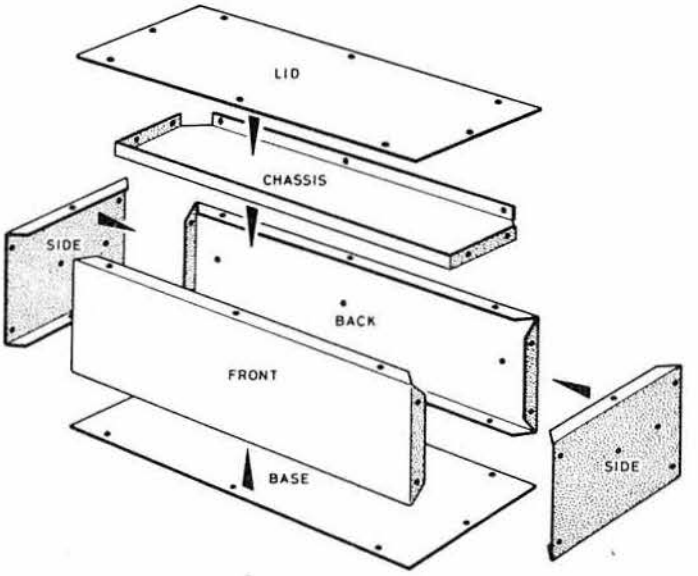

Fig 13. Component parts of the cabinet. Overall dimensions are: front and back, 14 by 4·25 by 0·375in; sides 6 by 4·25 by 0·375in; lid and base 14 by 5·875in; chassis 14 by 4 by 0·375in (0·625 by 0·625in cut away from rear corners). Material: 18swg aluminium.

The holes in the sides and back for fixing the chassis are 2·5in from the bottom. (It is possible that this dimension might need to be modified slightly to suit the particular slow motion drive being used)

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Fig 17 shows the front-panel layout. On the prototype the author used a Jackson 6:1 epicyclic drive (type 4511F) and pointer (type 4104), obtainable from Maplin Electronic Supplies. The scale was made by glueing some glossy white card to a thin sheet of aluminium. After drawing the scale with a fine, nylon-tipped pen and adding Letraset numerals, it was given several coats of protective varnish. The constructor may wish to invest in the luxury of a complete dual-ratio drive scale such as the Jackson type 4103, or he may wish to use a different epicyclic drive. A ratio of 6:1 is just adequate with the restricted frequency range used for the vfo, but some constructors will probably prefer to use a somewhat higher ratio.

A 100μA meter is used for the S-meter, and it is mounted upside down, ie with its zero to the right. To the left of the meter are two l.e.ds—a green one to indicate RECEIVE and a red one for TRANSMIT. The constructor may prefer to use one of the so-called multicolour or tricolour l.e.ds which have both a red and a green l.e.d. in one package; in this case only one hole will be required. The author used a five-pin 240° DIN socket for the microphone, and a standard 0·25in jack socket for the morse key, but other constructors may wish to use different types of socket.

The switch beside the key socket is a small dpdt toggle and is included for any possible enhancement which may be added later. Even if the constructor thinks he is unlikely to follow all the possible options, it is strongly recommended that he makes initial allowance for all the controls shown, for all the pcbs, and for all the recommended provisions to facilitate possible future enhancements. From bitter past experience with homebrew

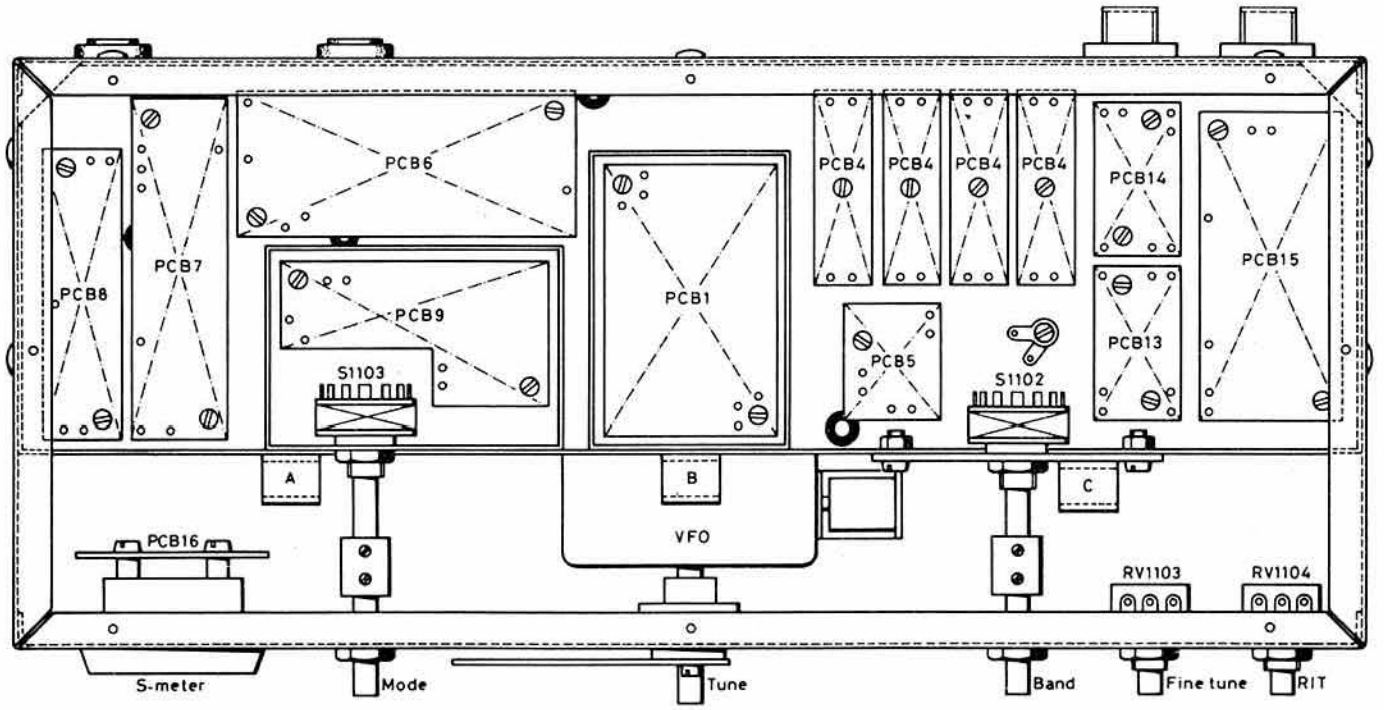


Fig 14. View from the top showing the position of the major items. A, B and C are short lengths of plastic tube used as guides for the wiring

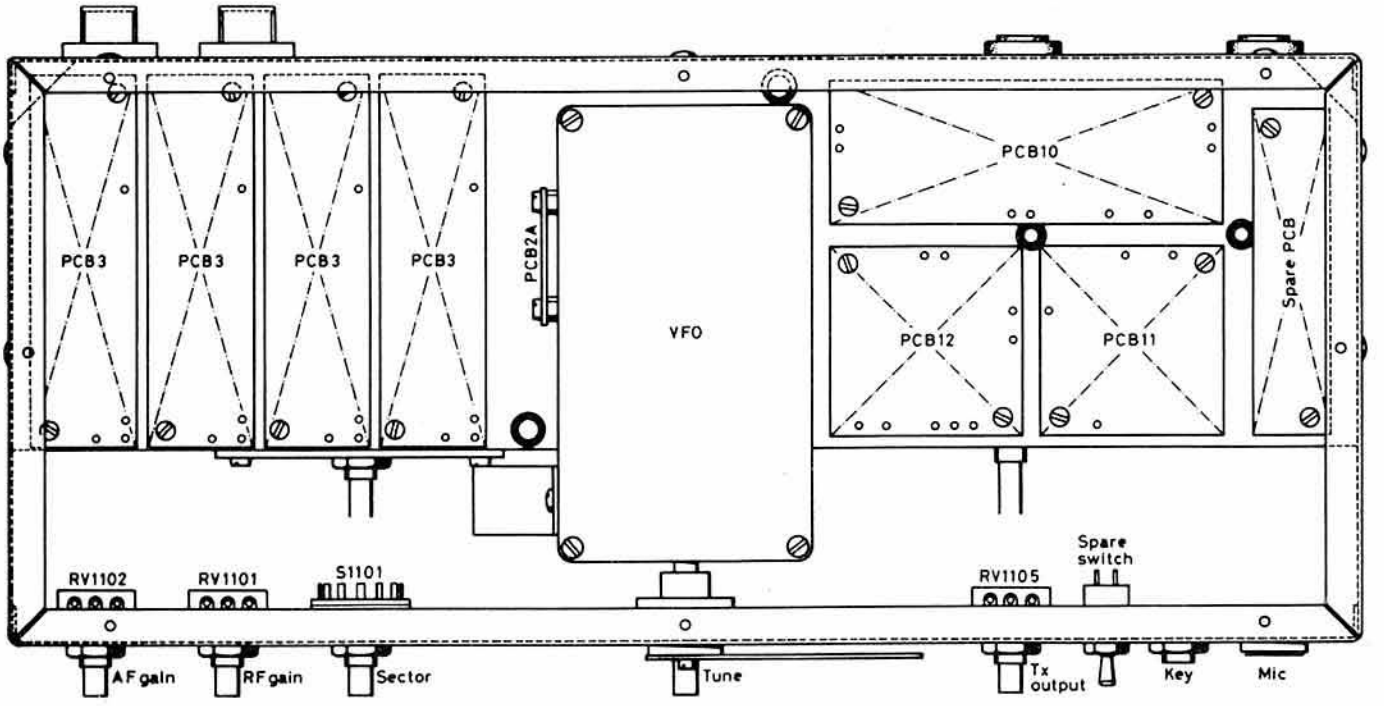


Fig 15. View from the bottom showing the position of the major items

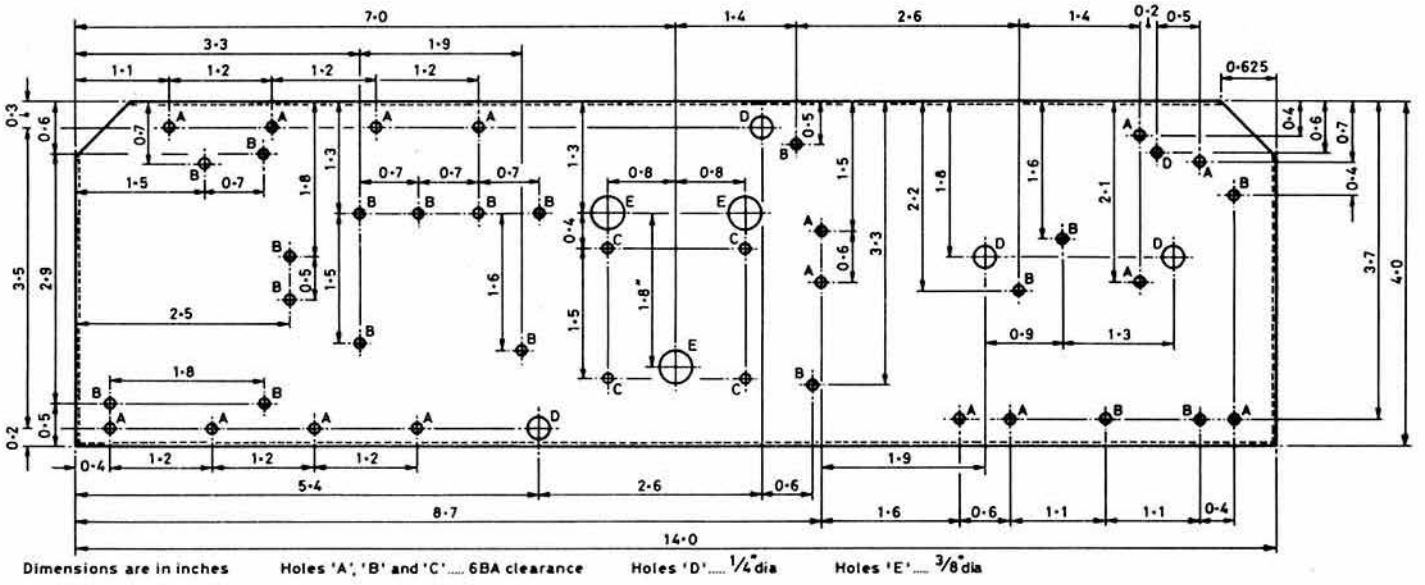


Fig 16. Chassis drilling diagram. This is the side away from the flanges (lower side when the chassis is fitted in the cabinet)

KEY

A. 6BA clearance holes for fixing 6BA pillars on the lower side of the chassis
B. 6BA clearance holes for fixing 6BA pillars on the upper side of the chassis
C. 6BA clearance holes for fixing (upper side) the filter box and the 6BA pillars which hold the filter pcb and (lower side) the vfo box
D. 0·25in diameter holes for grommets
E. 0·375in diameter holes to clear the 6BA bolt heads on the bottom of the vfo box

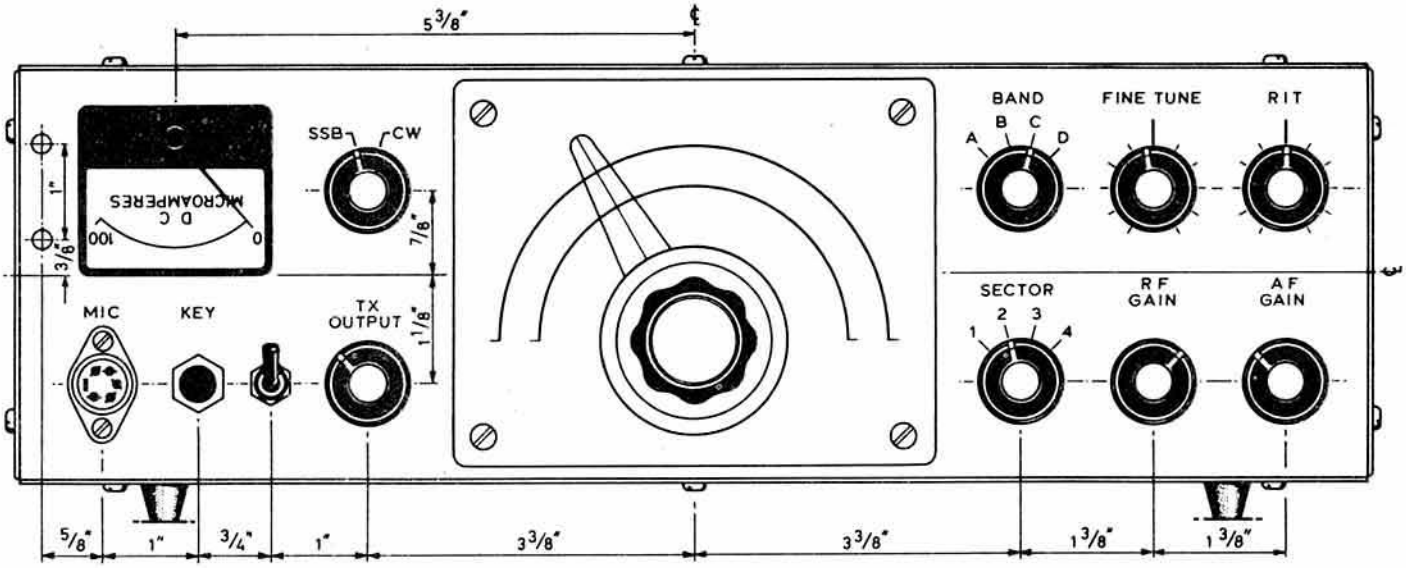


Fig 17. Front panel layout

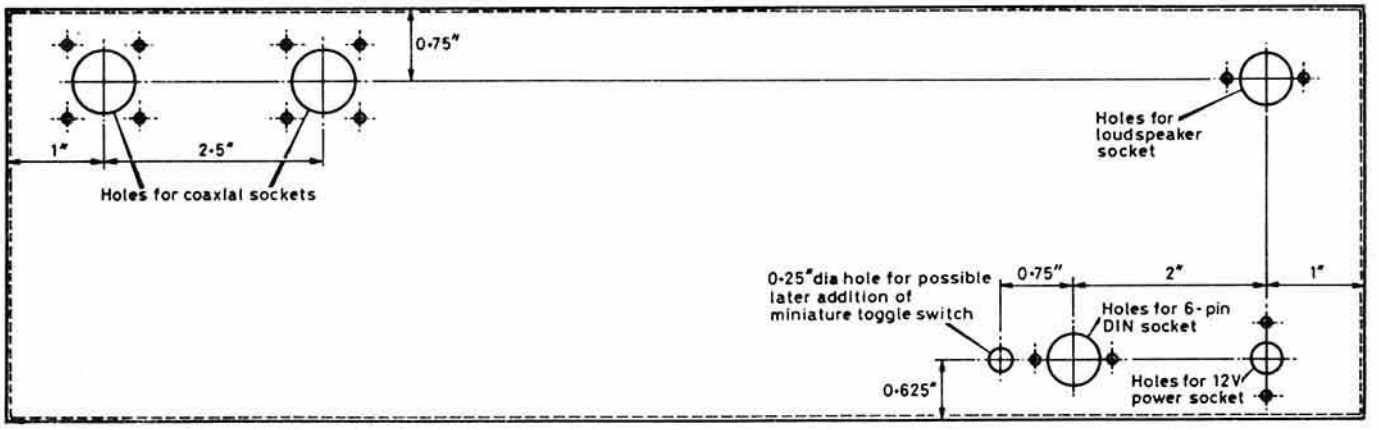


Fig 18. Back panel showing the positions of the various sockets

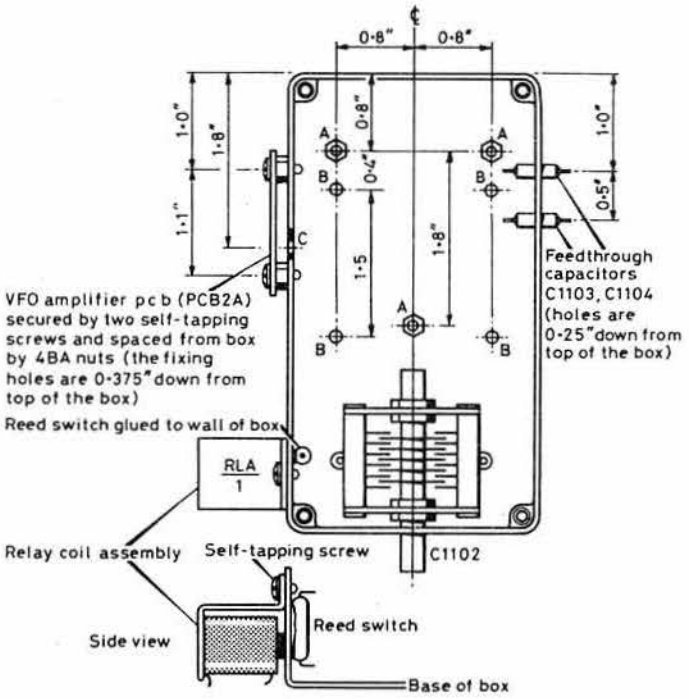


Fig 19. Construction of the vfo.
KEY
A. 6BA clearance holes holding the 6BA pillars to which the pcb will be fixed
B. 6BA clearance holes for fixing vfo box to the main chassis
C. 0·125in diameter hole to take output lead from vfo to vfo amplifier

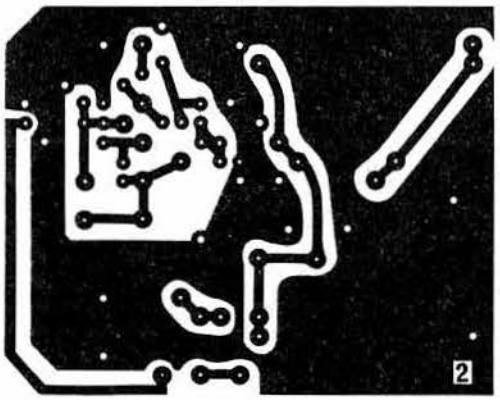


Fig 20. Etching pattern for the vfo board (PCB2)

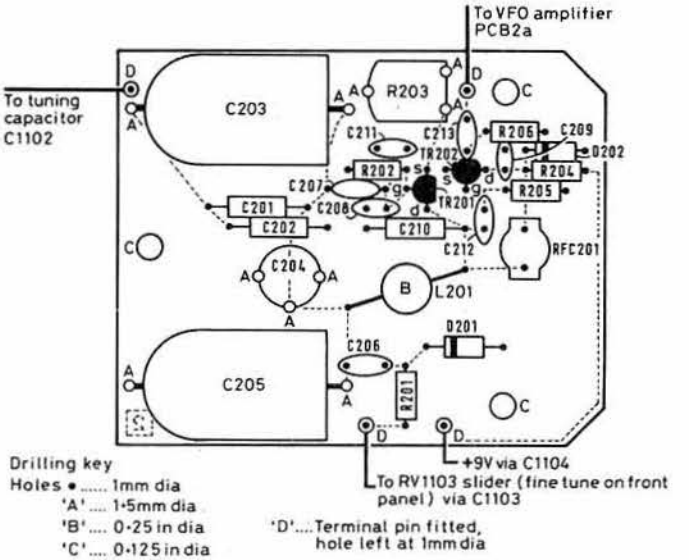


Fig 21. How components are mounted on the vfo board. Note that some holes need enlarging first before the components are fitted

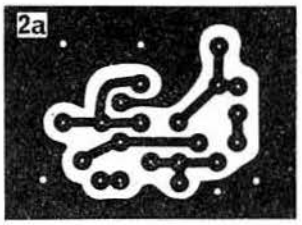


Fig 22. Etching pattern for the vfo amplifier board (PCB2a)

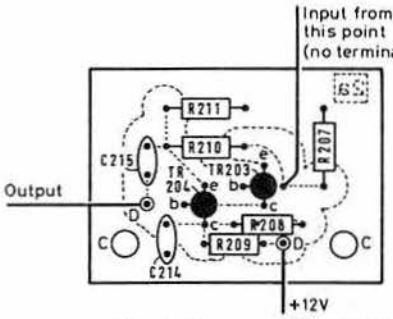


Fig 23. Component layout of the vfo amplifier board

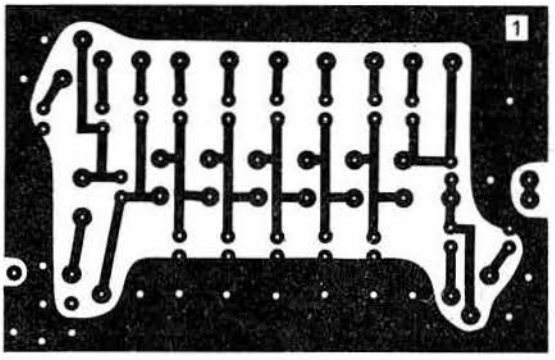


Fig 24. Etching pattern for the filter board (PCB1)

projects, the author knows there is nothing more exasperating than wanting to add some refinement later and finding that one has got to perform a major dismantling job in order to drill a few extra holes.

Fig 18 shows the back of the cabinet. The author used type SO239 coaxial sockets, a two-pin DIN socket for the loudspeaker, and a 2·5mm power socket such as is used on cassette players and portable radios. The six-pin DIN socket is for subsequent connections to the linear amplifier and possibly to other later add-on enhancements.

VFO construction

The vfo is built inside a diecast box which is 113mm long by 63mm wide by 31mm deep (Bimbox 5003P, available from Electrovalue, Maplin Electronic Supplies etc). Fig 19 gives the constructional details.

In the prototype the relay RLA was made using a miniature reed switch (Maplin Electronic Supplies) that was cemented to the inside of the box. The energizing coil, which was salvaged from an old relay, was fixed on the outside of the box with a self-tapping screw as shown in Fig 19. The constructor may find it easier to use a ready-made reed relay, cementing it inside the box and feeding the coil via a feedthrough capacitor.

The vfo board (PCB2) is made from single-sided copper-clad glass-fibre board and is etched to the pattern shown in Fig 20. The recommended way of making this pcb (and the others required) is as follows.

With a piece of tracing paper, trace out the outline of the pcb and mark the positions of the holes. Paste this to the coppered side of the board and use it as a template for cutting the board to size, and for drilling all the holes with a 1mm drill. Remove the template, remove any burrs, and clean the copper using fine abrasive paper. Mark out the required track pattern on the copper with an etch-resist pen. After checking for any errors and making any necessary corrections, etch away the unwanted copper in a bath of ferric chloride solution, wash the board, remove the etch resist with etch-resist solvent or steel wool, and give a final, thorough wash.

Fig 21 shows how the components are mounted on the pcb. Before this is done, certain holes will need to be enlarged as indicated. The first items

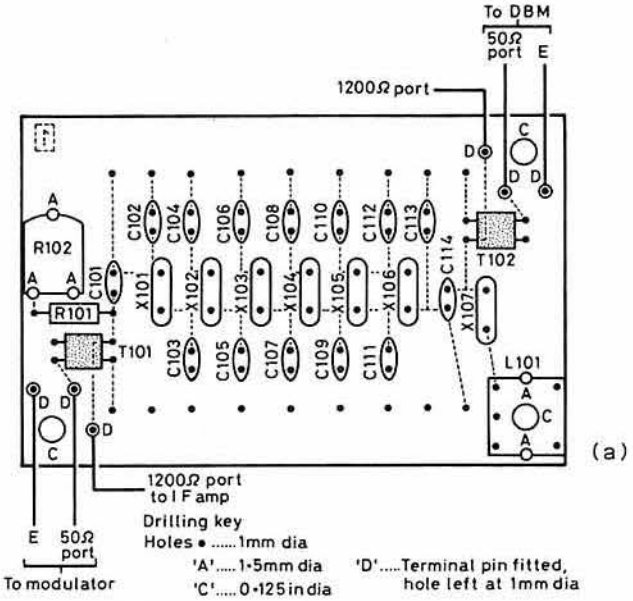


Fig 25. Component layout of the filter board. (a) Non-coppered side. (b) Coppered side

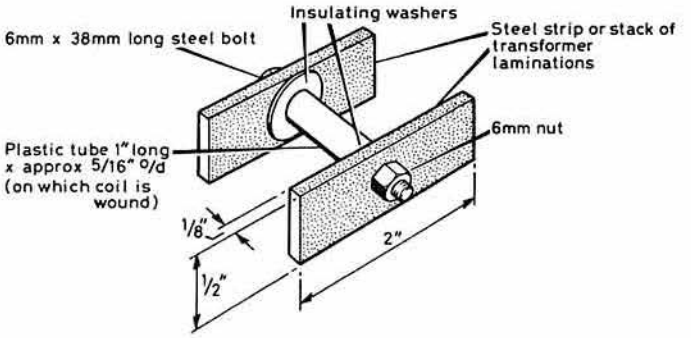


Fig 26. Construction of the magnet assembly used for switching the filter bandwidth

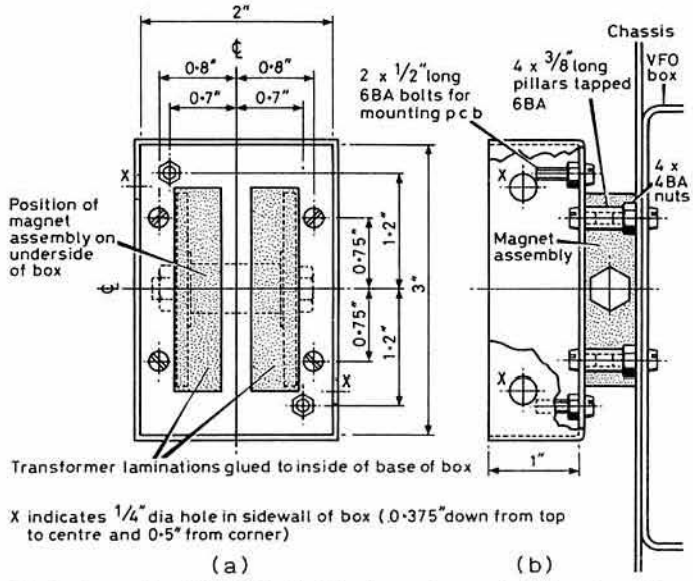


Fig 27. Assembly of the 4,433kHz filter box and magnet. (a) Top view of box. (b) Side view showing how the magnet assembly is held between the box and the chassis

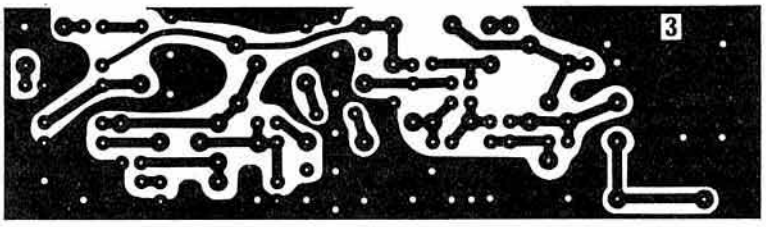


Fig 28. Etching pattern for the standard vfo converter board (PCB3)

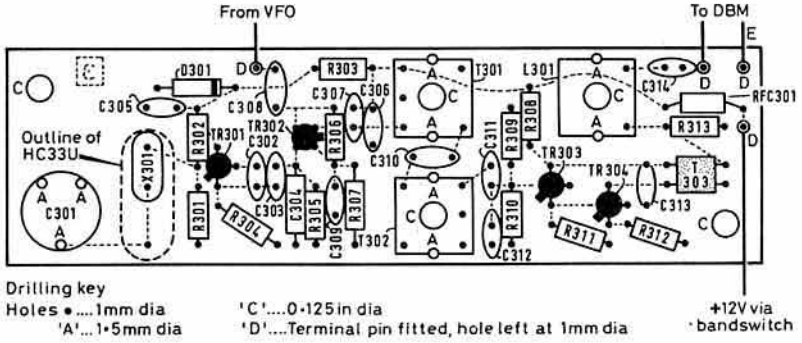


Fig 29. Component layout of the standard vfo converter board. The crystal, X301, is shown as type HC18U. The dotted line shows how an HC33U crystal is fitted

fitted to the board should be the terminal pins. These should be single-ended 1mm diameter pins, eg the type-02145 Veropins. L201 should have its winding securely held in place with polystyrene cement and be fixed into its mounting hole using Araldite. A dust core is used to facilitate adjustment of its inductance, but the core is sawn in half to limit its effect on the temperature coefficient of the coil. In order to obtain adequate frequency stability the two air-spaced trimmers, C203 and C204, should either be bolted or cemented to the board. All the other components should be mounted close to the pcb. Rigid wiring, eg 20swg, should be used for the connections from the tuning capacitor (C1102) to the pcb and to the relay. C1101 should be cemented to the tuning capacitor or to the diecast box.

To allow final adjustment of the vfo with the lid in position, two small holes should be drilled in the lid above the trimmers C203 and C204.

Figs 22 and 23 show the construction of the vfo amplifier board

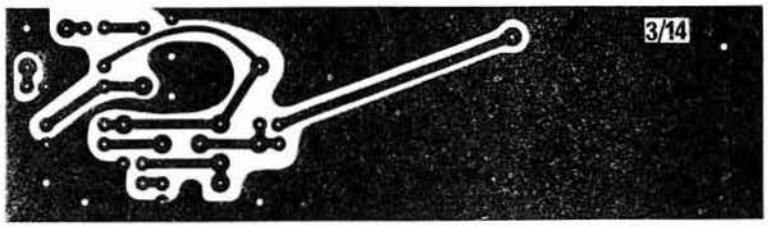


Fig 30. Etching pattern for the vfo converter board for 14MHz (PCB3/14)

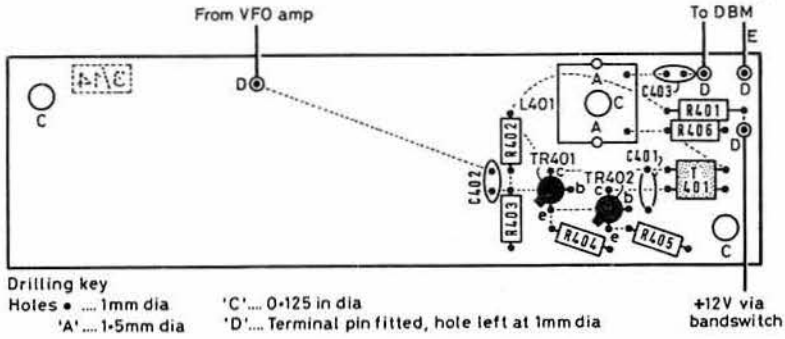


Fig 31. Component layout of the vfo converter board for 14MHz

Fig 32. Etching pattern for the vfo converter board for 28MHz (PCB3/28)

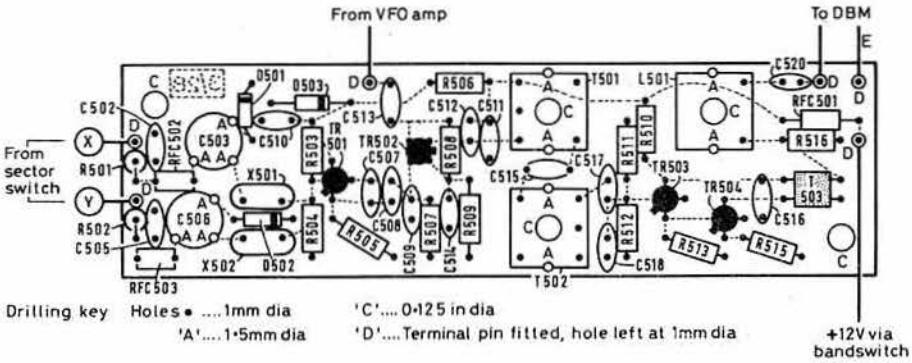


Fig 33. Component layout of the vfo converter board for 28MHz. The following components are soldered onto the wiring side and are not shown here: C501, C504, C519, R514

Fig 34. Etching pattern for the bandpass filter board (PCB4)

Fig 36. Etching pattern for the dbm board (PCB5)

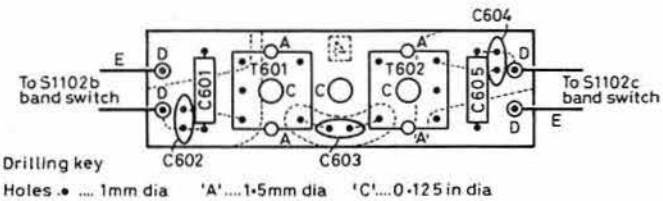


Fig 35. Component layout of the bandpass filter board

(PCB2A). It is mounted on the outside of the vfo box as shown in Fig 19, the connecting wire from the vfo passing through the hole marked "C" to be soldered direct to PCB2a.

Construction of the 4,433kHz filter

Fig 24 shows the etching pattern for the 4,433kHz filter board (PCB1). All the components except the reed switches are mounted on the uncoppered side as shown in Fig 25(a). The reed switches are then mounted on the coppered side as shown in Fig 25(b). It is necessary to put a sharp bend in

the switch leads fairly close to the glass pod, and some care is needed to prevent accidental cracking of the glass. It is advisable to grip the wire firmly with a pair of pliers close to the glass, and then bend the wire holding the *pliers*—not the glass. The switches should all be mounted so that they are parallel to, and roughly the same distance from, the board. It is desirable to leave 0·0625in or so of the wire protruding on the uncoppered side of the board; this makes it easy to check the operation of the switches with an ohmmeter after the board is fitted into the box.

When winding the transformers T101 and T102, and when winding similar ones subsequently, care should be taken to ensure that the enamel is not scratched off the wire as it is pulled through the ferrite bead. Before assembling each transformer onto the board it is advisable to check that the resistance between winding and bead is in excess of 10MΩ. It is also a good idea to fix the wire inside the bead with a few drops of polystyrene cement; this will minimize the risk of any subsequent damage which might be incurred by vibration or handling. Polystyrene cement can also be used to fix the transformer to the board. The use of a stronger adhesive is not recommended; it can make it too difficult to remove the transformer again should one ever need to do so at a later date.

The switches are all energized by the electromagnet unit, which is shown

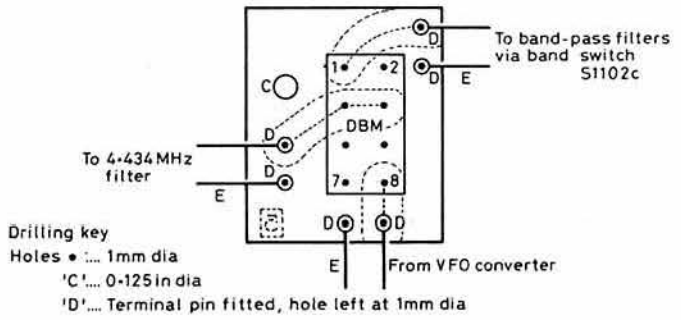


Fig 37. Component layout of the dbm board. Pin 2 of the dbm is located under the "M" of the "MCL" printed on the top

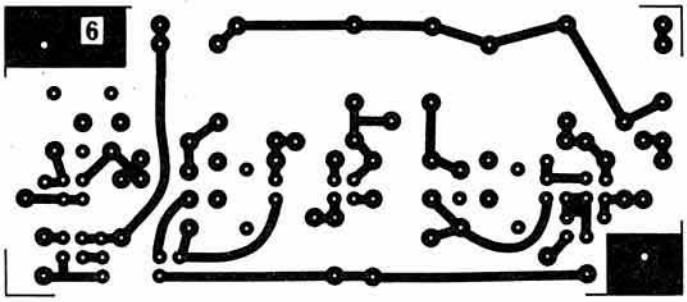


Fig 38. Etching pattern for the wiring side of the i.f. amplifier/product detector board (PCB6). This pcb uses double-sided board material, the other side being used as a groundplane

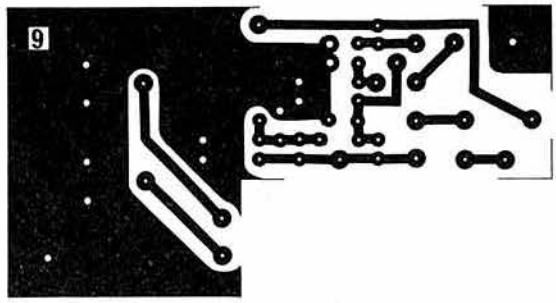


Fig 40. Etching pattern for the bfo board (PCB9)

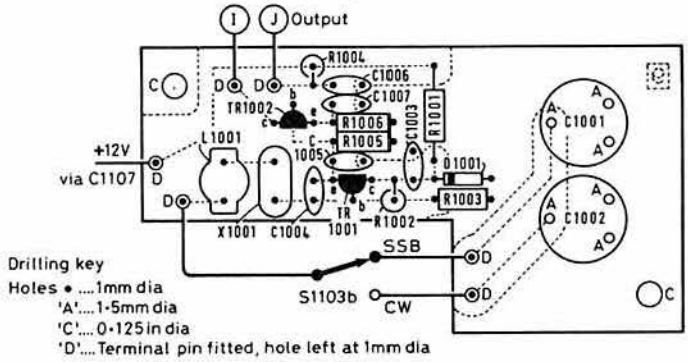


Fig 41. Component layout of the bfo board

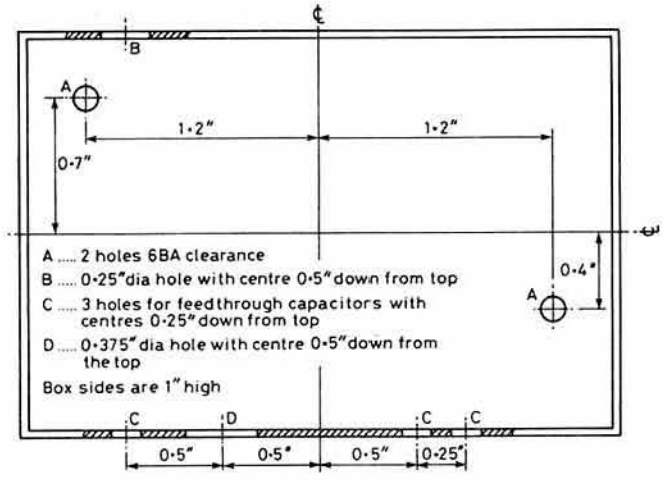
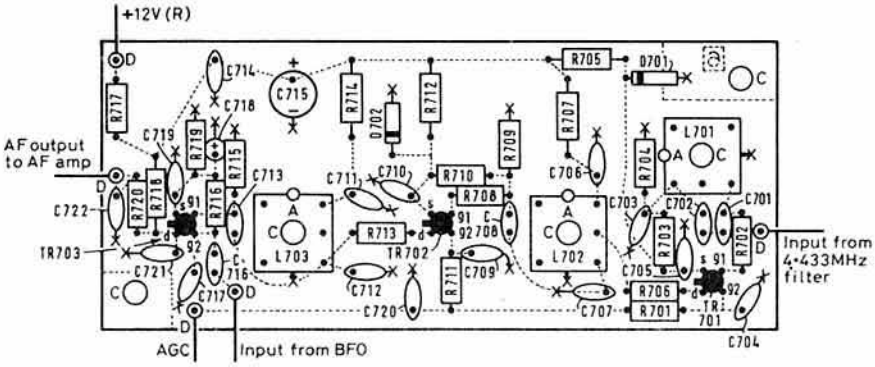


Fig 42. Drilling of the bfo box



Note that the components are mounted on the copper ground-plane side. Where a component wire is shown ending at an 'X', it is soldered direct to the ground-plane

Drilling key Holes • ....1mm dia 'A'....1·5mm dia 'C'....0·125in dia
'D'.... Terminal pin fitted, hole left at 1mm dia

Fig 39. Component layout of the i.f. amplifier/product detector board

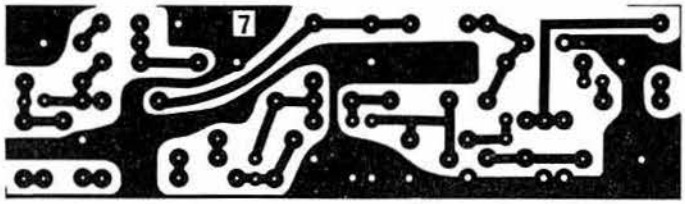


Fig 43. Etching pattern for the af amplifier/agc board (PCB7)

the box. The box itself is mounted on four pillars which are screwed onto the main chassis by the same 6BA bolts that hold the vfo box. The magnet unit is clamped between the filter box and the chassis. On the prototype a firm, but not overtight, fit was achieved by using 0·375in tapped pillars with a 4BA nut as spacer, as shown in Fig 27(b), and by putting a strip of masking tape on the lower and upper faces of the magnet.

A simple and worthwhile refinement is to glue two pieces of transformer lamination inside the bottom of the aluminium box, as shown in Fig 27(a). These help to "focus" the magnetic field around the reed switches and to make their action very positive.

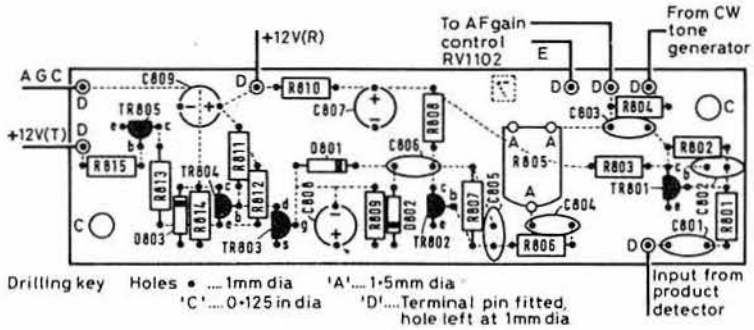


Fig 44. Component layout of the af amplifier/agc board

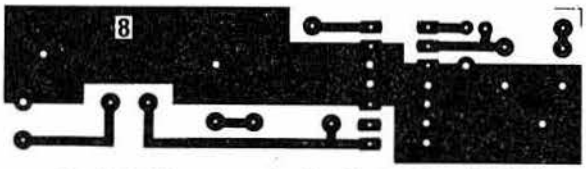


Fig 45. Etching pattern for the af output board (PCB8)

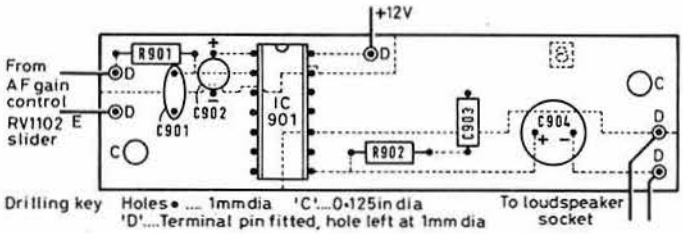


Fig 46. Component layout of the af output board

in Fig 26, and which is mounted underneath the pcb. The two pole pieces are strips of 0·5 by 0·125in steel, about 2in long. The constructor who does not have easy access to such material can achieve the same results by glueing together suitably-sized strips of transformer laminations. Each pole piece has a 0·2187in diameter hole in the centre, through which is passed the centre core. The latter consists of a 38 by 6mm steel bolt (obtainable from Halfords and other car accessory shops). A 1in length of rigid plastic tube is used as a spacer and, together with an insulating washer at either end, it forms the bobbin on which the coil is wound. A suitable plastic tube can be obtained from an old fibre-tip pen, but the ideal thing to use is a coil former which is threaded to hold a 6mm core.

The coil is scramble-wound with 44swg enamelled copper wire. The aim should be to get as much wire on as possible, while still ensuring that the winding will comfortably clear a straight edge placed across the pole pieces. The 44swg wire is quite fragile and it is essential therefore to: (a) solder each end to a thin insulated flexible lead-out wire; (b) insulate and anchor these terminating joints with adhesive tape, and (c) bind the completed coil with insulating tape.

It is recommended that the coil be wound after the magnet has been assembled and the 6mm bolt has been fully tightened up. This is rather a tedious operation, and not as simple as winding the bobbin first, but it is less likely to result in damage to the coil. With reasonably efficient winding the resistance of the coil should be around 300Ω. Should the resistance come out less it will not result in a smaller magnetic field; it will just result in more current being taken from the 12V supply—and a little more heat being generated.

Fig 27 shows how the whole filter unit is assembled. The pcb is mounted, switches downward, inside the aluminium box on two 0·5in 6BA bolts which are fitted through the base of the box and held by nuts inside the box. The pcb is held in position by two extra nuts, packing washers being put under the pcb as necessary to keep the reed switches clear of the bottom of

Construction of other modules

Figs 28 to 35 show the construction details for the various vfo converter boards (PCB3, PCB3/14, PCB3/28), the bandpass filters (PCB4), and the dbm board (PCB5).

When finally interconnecting these modules, miniature 50Ω coaxial cable (eg UR95) should be used wherever a screened lead is shown in Fig 7, with the outer braid of all the cables earthed to a common point on the pillar adjacent to S1102. Initially, however, the constructor is recommended just to get the receiver operational on one band. Thus only one vfo converter and only one bandpass filter will be connected up, the latter having its front terminal pins connected direct to the dbm, and its rear pins direct to the nearer coaxial socket. During this initial commissioning it is recommended that twin-lead is used rather than the miniature coaxial cable. Twin-lead is somewhat easier to work with than the miniature coaxial cable but it can result in a slightly higher loss at the wanted frequencies and less effective suppression of the unwanted frequencies. A suitable miniature twin-lead can be made by peeling two sections off from a length of ribbon cable.

Figs 38 and 39 give details of the i.f. amplifier/product detector board (PCB6). Unlike any of the others used for the basic receiver this pcb is made from double-sided glass-fibre board, one side being used for the general wiring and the other being used as a groundplane. This has been done to ensure that the i.f. amplifier, which has a fairly high gain, does not suffer any problems with instability. Before etching, the groundplane side should be completely covered with etch resist. After etching, a small circle of copper needs to be removed around each hole, using a spot face cutter or a suitable twist drill, to provide a clearance for the wires which will pass through. The components are all mounted on the groundplane side. Their leads are either taken through the board to be soldered on the wiring side or, in the case of all earth connections, are soldered direct to the groundplane (see Fig 39). Note that, in the case of the coil cans, one spill is bent through 90° and soldered direct to the groundplane, and the other is taken through the board. The assembly of this board needs just a little bit more care than the others, to make sure that there are no accidental short-circuits to the groundplane.

Figs 40 and 41 give details of the pcb for the bfo (PCB9). The bfo screening box is drilled as shown in Fig 42 and is fitted with three feedthrough capacitors for the +12V lines in and out. The box is fixed to the chassis by two 0·25in 6BA bolts screwed into 0·375in pillars inside the box. These pillars are used to hold the pcb.

Figs 43 to 46 give details of the af amplifier/agc board (PCB7) and the af output board (PCB8). It is usually recommended that the LM380 audio amplifier ic is mounted directly onto the copper-clad board in order to obtain good heatsinking. It is much more convenient, however, to use an ic socket, and the author has not encountered any overheating problems when using an ic socket in this application.

To be continued

Next month, Part 4 will deal with the commissioning of the basic receiver.

Technical Topics

by Pat Hawker, G3VA

THERE CAN BE little doubt that many of those who came into amateur radio some years ago are increasingly uneasy at the way the hobby appears to be changing; many feel that something of a malaise has overtaken what we still like to think of as an uniquely interesting and friendly way of spending our leisure time. The natural tendency is to search around for scapegoats: newcomers who have not yet absorbed our ways; cb-itus; multichoice examinations; the ubiquitous microprocessors that take the fun out of controlling things ourselves; ineffectual regulation of the spectrum; selfish operating; greedy or inefficient traders; the Society; bottle feeding or poor potty training. You name it, somebody or something must be at fault!

Yet there are still plenty of others who find much to interest them in one or two of the rather more specialised aspects of the hobby and who spend their time quietly pursuing these with little time left to complain. The fault, perhaps, lies not in our stars but in ourselves!

I have to admit that my own pet moan is that we are suffering from over-complexity and over-sophistication of factory-built equipment. We are all being forced to use techniques that many of us do not really understand; transceivers that we cannot adequately check or adjust or cannot service ourselves. Few of us can now escape the charge of being "black-box appliance operators"—applying just as much, if not more, to old-timers as to newcomers. The happiest and most enthusiastic amateurs are those who still do their own thing with understanding and technical interest, whether or not the equipment is home or factory built, of recent design, or what we are now coming to think of as from the vintage era.

THIS MONTH

Better-sounding ssb

The importance of achieving the correct relationship between the frequency of the carrier oscillator and the passband of the ssb filter, and its effect on the speech quality of an ssb transmission were discussed in some detail in *TT* August 1977 and *ART7*. The narrower the filter and the better its shape factor, the more important it becomes to ensure that the carrier oscillators are set pretty accurately 300Hz above or below the −6dB frequencies of the filter passband. With an ssb filter having a −6dB bandwidth of 2·4kHz and steep sides, correct trimming of the carrier oscillators can provide an af range of 300 to 2,700Hz—that is about the optimum intelligibility with such a narrow filter, providing what is admittedly "communications" quality rather than "broadcast" quality. Even a relatively modest error of 100Hz in the carrier oscillator frequency will result in a sub-optimum audio range of 200 of 2,600Hz (to −6dB points) or 400 to 2,800Hz, both of which will degrade intelligibility and the sound quality of the transmission.

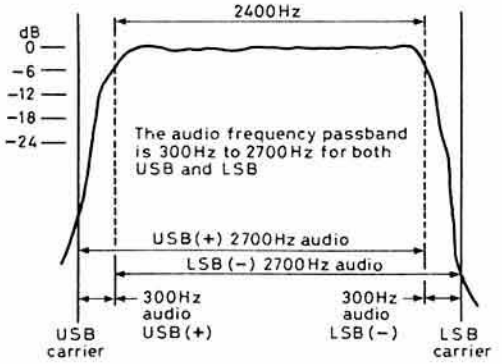


Fig 1. Showing correct adjustment of the carrier frequencies for a typical 2·4kHz ssb filter used for generating both usb and lsb and with frequencies set 300Hz from filter window edges.

Old-timers will probably recall with some nostalgia the days of a.m., and perhaps even those pre-war days of relatively spacious living when it was accepted that amateur transmissions needed virtually no audio filtering other than that provided by such components as the modulation transformer. Audio components up to and even beyond 5,000Hz were fairly common and, at least on some bands, phone transmissions could occupy 10 to 15kHz of spectrum bandwidth without disapproval. How easy to tune and how pleasant some of the a.m. signals sounded! One reason, perhaps, why a.m. still lives on unashamedly in some corners of the hobby.

In *Ham Radio* February 1984, pp58-62, Richard L. Measures, AG6K, provides an interesting survey of how to achieve "better-sounding ssb". He emphasizes not only the importance of correct carrier oscillator adjustment (Fig 1), but also factors such as not striving for absolute minimum bandwidth filters; the need for the best possible linearity in ssb power amplifiers; and the influence of design defects in handling and processing the af signal; he also destroys some commonly-held myths in regard to "ssb microphones".

He introduces his ideas as follows:

"I have never accepted the notion that good audio died with a.m. After all, isn't ssb just a.m. with two of the unnecessary parts removed? The question is why doesn't ssb audio give you good audio quality all the time? Armed with some electronic test equipment and a yearning for nice-sounding audio, I set out to find the answers.

"The results of my research indicate that three criteria must be met to achieve transmitted audio quality that compares favourably with a.m.: the first is smooth frequency response; the second, a wide-enough passband or 'window' to be able to include most of the important frequencies in the human voice; and third, distortion should be low enough so that the voice does not sound rough."

AG6K accepts that 300 to 3,000Hz contains the important human (male?) speech frequencies, achievable with a 2·7kHz ssb filter, though not with a 2·4kHz filter having a good shape factor. It is perhaps worth adding the observation that telephone engineers use 4kHz channelling for domestic telecommunications, dropping down to 3kHz channelling only for some long-distance circuits. The dx-operator in crowded bands using a transceiver will opt for a narrow ssb filter to aid receiver selectivity, but for transmission it can be argued that the bandwidth really occupied by an ssb transmission is utimately governed as much or more by the distortion products ("splatter") as by the ssb filter. Ideally, we need several bandwidth options, an expensive solution except for those prepared to build and use a homebrew variable-selectivity ladder filter of the general type outlined by G3UUR in *TT* December 1980 and since steadily gaining in popularity.

The ear, as AG6K argues, can detect very low levels of non-linear distortion; a trained musician's ear to around −40dB. It is by no means easy to achieve voice distortion products of −40dB on a typical modern

solidstate transceiver. AG6K writes: "Most of the radios on the market today are fairly clean. The cleanest by far are those with vacuum-tube finals employing rf negative feedback. If operated conservatively, some of the solidstate radios can also deliver a clean sound.

"On my solidstate transceiver I was able to achieve −40dB distortion products on my voice, but only after carefully setting the driver and final transistor idling current to the values called for in the service manual. I could only maintain the −40dB distortion level if I kept the alc level setting in the bottom quarter of the alc scale. If I tried to operate with the alc at the top of the 'safe' range, the distortion increased by a factor of nine." Note that AG6K is referring to measured distortion of the complex human voice and not to a less-critical two-tone test. AG6K suggests that "blowing into three holes of a harmonica also works well"—using dummy loads one hopes!

He describes methods of measuring distortion using a separate receiver with an S-meter of known accuracy, though unfortunately there are not many of these around.

He tilts at the myth that one should use a "special microphone for ssb". A flat-response electret condenser microphone with response shaping left to the transceiver should prove equally acceptable in frequency-limited and non-restricted applications provided that this is on a basically well-designed and correctly operated rig. There should be no need to use a microphone having a response tailored specifically for ssb operation. The small tie-clip electret condenser microphone that is nowadays widely used in tv broadcasting is becoming equally popular for amateur radio applications, albeit usually in lower cost form.

AG6K's article emphasizes that ssb transceivers can be accurately adjusted to provide better-sounding audio using your ear to monitor adjustments. But the same rig, used without real understanding as a "black-box" and driven too hard, can be a pain in the ear not only to the station talked to, but also, with its non-linear products splattering away, to those attempting to use any of the near channels.

One area that AG6K does not touch upon is the impairment of audio quality that results from mistuning the receiver. With ssb any mistuning results, of course, in frequency-shifted audio. Even very small errors are detectable on music transmissions. For music the receiver really needs to be accurate to within a couple of hertz. This is one reason why hf broadcasters, now tentatively planning to use ssb in the 21st century, are not intending to suppress the carrier to anything like the extent found in amateur rigs, but rather to retain part of the carrier to provide a pilot carrier for the receivers. It seems to me that the major advantage of reduced carrier broadcast transmissions will be the reduction of the severe distortion brought about by selective fading, but one wonders whether the cost in receiver complexity really makes this worthwhile; after all, there is nothing to stop anyone with a good receiver receiving double-sideband a.m. as though it were ssb. Narrower transmissions will make it easier for the jammers!

Better-sounding cw

In spite of the plethora of electronic keyers and keyboard devices, there are still appreciable numbers of operators who much prefer to exercise their craft skills on "straight" keys, sideswipers or semi-automatic ("bug") keys. I must admit a personal aversion to those too-clever-by-half operators who use "memory" keyers to send perfect high-speed CQ calls but whose sending when they revert to manual operation of their (usually) electronic keyer leaves much to be desired and frequently suggests that they have been breaking two cardinal rules of good cw operating practice: (1) sending faster than you can receive; and (2) sending faster than you should expect other operators to receive comfortably.

The semi-automatic bug key has a long history dating back to the first Vibroplex models of the late 19th century. Unfortunately the designs have not always progressed with the march of time. The first bug key I ever used, a pre-war McElrøy de-luxe key belonging to former-G4NY, incorporated effective damping of the dot U-spring. Most of the popular post-war cost-cutting designs seem to omit this important feature, needed to reduce contact-bounce that gives rise to "scratchy" dots and can also result in some cases in a significant increase in key-clicks.

Charles Fletcher, G3DXZ, has come up with an electronic "scratch remover" specifically designed to overcome the problem of ineffectively-damped U-springs in bug keys. He writes:

"Listening to cw contacts on the lower hf bands, the educated ear-hole detects quite a few semi-automatic keys still in use. These 'bugs' give great joy to anyone with a taste for morse with character, but they have always tended to produce scratchy dots due to vibration of the dot spring. While it is possible to overcome the problem by padding the spring with foam rubber etc, a more elegant electronic solution is provided by the single chip circuit shown in Fig 2. Its effect is to transform a scratchy key.

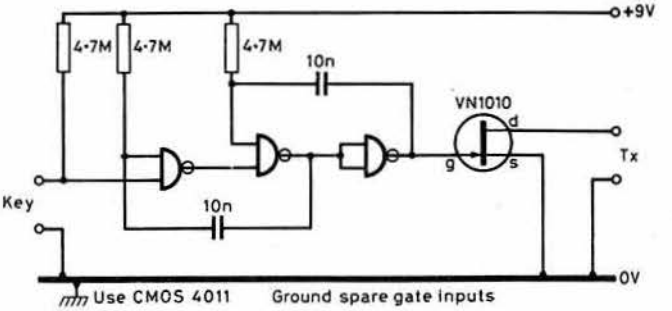


Fig 2. G3DXZ's way of removing the effects of contact bounce with semi-automatic "bug" keys that produce scratchy dots due to poor dampening of the U-spring

"This circuit is a double interacting monostable multivibrator which locks-in then locks-out the key contact, so producing a clean make, starting when the contacts first touch, and a clean break. Battery current is zero on standby and about 2·5μA with key down, resulting virtually in its 'shelf life' for the battery and eliminating the need for any on/off switch.

"The keying circuit for the transceiver is made by the vmos power fet such as a Siliconix VN1010 or equivalent. This will switch 0·5A at 100V which is probably enough for most transmitters!"

Perhaps one word of warning. If the key is physically separated from the scratch remover the leads into the cmos device could pick-up rf and there could be an rfi problem. This could be overcome by simple rf filtering such as that provided by ferrite beads, though I cannot help feeling that one of the attractions of mechanical rather than electronic keys is the total absence of rfi problems. It is a pity that modern bug keys are not designed in the first place to overcome contact bounce!

The G-line feeder

In view of the very high losses involved in using thin coaxial cable as a transmission line at uhf, and the very high cost of microwave waveguide with its far lower attenuation, it is surprising that more interest has not been shown by radio amateurs in single-wire transmission lines of the type originally propounded by Dr Goubau (hence the name G-line), an extension of the dielectric-rod waveguide. If a wave travelling in a dense dielectric strikes the boundary of a less-dense dielectric at an angle of incidence greater than a critical value, then ideally all the energy is reflected.

A practical G-line may consist of a copper wire conductor surrounded by a thick plastic covering. Theoretically, if the conductor is straight no radiation of energy takes place outwards into surrounding space. Again theoretically, there need be no cut-off frequency, but below the microwave band the field tends to spread outwards from the conductor. At each end of the G-line there needs to be surface-wave launcher/collector cones providing electromagnetic waves of the E type; these are simple structures although they tend to become large at lower frequencies.

Many years ago the late G5CD gave an impressive demonstration of a 430MHz G-line system during an RSGB lecture at the IEE. About 20 years or so ago there was a flurry of interest in the USA, and a G-line kit was marketed for uhf tv receiving antenna systems. Some very long G-line systems were also used, for example, to bring television signals over 3,000ft from an antenna on top of a hill.

One of the relatively few published articles describing experiments on G-lines for amateur radio was by the redoubtable Ed Tilton, W1HDQ (*QST* February 1964, pp52–3). He used one of the tv kits which had 14g wire with a thick vinyl covering and came with two launcher/collector cones. After modifying the cones he was able to measure a 2·7dB loss at 432MHz over a 100ft G-line, provided this was straight. With four bends in the line the loss increased to 6dB. The G-line needs to be kept clear of metalwork etc. The original papers by Dr Goubau suggested that losses of under 1dB/100ft could be achieved in the microwave region, so there is no reason to suppose that the modified kit used by W1HDQ represented a truly optimized system, though he pointed out that anything less than 3dB/100ft at 432MHz represents a very good system, but no better than can be achieved with alternative (but expensive) systems at 432MHz. The G-line really comes into its own above 1GHz.

A description of a G-line or "surface-wave transmission line" appears in some editions of the *RSGB Amateur Radio Handbook* as follows:

"A type of feeder which becomes useful above about 400MHz is the surface-wave transmission line. The wave is directed on to a single conductor by means of a horn: see Fig 3. The dimensions of the horn are not critical but the angle should be correct, and for the best performance

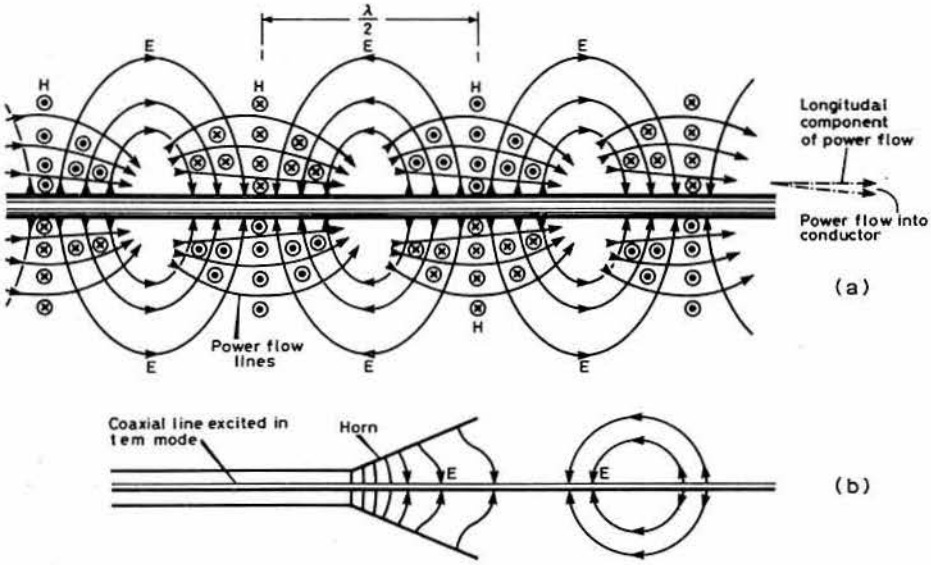


Fig 3. (a) Principle of an E-type wave guided by a single-wire conductor to form a low-loss microwave transmission line; (b) the method of launching or collecting a surface wave from a coaxial line

the sides should be several wavelengths long. The single conductor wire should be covered with a thin dielectric, preferably polythene, although enamel or even an oxidized covering is usually sufficient. This covering layer minimizes radiation-loss by reducing the effective diameter of the field surrounding the wire. Typical losses measured at 3·3GHz using horns 21in long and 13in in diameter and a No 14 swg wire feeder (bare but oxidized) are about 1·35dB/100ft plus about 0·4dB/horn, making a total of just over 2dB/100ft."

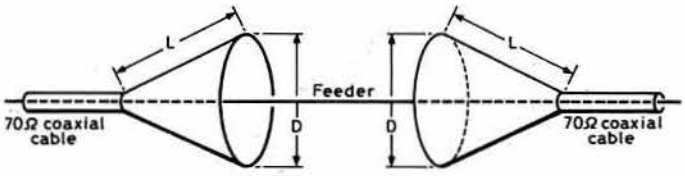


Fig 4. A G-line or "surface-wave transmission line" of the type shown in Fig 3. The outer sheathing of each length of coaxial cable is terminated by an open cone. The single wire feeder can be 10 to 16 swg copper wire, preferably enamelled or plastic (dielectric) covered. At microwave frequencies the attenuation is low enough to permit the use of several hundred feet of line, provided that it is kept as straight as possible (gentle large-diameter bends are possible but tend to increase the attenuation). The cone diameter D should be 0·6L to provide the correct angle for the cone, but L can be any length greater than 3λ

Sic transit gloria vacui!

Several years ago, Harry Leeming, G3LLL (Amateur Electronics UK/Holdings), drew attention to the fact that television-type line-output valves used in a number of Japanese and American hf transceivers were going out of production, and that equivalent valves of different manufacture were not always satisfactory replacements. His advice then was that owners of such equipments should build-up at least a small stock of matched spares (taking care first to test their suitability in the rig concerned). Line-output valves used in ssb linear power amplifiers tend to have a limited life expectancy as they are generally used at or beyond their icas rating. If a rig is used frequently a lifetime of about two years or so is typical, after which failing cathode emission can result in objectionable flat-topping and a spreading signal that will not be appreciated by other users of the band.

This month he warns of the possible phasing-out of some transmitting-type valves, although, as noted earlier in *TT*, some European firms are actually stepping up production of large transmitting valves. G3LLL writes:

"A few years ago many FT101 users, distributors and retailers came near to panicking when they discovered that NEC and Toshiba had ceased production of the 6JS6C and that most other makes would not work satisfactorily in this popular rig. Fortunately, being a tv-type valve, considerable stocks were held by wholesalers. The amateur radio trade managed to buy many of them, although inevitably prices have gone skywards.

"Most of us felt, however, that supplies of transmitting-type 6146B valves were safe for many years. Now I hear a strong rumour that RCA has ceased production. Many amateurs think that a 6146B is a 6146B regardless of manufacturer. Unfortunately this is not always the case. Many hf rigs expect output valves to work well beyond icas ratings, putting up to 1,000V on the anodes of the 6146B. The result can be the generation of excessive 'hash' in the receive mode. It is my experience that only 6146B valves made by RCA and General Electric can be virtually guaranteed to run quietly on 21 and 28MHz.

"If in fact RCA have ceased production, or intend to do so in the near future, some users will be dependent on GE valves for optimum performance, with no guarantee that this firm may not follow in RCA's footsteps.

"As a member of the trade, we continue to advise customers by all means to buy a valve rig if that is their preference, but seriously to consider holding a stock of suitable spares."

A good 6146B, if not grossly over-run, should have a longer operational life than most tv-type valves, but is by no means everlasting in linears, particularly where heavy speech processing is used without adequate cooling.

On the topic of valve longevity, Brian Kendal, G3GDU, mentions that a few years ago he dismantled a commercial transmitter which had been in continuous 24h service for over 22 years. On checking the maintenance records he discovered that the three 807 valves used in the power amplifier and still giving full rated output were the original ones! More proof, G3GDU suggests, that the only way to "kill" an 807 is to hit it with a large hammer! In my time I have managed to kill a few (gassy and ionized after flash-over) while running them at around 1,000V; but they were—indeed are—a hardy breed. Much the same can be said of the 813.

Not everyone regards valves nostalgically. Andy Talbot, G4JNT, was not impressed with the idea of using an ECC88 af preamplifier (*TT* May 1984). He writes: "The 10 to 100Ω matching resistor across the input will degrade the noise figure significantly, and the power supply is horrendously complicated for a preamplifier. Far better to use a purpose-designed transistor, or several in parallel to give the very low input impedance required to provide a noise-match to a dynamic head. I have never liked valve circuitry, believing the construction and design to be much more complicated than the transistor variety. For example, a pcb, box and relays is all that is needed for a 100W 430MHz linear that can run off a car battery, is compact and easy to use, and can be completely swr safe without special protection. This is more than can be said for certain valve circuits. Admittedly it takes courage to disconnect the antenna and transmit cw to test this when £70 worth of transistors are at stake. I will concede that the higher impedances of valve circuitry make matching circuitry much simpler, but just wait for better power fet devices."

G4JNT threatens to publish details of his solidstate linear to prove his point.

G4JNT also stresses a point made several times in *TT* on the subject of power supplies for high-power 12V equipments. He writes: "Why, oh why, do amateurs insist on building a psu rated at 30A or more? They are vastly complicated and if badly made or designed can ruin very expensive gear. A £15 car battery float-charged by a cheap battery charger (no smoothing or

regulation etc) can provide virtually unlimited peak current and cannot go over-voltage. The transmit/receive duty cycle and the low duty cycle of an ssb transmission means that an 8A (or possibly even less) charger plus car battery can replace a 30A mains psu with the advantage of kiss!"

Receivers: numbers right or wrong?

When in *TT* (May 1984, pp400-1) I included the list of receiver dynamic-range tests compiled by N6ND, I was careful to point out that no list of this type should be regarded as a definitive *Which?*-type consumer buying guide, adding: "Strong signal performance is a useful, but by no means absolute measure of receivers used with typical antennas in typical locations." I also noted that measurement techniques are by no means standardized and that any general list is likely to be compiled on the basis of a test on only a single model which may not be truly representative.

There is no doubt that manufacturers and retailers are alive to the fact that performance data can be manipulated so that lists or specifications may give a rosy impression of some models and an unduly gloomy view of the competition. Nevertheless my general impression of N6ND's list was that it represented a genuine effort to provide a reasonable set of comparative figures.

It is therefore only fair to admit that this view is not entirely shared by Rowley Shears, G8KW, managing director of KW Ten-Tec Ltd. He points out that the measurements given by N6ND for the Ten-Tec "Corsair" are not in line with the many measurements made by his firm, which provides each purchaser of a Corsair with an individual test report based on measurements made with Hewlett Packard and Marconi Instruments high-grade test gear. A typical KW report indicates an input intercept figure for the Corsair with rf amplifier "on" of about +4·5dBm and with amplifier "off" of around +18dBm, in each case roughly 6–7dB better than N6ND's figures, using basically similar measurement techniques, and putting the Corsair firmly among the leaders in terms of strong signal performance. He adds that the figures for some of the other models in N6ND's list differ from those given in various *Radio Communication* equipment reviews. My own view remains that from an operational viewpoint precise figures are far less important than they may appear to manufacturers or distributors, and that N6ND's figures for the Corsair clearly put this equipment into the category that I suggested would represent good strong-signal performance.

Another look at receiver data

Peter Lonsdale, G3PVX, has brought to my notice an extremely detailed and unusually comprehensive tabulation of measurements made on a wide selection of receivers and transceivers. This stems from Sherwood Engineering Inc, an American firm which specializes in receivers made by Drake (a firm unfortunately now concentrating more on the professional than the amateur radio market) and which has established a reputation for fitting improved filters having exceptional ultimate rejection characteristics. Their list (Table 1) is complex and needs to be studied very carefully in order to derive maximum benefit from the measurements.

Their pecking order is based on an important aspect of receiver performance that is seldom specified: cw-mode dynamic range measured using two input signals spaced only about 2kHz apart, and thus approximating to conditions that may be experienced in a real-life "pile-up" where a number of extremely strong signals may all be calling the same dx station. Clearly, they have chosen this parameter in order to highlight the value of a good cw filter having good ultimate rejection characteristics, so in that sense rival manufacturers may not regard the list as "impartial". However, the Sherwood list also emphasizes the importance of front-end selectivity (which they grade on an A to F scale) and having a low-noise (spectrum pure) local oscillator. Dynamic range is also listed on the basis of that measured with two inputs spaced the conventional 20kHz apart (although even that spacing is impracticable with some synthesized receivers).

It may well be claimed that the parameters and measurement techniques have been chosen to uphold the claim by Sherwood Engineering that a Drake R4C fitted with a Sherwood CF-600/6 filter is "still the finest competition grade receiver", and so faces the charge that it is a case of a firm "playing the numbers game". Nevertheless there is little doubt that the table does provide a mass of useful and illuminating data, though it should be remembered that they do stem from an interested party.

It is perhaps interesting to note that the Drake R4C is a valve rather than a solidstate design, though the "stock model" not fitted with the special filter comes fairly low in the table.

In this connection, Satori Associates (PO Box 832085, Richardson, Texas 75083, USA), another firm that specialises in handling and modifying Drake equipment, tell me that they have successfully developed direct plug-in semiconductor replacement sets for the valves in this and some other

Table 1. Receiver measurements as given by Sherwood Engineering Inc

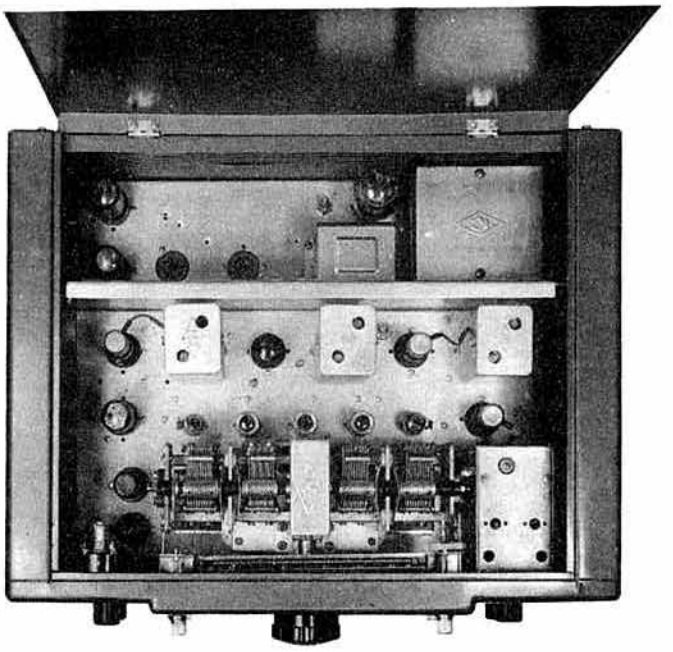
Model	Noise floor (−dBm)	AGC threshold (μV)	AGC threshold (dB)	Blocking (dB)	Sensitivity (μV)	Sensitivity (−dBc)	Lo noise (kHz)	Front-end selectivity Grading	Front-end selectivity Type	Filter ultimate (dB)	Dynamic range Wide spacing (dB)	Dynamic range Wide spacing (kHz)	Dynamic range Narrow spacing (dB)	Dynamic range Narrow spacing (kHz)
Drake R4C/CF600/6	139	0·7	3	133	0·15	130	2	A−	preselect	140	85	20	85	2
Atlas 350XL	131	1·0	11	117	0·2	125	4	C	bandpass	95	81	20	81	2
Trio TS830/YK88	129	1·5	3	122	0·1	114	2	C	preselect	85	84	20	81	2
Yaesu 901DM	135	1·6	3	124	0·15	109	2	C	preselect	85	87	20	80†	2·5
Collins R390A	137	na		130	0·2	130	2	A+	tracked preselect	85	81	20	79	2
Ten-Tec Corsair	131	0·1	14	130	0·2	132	5	C	bandpass	90	93	20	79	2·5
Icom IC720A	137	1·6	3	138	0·15	117	10	C	half-octave	80	93	50	78	3
Trio TS820S	137	0·4	3	115	0·2	125	10	C	preselect	80	79	20	78	3
JRC NRD515	138	3·5	4	103	0·1	118	10	C	0·8 octave	80	95	20	77†	2
Atlas 210/215X	120	na	—	123	0·5	na	—	C	bandpass	95	76	20	76	2
Drake R7	135/140*	0·4	3	145	0·28/0·15*	114	10	B	half-octave	85	97	100	75	2
Drake TR7	134	1·3	3	146	0·5	116	10	B	half-octave	90	99	100	75	2
Heath SB104	123	na	—	92	0·5	na	—	C	bandpass	75	79	20	75	4
Ten-Tec Omni-B	136	0·2	25	129	0·15	130	10	C	preselect	80	87	20	74	2
Icom IC730	140	1·5	3	135	0·1	118	10	C	half-octave	80	92	50	74	3
Trio R820S	125	4·0	3	125	0·35	123	10	C	preselect	75	74	20	74	4
Collins 75S3B rnd	146	1·1	15	122	0·1	120	4	B+	preselect	85	88	20	74	2
Trio TS930S	135	2·0	3	143	0·15	115	10	B−	half-octave	80†	86	20	73	3
Icom IC701	129	5·5	6	130	0·3	125	10	C	bandpass	75	81	50	73	4
Trio TS-830S	136	0·9	3	122	0·1	113	2	C	preselect	80	84	20	70	3
Trio TS430S	136	0·6	3	134	0·1	102	10	C	half-octave	70	78	20	69	5
Trio TS180S	139	0·9	3	115	0·15	120	10	C	preselect	80	70	20	68	3
Drake TR4C	124	1·2	3	105	0·4	130	10	C	preselect	80	74	20	68	2
Yaesu FRG7700	130	1·3	3	123	0·2	100	10	D	octave	65	83	50	64†	5‡
Icom IC751	127/133*	6·3	3	138	0·4/0·2*	127	10	B−	half-octave	90†	84	20	64	2
Trio R1000	130	0·9	3	119	0·2	107	10	D	octave	70	76	20	64†	3‡
Heath SB303	134	na	—	104	0·5	na	—	C	preselect	70	66	20	64	4
Collins KWM380	127	1·1	5	123	0·3	99	10	B	half-octave	70†	94	50	64†	2
JRC NRD93	141	1·6	3	128	0·15	133	10	A+	tracked preselect	80	94	20	63	2
Trio TS520	139	na	—	116	0·15	na	—	C	preselect	70	63	20	63	3
Yaesu FT-One	135	1·0	3	130	0·2	99	10	C	half-octave	80†	91	50	63†	2
Collins 75-S3 Wing	145	1·0	14	105	0·1	na	—	B	preselect	75	75	20	63	3
Icom ICR70/R71A	129/135*	3·1/1·4	3	132	0·4/0·2*	128	10	B−	half-octave	90†	86	20	62	2·5
Yaesu FT101E	141	na	—	102	0·15	na	—	C	preselect	70	60	20	59	3
Drake R4C Stock	139	0·7	3	133	0·15	130	10	A−	preselect	70	85	20	58	2
Yaesu 757	120/134*	14/1·3	3	130	0·7/0·15*	109	10	C	half-octave	70†	86	20	56	3
Trio R2000	130	1·4	3	115	0·15	105	10	D	octave	70	71	20	45	5
Trio R600	130	0·8	3	109	0·2	99	10	D	octave	65	68	20	FL	5

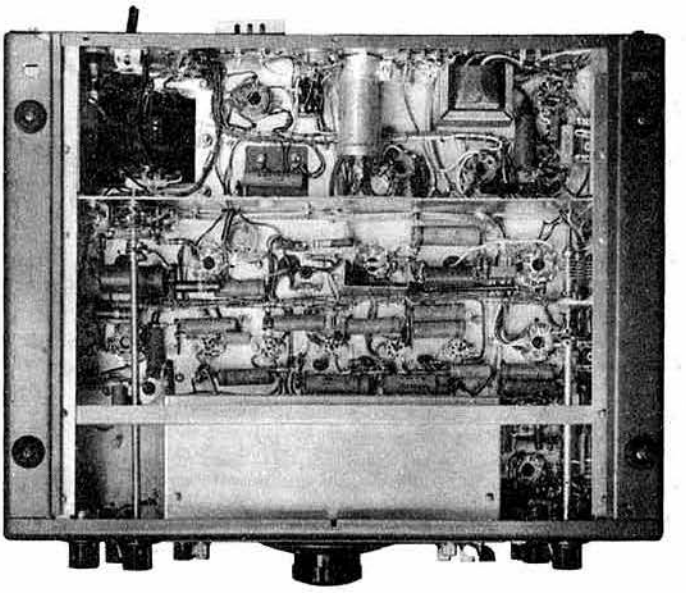
Notes on Table 1

Receiver test procedure as described in "Present day receivers—some problems and cures" *Ham Radio* December 1977, p10. Some data is average of two or more sets. Blocking test done at 100kHz spacing to eliminate phase-noise interference.

na indicates data not available. * built-in pre amplifier "on". † measurement phase-noise limited. ‡ readings would have been lower if 2kHz spacing had been possible. AGC figures show drop in af output level at threshold compared with a 5mV signal (typically S9+40dB).

All tests made where possible with 500 or 600Hz cw filter where available. Selectivity grading refers to ability to reject out of band signals, ganged tracked tuning being rated A+, no input selectivity rated F. Ultimate receiver rejection listed to nearest 5dB.





The later versions of the classic HRO design retained many of the features associated with the better known HRO-Senior and HRO-5 wartime models. The tracked three rf signal circuits provided good pre-mixer selectivity, and the open, clean layout was much easier to service than the complex modern receivers. Performance was by no means negligible. This is the HRO-50

Drake receivers "to upgrade your equipment to state-of-the-art performance". Judging by the Sherwood list, it might be equally useful to provide direct plug-in valve replacements for the solidstate devices used in some modern receivers!

The vintage receiver designs

P.A. Hopwood, G3UKH, was prompted, after seeing the illustration in the June *TT* of G2CIL's modified HRO receiver, to pen a warm tribute to the long-lasting family of HRO designs that came from National between about 1936 until they finally succumbed to the temptation of putting transistors into the HRO500 in about 1965, a change that seems to have contributed to the demise of this famous line, and the selling-off of the National brand name to Japan.

G3UKH is the proud possessor of both a pre-war HRO-Senior and one of the post-war HRO-50 models of about 1954, a time when import restrictions severely limited the number brought into this country. He continues to use his HRO-50 with a 1967 FL200B transmitter, carefully limiting his pa current to 150mA rather than 250mA in order to conserve valve life. But after reading the June *TT* he decided to give his very old, and only little modified, HRO-Senior, which he had last used in 1969, a whirl. He was "amazed how good it still worked". As someone who sat in front of one, two and even three HRO receivers simultaneously for many thousands of hours between 1941 and 1946, I am *not* amazed. If you can emerge from five years' intensive use of a receiver retaining a profound admiration for its original designers, it cannot be too bad a receiver by any standards! Though I would admit that performance of the original models fell off above 14MHz.

The point that G3UKH makes is that there is really no need for a newcomer to hf amateur radio to feel it necessary to think in terms of spending £500 or even double that on a new "black box" rig when a good HRO or AR88 can still be had for around £50 or even less. Admittedly, with the older, built-like-a-battleship equipment you need more room, but at least you don't get your fingers caught in controls and switches packed tightly together.

As G3UKH puts it: "I know I can sound biased, and I do appreciate all the good points of modern equipment, but surely the good point of amateur radio is that everyone can do their own thing. There is a place for those who like to operate hf with a black box and those like me. I do all my own servicing, basically using just a BC221 and a multimeter. I would hesitate to even try to put a modern ic-based rig right. I cannot help but admire the Russian amateurs who use all home-made equipment, no doubt to them a necessity."

Constant-voltage transformers

The June *TT* included a note from WA6BAN on "sola-transformers" incorporating resonant circuits that he had found very effective in overcoming the life-shortening switch-on surge of heater current into high-cost pa valves such as the 4CX1500B. I confessed then that I had not previously come across this type of transformer, and speculated whether it would be possible to modify a standard transformer to provide similar benefits. The result has been that several readers, including Don Nappin, G3MLS, and Ted Hatch, G3ISD, have provided more information on constant-voltage transformers and the firms that manufacture them. G3MLS writes:

"The Sola transformer is one of a number of types of constant-voltage transformers (cvts) which operate on a principle involving magnetic saturation. Sola is a trade name and not a generic name for cvts. The firm of Advance have for many years made cvts in the UK under the trade name of Volstat. This company used to be located at Enfield and also made test gear and power supply units. Some years ago they were taken over by the American firm Gould, but this firm has hived off both the cvt and psu operations. The cvt operation has been bought by its management and is operating under the Advance name from somewhere in Wales.

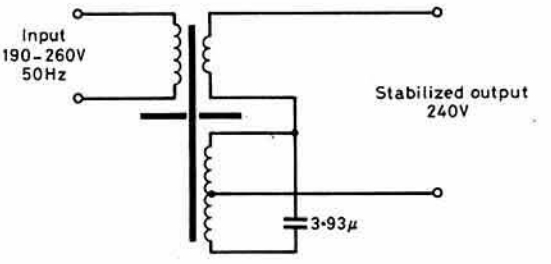


Fig 5. Basic arrangement of a constant-voltage transformer made by Advance

"Constant-voltage transformers can be found on the surplus market; indeed I purchased a 150W cvt at the 1983 Derby mobile rally for the princely sum of 50p. This took an input of 190–260V at 50Hz and gave a mains voltage output of 240V. The circuit is shown in Fig 5 and incorporates a resonant circuit.

"This form of transformer does indeed give a distorted output waveform, as the effect of saturation is to flatten the peaks. The rms value is substantially constant, ideal for heater or filament stabilization. The

maximum output current into a short-circuit, as stated by WA6BAN, is about twice the full load current. There are more complex types of cvt incorporating compensating windings which give a much lower harmonic content and thus a nearer sinusoidal output, but they are rarer than the simpler type. Advance also made some of these.

"One interesting application of the principle which I came across some few years ago was in a 24V dc-to-mains inverter, in which a centre-tapped primary was used, with the 24V being switched with thyristors, thus giving a square-wave input. The action of the cvt then gave a substantially sinusoidal and stabilized output. A range of these inverters was produced with outputs in the hundreds of watts to kilovolts range."

G3ISD also pointed out that "sola" refers to the American firm Sola Basic Industries (often known as SBI). He comments further that it is not just a question of the resonant circuit but also involves operating the special core close to saturation. He is certain it would not be feasible to modify a standard transformer into a cvt of this type. He recalls that some time ago he had an Eddystone 888 receiver which drifted badly whenever there was a change of mains voltage, even, for instance, when a 500W electric fire was turned on. The 888, however, had a socket for feeding in external supplies, including heater supply. G3ISD solved his drift problem by using a 6V Advance cvt. He also admits to having a 150W Advance cvt in his garage that he has never used or even examined carefully.

The high-current psu saga

The prime reason why Ted Hatch, G3ISD, reached for his typewriter was to respond to the notes from Earl Hornbostel, DU1AE, in the June issue that commented on his *Radio Communication* article of July 1983. He accepts fully the validity of the point made by DU1AE on the "worst case" problems involved in running a 2N3055 pass transistor at currents of the order of 10A even when these appear at first sight to be within the device ratings. He feels it is exactly this type of informed information from professional design engineers that is all too seldom put before the radio amateur.

G3ISD adds: "The prudent constructor will now rate the 2N2055 in this application for no more than 5A. Thanks, Earl!"

However, G3ISD is less convinced of the need to put a resistor in series with a thyristor in a "crowbar" protection circuit. He writes:

"If the scr fails, as DU1AE suggests, it will 'fail safe' so how can it give 'a false feeling of security'? I think the thing to bear in mind is that the prime purpose of the crowbar is to protect an expensive transceiver from the effects of an overvoltage caused by a faulty psu (usually a short-circuited pass transistor). The crowbar, as its name implies, is a brute-force, last-ditch device, intended to protect the transceiver at all costs. The possible replacement of a few semiconductors in the psu at the cost of a few pounds is preferable to the alternative of a ruined transceiver. After the crowbar has fired, it is desirable that the fuse should blow as soon as possible, and I question the wisdom of delaying the fuse as a result of limiting the current.

"Since the chain of events begins with a short-circuited pass transistor, it is that which would pass the bulk of the fusing current, leaving the other relatively unaffected. It is very unlikely that the psu transformer would suffer any ill-effects, as its thermal capacity would enable it to absorb the heat resulting from the excess current. Furthermore, I do not think it necessary to consider transient overvoltages from the mains or as a result of load switching. These would be of extremely brief duration and harmless, and if the crowbar circuit were not slugged the result would be frequent nuisance tripping."

I have a suspicion that this is one of those design debates in which each side can be right or wrong according to the particular circumstances. What I am not certain of is whether the power stored in an electrolytic capacitor could be sufficient to cause a thyristor to fuse "open circuit" in advance of the main fuse. If this were the case then DU1AE's comment about a false feeling of security would be well justified.

Analogue expertise still needed

The March *TT* (pp222 and 228) drew attention to the manner in which the impact of digital techniques is tending to change, and in some ways distort, the pattern of formal electronic engineering training; rather as the dropping several years ago of all mention of thermionic valves in the RAE means that some newly-licensed amateurs are at a loss when it comes to understanding high-power linear amplifiers, etc, unless these are based on solidstate devices.

Chris Dillon, G3WCD, who is a lecturer in electronics for the Open University, fully agrees that problems are already arising from the shortage of analogue and rf design engineers. He writes: "The often heard cry that 'everything will be digital in 'x' number of years' time may turn out to be a self-fulfilling prophecy simply because there will be a vanishingly small number of engineers who are skilled in analogue and rf design.

"As an academic I tend to come across two conflicting points of view. One, from students and some colleagues riding high on the micro boom, has it that unless a product contains at least one microprocessor it's not worth having. These same people also tend to believe that the only real problem standing in the way of completely digital electronics is one of speed limitation in digital ic devices. At the same time they often appear to be baffled by the problems thrown up by high-speed switching; something any good rf engineer would recognize and cope with.

"The other point of view comes from contacts in the electronics industry. They are desperate to find and employ competent analogue engineers—regardless of the size of the company. They need people with a well-rounded education in modern electronics. 'They can all connect matchboxes together,' is the complaint, 'but we cannot find enough people who understand how a simple emitter-follower works'."

G3WCD is much concerned with the damaging effect on the British communications and electronics industry that is already resulting from the decline in analogue and rf engineering skills. It could be argued that this is of only limited concern to the many readers of *Radio Communication* who have little or no connection with the profession and who rely more and more on the design-expertise of Japanese engineers. This would be a short-sighted attitude: amateur radio is unlikely to flourish for long in a country in which the hobby is seen only as a radio operating sport and if, to use one of G3WCD's phrases, the analogue baby is thrown out with the bathwater. He stresses: "The best electronics designs of the 1990s—and into the 21st century, must exploit the advantages of both digital and analogue techniques. Neither has the monopoly of excellence."

G3WCD mentions his particular interest in an analogue technique developed in the UK: Gingell's polyphase method of generating ssb signals. He has recently completed a low-power 3·5MHz ssb transmitter based on this system, even though his professional field of research is crystal filter design.

Chris Sheperd, G4OOA, similarly draws attention to the book *RF Circuit Design* by Chris Bowick, WB4UHY (published by Howard W Sams Inc, ISBN 0-672-21868-2). He points out that it is a very practically-orientated book that covers such useful techniques as impedance matching using Smith charts and explains *S* and *Y* parameters, as well as small and large signal amplifiers and filter design, all in considerable detail but without too much mathematics. He adds: "In summary, a very readable and useful reference book that I use whenever I can get it back from the last person who borrowed it."

All stuck together

The increasing use for consumer and other mass-produced electronic equipment of surface-mounted components (smcs) adhesively fastened to printed circuit boards has already been described in *TT*. A new technique for surface-mounted boards has been reported from the USA. Normally, the electrical connections between the smc and the pcb are soldered. Now Epoxy Technology Inc has come up with the idea that instead of solder it should be possible to use an electrically conductive epoxy to make all these connections. They are reported to be evaluating the use for this purpose of their conductive epoxy types Epotek H70E and H20E, and claim that the use of a conductive epoxy would offer many advantages compared with solder for this type of application. There is a possibility also of developing copperless pcbs with printed wiring consisting of screened-on conductive epoxy, an idea that dates back to 1968 but now regarded as more practical when there is no requirement for the plated-through holes used for conventional component mounting.

Consult the Oracle

Serendipity has shown up a fairly sensitive detector of tropo conditions, in the form of the Oracle and Ceefax teletext services on the British uhf television transmissions. In my seventh-floor office in Knightsbridge, among many tall buildings, I break all the rules by using a crude "indoor" (home-made) antenna. Normally the teletex display on all channels is reasonably good with virtually no errors due to short-term multipath reflections. But come a "lift" and invariably the display is reduced to near "garbage", though the multipath echo period seems too short to affect the normal pictures. As a number of viewers have reported poor teletext reception "in certain weather conditions" I suspect there could be quite a few locations where this form of tropo detector would work. But I shall be in trouble if I appear to be advocating poor indoor antennas for tv reception! □

4-2-70

*by Ken Willis, G8VR**

AFTER MONTHS OF VERY MODERATE vhf conditions, everything seemed to happen on a single day, Friday 8 June, when good tropo, a minor meteor shower and simply incredible sporadic-E all combined to provide a feast of super-dx, much of it a first-ever experience for the many newly-licensed stations who must have emerged somewhat dazed by it all. Any rumbling noises underfoot on that day would doubtless have been caused by irritable old-timers rotating in their graves at the very idea of Russia being worked with consummate ease on the 144MHz band; yet hundreds of UK stations did just that, many of them using modest equipment and low power. This is described later, but that single day did much to illustrate what a useful dx-band 144MHz can be, since it offers all possible modes and, unlike 50 and 70MHz, enjoys a massive European support which ensures that whatever happens, someone, somewhere will be there to take advantage of it.

Having said that, it cannot be denied that the band these days is becoming very crowded. A migration to 432MHz and higher bands has already begun, but it would be a sad day indeed if ever we lost the 144MHz band with its tropo, Es and auroras despite the mayhem which at times it is heir to. *Vive le deux!*

The repeater scene

The summer issue of *Central Scotland & Borders FM News* contains its usual wealth of information, both local and from further afield, under the editorship of Colin Dalziel, GM8LBC. You can subscribe to this publication for the sum of £3 per annum by writing to George Smith, 80 Deanburn Park, Linlithgow EH49 6HA. Among the many interesting items in the newsletter, Alasdair, GM3AXX, refers to a contact made through the new Inverness repeater, GB3BI (R5), with GM3TNT in Wick when GM3AXX was in the car park at Aviemore station. This was a long haul of almost 250 miles. Glen Urquhart is surrounded by mountains, but GB3BI can be received at S9 there, thanks to a reflection from a high tv mast above Loch Meikle. This has encouraged the repeater group to install a half-wavelength reflector near the summit of Suidhe Ghuirman (nearly 2000ft asl) so that coverage of GB3BI can be extended even further. It will be interesting to hear how this novel project works out.

Other snippets of news from this group are that GB3PA (Paisley) requires 6s of audio before valid access is obtained, unlike the other Scottish repeaters; also, the Repeater Management Group plans an open meeting in the Borders area sometime in the first half of 1985—details to be published when finalized. Finally, GM8LBC notes that Scotland is lacking any proposals for repeaters handling rtty, tv, data, microwave or other forms of communication, so interested parties should contact him as a starting point.

Some information has also come to hand on GB3AS (Caldbeck, Cumbria) which is operated by the Anglo-Scottish Repeater Group. It is located some 17km SW of Carlisle on the IBA mast, and its coverage includes the Carlisle area, Dumfries, Castle Douglas and up to Beattock along the A74. Coverage to the south is said to be patchy, however. It has given good service since it was switched on in August 1980, and visitors are invited to "tune to S20" when in the area since they will be made welcome with a friendly chat. Plans are afoot to improve the repeater hardware and operating system. Meanwhile, those wishing to join this group can do so by writing to Mr I. Duthie, 5 Park Close, Scotby, Carlisle.

Chris Lorek, G4HCL, has sent me No 4 of the Cambridge Repeater Group's newsletter. This is another beautifully-prepared publication, and by strange coincidence, Chris and Colin, GM8LBC, were students together, so there must have been something in their course of study which contributed to their skill as editors! Chris makes the claim that GB3PT is Britain's *first* data repeater as well as *first* on rtty, while GB3PI and PY were, respectively, pioneers on 2m and 70cm. "So, what's all this about the Leicestershire Repeater Group being the oldest in the country", asks Chris? (see *4-2-70* June 1984).

The new receive antenna and feeder on GB3PI (R6) are performing well, and hand-portable operators have especially benefited from this modification. With higher power being used these days by mobiles, several operators are getting into the repeater when they can barely receive it, so a replacement 40W transmitter is being built by the Cambridgeshire Group. The opportunity will be taken when the changeover occurs to install a new receiver with an fet front-end and better dynamic characteristics. Several other improvements using state-of-the-art technology are contemplated by this active group.

GB3PY (RB14) is reported to be getting busier than ever as more and more operators seem to be discovering 70cm. This repeater is at Madingley, four miles west of Cambridge, (see *4-2-70* November 1983 re proposed site change). When not in use it transmits callsign every 10min, and for access a 1,750Hz toneburst is required. Timeout is 5min. This repeater runs 12W via two cavity filters and heliax feeder to a folded dipole. The hardware includes Pye base-station equipment which has proved extremely reliable in use. Crystals, by Cathodeon, are reported to be to the same high specification as those used for Uosat 1, so any charges that the repeater is off-frequency will not be entertained! More information on this group's equipment in a later issue when space permits.

The emergence of some good tropo brought the inevitable reports of dx through repeaters, and it is difficult to complain about such use of the "machines" even though the owners sometimes feel it is a misuse of their facilities. On 10 June, Bill Bramham, G3OPI (Cumbria) was able to access the repeater EI2WRC (nr Waterford) and through it worked G6HHS (St Austell) and G6UKP/A and G6TLZ (both at Hayle, near Land's End). Bill was using an Icom IC20E handheld with 4W, into a seven-element beam at 16ft height.

Tropo

It has been a very long time since there was any good tropospheric propagation to report, but at long last conditions came good on 8/9 June when everything seemed to happen at once. During the big Es opening on 8 June, the 2m band was wide open to Scandinavia, or at least Norway, with LA6HL a steady 59 plus, working many G stations. This persisted throughout most of the afternoon and evening, but overnight things changed and at breakfast time on 9 June the path from UK was mostly NW-SE, with the HB9 beacon at S9 in the south, and at S6 in Oakham where G6ZCY copied it, a rare event from his location. Several HB9 stations were active, working into the UK, and some northern Italians appeared also and were worked by Gs. G3IMV, who worked some of them, noted strong ms-like bursts on the signals, which were never very consistent, and wondered whether the minor showers prevalent at that time were contributing to this propagation.

Italian stations reported heard or worked at this time were I2FAK, I2FHW and IW2ACD, but there were probably others. IW2ACD was reported as using only 10W. The path was quite localized, but continued at least up to Lincolnshire because G4DHF worked I2FAK (yet again, as he said! Some of us would be glad to do it just once!).

On Sunday 17 June, during a QRP contest with many portable stations operating from vantage points, several contacts were made with EI and GI, though conditions were never exceptional. In fact in the south a cloudburst accompanied by intense lightning caused many to close down temporarily.

There have been signs since 8 June that many stations are becoming blasé about working the mid-dx after having been exposed to the joys of super-dx via sporadic-E. After all, when you have worked Russia, even HB9 or northern Italy seems pretty ordinary stuff, so the more local Continentals have been less in demand of late. Still, we should get one or two openings via tropo into OK and SP this summer with any luck, and these represent dx even for those who have now "done it all" on 2m!

50MHz

It is good news that the Green Paper published under the title *Bands 1 and 3, a consultative document* specifically mentioned amateur operation in the 50MHz band (See p652). There will be many demands on Band I frequencies once they have been freed from tv use in the UK, so this positive attitude at this early stage of planning can only be regarded as encouraging.

*11 Old Downs, Hartley, Kent DA3 7AA

By the time this is being read it is likely that the 50MHz beacon at RSGB headquarters will be in service; but following the tests reported elsewhere (*RSGB News Bulletin*, July), reception in Wales via tropo and in Scotland through ms was reported. Thanks are due to John Wilson, G3UUT, for his work in providing the hardware for this beacon, and to Brian Bower, G3COJ, who co-ordinates vhf beacon activities for the VHF Committee.

The photograph at bottom left shows the excellent 50MHz antenna installation used by Jeremy Royle, G3NOX (his late father G2WJ was also a very well-known vhf enthusiast). With such an antenna, Jeremy hears quite a lot, and he has been pleased to note a growth in more efficient antenna systems by the 50MHz operators, since many permit holders started off by using simple dipoles or even indoor antennas in order to get going on the band. Jeremy is convinced of the need for a "proper" antenna, whatever the band, and he says that during the big Es opening on 8 June it was an amazing experience to turn his beam towards Europe and hear layer upon layer of television broadcast signals, many of them at considerable strength. He said that the result was to make him realize how privileged he was to be authorized to operate on this band in the face of so much demand from other users of this part of the spectrum. Band 1 tv is likely to continue for some years to come in various parts of Europe and the USSR, so undoubtedly there will be many keeping a close watch on any developments in the UK to make 50MHz available to the amateur service, and it is in our own interest that we do nothing to abuse the privilege of operating there, either now through special permits or possibly later through a general allocation. Jeremy worked SM6PU and OZ9QV on 9 June, taking advantage of the sporadic-E conditions. These were 50/28 crossband contacts.

Another station with a big antenna on 50MHz is G3UGF of West Yorkshire, 1,130ft asl in the Pennines (photo bottom right). He uses a five-element Cushcraft, seen in the illustration alongside a Cushcraft 11-element 2m array. Both are 12ft in length, but the 50MHz beam is 9ft wide. It gives a gain of some 10·5dB. Richard says he is the only station in Yorkshire currently licensed for 50MHz operation, having been granted a permit in August 1983. He got going in earnest early this year, and in his area he found that night-time operation was out of the question due to Holme Moss tv flattening his receiver (presumably from transmissions for engineering purposes outside programme hours) since he is only 10 miles line-of-sight from this transmitter. He is on most mornings because he says, "breakfast tv does not use the vhf transmitters, so the band is clear until 8.30am". He says much useful information on propagation is obtained from cross banding to 3,718kz in the mornings; he also monitors 144·185MHz and has been very surprised at the number of Class B operators monitoring this band (G3NOX made a similar comment last month). G3UGF makes some interesting observations on 50MHz propagation. He thinks that the signals, for equivalent erp, are many times louder on 2m than on 6m, and finds the band "not like 4m at all".

G3UGF goes on to say that he was not prepared for the terrific ground absorption effects which he has observed on 6m. He finds that for successful operation on this band, it is just not good enough to mount the 50MHz antenna at the bottom of the stack (as many do for 4m operation) since height and a clear take-off are important. He also uses some power, claiming that 10W is barely adequate. Richard hopes that these comments will benefit those monitoring or preparing to commence operations on this band. He has found his activities on 50MHz so far to be "an education".

The vhf manager reported that in addition to those who originally applied for a 50MHz permit but were unsuccessful and asked to be considered again, some 105 new applications had been received up to the closing date of 30 April. The list includes stations in G, GM, GW, GI and GU.

G5UM (Leicestershire) makes a plea for operators using ssb on 6m to sign their calls using cw since he hears many too weak to identify during his morning listening sessions (and crossband 50/70 activities).

Expeditions

There will be a special event station operating from the summit of Mount Snowdon between 18 August and 2 September, during which 144, 432 and 1,296MHz will be used, and various modes will be utilized, possibly including sstv, fstv, atv and rtty.

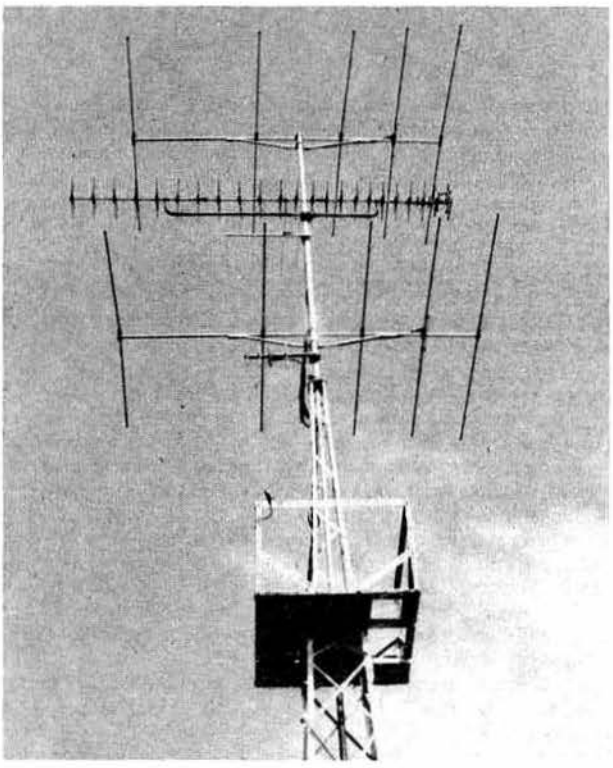
Meteor scatter enthusiasts should look out for LA1K, the university radio club from Trondheim, when they go to location EY80e (JP44WA) between 7 and 14 August. They will operate both ssb and cw ms on frequencies 144·117 and 144·147MHz (cw) and 144·157 and 144·357MHz (ssb). With several operators and multiple rigs they may be heard on up to three of these frequencies at any one time. They are very heavily booked with skeds, but if they complete early, they will listen for calls; they will also be on the 14MHz vhf net. This is at the peak of the Perseids and from a very rare square, so it may be worth the effort to monitor and be ready to call at short notice.

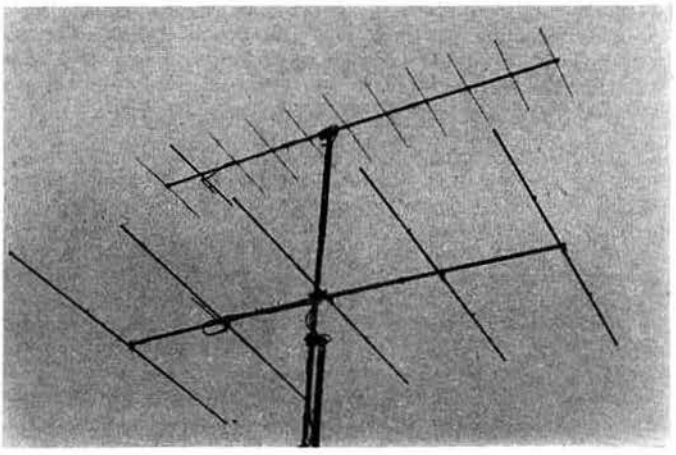
Julian Moss, G4ILO, plans to operate /P from the Lake District while on holiday between 4 and 18 August, using a Belcom LS202E, a 15W amplifier and an HB9CV antenna. Skiddaw should be the main location, with operation during afternoons and early evenings.

The operation from WL square by the Derbyshire Hills Contest Group (*4-2-70* March 1984) has gained two new operators in G8PNM and G4SHC, the latter solving the Class A operator problem for the vhf net and proposed operation on 4m. The callsigns allocated are EI2VPX/P (2m only), EI3VPB/P (70cm only) and EI3VPC/P (23 and 13cm). The 4m call is awaited. Their proposed site at WL03h has been vetted by EI2CA, but access appears to be a problem. However, another site has been located on Ardmore Head in WL02j which seems suitable. Dates are 4 to 18 August. All contacts will be confirmed. Our thanks to Martin, G6ABU, for this update.

Meteor scatter

Interest in this form of transmission is increasing by leaps and bounds. Several Class B operators who only recently passed their morse tests and graduated to a G4-plus-3 callsign are already getting equipment ready for this mode, since it is becoming generally realized that cw/ms really is an





The big 50MHz antenna arrays of Jeremy Royle, G3NOX (l) and Richard, G3UGF, (r)

Henning, operator of Y22ML (GL) in Dresden at the controls of his neat station. He operates ms cw from one of the three Dresden University Radio Club stations (Y41ZL) using the call Y22ML/A, and would like skeds with UK stations

easy way to make dx contacts on the 2m band and lower frequencies. G4XKV and G4XKZ, both of Bexleyheath, Kent, are building memory keyers and modifying tape-recorders, while in the interim they monitor every ms cw sked they can find for practice. This is a very good way to start. G4MUT (Reading) has also completed a memory keyer and is looking forward to his first sked. G4RGK, G4IOC and G4NDG have all been reported in *4-2-70* before. They are all having successful contacts on ms cw using only 60-80W amplifiers and simple antennas and using sporadic meteors also, not waiting for the big showers. Another enthusiast is Y22ML (GL), pictured here, who goes /A to the Dresden University Radio Club for his meteor-scatter. He likes to work UK stations and is often to be heard on the vhf net.

During the Perseids (2 to 17 August) DL8NBN/TK will be the callsign of a group operating from Corsica on 144.433MHz (ssb) and 144·060MHz (cw). Skeds may be fixed up through the vhf net.

SM3LBN operates ms from the comparatively rare square IU, running 300W to 4 × 15-element Cue Dee antennas. This is the first "season" on ms cw, having last year worked only ssb, and his skeds on the vhf net are arranged for him by SM5MIX. SM3LBN may make some expeditions into GV, HV and GU later. Dave, G4DHF (Lincs) worked him from IU on 144MHz cw ms recently, as did G8VR. In the latter case, reflections were received every few seconds throughout the sked, so the QSO was completed in the minimum possible time.

G4DHF had some other successful ms skeds, the "jewel" in his estimation being EA7CPW, worked on ms ssb from YX square.

On 9 June at the height of the good tropo, G4MEJ put out a "CQ" call on the ms cw random frequency (144·100MHz) and was answered by I1KIB. They completed in about an hour, this being during a minor shower (or even two!) since the Arietids were due to peak on 5 June and Zeta Perseids on 7 June. These contacts are always very pleasing as, unlike a sked, at the outset one has no idea at all of who might be "at the other end".

Newcomers should listen to the ssb random channel (144·200MHz ssb) around 12 August when the Perseids should be at their height, but please pay great attention to the 1min period timing when calling. The silence during the listening periods (broken only, we hope, by long reflections) can be very soothing after the bedlam of hundreds of operators calling simultaneously. Fortunately the ms mode seems to have its own ways of separating the mass of signals at the remote end of the link!

Solar observations

Those who combine other activities of a scientific nature with amateur radio seem to me to have a much greater opportunity of obtaining maximum enjoyment from their hobbies than those who simply sit back and wait for the right conditions to work the dx. Many amateurs these days are doing pioneer work with microcomputers, interfacing them with radio in a variety of ways, and this field is as yet in its infancy. There are also many amateurs who have an interest in astronomy. It is possible with quite simple equipment to observe the sun, our nearest star, which has such an important effect on radio communication both at hf and vhf.

Mike Parkin, G8NDJ, of Alton, Hants, is one such amateur. He has sent some very interesting information relating to the massive solar flare which occurred at the end of April. It was mentioned in June *4-2-70* that this flare produced very high levels of sun noise on the 2m band, and in some cases caused confusion among those who had never previously encountered this phenomenon.

Mike said that at the time when the flare was reported, he noticed "2 or 3" decibels of sun noise on his 2m receiver, especially as he was able to line up his eight-element beam on the sun when it was low on the horizon. His neighbour, Chris Plummer, G8APB, observed the same effects, though experiments on 432MHz produced no tangible results, probably because the front-end of the transverter used was not good enough to detect sun noise at this frequency.

Since Mike is also an amateur astronomer, and is equipped with a 60mm refractor telescope with ×45 magnification, he decided to observe the sun with it. He was surprised to find a large group of sunspots—large enough to be seen without magnification—very unusual for this part of the solar cycle, which is now so rapidly in decline. Mike has sketched his observations, an essential part of good astronomical observation, and the result is illustrated in Fig 1. He was able to track this sunspot group for three or four days, and heard the noise in his receiver disappear when the spots moved to the side of the sun remote from the earth as the sun turned on its axis in its 27-day period of rotation.

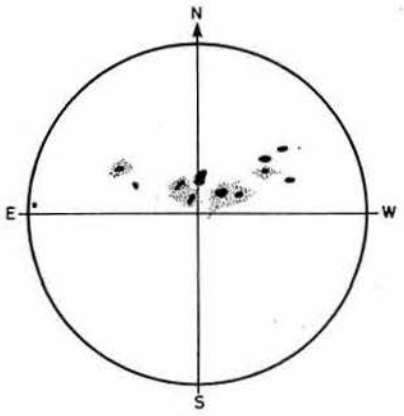


Fig 1. Sketch of sunspot group observed by G8NDJ, 28 April 1984, using 60mm refractor, × 45 magnification (E-W reversal due to telescopic image)

NB. It is very important not to view the sun directly through any optical instrument, as this will almost certainly cause permanent damage to the eye. Filters can be used for solar observation and the image produced by the telescope should be projected onto a screen where the sun's disc can be studied in safety. This cannot be emphasized too strongly. If in doubt, don't do it!

Sporadic-E

The Es season on 2m was a long time coming, but when it did it proved to be well worth waiting for. In its aftermath were hundreds of UK stations, many of them only recently licensed, with super-dx contacts under their belts which they will remember for many a day.

It started quietly enough around 1225gmt on 8 June when some strong Italian signals appeared on the 144MHz calling channel, and several G stations worked into I8. Only a few Italians seemed to be active, those reported being I8YZO (HY), I8TUS (IZ) and I8PKQ, I8MIB (IY). Gloria, G4UYL (Gillingham) was one UK station to take advantage of the opening to get a new square and country by working I8YZO from what she calls her "hole in the ground QTH". The opening was quite brief, and by about 1315 all was quiet again.

During the afternoon, with many stations continuing to monitor, G3IMV (Bucks) showed what a good operator he is by catching SV2JQ (LA) who put in a brief appearance at the cw end of the band (but using ssb) to exchange calls, report and locator with John for a fine long-haul contact. During all this time there was excellent tropo up to Scandinavia, LA6HL being 59plus in the south of England.

In the early evening a major opening to the USSR was in full swing by 1800gmt, both on cw and ssb. Russians tend to be very good cw operators, and their equipment these days seems much more sophisticated. A lot of them are active on vhf, and their presence during this opening had to be heard to be believed; pile-ups were enormous, also reflecting the much-increased UK activity.

The distances from the UK of some of the very loud USSR stations were also enormous. UA3LAW (PO26g) was 59 for long periods and must have worked at least 100 Gs. RB5XBR (OJ12c) using only 5W to a two-element quad was another strong one, as was RB5AO (QL30c) who worked strings of stations on cw. It was fascinating to hear some G1 stations exchanging

reports with stations deep in the USSR as casually as they would with a local; one suspects that at the time the significance of their achievements had not dawned on them—these were squares they might not hear from again in a lifetime of vhf operating, situated 2,000km and more from the UK.

A few reports from stations active in this event serve to illustrate its spread and intensity. Bob, G6ULN (Gateshead) using 45W to a nine-element Yagi worked UO5OX (OG5g) from a portable location. This can only be described as a rare one—the path length was some 2,300km. Geoff, G3YVR (W Sussex) worked UC2AA (NN18d) for his first ever "real dx" on 2m. Geoff used only 25W, again to a nine-element Yagi. Down in Wales, Brian, GW4BHZ (Denbigh), worked RB5UCE (PK55a), located near Kiev, also at a QRB of 2,300km. From London, John, G4FRX, had his first experience of Es, using it to good advantage in working RB5AO.

Going further to the north, G4DHF (Lincs) worked UC2AAB (NN), UC2AA (NN), RC2AA (NN), UB5PM (MK) and RB5HD (RJ), this last one at 2,438km range. Dave also said that he had heard a report that there had been a contact between Norway and UD6, and there was a rumour of a Hungarian having worked Iceland!

Martin, G3ZXZ (Wakefield, W Yorks) sent in a report which indicated that he was hearing things not audible further south. His "bag" included SP5FHC, SP5IWE and SP5CCC, all in KM square, and a partial contact with SP5BTN, believed to be in KN. This shows the selective nature of Es. Martin also worked RB5UCE (PK) at a QRB of 2,231km.

Going further north still, into Scotland, the pattern changes somewhat. Andy, GM4IPK, is reported to have worked SP7CNL (JL), SP7DSA (JL), UB5BAE (MJ) and UB5PM (MK), while UO5OX was heard but not worked. The Polish stations seem to have been heard only in the northern parts of the UK. GM4COK, on the other hand, is reported to have worked UO5OX.

The event from the point of view of a station with a very big antenna system, namely G3POI (Kent) was a different one. Clive worked 31 stations in prefixes RP2, UP2, YU1, YU2, YU7, HG1, HG2, HG3, HG8, OK3, UB5 and UC2, but when the main Es signals were beginning to fade with most stations, he continued to make contacts (with YU and HG) by beaming to about 070°. HG1YA, whom Clive worked, told him that he was beaming 350° so the reflection from whatever was causing the event was a "sideways" affair at this stage. Also Clive reported that the stations worked at this time were generally very weak (they were certainly not audible in the southeast using more conventional antennas) and they were also low-power stations who apparently were not normally used to working dx on vhf. Was it FAI propagation? How little we know about what goes on up there.

To complete the picture of an amazing day, Geoff, GJ4ICD, reported working LZ2XU (MD) and LZ2KBI (LD) plus several Italians in GB earlier that day (at around 1615gmt), while GJ6SUI worked YU2WA (ID) at 1300gmt.

Since then there have been some mini-openings to Italy and 9H1, but no sustained event in any one direction—it is hoped that more will come. It is clear that many more stations have now got the equipment and the knowledge to monitor for Es on the lower frequency bands, so they are on the spot to take advantage of even the briefest opening. Let us hope that there is much more excitement to report next month. But let Tony, G1ARU, end the story. He writes "Many stations heard calling Es. Nothing heard until 1933gmt when RB5AO (QL30c) was called and worked with 59 reports both ways. Equipment at my end is a barefoot FT290R plus Mutek board (3W) to an eight-element Jaybeam at 25ft". . . . To Russia, with 3W on vhf!

Slow morse transmissions

In June, *4-2-70* included some comments on interference to slow morse transmissions on the 2m band. G4BFJ (Surrey) was quoted as having had to change the frequency of his transmissions because of interference from some Hertfordshire stations. Mike, G4BFJ, disputes this, and says that he had received nothing but co-operation from stations when he used 145·250MHz in the early days of his transmissions, but he changed to 144·625MHz simply because of the high level of use of 144·250MHz in the London area. In another quote, GW4OXB was stated to have had problems with atv operators using his channel for talk-back. Trevor, GW4OXB, has written to say that the atv operators in his area had, in fact, used the channels for some years, since no official slow-morse transmissions had been in operation for a considerable time in the area. When GW4OXB became an official slow morse transmission station, the matter was discussed amicably between the atv operators and himself, and he chose to move to S11, sinee when he has had no problems whatsoever; on the contrary, he has noticed stations on S11 deciding to QSY when the slow morse transmission time drew near at 1830.


ISLAS BALEARES - ESPAÑA

RADIO - BALIZA DIRECCIONAL DE V - UHF

EA6V-UHF

DIRECTIONAL AMATEUR RADIO - BEACON

RADIO	LOCATOR	ERPW	ANT	HASL	BEAM DIRECT.	MODE
G3VR	AYØ7J	2ØW	4 EL. YAGI	47Ø M.	NORTH	A-1

INFO: EA6FB
Box 8 - San José
IBIZA Isl. (SPAIN)

An unusual QSL card, from the vhf/uhf beacon in Ibiza, sent by Jose, EA6FB. EA6VHF is listed as 144·918MHz, but no information is to hand for EA6UHF

From here and there

The callsign of G6RAH (Ilford, Essex) is being pirated by a station signing G6RAH/M. The real G6RAH does not currently work mobile, but often operates portable, and is a QRP station. Any information to G6RAH, QTHR.

G8HHI (Hants) has been awarded a "Supreme", No 55, for having produced verifications for a 1·3GHz Standard certificate to cap his previous Seniors on 2m and 70cm.

For rtty/micro enthusiasts, Trevor Tugwell, G8KMV, has a program for the Acorn Electron. This very interesting micro, which offers most of the features of the much more expensive BBC-2 (and comes from the same engineering stable), can now be fitted with an interface to enable it to be used for rtty, morse and other amateur radio applications.

For those interested in packet radio, G8KMV reports that the following amateurs in the Herts/Beds area are experimenting with this form of communication on 2m: G6MGQ, G6JEH, G6TQL, G1BFV, G3TIK, G4RMD, G4PSO, G4UKE and G8ATI, as well as G8KMV himself. Programs are apparently available for a BBC-2 for this mode of communication, and one by G6GIX requires no terminal unit, all input/output being via the BBC-2 cassette port. Most of the activity is on Monday evenings (1900–2200 bst) on 144·675MHz, using fm. Those wishing to call in for further information will be welcomed. For the computer program information write to G6GIX, QTHR.

Nigel Hoult, G4CIK, has commented on the discrepancies in distance scoring programs (*4-2-70* May 1984) and thinks that there are two main sources of error, the figure used for the earth's radius and the loss of accuracy due to finite precision in the computer. He suggests ways around this, which I will be pleased to pass on to any interested readers, and he says that in the example given in *4-2-70* he agrees with the result stated by G3JKV (903km).

Don't overlook the fact that the *VHF/UHF Newsletter*, annual subscription £4.20, is now available from the membership services department at RSGB headquarters,. The editor is Dave Butler, G4ASR, and the newsletter will contain technical as well as operational information of interest to dx-operators on the bands covered by *4-2-70*.

Geoff Brown, GJ4ICD, makes a plea to amateurs not to send QSLs to Channel Islands stations with UK stamps enclosed, since these are not valid in C.I. He asks that ircs be sent as one would do in the case of other countries outside the UK.

Several readers have asked me to fulfil a promise made some time ago to include a short piece on propagation by *field aligned irregularities* (fai), also known as *"transAlpine mode"* by the Italians, and called *"special propagation"* in Yugoslavia (a nice name, that!). When space permits this will be done. Meanwhile see this month's comments on the sporadic-E opening on 8 June when G3POI benefited from some unusual propagation to work a lot of interesting dx.

Jan, LA8AK, says that about 100 of his up-converters for ms cw tape-recording (see *TT* September 1982, pp 770–1) have been built by amateurs in at least 12 countries, but he can no longer supply the printed circuit board. He has, however, designed another circuit using the SN6660N device, and his new board can be obtained from SM4LLP or SM4AXY. It is a simpler circuit, easier to mount than the original, and he hopes it will prove effective. G8VR has used one of the original models for some time, and can confirm that it is a most interesting and useful unit, especially for ms cw speeds in excess of 800lpm.

I am constantly asked why I do not publish deadlines for *4-2-70*. The reason is that I never have sufficient space to include everything I receive from readers, so I try to use every line. Anything sent in which is not too "time-related" is used eventually, though obviously information on stations worked etc becomes out-of-date very quickly when conditions are good over a long period. So, send me your information regardless of deadlines; meanwhile I have used up some precious space in making the point! □

Microwaves

*by Mike Dixon, G3PFR**

Operating news

In the absence of significant operating news this month (presumably people are busy operating rather than reporting their results!) a report on the Sheffield round table held on 2 June appears appropriate, since this mainly concerned operating, with 10GHz usage to the fore.

I was struck by two things: first the wide range of callsigns—old and new—all sharing a very keen interest in simple wideband equipment; and second, by their apparent need for information and guidance, especially on measurements.

Apart from Barry's (G8AGN) excellent short presentation on microwave propagation, almost all of the session centred on 10GHz wideband equipment. Quite lively discussion took place, and one important thing emerged: the need for agreement on a standard i.f. (other than a nominal 105MHz)—30MHz seemed to be a strong contender, using a second conversion down to 10·7MHz, with the provision of *effective* afc.

Peter, G3PHO, and others put forward a strong plea for operators in the 10GHz cumulatives to "spread out a bit and try some new paths": he felt (and I echo the sentiment) that the competitive side of the cumulatives tends to lead to the same paths being worked by the same (successful) stations year after year, resulting in a certain staleness about the whole operation and perhaps discouragement of new operators. Perhaps a "bonus" score for each *new* path might encourage the use of more adventurous sites?

Ray, G3NKL, expressed a similar sentiment, and both he and Peter showed their latest compact equipments capable of being carried in a small rucksack to places inaccessible to cars; both intend to use unexplored sites (in the microwave sense).

Ray presented the impressive results of his fixed station link from Longridge (near Preston) to Dennis, G3FNQ, at Southport. This is a 40km (probably) obstructed path and the link has been running almost continuously since 1979. With microwave heads and 30MHz preamps at masthead, and 20dB horns, chart recordings of signals show quite clearly the various types of weather front passing through the path and the enhancements present, almost daily, from very early morning until around midday. He also played a recording of a recent full duplex contact which approximated closely to a hi-fi noise and interference-free telephone conversation! Stability of the microwave oscillators is such that mechanical retuning had not proved necessary, only minor adjustments to supply voltage being needed to correct (thermal) variations. Data and fast-scan tv have been exchanged in addition to the normal speech. Ray wonders if there is a station along the North Wales coast that might be interested in extending this fascinating and valuable experiment. In my opinion more long-term experiments of this type are desperately needed to enhance our knowledge of 10GHz propagation—how about it?

Finally, the recommended move of wideband operation up the band (July *Microwaves*) was debated and the reasons for the move agreed as sensible. Time, unfortunately, did not allow the proposed discussion on digital modulation techniques.

Fundamentals (2)

The next most important module in a simple 10GHz transceiver is the mixer. This must be constructed in waveguide, and arrangements made to couple some of the oscillator power and, if possible, all of the received signal into the mixer device—a point contact or Schottky diode in a package suitable for waveguide mounting.

For the beginner, the simplest solution is the "in-line" mixer, the use of which brings several benefits and some disadvantages. The main benefits are ease of construction, good receive performance and elimination of the t/r switch, for it is inevitable that some oscillator output escapes from the antenna end of the device at a level sufficient to act as a reasonable transmitter. However, transmit power is limited to a milliwatt or two because of the need to avoid overdriving the mixer diode. Overdriving will result in impaired receive performance, and most mixers require about 500 to 750μA for satisfactory performance, a current which is usually attained with 1 to 3mW appearing at the antenna flange. This low power level is, however, quite sufficient to work all known terrestrial line-of-sight paths.

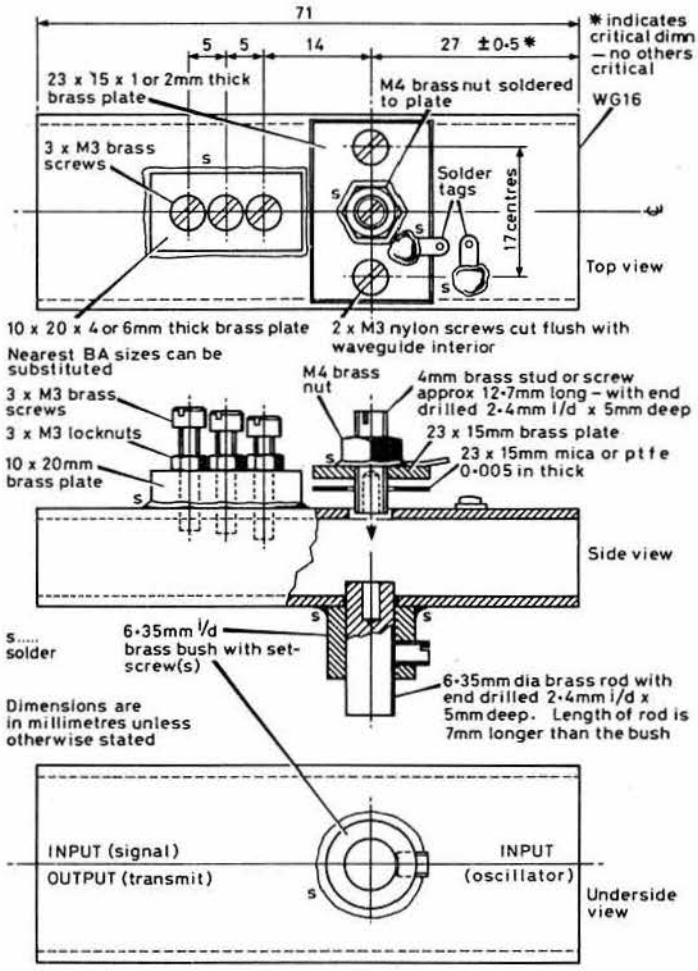


Fig 1. Alternative construction, in-line mixer

If the constructor wishes to use more power, there is no reason why a separate higher-powered Gunn and t/r switch cannot be added later, retaining the "in-line" as a receiver only.

Details of construction of the mixer are given in the *VHF/UHF Manual*, 4th edn, p9.43, Figs 99a and 99b, and a similar logical approach to construction should be adopted as for the oscillator. The same methods of fabrication, jigging and soldering are applicable, the only critical dimension being the distance of the mixer diode centreline from the oscillator end of the cavity. The tolerance required is within 1mm, which can hardly be described as highly demanding! It is quite easy to work well within 0·25mm using handtools. An alternative form of construction is given in Fig 1, and in some senses is a combination of some of the features of the two forms of construction given in the *Manual*, but which eliminates the need to tap the diode spigot. Whichever form of construction is adopted, the alignment procedure given in the *Manual* is applicable. The constructor is again urged to use plain flanges at both ends of the mixer; this enables the same firm clamping of the iris plate at the oscillator end and allows a thin polythene or mylar sheet to be held between the antenna flange and the antenna feedflange for weatherproofing (if so desired). A suitable alternative is the Solfan module mentioned last month. On this occasion, I have left the constructor to work out which holes are tapped and which are clearance —and the appropriate drill sizes!

At this stage the beginner is advised to dismiss the potentially improved performance of balanced mixers which require power splitters (for instance, hybrid tees) for their operation or the use of circulators, cross-couplers and t/r switching. These can come at a later date and will be discussed here if sufficient interest is shown in correspondence—which I hope will be provoked!

Next month the practical construction of a 20dB horn will be discussed. This is a good, simple antenna for the beginner, presenting as it does a good match over a wide range of frequency, and one which can later be used as a test antenna of known gain and match. Even with simple methods of construction the gain will be within 1dB of its design. A further bonus is that its beamwidth makes it easy for the inexperienced to point in the right direction! □

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

EPHEMERIS
Satellite news and views
*by R. O. Phillips, G4IQQ**

Uosat
After the successful re-activation of the 145·825MHz beacon on Uosat 2 on 14 May, full control of the spacecraft was regained on 6 June (orbit number 1,418). During this time the team at Surrey carried out lengthy diagnostic checks to try to locate the cause of the problem that resulted in loss of control of the satellite on only its fourth orbit. This work led to the isolation of the fault to an area of five components concerned with the routing of data from the command receiver to the decoder. The design of the spacecraft is such that it is possible to re-configure the routing of these signals to by-pass the problem area. This has now been completed and the spacecraft appears to be in very good health; however, its unfavourable attitude with respect to the earth is making command via the uhf up-link rather difficult. Further detailed check-out of the on-board systems is planned, as well as navigation analyses and attitude manoeuvres prior to gravity gradient stabilization. The team is clearly very pleased to have regained control over its satellite, and has expressed its gratitude to those who provided assistance during the recovery period.

One of the criticisms that I mentioned had been directed towards the Uosat project was the lack of published information. To a very large degree this had been put right by the publication of a number of technical datasheets—four on Uosat 1 and three on Uosat 2. These provide descriptions of the design and orbital characteristics of each satellite together with comprehensive data on the telemetry systems. Copies of the datasheets may be obtained by sending a large stamped addressed envelope to: The Uosat Team, University of Surrey, Guildford, Surrey GU2 5XH. The 1,200baud bulletin board on Uosat 1 has recently carried a questionnaire to obtain ideas on possible future projects for the satellite group at the university. The group would like to know what type of equipment is currently in use at amateur satellite stations as well as how the information from the Uosat satellites is received, processed, displayed and stored. The data will be used to decide how best to provide extra services via the operational satellites, as well as perhaps giving ideas for future construction projects. Any input together with name, address and callsign should be sent to the address given above.

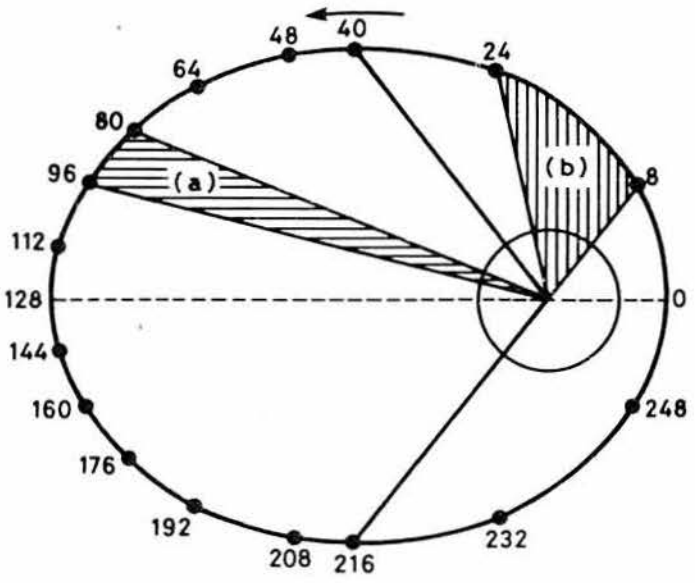


Fig 1. Orbit of Oscar 10. The mode B transponder is switched on between MA40 and 216. The areas (a) and (b) are equal and correspond to equal periods of time—approximately 44min

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

Oscar 10
I have received a number of comments recently indicating that although a lot is known about Oscar 10, very little has in fact appeared in print other than from the AMSAT groups, notably those in the US and UK. In order to provide a better understanding of the satellite and its operation, I have included this month some information which should be of use to existing as well as potential operators.

The satellite is, of course, in a highly elliptical orbit, with its minimum and maximum distances from the earth being 3,830km and 35,600km respectively. The general shape of the orbit is indicated in Fig 1. One term that often causes confusion is the *mean anomaly*, which for most purposes may be taken to indicate the relative position of the satellite in its orbit. The arc of the orbit is usually divided up into 256 parts (sometimes 360); these parts do not represent equal distances, but rather correspond to equal areas swept out by the point from the centre of the earth to the point on the satellite's path. The period of the satellite is slightly less than 700min, so each unit of mean anomaly corresponds to a period of 2·73min. To give an example, the two areas marked (a) and (b) on Fig 1 are equal and correspond to a mean anomaly difference of 16, which translates to a time of approximately 44min. The mode B transponder is usually switched on from MA40 to MA216, which equates to 109min after perigee to 109min before the following perigee, a total of some 8h.

Oscar 10 has a telemetry beacon on 145·810MHz which carries a cw bulletin for about 5min at every half hour. This is followed by 400baud telemetry transmissions and possibly ranging signals. The format of the bulletin is essentially fixed, and a typical message would be as follows:

```
HI HI AMSAT OSCAR 10 AT 19:00:00 UTC
ORBIT 758 MA 26/256
TLM: UBAT 14.4 V TBAT 9.3 C IARRAY 0.4 A
SA 0.1 DG
SPIN N22 RPM
SATELLITE STATUS: POWER PRODUCTION IS APPROACHING MAXIMUM
WITH THE SUN ANGLE MOVING TO ZERO. MODE B AND MODE L
SCHEDULE REMAIN UNCHANGED DURING MARCH
AMSAT OSCAR 10 HI HI
```

The battery voltage and temperature are indicated with the solar array current. This is followed by the sun angle (SA) in degrees and the spin rate of the satellite. The satellite status report is updated periodically though, as the one above was noted towards the end of June, such events clearly do not occur too often. More details will be included in future issues.

A final point on Oscar 10 this month is that the frequency for the H2 special service channel used to carry the GB2RS news bulletins has been changed to 145·962MHz. The schedule for these transmissions was given in the June 1984 issue of *Radio Communication*.

Other news
The latest update on the Japanese amateur satellite JAS 1 indicates that the project is proceeding very well and is on schedule for a launch on 4 February 1986. The available technical details were carried in *Ephemeris* March 1984 and there has been no significant change since then. The only additional data is that a single monopole antenna will be used for both of the 145MHz uplinks. Separate 435MHz antennas (turnstiles) will be used for analogue and digital downlinks. In fact two flight models are being constructed just in case there are problems with the H1 launch vehicle which will be on its maiden flight. □

The Month on The Air

*by John Allaway, G3FKM**

HF BAND USERS often despair that illegal intruders are ever removed as a result of IARUMS action. However, G5XB reports extreme helpfulness and co-operation from the authorities in moving a modulation-triggered parasite associated with a Paris-RTF broadcast which was causing problems in the 7MHz band. The trouble ceased in two days. This is of course an example of an accidental intrusion caused by a station in a co-operative country—unfortunately so many intruding signals are caused by administrations who know exactly what frequencies they are using and are fully aware that they are causing interference.

GM4IHJ has produced a microcomputer program which, together with a Sinclair Spectrum or Timex 2068, will help in studying and predicting hf propagation. He will answer questions (sae please) but does not yet have a "production model"—this will materialize if sufficient interest is shown. John Branegan lives at 8 Whitehills, Saline, Fife.

G3DRN reports the return of a rather elaborate QSL from Box 88—in this case from a "Philip" in Kent who is using the callsign G3SD, or alternatively G3ZJP (as mentioned on the card).

DX news

BY1QH, originally believed to be a pirate, has now started to prove otherwise by sending out QSLs. The station is at Qing Hua University, and activity has been noted on 21MHz cw and ssb. The QSL appears to be rather large (as is that from BY4AA), and anyone applying direct is advised to send a large envelope. BY8AA and BY1PK are also very active, again mostly on 21MHz.

In spite of the unsettled state of affairs in Lebanon, there are several stations active: OD5ZZ and OD5LT have been worked on 14MHz ssb, and OD5LX on 21MHz cw.

VR6KY has been working into the UK between 0600 and 0700 in the lower part of the 14MHz phone band. Tom Christian, VR6TC, is also to be found at similar times in the same area. T2ADE (according to *DX NL*) is often on 21,292kHz ssb around 1000. Another new Tongan is A35MO, who has been reported by the *Long Island DX Bulletin* as often to be found on 21,280kHz at 0100—not suitable for European QSOs but worth listening out for at other times. H44IA is another station of interest in the Pacific area; he is often near 14,210kHz between 1200 and 1400. ZL8AFH, on Kermadec Is, has also been worked in the USA on 21,305kHz at 0000. Those looking for FO8 on 7MHz might look around 7,005kHz at 0600-0645 on Saturdays or Sundays for FO8KP. FW8AF will reputedly be on 14,236kHz on Saturdays at 1800, and has also been reported on 14,279kHz at 0800 on Tuesdays.

DX News Sheet says that DXCC status for 4U1VIC (UN, Vienna) is currently under consideration by the DXAC. A proposal to delete Baker, Howland and American Phoenix Is and to replace them with a new Baker and Howland entry is also being looked into. The reason for the change is the termination of the joint USA/Kiribati administration of Canton Is.

KA9CVR/SV9 and W0PU have retired to Crete, and at the time of writing were using the former's call. They enjoy operating on cw at the low end of 14MHz but are also using rtty on the same band. Other stations which have become active on rtty include WL7AWJ, 9H1GD, SV5TH and 3X4EX (with whom schedules can be arranged by ssb contact on 21,225kHz at 1900).

Overseas news

G2FUX has been visiting the USA and while there had the pleasure of attending a function arranged in Philadelphia by the Ex-G Radio Club. This was to celebrate its 25th anniversary together with the 25th anniversary of W3HQO's service to the club. Some 38 members and wives attended from all over the USA, and Reg and Gertie were presented with various mementos and a colour television set. G2FUX was also able to present Reg with the Calcutta Key—a Society honour which is given for "outstanding service to international friendship". (This is the second time that W3HQO has been the recipient.)

G4MSP, who has until recently been ZS6CAH, now lives in Bophuthatswana and has been issued with the callsign H5AE. He is often on 21MHz (near 21,420kHz) on Saturdays and Sundays around 1800.

In order to commemorate the anniversary of the landing of the Allied Forces in the South of France, a special station will operate from Mont Faron near Toulon on 15 August from 0000 to 2400 on cw and ssb. The callsigns will be FV3VAR (on vhf/uhf) and FV4VAR on all the other bands. The time of operation may be extended. A special QSL card will be issued.

The DX Family News Letter dated 2 June says that it seems to be the intention of the authorities in Taiwan to license up to 12 more amateurs in addition to BV2A/B in the near future. The latest news on activity from Kampuchea is that XU1SS came back on the air on 2 May following the fighting in the Ampil area. The station is very active and checks into the DK9KE net on 21,157kHz regularly. On weekdays XU1SS is often to be found near 14,005kHz between 1100 and 1300. QSLs are guaranteed but applicants are asked to please be patient as logs take several months to reach QSL manager JA1HQG—please do not send second cards until plenty of time has elapsed.

The Palo Alto Chapter of the American Red Cross in conjunction with the North California DX Foundation will be operating two special stations during the period 28 July to 8 August in honour of the Olympic Games. One will use the callsign W84OG and the other K84OG and a total of 10,000 QSOs is being aimed at. Special QSLs will be sent to all who work the stations and apply either via the W6 QSL bureau or to the address in "QTH Corner". (If using the direct route please include three ircs and an sae.) Activity will concentrate around 3,505, 3,535, 3,783, 7,005, 7,035, 14,005, 14,035, 14,160, 14,230, 21,005, 21,035, 21,175, 21,360, 28,005, 28,035 and 28,560kHz.

A special station will be on the air until 11 November from the Louisiana World Exposition in New Orleans. K5WF will have "space-age" equipment, an international message-sending service, and the Smithsonian Institute's Marconi exhibit as well as demonstrations of slow-scan colour tv, computer interface, and satellite systems. USA amateurs are advised to call Fred Heisler (504 242 3337) if they wish to operate the station—reciprocal licence holders would probably be well advised to do the same.

Tony Oakley, 5Z4DJ, reports two new stations on the air from Tanzania: 5H3AS (formerly G3TEU/5Z4DP) and 5H3OJ (formerly 5Z4DJ). Their activity will be spasmodic and unscheduled, either station may operate from Dar-es-Salaam, or /A from Tanga or Kipumbwe. They hope to operate from Zanzibar, 5H1, in the near future. Tony says that the Worked All Mombasa Award is now even easier to obtain as 5H3CV has left Mombasa and there are now only two stations to work: 5Z4DP and 5Z4DJ. Work both and claim—there is no fee.

The Gambia

Tony Guiver, C53FG, has kindly sent in information about amateur radio in Gambia. This was prompted by the appearance of some C5 calls in February "QTH Corner". C53AA is the RSTG club station and currently inactive—the call has never yet been used. It is hoped to use the station by borrowing members' equipment. CS0WCY was Gambia's contribution to WCY and was active for one day only—26 December 1983. The CS0 prefix is used for special event stations. To the club's knowledge the station and operator of C53K gave up residence several years ago. Last November several amateurs, including C53T, arrived in the country and operated from an hotel. Their previous licences could not be, and to the best of RSTG's knowledge and that of the Post Office were not renewed. It is suspected that "C53K" could have been one of them and as far as the Gambian authorities are concerned the operation was illegal.

There is no official Gambian QSL bureau, but cards sent to the RSTG at PO Box 2470, Serre Kunda, The Gambia, or to Tony at PO Box 273, Banjul, will reach their destination.

To obtain a C53 call one must now be a resident as well as having proof of holding a foreign licence. Visitors now use their home call/C56 and it is strongly advised that applications (which cost D40, about £8) should be sent

*10 Knightlow Road, Birmingham B17 8QB

via the RSTG. An additional D20 should be enclosed for temporary membership of the society. The C56 prefix is being used because it is intended to follow Senegal and use C51 to C55 for the five geographical areas of the country. New calls are being issued in alphabetical order, and at the time Tony's letter was written C53FG and the out-of-sequence C53FR were the most recent. The only legal/MM station is C53DY/MM.

Expeditions

IRTS says that there will be a visit to Inish Bofin Is by members of the Galway Radio Experimenters Club between 28 July and 5 August. Callsigns to be used will be EJ4ALE and EJ4IDX.

A number of rumours persist concerning pending activity from San Felix Is, CE0X. CE3AQN has written to OH2BH to tell him that the authorities are unlikely to allow any operation before 1988 and that even then only Chilean operators will be allowed.

According to *DX-NL* KE6PU/DU1 has applied for permission to operate from the Philippine base in the Spratly Is for a 10-day period during August. The same publication also says that VS6CT has reported that the previously-mentioned expedition to the islands has been postponed due to lack of funds, but that there should be an operation in October or November after the monsoon season finishes.

DXpress editor PA0GAM has seen a copy of a landing permit issued to WP4ATF, HI3RST, NP4GD and others, for an expedition to Desecheo Is. That was for late May but transport was not available. It is now possible that it may take place from 23 to 31 July.

Recent information concerning visiting amateurs in Tunisia is that in future no permission will be granted for amateur radio activity. *DX-NL* says that "all former 3V8 expeditions were illegal" but this does not seem to agree with information supplied from official sources.

GK0JFK

To coincide with the 23rd Olympic Games and the 20th anniversary of the gift of the Kennedy Memorial site to the people of the USA by Parliament, the Chiltern DX Club will be operating a special event station from the site with the callsign GK0JFK. Two hf stations will operate continuously for about 60h during the period 3 to 5 August. They will be on all bands 3·5 to 28MHz, on the "usual" frequencies with split-frequency operation as required. A previous operation took place from the site in 1976 as WG1JFK. This was chosen to include "W" for the USA and "G" for the UK, and the licence was issued by the FCC. This time the callsign has been issued by the UK authorities and again indicates the link between the nations. The site does not count for DXCC but the GK0 prefix is unique. All QSLs will be answered with an attractive card—they may be sent to the address in "QTH Corner" or via the RSGB QSL Bureau.

Tables

The appearance and deadlines for the 1984 tables have been a little disorganized to date! G3GIQ has very kindly come to the rescue, and deadlines and table publication dates in 1984 will follow this plan: **(1)** Year tables: closing dates 15 August, 15 October and 15 January 1985 respectively for publication in October, December 1984 and March 1985. The last will include scores to 31 December 1984. After that, closing dates will be 15 January, 15 March, 15 May, 15 July, 15 September and 15 November, for March, May, July, September, November, and January. **(2)** The All-Time listings will have deadlines of 15 January (with deleted countries), 15 April (current only), 15 July (with deleted), and 15 October (current only); publication will be in March, June, September and December respectively.

SEANET

What is SEANET all about? Amateurs can only talk "shop" with other amateurs, so in the 'sixties the few licensees in SE Asia started getting together on the air at a set time and frequency to discuss their experiments and achievements. Like all good things, numbers grew and soon there were too many to handle in a round-table type of net. So the group had a controller who would call in members, country by country, and after many trials it was decided that the SEANET would meet daily at 1200 on 14,320kHz.

Soon hearing voices was not enough. Members wanted to meet each other, so it was decided that they would meet in Penang in 1971. The SEANET Convention was born with 25 members meeting for the first time. Since that time it has been held annually as follows: 1972, Bangkok; 1973, Singapore; 1974, Manila; 1975, Kuala Lumpur; 1976, Jakarta; 1977, Bangkok; 1978, Singapore; 1979, Penang; 1980, Manila; 1981, Jogjakarta; 1982, Bangkok; and 1983, Singapore. This year it returns to its birthplace, Penang. It is a pity that it cannot be held at its original venue (the Ambassador Hotel) but this is not able now to cater for the 150-200 delegates expected to attend. The convention will take place on 16, 17 and 18 November at the Eastern & Oriental Hotel.

SEANET is a very informal convention where the hosts entertain delegates and expose them to the culture, in true amateur spirit, besides discussing the past, present and future of SEANET. The national airline, MAS, has special fares for delegates, as have the hotels.

Anyone wishing to attend is advised to contact the organizing secretary, SEANET, PO Box 13, Penang, W Malaysia.

Thanks are due to Sangat Singh, 9M2SS, hon secretary of MARTS, for the above information.

1984 28MHz Table

G3XQU	132	G4VJK	67	G4NXG/M	45
G4SKI	99	G4FEL	65	G4OBK	35 (cw)
G4TTR	91	G3WVG	58 (cw)	G3KSH	23 (cw)
G4MUW	85	G4DXW	56	GM3CHX	19
G3KDB	84 (cw)	G4RAB	52	G4FVK	14
G3SXW	82 (cw)	G3XXT	49	G2FQR	8
G3TXF	82 (cw)	GW4TEJ	48		

1984 Six-band Table No 3

	1·8MHz	3·5MHz	7MHz	14MHz	21MHz	28MHz	Total
G3XQU	2	80	96	**148**	**174**	**135**	635 (ssb)
G3SXW	49	81	**105**	120	115	77	547 (cw)
G3TXF	52	83	**105**	121	104	77	542 (cw)
G3KDB	37	56	74	100	120	83	470 (cw)
G4SKI	2	46	9	111	131	109	408 (cw)
GW4OFQ	13	116	75	94	71	28	397
G3XTT	**68**	53	76	72	65	59	393
G4OTU	4	11	55	91	80	42	283 (cw)
G4RHW	0	1	86	70	81	23	261
G4GOF	6	8	16	39	45	37	151

(NB. Scores are necessary for all bands)

Contests

LZ DX Contest

0000 to 2400 2 September

CW only. Stations may be worked once on each band, 3·5 to 28MHz. Activity must be confined to the following band segments: 3,510–3,590, 7,005–7,040, 14,010–14,090, 21,010–21,125 and 28,010–28,125kHz. Exchanges consist of RST and ITU zone (UK is in zone 27). Six points are gained by working an LZ station, one for other stations in same continent,

Operators of XU1SS and XU1YL received the Dot & Dash Prize from the DX Family foundation in 1983, for their efforts to activate amateur radio in a rare country, Cambodia, despite the war between Cambodia and Vietnam

and three for stations in other continents. Listeners count three points for logging both callsigns in a QSO plus both exchanges. The multiplier is the number of ITU zones worked on each band added together. There are single-operator single- and multi-band, multi-operator multi-band, and listener classes. Logs should be submitted in "standard form" with separate sheets for band. A summary sheet showing zones worked on each band and the usual declaration should be included. State continent on log. Post within 30 days of the contest to: BFRA Contests, PO Box 830, Sofia 1000, Bulgaria.

Howdy Days

1800 5 September to 1800 6 September

This is a special YL contest. All bands/modes may be used, stations may be worked once only. Photocopies of rules are available from G3FKM (sae please).

Results of the **1983 CQ WW WPX CW** contest have appeared in *CQ*. UK scores are as follows:

Callsign	Band	Points	Callsign	Band	Points
G4CP	All	1,383,015	**G4CNY**	14MHz	1,414,755
G3ESF	All	464,720	**GM3RAO**	14MHz	272,896
G4OKN	All	119,448	G4MVA	14MHz	77,400
G4AAQ	28MHz	11,316	G6NK	14MHz	23,765
G3HRY	21MHz	146,568	G2AJB	14MHz	3,822
G3XQX	21MHz	70,152	GM8SQ	14MHz	520
G3XWZ/A	21MHz	14,213			

In the QRP section there were three entries (all on 21MHz): **G3VMY** (63,114), G4GIU (6,944) and G3CWL/A (1,575).

Awards

Zone 12 Award

This is a handcrafted copper plate available to those who have worked 12 different zones (including zone 12). It is issued for phone, cw, rtty, sstv or Oscar operation. Send list of QSLs certified by a local club, plus US$5 or 15 ircs (for airmail delivery) to Awards Manager, Radioclub de Chile, Casilla 13630, Correo 21, Santiago de Chile, Chile.

Canary Islands Diploma

European applicants need to have worked 40 different EA8 stations since 29 April 1971, on any band or mode. QSLs are not needed—send list of contacts plus 15 ircs to Diploma Islas Canarias, Apartado 860, Las Palmas de Gran Canaria, Canary Is.

Balearic Islands Award

For this, applicants must have worked at least 15 stations in EA6 on two bands (or 20 on three or more bands). Each station may be worked once per band. Modes may be cw, ssb or rtty. Send list of QSOs plus five ircs to URE, Delegacion Regional, Apartado 34, Palma de Mallorca, Spain.

IARU Region 3 Award

Available to licensed amateurs and listeners. Basic award requires list of contacts with seven countries, silver star award with 12 countries, and gold star with 17. All QSOs must have been since 5 April 1982, and endorsements are available for any band or mode. Eligible countries are: JA, VK, ZL, HL, DU, VS6, HS, P29, 3D2, 9V, VU, YB, 9M, 4S7, A3, 5W and H4. Send list plust $1 for surface or $2 for air-mail delivery to: NZART Awards Manager, 152 Lytton Rd, Gisborne, New Zealand.

This photograph taken at a party in honour of WD5FQX and WD5HIL, who are renowned dxers—having operated from many countries, shows, l to r, G3GIQ, W6SN, G3DOG, G3ZAY, G3MCS, G3LQP, G4DYO, G2DMR and G3KMA, all of whom are on or have applied for Honor Roll

QTH CORNER

BV0JA	JG1QGT, DX Family Foundation, Box 12, Shinjuku, Kita, Ochiai, Tokyo 161, Japan.
BY1QH	Box 2654, Beijing, Peoples Republic of China.
D68WB	Dr W. J. Bennett, BP 540, Moroni, Gran Comoro, Rep of Comores.
DJ5CQ/SV/A	via DJ5CQ, Alter Main 23, D 8601 Ebing, FR Germany.
F0GYM/FC	DL3BK, H.Scholz, Firkenweg 3, D-7441 Wolfschlugen, FR Germany.
GK0JFK	G3VIE, 35 Brookside, Wokingham, Berks RG11 2ST.
K84OG	(see W84OG)
KA0CYR/SV9	WB4TDB, V. T. Miller Jr, RFD 2-Box 91, Dickson, Tn, 37388, USA.
T31AT	via G4GED, 92 Betham Road, Greenford, Middx, UB6 8SA.
TK6JUN	via F5JY, J. Davy, 32 R.Lamartine, 50120 Equerdreville, France.
VK9ZA	VK6YL, 23 Corbel St, Shelley, 6155, W Australia.
W84OG	Olympic Games, PO Box 9007, Stanford, Cal, 94305, USA.
XX9WW	JH1AGU, T.Aoki, 2-24-15 Higashicho, Koganei, Tokyo 184, Japan.
ZL7BKM	via ZL2HE, A.E.Law, Mangatoro, Dannevirke, New Zealand.
5H3AS	PO Box 99111, Mombasa, Kenya.
5H3OJ	PO Box 99111, Mombasa, Kenya.
5H3HS	DK8MZ, W.Urban, Karl-Robiczek Str.13, D-8080 Furstenfeldbruck, FR Germany.
5U7LD	via IN3RZY, D.Monauni, Casella Postale 212-39100 Bolzano, Italy.
9M2DC	via G4RZQ, 13 Ternal Mead, Godshill, Isle of Wight.

Ontario Bicentennial Award

The information given in May *MOTA* concerning this award was incorrect. Each QSO with a VE3 station counts 10 points, and with one using a special prefix 20—not 20 and 40 as stated. Leaflets are now available from G3FKM (sae please).

R-10-R Award

It is understood that this award has been discontinued following the recent extensive changes in the USSR callsign system.

Welcome

The following non-UK amateurs joined the Society during May: A4XKB, EA8ADP, F2YT, F6AXC, I8VOY, VK6LC, W1ODA and WB3LJK. Welcome also to N. J. Copeland from the Sultanate of Oman.

Around the bands

Quite a lot of interesting activity on all bands except 18 and 24MHz, which seem to attract little attention. The various restrictions certainly inhibit users, but it would be good to see a few more logs containing mention of them.

The following supplied logs for this month's column: G2HKU, G3YY, G5JL, G3s GVV, KSH, GIQ, YRM, G4s EHQ, FVK, GM4KHE, G4s OBK, TTR, UOL, and RS10906.

Stations printed in italics were using A1A.

1·8MHz. 0000 *HB0PP*. **0100** *LZ1JY, VE1ZZ*. **0200** *KA1PE, VE1ASJ, 4N7W*. **0300** *CX8DT, EA9CE, LU9EIE, PY1BVY, WA3EUL*. **2200** *I2VUC, SM6EHY, UO5OLW, 4X4NJ*. **2300** *UD6DHL, 4U1ITU*.

3·5MHz. 0500 *LU2AAP, PY*. **2100** ZS3GB. **2200** A4XKD, CT2EJ, VK6HD, YB0WR. **2300** A22ME, TU7I, VK6LK, VP8ML, ZD7CW, ZP5CDV, ZS6BCR.

7MHz. 0400 *CO/CM, CX3CZ, LU2YA, PY, YV3XL, ZL* (to 0700). **0500** *CE, FG7AS, HK, HR1RC, OX3NL, VK9NS, W6-W7*, ZF2HX. **0600** CP8HD, CT2ARA, CT3ET, *EA9KD*, HK0HEU, J87BY/MM (G8AI), K2KTT/PJ7, *VK3, VP9C, YB2ZI, XE2CKA*, ZF2HX, 6Y5MJ. **0800** *ZB2EO*. **2200** AP2ZR, VK6IH, YB0AV, 5Z4ED. **2300** *FM7WD, UM8MBA*, YB0AV.

10MHz. 0400 *W3,4,6,7,0, ZL1-ZL4*. **0500** *KH6AQ, VK2, VK3*. **0600** *VK4QP, ZF2HX*. **1900** *VK2PA, 4X6WF*. **2000** *VK2KM, ZL1HY*. **2100** *ZL3GQ*. **2200** *FG7BG, K2TQC, WQ4W/SV*. **2300** *J73D, DL2GG/YV5*.

14MHz. 0400 *TI2CCC*, W6-W7 (to 0800). **0600** *FO8FO*, JA (to 0800), *JY9CL*, KH6 (to 0800), KL7 (to 0800), VE6-VE7 (to 0800). 3X4EX. **0700** *C31OF, FO8NB/MM, KG6GF*, T77C, *ZK1DA, ZL7AMO, 5W1EJ, 6W1CC*. **0800** FO8IW, *JT1AA, KL7Y, VP2EC, 9L1LM*. **1700** 9H50DC. **1800** *W6*. **2000** A71AD, JA, VK (to 2300), *ZL1AH*. **2200** J39BS, VP2MCG, ZD8RC, *G3IAD/5N4*. **2300** A71BK, *D44BC, HZ4MZ* (?), 5T5RY.

18MHz. 0700 *DL, G, GI*.

21MHz. 0600 *JA (to 0900)*. **0700** A4XJQ, *JT1KAA, 5W1EJ*. **0800** *OD5LX, P7TS, T77C, VS6HI, VU2SU, ZC4CZ, ZS*. **0900** *KX6DS*, DJ5CQ/SV/A, 9K2IA. **1000** *ZC4RP, 3B8FK*. **1100** 3D6AN, *5Z4MX*. **1200** AP2P, *9K2DZ*. **1300** *KA0CYR/SV9* **1400**FR7BT, *YC2FEA*. **1500** HK0HEU, IY4SGM, JY9CL, VU2MAC, 9M2CO, *9V1TL* **1600** *S79SM*. **1700** 4S7NS, 9L1SL. **1800** D68WB, 1Z9A, 5N8HEM. **1900** 3X4EX. **2000** A71AD, OE8HFL/YK. **2100** HK0HEU, OH9TH/4U. **2200** *CE3QP, HK1QQ, VE1XX, 6Y6A*.

24MHz 0800 *F, G, GW*.

28MHz 0800 T77C. **1200** *DA1WA/HB0*. **1400** PY (to 2000). **1600** *ZS1CT*. **1700** *L8DQ*, 5H3QM. **1800** CX4WS, KP2J, *ZP5XGG*. **1900** PJ4CR. **2000** C53CR. **2100** 5H3DB, 9Y4AT.

Many thanks to all who wrote during the past month, and also to the *Ex-G Radio Club Bulletin* (GI3OEN/W6), *Long Skip* (VE3GCO), *Lynx DX Group Bulletin* (EA2JG/EA3CBQ), *DX'press* (PA0GAM) *GQ Magazine* (W1WY), *DXNL* (DL3RK), the *DX Bulletin* (K1IN), the *Long Island DX Bulletin* (W2IYX), and *DX News Sheet* (G3XTT/G3ZAY).

Please send all items to reach G3FKM by **30 August** for the **October** issue. This really *is* the last day that copy can be accepted! □

HF propagation predictions for August 1984

Using the table

The time is presented vertically at two-hour intervals 00(00)gmt to 22(00)gmt for each band, ie ♀ = 0000, ♀ = 0200, ♀ = 0400 etc.

The probability of signals being heard is given on a 0 (indicated by a dot) to 9 scale; the higher the number the greater the probability, with 1 meaning 10 to 19 per cent of days, and so on. Additionally 50MHz F-layer and 1·8MHz openings are indicated by a dagger (†) sign in the 28 and 3·5MHz columns respectively. The higher probability figures are printed in BLACK, lower probability in RED and lowest probability in GREEN type.

	28MHz				21MHz				14MHz				10MHz				7MHz				3·5MHz			
GMT	000	001	111	122	000	001	111	122	000	001	111	122	000	001	111	122	000	001	111	122	000	001	111	122
	024	680	246	802	024	680	246	802	024	680	246	802	024	680	246	802	024	680	246	802	024	680	246	802
EUROPE																								
Moscow						1		21	2	556	556	883	535	544	445	788	864	222	122	578	53			24†
Malta						11	1	32	1	566	656	895	755	655	556	799	997	422	223	588	††4			25†
Gibraltar								11		155	443	783	632	665	555	798	987	543	223	589	††5	2		25†
Iceland										13	222	562	311	445	555	687	766	543	233	467	5†4	2		34
ASIA																								
Osaka										233	232	121		21	112	363				241				2
Hongkong						1	1	1	1	133	335	642	1	11	12	575				253				2
Bangkok						112	112	1	1	123	335	663	3	1	12	587	1			266				33
Singapore						112	112	1	1	123	335	661	3	1	12	585	1			266				33
New Delhi						112	112	2	1	223	335	762	52		12	587	41			267	2			34
Teheran				1		223	213	53	2	322	335	785	743	1	12	588	731			267	4			34
Colombo						123	213		1	223	335	563	52		12	588	51			267	2			34
Bahrain				1		223	324	52	3	322	335	786	853		12	589	841			267	5			35
Cyprus				2		334	334	751	4	655	567	898	976	433	334	689	873	1	11	378	†4			4†
Aden			1	1		223	335	611	5	312	235	788	973		12	589	851			267	52			35
OCEANIA																								
Suva (S)										222	22	541	2	421	112	43		2		21				
Suva (L)								31	111	51		63	2	52		331		2		21				
Wellington (S)									1	331	11	41	2	421	111	152	1	2		22				
Wellington (L)								1	321	3		45	223	51		42	1	2		12				
Sydney (S)						11			1	543	111	1 1	1 1	321	12	443		1		251				2
Sydney (L)								2	31	11		26	111	32		63		1		141				2
Perth						223	1		1 2	353	211	1	31	21	12	44	2			263				33
Honolulu										112	2	421	2	421	2	3	1	2						
AFRICA																								
Seychelles			1			223	435	3	3	222	335	763	643		12	588	841			267	52			35
Mauritius			1	2		224	445	73	1 3	323	335	796	613	1	12	589	841			267	52			35
Nairobi			111	2		223	456	81	4 3	421	235	786	855	1	12	589	872			267	55			35
Harare			112	31		233	556	861	6 3	522	235	798	956	3	2	589	884			267	†52			35
Capetown			111			133	555	4		653	335	771	43	42	2	586	774	2		267	5†2			35
Lagos			112	41		132	457	87	641	642	225	797	986	51	2	589	885	2		257	5†2			25
Ascension Is			1	42		32	235	871	3	53	223	798	86	121	1	479	881	2		157	5†3			24
Dakar				32		32	334	771	541	453	222	688	986	53		379	886	2		157	5†3			24
Las Palmas				11		33	222	671	531	576	666	798	986	653	333	589	897	421	111	268	††4			3†
S AMERICA																								
South Shetland							345	52		1	335	773	411	11	2	467	765	2		236	5†3			3
Falkland Is				22			334	77	2	3	335	677	854	311	2	358	886	2		25	5†3			2
Rio de Janeiro				22		2	233	671	631	14	322	578	986	121		258	886	2		27	5†3			4
Buenos Aires				12		2	232	672	631	3 4	333	468	986	5 1		147	886	2		15	5†3			2
Lima				1			121	252	62	132	332	236	885	431		14	686	2		2	4†3			
Bogota						1	11	142	52	23	321	136	874	331		4	686	2		1	3†3			
N AMERICA																								
Barbados				1		1	111	252	62	124	321	257	885	431		26	786	2		3	5†3			
Jamaica							11	132	51	2	321	135	773	311		3	585	2		1	253			
Bermuda							1	132	51	3	221	246	773	211		14	685	2		2	353			
New York								11	4	2	222	235	663	111		13	475	2		1	52			
Mexico								21	3		222	123	453	21		1	165	2			32			
Montreal								11	4	2	222	245	653	111		13	475	2		1	42			
Denver									2		112	113	333	2	11	1	145	2			2			
Los Angeles									1		12	112	223	3	12		35	2			2			
Vancouver									1		11	111	223	311	12	1	25	2			2			
Fairbanks										211	111	111	112	421	112	211	1	2						

The provisional mean sunspot number for May 1984 issued by the Sunspot Index Data Centre, Brussels, was 75·1. The maximum daily sunspot number was 118 on 13 May, and the minimum was 24 on 6 May. The predicted smoothed sunspot numbers for August, September, October and November 1984 are, respectively: (classical method) 51, 49, 47 and 46; (SIDC adjusted values) 43, 41, 39 and 38.

THE THIRD RSGB NATIONAL HF CONVENTION

P. F. Linsley, G3PDL, giving his talk on pcbs

FOLLOWING THE SUCCESS of the 1983 HF Convention at the NEC, Birmingham, the HF Committee decided last autumn to hold the 1984 convention at the same venue, once again in conjunction with the Society's National Amateur Radio Convention. However, unlike last year, it would be a one-day-only event, although an hf stand in the main exhibition hall would be manned on the Sunday by members of the HF and HF Contests committees.

The 1984 HF Convention was located, like its predecessor, in the Pendigo Suite situated at the top of the central block within the NEC complex. The Pendigo Room was set up for the lectures and presentations with a seating capacity for around 300, and the foyer contained displays on, among other things, RSGB hf awards, hf contests, hf band planning, *DX News Sheet* and QRP operation. Members of the HF and HF Contests committees were on hand to provide advice and answer questions. In a nearby room excellent light snacks and suitable convention beverages—including beer—were available throughout the day. This facility again proved to be very popular, many personal QSOs and extended round-the-table natters took place—which, after all, is partly the purpose of such a convention . . . meeting those that one has met over the air.

The doors opened at 10am, but business was very slack—as had been expected—until just before 12 noon when visitors began to arrive for the first lecture, on dxpeditions. G3XTT, G3ZAY and GM3YOR presented some colourful and interesting slides of operations from OJ0 (by G4JVG and PA0GAM), VP8ANT (by G3CWI), ZB2, 9L and OY (by GM3YOR *et al*). The problems and the enjoyment of such operations were very apparent from the pictures. This session was well attended but the numbers swelled for the 1pm lecture by Peter Chadwick, G3RZP, on linear amplifiers. Peter, as usual, explained technical concepts in a down-to-earth and readily-understood manner, liberally laced with a selection of anecdotes (and jokes) from his extensive repertoire.

By 2pm there was standing room only in the Pendigo Room for the start of the Home Constructors' Forum presented by the G-QRP Club and chaired by the Rev George Dobbs, G3RJV. George opened the 90min session by expounding the attraction of homebrewing and describing how to select, purchase and store components. One of the many tips he offered was to buy ice cream in bulk, and then feed it to one's children as quickly as possible so that the resulting empty plastic containers could be turned into useful component storage boxes with the minimum delay! He was followed by GM3OXX who spoke on "Circuit to board to box", G3VTT on "Test equipment", and G3PDL on "PCBs without etching". There then followed a question-and-answer period with a panel of well-known writers and constructors (G3GSR, GM3OXX, G3ROO and G3VTT) providing much valuable advice. In all, a very popular session with plenty of audience participation demonstrating that interest in the art of home construction and innovation is far from dead.

At 3.30pm the President, GW8HEZ, honoured the convention with a visit, and he presented various hf and hf contest awards to the winners, as shown in the accompanying photographs.

PRESENTATION OF AWARDS BY THE RSGB PRESIDENT

L to r: S. R. Cole, GW4BLE, receiving the Whitworth Trophy; the Plowditch Receiving Trophy to J. Singleton, RS47778 (now G4WJR); and R. N. Graham, G3OAY, accepting the T. E. Wilson G6VQ Cup

L to r: The Houston-Fergus Trophy miniature to J. J. Pascoe, G4ELZ; a representative of the East Barnet ARCC accepting the Edgware Trophy; the Somerset Trophy to R. Stone, GW3YDX, who also received the Victor Desmond Trophy

L to r: A member of the Barry College of Further Education RS, GW4BRS, accepting the Milne Trophy miniature; N. S. Cawthorne, G3TXF, receiving the ROTAB Trophy; the G2QT Cup Winners Cup to I. R. Frith, G4GIR, who was also awarded the L. H. Thomas Trophy

L to r: D. J. Andrews receives the Braaten Trophy; D. Thom, G3NKS, accepting the Bristol Trophy obo the Great Western Contest Group; the Gravesend Trophy to members of the Glenrothes ARS, GM4GRC, which also received the Scottish NFD Trophy

The final session of the day, at 4pm, was the HF Forum chaired by the Society's hf manager, John Allaway, G3FKM, and with panellists G3HCT, G3NKS, G3ZAY and G6LX providing a broad spectrum of experience in hf matters. Attendance was not as great as at the earlier sessions but nevertheless some lively discussion ensued. Council's decision not to allow trophies to be retained by the recipients came in for some criticism, even though it was explained that the decision was taken, after much debate, for insurance reasons and because of the difficulty which had been experienced in retrieving all the trophies each year for presentation to the next recipients. The validity and ethics of lists and nets for dx chasing also came in for some comment, with considered arguments being presented both for and against—a notable comment came from a founder member of the "Campaign for real dx" when he said that the problem related to the individual operator's own standards of achievement. The need for a novice licence was discussed and those present voted heavily in favour of its introduction. There was also some support for incentive licensing. Questions were asked about the Society's work on the emc front, especially with regard to the possibility of legislation being introduced to bring about improvements in the performance of domestic equipment. This was a topic of great interest and it was suggested that the Society's EMC Committee should be invited to participate in next year's HF Convention. It was also suggested that the general manager should be invited to join the forum next time so that general questions could be addressed to him—however, this would probably divert interest away from the main theme of the convention. The convention itself came in for some discussion; while it was again felt to be a success and, indeed, several expressions of thanks were offered from the audience, some believed that a better convention atmosphere could be created if the event was held elsewhere on a separate occasion (like the VHF Convention). The problems of organization were recognized, but nevertheless the HF Committee undertook to discuss possible alternative forms which the convention could take before deciding on next year's arrangements.

Members of the Northumbria ARC, G4AAX, accepting the Northumbria Trophy

Members of the Hereford ARS receiving the Frank Hoosen Trophy

This report would not be complete without the HF Committee recording its grateful thanks to all the participants in the lectures and forums; to the Exhibition & Rally Committee for arranging the facilities; and to RSGB HQ staff for providing many things, but particularly the display material and the handouts. Finally, and by no means least, an appreciative thank you to Dave Lawley, G4BUO, who carried out the careful planning needed on behalf of the HF and HF Contests committees. □

SWL News

*by Bob Treacher, BRS 32525**

VHF news

The sporadic-E event of 8 June is fully reported under *4-2-70* in this issue, but of particular interest to swls was the number of USSR stations heard, including RB5UCE, (PJ square possibly), UA3LAW (PO26g), RC2AA (NN18a) and UC2AAB (NN18c).

On the following morning there were good tropo conditions to SE France, Switzerland and Italy—I2FAK and I2FHW, ms operators, were audible from EE and EF squares. Dave Whitaker, BRS25429, considered this tropo to be the first decent opening of the year, and logged TK6JUN (ZJ44c, QSL via F5JY), F1DQK (DI23a), HB9CRQ (EH61b) and HB9RSO (DH18b) between 0740 and 0858. By 1000 the band was quiet, but I heard OE9NHI at 1032.

Martin Parry, BRS52543, heard his first GM and GW of the year in the June 70MHz contest. New squares included YK, XK, YP and XR.

Michel Monteil, FE8957, had not found much dx on 144MHz up to the time of writing. He is located in BF41f, but when good tropo occurs he uses a site at BF21f (a little hill nearby) or AF40h (a good site, 3,000ft asl, with a good take-off in all directions and easy to reach). F6CJG/P is very active from Michel's area. He owns a site at BF21j, 3,300ft asl, and runs 1 to 1·5kW into 2×16-F9FT Yagis. He is presently most active on 432MHz eme using 8×17-F9FTs. Michel explained that during good conditions there are quite a few stations active from AF and BF squares—F1CAS/P, F6ECI/P, FD1HAS and F6CQU, to mention a few. F8UM, Michel's father, has been building a 4CX250 linear amplifier to be used from AF and BF squares during the summer, and a 1,296MHz transverter with which he hopes to give several rare squares in France to Gs this year. Michel hoped to be active using GJ6WDK/P during VHF NFD. Both will QSL accurate and informative listener reports.

For those interested in awards, I have details of the French DDFM Diploma—the equivalent of our Counties Award. Just 20 out of 96 departments are required to claim the basic award. The first two figures of the postcode signify the department, eg 19300 Egletons is Dept 19. It might also be worth looking for the FX8VHF beacon (AF78e) on 144·955MHz during good tropo lifts to the south.

HF news

Brad Bradbury, BRS1066, reported a good month for QSL returns, with W6KG/CE0, KX6DS, TJ1QS, PY0CW and TF3XUU (1·8MHz) all coming in direct. Martin Parry, BRS52543, caught up with CP8HD on 1·8MHz at 0315, while 3·5MHz produced good signals from YB0WR and VK6HD; he also logged A35JL for an all-time new one on 14MHz, and D68WB for a new one on 21MHz.

Mike Dawson, RS44083, had a good month on ssb, especially on 14MHz, logging AL7BL, BV0AA, 9M6MO, YJ8RG and T30DB. N4YD was particularly novel, as the operator was a robot named *Proteus*. The computer-chip voice was quite readable but was not at all human in tone. Mike's best QSL was from W6RQ. He received the first UK swl QSL for reporting on all eight 14,100kHz beacons. Since information on them was given last year, he had made a point of checking 14,100kHz, but it took him a year to hear all eight. KH6OB/B was the last to be logged, and along with JA2IGY was only heard once during the year-long period. W6RQ remarked that the next two beacons should be on the air from Columbia (HK5), while the tenth will be in Australia (VK6).

Douglas Johnstone, BRS54163, borrowed a Trio Kenwood R600 from G6TXC, and logged many interesting stations, including HH2 and VP2M. The increased activity meant that Douglas was spending more on ircs and postage in order to receive the QSL cards direct.

Robert Small, BRS8841, reported a poor month, with exceptions in the form of BV0AA and UW3HY/1. Signals from South America on 3·5MHz had been good after midnight, while 7MHz produced 4K1ANO (Antarctica), 3X4EX, 5Z4ED and CE4GGY. The 14MHz band was patchy, but FW8AF and VE7BBC/KH8 were the undoubted highlights. On 21MHz BY1PK was logged on ssb, as was F6GNS/TU, L8DQ(LU), YS3FH, V85BM (new prefix for VS5) and FV6PAX(F). Some sporadic-E signals from around Europe were heard on 28MHz.

David, BRS25429, has at last copied signals from VP8 on 3·5MHz; VP8ML obliging at 2327 early in June. The lower frequency bands were interesting in early June, with ZD7CW on both 3·5 and 7MHz, CE8ABF on 3·5MHz, while 7MHz also produced AP2ZR, VK6IH, FM7WS and YB0AV between 2230 and 2310. CP8HD was also logged on 1·8MHz ssb at 0105 at 58 with no European takers. C21RK quickly responded to Dave's 7MHz QSL, but ZL2BT had still to confirm Dave's 1·8MHz report, although CT2CE and VP9AD sent confirmations for 1·8MHz, as had VR6TC for 7MHz.

1984 HF Countries Tables
(Starting score 150)

Station	DXCC	28	21	14	7	3·5	1·8	Total
				G listings				
BRS8841	228	74	157	188	128	131	40	718
BRS48909	211	78	143	161	126	119	46	673
BRS52543	214	86	124	160	130	125	46	671
BRS25429	199	96	118	142	103	118	52	629
BRS44395	—	86	128	121	51	58	54	528
BRS31879	168	98	110	117	80	64	36	505
BRS1066	150	63	114	100	80	53	48	458
BRS10906	182	55	119	120	51	76	10	431
BRS50134	149	4	8	13	106	103	36	270
BRS18529	—	1	47	25	53	85	14	227
ARS53844	—	—	—	—	88	96	30	214
BRS44984	—	23	36	65	42	40	0	206
RS49875	94	31	50	42	28	20	3	174
				DX listings				
ORS45992	205	118	139	167	49	53	2	528

1984 UHF/VHF Table

Station	QTH loc	70MHz Squares	70MHz DXCC	144MHz Squares	144MHz DXCC	432MHz Squares	432MHz DXCC	Total via*
BRS52543	YN	16	5	30	11	8	2	72 a, c
BRS32525	AL	—	—	25	9	12	3	49 a, b
BRS25429	ZN	—	—	24	8	—	—	32 a,
RS49875	YN	—	—	13	5	2	2	22 a,
BRS62088	AL	—	—	5	2	6	2	15 a,

* a = tropo, b = Es, c = Ar, d = ms

Overseas news

Stan Porter, ORS45992, has updated the situation in 7Q7. A move of QTH to Salima in the central region of Malawi, just 10m from the southern end of Lake Malawi, took up much of this time, but propagation had been poor, especially on 3·5, 7, and 28MHz. On 1·8MHz, two countries have been added, Stan overhearing a ZS on 3·5MHz making a sked with a VE, and both showed on 1·8MHz; the VE being a particularly good catch. John Lord, ORS46084, is still active but is concentrating on improving his all-time score rather than entering the 1984 table. 7Q7LW was largely inactive at the time of Stan's letter.

VHF slp

SLPs on the hf bands are quite common, but on the vhf bands they are something of a rarity. To increase vhf activity among listeners, and as an experiment, two slps will be held on 144MHz, on Wednesday 15 August and Tuesday 21 August between 1900 and 2200. The event will be open to all swls, and to licensed amateurs on a listener-only basis, and the aim of the event will be to log as many counties, squares and countries as possible during each 3h period. It will not be a contest, but the idea has been agreed by the Society's VHF Contests Committee. Although activity on 144MHz does not need to be promoted, it is felt that the idea will form the basis of an interesting experiment. Entries to me simply listing the time, station heard, counties, square and country. The results will be tabulated in *SWL News* in due course.

While on the subject of competitions, it might be worth reminding listeners of the uhf/vhf contests which will be open to listening members of the Society during the remainder of 1984. They are: 4 August, 432MHz Low Power; 5 August, 144MHz Low Power; 1-2 September, both RSGB and IARU events; and 16 September, 70MHz. Full rules of these events can be found in "Contest News".

Here and there

It might be interesting to listen for GK0JFK over the period 4-5 August. This special prefix is to be used from the John F. Kennedy Memorial at Runnymede to coincide with the Los Angeles Olympic Games and to mark the 20th anniversary of the presentation of the memorial site to the USA. Listener reports will be QSLd 100 per cent by G3VIE.

Finale

A reminder: don't forget the 28MHz slps mentioned last month. News, views, table scores for the October issue should reach your scribe no later than Wednesday 15 August with late news by Wednesday 29 August. □

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

QRP

*by Rev George Dobbs, G3RJV**

The G-QRP Club late summer cw activity weekend

This event, one of a series designed to promote two-way QRP activity, will take place on the weekend 22/23 September. It is not a contest. Just report on the bands at the suggested times and listen for stations calling, or call "CQ QRP". The usual power limitation will be 5W dc input or 3W rf output. If band conditions are unsuitable at the specified times, move down the frequency range until a suitable band is found. Reports and comments may be sent to: Mr A.D. Taylor, G8PG, 37 Pickerill Road, Greasby, Merseyside L49 3ND. The suggested times and frequencies are:

Time (gmt)	CW QRG (kHz)	Time (gmt)	CW QRG (kHz)
0900-1000	14,060	1500-1730	21,060/28,060
1000-1100	21,060/28,060	1730-2000	14,060
1100-1200	7,030	2000-2100	7,030/10,106
1200-1300	3,560	2100-2200	3,560
1300-1400	10,106	2200-2300	14,060
1400-1500	3,560		

Harmonic attenuation of simple transmitters

Very often simple QRP transmitters use inexpensive bipolar transistors in the power amplifier which are driven into Class C for cw operation. Although the total rf output of such transmitters may only be in the order of 1 or 2W, the Class C final stage produces an output rich in harmonics, and harmonic attenuation is important to avoid unwanted radiation at higher frequencies. A simple five-element lowpass filter was shown with the design for the basic OXO mini-transmitter in *Rad Com* October 1983. Many lowpass filter designs use non-standard values of capacitance, and in some cases a five-element lowpass filter may not provide an adequate amount of harmonic suppression.

I am grateful to Ed Wetherhold, W3NQN, for his work on standardized lowpass filter design, and for his allowing me to pass on some useful information in this column. W3NQN has produced a range of seven-element filters using standard capacitor values, designed for excellent harmonic attenuation and close matching of 50Ω input and output ports. These filters do require an extra two components above the five-element filters, but the cost of one extra inductor and a capacitor is little to pay for the better performance. The circuit for the standard value capacitor (svc) lowpass filters is shown in Fig 1. Suitable values for the 3·5, 7, 14 and 21MHz bands are listed in Table 1. These values would be ideal for the OXO transmitter.

All the capacitor values are standard, and if the inductors are wound on the Amidon range of toroid formers, the numbers of turns for each is easy to calculate. Working out the windings for L2, L4 and L6 is a matter of following a few simple stages.

(1). Choose a suitable toroid. The type number of the toroid indicates the size and type of iron dust mix. For example, a T37-6 toroid former has an outer diameter of 0·37in (37) and uses the No 6 core mix (coded yellow). The correct core mix for the intended filter frequency is required. The common T50 size of former could be used, but the smaller T37 core will easily handle powers up to 10W and is cheaper.

(2). Work out the number of turns required. Using Table 2, find the inductance at 10t for the chosen former. The number of turns is calculated from the formula using the values for desired inductance and inductance at 10t.

(3). Choose the gauge of wire. Coils on toroidal cores are usually close-wound (turns tightly side by side) and each time the wire passes through the core counts as one turn. It is recommended that only 90 per cent of the maximum turns be close-wound on the core. This provides a space of about 30° between the ends of the winding to minimize winding capacity. Table 3 allows a suitable gauge of swg wire to be chosen for a particular core.

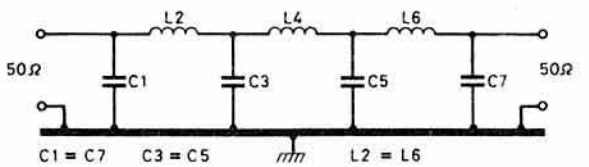


Fig 1. The W3NQN seven-element svc filter

Table 1. Recommended 50Ω seven-element svc lp filter designs

Band (MHz)	F- co (MHz)	F- 3dB (MHz)	F- 40dB (MHz)	C1,7 (pF)	C3,5 (pF)	L2,6 (μH)	L4 (μH)
3·5	4·125	5·11	8·38	470	1,200	2·43	3·01
7	7·362	9·04	14·8	270	680	1·38	1·70
14	14·40	16·4	25·6	180	390	0·773	0·904
21	21·55	27·6	46·0	82	220	0·444	0·561

Table 2. Inductance at 10t for Micrometals toroidal cores

Core mix No	Colour	Core T37	Size T44	Prefix T50	μH/10t T68	Recommended Freq range
−2	Red	0·40	0·52	0·49	0·57	1 to 5MHz
−6	Yellow	0·30	0·42	0·40	0·47	7MHz plus

Formula for number of turns: $N = 10\sqrt{L/L10}$
Where N = number of turns, L = desired inductance, L10 = inductance at 10t (Table 2)

Table 3. Maximum turns of swg wire in single layer winding

Toroidal core		Max No close-wound turns on core					
No	Min ID (Inches)	swg enamelled wire size 20	22	24	26	28	30
T37	0·200	13	17	22	28	35	42
T44	0·224	15	20	26	32	39	47
T50	0·298	21	27	35	43	53	64
T68	0·360	26	34	43	53	65	78
t (turns/in)		26	33	41·5	50·3	61	72·5

Example. Winding L2 or L6 for 14MHz design in Table 1.

Using a T37-6 core, the value for L10 is 0·30, value for L6 is 0·773.

Calculation from the formula

$$N = 10\sqrt{\frac{0{\cdot}773}{0{\cdot}30}} = 16{\cdot}06 \text{ or } 16 \text{ turns.}$$

As 22swg could put 17 turns on a T37 core but would fill the whole former, 24swg can be used to allow the desired 30° spacing between the start and finish of the winding.

Toroids may be obtained from: SMC (TMP Electronics), Unit 27, Pinfold Workshops, Pinfold Lane, Buckley. Tel (0244) 549563. An sae will obtain a data leaflet and current price list. □

BOOK REVIEW

Guide to Utility Stations (2nd edition, 1983) written and published by Joerg Klingenfuss, Panoramstrasse 81, Hagelloch, D-7400 Tuebinger, Federal Republic of Germany, 230 pages, (239 by 169mm). DM60 (including air mail postage) or equivalent in other currencies.

This book (English text) provides information on over 10,000 stations receivable in Europe between 1·6 and 30MHz, including point-to-point "fixed" services, coast stations, aeronautical stations and the like. An alphabetical callsign list covers 3,329 callsigns, with name of station, ITU country/geographical symbol and the frequencies in use. The main listing in order of frequency covers 10,314 entries, all claimed to have been monitored during 1983 with frequencies measured to within 100Hz, and including the new aeronautical mobile service frequency allotment plan introduced in February 1983.

A considerable amount of other reference material, frequency tables, abbreviations, ITU definitions, and three world maps relating to the aeronautical service are included. In essence this book is, in effect, a European version of Oliver Ferrell's *Confidential Frequency List* reviewed August 1983, but compiled with Teutonic thoroughness. While the deliberate reception by private listeners in the UK of "utility" stations is in almost all cases a breach of the Wireless Telegraphy Acts, there can be few of us who could claim that we have never found such listings extremely useful both for checking calibration and for monitoring propagation etc. This is only one of a series of publications covering also rtty frequencies, air and meteo code manual etc, available from this German source.

Essentially a valuable reference book for anybody interested in what happens on hf outside the amateur radio and broadcasting bands.

G3VA

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Contest News

HF Contests Championship 1984-5 rules

The scoring arrangements for the 1984-5 championship have been revised to encourage more stations participating in contests to submit logs. For the 1984-5 championship, points will be awarded to all stations who participate in two or more contests during the qualifying year.

1. RSGB hf contest general rules do not apply.
2. No entries for the championship are required.
3. The championship will be decided on the basis of RSGB hf single-operator contests held between 1 October 1984 and 31 July 1985.
4. Points will be awarded in each contest as follows to every UK station submitting a log:

4.1 Points will be calculated by expressing the score gained by each station in each contest as a percentage of the leading UK station in that contest.

4.2 The points calculated in 4.1 will then be multiplied by the following factors for the relevant contest:

21/28MHz Telephony	20
21MHz CW	20
7MHz Telephony	20
7MHz CW	20
Commonwealth	30
Second 1·8MHz 1984	10
First 1·8MHz 1985	10
Region Round-up	10
Town & County	10

Example: If the leading station in the 21MHz CW Contest scores 30,000 points, and the entrant concerned gains 6,000 points, the points awarded to that competitor in the HF Contests Championship for that contest will be: $\frac{6,000}{30,000} \times 100\% \times 20 = 400$

5. Points calculated as in 4 above by UK stations using the same basic callsign (with or without suffixes) and entering two or more of the individual contests will be totalled and a table published in *Radio Communication*.
6. **Club stations.** To be eligible for inclusion, a club station must be operated by the same single operator during each contest. In the event of a club station meriting an award, the award will be made to the operator concerned and not to the club.
7. **Awards.** The winner will receive the G2QT Trophy. A certificate will be awarded to the runner-up.

28MHz Cumulative Contests (Phone) rules

There have been many requests for a 28MHz phone cumulative contest to follow the established pattern of the cw events. This series of short activity periods is experimental and it is hoped that it will receive the support of those members who have asked for the event. As awards will be based on the accuracy of logs, and account will be taken of any special circumstances (eg remote QTH etc), it is also hoped that all those that have an interest in 28MHz will participate. Four sessions are included to allow entrants a choice of days.

Dates and times. 1900 to 2100gmt Monday 3 September, Tuesday 11 September, Wednesday 19 September, and Thursday 27 September. Only two sessions will count for points, but check logs for other sessions will be welcomed.

Frequencies. All contacts must be within the segment of the 28MHz band between 28,350 and 28,600kHz.

Exchanges. Each session will be treated as a separate event. A contest exchange will comprise RS followed by a serial number (starting at 001 for each session) and the county code (see *Radio Communication* January 1984).

Operators. All entrants must be members of the RSGB. Both single-operator and club entries will be accepted (entries must clearly show which section). Single-operator entries should show if the entrant is a member of an RSGB affiliated club or society, and its name.

Listeners. Logs from shortwave listeners will be welcomed and will be listed separately. (Best two to count for points.) Logs should show the date and time; the callsigns of both the stations that are in contact; together with the report and the county code sent. Each station may only be logged once in each of the sessions, and the station in the "station worked" column should not appear more than once in three contacts.

Scoring. Each completed contact, or logged exchange by a listener, scores three points.

Logs. All logs to be sent to RSGB HF Contests Committee, c/o G4RWW, 279 Addiscombe Road, Croydon CR0 7HY, to arrive not later than 15 October 1984. If entrants wish to be considered for the award of the merit certificate (see "Awards" below), they should state the reasons why they think they qualify.

Awards. Certificates will be awarded to the entrants in each section who submit the most accurate log. In the event of there being several faultless logs, the award will go to the entrant having the highest score. In addition the committee will award a certificate of merit tc the single-operator entrant who, in its opinion, has made the best effort, but because of QTH or other adverse factors was not competitive. The listener certificate will be issued subject to a minimum of three entries being received.

432MHz Cumulative Contest 1984 rules

1. 1930-2200gmt, 9 October
2. 1930-2200gmt, 25 October
3. 2030-2300gmt, 10 November
4. 2030-2300gmt, 26 November
5. 2030-2300gmt, 12 December

Entries will only be accepted from single-operator stations as defined in general rule 4. Entrants should provide a summary of the claimed scores from each session. Logs should be clearly marked with the session number and date. The leading fixed and portable stations will each receive certificates, along with the overall runner-up.

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

All entries and checklogs to: VHF Contests Committee, c/o D. A. Yorke, G4JLG, 40 Edge Fold Road, Worsley, Manchester M28 4QF.

1,296MHz Cumulative Contest 1984 rules

1. 1930-2200gmt, 17 October
2. 2030-2300gmt, 2 November
3. 2030-2300gmt, 18 November
4. 2030-2300gmt, 4 December
5. 2030-2300gmt, 20 December

Entries will only be accepted from single-operator stations as defined in general rule 4. Entrants should provide a summary of the claimed scores from each session. Logs should be clearly marked with the session number and date. The leading fixed and portable stations will each receive certificates, along with the overall runner-up.

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

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

70MHz Fixed Station Contest 1984 rules

1000-1500gmt, 28 October

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

All entries and check logs to: VHF Contests Committee, c/o C. Sharpe, G2HIF, 20 Harcourt Road, Wantage, Oxon OX12 7DQ.

November 144MHz CW Contest 1984 rules

There will be two sections in this event:

Section 1—24h; 1400-1400gmt, 3-4 November

Section 2—6h; 0800-1400gmt, 4 November

This contest is timed to coincide with the Marconi Memorial CW Contest. Scoring will be at 1 point/km to enable logs to be forwarded for this event.

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

All entries and check logs to: VHF Contests Committee, c/o G. M. C. Stone, G3FZL, 11 Liphook Crescent, Forest Hill, London SE23 3BN.

April 432MHz CW Contest 1984 results

This contest, which was in its second year, proved more popular than last year, with entries up to 19 stations. This was despite flat conditions with few Continental stations worked.

Syledis was again a problem for some stations on the east coast, who had to restrict their beam heading to avoid the interference.

The winner, G3UVR, a fixed station, proved, like last year, that fixed stations can compete with portable stations.

Certificates will be awarded to G3UVR and to runner-up G3LCH/P. Thanks go to G8PW for his check log. *G4HWA*

Posn	Callsign	Points	QSOs	QTH	Best dx	Km
1	G3UVR	298	33	YN55j	G4MDZ	380
2	G3LCH/P	286	42	ZN71h	G4MDZ	311
3	G4NDG/P	269	29	YK21f	PA0FRE	605
4	G4BVY	266	39	YM79a	PA0FAS	533
5	G3NNG	253	45	ZL23f	PA0FAS	483
6	G3JXN	207	47	ZL39e	PA0FAS	399
7	G3XDY	200	32	AM77g	G4NDG/P	393
8	G4MDZ	199	31	AL76b	G3UVR	380
9	G3UKV/P	182	26	YM28c	G4MDZ	310
10	G4CWH/A	170	38	ZL68h	PA0FAS	424
11	G4RPQ	164	32	AL73h	G3UVR	343
12	G3SCZ/P	144	34	ZL34j	G3KKP	257
13	G6UT/P	124	32	AL12g	G4NDG/P	313
14	G3WIM/A	114	35	ZL59c	G3UVR	312
15	G4LWQ	111	23	AL55j	G3UVR	351
16	G4PJO	109	14	YK07c	PA0FRE	506
17	G3TUX	82	20	ZL77a	G3LCH/P	240
18	G4AGQ	50	19	ZL66b	G3XDY	169
19	G4WRW/P	33	8	YL48f	G4RPQ	211

70MHz Cumulative Contest 1984 results

The 70MHz Cumulative Contest was enjoyed, as always, by a small number of devotees, some of whom gained a considerable advantage by enduring winter conditions from /P locations. It was disappointing however to find that many of the stations who were active throughout a sufficient number of sessions to qualify failed to submit entries. On the other hand, particularly welcome were the logs of those who, for one reason or another, could not complete even three full sessions and were content to send in logs for a handful of QSOs, merely to qualify.

Conditions ranged from poor to barely average, and GM stations were particularly conspicious by their absence. Some of the contestants favoured

the regular Sunday morning sessions, while others would prefer an eight-day cycle. Session 4 yielded the highest number of points, and session 5 was the least well supported.

Most contestants submitted neat and tidy logs with few corrections and errors. Some, however, exhibited a degree of originality by confusing session numbers and dates; at least two stations claimed a grand total for all the sessions without separating the scores for each. So please, in future cumulative contests, use a new log sheet for each session and indicate clearly those sessions which you wish to qualify as your entry.

Only 11 points in over 700 split the winner and runner-up. As these stations shared only session 4, the prevailing conditions at the beginning and end of the contest may have been the major factor in determining their relative positions in the results table. Congratulations both to G4ERP/P and G4SJP/P.

G2HIF

Posn	Callsign	Score	QTH	Best dx	Km	Sessions
1	G4ERP/P	773	YL10	G3BW	314	4,6,7.
2	G4SJP/P	762	XK08	G3ZXX	367	2,3,4.
3	G3UKV	624	YM28	GM3WCS	374	1,2,4.
4	G3ZAM/P	590	ZL65	EI9Q	434	2,3,4.
5	G4AFJ	571	ZM05	EI2CA	335	2,3,6.
6	G3UAX/P	541	ZL53	G3BW	383	5,6,7.
7	G3UEY	476	YM80	GD2HDZ	282	1,3,4.
8	G3VNQ	414	YN39	G4SJP/P	338	2,3,4.
9	G4FOH	402	ZM60	GD2HDZ	360	3,4,6.
10	G4LNV	394	ZL46	GD2HDZ	388	1,2,3.
11	G4SHP	388	AL41	EI2CA	456	4,5,7.
12	G4CIZ	291	ZL55	EI9Q	421	4,6,7.
13	G4OUW	268	ZL59	G4SJP/P	305	3,4,6.
14	G4HLX	264	ZL23	GU4IUW	253	1,4,7.
15	G5UM	198	ZM26	GD2HDZ	261	1,2,5.
16	G4MUT	180	ZL46	G4FXW	214	4,6,7.
17	G3TWG	168	ZL37	G4DGU/P	290	1,2,3.
18	G4FMC	119	ZM42	G3ZAM/P	173	3,5,6.
19	G2DHV	9	AL41	G5DQA	4	1,3,5.

March 144/432MHz Contest results

This dual-band contest has now become well-established in the contest calendar. This year a record number of entries was submitted. Unfortunately a record number of bad signal complaints was also received, which seems to suggest that many entrants did not take sufficient care to ensure that their equipment was operated, or capable of being operated, to a standard adequate for contest conditions. As a result one station has been disqualified and several others have received warnings. Prospective contestants are strongly advised to follow the Code of Practice (see *Rad Com Operating Guide*, January 1984).

The contest was enjoyed by most entrants, despite the generally flat conditions which prevailed as a result of the arrival of a deep low pressure area. Nevertheless, some reasonable dx was worked, although generally this was with difficulty, especially on 432MHz.

The overall winner of the fixed station section was the Five Bells Group, with North Bucks, last year's winner, as runner-up. In the other-stations section the Sheppey Contest Group demonstrated that it is possible to win from a western location, beating Parallel Lines in the east into second place. Congratulations to the winners and runners-up in each section. Certificates go to all those mentioned.

In the listener contest RS52543 once more takes the honours, but again from a small entry.

G3VPK

OVERALL RESULTS—FIXED STATION SECTION

Posn	Name of group, or callsign	QTH	144MHz points	432MHz points	Total
1	Five Bells	ZM29	864	566	1,430
2	North Bucks CG	ZM77	719	526	1,246
3	GJ4ICD	YJ70	1,000	168	1,168
4	Isle of Man ARS CG	XO67	573	4	577
5	Southampton University RC	ZK05	239	81	320
6	G6TMP	YM38	192	96	288
7	Nene Valley RC	ZM57	196	43	239
8	University of Kent ARC	AL56	138	62	200
9	G6TEP	AL47	144	53	197
10	Plessey RC	ZM04	115	55	170
11	The "A" Team	YN30	87	68	155
12	G4AGQ	ZL66	70	63	133
13	G6HXU	YN68	90	36	126
14	G6TFT	AK11	62	38	100

OVERALL RESULTS—OTHER STATIONS SECTION

Posn	Name of group	QTH	144MHz points	432MHz points	Total
1	Sheppey (Western) CG	YL25	826	1,000	1,826
2	Parallel Lines CG	AN61	914	854	1,768
3	Radio Society of Harrow	ZK10	792	868	1,660
4	Mudhoppers	AL34	1,000	440	1,440
5	East Kent RS	AL56	856	359	1,215
6	Flight Refuelling ARS	YK30	808	399	1,207
7	Flowerpot Men	AM72	626	539	1,165
8	Socom CG	AL67	898	115	1,013
9	Abingdon CG	ZL15	707	257	964
10	Havering & D ARC	AL17	542	345	887
11	Southdown ARS	AK12	420	439	859
12	Albright & Wilson ARS	YM55	566	255	821
13	Wirral & D ARC	YN75	395	320	715
14	Colchester Radio Amateurs	AL04	543	108	651
15	Cotswold CG	YL10	503	145	648
16	Harwell ARS	ZL33	617	—	617
17	South Belfast VHF CG	WO40	324	210	534
18	Andover RC	ZL63	263	142	404
19	North Wakefield RC	ZN23	296	106	402
20	Highcross CG	ZM44	269	128	397
21	Exmoor RC CG	YL72	218	134	352
22	Pangalactic Gargleblasters	ZL18	207	126	333
23	Itchen Valley RC	ZL73	263	57	320
24	Coulsdon CG	AL56	234	81	315
25	South Cheshire & North Staffs CG	YN70	212	95	307
26	British Telecom TC ARC	YM10	176	73	249
27	X-Ray Papa CG	XP17	168	28	196
28	Grafton RS	ZL40	91	65	156
29	G6CSY/P QRP	AL51	36	63	98
30	Coulsdon ATS	ZL60	56	30	86
31	G6DXI/A	ZK14	7	6	13

144MHz FIXED STATION SECTION

Posn	Station	Score	QSOs	QTH	Best dx	Km	Power	Ant
1	GJ4ICD	5,061	393	YJ70	F1GCA	718	+25	10P
2	G8ZHP	4,375	455	ZM29	HB9RYI/P	814	+26	2×16Y
3	G4NUT	3,641	527	ZM77	F6KCM	676	+26	19Y
4	G8BBC	3,472	600	ZL40	HB9RYI/P	708	+25	14P
5	GM8YJU	3,423	334	YO05	F1GNQ	730	+26	17Y
6	G2BRS	3,066	405	YK19	DL0BD/A	813	+26	14Y
7	GD4IOM	2,898	291	XO67	ON4ASL/A	669	+26	16Y
8	G6WBP	2,037	399	ZL38	DL0SR/P	675	+20	14P
9	G3SDC	1,897	350	ZM25	DK9TF/A	630	+26	2×11Y
10	G1CDN	1,456	265	ZN34	DK0BN/P	745	+18	4×10Y
11	G3KMI	1,209	288	ZK05	DF7DJ	661	+26	9P
12	G8GBY	1,124	165	ZN29	PI4VLI	587	+25	16Y
13	G6LFP	1,101	203	ZL34	PA0CIS	443	+19	9Y
14	G6GWZ	994	192	ZM57	GM4TXX/P	465	+20	14P
15	G6TMP	972	209	YM38	F1DYD	503	+20	2×16Y
16	G1DOX	917	215	YM28	PE0MAR/P	455	+18	10XY
17	G4AFF	905	111	YK38	PA0GUS/P	614	+25	13Y
18	G6XYH	890	143	ZO03	GJ4ICD	631	+20	17Y
19	G3CMH	764	134	YK07	PE3AXY/P	551	+23	9Y
20	G6TEP	730	110	AL47	GD4IOM	506	+15	8Y
21	G3UKC	699	97	AL56	DL0WN/P	515	+20	14Y
22	G3YDY	693	135	AL23	PA0GN	443	+16	7Y
23	G4DFI	659	86	AL41	GI4VIP/P	530	+23	16Y
24	G4PIQ	613	95	AL16	DF7DJ	455	+7	14Y
25	G8XWA	609	77	YO57	F1KBF/P	512	+19	4Q
26	G8IGQ	584	146	ZM04	F1DYD/P	457	+20	8/8S
27	GU6ZXI	582	60	YJ48	GI4VIP/P	611	+17	16Y
28	G6NQX	542	80	AL47	DK2KAL	371	+10	7Y
29	G6DTD	521	125	YN48	F1TNB/P	482	+14	8Y
30	G6TEX	497	101	YN35	F1KBF/P	475	+15	9XY
31	G6HXU	457	117	YN68	F1KBF/P	416	+13	6Q
32	G4NRJ	456	65	ZM39	GJ4ICD	390	+19	10Y
33	G6MEM	443	75	YN30	F1DYD/P	553	+19	11Y
34	G4VRY	429	112	ZN13	F1KBF/P	439	+22	17Y
35	GW4RKX	360	68	YN65	F1DYD/P	570	+13	8Y
36	G4AGQ	357	81	ZL66	HB9RYI/P	723	+10	9Y
37	G8YGD	332	74	ZL67	GM8YJU	495	+11	8Y
38	G6TFT	315	47	AK11	PA3AXY/P	387	+22	6Q
39	G6EFJ	257	57	ZK15	PE1JQJ/P	402	+15	12ZL
40	G6DCF	254	52	YN38	F1KBF/P	439	+15	8Y
41	G1AMX	204	24	ZP73	G2BRS	455	+10	9Y
42	G2DHV	66	30	AL41	F1KBF/P	183	+10	6/6S

144MHz ALL OTHER STATIONS SECTION

Posn	Station	Score	QSOs	QTH	Best dx	Km	Power	Ant
1	G4DEZ/A	7,634	804	AL34	F1BPS	765	+26	4×16Y
2	G4LIP/P	6,979	656	AN61	HB9RYI/P	831	+26	2×16Y
3	G6HH/P	6,978	660	AK14	DL3AAL	712	+26	4×17Y
4	G4BWG/A	6,855	645	AL67	Y22QG	719	+26	4×14Y
5	G6EKR/P	6,536	627	AL56	GI3CFH/P	682	+25	19Y
6	GW4BVY/P	6,308	712	YL25	DJ0QZ	762	+26	2×16Y
7	G4RFR/P	6,172	630	YK30	DL0KW/P	840	+26	2×14P
8	G3EFX/P	6,046	658	ZK10	DJ9VX/P	690	+25	2×16Y
9	G4PBP/P	6,026	672	YM48	DK0AA	933	+25	80CL
10	G8LNC/P	5,715	691	ZK35	DL0KW/P	772	+26	4×9Y
11	G4UHF/P	5,394	772	ZL15	DL0KW/P	754	+23	16Y
12	GW4ULX/P	5,265	615	YL15	DF0WZ/P	838	+26	4×9Y
13	G8SJP/P	4,777	635	AM72	F6KJS	663	+26	4×9Y
14	G3PIA/P	4,711	667	ZL33	DL2FAJ/P	765	+24	2×16Y
15	GW3OXD/P	4,320	530	YM55	DK5PE	721	+23	19Y
16	G4CRA/P	4,147	486	AL04	DL0RL	652	+22	2×17Y
17	G8HRC/P	4,136	423	AL17	HB9RYI/P	666	+26	2×13Y
18	G4ERP/P	3,842	645	YL10	DL8GP	694	+25	12Y
19	G3WQK/P	3,202	362	AK12	DF9OX	702	+24	2×16Y
20	GW4MGR/P	3,015	554	YN75	ON4ASL/A	594	+20	4×8Y
21	GW8IVO/P	3,013	506	YL05	—	—	—	2×6Q
22	G4WMC/P	2,880	463	YM36	DD3KF	657	+23	16Y
23	GI4VIP/P	2,476	250	WO40	ON4ASL/A	771	+26	16Y
24	G4NOK/P	2,260	377	ZN23	F1DRR/P	566	+20	2×16Y
25	G4KZY/P	2,228	409	ZL74	PA0GN/P	584	+25	8Y
26	G4WET/P	2,181	449	ZM71	PA3CGR	600	+14	19Y
27	G8TZT/P	2,059	334	YO69	DB0KM	661	+22	14P
28	G6KNF/P	2,053	389	ZM44	DK0BN/P	693	+20	19Y
29	G6WWR/P	2,034	367	ZL76	DJ0QZ	603	+14	—
30	G6IVR/P	2,008	352	ZL73	EI0CZ	602	+23	16Y
31	G3ZDG/P	2,004	390	ZL63	DJ0QZ	652	+24	9Y
32	G4KKC/P	1,789	295	AL56	GI4VIP/P	595	+20	QY
33	G4BQB/P	1,775	265	YK05	PI4THT	680	+10	17P
34	G1AYM/P	1,763	337	YL29	DK2KAL	618	+20	16Y
35	G8WYR/P	1,681	289	ZN12	PI4VLI	671	+22	11ZL
36	G4SSS/P	1,665	273	YL72	HB9RYI/P	890	+24	4×9Y
37	G6LJO/P	1,620	380	YN70	ON1BCB	466	+16	15Y
38	G8LSS/P	1,579	313	ZL18	GI3CFH/P	554	+20	10Y
39	G4VFL/A	1,343	262	YM10	DK2KAL	639	+24	17Y
40	GM4TXX/P	1,284	152	XP17	F1KBF/P	717	+24	13Y
41	G4CDD/A	1,226	254	ZN21	F1DYD/P	544	+21	2×8Y
42	G8TA/A	1,106	292	YN40	ON4ASL	443	+23	15Y
43	GW4LNP/P	843	167	YL33	F1KNO	660	+20	12Y
44	G4VKE/P	720	112	YO65	F1KBF/P	500	+14	8ZL
45	G3AFT/A	693	196	ZL40	DK2DYT	547	+20	8Y
46	G6EPN/A	437	61	ZN64	F1DYD/P	476	+14	12ZL
47	G4FUR/P	427	106	ZL60	F1KQA	343	+15	8/8S
48	GI3CFH/P	392	32	WO05	F1TNB/P	750	+20	17Y
49	G6CSY/P	273	87	AL51	G4VKE/P	389	+7	9Y
50	G6XDI/A	52	24	ZK14	G4SSS/P	173	+4	9Y

432MHz FIXED STATION SECTION

Posn	Station	Score	QSOs	QTH	Best dx	Km	Power	Ant
1	G4LOJ	1,585	159	AM37	F1FHI	635	+26	27QL
2	G4CQR	976	150	AL71	GI6ATZ/P	568	+20	21Y
3	G4SIV	898	120	ZM29	DF9FD	708	+26	4×21Y
4	G3TGE	834	148	ZM77	GI4GVS	448	+26	2×21Y
5	G3HRY	209	41	ZM77	PA0EZ	402	+17	19Y
6	G6TMP	152	34	YM38	F1HET/P	366	+17	4×17Y
7	G8KMI	128	40	ZK04	G4JNZ/P	412	+10	14Y
8	G6GJD	120	16	YN15	F1HET/P	500	+15	2×48MB

Posn	Station	Score	QSOs	QTH	Best dx	Km	Power	Ant
9	G8YTF	107	27	YN30	GW8TFI/P	229	+10	—
10	G4AGQ	100	24	ZL66	F1FHI	456	+10	19Y
11	G8KUC	98	22	AL56	GW8TFI/P	294	+10	17Y
12	G8ZK	87	31	ZM04	G4VIX/P	207	+10	18P
13	G6TEP	84	16	AL47	GW8TFI/P	310	+10	17Y
14	G6GWZ	68	18	ZM57	F1HET/P	256	+10	15Y
15	G6HXU	57	23	YN68	G8KQW/P	237	+10	48MB
16	GD4IOM	7	1	XO67	GW8WDC/P	158	+10	88MB

432MHz ALL OTHER STATIONS SECTION

Posn	Station	Score	QSOs	QTH	Best dx	Km	Power	Ant
1	GW8TFI/P	3,050	314	YL25	DG4FAO/P	804	+26	4×16Y
2	G4CLA/P	2,604	271	AN61	Y23FG	779	+26	4×21Y
3	G4JNZ/P	2,093	255	ZK10	DF0ML/P	676	+24	2×21Y
4	G8KQW/P	1,644	244	AM72	F6KFN/P	907	+26	4×21Y
5	G4BCH/A	1,342	160	AL34	DF9LN	697	+25	136Gp
6	G4MVN/P	1,340	182	AK12	DL6WU	604	+20	2×48MB
7	G4WHO/P	1,217	157	YK30	DF6GX/P	797	+22	2×24QL
8	G8ULU/P	1,095	149	AL56	GI6ATZ/P	600	+18	21Y
9	G4VIX/P	1,052	123	AL17	DF0ML/P	594	+20	4×21Y
10	GW8WDC/P	977	178	YN75	PA0FRE	531	+17	4×19Y
11	G4PSU/P	766	152	ZL15	GI6ATZ/P	—	+19	21Y
12	GW3YRJ/P	765	108	YM55	PA0EZ	575	+20	2×24Y
13	GI6ATZ/P	640	60	WO40	G8ULU/P	600	+20	2×21Y
14	G4VXE/P	442	86	YL10	PA0EZ	492	+13	19Y
15	G6GFO/P	432	90	ZL63	PE1ETR	505	+20	24P
16	G4HGU/P	410	71	YL72	F1FHI	471	+22	2×15Y
17	G6LMZ/P	391	102	ZM44	G8PNN	315	+17	2×48MB
18	G8PTP/P	384	90	ZL18	G8PNN	380	+17	12Y
19	G4DCV/A	352	54	AL67	PA0GUS/P	359	+20	23Y
20	G4TZM/P	329	71	AL04	G4HGU/P	325	+10	2×15Y
21	G4TCZ/P	323	58	ZN23	F1HET/P	414	+10	19Y
22	G3GBU/P	289	95	YN70	GI6ATZ/P	298	+10	88XY
23	G4OCG/P	247	61	AL56	GW8WDC/P	343	+10	2×88Y
24	G4SCY/A	222	52	YM10	GI6ATZ/P	312	+20	24Y
25	G6CSY/P	191	56	AL51	G6CVT	298	+7	19Y
26	G4SBJ/P	173	54	ZL73	G3WOH	271	+15	6/6S
27	G3ZMF/P	91	27	ZL60	PA0PLY/A	375	+15	28Y
28	GM6LNM/P	86	14	XP17	G8KQW/P	530	+17	21Y
29	G6XDI/A	17	9	ZK14	GW8TFI/P	168	+0	19Y

Entries disallowed from: G3NNG/P, rule 18; G4ULL, G4UQB rule 2(a). Check logs received from G4IDF, G4LRS, G6APZ/P, G6DHY, G6MEN, G6PDA/P, G6PJB, G6XSU, G8ROU/P and G8XTV.

LISTENER CONTEST

			144MHz		432MHz		
Posn	Entrant	QTH	Score	Points	Score	Points	Total
1	RS52543	YN15c	655	1,000	20	741	1,741
2	RS28198	AK04h	335	512	27	1,000	1,512
3	RS25429	ZN03h	491	750	—	—	750
4	RS46296	YN70	245	374	—	—	374

7MHz Contests 1984 results

Following the commentary in this year's rules about the low G entry for the ssb section of this contest in 1983, the HF Contests Committee is encouraged by the increase in G entries in the 1984 ssb event. To balance this, the number of G cw entries is somewhat down on last year. Overall, however, interest in the 7MHz contests is showing a positive trend, and the HF Contests Committee has decided to retain the contests in broadly their current form for 1985.

A number of competitors commented on the multiplier confusion arising from the new USA call area policies, and the HF Contests Committee will review this for next year's event.

John Gilbert, G4CEB, operating G3RRS, wins both sections of the contest this year, and will be awarded the G6QB Trophy. Winners and runners-up in other sections will be awarded certificates. *G3OZF*

Equipment used by leading stations

G3RRS TR7 + linear (ssb) 3-el beam at 30m, Beverages antennas
G4DRS T4XC/R4C linear, slopers
G3SXW Ten Tec Triton IV, λ/2 dipole at 40ft

DX worked and breakdown of leading entrants' scores

G3RRS (Phone) A7, A9, CT1, CT2, DJ, EA, EA6, EA9, EI, F, HA, HB9, I, JY, LA, LX, LZ, OA, OE, OH, OK, ON, OZ, PA, PY, SM, SP, SV, TN8, UA, UA2, UA9, UB5, UI8, UJ8, UO, UP, UQ, VP2K, VK9, VU, W4, W5, XE, Y2, YO, YU, ZL4, ZS6, 4X6, 5B4, 6Y, 9H, 9Y (54 multipliers, 417 QSOs, 2,363 points.)

G4DRS A9, CT, DJ, EA, EA9, EI, F, HA, HB9, I, LA, LX, LZ, OE, OH, OK, ON, OZ, PA, PS7, SM, SP, UA2, UA, UB5, UI8, UK1, UO, UP, Y5, YO, YU, 4X6, 9HI, 9K2. (35 multipliers, 296 QSOs, 1,383 points.)

G3RRS (cw) CO, DL, EA, EA8, EI, F, HA, HB9, HL, I, JA, LA, LZ, OE, OH, OK, ON, OZ, PA, PY, SM, SP, UA, UA2, UA9, UB5, UH8, UJ8, UL7, UO5, UP2, UQ2, UR2, VE1-3, VK2, VK6, W1-0, Y2, YO, YU, ZL 1-3, 6Y5, 8P6. (56 multipliers, 606 QSOs, 5,751 points.)

G3SXW C6A, DL, EA, EA6, EA8, EI, F, HA, HB9, I, IS0, JA, LA, LZ, OE, OH, OK, ON, OZ, PA, PJ7, SM, SP, SV, TI, UA, UA2, UB5, UO5, UP2, UQ2, UR2, UA9, UH8, UJ8, UL7, VE1, VE2, VE3, VO1, VK3, W1-0, Y2, YO, YU, ZL2, 6Y5, 8P6, 9Y4. (58 multipliers, 576 QSOs, 4,958 points.)

7MHz SSB TRANSMITTING—UK

Posn	Callsign	Points	Posn	Callsign	Points
1	G3RRS	127,602	10	G3VLX	9,460
2	G4DRS	48,405	11	G4RHW	5,670
3	G2QT	41,440	12	GW4BRS	4,043
4	GW4BKG	40,713	13	G3PEK	2,880
5	G4IUF	34,410	14	G3SJX	2,800
6	G4AFJ	33,495	15	G6QQ	2,795
7	GW4UZL	17,108	16	G3GQC	2,167
8	GU4NYT	14,658	17	G4NRJ	1,785
9	GI4AHD	12,948			

7MHz SSB TRANSMITTING—EUROPE

Posn	Callsign	Points	Posn	Callsign	Points
1	PA3AVJ	12,320	5	OZ5KG	6,180
2	DF1DN	9,732	6	DJ3HJ	5,796
3	DL8JS	9,468	7	YU3TXB	4,212
4	ON7TH	8,722	8	UO5OHH	3,553
9	DF6JC	3,249	39	PA3BVT	365
10	UY2SXS	3,216	40	OZ1CFV	360
11	Y39JA	2,961	41	DF4ZL	350
12	OK1TN	2,840	42	PA3ATZ	330
13	OK2BTI	2,343	43	SM7DXQ	315
14	LX2CA	1,720		EA5JC	315
	Y51TG	1,720	45	OZ3KE	300
16	UA2EC	1,580	46	UB5LCV	290
17	EI7CC	1,575	47	HA1UG	280
18	UP2PBW	1,440	48	OZ4LX	275
19	UY5XE	1,320	49	Y58ZA	225
20	F6BVB	1,170	50	SM7HSP	220
21	LA2IZ	1,071	51	UA3VFS	212
22	OKSPS	1,024	52	UB5MNO	200
23	Y21HB	945	53	Y27GL	192
24	Y53ID	931	54	OH7NW	180
25	ON5CZ	930		Y38UG	180
26	SK7AX	740	56	YO5BYV	160
27	UB5IHF	735	57	YO2BTW	140
	UA6LMT	735	58	EA7LM	132
29	HB9DX	700		EA2SN	120
30	Y24YH	665	59	OK2ABV	120
31	Y56WA	660		SP6DVP	120
32	LX2KL	600	62	LA5VAA	90
33	OK1KZ	510	63	Y32PI	84
34	OZ4HW	498		Y44NO	84
35	EA2CR	455	65	Y78XL	75
36	LA1IE	425	66	YU7SF	60
37	LA1NRK	375	67	OH5MQ	50
38	LA9PT	372			

7MHz SSB TRANSMITTING—REST OF THE WORLD

Posn	Callsign	Points	Posn	Callsign	Points
1	4X6DK	3,480	4	UJ8JKO	40
2	UA9FAT	1,400	5	9K2BE	15
3	UA9CGT	1,025			

7MHz SSB RECEIVING—UK

Posn	Station	Points	Posn	Station	Points
1	BRS28198	23,780	3	G6XMJ	4,560
2	BRS32525	19,260	4	BRS44395	3,780

7MHz SSB RECEIVING—EUROPE

Posn	Station	Points	Posn	Station	Points
1	ONL 383	1,640	9	Y2-EA-11953/L37	777
2	Y2-7215/164	1,480	10	Y2-11100/F59	735
3	NL 6945	1,344	11	Y2-EA-13143/E39	584
4	Y2-EA-13112-E39	1,160	12	Y2-9762/A48	540
5	UB5-073-3135/U6F	945	13	UB5-060-2626	390
6	Y2-11249/F49	917	14	Y2-9540/A55	350
7	Y2-8983/F44	803	15	Y2-16870/G38	300
8	Y2-16930/G36	780	16	Y2-EA-19002/B31	192

7MHz SSB RECEIVING—REST OF WORLD

Posn	Station	Points
1	4X4 – 1401	760

Check logs gratefully acknowledged from UB5EAU, Y41VF, LX1RK, DL9HP, OZ4ZT, YO3RN and HA5FA.

7MHz CW TRANSMITTING—UK

Posn	Callsign	Points	Posn	Callsign	Points
1	G3RRS	322,056	19	G4OTU	65,352
2	G3SXW	287,564	20	G4FAS	64,370
3	G3TXF	284,096	21	G3JKS	64,165
4	G3SJJ	243,712	22	G3ESF	51,675
5	G4EDG	220,416	23	GM4SJL	24,600
6	G3VMW	218,340	24	G3AWR	21,750
7	G4CNY	187,425	25	G3EBH	19,980
8	G4DRS	160,450	26	G4UOL	19,720
9	G2QT	144,485	27	G4EBK	17,110
10	G3CCZ	118,384	28	G4OKN	16,125
11	GM4BYF	91,750	29	GU4NYT	13,260
12	G4KGK	89,540	30	G3JJZ	12,090
13	G3PSM	88,620	31	GM8SQ	8,740
14	GW6TM/A	83,250	32	G3GMM	5,670
15	G4IQM	78,120	33	G2AJB	5,580
16	G4UPS	76,360	34	G3RDQ	4,655
17	G3NKS	74,005	35	G3SJX	175
18	GW3ZDW	69,445			

7MHz CW TRANSMITTING—EUROPE

Posn	Callsign	Points	Posn	Callsign	Points
1	HA5KDB	7,920	33	UT5RF	2,907
2	DL5JQ	5,181	34	DL1QT	2,892
3	Y22YO	5,115	35	PA2JDB	2,880
4	UP2BCR	5,100	36	ON5GL	2,790
5	EI5DI	5,038	37	UB5INO	2,750
6	EI7CC	4,980	38	DF4QW	2,745
7	Y47YN	4,700	39	SP9CVY	2,700
8	UP2BLQ	4,650		Y38YE	2,700
9	Y25OH	4,620	41	Y32CM	2,655
10	Y22UB	4,510	42	Y23HJ	2,520
11	UA6LCN	4,450		HR9AGH	2,520
12	YO3CD	4,200	44	UB5VK	2,430
13	PA3AMA	4,158	45	Y56VM	2,424
14	HA8ZC	3,950	46	HA7RO	2,410
15	LZ2KRS	3,800	47	EA1OJ	2,367
	DJ0YZ	3,800	48	UP2BKM	2,340
17	OZ1III	3,700		ON4XG	2,340
18	DL5LAW	3,685	50	Y24DG	2,322
19	UA1ZCP	3,650	51	DL1ZQ	2,295
20	OK3CJP	3,600	52	UA4HNP	2,275
	PA3CEF	3,600	53	Y53UN	2,224
22	OH3OS	3,500	54	DF3QN	2,200
	Y39IA	3,500	55	UA1QBV	2,115
24	ON7XN	3,480	56	HA5KBC	2,100
25	UP2QA	3,420	57	UB5IIB	2,052
26	OK1DAV	3,400	58	YU7PXT	2,032
27	OK1TN	3,320	59	YU4EZC	2,030
28	OZ3QN	3,200	60	UP2BKA	2,020
29	OK2BSG	3,150		UA3AJK	2,000
30	LZ1PN	3,120	61	UA6LTJ	2,000
31	HA8ZO	2,970		YU2WJ	2,000
32	Y31XN	2,934	64	SM6EUZ	1,880

Posn	Callsign	Points	Posn	Callsign	Points
65	Y39JA	1,854	105	Y34SE	1,110
66	YU1NAL/X	1,827	106	YO3JG	1,098
67	SM7ERC, UB5ULI, Y24IF/P	1,800	107	OK3KKF	1,071
		1,800	108	OH6AK	1,050
		1,800	109	DK9BR	1,020
70	OK3PQ	1,760	110	UT5RW	1,000
71	UA2EC	1,755	111	HA4XX	960
72	HB9DX, DF4ZL, LA1IE	1,750	112	Y23HN	930
		1,750	113	DL1SN	850
		1,750	114	LA1XDA	846
75	UY7SF	1,715	115	SP5ES	760
76	OK1KZ	1,645	116	SM7LAZ	750
77	Y21EA	1,575	117	YO2DFA	738
78	EA3ALV	1,552	118	LA5VAA	690
79	YO8DDP	1,544	119	LZ1HY	665
80	LZ2KRZ	1,491	120	LA2SL	660
81	OK1DBM, UA3TGC	1,480	121	EA4BV	630
		1,480	122	Y27ML/A, UA3ACX	625
83	Y32PI	1,470			625
84	OK3FON, OH3NM	1,440	124	UB5KAG	616
		1,440	125	OH7QR	595
86	Y44ZB, DL1OO, HA2NI	1,400	126	UA6BPM	572
		1,400	127	Y45SA	560
		1,400	128	UB5CI, UA6AJG	500
89	YU7ORQ	1,360			500
90	UO5OWC	1,338	130	OH80B, Y26UM	480
91	Y54YH	1,330			480
92	DL2OM	1,326	132	UR2QD	450
93	DJ6WU	1,320	133	YO5ALH	440
94	UY5LO	1,295	134	YU3NP	425
95	Y47ZF, UB5WAR	1,281	135	DL1AM	420
		1,281	136	LZ2PT	415
97	Y26IL	1,264	137	Y48RJ	400
98	HA5KCO	1,260	138	EA3JC	366
99	OK2BFX	1,204	139	YO8KGP	164
100	OZ4HW	1,200	140	Y38ZB	152
101	UB5VAA	1,155	141	Y21ZB	150
102	PA0DIN, UB5FFZ	1,140	142	Y23TL	80
		1,140	143	Y32WN	15
104	OK2PAW	1,120			

7MHz CW TRANSMITTING—REST OF WORLD

Posn	Callsign	Points	Posn	Callsign	Points
1	UH8EAA	18,120	13	EA8AGF	2,340
2	UA9YAN	13,145	14	UA9FGO	2,325
3	UA9FAL	10,600	15	NK4Q	2,160
4	UJ8JAS	10,350	16	W1DA	1,650
5	UA9KAA	6,840	17	W8YGR	1,550
6	UA9FKM	5,880	18	UA9AAP	1,480
7	VO1AW	5,808	19	UA9CPJ	945
8	EA5BAA/8	4,960	20	KR2Q	720
9	UL7BAY	4,795	21	UA9FDW	660
10	UA9CBR	3,570	22	K2SX	585
11	6Y5HN	3,045	23	9K2BE	60
12	UL7CAD	2,490	24	JH3WKE	30

7MHz CW RECEIVING—UK

Posn	Station	Points	Posn	Station	Points
1	BRS 1066	67,950	2	BRS44395	39,590

7MHz CW RECEIVING—EUROPE

Posn	Station	Points	Posn	Station	Points
1	OK1-11861	4,800	4	Y2 9757/B57	1,710
2	UA3-142-198	3,735	5	NL4483	340
3	OK3-27740	2,250			

Check logs gratefully acknowledged from: Y23RJ, HA5FA, W2KTF, UA3GDJ, UA9FAK, Y24VK, Y39SH, Y51WO/P, UB5LFG, UA6LUE, OK1DHB, LA7XB, LA5BE, SM5DAC, OZ1FGC, UA3AAJ, LZ1GD, W8VSK, LZ1KAU, BRS52868, and VO1PJ.

ROPOCO 1 1984 results

Once again there was an encouraging increase in the number of entrants for the contest. From the comments received with the logs it seems that this type of contest is enjoyed by all, and the duration felt to be just right.

In a contest of this nature it is possible to check the vast majority of contacts made, and it becomes obvious that many mistakes occur when writing up the logs. These also happen when entrants do not believe the postcode they have received and try to make it into something more recognizable! Some of the more amusing postcodes received were:—5RLOW, T36DB, DT5ZDW, OO1OK and, judging by the number of WN36EJ/WN36SJ codes about in the last hour of the contest, it would appear that someone was sending these codes to everyone. Perhaps holding this contest on 1 April as we did may explain the "funny" codes. The winner was G4NUT/A, operated by Fraser Robertson, G4BJM, who had 73 QSOs. Second placed was G4MCC, operated by G4HIU, who had 65 QSOs, and third was G3RTE,with 64 QSOs.

The adjudicator would like to thank all who entered, all who submitted check logs, and all members of the Marple Contest Club, who submitted four logs. *G3KDB*

Posn	Calsign	Points	Posn	Callsign	Points
1	G4NUT/A (G4BJM op)	721	18	G3GC	474
2	G4MCC (G4HIU op)	646	19	G4ARI	468
3	G3RTE	628	20	G4MUL/A	467
4	G3TXF	614	21	G4PDQ	454
5	G3PDL	577	22	G3EBH, G4OTU	444
6	G4OBK	565			444
7	G6UT (G3WUX op)	557	24	G3JJZ	434
8	G3KKQ/A	530	25	G3JKS	430
9	G3NKS	520	26	G4IZZ	418
10	G4EVS	511	27	G2HLU	414
11	G3SYA	507	28	G4HZF	407
12	G2VJ	504	29	G4EBK	397
13	G4UPS	497	30	G4OOS	394
14	G4BLX	496	31	G3SB	388
15	G3YAJ, G4BOU	494	32	G3AWR, GW3KOR	370
		494			370
17	G3HKO	488	34	G4CZB	368

Contests Calendar

4 August	432MHz Low Power & SWL *(Rules in June issue)*
4-5 August	YO DX *Rules in July* MOTA)
5 August	144MHz Low Power & SWL *Rules in June issue)*
5 August	DF Qualifying Event South Manchester *(Details in July issue)*
11-12 August	European DX (CW) *(Rules in July* MOTA)
12 August	10GHz Cumulative (Session 4) *(Rules in April issue)*
19 August	DF Qualifying Event Salisbury
19 August	1,296/2,320MHz *(Rules in June issue)*
25-26 August	All Asian (CW) *(Rules in June* MOTA)
26 August	ROPOCO FD *(Rules in May issue)*
26 August	Microwave Cumulative (Session 5) *(Rules in April issue)*
3, 11, 19, 27 September	28MHz Cumulatives (Phone) *(Rules in August issue)*
1-2 September (prov)	SSB FD *(Rules in May issue)*
1-2 September	144MHz Trophy and IARU VHF & SWL *(Rules in June issue)*
2 September	Howdy Days *(Rules in August* MOTA)
5-6 September	LZ DX *(Rules in August* MOTA)
8-9 September	Cray Valley RS SWL *(Rules in August issue)*
8-9 September	European DX (Phone) *(Rules in July* MOTA)
9 September	DF Qualifying Event Chelmsford/Colchester
16 September	70MHz Trophy & SWL
October-December	432MHz Cumulative
October-December	1,296MHz Cumulative *(Rules in August issue)*
6 October	DF Double Night Event Slade
6-7 October	432MHz-24GHz & IARU UHF *(Rules in June issue)*
14 October	21/28MHz Phone *(Rules in May issue)*
21 October	21MHz CW *(Rules in May issue)*
27 October	DF Treble Night Event Mid-Thames
28 October	70MHz Fixed *(Rules in August issue)*
3-4 November	144MHz CW & Marconi Memorial *(Rules in August issue)*
4 November	LF CW WAB*
10-11 November	European DX (RTTY) *(Rules in July* MOTA)
10-11 November	2nd 1·8MHz
12, 20, 28 November 6-14, December	28MHz Cumulatives
2 December	144MHz Fixed
16 December	70MHz CW
January-February	BATC ATV Winter Cumulative *(Rules in* CQ-TV)

* Rules, logsheets and other information from Steve Lawrence, 7 Ashfield Road, Market Harborough, Leics.

Posn	Callsign	Points	Posn	Callsign	Points
35	G4IXF	367	44	G3MUO	315
36	G4GLC	364	45	G3GMM/A	261
37	G4OGB	338	46	GM4LVW	204
38	G5ECD	335	47	GM4OSS	184
39	G4OKN	334	48	G3CQR	181
40	G3VFB	332	49	G4KTI	148
41	G4OTV	324	50	G3COJ	140
42	GM4SJL	321	51	G4TQM	30
43	G3MKR	320			

Check logs received from: BRS44395, G3FXA, G3SXW, G4KLQ/P, and GW4PXQ.

Salisbury DF Qualifying Event

Date: 19 August 1984
Map: OS sheet 184, 1:50,000 series, Salisbury and the Plain
Assembly: 1300bst for start at 1320bst
Location: Bokerley Junction, ngr 032 199

Competitors requiring tea should notify Mr A. Newman, 74 Victoria Road, Wilton, Salisbury, Wilts, SP2 0DY, tel 0722 743837, not later than 12 August 1984.

Coventry DF Qualifying Event results

Ninteen teams assembled at Warwick racecourse for the start of the Coventry qualifying event for the RSGB National Final. Two good signals were heard at the start, which inspired most teams with confidence to tackle the task ahead.

Station A, G4CFG/P, was located in a small wood near Wormleighton, approximately 13 miles south-east of the start. Unfortunately, a long period of dry weather had left the undergrowth very brittle and the station cover soon disappeared under the onslaught of several mean and hungry df teams. However, the brambles were thick enough to inflict many scratches and cuts on the early arrivals.

Station B, G3TFA/P, was hidden in a wood approximately four miles west of the start. The bearing of this transmitter from the start passed through three woods, and most competitors who chose to find this station first thought it was the one further from the start. The transmitter was hidden as far from the road as possible to give competitors some exercise and work up an appetite for tea. Highlight of the afternoon here was Doreen Pechey's Oscar-winning performance in feigning multiple injuries to attract husband Bill when she had found the transmitter, not wishing to give the game away to the other teams.

A total of 48 sat down for tea afterwards, while Ian Butson gave an account of how he had won and could now arrange his holidays, having qualified for the National Final. Mike Hawkins thanked the Coventry ARS on behalf of the RSGB for organizing the event. Thanks must also go to Norman Rathbone, G4KZU, who devoted much time prior to the event erecting antennas.

			Time of arrival	
Posn	Name	Club	Station A	Station B
1	I. Butson	Colchester	1458	1417
2	W. Pechey	Mid-Thames	1507	1424
3	M. Hawkins	Chelmsford	1507·5	1420
4	C. Wells	Mid-Thames	1508	1423
5	D. Newman	Slade	1508·5	1421
6	A. Simmonds	Mid-Thames	1509	1418
7	T. Gage	Mid-Thames	1511	1420·5
8	F. Mepham	Mid-Thames	1511·5	1419
9	D. Holland	S Manchester	1530	1447
10	M. Easterbrook	Dartford Heath	1457	1546
11	C. Merry	Dartford Heath	1442	1550
12	A. Butcher	Chelmsford	1550·5	1421
13	A. Williams	Braintree	1441	1551
14	C. Plummer	Mid-Thames	1509	1558
15	R. Vickers	Slade	1558·5	1509
16	I. Jackson	Rugby	1628	1514
17	J. Armitage	S Manchester	1629	1500
18	T. Judd	Mid-Thames	—	1559

One competitor failed to find either transmitter
I. Butson and W. Pechey qualify for the National Final.

IARU Region 1 VHF/SHF Contest 1982 results

The following tables have been extracted from results received from PZK, the Polish national society. Further information may be obtained by contacting the chairman of the VHF Contests Committee, G3XDY, QTHR.

SECTION 1—144MHz SINGLE-OPERATOR

Posn	Callsign	Points	Posn	Callsign	Points
1	GJ4ICD	257,490	182	G3ZLQ	40,463
2	OK1OA/P	244,890	204	G8SVF	36,793
3	OE3LFA	228,375	212	GW6JJU/P	35,824
17	G4NQC	125,703	239	G4KGC	32,045
31	G4ASR	99,170	264	G6CUK	27,351
32	G6ECM	98,756	291	G3UHK/A	23,570
55	GI4OPH	78,135	323	G8UYD	20,042
60	G4ARI	73,139	374	G6CSY	15,471
68	G4ITR	70,227	448	G8LXY	9,577
131	G6FDW	49,437	456	G6FPU	8,835
143	G6ELH	46,346	532	G4AGQ	4,658

604 entries

SECTION 2—144MHz MULTI-OPERATOR

Posn	Callsign	Points	Posn	Callsign	Points
1	F6CTT/P	479,106	109	G6UT/P	144,804
2	G4LIP/P	390,264	116	G4HUP/P	141,988
3	DK0OX	374,150	117	G4LIN/P	140,403
4	G4MRS/P	349,718	118	G3WKS/P	138,421
5	G4DEZ/A	312,602	140	GI4KIS/P	127,798
6	G4APA/P	309,471	143	G8LNC/P	125,810
9	GW4NXO/P	295,639	151	G4NUT/A	118,768
13	G4BWG/A	279,455	152	G8DDC/P	117,694
16	GW3OXD/P	276,156	171	G8EBT/P	111,932
22	G3ZIG/P	255,389	172	G8WYR/P	111,781
24	G8RZO	237,381	175	G3UHF/P	110,153
29	G6EKR/P	218,762	180	G4ARE/P	108,914
30	G3YMD/P	217,661	191	GI6JSL/P	103,487
35	GD4IOM	213,056	201	G6DRT/P	97,633
36	G8BQX/P	212,216	229	G6GXF/P	84,780
40	G4KDL/A	203,905	254	GW2OP	77,020
44	G4NVA/P	196,427	257	G8UAQ	76,007
54	G6JIM/P	187,126	291	G8XVJ	64,376
59	G8HRC/P	183,711	300	G8XEM/P	61,569
61	GW6GW/P	181,890	322	G3ISO/A	56,101
66	G8ZHP	177,331	340	G8TRS	52,271
69	G4DZO/P	175,766	375	G4GTT	41,902
77	G3SEK/P	170,043	378	G6GRG/P	40,863
86	GM4CCC/P	163,081	392	G3KUE/P	38,755
87	G4GKS/P	162,773	416	G4GGD	33,549
91	G4NUL/P	157,946	435	G6HYF/P	28,268
104	G8SDS/P	147,348	478	G4GQR/P	12,199

493 entries.

SECTION 3—432MHz SINGLE-OPERATOR

Posn	Callsign	Points	Posn	Callsign	Points
1	DL7QY	82,700	100	G8JVM	15,049
2	OE1ERC/9	82,697	113	G8KEN	13,010
3	DJ9DL	70,313	208	G6CHK	4,995
9	G4LOJ	55,835	253	G3COJ	3,102
48	G3SEK	24,783	297	G4LRT	1,129

324 entries.

SECTION 4—432MHz MULTI-OPERATOR

Posn	Callsign	Points	Posn	Callsign	Points
1	DK8VR/A	156,288	24	G4MRS/P	65,241
2	DK0IK/P	142,622	67	G4OUF/A	24,948
3	F6CTT/P	135,363	78	G3TQF/P	21,977
6	G4JAR/P	108,748	84	G3UHF/P	20,485
12	G4NXO/P	90,479	125	G8BQO/P	12,343
17	G4LIP/P	75,588			

174 entries.

SECTION 5—1·3GHz SINGLE-OPERATOR

Posn	Callsign	Points	Posn	Callsign	Points
1	DJ3ZU	26,609	90	G3COJ	1,439
2	DJ5BV	26,036	109	G4LRT	667
30	G4KIY	7,281	111	G4PMK	638

131 entries.

SECTION 6—1·3GHz MULTI-OPERATOR

Posn	Callsign	Points	Posn	Callsign	Points
1	DL0HC/P	32,003	22	G4BAR/P	9,247
2	DK0IK/P	26,439	36	G3ZUD/P	5,659
7	G3XDY/P	17,982	43	G3FVA/P	4,569
9	G4HWA/P	15,295			

74 entries.

SECTION 7—2·3GHz SINGLE-OPERATOR

Posn	Callsign	Points	Posn	Callsign	Points
1	PA0EZ	5,074	29	G4LRT	283

39 entries.

SECTION 8—2·3GHz MULTI-OPERATOR

Posn	Callsign	Points	Posn	Callsign	Points
1	DK0NA	4,321	18	G4FAW/P	429
17	G8LMW/P	439	20	G4OHM	146

20 entries.

SECTION 9—3·4GHz SINGLE-OPERATOR

Posn	Callsign	Points	Posn	Callsign	Points
1	DK1UV	918	13	G4LRT	35
9	G4MBS	75			

15 entries.

SECTION 10—3·4GHz MULTI-OPERATOR

Posn	Callsign	Points	Posn	Callsign	Points
1	PA0JRS/A	464	6	G3TQF/P	35

6 entries.

SECTION 11—5·7GHz SINGLE-OPERATOR

Posn	Callsign	Points	Posn	Callsign	Points
1	F0GOH/P	356	6	G4MBS	77

10 entries.

SECTION 12—5·7GHz MULTI-OPERATOR

Posn	Callsign	Points
1	DK0NA	77

3 entries

SECTION 13—10GHz SINGLE-OPERATOR

Posn	Callsign	Points	Posn	Callsign	Points
1	I4CHY/A	3,312	42	G4FHO/P	339
40	GW3PPF/P	450			

60 entries.

SECTION 14—10GHz MULTI-OPERATOR

Posn	Callsign	Points	Posn	Callsign	Points
1	IN3TZL/3	2,464	19	G4FRE/P	13

20 entries.

SECTION 15—24GHz SINGLE-OPERATOR

Posn	Callsign	Points
1	OE2GKM/2	320

9 entries

SECTION 16—24GHz MULTI-OPERATOR

Posn	Callsign	Points
1	DK0BC	147

3 entries

OVERALL UHF/SHF RESULTS—SINGLE-OPERATOR

Posn	Callsign	Points	Posn	Callsign	Points
1	OE1ERC/9	170,567	102	G3SEK	24,783
2	DJ5BV	141,007	153	G8JVM	15,094
3	DJ3ZU	133,045	165	G8KEN	13,010
30	G4LOJ	55,835	203	G3COJ	10,297
62	G4KIY	36,405			

206 entries.

OVERALL UHF/SHF RESULTS—MULTI-OPERATOR

Posn	Callsign	Points	Posn	Callsign	Points
1	DK0IK/P	274,817	22	G4NXO/P	90,479
2	OK1KIR/P	222,914	39	G3TQF/P	55,362
3	DF0RX/P	215,832	49	G3UHF/P	43,330
9	G4MRS/P	159,701	75	G4OUF/A	24,948
11	G4JAR/P	154,983	121	G8BQO/P	12,343
12	G4LIP/P	152,063			

129 entries.

International ATV Contest 1984

(Organized jointly by VERON, AGAF, BATC, UBA, and REF)
Section A: Transmit/receive stations
Date: 8/9 September 1984
Time: 1800gmt Saturday–1200gmt Sunday
Bands: 432MHz/1,260MHz/10GHz
Scoring: Two points/km for each two-way QSO. One point/km for each one-way QSO.
Exchanges:
1) Code-group consisting of four non-sequential digits individually chosen by each entrant, eg 1865 or 9732. This code group must be exchanged on video only.
2) Call, QTH locator, report, serial number starting at 001. This data is to be exchanged via video or if necessary by phone.
Entries: Must include log sheets recording all above information and full postal address, locator and details of the station, and be mailed not later than 30 September 1984 to: G. Shirville, G3VZV, 18 Church End, Milton Bryan, Milton Keynes, Bucks MK17 9HR.
Notes: Multi-operator stations may only use one call. QSOs via repeaters do not count. Please keep video transmissions as brief as possible and QSY from the calling channels as soon as contact has been established.
Section B: Receive-only stations. The same rules are applied as above. Please note, entrants in section B may not "give" points to those in section A.

Cray Valley RS 14th SWL Contest rules

1800gmt 8 September to 1800gmt 9 September
The rules for this contest, which are similar to those of preceding years, can be obtained from Owen Cross, G4DFI, 28 Garden Avenue, Bexleyheath, Kent DA7 4LF. Log sheets are also available from this address on receipt of a large sae, and logs should be sent there to arrive no later than 29 October 1984.

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 the January 1985 issue.

RSGB affiliated organizations are requested to report all programmes and news items to their regional representatives regularly. Information for inclusion in the **October** issue should reach them by **20 August** and for the **November** issue by **18 September.**

Club programmes are given in order of date, subject time and place of the meeting. All callsigns of club secretaries and other contacts are QTHR (correct in the current *RSGB Call Book)* unless otherwise stated.

All clubs welcome visitors and would be pleased to hear from potential new members.

REGION 1—RR to be announced

Bury (BRS)—14 August (Fox hunt), 7, 21, 28 August (Informal meetings), 11 September ("Remote inspection—video vs photography", by Bob Hayter, G4OAC), 5,18, 25 September (Informal meetings). **Note:** the second special edition of "Feedback" conversion of 27MHz fm transceivers to 29MHz is now available, £1,25. 8pm. Mosses Community Centre, Cecil Street, Bury. Pro Malcolm Pritchard, G3VNQ.

Chester (C&DRS)—28 August (Pre-discussion for SSB Field Day) 11 September (HF aerials, by Dennis Wardle, G3EWZ), 18 September (Amateur tv, by Alan Warne, G4EZO), 25 September (RSGB video tapes "W5LFL, space shuttle" and "Two pioneers of radio"), 8pm. Chester Rugby Union Football Club, Hare Lane, Vicars Cross, Chester. Note only one meeting in August. Details from Chairman Alan Warne, G4EZO, tel 0244 40055.

Fylde (FARS)—7 August ("RTTY", by John Ball, G4RSA), 21 August (Natter night and morse class), 7.45pm. Kite Club, Blackpool Airport. Sec Harold Fenton, G8GG, tel 0253 725717.

Manchester (UMIST R&ES)—Meetings are held most lunchtimes and Wednesday afternoons in the shack on L floor in the main building and every Thursday at 8pm in the Union Bar. Contacts are Alistair Bailey, G6NEH, Tom Green, G4NQN, or Robin Commander, G6HEG, c/o UMIST Radio & Electronics Society, PO Box 88, Sackville Street, Manchester M60 1QD. New members should make contact at the stall in the Union during Freshers' Week (1-5 Oct).

Manchester (South Manchester RC)—Following the agm the new chairman is Mike Duckworth G6EAO, other officers are as last year. 3 August (DF event, 8.15pm start), 10 August ("QRO miscellany", by Harry Whalley, G2HW), 17 August ("Programming computers for amateur radio", by Malcolm Pell, G6WUT, 24 August ("Mystery lecture", by Colin McKenzie, G6LQO), 31 August (Natter night), 7 September ("Famous railway accidents", by Dr D. Yorke, G4JLG), 14 September (Mini lecture contest), 21 September (Surplus equipment sale), 28 September (Lecture, to be arranged), 8pm. Sale Moor Community Centre, Norris Road, Sale. Informal meetings Mondays, in the shack. Sec David Holland, G3WFT, tel 061-973 1837.

Oldham (OARC)—6 August (AGM—members only), 11,12 August (Special event station GB2OSS at Alexandra Park, Oldham), 13 August (Natter night, particularly for new members and visitors), 8.45pm. Devonshire Arms, Elliot Street, Lees, nr Oldham, Sec Mrs Fiona Butterworth, G4SPX, PO Box 29, Oldham, tel 061-652 8862.

Preston (PARS)—16 August (Preparation for rally), 26 August (Preston 17th Annual Rally at Lancaster University), 30 August (To be announced), 13 September (Video—"Aerial circus", by Dud Charman, G6CJ), 27 September ("Auction", by Jack Brindle, G4SHX) 8pm. Lonsdale Club, Fulwood Hall Lane, Fulwood, Preston. Sec George Earnshaw, G3ZXC, tel 0772 718175.

Stockport (SRS)—8 August (Informal meeting), 15 August (Natter night), 22 August ("Intro into Basic", by Tony Blackburn, G6AKX), 8.15pm. Blossoms Hotel, Wellington Road South, Stockport. Sec Mel Betts, G4FFW, tel 061-224 7880.

Thornton Cleveleys (TCARS)—6 August ("Switched mode power supplies", by Cedric Cawthorne, G4KPY), 13 August (Morse class, first of a regular class to be held on the second and when applicable, the fifth Mondays of each month, tutor Ian Cobbe, G3ZRZ), 20 August (To be announced), 27 August (Meeting cancelled—bank holiday), 3 September ("Japanese morse", by Norman Kendrick, G3CSG). Note, change of sec, Now Mrs Jen Ward, G8YOK, 3 Sherbourne Close, Carleton, Blackpool, Lancs FY6 7UB, tel 0253 890114.

Wirral (WARS)—15 August (To be announced), 5 September (A debate—"cw is a dying art"), 19 September (Problem night), 3 October (Sale of surplus equipment), 7.45pm. Guide Hut, Westbourne Road, West Kirby. Sec Cedric Cawthorne, G4KPY, tel 051-625 7311.

Wirral (W&DARC)—4 August (432MHz QRP contest), 5 August (144MHz Low Power Contest), 12 August (Sunday df hunt) 22 August (Junk sale), 1,2 September (144MHz Trophy—club entry), D&Ws on 15, 29 August, 5 September, 9 September (Final Sunday df hunt), 12 September (Equipment demonstration by Lowe Electronics), 16 September (70MHz Trophy Contest), 19 September (D&W), 26 September (Inter-club quiz night, second round with Chester at Irby), 8pm. Irby Cricket Club, Irby, Wirral. Sec Gerry Scott, G8TRY, tel 051-630 1393.

As my period of office as your RR is drawing to a close I would like to thank all those in the region who have given me their support, particularly in the last 12 months when health problems have curtailed much of the planned programme and reluctantly precludes me standing for a further period of office. Over the last three years there has been a considerable influx of new members and clubs in the region and it is my hope that the vigorous tradition of Region 1 will continue well into the future. I am sure members will join me in wishing success to the new RR. 73s, *G3FNM.*

REGION 2—RR P. N. Butterfield, G4AAQ, 43 Lynwood Crescent, Pontefract, West Yorks WF8 3QT. Tel 0977 791071.

Denby Dale (DD&DARS)—The club has just had its annual rally which proved a great success. Second and fourth Wednesday in each month, 7.30pm. Pie Hall, Denby Dale. Details from sec J. Clegg, G3FQH, tel Huddersfield 862390.

Goole (GR&ES)—7 August (Natter night), 12 August (Trip to the Dales), 14 August (Video night), 21 August (Unspecified talk), 28 August (Operating evening), 7.30pm. Junior Chambers Building, Boothferry Road, Goole. Details from sec Richard Sugden, G8IOH, tel 0405 84 462.

Hornsea (HARS)—Wednesdays, 8pm. The Mill, Mill House, Atwick Road, Hornsea. Details from sec Norman Bedford, G4NJP, tel 0262 73635.

Hull (H&DARS)—Fridays, 8pm. West Park Recreation Centre, Walton Street, Anlaby Road, Hull. Note new sec W. Coldbeck, G6ABG.

Keighley (KARS)—August (Construction judging night), Details of date and venue from sec Gerry Fuller, G3TFF, tel Keighley 42977, or pro Jack Birse, G1BOD, tel Keighley 663203.

Pontefract (P&DARS)—Thursdays, 7.30pm. 9 August (Joining North Wakefield Club foxhunt), 16 August (Informal evening), 30 August (Talk by Ray Price, G3VTD). Advanced notice is given of a talk and slide presentation by Rev G. Dobbs, G3RJV, on 27 September. This is open to all clubs in the region. CW classes on Mondays. Carleton Community Centre, Carleton, Pontefract. Details from sec, Ron Tams, G4TCG, or G4ISU, tel 0977 792784.

Wakefield (W&DARS)—21 August (To be announced), 1/2 September (144MHz Trophy & SWL contest), alternate Tuesdays, 8pm. Ossett Community Centre, Prospect Road, Ossett. Details from sec Walter Parkin, G8PBE, tel Wakefield 378727.

Would club secs please keep RR informed of their activities as regularly as possible. A regional meeting for ARs and club officials is planned for late autumn.

REGION 3— RR to be announced

Birmingham (Midland ARS)—19 August (General discussion evening), 7.30pm. 294a Broad Street, Birmingham B1 2DS. Sec G8BHE, tel 021-422 9787.

Birmingham (South Birmingham RS)—8 August (Surplus gear auction sale), 8pm. 12 August (Derby Rally, Lower Bemrose School, Derby). Hampstead House, Fairfax Road, West Heath, Birmingham, Sec G8RGQ, tel 021-459 8312.

Bromsgrove (BARS)—14 August (Main meeting), 28 August (Informal meeting), 8pm. Bromsgrove British Legion Club. New sec, Andy, G8HAC, tel Bromsgrove (26) 71986.

Coventry (CTARS)—25/27 August (Full display station, Town & Country Festival, Stoneleigh),

The wedding of Andy Abbot and Sandra Brown gave South Birmingham ARC reason to celebrate. Members are shown here with the bride and groom. L to r: G4GZJ, the bride's father; G4GZI; swl Richard Michael; G4JNT; G8RGQ; G8ORR; G4NPA and G4NPB, the bridegroom and bride; G8NQW, the bride's mother; G8NWD; G8KAE and G8KPB

Club meetings, Mondays, 7pm. Winfray Annexe, Coventry Technical College. Sec Roy, tel Coventry (0203) 77947.

Halesowen (MEB Sports & Social Club)—14 August ("Microwaves", by Glen Ross, G8MWR), 8pm. New Headquarters Social Club, Mucklow Hill, Halesowen. Sec Bob, G4RWH, tel 021-747 8784.

Hereford (HARS)—3 August (Outside QSO party at Westhope Hill), 17 August (TBA). Civil Defence HQ, Goal Street, Hereford. Sec G3WRQ, tel Hereford (0432) 54064.

Malvern Hills (MHRAC)—5 August (Woburn Rally), 14 August (Club meeting, TBA), 7.30pm. Red Lion Inn, St Ann's Road, Malvern. Sec Nic, G4TXG, tel Malvern (06845) 65802.

Redditich (RRG)—August, no speakers, but regular club meetings, second and fourth Thursday in each month, 8pm. WRVS Centre, Ludlow Road, Redditch. Sec Ray, G3EVT, tel Alcester (0789) 762041.

Shrewsbury (SARS)—2 August ("Fets and things", by G8SXL), 9 August (Natter night), 16 August (Picnic, courtesy of G6AKE), 23 August (Discussion evening), 30 August ("Moans, groans, & suggestions"), 8pm. The Albert Hotel, Smithfield Road, Shrewsbury. Sec G4XBI (ex-G6UDB), tel Shrewsbury (0743) 62737.

Stourbridge (STARS)—August, no meetings. Normal meetings at The Robin Woods Centre, School, Street, off Enville Street, Stourbridge. Sec G8JTL, tel Lye (593) 4019.

Stratford-on-Avon (S-on-Avon & DARC)—Second and fourth Monday in each month, 7.30pm. The Control Tower, Bearley Radio Station, Bearley, nr Stratford-on-Avon. Please note, correct club sec is David, G8OVC, tel Stratford (0789) 750584.

Sutton Coldfield (SCARS)—No August meetings due to holidays. Normal meeting second and fourth Mondays in each month, 8pm. Central Library, Sainsbury Building, Sutton Coldfield, Sec G6UFD, tel 021-358 6501.

Telford (T&DARS)—1 August (Committee meeting G3ZME/G6ZME), 29 July-4 August (Portable expedition to Wales). Dawley Bank Community Centre, Dawley Bank, Telford, Sec Martyn, G6XUF, tel Telford (0952) 47952.

Warwick (Mid-Warwickshire ARS)—14 August (Town & Country Festival planning meeting). 28 August (HF night on the air), 8pm. 61 Emscote Road, Warwick. Sec G4TIL, tel Southam (092681) 4765.

Worcester (W&DARC)—6 August (Video of W5LFL operating from space shuttle), 8pm. Odd Fellows Club, New Street, Worcester. 20 August (Informal evening at Old Pheasant Inn, New Street, Worcester), 1/2 September (RSGB Field Day Contest at Kempsey Common). Sec G4NRD, tel Evesham (0386) 41508.

Wordsley (WRC)—9 August (Natter night), 23 August ("Reckford rebuild", by Steve, G6IGC), 8pm. Vine Inn, Camp Hill, Wordsley, West Midlands. Sec Andy, G4TGM, tel Kingswinford (2) 295082.

Due to holidays the script for Region 3 "Club News' had to be sent to the editor a week early. Apologies to any clubs which have had to be missed out for this reason. *G4EQI*

REGION 4—RR M. Shardlow, G3SZJ, 19 Portreath Drive, Darley Abbey, Derby DE3 2BJ. Tel Derby (0332) 556875

Buxton (BARS)—21 August (Open forum), 8pm. Egerton Hotel, St Johns Road, Buxton. Sec Dave Cooper, G6MIF, tel Buxton 6174.

Derby (D&DARS)—1 August (Bring & buy sale), 8 August (Rally preparation at Lower Bemrose School), 12 August (27th Annual Mobile Radio Rally at Lower Bemrose School), 15 August (TBA), 22 August (TBA), 7.30pm. 119 Green Lane, Derby. Sec Jenny Shardlow, G4EYM, tel Derby 556875.

Grantham (GRC)—21 August (Diagnostic night, G8WWJ), 8pm. Shirleycroft Hotel, Harrowby Road, Grantham. Sec John Kirton, G8WWJ, tel Grantham 65743.

Ibstock (IARS)—Tuesdays, 8pm. Hastings Arms, Ibstock. New sec John Garner, G3ZJG, tel Ibstock 61954.

Lincoln (LSWC)—1 August (RAE), 8 August (Activity night/night on the air), 15 August (RAE/ hamfest meeting), 22 August ("Homebrew gear", by G8ZCD), 29 August (RAE), 8pm. City Engineers Club, Waterside South, Lincoln. Sec Pam Rose, G4STO, tel Gainsborough 788356.

Loughborough (L Falcon ARC)—The club has arranged a lecture by Louis Varney, G5RV, on antennas. It will take place at Loughborough University on Friday 7 September. Tickets are available from the club sec, Peter Crooks, G4KGG, tel Loughborough 268561.

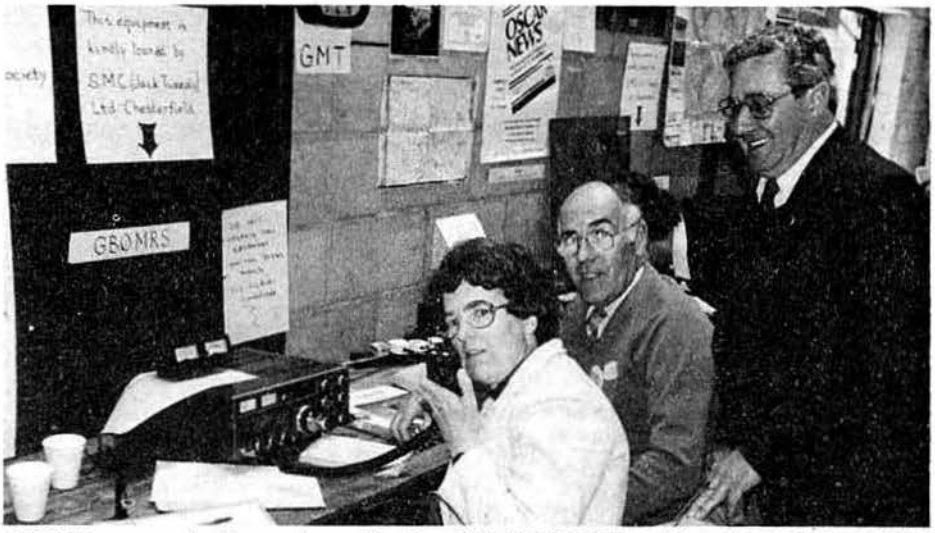
Market Harborough (Welland Valley ARS)—Mondays, 7.15pm. Welland Park Community College, Market Harborough. Sec Dave Lunn, G3LSL, tel Market Harborough 880746.

Newark (N&DARS)—2 August (Construction evening, G3PJR), 11-12 August (GB4RRM, special event station at Rutland Railway Museum), 7.30pm. Palace Theatre, Appletongate, Newark. Sec Roger Hiscock, G4MDV, tel East Stoke 539.

Nottingham (ARCON)—1 August (Forum), 9 August (432MHz foxhunt), 16 August (Foxhunt No 4), 23 August (Activity night), 30 August (Field Day preparation), 6 September (Forum), 7.30pm. Sherwood Community Centre, Woodthorpe House, Mansfield Road, Nottingham. Sec Jim Towle, G4PJZ, tel Nottingham 624764.

Scunthorpe (S&DARC)—Tuesdays for lectures, Thursdays for cw practice, 8pm. Grange Farm Hobbies Centre, Franklin Crescent, Scunthorpe. Sec Ida Aizlewood G6ZCA, tel Scunthorpe 732268.

Spalding (S&DARC)—10 August (Members' bring & buy sale), 8pm. The Maple Room, White Hart, Market Place, Spalding. Sec Betty G6YBL, tel Spalding 2781.



GB0MRS was organized by members of the Mansfield ARS (G3CQC), and formed part of "Expo '84", a hobbies and leisure exhibition staged by the Peak Society, at Mansfield Leisure Centre recently. The 144MHz fm/ssb station is seen here, operated by, l to r: G6OFK, G6OFL and G1DSC. *Photo* by G4DFV.

REGION 5—RR J. S. Allen, 77 Rosslyn Crescent, Luton LU3 2AT. Tel 0582 508515 or 0582 21151

Bedford (BARC)—Closed for August. Details of club from sec G4PBE.

Cambridge (CUWS)—Closed for August. Club meets Sundays, 9pm. St Johns Buttery Bar, termtime. Sec G8NJJ.

Dunstable (DDRC)—3 August (Computers in amateur radio), 17 August (DF hunt on 1·8 and 144MHz), 31 August ("Microwaves", by Les, G3BNL), 8pm. Chews House, Dunstable Downs. Sec Phil Morris, G6EES.

Leighton Linslade (LLRC)—6 August (Meeting, speaker to be announced), 20 August (Club closed). Vandyke Community College. Sec Peter Brazier, G6JFN.

Luton (Kent Process Controls ARC)—1 August. KPC Social Club, Tenby Drive, Luton. Sec G3DOT.

March (MARC)—Club closed for August. Club meets at March Adult Education Centre, Station Road, March, Cambs. Sec G4KPZ.

Milton Keynes (MKARS)—No meeting in August as Lovat Hall closed. Sec G3ZPA.

Peterborough (GPARC)—23 August (Social gathering as club closed, venue to be announced). Sec Frank, G4NRJ.

Shefford (S&DRS)—Club closed until 20 August when the subject will be SSB NFD planning. During August the club will unofficially meet at The Black Horse pub at Ireland, near Old Warden, Bedfordshire. Details from sec Alan, G4PSO.

Wellingborough (Nene Valley RC)—1 August (Technical topics natter night), 8 August ("Solar factual data", by Peter Cleall, G8AFN), 15 August ("Slow scan tv, colour and black & white", by Clive Asquith, G4ENB), 22 August (Technical topics natter night), 29 August (Lecture, "6m", by G4BAO), 8pm. Dolben Arms, Finedon, nr Wellingborough, Northants. Sec L. Parker, G4PLJ.

Club secs, to advertise you club with the up-to-the-minute programme changes etc, please make use of the RSGB news service.

REGION 6—RR F. S. G. Rose, G2DRT, 84 Cock Lane, High Wycombe, Bucks HA3 7EA. Tel Penn (049481) 4240

Aylesbury (AVARS)—21 August. Details of this meeting from sec Cathy Clark, tel 0844 51461.

Banbury (BARS)—This club is holding a series of local df hunts on Fridays evenings during the summer. For dates and details contact sec J. Burrell, G8OZH.

Bracknell (BARC) (G4BRC)—8 August (Informal natter night), 12 September ("Propagation at hf", by G4CGS), 8pm. Coopers Hill Community Centre. Sec G4CGS, tel Bracknell 55898.

Maidenhead (M&DARS)—2 August ("Behind the scenes at London Airport", by D. Beech, G8JMP), 21 August (To be arranged). For details contact John P. Hicks, G8RYW.

Vale of White Horse (VoWHARS)—1/2 September (Proposed expedition to Devon and Cornwall). Details from sec Ian White, G3SEK, tel 0235 31559.

REGION 7—RR to be announced

Coulsdon (CATS)—13 August (Return quiz with Sutton & Cheam RS), 30 August (Morse tuition and club projects), 8pm. St Swithin's Church Hall, Grovelands Road, Purley, Surrey. Details from Alan, G6HC, tel 01-684 0610.

Crystal Palace (CP&DRC)—18 August (Informal evening with test equipment), 8pm. All Saints Parish Rooms, Upper Norwood, SE19. Sec G. M. C. Stone, 11 Liphook Crescent, SE23, tel 01-699 6940.

Croydon (Surrey Radio Contact Club)—First and third Mondays in each month, 6 August (Barbeque, G4DDY), 3 September (Surplus equipment sale), 7.45 for 8pm. TS Terra Nova Mess Deck, 1st Floor, 34 The Waldrons, South Croydon, Surrey. Sec John Simkins, G8IYS, tel 01-657 0454.

Sutton & Cheam (S&CRS)—5 August (Woburn Rally), 6 August (Committee meeting, 153 Boundary Road, Wallington), 13 August (Inter-club quiz with Coulsdon ATS, at St Swithin's Church Hall, Purley), 26 August (BARTG Rally at Sandown Park), 1, 2 September (SSB Field Day at Legal & General), Club meetings 7.30pm, committee meetings 8pm. Downs Lawn Tennis Club, Holland Avenue, Cheam, and Sutton College of Liberal Arts. Sec G4BOX.

REGION 8—RR M. Elliott, G4VEC, 20 Haysel, Sittingbourne, Kent ME10 4QE. Tel 0795 70132.

Canterbury (East Kent ARS)—2 August (Talk on slow scan tv, by D. N. T. Williams, G3MDO), 16 August (Natter night), 7.30 for 8pm. The Radio Cabin, Kings Road, Herne Bay, Details from Mr Broad, G8GTF, tel Canterbury 63104.

Horsham (HARC)—2 August ("Automated noise figure measurement", by Graham Payne, G4EUG), 8pm. Guide HQ, Denne Road, Horsham. Details from Pete Head, G4LKW, tel Horsham 64580.
Medway (MARTS)—3 August (Talk on satellite working by G8XLH), 31 August (Talk and demonstration by KW Communications Ltd), 7.30 for 8pm. St Lukes Church Hall, King William Road, Chatham. Details from Andy Wallis, G4TQS, tel 0634 363960.
Tunbridge Wells (West Kent ARS)—10, 24 August (Formal), 3, 17, 31 August (Informal), 7.30 for 8pm. Adult Education Centre, Quarry Road, Tunbridge Wells. Details from Brian Guinnessy, G4MXL, tel 0892 32877.
Worthing (W&DARC)—Wednesdays, 7.30pm. Lancing Parish Hall, South Street, Lancing, W Sussex. Details from sec G4KIT, tel Lancing (0903) 766318.

Not much news this month. I assume this is because it is peak holiday time. I am therefore looking forward to receiving plenty of news for the September issue. *RR8.*

REGION 9—RR to be announced
Axe Vale (AVARC)—3 August (144MHz fox hunt), 7.30pm. Cavaliers Hotel, Axminster, Devon. Pro Roger Jones, G3YMK, tel 0404 86468.
Camelford (North Cornwall ARC)—1 August (AGM), 7.30pm. RAOB Club, Fore Street, Camelford, Pro Jack Boundy, G8ZOK, tel Tintagel 770542.
Exeter (EARS)—13 August (Constructional contest. Members are invited to bring along any item of homebrew equipment, no matter how small or big, to be judged by a team of "experts". A cup will be awarded to the winner. Further details from pro), 7.30pm. Community Centre, St Davids Hill, Exeter. Other Mondays (Informal). Emmanuel Scout Hut, Okehampton Road, Exeter. Pro, 11 Chancel Court, Chancel Lane, Pinhoe, Exeter EX4 8QE.
Newquay (N&DARS)—1 August (Beginners' forum), 15 August (Fox hunt), 29 August ("Amateur radio yesterday and today", by G3XC). Drill Hall, Crantock Road, Newquay. Sec Andy Angrove, G6ZWI, tel Newquay 4285.
Penzance (Cornish RAC)—2 August ("Early radio and tv", by Bert Hammett, G3VWK). The Church Hall, Treleigh. Sec Simon, G4PEM, tel Penzance 3948.
St Austell (English China Clay RC)—13, 27 August (Informal meetings). Treverbyn Club House. Sec Mike Porter, tel 0726 850818.
Torbay (TARS)—No meeting in August. Results of recent club contest:

Cup	Winner	Runner-up
W8HJ World Friendship Trophy	G3CMT	G3SXW
G3LFL Rose Bowl	G3SXW	G4EDG
28MHz tx	G3CMT	G3SXW
G3LHJ rx (hf)	M. Crocker	G8LXQ
VHF tx	G6YXT	G6GLP
Construction Cup	G6GLP	G3YLJ

Club rally, 26 August, at the STC Social Club, Brixham Road, Paignton. Talk-in on S22. Details from sec M. Rider, 7 Kingston Close, Kingskerswell, Devon TQ12 5EW.

REGION 10—RR E. J. Case, GW4HWR, 2 Abbey Close, Tyrhiw, Taffswell, Mid-Glamorgan CF4 7RS. Tel 0222 810368.
Bridgend (B&DARC)—Second Wednesday in each month, 7.30pm. NCB Social Club, Tondu, Bridgend. Please note change in officers: sec Trevor Morgan, GW4SML; chairman, Clive Trotman, GW6LDX, tel 0443 226198.
Cardiff (CRSGBG)—13 August (Natter night), 7.30pm. Pantmawr Hotel, Tyla Teg, Pantmawr Estate, Whitchurch, Cardiff. Sec Cyril Laws, GW6ZHP, tel Cowbridge 3212.
Newport (NARS)—Mondays, 7pm. Brynglas House, Brynglas Road, Newport, Club closed for the summer recess. It will reopen on 3 September. Sec Robert Johns, GW4NXD, tel Pontypool 56348.
Pembroke (P&DRAC)—Last Friday in each month, 7.30pm. The Defensible Barracks, Pembroke Dock. The bucket and spade event arranged for Saundersfoot has had to be cancelled. It will now take place in Pembroke Castle on Sunday 12 August. A special event station GB2PC, will be operating from this venue from midday on 11 August to 5pm on 12 August. Unfortunately sec Dave has moved away. For the time being further information may be obtained from the chairman Roger Baker, GW4RGI.
Swansea (SARS)—First and third Thursday in each month, 7.30pm. Lecture Room N, Applied Sciences Building, Swansea University. 16 August (Devoted to preparation for the society's participation in HF SSB Field Day on 1/2 September. The society plans to run a 53 seat coach to the Telford Rally on Sunday 9 September. Further details on any of the above from Roger Williams, GW4HSH, tel 0792 404422.

Would club secs please note that I shall be on holiday during most of September so that any items for inclusion in the November edition of "Club News" should be in my hands by *3 September*, and not the date given at the beginning of the "Club News" section. *John, RR10*

REGION 11—RR B. H. Green, GW2FLZ, 1 Clwyd Court, Tan-y-Bryn Road, Colwyn Bay. Clwyd LL28 4AH. Tel 0492 49288

SPECIAL MEETING
The Conwy Valley ARC will hold a special meeting on 2 September 1984, which will be open to attendance by members of other clubs in the area. At the meeting, Mr Louis Varney, G5RV, will deliver a lecture on antennas commencing at 3pm. The meeting will be held at the Leisure Centre, Colwyn Bay, and to defray the cost of hiring the hall a charge of £1.50 each will be made. Further details and tickets can be obtained from GW4KGI, tel 0745 823674.

Colwyn Bay (Conwy Valley ARC) (GW6TM)—9 August (Discussion on antennas by Mr J. Fielden, GW4NAH), 8pm. Green Lawns Hotel, Bay View Road. Sec Mr J. N. Wright, GW4KGI, tel 0745 823674.
Rhyl (R&DARC) (GW4ARC)—6 August (RSGB film, "The world at their fingertips"), 20 August (Activity night), 8pm. 1st Rhyl Scout HQ, Tynewydd Road, Rhyl. Sec Mr J. McCann, GW4PFC, tel 0745 583467.
Upper Bangor (Dragon Radio Club) (GW4TTA)—First and third Monday in each month, 20 August (Talk and slides "Human machine as a radio operator"), 8pm. Bangor Rugby Club, Caernarfon Road, Bangor. Sec Mr D. N. F. Whitehouse, GW4VRY, tel Pentraeth 224.

REGION 13—RR to be announced
Galashiels (G&DARS)—23 September (Open day), Focus Youth Centre, Livingston Place, Galashiels. Details from Tony, GM3DAR, tel 56027.
Glenrothes (G&DARC)—Wednesdays and third Sunday in each month, 19 August (Films and forward planning discussions), 16 September (AGM), 7.30pm. Provosts Land Centre, Leslie, Fife. Details from Bob, GM4LYQ, tel 745047.
Edinburgh (Lothians RS)—Top band df hunt is being arranged for August. Meetings recommence in September. Details from Colin, GM4HWO, tel 031-332 5502 (not QTHR).

REGION 16—RR to be announced
Braintree (B&DARS)—6 August (Operating evening on vhf and hf), 20 August ("Computers and amateur radio", by G8NPF), 7.30pm. Braintree Community Centre, Victoria Road. Details from Pat Penny, G6TAF. tel Braintree 26487.
Chelmsford (CARS)—7 August (High power transmitters), 7.30pm. Marconi College, Arbour Lane. Details from Andrew Mead, G4KQE, tel Silver End 83094.
Ipswich (IRC)—8 August (Planning for carnival), 11 August, (Demonstration station at Ipswich Carnival), 29 August (planning for SSB Field Day), 8pm. Club Room, Rose & Crown, Norwich Road. Details from Jack Tootill, G4IFF, tel Ipswich 44047.
Loughton (L&DARS)—3 August (Informal at the Wheatsheaf), 17 August (Informal at the Wheatsheaf), 31 August (Rainbow and Dove field weekend planning), 8pm. Loughton Hall, Rectory Lane. Details from Clive Knowles, G6FWT, tel 01-508 7190.
Vange (VARS)—2 August (Junk sale), 7.30pm. Main Hall, Bastable Tenants Association, Long Riding, Basildon. Details from Mrs D. Thompson, 10 Feering Row, Basildon SS14 1TE.

REGION 17—RR to be announced
Andover (ARAC)—7 August (Video tape, "Dud Charman's aerial circus), 8pm. The Wolversdene Club, Andover. Sec G8OPR.
Basingstoke (BARC)—14 August (Natter night). Second Tuesday in each month, 7.30pm. The Swan, Sherborne St John, Basingstoke. Chairman G4WIZ, tel 07356. 5185.
Bournemouth (BRS)—3 August (GB3NF, uhf repeater, by G3XHT), 17 August (Junk sale/natter night), 19 August (Club operating the hf demonstration station at FRARS Hamfest), 7.30pm. Kinson Community Centre, Kinson, Bournemouth. Sec G4EKE, tel 0202 877945.
Fareham (F&DARC)—1 August (Planning portable), 8, 15, 22 29 August (Portable operation), 7.30pm. Portchester Community Centre, Portchester. Sec G4ITG, tel Fareham 234904.
Horndean (H&DARC)—6 August ("Suppressing car electronics", by Lucas), 7.30pm. Merchiston Hall, London Road, Horndean. Sec G6IOV.
Liphook (Three Counties ARC)—Alternate Wednesdays, 8pm. Railway Hotel, Liphook. For lecture programme check the RSGB News Service or contact sec G6VMA, tel Headley Down 713012.
Poole (PRAS)—following the agm the following are officers of the society; chairman, G4AMW; sec G3XBZ; treasurer, G3ZPE; with G3ZAS, G3OBD, and G3PFM. Meetings at the Poole College of Further Education. Sec, tel 0202 730012.
Wimborne (FRARS)—19 August (Flight Refuelling Hamfest). Sundays, 7.30pm. Flight Refuelling Social Club, Merley, Wimborne. Sec G8VFY, tel 0202 882271.

REGION 19—RR to be announced
Cheshunt (C&DARC)—1 August (144MHz portable on Baas Common), 8 August (Natter), 15 August (Equipment evening), 22 August (Natter night), 29 August (144MHz portable on Baas Common, Broxbourne), 8.15pm. The Church Room, Church Lane, Wormley, nr Cheshunt, Herts. Details from Roger Frisby, G4OAA, tel 09924 64795.
Chiswick (ABCARC)—21 August ("The expert radar users—bees", a talk by G3XPC), 7.30pm. Chiswick Town Hall, High Road, London W4. Sec W. G. Dyer, G3GEH, tel 01-992 3778.
Edgware (E&DRS)—23 August (SSB Field Day briefing). The Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. Sec John Cobley, G4RMD, tel Hatfield 64342.
Harrow (RSH)—3, 10, 17, 24 August (Informal and practical), 31 August (G2UV memorial quiz. Details to be announced), 8pm. Harrow Arts Centre, High Road, Harrow Weald. Sec Alison Wilson, G6NDJ, tel 0923 53642.
Havering (H&DARC)—1 August (G3RZP linear amplifiers), 8 August (Informal), 15 August (Details not sent to RR), 22 August (Pre-contest briefing), 29 August (Informal), 8pm. Fairkytes Art Centre, Billet Lane, Hornchurch, Essex. Details from John Gibbs, G4UQR, tel Upminster 26904.
Hillingdon (HARC)—This club has recently become affiliated to RSGB and welcomes newcomers wishing to talk amateur radio. Sec H. F. Staddon, G6STI, 45 Saxony Parade, Hayes End, Middx, tel 01-561 2917.
St Albans (Verulam ARC)—14 August (Informal), 28 August (Bring & buy sale), 8pm. RAFA HQ, New Kent Road, St Albans, Herts. Details from Hilary, G4JKS, tel St Albans 59318.
Silverthorn (SRC)—24-27 August (Summer camp). No other details passed to RR19. Suggest details from Chris, G4AJA.
Southgate (SARC)—9 August (Open meeting, details from sec), 27 August (144MHz df hunt. Further details from sec or R. Snary, G4OBE), 8pm. St Thomas's Church Hall, Prince George Avenue, London N14. Pro G4OBE. This club is operating several special event stations under the call GB4EMC, Enfield Mayor's Charity.
Watford (WRC)—1 August ("SSTV", by Mike Hastings, G8ASI), 15 August (Informal), 8pm. Tudor Arms Pub, Bushy Mill Lane, North Watford. Sec Gordon, G8XXV, tel 01-950 3611.

Note to all club secretaries, and others. As of the date of writing these notes for your information and that of prospective new members of your club, I am not officially your regional rep. Because of apparent general apathy nobody came forward to nominate anyone for the post; perhaps one of the 9,000 members in Region 19 would come forward and do the job. Here's your chance at club level to do something about it. Who's man enough to grasp the burning stick? *Ron Broadbent.*

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.

The advertisements must be limited to items of amateur radio equipment or interest, but houses, vehicles etc of which they form part may be included. Advertisements consisting entirely of items unrelated to amateur radio, including items of citizens band equipment, will not be accepted.

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.

Warning. Members are advised that they should, as far as possible, ensure that the equipment they intend to purchase is not subject to a current hire purchase agreement. The "purchase" of goods legally owned by a finance company could result in the "purchaser" losing both the goods and the cash paid.

The current rate is £1 for 40 words or less: advertisements containing more than 40 words will cost an additional £1 for every additional 40 or less words. Each advertisement must be accompanied by the correct remittance, either as a cheque or postal order made payable to Radio Society of Great Britain.

Closing dates in 1984 for issues in brackets, are: **23 August** (October); **20 September** (November); **25 October** (December); **22 November** (January 1985).

Post to: MEMBERS' ADS, RSGB, 88 BROOMFIELD ROAD, CHELMSFORD, ESSEX CM1 1SS
Do not post to RSGB HQ or Advertising officer.

Please note that the above rules now specify the restrictions on content which have been applied since this service started in 1967

FOR SALE

BBC 32k morse programs, incl random allsorts, 100 plain language 3 min tests, 70 cw abbreviations/punctuation, save/playback of text typed in, output to speaker or external oscillator; learn and pass fast! £4.75. D. Brandon, G4UXD, 1 Woodlands Road, Chester CH4 8LB.

Receivers: Eddystone 830/7; Eddystone 850/4; Eddystone EC10; Marconi Atalanta; Racal RA17L all reconditioned. RX and tx, Pye R460, T461, 70cm fm, as new. TX/rx, Icom IC720A with all filters fitted, absolutely mint cond. Sensible offers please! Tel 03306 613, after 7pm.

Drake TR7A, PS7, SP75, MMK7 service kits/manuals, never used, orig boxes/bills, £950. Racal RA17, RA98A, £275. Immac diversity switch, £35. Philips scope PM3110, £225. Cossor scope 1058, £90. RCS univ counter MDL802, £150. Level voltmeter TM6B, £150. Pye colour bar generator, £150. Marconi sig gen TF144G, £175. Mains unit frequency generator TF390G, £175. Jaybeam vertical antenna C5/2M, all for sale/offer due to bereavement G3DVO. Tel Doncaster (0302) 840963, or 885275.

Yaesu FT101ZD, six-band version, cw fan, YD148 base mic, FC901 matching atu, all in exc cond, with orig packing (for what that's worth), the lot, £415. Tel Farnborough (0252) 547900.

Ten fm rigs, DNT M40FM, modified to 29·310 to 29·700MHz, brand new, warranted, £33 each. Kenwood R300 rx, £90. 13·8V 20A power supply unit, £40. Zetagi 30W linear for 10fm, £18. G4SNO. Tel 0562 884824, evenings or weekends.

Drake L4B 2kW linear, the best. *Wanted:* Drake MN2000 atu, must be vgc. Collins 30 LI linear, like new. Tel Derby 557705.

ARRL *QST* mags from 1981 to 1983. *Wanted:* foreign radio amateur callbook, a recent edition. G2DRT, QTHR. Tel 0494 814240.

Admiralty Handbooks 1931, 1938. Air Ministry Handbooks for Wireless Operators, 1939. *RSGB Amateur Radio Handbook*, 2nd edn, 1944. Other books by Scott-Taggard, Dictron, Camm, Decibel, Stranger, Norris, Sowerby, Squire, Ladner, Stoner. G3GOS, QTHR. Tel Axminster 34259, after 6pm.

PSUs, 12, 15, 30, 100, 150A, several of each available, some fully metered, all 13·8V ±, adjustable, global AT1000 rx, atu. *Wanted:* TS430, TS530, or TS130. Cash waiting. Electronic keyer. Tel 0621 828807.

Mint cond 2m IC25H 45W fm, £250. 70cm IC45E 10W fm, £210. 23cm IC120, 1W fm, incl antenna, £350. Jaybeam 2m colinear, £40. ICSM6 base mic, £20. 23cm mobile 3 × 5λ/8, £20. G3WDN, QTHR. Tel Lowestoft 62161, ext 434 or Gt Yarmouth 667597, evenings.

Stornophone 500 low band 0·5W fm IS portables, comp with handset antenna, circuit, working, £20; faulty, £15. Leather cases, £1.50. Pye PF70 handsets, £1. All incl carriage. G3RBP, QTHR. Tel 0283-75 496.

FT101ZD, fm, incl fan, mic, as new, boxed, spare pa tubes, carriage by arrangement, £475, no offers. FT290R, mint cond, no mods, nicads, mic, charger, boxed, as new, £200. Icom IC255, mint cond, no mods, boxed, as new, £200. Part-built heavy duty hf linear, 1kW 19in panel standard, 2xQY4-400 pa, designed and constructed to professional standard, £200. Buyer collects or carriage extra. QQVO640A, vhf, double tetrodes, £10 each. QQVO 320 vhf double tetrodes, £5 each. Mullard 3in 'scope tube DG75, £15. GW3WEQ NOT QTHR. Tel 0492 517500, evenings.

Datong auto woodpecker blanker SRB2, £50 ono, post extra. G4KDV, QTHR. Tel 0943 463083.

MM 500MHz digital freq meter MMDO50/500, as new, never used, approx half price, £40. G2FKO, QTHR. Tel Bideford (023-72) 2964.

Yaesu FT107M solidstate all bands tx/rx, 240W p.e.p., £450 ono. G5VH, QTHR. Tel 0533 783197.

Altron swing post, allows 20ft mast to be swung horizontal to vertical, well engineered and galvanised. One year old, in good cond, £30. G3HKH. Tel Weybridge 47112.

HB LG300 psu, £10. HB six-way ant switch, £5. New Trio hi-pwr 50Ω lpf, £12. ZX81 computer, 16k, rampak, psu, £25. Eddystone 888 amateur bands rx, variable selectivity notch filter, £35. 10mλ/2 vertical, £10. G3JFC NOT QTHR. Tel 0474 872743.

Standard C8900 2m fm, 10W, five memories, repeater shift, scanning mic, safety mic, gutter mount, 7λ/8 sun ant, all perfect cond, £175. G4OCH, QTHR. Tel Keith, 0543 376355, (West Midlands) weekends only.

Hammarlund SP100X (UX valve) rx, psu, £45. RME79 rx, £30. Hallicrafters SX24 Skyrider Defiant, £30. Eddystone S640, S-meter, loudspkr, £45. Eddystone 1935 TRF Kilodyne, four plug-in coils, £30. Buyer collects. G4HHZ, QTHR. Tel 0962 822401, day, 04215 68705, evening.

KW202.rx, KW204 tx, KW107 Supermatch, KW vox unit, buyer to inspect and collect, £300. G8WTY, QTHR. Tel Malvern 4968.

Mini-beam, G4MH, comp with aluminium tubes, spare rods, fittings, £50 ono. Can deliver 15 miles radius Birmingham. G4GEU, QTHR. Tel Jim, 021-444 3114, evenings.

KW1000 linear, exc cond. £210. KW Vanguard 50W, cw/a.m. wkg, £20. G4EUK, 47 Bear Road, Brighton, Sussex BN2 4DB.

Trio VB2200 power amp, 10W out, for 1W in, £25 ono. GM6JIC, QTHR. Tel Kilmarnock (0563) 34383.

FRG7 rx, Global AT1000 atu, £120 ono. Leak Delta hi-fi stereo amp, 15W per channel, £35 ono. All equipment in mint cond. G4XPK. Tel 021-422 7515.

HF atu, Tokyo hy power, HC150, as new, £40 ono. Realistic DX200 rx, offers. Will exchange for 70cm beams or equipment. G6WXE. Tel Ormskirk 76867.

18ct gold plated golden eagle mic, limited edition, only about 12 in UK, still boxed, unemployment forces sale, £150, no offers. Buyer inspects and collects or pays Securicor. GW4TUL, QTHR. Tel 0495 791884.

Transformer, 1000-0-1000, twice at 200mA, Dessyn compass indicator, emitter, cowl gill motor, £10 the lot. Buyer collects. G3GAD, QTHR.

Icom 251E, 2m multimode, used as base station only, vgc, £375 plus carriage. G4TFI, QTHR. Tel 0245 413249.

Collectors interest: 10 volumes Newnes *RTV Servicing*, incl charts for 'fifties, 'sixties models, vgc, property of silent enthusiast, offers invited. G3OAK, QTHR.

Heathkit tower model HT/-1G, 32ft high, buyer collects. £75. G3SBJ, QTHR. Tel 0293 35485.

Free to collector: 6ft GPO rack with remains of homebrew tx, pu, mopa, bias unit, atu, etc. G4AGR, QTHR. Tel 0279 724041.

Trio R1000, £150. HK808 morse key, new, £25. Curtis KB4900 ASCII baudot cw keyer, £150. Himound EK103Z electronic keyer, new, £40. FT202M handheld, 6ch, maritime band (156MHz), needs attention, £50. All plus postage. G4TEN. Tel John, 0258 53075, weekends.

Icom IC451E 432MHz multimode base station, vgc, orig packing etc, 1-10W variable on all modes, £450. G6NKB, QTHR. Tel 0509 502989, after 6pm.

Yaesu FL50B/FR50B, KW201/Vespa Mk2 separates, £90 pair. Yaesu FRG7, £105. Must collect Glos area. Consider exchange for synthesized rx or 2m tx/rx or W.H.Y? G3DCE, QTHR. Tel Cheltenham (0242) 44179.

LCL2740 10m fm tx/rx, brand new cond, perfect, comp with mic, manual, £35. Carriage extra please. G3KZU, QTHR. Tel Oxford (0865) 63000.

Rotator, Hirschman RO250, £25. SWR25 swr meter, to 150MHz, £9.50. TI5511 programmable calculator, £15. Vero KM4C double Eurocard frame, £12. 2708 eproms, 95p. CRTs VCR97, CV2286, CV1596 (Hartley 13A scope), £4.50 each. G8ISI, QTHR. Tel 0428 723168.

Building an rx? Stripped HRO chassis, tuning cond and dial, coil packs, case, sub-chassis for G2DAF type i.f. strip, S-meter, ex-abandoned project, £12. Prefer buyer inspects and collects. G4GXQ. Tel Paul, 061-485 7752.

HW8, four-band QRP cw rig, power supply, recently checked by Heathkit, £100. GM4GIF NOT QTHR. Tel Helensburgh (0436) 78646, after 6pm.

VFO820, rarely used, orig carton, £50. Morse key No2, £5. G4PWD, QTHR. Tel Rugeley (08894) 78981.

Video Genie Mk1 16K computer, Tandy green screen monitor, Catronics CT600 rtty terminal, software, £175 the lot, no split. Upgrading to Commodore 64. G1AUU, QTHR. Tel Steve, 01-363 9980, evenings.

Lafayette HE30 gen cov rx, recently aligned, needs external spkr, 4-8Ω, £35. PF1 pocket-phones, one pair, xtalled, tuned to RB0, nicads, homebrew charger, circuit diagrams, £30. G4SGF, QTHR.

Mosley dipole antenna TCD2, cost £50, comp except for 75ft 16swg tinned copper wire, had 18 months' use, full instructions, £20. G4KME, QTHR.

Trio R6000 gen cov rx, £150. JIL SX200 scanner rx, £150. Both green display. G6JXA. Tel 01-648 0028 (Morden, Surrey), after 7pm and weekends.

Trio TS510 80-10m tx/rx, good cond, £150. HRO rx, several coil sets, £20 ono. Murphy A128 eight band broadcast rx, vintage model, good wkg cond, offers. G4KHU NOT QTHR. Tel 0963 70045.

Sommerkamp FL2277Z-FL2100Z linear amp, £350. Tel Southend-on-Sea (0702) 64485, evenings.

Amber 2400 plain paper printer, 2in dot matrix, serial or parallel interface, cw seven rolls paper, two ribbon cartridges, cable for BBC B, £55. G4UKF, QTHR (Somerset). Tel 0935 823475.

Tandy PRO2001 fm uhf/vhf scanner rx, 16560 frequencies, comp with discone, portable antennas, £90 ono. Realistic DX200 communications rx, £65 ono. Both in mint cond, comp with orig packing. G6UGU, QTHR. Tel John, 0302 841530.

Yaesu FT77, fm, six months old, great performer, case top scratched, otherwise 100 per cent, £410. Set of Yaesu mobile antennas, gutter mount, 80-10m, £50. Straight key, £5. Electronic keyer, paddle, £10. Tel Peter, 021-300 7426, office hours (Birmingham).

FT200, SP200 hf tx/rx, £200. Adonis AM502, comp mic, £20. G4DPZ, QTHR. Tel 0787 476925.

Amtor-VIC20 computer, Amtor software, in rom, RS232 driver, cables for AMT1 terminal unit, £120. Seikosha GP100VC printer, £165. Uniden 2030 2m tx/rx, £60. Miranda 35mm slr camera, £10. G3XOF, QTHR. Tel 0332 367806.

RX, Marconi Atalanta 15kHz-30MHz, built-in psu, exc cond, £70. *Wanted:* contact with marine radio-officers 1963/64 SEETC course. G4PZL. Tel 0206 47382.

Commodore Pet 3032, toolkit, superchip, sound-box, reset, cassette, 4040 dual drive, 4022 printer, software, visicalc, wordcraft 80, dms database, plus 100s more. Lots of books. Nearest offer to £1,100 wins. G4DXA, QTHR. Tel Tony, Leeds (0532) 454868, daytime.

FT200, psu/spkr, all 10m xtals, good cond, wkg well, £210. Buyer collects/arranges carriage. G4LUF, QTHR. Tel Swindon 782787, after 6pm.

Trio TS820S, as new, £375. ATU, £20. Western DX5V five-band trap vertical, £20. Buyer collects. G4NTY, QTHR. Tel 061-790 7673, after 6pm.

UHF MS Starfone tx/rx, just out of service, can be used mobile or portable, min output 5W incl mobile mount, spkr/mic, leather case, tuning data, £25. G4GSY, QTHR. Tel 061-761 5083, evenings. (Manchester.)

Heathkit DX40U cw tx, matching vfo, spare valves, circuits, £35. Spacemark ETM3C electronic squeeze keyer, as new, boxed, £50. All ono. G4AQZ, QTHR. Tel Clacton 861632.

Trio JR310 amateur bands rx, 10-160m, narrow filter fitted, manual, £70 ono, or exchange 2m fm portable or mobile (cash adj if necessary) or mains/battery type hf rx. G4VLB, QTHR. Tel 061-480 1549.

MMT432/144 transverter, £85. G8ZSV, QTHR. Tel 0284 68262, or 0842 63252.

QRO 144MHz linear, part built, incl 5CX1500 in cavity with blower, vacuum variables 4kV capacitor bank, 2·5kV 1A transformer, regulated screen supply, controls, professional welded angle-iron chassis, £50. 6ft by 19in rack, £5. G8IQL NOT QTHR. Tel Horndean 598403.

Teleprinter ITT/Creed Envoy, 110 bauds, ASCII, mechanical type, in gwo, £50 ono. G8YPK, QTHR. Tel 0702 218443.

Yaesu FTDX560, in immac cond, virtually unused, must be seen to be believed, the price for half a kilowatt on the hf bands (plus the new bands for price of xtals), is £200. Cash and collect. G4AYG, QTHR.

Scope D83 double beam, 50MHz, gwo, £150. G3OYU, QTHR. Tel Lingfield 832559.

Microwave Modules MML 144/100 2m linear amplifier, £85. Microwave Modules MMA 144V 2m low noise switched preamp, £15. Lattice mast, 10ft sections, £12 each. G8WXU, QTHR. Tel 02774 3019, evenings.

Icom 701, comp with power supply, Kenwood AT200 antenna tuner, G2DYM five-band de-luxe trapped longwire antenna, HF5 10-80m vertical, MM144/28 converter, Datong morse tutor, used very little, can be tested at QTH, all manuals, instructions available, £695 ono for the lot. Would split if necessary but prefer to sell as one package. Tel Frank, Northampton (0604) 408798.

Kenwood VFO120, matches TS120-30, ok TS530-830, £55 or swop decent AR88D B40 HRO etc. *Rad Coms*, 1973-83, free to RSGB member. Vintage Lissen rx, three valve ht, lt, etc chassis, offers. G4VUN, QTHR as G6PIK. Thirsk, Nth Yorkshire. Tel Peter, 0845 567249, after 6pm.

Codemaster cw/rtty decoder, morse tutor CWR610E, £120. G4UVJ, QTHR. Tel Canvey Island 697978.

FT480R, used little, cond as new, £250 ono. Prefer buyer to call and collect/inspect. G4RTG, QTHR. Tel Thetford 4483.

ZX81, 16k, excellent external keyboard, ICL cassette course (How to program the ZX81) two manuals, two books, software, all leads, power supply, manual, £69 ono. Postage extra. Prefer buyer collects. G1EOJ. Tel 0253 45431.

FRG7700 gen cov rx, mint cond, manual, orig packing, £260. *Wanted:* TS530S or similar nine-band hf tx/rx, buy outright or part-exchange FRG. W.H.Y? G4BLT, QTHR. Tel Wakefield 25515.

Transformers, two at 20A 7V, adjustable mains input, three with 500-0-500 210mA secondary, four 6·3V windings, two 5V windings. Buyer collects or pays carriage. First offer of £2 for each transformer accepted. Tel 0608 810126.

Morse tutor, Datong, good cond, under one year old, price £35, incl postage. G8WGW, NOT QTHR. Tel Ilminster (04605) 3453.

Creed 444 15B Mk1, built-in perf, sender, as new, wkg, terminal, exchange for £50 note, bc. G3GRJ, QTHR. Tel 01-976 2016.

Yaesu FRG7700 comm rx, antenna tuning unit, as new cond, £250. Tel Worcester 775206.

Trio TS830S hf tx/rx, AT230 antenna tuner, SM220 station monitor, SP230 external spkr, never used, immac cond, £500 ono. G6JWB, QTHR. Tel Reading (0734) 864054, anytime.

R4C, vgc, extras, £270. YC355D, dfm, vgc, £65. CR23CM, new, unused, half price, £20. FT708R, extras, £125. AR2001, 25-550MHz rx, new, £285, plus carriage. G8ESK, QTHR. Tel 0274 497438.

IC720A, new, £815. Atlas 210X, digital readout faulty, £250. TR2500, faulty, £45. Creed 75 rx only, 50/45 baud auto cr/lf, £30. New tape LVC150, Philips video N1700, £15. G3LZN, QTHR. Tel Lapworth (05643) 2014.

Welz vertical antenna CP5, 10-80m, traps, gives low swr on all bands, roof, wall or even verandah mounting, moved house hence sale, new cost £133, as new cond, £75 ono. G3YYG. Tel Hemel Hempstead 61741.

FT207, two comp systems, NC3 chargers, mic spkrs, extra nicad, offers? G3PEU NOT QTHR. Tel 07372 46518.

Realistic DX200 rx, exc cond, used little, £85. G4UYI, QTHR. Tel Bob, Cleator Moor 810205.

Video Genie, expansion interface, software, manuals, £270 ono. Pye Pocketfone PF2UH, six batteries, manual, xtals RB0, RB4, RB14, SU8, SU18, SU20, leather case, 3W pa, £80. Dummy load, 0-1000MHz, 500W continuous, £75. 40-track disk drive, double-sided, double density, £120. Maplin modem, case, three-quarters built, £30. Sideways ram board for BBC micro, contains 8x 6116LP, £40. *Wanted:* 30ft Versatower. Mike Tubby, G8TIC, NOT QTHR, 8 Waterford Close, Worcester.

FT707, £390. RAF rx R1132A, offers. Various lengths coaxial, UR67, UR57, FHJ/LDF 2-50/4-50, used but ok. G3UUT, QTHR. Tel 0223 843546.

Icom 740, incl fm board, FL44A filter, keyer, only used two months, £500. G4TIH. Tel Clive, 01-834 7296, business hours.

Yaesu FT707 tx/rx, FP707 psu, cw YM35 mic, £400 ono. G3ZZR, QTHR. Tel Witney (0993) 3792.

Grundig TS945 studio reel to reel tape recorder, 8in reels, further 7,200ft BBC tape, has many facilities, echo, multitrack etc, full handbook, cct diagrams, £250 ovno. Rob Macfie, G4FAX NOT QTHR. Tel Luton 594869, after 6pm.

Yaesu FR50B hf rx, £50. Osker Block swr/power meter, £15. Microwave Modules 2m converter, £10. Buyer must collect. G4BHK, QTHR. (Basingstoke area.) Tel 073 56 3963.

FT290R, FL2010 10W amp, case, nicads, charger, £220. Microdot 2 communications terminal cw/rtty, incl 5in green monitor, mint, £240. GI3VAW, QTHR. Tel Limavady 62946.

JVC KD720B stereo cassette tape deck, seldom used, in perfect cond, ac mains powered, instruction book, din connecting cord, Dolby noise reduction system, £40 ono. Inclusive of postage and packing. GW4CPZ, QTHR. Tel Cwmbran 67457.

ZX81 computer, Memopak 16k memory extension, £30. G6TWV. Tel Barnsley 89578, after 6pm.

Microdot cw rtty tv, built-in vdu, printer, as new, comp cw rtty terminal unit, only needs tx/rx, £400. Buyer collects or deliver 100 miles at cost. G3TJQ, QTHR. Tel 02273 63345.

FT101E, exc cond, property of late G3LED, £280 ono, via G3ZJY, QTHR. Tel 0385 66773.

Daiwa CNA2002 auto hf atu, as new, five months old, £165, incl delivery. Surplus to requirements. GW4RLP, QTHR. Tel 0286 5322, after 6pm.

Trio 7010 2m ssb, comp with mic, mobile mount, manual etc, good cond, full wkg order, £100. G3YPP NOT QTHR, 36 York Square, Wyton, Huntingdon, Cambs PE17 2HX. Tel Hunts 51180.

Spectrum programs: QRA, gives bearing, distance, contest scores, QRA encode, decode, the new world QRA system, morse practice, fully user controlled, speed, tone, spacing, length, all programs very user friendly, full instructions supplied, each program, £3.95. GM3WCS, QTHR.

Pye PF1 tx, rx, working on RB2, built into Verobox, internal mains psu, toneburst, Pye hand mic, incl, £35 ono. Daiwa SR9 2m rx, six xtals fitted, vgc, £35 ono. G4VMZ. Tel Herne Bay (02273) 69028, evenings.

Yaesu FT75 mobile hf tx/rx, squelch us otherwise good, 12V psu, separate vxo, FV50C, also three-band G-whip, handbook, £110 the lot. Tel 0495 270900, evenings.

FDK Multi Palm 4, xtalled SU20, RB4, RB6, £95. 2m 80W op for 250mW ip, fm amp, 12V, £80. Tel 0782 643476.

Creed 444, cw tape reader, tape punch, unmodified, full working order, now computerised, and thus surplus, £20. G4XOS, QTHR. Tel 0384 371108.

IC24G 2m tx/rx, £100. Belcom Liner 2, Liner 40W linear, good rig, no strogs, £100. G4WTE. Tel Medway (0634) 221061, evenings.

Microdot cw/rtty terminal unit, integral keyboard, video monitor, £285. G3TLB, QTHR. Tel Crowborough (08926) 5527.

MM transverter, 28/144, as new, £60. Nasbus/80-bus graphics card, using Thompson EF9365, displays 512 by 512 dixels, onboard 64k display memory, offers. Nascom two pcg allowing hi-res graphics, £30. G8RDI, QTHR. Tel Rob, 021-373 0562, after 6pm.

Datong UC1 up-converter, 90kHz-30MHz, 144MHz or 28MHz input 12V, £80. G4JFE. Tel Newbury 41613.

Spectrum programs, meteor scatter, gives major shower times and best directions, bar-graph display, essential for the serious ms operator, morse practice, alter tone, speed, spacing, groups, QRA best bearing, distance, world, best program available, £3.95 each program. GM3WCS, QTHR.

Teletext decoder, Mullard VM6101, £35. 2m pa, 250mW in, 5W out, class C, 13·8V supply, quality product, not home built, incl circuit, £15. G8JAI, QTHR. Tel Barbon (046836) 276.

FRG7700; FRA7700; CWR670E; Sony ICF2001, cw psu. All in exc cond very seldom used. Offers please, the lot or separate. Fryer. Tel Oxford (0865) 891114, anytime after 5.30pm.

Save £55. Standard C7900, 70cm, 10W, latest model, mobile, five memories, full scanning, used only few times at home, still for sale at £185. Brand new, unused nicad pack for Palm 2, £10 plus p&p. G2ATK, QTHR. Tel Pershore 553735.

Gen cov rx, ICR70, mint cond, used little, fm fitted, fine rx, offers over £350. G4JQI, QTHR. Tel 025482 3366.

Yaesu FT480R 2m multimode transverter, mint cond, boxed, £280 ono. G3VBW, QTHR. Tel Southampton (0703) 472584.

QM70 144/28 transverter, £55. Burns MC3 multiverter, 281F 70cm-2m-4m, rcv converter, integral psu, £45, or swap both for four-jaw chuck for Myford Super Seven lathe. G3YRB, QTHR. Tel 01-684 3974.

Realistic DX160 comm rx, 50kHz-30MHz coverage, five bands, separate spkr, amateur and broadcast bands, good cond, £50 ono. 10-2m converter to listen to 2m band, £10. G4XSE, QTHR. Tel Bishops Waltham (Hants) 3511.

2m linear amp, Lunar, 80W output for 10W input, rx preamp, £80. 2m 25W linear for 1/2·5W input, rx preamp, suit FT290R, £35. Microwave Modules 144/28 rx converter, £15. All exc cond. All ono. GM3WCS, QTHR. Tel 0383 726456.

4m folded dipole, covers lo-band, £5. Double beam scope, cw probes, handbook, £20. Sansui SC737 stereo cassette deck, £20. Assorted ali tube, 0·75-2in for hf beams, offers. G3TMU, QTHR. Tel Yateley 877485.

Yaesu FT101E, external spkr, spare pa valves, £350. All boxed and in mint cond. Buyer collects. G4HMW. Tel 0246 36496.

Shack clearance: sae for long list, incl IC202S, £75; IC402, £100; Tonnas, coaxial, mast hardware, waveguide bits for 3·4GHz, 5·7GHz, 10GHz, rf components, connectors, everything ono. Steve Davies, G4KNZ NOT QTHR, 2 Beaconsfield Road, Aylesbury, Bucks. Tel 22782.

Datong UC1 gen cov converter, 144-145MHz, 28-29MHz outputs, £75. G8OSY. Tel 07948 286.

FT101ZD Mk3 fm, immac, £475. SP901 spkr module, £20. YO301 monitorscope, perfect cond, boxed etc, £95. Trio R1000 rx, £195. KW separates, 201 rx, Vespa tx, psu, £175. Tel Dave, Hornchurch 57722.

13·8V, 60A psu, Advance, £75. HF linear parts 4CX250B, bases, chimneys, transformers, blower, case etc, with circuits, £50. Quad 22/202 stereo amp, spare valves, offers. Datong morse tutor,

£36. Goldring GL75 turntable, Shure cartridge, £18. G4JUN, QTHR. Tel Leicester 891538.

Microwave Modules 144/100LS linear amp, 100W output for 1/2·5W input, rx preamp, suit FT290R, £125. MM 70/144 4m transverter, plugs straight into 2m prime mover, 10W output, all exc cond. All ono. GM3WCS, QTHR. Tel 0383 726456.

Bargain: Teleprinter KSR33, ASCII, 110 baud mechanical type, needs psu, no punchout, hence price, £35 or exchange for any 2m handheld. W.H.Y? *Wanted:* 10XY Jaybeam 2m antenna. Buyer collects item. GW4PCX, QTHR.

TS120V hf tx/rx, 20W input, 80-10, DFC230 digital vfo, four memories, mic, up/down shift, both in vgc, £300. QR666 communication rx, 170kHz-30MHz, ssb, cw, a.m., bandspread tuning, £65. G4WOX. Tel Ashington (Northumberland) (0670) 815587.

Creed tty equipment: 7B page printer, two 7E page printers, 85R printer reperforator with keyboard and tx fitted, 6S auto tx, loop and motor supply rectifier 44, all wkg. G3XMM. Tel Gloucester 33780, after 6pm.

Commodore Pet 3032, series 3 rom (basic 4 roms available extra if required) several radio programs, rtty, morse, QRA locator, satellite tracking, £230. Inspection and collection preferred. G3AZI, QTHR. Tel Preston (0772) 37815.

Sell or exchange: one pair 15in reflex horns (full range) 100W, very efficient units designed for disco use, sell for £150 ono, or swap for radio/computer gear, anything considered. G6MMG, QTHR. Tel Dave, 051-430 9167, (Merseyside).

Icom IC2E, still under warranty, orig packing, case, charger, 12V adapter, all as brand new, even the instruction manual is uncreased, £125. G4TSO, QTHR. Tel Torquay 38043 or 313758.

Kenwood R820, £530. JRC NRP515, £725. Nat Panasonic DR48, £150. Bang & Olufsen 3000, £70. Baker mixer, amp, £35. *Wanted:* circuit, or manual to borrow buy. Hammarlund SP600. Urgent. G6XNC NOT QTHR. Tel 01-462 4461.

Sommerkamp FT725 25W fm mobile, four memories, scanning base mic, same as Yaesu FT720, £135. Many orig programs, some unique, for BBC Micro, send sae for details, includes morse translator. G4MGD, QTHR. Tel Ashley, Canvey Island 685160.

Trio 9R59D rx, £30. Murphy A188C baffle console radio, £35. Pye C12 calibrator, £10. Command rx, 1·5-3·0MHz, rough, £5. G3GGK, QTHR. Tel 0954 210374 (Cambs).

Robot 400 sstv, slow to fast, and fast to slow scan converter, £290 plus carriage, no offers. G3VOM. Tel 061-794 6659.

Yaesu FT707, mint cond, genuine bargain, will guarantee as maker's cond nearest £350, or exchange mobile 2m Yaesu. 200W, five input, 110V line output amplifier, suitable sports functions etc, £40, snip. G6YZP, QTHR. Tel 01-850 6920.

Complete station, hf/vhf, going QRT. Comprising FT101, IC290H air band rx, Daiwa preamp, Shure 444D mic, Daiwa CN1001 auto atu, HV405 mono camera, 5A psu, 14-el Parabeam, Creed 85RP reperf, Creed 6S6 auto tx, ST5 terminal unit, Creed 7PN3 perf, comp psu, +12Vm −12V, +5V (large ampere type), Yaesu fist mic, astronomical tele, 25 Dragon 32 games, Astroblast for Dragon 32 on cartridge, several non-working monitors, several books for clubs or amateurs, tv/radio, lots of bits and pieces. For details of prices, dems, etc. Will consider px or swops W.H.Y? Delivery can be arranged within 50 mile radius or by agreement over larger areas. Bill Ball. Tel Fleetwood 70746.

Commodore 1530 datasette tape deck model C2N (for Commodore computers, Pet, VIC20, CBM64, etc), £33 plus p&p. *Wanted:* a mulberry tree or advice on where one can be obtained. G3AZI, QTHR. Tel Preston (0772) 37815.

Property of late G4HPM: Versatower P40, approx four years old, good cond, £275. Hygain TH3 Mk3, £100. Ham 4 rotator, £125. Last two items incl cables, approx 30m. Buyer to remove tower and arrange transport. G4ETM, QTHR. Tel Bradford 613085.

Trio TS700, 144MHz multimode, preamp, sidetone, £230. Yaesu FT101DFM, WARC, mic, fan, £450. ITT SF1, 70cm handheld, fitted RB10, charger, £35. Microwave Modules MMA28, 10m preamp, £15. Will deliver 50 miles or carriage extra. G4KLX, QTHR. Tel Wirksworth (062 892) 2037.

FT290R, helical, nicads, charger, spkr mic, case, mobile mount, boxed, £225. MML144/100LS, as new £120. SWR25 swr meter, £8. DRAE vhf wavemeter, £14. 7/8 whip, £8. Tonna 2m bidirectional, N series, power splitter, £25. G6FXS, QTHR. Tel 01-360 5914.

Yaesu FT225RD, Mutek board, variable power modification, YD148 mic, manual, circuit diagram, orig front end board, vgc, £450, or part exchange for FT102. Yaesu FTDX401, FV401, new 6KD6, manual, circuit diagrams, £250. G4WZQ, QTHR as G6MVM. Tel Herne Bay 4318.

VIC20 owners, superb programs incl contest log, QTH locator, distance and bearing, logbook, Q-code, four program morse tape for fast easy learning, rtty soon, many more available. £3.50 each or two for £6! Deals available. Tel 053672 3866 for details.

80m through 70cm station, TS130V tx/rx, MMT144/28, MMT432/28, VFO120, DFC230, YK88SN, rf switching module, interconnecting cables, demonstration available, prefer not splitting, £710 ono. Carriage at cost—local delivery if required. Graeme, G6CSY, QTHR. Tel Orpington (0689) 29230, evenings.

Multiband, multimode tx/rx, Sugiyama F850, 1·8MHz, 3·5MHz, 7MHz, 14MHz, 21MHz, 28MHz, 70MHz, 144-145MHz, Kenwood MC80 mic, HF5 antenna, ground plane radial kit, £675. G4LMA. Tel Telford 49306, after 7pm, weekdays, ask for John.

Computhink pcb type DD DSK CTL, controller board for Computhink disk drives, plugs into Commodore Pet main pcb, all plug-in connectors provided, offers invited. *Wanted:* disk drive for Atari. Yaesu SP901, YO901P, FC901/902. G3AZI, QTHR. Tel Preston (0772) 37815.

Heathkit HW101 ssb/cw tx/rx, 10-80m, mains psu, mic, 10-80m trapped dipole, some spare valves, £150. *Wanted:* fm conversion kit for FT101 or details of fm mods. FT101 workshop manual. G4MAM. Tel Falmouth 317330.

FT230R, 25W fm mobile, good cond, offers around £185. GM4TXN, QTHR. Tel Alan, Kelso (0573) 23742, after 4pm.

IC240, £100. HQ1 minibeam, £70. G4NBQ, QTHR. Tel Ray, Greenhithe (0322) 844974.

Tower, SMC P40, 40ft post mounted tower, freestanding rotator head, two years old, good cond, genuine offers this time please! £275 or £325 incl KR400 rotator with 30m+ of control cable. Buyer collects. G4PLH, QTHR. Tel 01-788 2674, evenings and weekends.

KW Viceroy, needs sorting out, open for offer. Hygain vertical hf antenna, £20 or offer. G4PJD, QTHR. Tel Sheering 331.

FT757GX, mic, £600. Dressler D200, 1kW power meter, 1kW dummy load, £450. Tel 01-520 6020.

Drake TR7 hf tx/rx, gen cov rx, full TR7A spec, a.m., rtty, cw sideband filters fitted, NB7 fitted, Astatic mic, dc power plug, genuine reason for sale, for details contact G4HSB, QTHR. Tel Peter, 0642 816608, after 6.30pm.

Trio TM201A 2m tx/rx, five months old, £200. Will deliver within 50 miles radius. Power supply, Kenwood PS6, £25. G4IUX, QTHR. Tel 021-475 8403.

Yaesu FT707 rx, FP707, FL2100Z amplifier, Daiwa CNW518 tuner, C4MH mini beam, many accessories to a complete radio system, exc cond, £1,300 ono. Tono CRT1200G display screen, £90. Epson RX80 printer, £220. Both as new. GM4FNF. Tel (Crathes) (033 044) 546.

FT207R 2m handheld tx/rx incl mains charger, 12V charger, spkr mic, whip, helical antennas, two battery packs, adaptor for chargers etc, manuals, orig packing, £130 ono. Nigel Lihou, G8OVO, c/o 36 Green Way, Newton Longville, Bucks MK17 0AP.

CBM64, rtty/cw ASCII/sstv interface, £275. CBM3016 (will convert 4032!), £245. MM4000KBD, £185. TW4000A, boxed, new, £350. 9in green monitor, new, £75. MC50 mic, £24. IC720A, with fm, £695. 100m UR43, £12.50. Teletext adaptor, £80. Tel Rayleigh (0268) 774089, after 3pm.

Tono 9000E rtty, cw, ASCII, any offers. Am looking for hi-def colour monitor. GM4RSJ, QTHR. Tel 0292 76365, anytime.

Microdot rtty/cw send/rcv terminal, qwerty keyboard, built-in vdu, as new, manual etc, £350. PF1 tx/rx, four batts RB4, vgc, £35. Trio TM201A 2m fm, £200. Shack sortout: coaxial, nicads, instruments, metalwork. Callers by appointment. Lockwood, G3XLL, QTHR. Tel Mellis 596, evenings, weekends.

Icom IC24G fm mobile, 24 or 12·5kHz synth tuning, mobile mount, mic, pwr lead, box/manual, £105 ono. G4MWP, QTHR. Tel Coventry 462035.

CGP115 four-colour pen printer/plotter, 80 column, full graphics capability, Centronics (parallel) port, only one year old, as new, £100 ovno. GM4UKG, QTHR. Tel Inverkeithing (0383) 416688.

Mosley two-el beam TA32 junior, 10, 15, 20m coded for easy assembly, dismantled length 150in, will dismantle further. Space needed for 4m beam, £65 ono. G4CIM, QTHR. Tel 01-304 8975, evenings.

Exchange BBC 32k comp, six months old, for hf rig or 2m base station. Would consider FT290 and 2m handheld. G6COB, QTHR. Tel 06065 54634 (Cheshire).

FT102, fm, cw, a.m., filters, immac cond, used little, good performance, offers about £575. G4JQI, QTHR. Tel 0254 823366 (Lancs).

Atlas 215X, ac console, mobile mount, £350. G3VHA, QTHR. Tel 0562 730484.

Hitachi portable mains video unit, matching camera, comp with carrying cases, two new rechargeable batteries, perfect wkg order, £600 the lot. Can be seen working. G4URK. Tel John, Maidstone 28401.

Trigano Ranger four-berth trailer tent, used three times, as new, garage stored, £600 or would exchange good quality hf tx/rx, 2m multimode or BBC model B. Tel 0553 810642, evenings.

20-60ft tilt-over lattice tower, vgc, fitted 12V elec power winch, up/down, tilt, no hard work with this one, £500 the lot. Buyer collects. Reason for sale, moving to 550ft asl. G4URK. Tel John, Maidstone 28401.

FT102, eight months old, only used as second rx, £575. G3IJ, QTHR. Tel Aldershot 310132.

TS130V, WARC, new, unused, still in guarantee, £325. 10fm mobile, new, £25. Multi U11, £70. AVO8, £40. Going QRT. G4FQS, QTHR. Tel John, 01-253 0661, ext 129, daytime, 01-459 2543, evenings.

Icom 202S, immac cond, xtalled 144·000-144·400, manual, charger, case, orig packing, £100 ono. Exchange for fm handheld or ICF2001, cash adjustment if necessary. G4VLB, QTHR. Tel 061-480 1549.

Eight-core screened cable, 1A/core, 440V, suit rotator control or RS232 etc, similar to RS367-476 or Farnell 140-484, £35/100m plus carriage. I have 2500m (will haggle larger quantities). G8SDN, QTHR. Tel Ian, 0525 714128.

2m Jaybeam Q8/2m quad, eight-el, buyer collects, £27. G4OGY, QTHR. Tel 0702 587968.

Mk123 spyset, in wooden case, £65. Relay box for FT301, £20. 15A variac, £25. Microwave Modules 500MHz frequency counter, probe, £65. Codar AT5 tx, £30. AR30 rotator, unused, £40. Telford TC7 tunable 10m i.f., £30. Tel Dursley 811454.

FT790, nicads, case, three months old, still under guarantee. MML432/30L 432MHz 30W linear amp, three months old, used very little, over £400 to buy new, will take £295. G1DOQ. Tel Stoke-on-Trent 328561.

Valves, approx 2,000, mostly boxed rx types, offers? 18 tx types, offers? Heath SB620, £60. PO box, new, £90. Dragon 32, cassette recorder, chess, basicode, £125. Buyers to collect. G4AXS, QTHR. Tel 0227 831709 (E Kent).

FT101B exc cond, fitted cw filter, £325. G3VHA, QTHR. Tel 0562 730484.

FT290R, nicads, mobile mount, £200 ono. DX tv vhf to uhf converter, Labgear CM6022, £15. 12in portable GEC tv, poor cabinet, £15. Ideal shack, computer, monitor. G4RXD, QTHR. Tel Sandbach 61354.

Yaesu FRG7700 gen cov rx, 0-30MHz in 1MHz bands, a.m./fm/cw/ssb, mint cond, manual, orig packing, £260. Securicor delivery, £10. *Wanted:* Decent atu, eg Z-Match, or w.h.y? G4BLT, QTHR. Tel Wakefield 255515.

Shack clearance: many items for sale inc FT221, £275. Crotech oscilloscope, £125. TMK multimeter, £20. Antennas, books, etc. Please send sae for list. G8KRK, QTHR. Tel Freeland 882605, after 6pm.

Datong morse tutor, £35. Audio processor filter, £28. Heathkit rfsg 100kHz to 110MHz incl, psu, £25. Mic AKG190E, cables, £35. Eight-ch stereo mono mixer, £27. Pair stereo headphones, Dynatron, £10. G4WRL. Tel 0643 4743, evenings.

Kenwood TS130S, VFO120, ATU130, PS30, M35S, SP120, mobile mount, £500. Trio 9130, BO9 base, £320. BNOS 2m linear, 10W in, 100W out, £100. Daiwa rotator, £75. G4VKE, QTHR. Tel Ray, 0229 24438.

Standard C78, CPB78 power booster, nicads, charger, soft case, vgc, £220. Microwave Modules MML 144/100LS, as new, £120. G4URE, QTHR. Tel Basildon 551952.

FT107M, memory not fitted, 17, 30m fitted, 600Hz cw filter fitted, FP107E, FV107, all good cond, £650 ono. FC902 tuner, £80 ono. IC255E, £155 ono. Will deliver within 50 miles, but prefer purchaser view. Carriage extra. G4WUZ. Tel Colne 862551.

Teletype model ASR33, stand, tape reader, set of manuals, £30. Buyer collects. G8IFH. Tel Uckfield (0825) 61473.

KW204 tx, exc cond, comp with full set spare valves, Trio Hi-Z desk mic, buyer collect, £145 ono. G3DPR, QTHR. Tel Kemble (028577) 514, evenings.

Trio TS515 80-10m tx/rx, £185. Yaesu FRG7, mint, £140. 2m converter, 28-30MHz i.f., £10. Widespace variable, 250pF, £15. *Wanted*: Trio TS830, or gen cov tx/rx. Tel Thanet (0843) 69068, anytime.

Uniden 2021/Tandy DX400 rx, superb portable, very sensitive, selective, stable, 150kHz-30MHz, mains battery, 12V dc, new, £145. Yaesu FRT7700 atu, new, £35. MM converter, 156-158MHz, marine, to 28-30MHz, £23. Tel Wombourne (Staffs) 896625.

ZX Spectrum 48k morse tutor program, ideal for learner, club or group, even experienced operator to increase speed, £5. Callsign directory program, 16 or 48k, fast retrieval, 500 entries, £4. Both for £7. G6LTR, QTHR. Tel Jim, Leicester (0533) 700974.

Icom IC740 as new, used rx only, less than one year old, £485. Daiwa AF606K all-mode active filter, £45. Tel Swanley (Kent) (0322) 63968.

Icom IC751 hf and gen cov tx/rx, comp with mic, six months old, hardly used. D. E. Wood, G4JEF, QTHR. Tel 044 93 7764.

Yaesu FT202R 2m handheld, ext mic/spkr, nicads, S20-22, R5-7, xtals, £55. G8OSY. Tel 07948 286.

Versatower W40, telescopic wall mounting, floor wall brackets, wirerope, two auto braked winches, £105 or swap for Yaesu FL101 tx. Teletype 33 with stand, £30. Six rolls paper, 4·5in dia, £12. G3WLX, QTHR. Tel Gt Milton (084-46) 643 (nr Oxford).

R820 Kenwood communication rx transceives with TS820, immac, £375 ono. TV502 2m transverter, operates with TS820, £85 ono. G3GIQ, QTHR. Tel 01-567 6389.

Clearance: Garrard 202STC autocharger, with cover, £5. Philips 9144 stereo cassette recorder, £5. Telefunken S82 stereo amplifier (suit collector), £5. Heathkit AFM1 rx, £5. Windsor 65C sig gen, £5. Push button phone, £2.50. Philips AG81 reel-to-reel tape recorder (suit collector), £5. Crystal calibrator No10, mains psu, £5. Metal carrying case, splashproof, 6 by 12 by 18in, Admiralty grey, webbing strap, suit Raynet or portable fanatic, £5. Triang model railway, 00-gauge, 30ft track, locos, rolling stock, £30 ono. Buyers inspect and collect. G6RAH. Tel Ilford (Essex) 01-554 7286.

BP60 heavy duty tiltover Versatower, remotely operated, electric winch, cost over £950, only £765. TH5DXX Mk2, only 0·5dB less gain than a TH7DXX, cost £419, only £356. Tailtwister T2X, rotator, the most powerful and the very best, cost £332, only £282. All the above items as new, purchased April 1984. Sudden move forces sale. Buyer to collect from Brookwood, four miles from exit 3 of M3. Tel Brookwood (04867) 6670.

Trio 7200G, 2m fm tx/rx, comp with mobile mount, VFO30G for full 2m coverage, repeater shift, £100. Belcom Liner 2, preamp, mobile mount, £50. Both items vgc. G4HUQ, QTHR. Tel 0254 47963, after 6pm.

QM70, 28-144MHz transverter, 2W output, £25. Creed tape reader model 6S6, still boxed, £15. Creed tape puncher model 7TR3, £15. G8OSY. Tel 07948 286.

VHF-UHF sale: Yaesu FT730R, still under guarantee, mint cond, £160. Trio TR9000, SP120 spkr, BO9A base, £270. Microwave Modules MMA144V rf switched preamp, £19. Jaybeam 8XY, 2m, £16. Jaybeam D8, 70cm, £11. Buyers to pay carriage. G4FLY, QTHR. Tel 0734 594495.

Yaesu FRG7700M, FRT7700 atu, used little, good cond, boxed, £325 ono. Tel Bernard, Leicester 885540, after 7pm please.

CD614 oscilloscope, vgc, £29. CD814 for spares, £9. Both, £31. Copy handbook, Schomandl FD1, 30-900MHz freq meter, offers. 30ft sectional ali mast, rotator, illuminated indicator, power supply, guys, 50ft coaxial control cable, needs some engineering to set up, £69. G5RV antenna, neat Z-Match atu, swr meter, 70Ω load, £17.50. All parts for 2m solidstate 10/15W linear amp, 6A reg psu, £9. 13V 1-2A reg psu, ideal IC202, £3.50. Ditto 5V 3A, £3.50. G2HCV, QTHR. Tel 01-866 4871.

Enter the new uhf generation with the new Icom IC120, 23cm fm tx/rx, 10kHz pll spacing, memories, scan covers 1,260MHz to 1,300MHz, new, bargain, £370. Tel Garston (0923) 675009.

Robot 800, comp rtty/cw computerised terminal, sstv transmit, input filter, 90Hz ensures copy despite QRM, comp with leads, manual, 9in Hitachi monitor, gift at £500. G3SVH, QTHR. Tel 0922 414524.

FT780R, Yaesu 70cm multimode, used little, need cash for hf gear, £290. G6WNY, QTHR. Tel Mark Moor 486.

New Shure 526T powered base station mic, £30. New Trio MC35S hand mic, (cost £15), £5. Pair PF1 pocketphones, £5. 13V 2A stab psu, £4. *Wanted*: Bird Thruline elements to cover 144MHz, 500W. G4GSR. Tel Dave, 051-428 1845, or 051-227 1919.

Best offers invited for shack clearance: Sommerkamp FT250 hf tx/rx, psu, good cond, orig carton, Liner 2 ssb tx/rx, preamp, mobile mount. New 4CX250B, base, chimney, £15. Armstrong, GW3EJR. Mayfield, Cardigan, SA43 3AU. Tel 0239 612331.

SW rx, Tandy DX100L, vgc 150kHz-30MHz in five bands, a.m./ssb, small, light, only £45. 50W audio amp, JHS50T, vgc, has built-in tremolo unit, £65 ono. G4SYI. Tel Lucien, 01-958 9868, after 5pm.

Realistic DX300 communications rx, 10kHz-30MHz, digital display, exc cond, boxed, cost £289, sell £135. 2m 50W linear, preamp, £40. Stolle 2010 rotator, 40ft cable, as new, boxed, £42. 2m masthead preamp relay, switched, unused, £25. Tel Kings Langley 63773.

Yaesu FR101S rx, 160-10m, 4m, 2m, 19m, 25m, FL101 tx, £275 ono, or may split. Amtech 200 atu. Handy freq counter HF60. Offers. G3RCE, 73 Devonshire Avenue, Southsea, Hants. Tel 0703 737180.

Pye a.m. Olympic high band, exchange for ditto low band, or sell. (MF6AM considered high or low.) Pye VR200 24-12V regulator, £10. Modern scope, less probe, ring for details. Pye Selcall module, £5. G3XDA, QTHR. Tel 0775 66533.

FT480R, Yaesu 2m multimode, virtually unused, absolutely mint cond, carefully maintained, never used mobile, offers over £285. G8MPS, QTHR. Tel Durham (0385) 734422.

Code converter, MBA-RC tx/rx, morse, baudot, ASCII, £210 ono. G3FFC, QTHR. Tel 0533 898826.

KW204 tx, £120. KW202 rx, £100. BC221 freq meter, £20. KW E-Zee Match, £15. All ono. Buyer collects. G6NK, QTHR. Tel 0932 44058.

Standard C78 70cm fm portable scanning mic, nicads, mobile bracket, case, £160. JVC 2in portable tv, fm/a.m. radio, leather case, battery ac adaptor, magnifying lens, ideal as monitor vhf/uhf, as new, £55. G4IOF, QTHR. Tel 01-486 8286, daytime, 01-722 7040, evenings.

Altron mast WM30, heavy duty cde rotator, three-el Hygain DB10-15A Yagi, all under one year old, cost £620, will accept £400 ovno. Unemployment forces sale. Buyer collects or arranges transport. GW4TUL, QTHR. Tel 0495 791884.

Kenwood TR8300 70cm 10W fm mobile, xtals for even repeater channels, incl RB12 (rtty), SU8, SU18, SU20, SU22, RB0 input, £80. G8WTB, QTHR. Tel 0279 34471, after 6pm.

HRO 500 hf synthesized rx, 0·5-30MHz in 500kHz bands, £300. FT101B, recently overhauled and realigned, 10MHz and cw filter fitted, £295. Airmec 304 power sig gen, 100MHz, £50. G3WZT, QTHR. Tel 0403 710565 (Horsham, Sussex).

Daughter has drawn a dollies' wardrobe on the packaging, otherwise my Datong D70 morse tutor is as new! £30. G4XXT NOT QTHR. Tel Hornchurch (04024) 46174.

Trio TS430S, as new, £550. BNOS 12/25A psu, 30A max, £80. FC902 atu, 500W max, all new September 1983. G8ZME, QTHR. Tel Mike, 01-994 1249.

IC260E, Icom 2m multimode, 10/1W memories, scanning, sidetone, semi-break-in for cw, vgc, orig packing, £190 ono. G6OBR. Tel Richard, Birmingham (021) 353 5806.

FRG7 rx with FRT7700 atu, exc, £150. Vintage Eddystone bug key, £50. 1923 Columbia Grafonola on oak pedestal, motor resprung, needles, 78s etc, £100 ono. G3CGQ. Tel 0582 25519.

Dressler D200C 2m linear amp, 240V, sell or w.h.y? Datong rf clipper, £25. G3VOF, QTHR. Tel Ingrebourne 73366.

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FT560 tx/rx, wkg order, spare pa tubes, £225. FV400S vfo, £35. G3ZAY NOT QTHR. PO Box 146, Cambridge. Tel 0223 311714.

FT77, fm fitted, £395. FP700, £85. FC700, £65. FT790R, £195. All above boxed, as new, Marconi a.m./fm vhf/uhf sig gen, £85. 70cm 18-el Parabeam, unused, £18. Daiwa RF670 speech processor, £18. *Wanted:* 2m/70cm handhelds. G6HLK. Tel 0538 382117 (Staffs).

Mizuho SB2X, xtalled 144·00-144·600, 144·800-145·00, exc cond, nicads, £100 ono. Trio 2300, nicads, spare power leads, helical antenna, mobile mount, good cond, £90 ono. 144MHz valve linear, 40W output, £50 ono. Woods, GW8XAN. Tel Newtown Llantwit 201694, after 6.30pm.

Yaesu FT707, FC707 atu, Datong automatic rf speech processor, manuals, £400 ono. No split. Will take 2m multimode in part exchange and cash adjustment. G1GJO. Tel Jim, 01-942 7094.

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Icom IC2E 2m handheld, spare battery pack, spkr mic, charger, full λ/4 and helical antenna, orig box, £120. 10m fm rig, £25. *Wanted:* hf atu. Tel Coventry 89539.

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Yaesu FL2100B linear amp, vgc, £280. Datong rfc speech processor, £40. Multi 800D, 2m, fm, tx/rx, 25W mobile, £180. G4ETN, QTHR. Tel 0278 451357, after 6pm.

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GEC Selectest D3 circuit diagram, (similar to Avo), photo would do. All costs refunded. GM6TAJ. Tel 031-664 3062.

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FC902 atu. G2FXS, QTHR. Tel 0632 572852.

Urgent: fm board for FT101ZD Mk3, good price paid, must be in good wkg order. Tel John, 0734 598326, anytime.

IC402, IC202. Must be in exc cond, best price paid. Any information, advice, circuit diagrams etc to help me get onto 23cm, 13cm and 3cm as cheaply as possible. Any info gratefully received. Tel Haydn, Rotherham (0709) 813042.

£10 per bound volume offered for pre-war *"Bulletins"*, your postage also paid. Single copies also considered. Most other pre-war amateur radio publications also wanted. G4LQF, 14 Regent Road, Harborne, Birmingham 17. Tel 021-426 3663.

AR30 rotator control box, urgently needed by club, must be eight-wire control box. Goole Radio & Electronics Society, c/o G8IOH, QTHR. Tel 0405 84 462.

7094 valve. HF linear amplifier. G3QD, QTHR. Tel Nottingham (0602) 257197.

Yaesu FT625RD 6m multimode tx/rx, matching rig to the Yaesu FT225RD, if anyone knows the whereabouts of such a rig for sale, would appreciate a call. G4KZZ, QTHR. Tel Coventry (0203) 444160.

G1FAZ wants to be shocked! Anyone got one of those old toys, or a homebrew device, that uses a small battery to provide an (adjustable) electric shock? Please contact: Chris Williams, 267 Hay Green Lane, Bournville, Birmingham 30. Tel 021-476 6438.

FT200 circuit diagram. Dave Butterworth, 3-5 The Grove, Slough, Berks SL1 1QG.

Vertical antenna such as HF5, must have radials. AT130/120 antenna tuner. Exchange for above or sell: FC901 antenna tuner, G-whip, 10-el 2m beam, 2m 5λ/8 mag mount. Also wanted: WS128, A16, or similar QRP spy set. G4TMO. Tel Swindon 783461.

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KW E-Zee Match or similar atu for balanced feeder. GM4LBE, QTHR. Tel 0595 4270.

Kenwood DG5 digital display for TS520SE. Salt, G4WUC, 8 Smallways Lane, Chilton Polden, nr Bridgwater, Somerset. Tel 0278 722402.

Fingers crossed for May RAE results. If successful want complete vhf/uhf station, prefer Trio TR9130/9500 or Yaesu FT480/780R. FT290R/790R considered. Cash available. Tel Tony, Fleet (Hants) (02514) 7962, after 7pm or weekends.

Urgently: Any information on type L342 tuner radio freq made by Mullard Equipt Ltd. Copies of US manuals TM11-227B, TM11-227E, RAF publication AP2276 series, concise details of signals equipt. G8AVJ, QTHR.

Swan 102/3BX, TenTec Corsair, Trio 930, Dentron MT3000 atu must be in good cond, and a reasonable price. G4EMG, 91 Buxton Road, Stratford, London E15 1QX. Tel 01-534 3460.

Manual (or copy) of Sinclair Mk14, issue 4. Buy or borrow for copying. Costs refunded. R. Jefferson, G8UZM, 16 Edge Dell, Stoney Haggs, Scarborough, N Yorks YO12 4LL. Tel 0723 376732.

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Yaesu FTV650B 6m transverter, good price paid for clean unit, will fetch or pay carriage. SP101 spkr console. G3XSI, QTHR. Tel Sheffield 51417.

Help! Conversion details for Cobra 148GTL dx (early version), for 10m operation. K. Wilson, G4SMK, QTHR. Tel Bradford (0274) 560183.

Pye PF8 pocketphone. Preferred working on 70cm. Good price paid for nice example. Tel Birmingham (021) 360 9307.

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FT221, FT7B, TS120, TS130. Working or faulty units acceptable as long as mechanically sound. Can collect almost anywhere. G3TA, QTHR. Tel Miserden (Glos) 571.

KW2000 series tx/rx. Any cond. G3LD, QTHR. Tel Rickmansworth 773278.

Maintenance/technical manual and circuits for DRF3100 Winchester disk drive (not user's manual). G8ISI, QTHR. Tel 0428 723168.

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Manual/handbook for Heathkit 'scope IO12U, to buy, borrow, or copy. GM2TW, QTHR.

Arac 102 all-mode 10m and 2m rx and psu. G6EOX, QTHR. Tel 0922 73492 (West Midlands), or 06285 21726 (nr High Wycombe).

Suitcase tx/rxs, any spares, incomplete or damaged sets; any connecting cables or spares for WD (CDN) No29. Any instruction books or manuals (originals only) for military sets post-1939 up to 1960. Taylor, G3UCT, 8 Government House Road, York. Tel 0904 29777.

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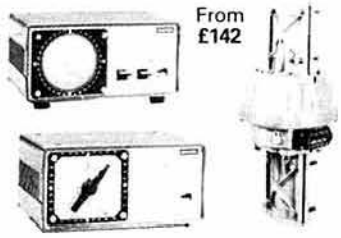

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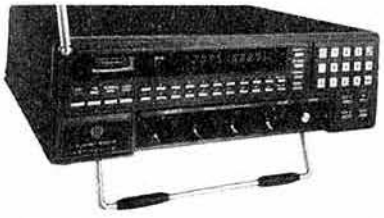

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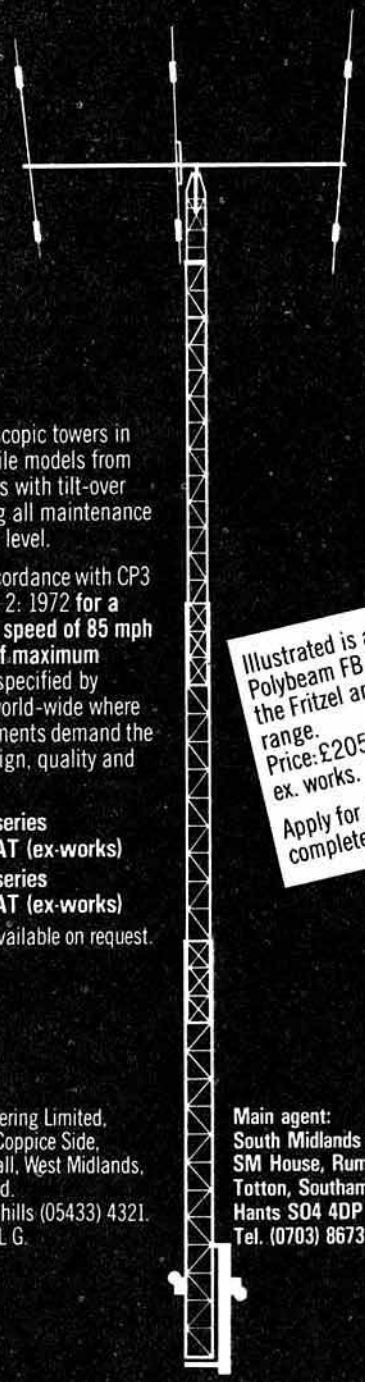

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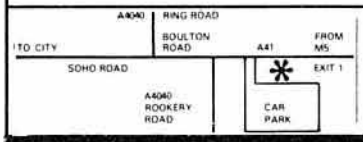

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INDEX TO ADVERTISERS

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Copy and remittance to: **M. J. HAWKINS G3ZNI, RSGB Advertisements, PO Box 599, Cobham, Surrey KT11 2QE.**
(Cheques should be made payable to RSGB.)
Members' Ads must be sent to the editor at Chelmsford.

FOR SALE

QSL CARDS printed to your own specification on white or coloured gloss card. Send S.A.E. for sample pack to: The Caswell Press, 11 Barons Way, Woodhatch, Reigate, Surrey.
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AMATEUR RADIO EQUIPMENT bought, sold and exchanged. Phone Dave on (040 24) 57722 or send SAE for latest list. G3RCQ Electronics, 132 Albany Road, Hornchurch, Essex RM12 4AQ.
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FOR SALE CONTINUED

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ATTENTION TV AMATEURS! (UHF). "Callsign 64" is now available for Commodore 64. Generates large callsign or message on test-card background. Program includes several other features. £6.50 from: Galaxy Software, 22 Mountfield Gardens, Kenton, Newcastle-upon-Tyne NE3 3DB.
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MISCELLANEOUS

PATENTS, TRADE MARKS and DESIGNS—Booklets on request, Kings Patent Agency Ltd. Established 1886 (B. T. King MIMech., E J. B. King, Regd. Patent Agents)—146a Queen Victoria Street, London EC4V 5AT. Tel. 01-248 6161. Telex 883805.
NEAR WREXHAM, IDEAL QTH. 1000ft A.S.L. Open views to 5 counties. 120ft × 60ft plot. 4 bed. 3 rec. det. house built 1968. large garage, C.H. £37,000 o.n.o. Phone (0978) 757825.
HEATHKIT. APPOINTED UK spares and service centre. Cedar Electronics, Unit 12, Station Drive, Bredon, Tewkesbury, Glos. Tel (0684) 73127.
ON BEHALF OF THE YAESU CLUB, I would wish to thank Roger and John at SMC Chesterfield for their excellent service on 26th May enabling our Special Event Station, GB2CNC to continue on HF. Pete Hemmings G4RXV.
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A Guide to Amateur Radio (19th edn)	£3.44	£3.10
Amateur Radio Awards (2nd edn)	£3.41	£3.07
Amateur Radio Operating Manual (2nd edn)	£5.22	£4.70
HF Antennas for All Locations	£6.91	£6.22
Microwave Newsletter Technical Collection	£6.83	£6.15
Morse Code for Radio Amateurs	£1.31	£1.18
RSGB Amateur Radio Call Book (1984 edn)	£7.14	£6.43
Radio Amateurs' Examination Manual (10th edn)	£3.42	£3.08
Radio Communication Handbook (5th edn) Vol 2	£9.16	£8.24
Radio Communication Handbook (Vols 1 and 2 combined, paperback)	£10.91	£9.82
Teleprinter Handbook (2nd edn)	£13.84	£12.46
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VHF/UHF Manual (4th edn)	£10.31	£9.29
World at Their Fingertips (paperback)	£7.75	£6.98

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Mobile Logbook	£1.14	£1.03
Receiving Station Logbook	£2.72	£2.45

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HF Awards List and Countries List	48p	43p
Great Circle DX Map (wall)	£2.12	£1.91
IARU Region 1 Beacon List	35p	32p
IARU QTH Locator Map of Europe (wall)	£1.43	£1.29
QTH Locator Map of Western Europe (wall)	£1.43	£1.29
QTH Locator Map of Europe (card for desk)	76p	68p
UK Beacon List	35p	32p
UK Repeater List and maps	45p	41p
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Meteor Scatter Data	£3.24	£2.92

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**Delivery approximately five weeks*

Miscellaneous		
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"I'm monitoring ·5 are you?" (two colours) car sticker	62p	56p
QSL card holders	£1.23	£1.11
Radio Communication back issues *(As available)*	£1.01	91p
Radio Communication bound volume, 1980 (Parts 1 and 2)	£14.93	£13.44
Radio Communication bound volume, 1981	£14.93	£13.44
Radio Communication bound volume, 1982	£15.93	£14.34
Radio Communication bound volume, 1983	£16.90	£15.21
Smith charts, pad of 25 (Chartwell D7510)	£2.23	£2.01

Other publications	Non-members' price	Members' price
Active-filter Cookbook (Sams)	£12.71	£11.44
All About Cubical Quad Antennas (RPI)	£5.69	£5.25
Amateur Single Sideband (Ham Radio)	£5.46	£4.91
Amateur Television Handbook (BATC)	£2.55	£2.30
Amateur Television Handbook Vol 2 (BATC)	£2.77	£2.49
AMSAT-UK Technical Manual (AMSAT-UK) (Includes all revises and updates, including Oscar 10 data sheets)	£14.37	£12.93
Antenna Anthology (ARRL)	£3.83	£3.45
ARRL Antenna Book (ARRL) (New edn)	£8.78	£7.90
ARRL Electronics Data Book (ARRL)	£4.47	£4.02
Beam Antenna Handbook (RPI)	£6.83	£6.15
Better Short Wave Reception (RPI)	£6.83	£6.15
Care and Feeding of Power Grid Tubes (Varian)	£5.69	£5.25
CMOS Cookbook (Sams)	£13.07	£11.76
Complete DX'er (W9KNI)	£7.77	£6.99
Complete Shortwave Listener's Handbook (Tab)	£12.21	£10.98
English-French QSO Language Instruction (out of print)	—	—
FM and Repeaters for the Radio Amateur (ARRL)	£4.30	£3.87
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International VHF FM Guide	£2.45	£2.21
Newcomer's Guide to Simplex and Repeaters on 2m (UK FM Group)	£1.06	95p
Radio Amateurs Antenna Handbook (RPI)	£6.88	£6.19
Radio Amateur Callbook (1984 USA listings) (ARCI)	£16.93	£15.24
Radio Amateur Callbook (1984 DX listings) (ARCI)	£16.23	£14.61
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Understanding Amateur Radio (ARRL)	£4.73	£4.26
VHF Propagation Handbook (Nampa)	£3.75	£3.38
Weekend Projects for the Radio Amateur (ARRL)	£4.95	£4.46
World Atlas (RACI)	£3.35	£3.02
World Radio TV Handbook 1984	£12.25	£11.03

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NON-MEMBERS. Use left-hand price columns. Note that members' sundries are only available to members of RSGB.
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PRICES. These include postage, packing and VAT where applicable. For airmail despatch, please ask for price before ordering. Goods are obtainable, less p & p, at RSGB headquarters between 10am and 4pm, Monday to Friday.
POSTAL TERMS. Cash with order. **Stamps and book tokens cannot be accepted.** Cheques and postal orders should be crossed and made payable to "Radio Society of Great Britain". Our Giro account number is 5335256. Please write your name and address clearly on the order, and allow up to 28 days for delivery.

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Ham Radio Magazine (per annum) (incl air delivery)	£19.00	£17.10

ORDER FROM

RSGB Publications (Sales),
Alma House, Cranborne Road, Potters Bar, Herts EN6 3JW

(Raynet supplies should be obtained from Mrs J. Balestrini, Merrivale, Willow Walk, Culverstone, Gravesend, Kent)

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All prices include VAT. Postage free on all Mainland UK orders

YAESU MUSEN

AUTHORISED YAESU

FT-690R
FT-290R
FT-790R

MULTIMODE MULTI-ROLE VHF/UHF TRANSCEIVERS

MULTIMODE OPERATION
Never before possible from such a compact package, true multimode —USB, LSB, CW & FM—operation is yours to enjoy. With CW and SSB activity at an all-time high, you will not be left out of the satellite or DX action ahd you can still ragchew on FM simplex or even via a repeater (inbuilt shift and 1750Hz tone burst).

ADVANCED MICRO CONTROL
Advances in microprocessor circuitry allows selectable synthesizer steps, up/down scanning from the microphone, priority channel operation, and ten memories (with memory scan), all called up with fingertip ease.

LCD DISPLAY
A large, newly developed Liquid Crystal Display provides readout of the operating frequency, and an indication of a number of the control functions. It is highly readable under conditions of bright sunlight and is backed up by a lamp for night-time operation.

PROGRAMMABLE SYNTHESIZER
The optimum synthesizer steps for SSB/CW or FM operation are very different. That's why Yaesu gives you the flexibility of two synthesizer steps per mode: 100Hz or 1kHz per step on SSB and CW, and 12½/25kHz (2m), 25/100kHz (70cm). When changing modes from SSB/CW to FM, your transceiver is automatically set to the nearest standard channel when you start scanning or tuning.

TEN MEMORY CHANNELS
As many as ten frequencies may be stored into memory, for instant recall. The priority feature allows you to check a favourite frequency every few seconds, with automatic halting (FM mode) when the channel is clear or busy, as desired. Memory backup is provided by a built-in lithium cell, with an estimated lifetime of five years.

DUAL VFO SYSTEM
These transceivers feature a digitally synthesized dual VFO system which provides tremendous flexibility in day to day operation. For example, one VFO may be set up in the SSB portion of the band, and the other in the FM sub-band, for immediate QSY when changing modes.

CONVENIENT FEATURES
Among the many features adding to the convenience of the transceiver is a supplied portable antenna, a high-performance noise blanker, a high/low power switch, and a battery condition meter. A clarifier (offset tuning) allows you to follow unstable or Doppler-shifted signals.

FT690R
In addition to the two metre and 70 centimetre units detailed here, the FT690R six metre (50-54MHz) transceiver completes *for the time being*, the range. The general specifications are similar but modes are USB-CW-AM-FM, power is 2½W PEP [0.8W AM—for which a 4kHz filter is fitted]. Further details on request.

GENERAL FEATURES

Modes of operation:
SSB (USB, LSB) CW & FM

Frequency response:
300-2,700Hz @ −6dB

Carrier Suppression:
Better than −40dB

Sideband Suppression:
Better than −40dB

FM Deviation:
±5kHz (max)

Tone burst frequency:
1,750Hz

Selectivity:
SSB/CW: 2.4kHz @ −6dB
4.1kHz @ −60dB
FM : 14 kHz @ −6dB
25 kHz @ −60dB

Image rejection:
Better than −60dB

Audio output:
1 Watt @ 10% THD

Audio output impedance:
8 Ohms

Dimensions:
58H × 150W × 195D mm
1.3kg (without cells)

Power requirements:
8 × C size dry cells
8 × C size Nicad cells
External 8.5-15.2VDC
Memory backup: Lithium cell

Microphone:(YM47 supplied)
600 ohms ppt with scan

ACCESSORIES

YM49
Remote speaker mic

YM50
DTMF keyboard mic

MMB11
Mobile mounting bracket

FL2010
2 metre 10W amplifier

FL6010
6M 10W amplifier

CSC1A
Vinyl carrying case

NC11C
Battery charger

YHA15
Helical antenna (FT290R)

FT-290R

Frequency coverage (MHz):
144-146 or 144-148

Synthesizer steps:
SSB/CW: 100Hz/1kHz
FM : 12.5/25kHz

Current consumption:
70mA receive
800mA Tx (2.5 W RF FM)

Antenna:
SO239 on rear
Telescopic ¼ Wave supplied

RECEIVER

Intermediate frequencies:
1st IF 10.81MHz
2nd IF 455kHz (FM)

Sensitivity (better than):
SSB/CW : 0.5μV for 20dB S/N
FM : 0.25μ for 12dB SINAD

TRANSMITTER

Power Output:
2.5 Watts at 12VDC

Spurious radiation:
Better than −60dB

Repeater split:
600kHz (+ and −)

FT-790R

Frequency coverage:
430-440MHz

Synthesizer steps:
SSB/CW: 100Hz/kHz
FM : 25/100kHz

Current consumption:
100mA receive
750mA Tx (1W RF FM)

Antenna:
BNC on top panel
¼ Wave flexi supplied

RECEIVER

Intermediate frequencies:
1st IF 67.3MHz
2nd IF 10.7MHz
3rd IF 455kHz (FM)

Sensitivity (better than):
SSB/CW : 0.16μV for 10dB S/N
FM : 0.25μV for 12dB SINAD

TRANSMITTER

Power Output:
1 Watt at 12VDC

Spurious radiation:
Better than −50dB

Repeater split:
1.6MHz (input listen)

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SM HOUSE, RUMBRIDGE ST
TOTTON, SOUTHAMPTON SO4 4DP

SMC

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