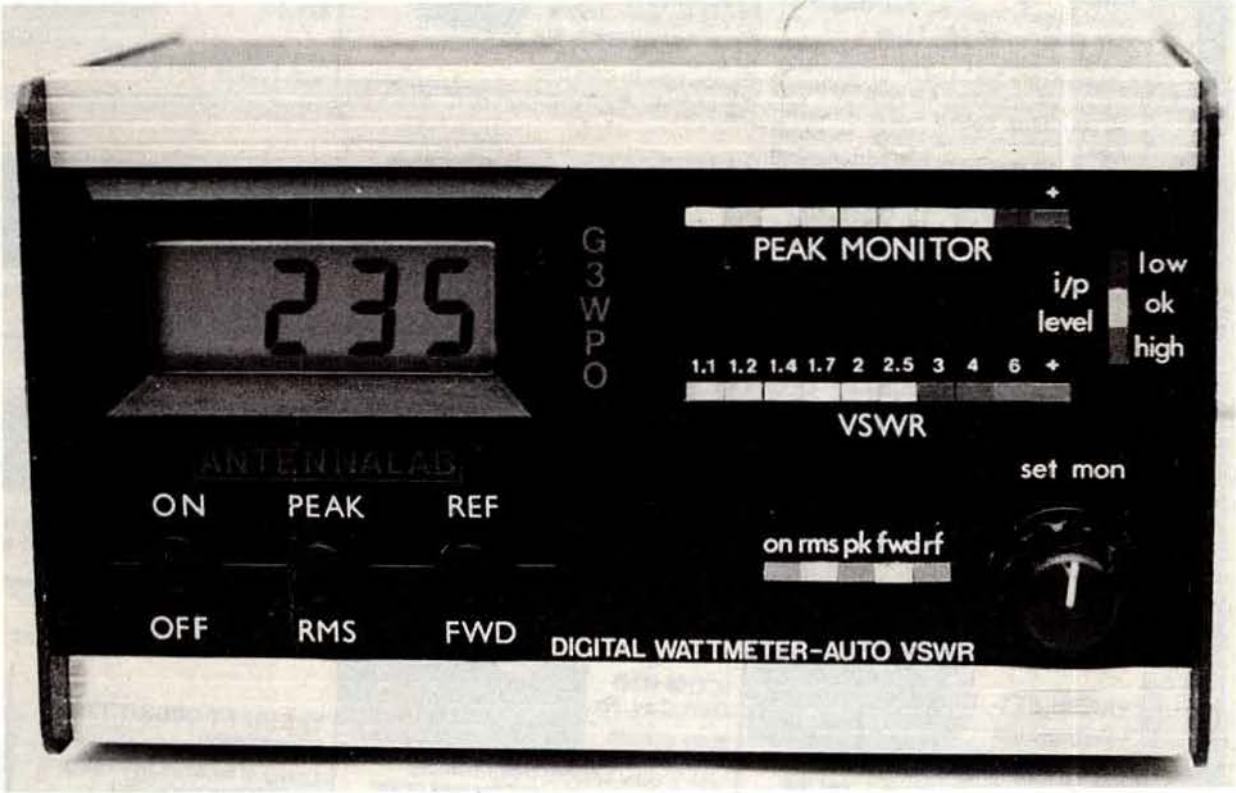
August 1983

RADio COMmunication

THE ANTENNA LAB

Commences in this issue

A state-of-the-art digital wattmeter, automatic vswr indicator and peak power monitor



by A. L. BAILEY, G3WPO

Journal of the Radio Society of Great Britain

ANNEE MONDIALE DES COMMUNICATIONS
WORLD COMMUNICATIONS YEAR
AÑO MUNDIAL DE LAS COMUNICACIONES
1983

THE AMCOMM HOTLINE

CALL 01-422 9585 (THREE LINES) NOW

YAESU FT 757 GX

Here is a little General Coverage gem that **does it all and has it all** – Usual high consideration for the SSB man and – Lo and behold **total consideration for the CW man** – if you are into both you're on to a real winner – Look closely – no extras! Everything you'll need already installed. **Full Break In – CW Filter – Iambic keyer** – 25 Khz marker – IF/Shift width – Noise blanker – Switchable AGC and RF preamp plus a lot more including **AM and FM fitted as standard. Twin V.F.O's,** RX coverage 150 Khz to 29.999 Mhz – **transmit 160 to 10 metres with a commercial version** also available. Dimensions 238 x 98 x 238 mm and weighing only 4.5Kg – A real smash at a price you're going to like – send or call for full details and price. Tel: 01-422 9585.

YAESU FT102 9 Bander.

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

ICOM 745/751/271

Three new ones just around the corner, two HF general coverage transceiver and one VHF base for 2M, stock should be with us by the time you read this, call 01-422 9585 for more information.

YAESU FT290RB

The biggest selling 2M rig ever...hands up if you have'nt got one. Call 01-422 9585, we'll tell you how to own one.

YAESU FT101ZD Mk III

Available while they last, complete with FC902 ATU at £649.

YAESU FT980

Bob and Stan called us soon after we delivered, Bob said "At last a rig that does it all and does it right", Stan doesn't say a lot, "Magic" was his only comment.

ICOM 740 9 Band Transceiver

You'll hear nothing but good words on this one, ask an owner then call us on 01-422 9585.

ICOM 290H

2M Multimode with same super performance as the 290E but with 25 Watts.

YAESU 726R

All mode base station, 2M, 70cms and 6M, think what three rigs would cost you and work out the value for money on this one. Call 01-422 9585, we'll give you the info and the price.

YAESU FT77

Probably the best HF mobile ever made, low frills and low bills, call 01-422 9585 and we'll tell you how low.

YAESU FT1

Yaesu say it's number one...one journal said "A lot of radio for a lot of money". If you can afford it...get the best, call for quote.

ICOM R70 Gen.Cov.Rx.

Silky smooth appearance with a silky smooth performance, thousand pounds value for well under £500, call 01-422 9585.

YAESU FT 208R/FT708R Handhelds

Loads of facilities at extremely competitive price, call 01-422 9585.

AMCOMM

Amcomm Services,
194, Northolt Road, South Harrow,
Middlesex HA0 2EN.
Telephone: 01-422 9585 (3 lines)
Telex: 24263.

OPPOSITE SOUTH HARROW TUBE STATION ON THE PICCADILLY LINE

SHOWROOM OPENING HOURS
TUE-FRI 10.00am–6.00pm CONTINUOUS
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ASK FOR DETAILS OF OUR INTEREST FREE AND LOW DEPOSIT H.P.

FAIR DEAL POLICY

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 management and staff are all amateur radio enthusiasts. We sell nothing else.

Many firms can give you a so-called fair deal, at the time of purchase, but only a handful of companies in the U.K. are fully equipped to give you a total after-sales service. Amcomm is one, with a wide range of spares, and speedy access to factory stocks, we offer a complete service. Whether you buy now or bought 10 years ago. What's more, we pride ourselves on being able to service everything we sell ourselves.

Don't take our word for it, find out for yourself, ask around on the air, you'll keep coming up with the same answers, good competitive prices and excellent after-sales service. Go on, ask around.

AUGUST 1983

VOLUME 59 No 8

RADio COMmunication

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

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Office hours: 0900 to 1700

ADVERTISING

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

M. J. Hawkins, G3ZNI,
RSGB Advertisement Officer,
PO Box 599,
Cobham,
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Tel 037 284 3955

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

Tel 0707 (from London, 77) 59015

Business hours: 1000 to 1600

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

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

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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TRIO

We give below a list of approved dealers in the UK. Any dealer not on this list has no connection with the distributor network and has no 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 approved dealer.

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

London Lowe Electronics Ltd.
Lower Sales Floor, Hepworths, Pentonville Road, London.
Tel: 01-837 6702

Glasgow Lowe Electronics Ltd.
4/8 Queen Margarets Rd, off Queen Margarets Drive, Glasgow.
Tel: 041-946 2626

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

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

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

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

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

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

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

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

Wales MRS Communications Ltd.
Imperial House, 95 Penarth Road, Cardiff CF1 7JT
Tel: 0222 24167/8

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

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

Northern Ireland George Moore Electronics
7 Cyprus Avenue, Belfast BT5
Tel: Belfast 647570

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

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

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

TRIO-KENWOOD CORPORATION

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

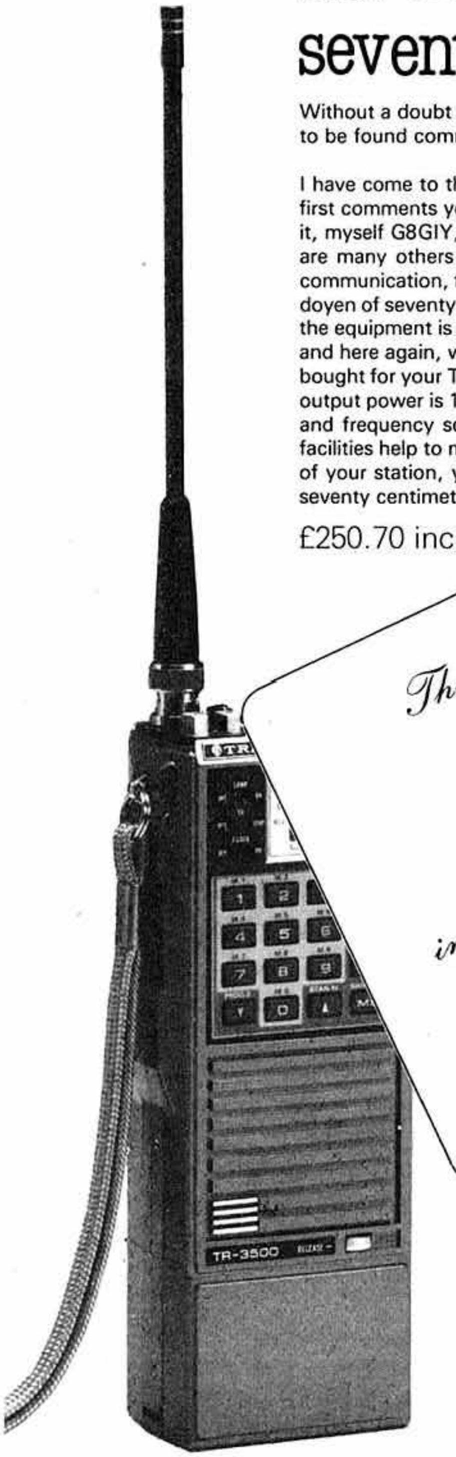
TRIO-KENWOOD COMMUNICATIONS, GmbH
D-6374 Steinbach-TS. Industriestrasse,8A West Germany

the TR3500 handheld for those seventy centimetre contacts.

Without a doubt one of life's great mysteries to me is why, when the two metre band is at times so busy, few people are to be found communicating on the wide open spaces of the seventy centimetre band.

I have come to the conclusion that misapprehensions exist about the band. The first being the lack of activity. From my first comments you will have gleaned the fact that seventy centimetres is not a busy band, however there are stations on it, myself G8GIY, my colleagues David G4KFN and Roy G8ROR form the nucleus of a UHF group here in Matlock, there are many others like us up and down the country. Seventy centimetre repeaters abound and are a perfect means of communication, their somewhat shorter range serving well their immediate area and, please remember, in the words of that doyen of seventy centimetres Jack G5UM, "Activity breeds activity," simple but true. The second misapprehension is that the equipment is expensive. Not so, the Trio TR3500 costs only slightly more than its matching stable mate, the TR2500, and here again, with the same sensible approach which we have all com... ...ect from Trio, the accessories which you bought for your TR2500 are compatible with the new TR3500. The ... ...ze and weight are similar to the TR2500, output power is 1.5 watts high and 300 milliwatts low, repea... ...ble, ten memory channels are provided and frequency scan between operator-defined limits i... ...l memory scan and reverse repeater facilities help to make operating a pleasure no ma... ...h the Trio TR3500 handheld as part of your station, you are equipped to expan... ...g on the wide open spaces of the seventy centimetre band.

£250.70 inc VAT ca...



The Directors and Staff of
Lowe Electronics
have pleasure
in inviting you, your wife and family
to their 1983 open day
to be held on Saturday 20th August.

...for the ...obile operator.

...used or owns a Trio TR7800 has had the finest piece of 2 metre mobile ...ingertips. The TR7800 had simply everything that the keen mobile operator could ...of course, there were a few points which customers said could be improved on and, ...admit, we, in the majority of cases, agreed. Trio, with the introduction of the new TR7930, have taken note of this feedback of information and the result, I am sure you will agree, is as close to perfection as you will find in a rig.

The improvements are, a green floodlit LCD readout which does not disappear in strong sunlight, additional memory channels, both timed and carrier scan hold on occupied channels, selectable memory channel for the priority frequency and automatically corrected mode selection (simplex or repeater) without having to instruct the rig. The most significant change is the liquid crystal frequency readout on a green illuminated background, but closely following this must be the ability to omit specific memory channels when scanning, and the programmable scan between user designated frequencies. This gives the rig the ability to scan simplex channels only, without holding on repeaters.

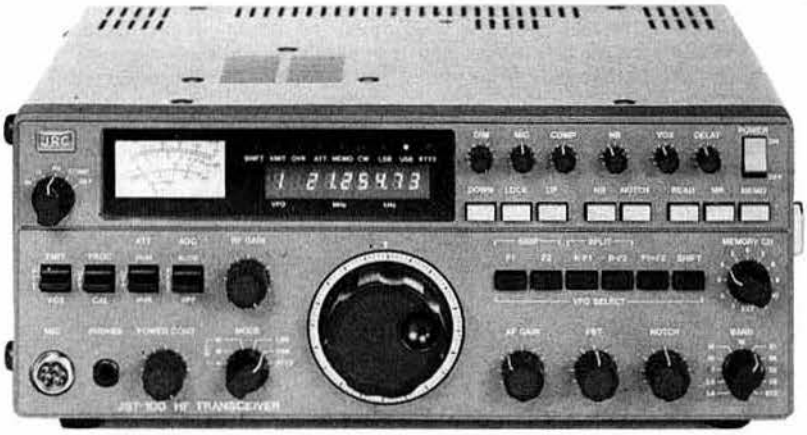
The Trio TR7930. The mobile 2 metre FM rig designed with ease of operation coupled to outstanding performance.

£305.21 inc VAT carr £6.00

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

for the hf operator for whom only the best will do, the **JST100** amateur band transceiver.

JRC *Japan Radio Co., Ltd.*



The JST100 from the Japan Radio Company is a solid state transceiver built to the high standards as set by JRC for their complete range of products. The JST100 is first and foremost an "Amateur Bands" only rig. Having an extremely high class receiver, the JST100 enables the enthusiast HF operator to clearly hear weak signals under even the poorest of conditions.

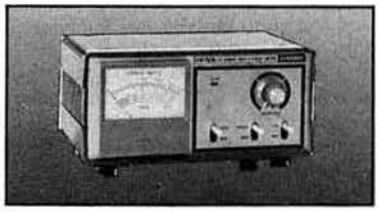
Having located the weak DX station or your sked contact out of the QRM then the high quality of JRC transmitted audio produces a first class contact.

Those familiar with the Japan Radio Company's previous items of equipment—the NRD505 and 515 general coverage receivers, the NSD515 matching amateur band transmitter, the NDH518 96 channel memory unit and the NCM515 remote controller—will know that the equipment is designed to provide the ultimate in operating satisfaction. The JST100 is built in the same tradition.

JST100 £998.00	inc VAT carr £6.00
NFG97 ATU £150.00	inc VAT carr £6.00
NVA88 SPEAKER £37.50	inc VAT carr £6.00

we recommend the DAIWA range.

		Price inc. VAT	Carr.
VHF AMATEUR RECEIVERS			
SR9	2m FM tunable / xtal receiver 144-146MHz	46.00	2.50
SR1000	2m synthesised VHF monitor receiver. Requires no crystals for full amateur band coverage 144-146MHz	72.50	2.50
POWER & SWR METERS			
CN520	1·8 60MHz mini cross needle power/SWR meter.	36.50	1.50
CN540	50-150MHz mini cross needle power/SWR meter.	39.50	1.50
CN550	144-250MHz mini cross needle power/SWR meter.	39.50	1.50
CN620A	1·8-150MHz cross pointer power and SWR meter. Up to 1kW	57.00	2.50
CN630	140-450MHz cross pointer power and SWR meter. Up to 200W	85.00	2.50
CN650	1·2-2·5GHz cross pointer power and SWR meter. Up to 20W	114.00	2.50
CNW419	1·8-30MHz 200W gen. cov tuning unit	130.00	6.00
CNW919	2M power meter and antenna tuning unit	92.00	2.25
CNA1001A	Fully automatic all band ATU. Includes cross pointer power meter	156.00	6.00
CNA2002	As for CNA1001A but 2kW rating for tuner and power meter	228.00	6.00
ANTENNA ACCESSORIES			
CS201/TW2	Two way 50 ohm coax switch. 0-500MHz	13.95	2.00
CS401	Four way 50ohm coaxial switch 0-500MHz	43.50	2.50
ROTATORS			
DR7500X	For HF 3 element beams. Preset controller. 6 core cable	113.72	6.00
DR7500R	As for DR7500X but using the DAIWA round controller	125.00	6.00
DR7600X	Heavy duty. Will take up to 2 element 40m beam. Preset control	163.49	6.00



DR7600R	As for DR7600X but using the DAIWA round controller	176.29	6.00
POWER SUPPLIES			
PS200D	Heavy duty power supply 9-15V amps. Fully metered	118.00	6.00
PS300	Daiwa heavy duty PSU 30A max 22A continuous	135.00	6.00
PSR1250	Daiwa 50A max	338.00	6.00

INFRA-RED MICROPHONE			
RM940	New mobile mic with no connections between mic and rig	45.00	2.00
S9	Spare sensor for RM940 mic system	6.50	0.50
M9	Extra mic for RM940 system	13.00	0.50
F4	Set of four windshields for RM940 mic. Available singly at 75p	3.00	0.50

OBITER DICTA

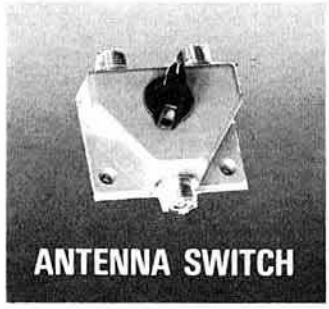
Good morning.
Good news!! The VHF converter for the R2000 is here. Called the **VC10** and costing **£113.00,** including VAT, plus carriage, this I am sure will prove to be another Trio accessory that shows what an understanding Trio have of the requirements of the serious listener. With the VC10 fitted, **the already superb R2000 general coverage receiver** adds to its existing specification – VHF continuous coverage from 118 to 174 MHz. This increases the receive capabilities of the R2000 to include frequencies which carry aircraft communication within the United Kingdom. Alternatively you could use the R2000 plus VC10 to give 2M amateur band coverage on SSB, CW, AM and FM. So when you have listened HF you can QSY to 2 metres.

For those of you who consider £113 to be a lot to spend on a converter then consider the alternatives: to give good 118 to 174 MHz coverage possibly four separate converters may be required. A typical converter costs £30 so a comparative system would cost around £120 and remember you would not get either digital readout or automatic switching, giving effectively **continuous coverage from 118 MHz to 174 MHz.**

The VC1 has its own telescopic whip so portable VHF operation is possible, the converter being mounted internally uses DC power from the mother R2000.

The R1000 was good but **the R2000 is much better** – not only does it give you the world at your fingertips, distant lands and far off radio stations, but it enables **its proud owner to listen VHF.**

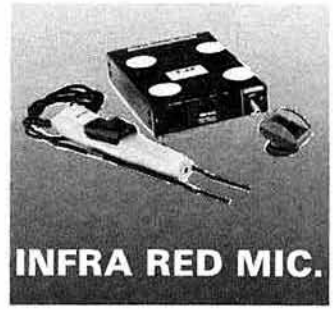
Talking about shortwave receivers, I wish I had taken an **R600** or **R2000** to France with me on holiday. Possibly the compact R600 would have been ideal. My French is passable to get about and not starve but definitely not suitable for engaging the locals in conversation. **Imagine,** therefore, for a man used to **conversing** with his **fellow amateurs,** a man who regularly each evening tunes the short waves, **having only his wife to talk to for fourteen days!** I am convinced I suffered withdrawal symptoms. I even got to the stage of hearing weak signals in the roar of the surf. The taxi horns gave a 'da-di-da' and the rush hour French drivers produced a montage of CQ calls. **Back home** before the water was turned on, the various pilot lights lit, fourteen days' post, papers and milk bottles sorted out, a visit to the shack was the top priority. There, bathed in the cool relaxing glow of meter lights, red leds and green digital readouts, **I was again at peace.** I suppose I should have taken a rig with me – I will next time.



I must make a comment regarding **the remarkable new Belcom LS20XE** hand portable **miniature transceiver for 2M** (in stock). Those who know **Bill** our Chairman, callsign **G3UBO,** will not have heard him on the bands for many years. However, the unbelievable has happened. Bill was so impressed with the LS20XE that he has taken one home for his own use and has since been heard in QSO. **I understand he is also QSLing each contact.** So the Belcom LS20XE must be a remarkable rig at £128 including VAT.

Since I last mentioned the subject of **"grey" imports** and the need to look beyond the **"apparent bargains"** and to enquire into the quality of serviceability and test equipment, together with the quantity, if any, of spare parts components, I have received many 'phone calls from people who have rung to thank me for drawing their attention to this aspect of buying. Indeed, the majority have been **left in no doubt of the vendor's ability: his smile** was right, **his price** "less than Lowes" but when it came to showing his test equipment and spare parts, then that was **a different story.** And a point about test equipment: even having the best that money can buy is worthless if the "technician" does not know how to use it. The only way to find if the knowledge is available is to ask around and harken to what is being said about a particular dealer: **in short, his reputation.** And my final comment on the subject, **repairing** a complex piece of amateur radio equipment **starts** with **diagnosis** of the cause of the fault, **followed by the repair.** This produces a reasonable charge for the work. Not a system of **changing** each **component** piece by piece until the rig bursts into life, that is not the way **and could prove very expensive.**

The TW4000A – what a fantastic piece of gear. **70cm** and **2 metres** in one rig. As you read this edition stocks should just be arriving. Ring for further details. The **TW4000** that I've had in my car for the past two months has given me great pleasure. Simple to operate and with the voice synthesizer extra safety whilst mobile. No need to consult the digital readout, no need to take one's eyes off the road ahead, **just press the voice recall button** on the mike and instantly your position on the band and whether you are in repeater mode is communicated to you verbally – no need to brake heavily to avoid the car in front.



I don't know whether it is worth telling you about **the special Summer Sale.** I am certain that all the **Trio** items will have gone by the time this reaches you, but I will list them just in case: **PS10** was £64.86, now **£25.00, TR8400** was £299, now **£199. VB2300** was £65.78, now **£36.50, VF0120** was £98.67, now **£49.50, YG455CN** (270Hz CW for R2000/TS830S) was £77.97, now **£39.50, TR7730** was £283.13, now **£199** and last but not least, the DFC230 was £153.18, now **£29.50** – no, this is not a printing mistake, **the price is £29.50.** Other items at special prices are too many to enumerate – **ring for details in case anything is left.**

Just a general point, we have been forced, due to rising costs, to increase Securicor carriage from £5.00 (which it has been for the last three years) to £6.00.

Now, the Open Day. Your invitation is on another page. The date is Saturday, 20th August. **Matlock Band** are playing selected tunes from 11 o'clock onwards and our usual guests, the **RSGB, Strumech, Practical Wireless, Birkett's bits** from Lincoln and **the Club 24 girls** will be in attendance. Now this year for something completely different I have arranged a **Members' Enclosure** for you Lowe Card Holders. A glass of wine **"Chateau Lowe 1984",** awaits you, together with a dish of **nuts,** in a special marquee which is to be erected on the forecourt. And for the enjoyment of your wives and girlfriends I have arranged a fashion display by **"Next" shops.** I had considered a fashion parade but I thought that this might be a bit inconvenient, plus it would empty the showroom and **the model girls wanted to use my office in which to change.** As you know me as being a somewhat shy retiring person!! I could not allow this, so a static display with charming helpful assistants is what awaits you.

Anyway, that's about it for now as some of our girls want to model some of the clothes instead of wearing their own so I suppose I had better collect their vital statistics.

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

David

DATONG

New

see us at A.R.R.A. Doncaster Oct. 6, 7, 8

AUTOMATIC WOODPECKER BLANKER MODEL SRB2

All too often in the past the appearance of the Woodpecker has wiped out that elusive DX, just when it was within your grasp. Now for the first time there is a really effective antidote, and at a highly competitive price.

With Model SRB2 fitted in series with the antenna and loudspeaker of your receiver or transceiver everything is the same until the Woodpecker appears. Then after a few seconds a magical difference becomes apparent; the receiver comes back to life again and you can copy the original signal. What happens is that the receivers antenna and loudspeaker are momentarily disconnected during each Woodpecker pulse.

No synchronisation, pulse width, or 'in/out' adjustments are required. Instead the blanker's exclusive circuitry (patent applied for) analyses the Woodpeckers signals, and produces blanking signals to suit. It can even remove multiple Woodpeckers at the same time (a situation which occurs fairly often.)

Because blanking occurs at both RF and AF, serious receiver desensitisation is avoided and yet the unit is also effective on AM broadcast signals as well as SSB and CW (of course, if the Woodpecker pulses are very wide then fast CW may become uncopiable).

A built in r.f. activated transmit relay will handle the output for normal HF transceivers and three push button switches are fitted for: power on/off, selectable 10 or 16 Hz pulse rate, and before-and-after comparison. The unit uses the same case design as Model ANF (see this ad.), and a panel LED tells you when the unit is actually blanking. Price: £75.00 plus VAT (£86.25 total). Expected availability early July.

AUTOMATIC NOTCH FILTER MODEL ANF

Model ANF is a unique dual-mode audio filter designed to connect in series with a receivers loud speaker.

As an automatic notch filter it will make a continuous tone disappear within about half a second. You just leave it permanently in circuit and forget about problems from 'tuner-uppers'.

As a CW filter its 4 pole tunable filter dramatically pulls out weak signals from noise.

At all times the 10 LED bargraph-type display shows the filter's centre frequency. In auto-notch mode for example, you can see the notch filter sweeping over the full tuning range every second, until it finds a tone to notch out.

Performance is independent of receiver volume setting thanks to a built-in compandor chip, and the notch depth is typically well over 40 dbs.

Price: £59.00 plus VAT (£67.85 total). Available now. Free data sheet on request.

AUDIO FILTERS
MODELS FL2, FL3, FL2/A

Model FL3 represents the ultimate in audio filters for SSB and CW. Connected in series with the loudspeaker, it gives variable extra selectivity better than a whole bank of expensive crystal filters. In addition it contains an automatic notch filter which can remove a "tuner-upper" all by itself.

Model FL2 is exactly the same but without the auto-notch.

Any existing or new FL2 can be up-graded to an FL3 by adding Model FL2/A conversion kit, which is a Fully tested auto-notch module in P.C.B. Form.

Datong filters frequently allow continued copy when otherwise a QSO would have to be abandoned.

Prices: FL2 £78.00 with VAT £89.70, FL3 £112.50 with VAT £129.37, FL2/A £34.00 with VAT £39.67

MODEL AD370 HEAD UNIT

COMPACT RECEIVING ANTENNAS
MODELS AD270/370

Datong Active Antennas solve the age-old problem of finding space for a 'good' receiving aerial.

Model AD370 mounted on a roof top or Model AD270 in a loft will give similar sensitivity to much larger conventional aerials yet are only 2½ and 3 metres long respectively.

Moreover they do not suffer from interference picked up by the feeder cable; such pick-up can be a problem with conventional dipoles because it is hard to maintain good balance over a band of frequencies.

Although active antennas were introduced to the amateur market by Datong only a few years ago they have long been used by military and commercial receiving stations. The performance specifications achieved by the Datong AD270/370 are very close to those of "professional" active antennas selling for ten times the price – a point which is not lost on our many professional customers.

The advanced design ensures two things: that you don't miss signals through inadequate sensitivity and that the antenna does not invent signals which are not there.

Datong Active Antennas represent an advanced solution to a common problem and so far as we know have no serious competition in terms of performance at the price. (Reviewed in Rad. Com., June 1982).

AD270 £41.00 with VAT £47.15 AD370 £56.00 with VAT £64.40

GENERAL COVERAGE RECEIVER CONVERTER MODEL PC1

Once upon a time it was the norm to use a ten metre receiver to receive the two metre band. Now, large numbers of special purpose two metre SSB rigs are in use and conversion the other way becomes a very attractive possibility.

MODEL PC1

With the addition of Model PC1 each of these two metre SSB rigs becomes a really good general coverage receiver (from 50 kHz to 30MHz!).

Two metre SSB rigs are not cheap and it makes good sense to get the most out of them. They also tend to have very good performance in terms of sensitivity, selectivity, and big signal handling. Each of these features is just as vital for short wave reception and Model PC1 is designed not to degrade them at all. The result, your two metre SSB rig receives below 30 MHz as well as it receives on two metres. And compared to many medium cost general coverage sets, that is saying a lot!

Try this test. Listen on twenty metres after the band goes dead in the evening. With many general coverage receivers the band never dies. It remains populated with phantoms generated by the receiver from the many very strong signals on forty metres. This is the kind of effect that the higher quality receivers minimise, and that goes for PC1 plus a good two metre rig. Reviews: Rad. Com., April 1982.

PC-1 £119.50 with VAT £137.42

DATONG ELECTRONICS LIMITED

ALL DATONG PRODUCTS ARE DESIGNED AND BUILT IN THE U.K.

PRICES All prices include delivery in U.K. basic prices in £ are shown with VAT inclusive prices in brackets

FL3	112.50	(129.37)	AD370	56.00	(64.40)	Codecall (Linked)	28.00	(32.20)
FL2/A	34.00	(39.67)	AD270+MPU	45.00	(51.75)	Codecall (Switched)	29.50	(33.92)
FL1	69.00	(79.35)	AD370+MPU	60.00	(69.00)	Basic DF System	149.00	(171.35)
FL2	78.00	(89.70)	MPU	6.00	(6.90)	Basic Mobile DF System	159.00	(182.85)
PC1	119.50	(137.42)	DC144/28	34.50	(39.67)	Complete Mobile DF System	214.00	(246.10)
ASP	72.00	(82.80)	DC144/28 Module	28.00	(32.20)	PTS1	39.99	(45.99)
VLF	26.00	(29.90)	Keyboard Morse Sender	119.50	(137.42)	Model ANF	59.00	(67.85)
D70	49.00	(56.35)	RFA	29.50	(33.92)			
D75	49.00	(56.35)	Model SRB2	75.00	(86.25)			
RFC/M	26.00	(29.90)						
AD270	41.00	(47.15)						

Data sheets on any products available free on request –

DATONG ELECTRONICS LIMITED

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When you buy from Amateur Electronics UK you are dealing with a FACTORY APPOINTED IMPORTER with the largest stocks of equipment and spares in the country. Our delivery and after-sales-service is second to none and for your convenience we offer the following facilities ● On- the-spot credit sales (against recognised bank or credit cards) ● Interest free finance (50% deposit - balance over 12 months) ● Free Securicor delivery on all major items ● FACTORY BACKED EQUIPMENT - write or phone for all the details.

YAESU – Latest...

Latest news from YAESU - Expected in August is the new **FT-757GX** all-mode HF transceiver - 160 thru ten of course plus general coverage RX. FM and all options fitted including dual VFO's, eight memories, programmable memory scan, full break-in on CW, 100 watts PEP/DC output at 100% duty cycle and all this in a package measuring 238W x 93H x 238Dmm!

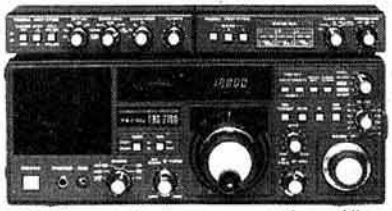
KEEP AHEAD WITH THE YAESU FT-102!

● Better Dynamic Range ● Total IF Flexibility
● New Noise Blanker
● Commercial Quality Transmitter
● Transmitter Audio Tailoring ● New VFO Design
● IF Transmit Monitor ● New TX Purity Standard

ANCILLARY EQUIPMENT

SP-102 EXTERNAL SPEAKER/AUDIO FILTER
FC-102 1.2 KW ANTENNA COUPLER
FV-102DM SYNTHESIZED, SCANNING EXTERNAL VFO

FRG-7700 HIGH PERFORMANCE COMMUNICATIONS RECEIVER



YAESU's top of the range receiver. All-mode capability, USB, LSB, CW, AM *and* FM 12 memory channels with back-up. Digital quartz clock feature with timer. Pictured here with matching FRT-7700 Antenna tuner and FRV-7700 VHF converter.

FT-290R/790R 2m & 70cm PORTABLES

10 memories, 2 VFO's, LCD display, C size battery, easy car mounting tray, FT-290R 0.5 low/2.5 high watts out FT-790R 0.2 low/1.0 high watts out (incorporates speech compressor).

FT-780R/208R SYNTHESIZED UHF/VHF TRANSCEIVERS

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

FT-230R/730R 2m & 70cm FM MOBILES

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

FT-480R/780R 2m & 70cm MOBILES

The most advanced 2 metre and 70 cm mobiles available today — USB, LSB, FM, CW full scanning with priority channel, 4 memory channel, dual synthesized VFO system.

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AUTHORISED YAESU

THE SYMBOL OF TECHNICAL EXCELLENCE

Your number one source for YAESU MUSEN

FT-980 ALL MODE HF CAT *

* Computer-Aided Transceiver

This incredible new transceiver incorporates the highest level of microprocessor control ever offered in an HF all solid-state radio. Including a general coverage (0.15-30MHz) receiver with its own, separate front end, this amateur transceiver offers a new dimension in frequency control; whereby frequencies can be entered by either front panel keypad or tuning dial, and then scanned in selectable steps either freely or between any two programmable limits. Twelve memories include four with special protection, and two large digital displays allow full flexibility and control for split frequency operation while two meters allow full transmitter information.

Additional controls include IF Width and Shift on concentric controls, AMGC (Automatic Mic Gain Control) to set microphone input threshold, RF Speech Processor, ALC Meter Hold function, IF Notch and Audio Peak filters, Transmit Monitor, Noise Blanker and CW Full Break-in. Controls are also provided for FM Squelch and CW Keyer Speed when the optional FM and Keyer Units are installed.

The most important feature of the FT-980 is that practically all of the above features can be controlled by the user's separate personal computer, when connected through an optional Interface, also available from Yaesu. Where up to now the few amateur transceivers that offered any kind of computer interfacing at all permitted only frequency control, the FT-980 permits almost total control of all functions from a separate microcomputer, including Mode; IF Width and Shift; Scanner Step, Speed and Limits; and switching of most other functions. (Microcomputers are not available from Yaesu.)

FT-77 THRIFTY HF TRANSCEIVER

UTILIZING THE NEW CAD/CAM* MANUFACTURING TECHNIQUES, YAESU PRESENTS THE FT-77 AS A NEW MILESTONE IN RELIABILITY, SIMPLICITY AND ECONOMY IN HF COMMUNICATIONS.

Thrifty

Featuring efficient, all solid-state, no-tune circuitry, the FT-77 offers a nominal 100 watts of RF output on all amateur bands between 3.5 and 30 MHz, including the WARC bands. New CAD/CAM techniques plus the simple design of the FT-77 add up to one of the smallest, lightest HF transceivers ever; both in your hands, and on your wallet.

Simple

The front panel control layout and operation are actually simpler than some VHF FM transceivers, with only essential operating controls; while the simple circuit design leaves fewer parts that could cause problems. Nevertheless, all of the essential modern operating features for HF SSB and CW are included, along with extras such as dual selectable noise blanker pulse widths (designed to blank woodpecker or common impulse noise), full SWR metering, and capabilities for an optional internal fixed-frequency channel crystal, narrow CW filter and FM Unit.

Reliable

Computer-aided design of the circuit boards in the FT-77 ensures the most efficient component layout possible in the smallest space, while automatic parts insertion and soldering greatly diminish the chance for human error. Reliability and quality control are thus improved and simplified beyond the degree previously attainable in amateur equipment. This means longer equipment life with less chance of breakdown.

Expandable

The extremely compact size and simple control layout make the FT-77 ideal for mobile operation, or as the heart of a complete base station with the optional FP-700 AC Power Supply, FV-700DM Digital Scanning VFO and Memory System, FTV-700 V/UHF Transverter and the FC-700 Antenna Tuner. The competitive price of the FT-77, coupled with the expansion capabilities presented by these accessories, make this transceiver the perfect choice for those new to amateur HF communication, or as a practical second rig for old-timers.

*Computer Aided Design/Computer Aided Manufacture

FT-726R VHF/UHF Multi-bander

Combining all of the best features from Yaesu HF and V/UHF transceivers, the FT-726R opens a new world of operating ease and flexibility for FM, SSB and CW on the 50*, 144 and 430/440 MHz amateur bands. The design of the FT-726R integrates the individual operating requirements of each of the three operating modes into one unit, and the user can then select which of the optional plug-in band modules he desires.

The VFO-A/B scheme has ten programmable memories, and can be tuned in 20Hz steps for CW and SSB operation, or in selectable steps for FM. FM tuning is accomplished by an indented tuning knob. IF Width and Shift controls are provided for CW and SSB operation, while both preset standard and user programmable repeater offsets can be selected for all modes. An optional Satellite Unit makes the FT-726R into a full duplex cross-band satellite transceiver.

*144 MHz Unit installed, other Units available as options according to local regulations.

AGENTS

North West - Thanet Electronics Ltd, Gordon, G3LEQ, Knutsford (0565) 4040
Wales & West - Ross Clare, GW3NWS, Gwent (0633) 880 146
East Anglia - Amateur Electronics UK, East Anglia, Dr. T. Thirst (TIM) G4CTT Norwich 0603 667189
North East - North East Amateur Radio, Darlington 0325 55969
Shropshire - Syd Poole G3IMP, Newport, Salop 0952 814275

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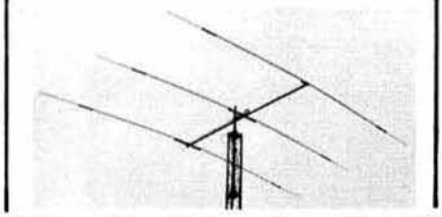
TET ANTENNA SYSTEMS



AX210N	10 ele. yagi for 2m crossed	74.95	(n/c)
HB10F2T	2 ele. 10m mono band beam	51.50	(n/c)
HB10F3T	3 ele. 10m mono band beam	74.95	(n/c)
HB15F2T	2 ele. 15m mono band beam	60.66	(n/c)
HB15F3T	3 ele. 15m mono band beam	93.46	(n/c)
HB15M25P	VP mini size 15m 2 ele.	69.50	(n/c)
HB15M35P	VP mini size 15m 3 ele.	102.30	(n/c)
HB34D	4 ele. tri band beam 10/15/20m	222.90	(n/c)
HB33SP	3 ele. tri band beam 10/15/20m	192.50	(n/c)
HB35C	Tri band array 10/15/20m	283.95	(n/c)
HB35T	5 ele. 10/15/20m	278.50	(n/c)
MV3BH	Vertical for 10/15/20m	37.99	(n/c)
MV4BH	Vertical for 10/15/20/40m	48.90	(n/c)
MV5BH	Vertical for 10/15/20/40/80m	63.95	(n/c)
MLA4	Loop antenna 10/15/40/80	105.60	(n/c)
SQ22	Phased 2 ele. swiss quad 2m	58.95	(n/c)
SQY06	6 ele. quagi 2m	45.75	(n/c)
SQY08	8 ele. quagi 2m	52.75	(n/c)
HB210S	10 ele. dual driven yagi 2m	47.99	(n/c)
TE214	14 ele. long yagi 2m	74.40	(n/c)
SSL720	9 x 2 ele. (18) slot fed 70cm	77.20	(n/c)
HB23SP	2 ele. tri band beam 10/15/20m	135.60	(n/c)
SSL218	9 x 2 ele. (18) slot fed 2m	144.79	(n/c)
TPH2	Phasing harness 2m	17.25	(n/c)
QYU10	10 ele. quagi 70cm	67.90	(n/c)
SQ007	70cm 2 ele. phased swiss quad	66.99	(n/c)
SQ10	Swiss quad 10m	97.50	(n/c)
SQ15	Swiss quad 15m	106.90	(n/c)

YAESU ANTENNAS

Base			
RSL145GP	½ wave base ant. 2m	21.20	(1.50)
RSL435GP	½ wave co-linear 70cm	31.60	(1.50)
HF Mobile			
RSL3.5	3.5MHz resonator & whip	12.21	(0.50)
RSL7.0	7.0MHz resonator & whip	11.80	(0.50)
RSL14.0	14.0MHz resonator & whip	11.45	(0.50)
RSL21.0	21.0MHz resonator & whip	11.20	(0.50)
RSL28.0	28.0MHz resonator & whip	11.00	(0.50)
RSL2A	Mast to suit above	5.00	(0.50)
RSM2	Gutter mount/Feeder/PL259 suit above	10.94	(0.75)
VHF Mobile			
RSL145	2m ¼ wave fibreglass whip	12.10	(0.50)
RSL145S	2m ¼ wave steel whip foldover	9.25	(0.50)
RSL150SS	2m ¼ wave PL259 shock spring	3.90	(0.50)
RSM2	Gutter mount/Feeder/PL259 (RSL145)	10.94	(0.75)
RSM4M	Heavy duty mag/Feeder/PL259	13.25	(1.00)
UHF Mobile			
RSL453S	½ wave antenna	15.50	(0.50)

ANTIFERENCE ANTENNAS

VHF Mobile			
TAP3009	½ wave 3db snap-in hinged whip	13.00	(3.00)
TAP3677	½ wave 3db snap-in shock coil	14.56	(3.00)
TAP3002	¼ wave unity gain snap-in hinged whip	9.96	(3.00)
UHF Mobile			
TAP3462	½ over ½ wave 3db	16.86	(3.00)
TAP3697	½ over ½ wave 5db	20.00	(3.00)
K220	Mag mount/Feeder to suit above	11.96	(2.00)

Antennas Various/Accessories

HQ1	Mini beam 10/15/20m 2 ele. 1kW	139.00	(4.00)
C4	Vertical 10/15/20m	48.50	(3.00)
G4MH	Mini beam 10/15/20	88.00	(4.00)
KTLM-4	Gutter mount/Cable assy. SO239	6.90	(0.50)

DATONG PRODUCTS

PC1	50KHz to 30MHz receive converter	137.42	(0.50)
VLF	Very low freq. converter	29.90	(0.50)
FL1	Frequency agile audio filter	79.35	(0.50)
FL2	Multimode audio filter	89.70	(0.50)
ASP/A	Auto RF speech clipper (YAESU)	82.80	(0.50)
ASP/B	Auto RF speech clipper (TRIO)	89.70	(0.50)
D75	Manual RF speech clipper	56.35	(0.50)
RFC/M	RF speech clipper module	29.90	(0.50)
D70	Morse tutor	56.35	(0.50)
AD270	Active dipole RX ant. (indoor)	47.15	(0.50)
AD370	Active dipole RX ant. (outdoor)	64.40	(0.50)
MK	Morse keyboard	137.42	(0.50)
DC144/28	2m converter	39.67	(0.50)
RFA	Broadband preamplifier	33.92	(0.50)
MPU	Mains power unit	6.90	(0.50)

MICROWAVE MODULES

Transverters			
MMT28/144	10m transverter	109.95	(2.50)
MMT70/144	4m transverter	119.95	(2.50)
MMT432/144R	70cm transverter	184.00	(2.50)
MMT1296/144	23cm transverter	184.00	(3.00)
MMT70/28	4m transverter	119.95	(2.50)
MMT144/28	2m transverter	109.95	(2.50)
MMT432/28S	70cm transverter	159.95	(2.50)
Linear Amplifiers			
MML28/100S	10m 100W linear amp.	129.95	(3.00)
MML70/50S	4m 50W linear amp.	85.00	(2.50)
MML70/100S	4m 100W linear amp.	139.95	(3.00)
MML144/30LS	2m 30W linear amp. 1-3W in	69.95	(2.50)
MML144/50S	2m 50W linear amp.	85.00	(2.50)
MML144/100LS	2m 100W linear 1-3W in	159.95	(3.00)
MML144/100S	2m 100W linear 10W in	139.95	(3.00)
MML432/50	70cm 50W linear amp.	109.95	(3.00)
MML432/100	70cm 100W linear amp.	228.65	(4.00)
MML1296/10	23cm 10W linear amp.	199.00	(2.50)
MML432/30	70cm 30W linear amp. 1-3W in	99.00	(3.00)
Converters			
MM1000KB	ASC11 morse converter with keyboard	99.95	(3.00)
MM4001	RTTY to TV converter	189.00	(2.50)
MM4001KB	RTTY transceiver	269.00	(2.50)
MM4000KB	RTTY transceiver with keyboard	299.00	(4.00)
MMC28/144	10m to 2m converter	29.90	(1.00)
MMC50/28	6m to 10m converter	29.90	(1.00)
MMC70/28	4m to 10m converter	29.90	(1.00)
MMC70/28LO	4m to 10m with LO	32.90	(1.00)
MMC432/28S	70cm to 10m converter	37.90	(1.00)
MMC432/144S	70cm to 2m converter	37.90	(1.00)
MMC435/600	UHF ATV converter	27.90	(1.00)
MMC1296/28	23cm to 10m converter	34.90	(1.00)
MMC1296/144	1296MHz low noise converter	69.95	(1.00)
MMK1691/137.5	1691MHz meteosat converter	129.95	(2.50)
Morse Talkers			
MMS1	Morse tutor 2-20WPM Side tone	115.00	(2.50)
MMS2	Morse tutor (advanced) 6-32WPM + speak back	169.00	(2.50)
Amateur TV			
MTV435	70cm 20W (PSP) transmitter	149.00	(2.50)
MMC435/600	Converter ATV UHF output	27.90	(1.00)
Preamplifiers			
MMA144V	2m preamp RF switched	34.90	(1.00)
MMA28	10m preamp	16.95	(1.00)
MMA1296	23cm preamp	34.90	(1.00)
Frequency Counters			
MMD650/500	500MHz digital meter	75.00	(1.00)
MMD600P	600MHz pre scaler	29.90	(1.00)
MMDP-1	Probe	14.90	(0.50)
Filters			
MMF144	2m band pass 40W max.	11.90	(1.00)
MMF452	70cm band pass 40W max.	11.90	(1.00)
Various			
MMS384	384MHz signal source	29.90	(1.00)
MMR15/10	15db 10W attenuator	11.90	(1.00)

HI-MOUND MORSE KEYS

HK702	Up down keyer marble base	24.50	(0.50)
HK704	Up down keyer	16.68	(0.50)
HK705	Up down keyer	12.50	(0.50)
HK706	Up down keyer	13.75	(0.50)
HK708	Up down keyer	11.96	(0.50)
HK808	Up down keyer marble base	39.57	(0.50)
MK704	Twin paddle keyer	10.95	(0.50)
MK705	Twin paddle keyer marble base	22.00	(0.50)

MOULDINGS

IK	Iambic keyer	19.95	(0.50)

TOKYO HY POWER

HC150	HF ATU SWR/Power meter 200W PEP	62.50	(n/c)
HC2000	HF 2kW ATU SWR/Power meter 6 POS ant. switch. 6 to 1 vernier high Q coils 2kW peak 1kW continuous	276.55	(n/c)

Antenna Rotators & Accessories

9502	Channel master med duty up to 8 ele.	57.00	(3.50)
9523	Alignment bearing for 9502	15.81	(1.25)
KR400	Med/Heavy duty 180° meter	90.85	(3.50)
KR400RC	Med/Heavy duty 360° meter Load 200Kg 1¼"-2" masts	114.94	(3.50)
CASTING	Lower casting set	15.00	(1.25)
KR600RC	Heavy duty 360° meter Load 200Kg Rot600Kg/cm Brake 4000Kg/cm 1¼"-2"masts	163.30	(3.50)

Antenna Switches

SA450	SO239 connectors 1 in 2 out	9.75	(0.50)
SA450N	"N" type connectors 1 in 2 out	12.75	(0.50)
Baluns			
BL50A	RAK 50 ohm ferrite BALUN 1:1 1.8-38MHz 1kW	12.88	(1.50)
BL-40X	Balun 2K PEP 1.1	11.52	(1.50)
Dummy Loads			
T30	30W DC 500MHz PL259	6.61	(0.50)
T100	100W DC 500MHz SO239	20.12	(1.00)
T200	200W DC 500MHz SO239	31.36	(1.50)
T210	Wide band 10W 1.2G-2.4G	24.50	(0.75)
AW05	Pocket RF wattmeter 5W up to 500MHz BNC	19.75	(1.00)

DRAE PRODUCTS

DRAE4	4 amp PSU	30.75	(2.00)
DRAE6	6 amp PSU	48.00	(2.50)
DRAE12	12 amp PSU	74.00	(3.00)
DRAE24	24 amp PSU	105.00	(4.00)
DRAE WM	135-450MHz wavemeter	27.50	(1.00)

"N" Connectors (Silver Plated)

N58	"N" Male connector RG58	2.25	(0.25)
N8	"N" Male connector RG8	2.40	(0.25)
N308	"N" T adaptor (three female)	2.40	(0.25)
N307	"N" L adaptor (1 male 1 female)	2.40	(0.25)
N306	"N" Double female adaptor	1.90	(0.25)
N310	"N" Double male adaptor	2.50	(0.25)
NB304	"N" Female to BNC male adaptor	2.10	(0.25)
N402	"N" Plug to SO239	2.05	(0.25)
N403	"N" Socket to PL259	2.00	(0.25)
N404	"N" Socket to SO239	1.80	(0.25)

TOKYO HY POWER

HL32V	VHF 30W linear 1-5W drive HI-LOW output	53.50	(n/c)
HL82V	VHF linear preamp output meter 2-12W in 35-85+ out	144.50	(n/c)
HL160V	VHF linear preamp output meter 1-10W in 160W+ out	242.40	(n/c)
HL45U	UHF linear preamp 2-15W in 10-45W out	119.75	(n/c)
YAESU			
YH55	Headphones Low Z	10.00	(0.50)
YH77	Lightweight headphones Low Z	10.00	(0.50)

SWR/Power Meters

YAESU			
YS200		52.90	(n/c)
YS2000		69.79	(n/c)
Other Makes			
RF2000	Twin meter 3.5-150MHz F/Scale 200/2000W	18.25	(1.00)
YM1X	Twin meter 3.5-150MHz F/Scale 12 or 120W	14.99	(1.00)

COMPUTERS

Commodore 64. 64K, sprites, sound chip etc.	343.85	(n/c)
Vic 20 + C2N datasett + intro to base part 1 + 4 games. Special price	139.99	(3.00)
Commodore 1541 174K disk drive	299.00	(n/c)
Vic 3K ram pack	29.95	(0.25)
Vic 8K ram pack	44.95	(0.25)
Vic 16K ram pack	74.95	(0.25)
Vic 20 reference guide	9.95	(0.25)
Commodore 64 reference guide	14.95	(0.50)
C2N datasett	44.95	(1.75)
Spectrum 48K	129.95	(1.75)
Spectrum 16K	99.95	(1.75)
ZX Printer	39.95	(0.50)

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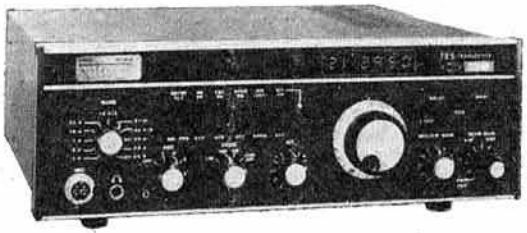
COLLINS KWM-380 Amateur Bands

Transceiver 1.8–30MHz
Receiver 1.8–30MHz
£2195.00

DRAKE TR7A

The Transceiver others try to copy
£1199.00

DRAKE TR5



DRAKE's low cost Transceiver
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BC-100FB **£345.00**
Hand held 16 channel programmable

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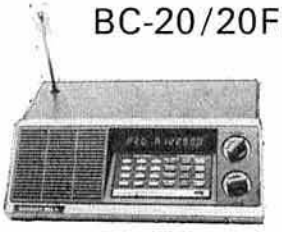
BC-20/20FB



40 Channels
AM/FM
£258.75

BC-150FB 10 channel	**£144.90**
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DRAKE R7A

General Coverage Receiver
£1173.00

BENCHER PADDLES

BY-1 Black Base	**£35.84**
BY-2 Chrome Base	**£43.72**
BY-3 Gold plated	**£92.00**
ZA-1A Balun	**£15.00**
ZA-2A Balun	**£17.25**
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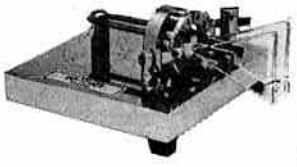

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ICOM's Latest The IC-751 HF Transceiver

Think about the IC-740,
One of the most popular amateur bands transceivers, make a few improvements such as adding 36 memory channels, doing away with mechanical bandswitching and then add full HF receive capabillity (0.1-30 MHz) which is even an improvement on the famous R70 and you get a pretty good idea of what the IC-751 is like. It is fully compatible with Icom Auto units such as the AT-500 and IC-2KL and a further option for computer control can be added. There is also a digital speech synthesizer option which will be ideal for blind operators. For power supplies you have the option of the IC-PS740 (which fits inside) or the PS-15/PS20 range for external use.

As you would expect there is a built in speech processor, a switchable choice of a J-FET pre-amp, straight through or a 20dB pin diode attenuator and two VFOs allowing split frequency operation.

Other standard features include:- 36 memory channels with scan facility and start/stop timers, a marker, 4 variable tuning rates, Pass Band Tuning, notch, variable noise blanker, monitor switch, DFM (direct feed mixer) in the front end, full break-in on CW and AMTOR compatibility. The first IF is 70.045 MHz. Any XIT and RIT adjustment is shown on the display. The transmitter features high reliability 2SC2904 transistors in a low IMD (-32dB@ 100W) full 100% duty cycle. Power is restricted to 40W on AM and adjustable from 10W on all modes. FM and the IC-FL44A crystal SSB filter are both fitted as standard.

As you can see from this brief description the IC-751 is certainly a transceiver worth considering – Why not call us for further details?

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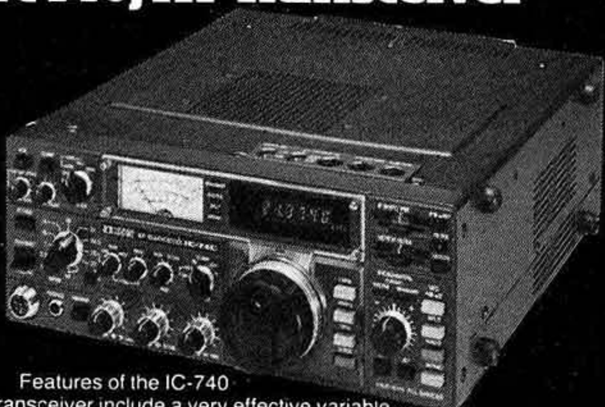
IC-R70, HF Receiver

The R-70 covers all modes (when the FM option is included), and uses 2 CPU-driven VFO's for split frequency working, and has 3 IF frequencies: 70MHz, 9MHz and 455KHz, and a dynamic range of 100dB. It has a built-in mains supply.

Other R-70 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 μv for 12dB (S+N)÷N, Am-0.5μv, FM better than 0.32 for 12dB Sinad. DC is optional.

IC-740, HF Transceiver



Features of the IC-740 transceiver include a very effective variable width and continuously adjustable noise blanker, continuously adjustable speed AGC, adjustable IF shift and variable passband tuning built in. In addition, an adjustable notch filter for maximum receiver performance, along with switchable receiver preamp, and a selection of SSB and CW filters. Squelch on SSB Receive and all mode capability, including optional FM mode. Split frequency operation with two built-in VFO's for the serious DX'er.

The IC-740 allows maximum transmit flexibility with front panel adjustment of VOX gain and VOX delay along with ICOM's unique synthesized three speed tuning system and rock solid stability with electronic frequency lock. Maximum versatility with 2 VFO's built in as standard, plus 9 memories of frequency selection, one per band, including the new WARC bands. With 10 independent receiver and 6 transmitter front panel adjustments.

Options include:

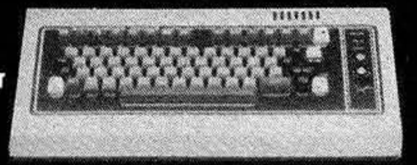
- FM Module
- Marker Module
- Electronic Keyer
- 2 - 9KHz IF Filters for CW
- 3 - 455MHz Filters for CW
- Internal AC Power Supply
- Automatic Antenna Tuner

RTTY, Morse & ASCII

Shortwave listeners and amateurs are able to take more interest in other modes of transmission than speech with the latest range of decoders and senders available. As well as amateur transmissions, there is an abundance of news and other interesting broadcasts which can be read using these space-age devices.

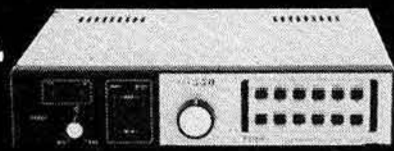
Some models in our range are the Tono 550, 9000E and the Telereader CWR-670, CWR-685E and CWR-610E. There is now available a professional version of the Tono 9000E, the PRO-1, which has a built-in scrambler. The Telereader CWR-670 is also available with a built-in VDU which can include a 40 column printer.

TONO 9000E Sender/Decoder



CWR-610E, Decoder

TONO 550, Decoder



As U.K. importers of the renowned TONO and TELEREADER products, we can offer you a wide range, from a simple morse and RTTY reader which can be plugged into your TV., to a complete send and receive system with memories and built-in displays, or outputs for high-definition VDU.

As well as stocking the complete ICOM range of equipment suitable for European use, we also sell Yaesu, Jaybeam, Datong, Welz, G-Whip, Western, TAL, Bearcat, Versatower and RSGB publications from our shop and showroom at the address below. Come in for a demonstration or just a chat, our qualified sales staff and technicians will be glad to assist you.

Securicor or post despatch free, same day if possible.

Agents

Please telephone first, all evenings and weekends only (except Scotland).

North West – Gordon G3LEQ Knutsford (0565) 4040, Ansaphone.
Scotland – Jack GM8 GEC (031) 665 2420

Do you know what time it is!

When the globe of this digital clock is revolved, a red lamp indicating a major city in the world will blink, and the current time of that city will be displayed in place of the date. At a glance know the current times of 24 different time zones throughout the world.

This mini-globe clock stands 195mm. high and also has an alarm fitted. This useful device should stop you getting your Amateur friends, on the other side of the world, out of bed in the middle of the night.

Thanet ICOM

NEW! IC-271, VHF Multimode Base station

Icom have made improvements to the popular IC-251 and brought it up to date.

Power can be adjusted up to 25W on all modes SSB, CW and FM Squelch works on all modes and a listen-input facility has been added for Repeater work. There is a switchable front end pre-amp. RIT shift is shown on the display. Why not call us for further details? Options include:
Speech synthesizer announcing displayed frequency.
22 Channel memory extension - with scan facilities.
10 Hz tuning facility. SM5 desk mic
Internal chopper PSU (IC-740S)

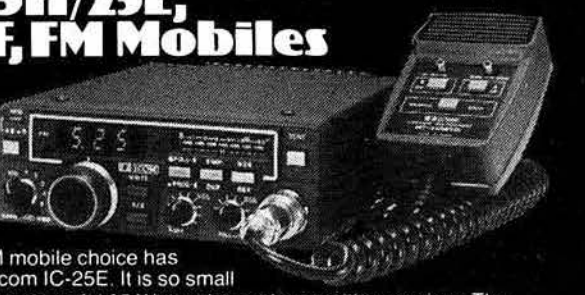
IC-251

Icom produce a perfect trio in the VHF base station range, from 6 meters through 2 meters to 70cms. The IC-251E is the 2 meter station while the IC-451E is used for 70cms. The 251E is now available with Mutek front-end fitted.

IC-290H, VHF Multimode Mobile

The recently introduced IC-290H has proved so popular that we have decided to concentrate on this (25W) model 2m multimode. With its bright green display, 5 memories, scan facilities on either memories or the whole band, tone-call button on the microphone and instant listen input for repeaters, this little box really is a beauty. The 70cm version, the IC-490E has similar features (although the output is only 10W in this case).

IC-25H/25E, VHF, FM Mobiles



The FM mobile choice has to be the Icom IC-25E. It is so small yet boasts a powerful 25 Watt voice and a sensitive receiver. The new 25H now avaiable has a green display and 45 Watts output. There are five easily programmable memories, and facilities for changing the repeater shift from the default value of 600kHz. You can tune the VFO while in a memory without losing or changing the memory. You can listen on the input instantly, and there are also priority channel facilities should you want to be sure of not missing that private message. The HM10 scanning mike is supplied as standard, but the HM11 with tone call on the mike can be used.

IC-2E, VHF/FM IC-4E UHF Portables

Nearly everybody has an IC2E – the most popular amateur transceiver in the world – there is also the 70 cm version which is every bit as good and takes the same accessories.

NEW! IC-120, 1296 MHz FM

Thinking of 1296? Then Icom IC-120 could be the answer.

Now you can have the sophistication of today's technology on this up and coming band-all built into a unit the same size as the IC-25E, very compact...

Features include:	Output Power = 1 W or more
Frequency coverage 1260 - 1300	Mode:- FM
Adjustable Repeater Shift	2 VFO's
6 Memories - with scanning facility	Deviation + 5 KHz
Spurious Emissions - 40dB or better	RIT

8 W and 16W (Puma) Linear Amps available shortly.

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ATC720 synthesised portable 118-136MHz	159.00	2.00
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Global PS15 6 amp PSU Volts/amp metering	25.00	2.00
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Global HP4A TVI high pass filter	5.95	n/c
PS134 13-8V 4 amp PSU	24.95	2.00
HP3A TVI HPF – the original braid-breaker	3.95	0.50
HK708 Manual telegraph CW key	12.75	1.00
EK121 Katsumi Electronic Keyer (battery operated)	32.50	1.50
EKM12 Matching tone monitor	10.95	1.25
KP100 Electronic keyer AC or DC	69.00	2.00
COK-2 Morse practice oscillator	8.00	0.75
YW3 Twin SWR Meter	12.95	0.75
BL40X 50 ohm 1:1 balun/centre insulator	11.25	0.75
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FP210 Self powered 2m FM monitor	10.95	0.75
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Altai Dip Oscillator	49.00	2.00
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Universal ni-cad battery charger	7.95	1.25
MG-YS Maggetic base with SO239 and cable	6.95	1.50

NEW

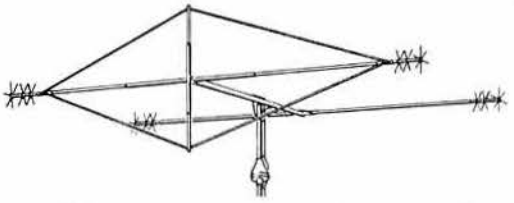
ATTENTION! IC2E & TR2500 OWNERS
KMC2300 MOBILE AMP

(KMC 2300 similar to above)

These units are purpose designed for the IC2E and TR2500. The transceiver sits inside the purpose built module which incorporates a 20-30 watt amplifier and 12V DC supply. The module can clip onto car door pocket and may be permanently wired into vehicle. The transceiver can be disconnected in seconds. The amplifier may be switched in or out of circuit from the control panel. When ordering please specify IC2E or TR2500.

KMC2300/IC2E **£75** KMC2300/TR2500 **£85**

THE ORIGINAL HQ-1
still the best
6M–10M–15M–20M **£139**
carriage £4



6ft turning radius 1kW power rating

MINI PRODUCTS
C4 VERTICAL
6M–10M–15M–20M
£59 carriage £4

★ NEEDS NO RADIALS
★ 11½ft HIGH
★ WEIGHS 4kg
★ POWER RATING 1kW
★ FEED 50 OHMS
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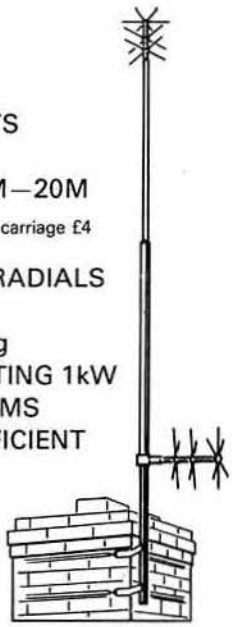


NEW

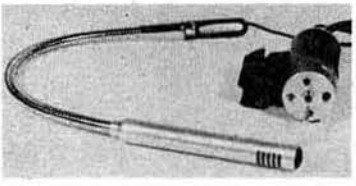
WELZ POWER SUPPLIES

RS-1150D

Model	Ouput voltage	Continuous current	Max current	Price inc VAT
RS-455	DC 3-15V variable	DC 3-6A	DC 4-2A	£39
RC-655	DC 3-15V variable	DC 6A	DC 6-5A	£59
RS-1100	DC 13-8V	DC 10A	DC 11A	£75
RS-1150D	DC 3-15V variable	DC 10A	DC 11A	£89

NEW

MOBILE MIC MM202FX



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£10.75

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SNAP–1 Clamps joins M.750 to EXP. 430	7.95	1.00
PS750 230v AC PSU for M.750	66.00	2.50
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As above fitted with tone burst	131.00	2.00
Palm IV 70cm 1 watt FM6 ch. handheld	119.00	2.00
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TM56B Amateur Monitor fitted 5 chs.	59.00	2.00
TM56B Marine Monitor fitted 5 chs.	59.00	2.00
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BT2 Nicad battery pack for Palm II or the IV	14.00	0.75
Xtals for Palm II and Palm IV	3.75	0.40
Xtals for TM56B	3.75	0.40
KP100 AC/DC lambic Electronic Keyer	69.00	2.00
ATC720 Synthesised Air monitor with nicads & charger	159.00	2.00
ATC12V 12v DC car adaptor	4.95	0.75
ATCC Carrying Case	4.95	0.50

FDK M750X 2M SSB-FM

144–148mHz 10w/1w FM-SSB-CW
Band scanning Up/down mic.

OUR PRICE £315!

AZDEN FM TRANSCEIVERS

PCS4000 2m FM transceiver 25 watts	229.00	2.50
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MC-1 spare AC charger	5.85	0.75
BP500 spare battery pack	12.50	1.00
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Mic. plugs for PCS3000	3.75	0.50
AS-006 Mobile extension speaker	9.95	1.75
Remote cable extension kit for PCS2800	14.40	1.50

AZDEN PCS4000 25W FM

144–146mHz 25W FM
12½ or 25kHz steps 16 memories

OUR PRICE £229

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SP15

AC38

WELZ DIAMOND AERIALS

M285 2m 5/8th wave mobile PL259	8.50	2.00
M287 2m 7/8th wave mobile	14.95	2.00
EL770E 2m/70cm mobile PL259	19.50	2.00
B285 2m 5/8 base aerial with radials	14.95	2.00
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BDS Bumper mounting strap	9.50	1.50
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CA-35A Static discharge protector. DC 500mHz 300w SO239	10.75	1.00
CA23N Static discharge protector. DC 1500mHz 300w 'N'	12.60	1.00
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CT300 300/1kw dummy load 250mHz	49.50	2.00
CTO3N 3w dummy load 1.3gHz N plug	30.00	1.00
CH20A 2 way coax switch 1kw SO239	17.95	2.00
CH20N 2 way coax switch 1kw N sock	31.95	2.00

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Compact Vertical

10-80M 200W
"A vast improvement over its competitors"

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£115

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C4 6-10-15-20 vertical dipole	59.00	4.00
3-30mHz SWL dipole with coax and fittings	25.00	2.00
3.5-30mHz 5 band 1kw dipole with 50' coax	39.50	2.00
EL40X 80-40m compact dipole 70ft with balun	32.00	2.00

VHF MONITORS

TM56B Amateur FM monitor fitted 5 chs.	59.00	2.00
TM56B Marine FM monitor fitted 5 chs.	59.00	2.00
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Sound Air M161 16 ch. FM monitor + nicads & charger	39.50	1.75

MIZUHO

MX2 2m SSB/CW handheld transceiver	89.00	1.75
Case for MX-2	3.95	1.00
Speaker/Mic for MX-2	13.95	1.00

ADONIS MICROPHONES

MM202S Mobile mic. with lapel/visor boom & clip	24.50	1.50
MM202HD Mobile mic. with head/neck band	31.00	1.50
MM202HM Mobile mic. with headphone unit	42.00	1.50
AM303 Base station mic with amp & response switch	29.00	1.50
AM503 As above fitted with compressor	39.00	2.00
MS10 Mobile spkr & message pad. Clips to visor	16.25	1.50

SAGANT AERIALS

AL-144FL Portable folding ground plane	23.50	2.00
EL-40X 80 to 40m compact dipole. 70ft. with balun	32.00	2.00
Super-rod 2. Telescopic 5/8 ant. BNC	8.50	1.00
MG-YS Magnetic base SO239 cable	6.95	1.50

South Midlands Com

FREE FINANCE

on regular priced Yaesu and many other lines (invoice Balances over £120)

FT ONE £1,450 inc. VAT @ 15% & SECURICOR

FREE SECURICOR

★ Rx: 150KHz-30MHz. Continuous general coverage.
★ Tx: 160-10m (9 bands) or 1.5-30MHz commercial.
★ All Modes: AM, CW, FM*, FSK, LSB, USB.
★ 10 VFO's!!! Any Tx-Rx split within coverage.
★ Two frequency selection ways, *no* bandswitch.
★ Main dial, velvet smooth, 10Hz resolution.
★ Inbuilt keyboard with up/down scanning.
★ Dedicated digital display for RIT offset.
★ Receiver dynamic range up to 100dB!!!
★ SSB: Variable bandwidth *and* IF shift.
★ 300* or 600Hz*, 2,400 → 300Hz, 6kHz*, 12kHz*.
★ Audio peak and notch filter. FM squelch.
★ Advanced variable threshold noise blanker.
★ 100W RF, key down capability, solid state.
★ Mains and 12VDC. Switch mode PSU built in.
★ RF processor. Auto mic gain control. VOX.
★ Last but not least *full* break in on CW.

★ Notch filter in TF (AGC immune to hetrodynes).
★ Full break in keying. 500/600/700Hz beat.
★ Unique analogue scale of digital type.
★ Comprehensive twin meter metering.
★ Memory retains mode information.
★ Rx 150kHz-30MHz.
★ Tx 160-10m 9 bands + 3 × 500kHz Aux bands.
★ All modes AM, CW, LSB, USB, AFSK, FM standard.
★ IF shift + variable bandwidth 2·6kHz-300Hz.
★ Inbuilt keyboard operation + Scanning.
★ Switchable attenuator 10, 20, 30dB.
★ Audio peak + notch filter – 40dB.
★ RF process or Auto mic gain control.
★ 3rd order IMD – 40dB at 100W PEP.
★ AFSK shift 170, 425, 850Hz selectable.
★ Multi channel memory + programmable scan limits.

INSTANT FINANCE

FT980 £1,215 inc. VAT @ 15% & SECURICOR

FT102 £839 inc. VAT @ 15% & SECURICOR

2 YEAR GUARANTEE

★ 1.8-3.5-7-10-14-18-21-24.5-28MHz
★ All modes: LSB, USB, CW, AM†, FM†, (†Option board)
★ Front end: extra high level, operates on 24V DC
★ RF stage bypassable, boosts dynamic range over 100 dB!
★ Variable bandwidth 2.7kHz →500Hz *and* IF Shift
★ Fixed bandwidth filters, parallel or cascade
★ IF notch (455kHz) *and* independent audio peak
★ Noise blanker adjustable for pulse *width*
★ External Rx and separate Rx antenna provisions
★ *Three* 6146B in special configuration—40dB IMD!
★ Extra product detector for checking Tx IF signal
★ Dual meter, peak hold ALC system
★ Mic amp with tunable audio network
SP102: – Speaker, Hi and Lo AF filters, 12 responses!
FV012: – VFO, 10Hz steps and readout, scanning, QSY
FC102: – ATU, 1·2KW, 20/200/1200 W FSD PEP, wire
FAS-1-4R: – 4 way waterproof antenna selector

★ 160-10 metres including new allocations.
★ Variable IF bandwidth 2.4kHz down to 300Hz.
★ Audio Peak and independent notch controls.
★ AM, FSK, USB, LSB, CW, FM, (Tx and Rx).*
★ Semi-break in, inbuilt Curtis IC Keyer included.
★ Digital plus analogue frequency displays.
★ VOX built-in and adjustable.
★ Instant write in memory channel.**
★ Tune up button (10 sec, of full power).
★ Switchable AGC and RF attenuator.
★ Optional 350 or 600Hz CW, 6kHz AM filters included.
★ Clarifier (RIT) switchable on Tx, Rx or both.
★ Plug in modular, computer style constructor.
★ Fully adjustable RF Speech processor.
★ Ergonomically designed with necessary LEDS.
★ Incredible range of matching accessories.
★ Universal power supply 110-234V AC and 12V DC.**

SPECIAL OFFER

FREE FTV901R transvertor frame with any FT902 List.....**£195.00**

FT902DM £885 inc. VAT @ 15% & SECURICOR

*Option **D & DE Models

FT77 £515 inc. Vat @ 15% & SECURICOR

FREE CREDIT COVER

★ 80-10 metres including WARC allocations.
★ Multimode LSB-USB-CW (W) CW (N)* *and* FM.
★ 100W PEP output (IOW "S" version).
★ No tune design—inbuilt SWR meter.
★ Only 3¾ × 9¼"—Less than a foot deep!
★ Dual selectable pulse width noise blanker.

FT77	Transceiver 100W output	£515.00
FT77S	Transceiver 10W output	£435.00
MARK 7	Crystal Marker board	£9.60
FMU77	FM Unit	£25.30
XF8,9HC(N)	600Hz or 300Hz (N)	£26.05
FV707DM	Digital Memory VFO	£200.00
FC700	Antenna Tuner	£99.65
FP700	Mains P.S.U.	£110.00
FTV707	Transverter, frame only	£79.00

Modules: 432 **£195.00** 144 **£109.65** 70 **£84.70**

URGENT

Then use **HOTLINE** numbers

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

SMC SERVICE
Free Securicor delivery on major equipment.
Access and Barclaycard over the phone.
Biggest branch agent and dealer network.
Securicor 'B' Service contract at £4.49.
Biggest stocklist of amateur equipment.

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

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

mmunications ltd.

AUTHORISED YAESU

MAIN DISTRIBUTOR—FACTORY BACKED

FT707 £515 inc. VAT @ 15% & SECURICOR

SPECIAL OFFER

FREE FTV707 transvertor frame with any FT707.
List.....£79.00

- ★ 80-10 metres (including 10, 18 and 24MHz bands).
- ★ USB-LSB-CWN-AM (Tx and Rx operation).
- ★ 100W PEP. 50% power output at 3:1 VSWR.
- ★ Full "broad band" no tune output stage.
- ★ Excellent Rx dynamic range, power transistor buffers.
- ★ Rx Schottky diode ring mixer module.
- ★ Local oscillator with ultra-low noise floor.
- ★ Variable IF bandwidth—16 crystal poles.
- ★ Bandwidths 6kHz*, 2.4kHz-300Hz, (600-350) Hz*.
- ★ AGC; slow-fast switchable VOX built-in.
- ★ Semi-break in with side tone for excellent CW.
- ★ Digital (100Hz) plus analogue frequency display.
- ★ LED Level meter reads: S, PO and ALC.
- ★ Indicators for: calibrator, fix, int/ext VFO.
- ★ Receiver offset tuning (RIT clarifier) control.
- ★ Advanced noise blanket with local loop AGC.

*Option

SMC FM MODIFIED VERSION AVAILABLE; £40 EXTRA

FT726R MULTIMODE £699 inc. VAT @ 15% & SECURICOR

- ★ 3 Bands 2 metres, 70cms* (10MHz) & 6M* plug-ins.
- ★ Full Duplex*! Cross band Tx & Rx simultaneously.
- ★ SSB-CW-FM! all optimumly catered for.
- ★ Variable bandwidth *and* IF shift! SSB & CW.
- ★ Processor! Front panel mic gain *and* drive.
- ★ Two main VFO's! A & B with 20Hz steps.
- ★ Separate channelised VFO! (for FM operation).
- ★ Scanning! Over the band *and* the 10 memories.
- ★ Repeater splits! Programmable *and* preset.
- ★ Instant reversal *and* + & − splits *and* A/B.
- ★ Twin meters; PO/DISC, S/ALC. Duplex switchable.
- ★ Switchable; AGC, CW bandwidth, dial lock.
- ★ Noise blanker, impulse interference tuned

		*Option
FT726R(2)	Transceiver c/w 144MHz	£699.00
430T726	430-440MHz module	£230.00
50T726	Six meter module	£170.00
SAT726	Full duplex unit	£90.00

AVAILABLE SOON HF MODULE FOR 21, 24, 28MHz

KDK2030 £199 inc. VAT @ 15% & SECURICOR

EXCEPTIONAL VALUE

- ★ 2M. 12VDC compact 2⅛" × 6⅜" × 7⅞".
- ★ 25W (+adjustable low power), 12½kHz steps.
- ★ 10 "year long" memories for "crystal control".
- ★ Display reads to 100's of Hz *or* channel number.
- ★ Sensitivity <0.2μV for 12dB SINAD (0.14μV typical).
- ★ Single knob frequency selection. 20 steps rev.
- ★ Rapid QSY button, end to end in a single turn.
- ★ Digital RIT 1kHz steps, adjusted from, main tuning.
- ★ 2, 5 slot memories, simplex, cross or 600kHz split.
- ★ Memories entered by pushing main tuning knob.
- ★ +600kHz split. Instant repeater input monitor.
- ★ Band scan between front panel selectable, limits.
- ★ Scan stop requires squelch open *and* centre zero.
- ★ Scanning and up/down tuning on the microphones.
- ★ Reprogrammable; steps, tone, splits, and coverage.
- ★ C/W mic. "Easy out" mobile mount and handbook.

RECEIVER WITH 12 MEMORIES: FRG7700M £399 inc. VAT @ 15% & SECURICOR

- ★ 30MHz down to 150kHz (and below).
- ★ 12 Channel memory option with fine tune.
- ★ SSB (LSB/USB), CW, AM, FM.
- ★ 2·7kHz, 6kHz, 12kHz, 15kHz @ −6dB.
- ★ 3 Selectivities on AM. Squelch on FM.
- ★ Up conversion, 48 MHz first IF.
- ★ 1kHz digital, plus analogue, display.
- ★ Inbuilt quartz clock/timer.
- ★ No preselector, auto selected LPF's.
- ★ Advanced noise blanker fitted.
- ★ Antenna 500Ω to 1·5MHz, 50Ω to 30MHz.
- ★ 20dB pad plus continuous attenuator.
- ★ Switchable A.G.C. Variable tone.

'7700 THE ONE WITH FM!'
NON-MEMORY VERSION £355

- ★ 110 and 240Vac, 12Vdc option.
- ★ Signal meter calibrated in "S" and SIMPO.
- ★ Acc; Tuners, Converters, LPF, Memory.
- ★ FRT7700; 150kHz-30MHz, Switch, etc.
- ★ FRV7700A; 118-130, 130-140, 140-150MHz
- ★ FRV7700B; 118-130, 140-150, 50-59MHz.
- ★ FRV7700C; 140-150, 150-160, 160-170MHz.
- ★ FRV7700D; 118-130, 140-150, 70-80MHz.
- ★ FRV7700E; 118-130, 140-150, 150-160MHz.
- ★ FRV7700F; 118-130, 150-160, 170-180MHz.
- ★ FF5; 500kHz (for improved VLF reception).
- ★ MEMGR7700; 12 Channels (internal fitting).
- ★ FRA7700; Active Antenna.

COMMUNICATION RECEIVER: NRD515

- ★ 30MHz to 100kHz or lower, 100Hz steps.
- ★ PLL digital VFO, stable (50Hz/hr AWU).
- ★ Backlash free, 500Hz analogue calib.
- ★ Fast tune up/down switch, dial lockout.
- ★ SSB (USB/LSB), CW, AM, RTTY.
- ★ 6 and 2.4kHz, 600* and 300* Hz @−6dB.
- ★ Passband tuning ±2kHz on SSB and CW.
- ★ Variable BFO on CW for preferred tone.
- ★ Modular plug in design with mother board.
- ★ Reliable—low power schottky & CMOS.
- ★ Designed for maximum ease of operation.
- ★ Noise blanker 0-10-20dB attenuator.
- ★ Small (140 × 340 × 300mm) light 7½Kg.

PROFESSIONAL MONITOR

- ★ Up conversion, 70.455MHz and 455kHz
- ★ No R.F. amplifier, balance U310 mixer
- ★ Crystal filter before first IF amplifier
- ★ Transceiver provisions; sidetone, trip etc.
- ★ Frequency data input/out port.

NHD518	96 (4 × 24) channel memory unit.
NCM515	Remote frequency keypad controller, LCD readout. 4 channel memory Up/down step tuning.
CQE515	Junction unit (NCM515 to NHD518).
NVA515	External 3W speaker.
CFL260	600Hz mechanical filter.
CFL230	300HZ crystal filter.

REMEMBER

Only authorised Yaesu dealers have direct 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 (Humberside)
247A Freeman Street,
Grimsby, Lincolnshire.
Grimsby (0472) 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

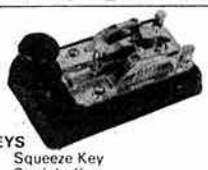
CHESTERFIELD
SMC (Jack Tweedy) LTD.
102 High Street,
New Whittington, Chesterfield.
Chesterfield (0246) 453340
9-5.30 Tue-Sat

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
10-7 Mon-Sat

EDINBURGH
SMC Scotcomm
23 Morton Street,
EH15 2HN
031-657 2420
10-5 Tue-Fri (9-4 Sat)

MORSE EQUIPMENT



MORSE KEYS

BKU1	Squeeze Key	£30.30	£1.20
HK703	Straight Key	£25.70	£1.20
HK704	Straight Key	£17.65	£1.20
HK706	Straight Key	£14.60	£1.00
HK707	Straight Key	£13.75	£1.00
HK710	Straight Key	£36.40	£1.75
HK808	Straight Key	£45.60	£1.75
HK711	Key Mounting	£29.50	£1.50
BK100	Mechanical Bug	£22.25	£1.75
MK701	Single Lever Paddle	£25.25	£1.60
MK702	Single Lever Paddle	£26.45	£1.60
MK703	Squeeze Key	£25.95	£1.75
MK705	Squeeze Key	£22.60	£1.75
MK706	Squeeze Key	£19.50	£1.75
IKP60	Iambic	£9.95	FOC
SR1	Straight Key	£12.65	FOC

MORSE EQUIPMENT

KP100	Squeeze CMOS 230/13·8V	£69.00	£2.00
KP200	Memory 4096 Multi Ch Mem Back Up 230/13·8V	£155.25	£2.50
D70	Morse Tutor (Datong)	£56.35	FOC
MMS1	Morse Tutor (M/M)	£115.00	FOC
MMS2	Morse Tutor Advanced	£155.00	FOC

MICROWAVE MODULES – RTTY EQUIPMENT

MM2001	RTTY to Demod./Convertor	£189.00	FOC
MM4001	RTTY Transceiver		FOC
MM4001KB	RTTY Transceiver c/w keybd	£299.00	FOC
MM1000	ASCII to Morse Converter	£69.95	FOC
MM1000KB	ASCII CW conv c/w keybd	£89.00	FOC

PRICES INCLUDE VAT at 15%
Carriage as shown

J-BEAM

4 METRES

4Y/4M	Yagi 4 element	7dBd	£29.90	£2.20
PMH2/4M	Phasing harness 2 way		£16.10	£1.50

2 METRES

H0/2M	Halo head only	0dBd	£5.98	£1.20
HM/2M	Halo with 24" mast	0dBd	£6.55	£1.50
C5/2M	Colinear omni vert	4·8dBd	£54.62	£2.50
LW5/2M	Yagi 5 element	7·8dBd	£14.37	£2.50
LW8/2M	Yagi 8 element	9·5dBd	£17.82	£2.50
LW10/2M	Yagi 10 element	10·5dBd	£24.15	£2.50
LW16/2M	Yagi 16 element	13·4dBd	£35.07	£3.20
14Y/2M	Yagi 14 element	12·8dBd	£36.23	£3.20
PBM10/2M	10 ele Parabeam	11·7dBd	£44.85	£3.20
PBM14/2M	14 ele Parabeam	13·7dBd	£55.77	£3.20
Q4/2M	Quad 4 element	9·4dBd	£29.32	£2.50
Q6/2M	Quad 6 element	10·9dBd	£39.10	£2.50
Q8/2M	Quad 8 element	11·9dBd	£44.85	£2.50
D5/2M	Yagi 5 over 5 slot	10dBd	£25.30	£2.50
D8/2M	Yagi 8 over 8 slot	11·1dBd	£34.50	£2.50
5XY/2M	Yagi 5 ele crossed	7·8dBd	£28.17	£2.50
8XY/2M	Yagi 8 ele crossed	9·5dBd	£35.65	£2.50
10XY/2M	Yagi 10 ele crossed	10·8dBd	£46.00	£2.50
PMH2/C	Harness cir polarisation		£9.77	£1.50
PMH2/2M	Harness 2 way 144MHz		£12.65	£1.50
PMH4/2M	Harness 4 way 144MHz		£28.75	£1.50

SEVENTY CM

C8/70	Colinear Omni Vertical	6·1dBd	£62.10	£2.50
D8/70	Yagi 8 over 8 slot	12·3dBd	£25.87	£2.50
PBM18/70	18 ele Parabeam	13·5dBd	£32.20	£2.50
PBM24/70	24 ele Parabeam	15·1dBd	£42.55	£2.50
LW24/70	Yagi 24 element	14·8dBd	£27.02	£2.50
MBM28/70	28 ele Multibeam	11·5dBd	£21.27	£2.50
MBM48/70	48 ele Multibeam	14·0dBd	£35.65	£2.50
MBM88/70	88 ele Multibeam	16·3dBd	£48.87	£2.50
8XY/70	Yagi 8 ele crossed	10dBd	£42.55	£2.50
12XY/70	Yagi 12 ele crossed	12dBd	£52.90	£2.50
PMH2/70	Harness 2 way		£10.35	£1.50
PMH4/70	Harness 4 way		£22.42	£1.80

1296 MHz

CR2/23CM	Corner reflector	13·5dBd	£40.25	£2.50
PMH2/23CM	Harness 2 way		£31.05	£1.50

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

ANTENNA ACCESSORIES

2M ASCOT ANTENNAS MOBILE
(The keenest prices) Complete with bases and cable

			p/p
340COM	¼ × Standard	£6.10	£1.50
310COM	¼ × Swival	£8.10	£1.50
344COM	¼ × Sprung	£10.38	£1.50
440COM	⅝ × Standard	£7.71	£1.50
330COM	⅝ × Swival	£10.00	£1.50
341COM	⅝ × Sprung	£12.31	£1.50
092	Magnetic Mount	£10.75	£1.50
350	¼ × Standard	£14.26	£1.50
351	¼ × Sprung	£15.01	£1.50
091	Magnetic Mt ¼ ×	£10.75	£1.50

MASTS & TOWERS

TT24	79' Tower c/w rigging	£626.00	DIST
TT30	101' Tower c/w rigging	£730.00	DIST
SMC16	16' Portable c/w rigging	£21.28	£2.20
SMC24	24' Portable c/w rigging	£25.88	£2.20
SPK16	16' Light duty portable	£17.25	£2.20
10P30	30' Telesc. Versatower	£388.00	DIST
13P40	40' Telesc. Versatower	£436.00	DIST
13P60	60' Telesc. Versatower	£534.00	DIST
16P40	40' Telesc. Versatower	£650.00	DIST
16P60	60' Telesc. Versatower	£739.00	DIST

COAXIAL CABLE (per metre)

UR43	50 ohm 5mm	£0.27	£2.00
UR76	50 ohm 5mm Stranded core	£0.29	£2.00
UR67	50 ohm 10·2mm low loss	£0.67	£2.40
LDF2	50 ohm ½" Foam Heliax	£2.85	£2.50
LDF4	50 ohm ½" Foam Heliax	£3.58	£2.50
307EP	75 ohm Economy	£2.21	£2.00
UR70	75 ohm 6mm	£0.30	£2.00
UR39	75 ohm 7.8mm	£0.44	£2.40
UR57	75 ohm 10.2mm low loss	£0.69	£2.50
302	75 ohm Galv. twin *	£0.17	£1.50
306	300 ohm Galv twin	£0.23	£1.50

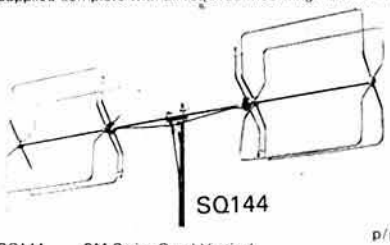
ANDREWS HELIAX CONNECTORS

L42W	'N' Plug male LDF2/50	£12.07	£0.65
L42N	'N' Jack female LDF2/50	£12.07	£0.65
L42P	UHF Plug (PL259) LDF2/50	£12.07	£0.65
L44W	'N' Plug male LDF4/50	£12.42	£0.65
L44N	'N' Jack female LDF4/50	£12.42	£0.65
L44P	UHF Plug (PL259) LDF4/50	£11.09	£0.65

SMC-HS

HF, VHF, UHF, BASE STATION ANTENNAS

SMC-HS range of base station antennas covers from 80M through to 70cm. All have S0239M connectors and are supplied complete with all required mounting hardware.



			p/p
SQ144	2M Swiss Quad Vertical Mounting 2M ⅜ c/w ground plane	£57.60	£2.50
GP2M	3·4dB ¼	£18.00	£2.50
GP144W	2M 2 × ¼ colinear 6·5dB ¼	£27.60	£2.50
GP23	2M 3 × ¼ colinear 7·8dB ¼	£39.85	£2.50
GP432	70cm 3 × ¼ colinear 6·8dB ¼	£29.90	£2.50
70N2V	2M/70cm colinear 2·8dB ¼/5·7dB ¼	£29.90	£2.50
HS770	2M/70cm Duplexer 50W 30dB isolation	£15.35	£1.50
VHFL	65-520MHz Discone Rx only	£15.70	£2.50
GDX1	80-480MHz Discone 3dB ¼	£40.25	£2.50
GDX2	50-480MHz Discone 3dB ¼	£49.45	£2.50
GDXA	100-480MHz Discone 3dB ¼	£33.75	£2.50
LT606	50-500MHz Log Periodic 7·8dB	£115.00	£2.50
HF5V	Trapped Vertical 10-80M 5 bands	£54.80	£2.50
HF5R	Loaded Radial Kit	£34.90	£2.50
3Y1015D20	3 ele 10, 15M Dipole 20M	£144.90	£5.00

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

ROTATORS

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

RLD3	Bell	5 Core	Light Duty	£40.25
505	Bell	5 Core	Light Duty	£40.25
AR30	Offset	5 Core	Light Duty	£50.35
KP250	Bell	6 Core	Lighter Duty	£54.91
9502B	Offset	3 Core	Lighter Duty	£56.92
AR22	Bell	4 Core	Medium Duty	£67.85
9508	Offset	3 Core	Medium Duty	£80.21
AR40	Bell	5 Core	Medium Duty	£90.85
BT1	Bell	5 Core	4 Preset medium	£91.43
KR400	Bell	6 Core	Matches KR500	£97.75
KR500	Thro	6 Core	Elevation	£97.75
AR50	Bell	5 Core	5 Position Medium	£113.85
KR400RC	Bell	6 Core	Medium Duty	£114.94
CD45	Bell	8 Core	Heavy Duty	£136.85
KR600RC	Bell	8 Core	Heavy Duty	£163.30
HAM IV	Bell	8 Core	Heavier Duty	£258.75
KR2000RC	Bell	8 Core	Heavier Duty	£314.52
T2X	Bell	8 Core	Very Heavy Duty	£327.75
H300	Bell	8 Core	Digital Readout	£493.35

Control Cable

RC4W	4 Way	28p/mtr	Carriage £1.80
RC5W	5 Way	33p/mtr	Carriage £1.80
RC6W	6 Way	51p/mtr	Carriage £1.80
RC8W	8 Way	55p/mtr	Carriage £1.80
9523	Support Bearing 9502	£15.81	Carriage £2.50
KCO38	Lower Mast Clamp KR400 600	£12.07	Carriage £2.50

Prices including VAT and Carriage, but accessories are extra unless sent with rotators.

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CPU2500RK	FM25W Keyboard Mic Scanner 25kHz	£189.00
CPU2500RKS	FM25W Keyboard Mic Scanner 25kHz	£179.00
FT227RBst	FM10W Scanner 25kHz	£189.00
FT227RKS	FM10W Scanner 25kHz	£179.00
FTV107	Transvertor Frame only (grey)	£49.00
FV107	Remote VFO (grey)	£59.00
DMS107	Digital memory unit for FT107	£69.00
FT207R	FM2.5W Handheld keyboard, Scanner set	£149.00
FTV650B	Matching 6m transvertor FT101 'B 'E	£99.00
YK901	Keyboard	£89.00
AMO101Z	AM unit MK3 101Z	£10.00
DIGT225OSC225	Digital modification kit for FT225	£55.00
Mobil mount	FT 101 series to E, FR, FL101	£12.00
Mobil mount for	FTs 107, 901, 221, 225, 301, FRG7, 7000	£10.00
MMC70/4	Convertor 70MHz to 4MHz	£19.00
MC70/18	Convertor 70MHz to 18MHz	£19.00
MMC1296/28	Convertor 1296MHz to 28MHz	£25.00
MMC1296/144	Convertor 1296MHz to 144MHz	£25.00
MMC156/28	Convertor Marine band to 28MHz	£27.00
Bearcat 220	Scanning Receiver	£169.00

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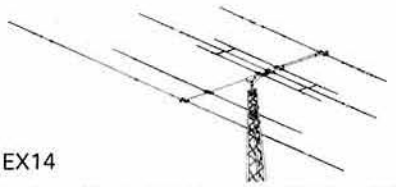

EX14

MULTIBAND BEAMS		Inc VAT	P&P
EX14	Explorer 10-20m	P.O.A.	
TH3JN	3 Ele 10-20m	£202.40	£3.50
TH2MK3	2 Ele 10-20m	£169.05	£3.50
TH3MK3	3 Ele 10-20m	£274.85	£5.30
TH5DXX	5 Ele 10-20m	£419.75	£6.70
TH7DXX	7 Ele 10-20m	£511.75	£8.75
TB3	3 Ele 10-20 Jaybeam	£181.70	£5.40
HQ1	Mini Quad 10-20	£139.00	£4.00
G4MH	Mini Beam 1-20	£82.50	£4.00
TA33JNR	3 Ele 10-20 Moseley	£161.00	£3.40
Mustang 2	2 Ele 10-20 Moseley	£177.10	£3.50
Mustang 3	3 Ele 10-20 Moseley	£220.80	£3.70
GQ2E	2 Ele 10-20 Quad	£189.75	£5.40
GQ3E	3 Ele 10-20 Quad	£313.95	£9.20
GQ4E	4 Ele 10-20 Quad	£446.20	£10.00
Hyquad	2 Ele 10-20	£171.35	£6.70
LP1007	Log Periodic 13-20 MHz	£1474.30	DIST
3Y1015D20	3 Ele 10-20m	£134.95	£5.00
DB10/15A	3 Ele 10-15m	£198.95	£4.80

TB3

MONO BAND BEAMS			
103BA	3 Ele Yagi 10m	£67.85	£3.50
105BA	5 Ele Yagi 10m	£155.25	£3.75
153BA	3 Ele Yagi 15m	£90.85	£3.50
155BA	5 Ele Yagi 15m	£236.90	£5.90
203BA	3 Ele Yagi 20m	£178.25	£4.90
204BA	4 Ele Yagi 20m	£286.35	£7.30
205BA	5 Ele Yagi 20m	£396.75	£9.40
402BA	2 Ele Yagi 40m	£247.25	£6.50
18TD	Dipole Tape 10-80m		

HF5V

HF5R

VERTICALS			
12AVQ	Vertical 10-20m	£50.60	£2.75
14AVQ	Vertical 10-40m	£64.40	£2.75
18AVT/WB	Vertical 10-80m	£113.85	£2.75
18V	Vertical 10-80m taped	£36.22	£2.75
C4	Vertical 10-20m	£59.00	£2.50
SMCHF5	Vertical 10-80m	£54.80	£2.50
SMCHF5P	Radial Kit for above	£34.90	£2.50
TRAP DIPOLE			
SMCTD/HP	High Power 10-80m	£43.41	£2.50
SMCTP/P	Portable inc coax	£59.80	£2.50
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Tribander	10-20m Slide sw.	£25.88	£1.50
Multiband	10-20m	£30.48	£1.50
Flexiwhip	10m only	£18.11	£1.85
Extra coils	For above to 160m	£5.70	£1.00
Flexiten	2, 10, 12, 17, 15, 20, 30, 40, 80M	£49.00	£2.00
Bases	For above	£5.75	£1.00

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

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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		89.70
FS710V	50-150 MHz	15/150W	Pep		89.70
FS50HP	1.8-60 MHz	20/200/2000W	Pep		89.70
FS50VP	50-150 MHz	20/200W	Pep		89.70
FS500H	1.8-60 MHz	20/200/2000V	Pep		69.75
FS500V	50-150 MHz	20/200W	Pep		69.75
FS300H	1.8-60 MHz	20/200/1000			46.40
FS300V	50-150 MHz	20/200			46.40
FS200	1.8-150 MHz	20/200	Pep		50.60
FS601M	1.8-30 MHz	20/200W	Pep		51.35
FS601MH	1.8-30 MHz	200/2000W	Pep		51.35
FS602M	50-150 MHz	20/200W	Pep		51.35
FS603M	430-440 MHz	5/20W	Pep		51.35
FS210	1.8-150 MHz	20/200W	Auto SWR		55.20
FS301M	2-30 MHz	20/200W			35.65
FS301MH	2-30 MHz	200/2000W			35.65
FS302M	50-150 MHz	20/200W			35.65
FS711H	2-30 MHz	20/200W	Head		36.80
FS711V	50-150 MHz	20/200W	Head		36.80
FS711U	430-440 MHz	5/20W	Head		36.80
HB1	FS711H Coupler				23.75
VB1	FS711V Coupler				23.75
UB1	FS711U Coupler				23.75
FS5E	3.5-150 MHz	20/200/1000W	HF		37.20
FS5S	1.8-150 MHz	20/200/1000W	HF		37.95
FS7	145 & (432 MHz)	5/20/200	144		41.00
SWR3E	3.5-150 MHz	20/200/1000W	HF		25.00
SWR3S	3.5-150 MHz	F/S Meter ant.			26.45
SWR50B	3.5-150 MHz	Twin Meter			26.45
FS20D	3-150 MHz	5/20W			37.95
FS-800	1.8-150 MHz	6/30/150W			115.00
JD					
JD110	1.5-150 MHz	10/100W			13.80
MIRAGE					
MP2	50-150 MHz	50/500/1500W	Pep		100.00
S.M.C.					
S3-30L	Mini				8.80
T3-170L	3.5-170 MHz	Relative			14.95

T3-170L

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

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

SMC 78F

GCD

SMC258

GCD

	SMC-HS MOBILE ANTENNAS	£	P&P
SMC6P2T/PL	Telescopic 2M PL259 fitting 0dB↓	3.45	0.60
SMC6P2T/BNC	Telescopic 2M BNC fitting 0dB↓	5.00	0.60
SMC2H/PL	Helical 2M PL259 fitting	3.45	0.60
SMC2H/BNC	Helical 2M BNC fitting	5.00	0.60
SMCHS430	70cm ¼ wave BNC fitting 2.5dB↓	6.90	0.60
SMC2QW	2M ¼ wave 0dB↓ 1.6'	2.30	1.50
SMC2NE	2M ⅝ wave fold 3.0dB↓ 4.3'	6.90	1.80
SMC2VF	2M ⅝ wave fold 3.0dB↓ 3.5'	11.50	1.80
SMC78F	2M ⅞ wave fold 4.5dB↓ 5.7'	13.80	2.00
SMC78B	2M ⅞ wave ball 4.5dB↓ 5.6'	13.80	2.00
SMC78SF	2M ⅞ wave short 4.7'	13.80	2.00
SMC88F	2M 8/8 wave 5.2dB↓ 6.5'	18.80	2.00
SMC118M	Colinear 2M 11/8 wave fold 7dB↓ 9.7'	29.90	2.50
SMC25B	70cm 2 × ½ fold 5.5dB↓ 3.1'	12.65	1.80
SMC358	70cm 3 × ½ 6.3dB↓ 4.7'	16.85	1.80
SMC70N2M	Dual band 2M 2.7dB↓ 70cm 5.1dB↓	16.85	1.80
SMCHS770	144/432 Duplexer 50W	15.35	1.50
SMC20SE	20M 1.72M 'fold over' 100W PEP	17.65	2.00
SMC15SE	15M 1.72M 'fold over' 130W PEP	14.55	2.00
SMC10SE	10M 1.72M 'fold over' 200W PEP	13.80	2.00
SMC17SE	17M 1.915M 'fold over' 200W PEP	15.70	2.00
SMC12SE	12M 1.915M 'fold over' 200W PEP	14.20	2.00
SMCGCCA	Gutter clip 4 mtrs cable	9.95	1.80
SMCSOCA	Cable assembly 4M	5.00	1.20
SMCSOCAL	Cable assembly 6M	5.35	1.20
SMCTMCAS	Trunk mount c/w 6M cable	8.45	1.80
SMCSOMM	Magnetic base c/w 4M cable	9.95	1.80
SMCSOWM	Adjustable wing mount base	4.20	0.90
SMCGCD	Gutter clip deluxe	4.60	1.20
SMCBSD	Bumper strap deluxe	8.80	1.20
HS88BK	Bumper mounted extension for 144 MHz ant.	18.80	1.80

SOMM

HS770

NB: PRICES INCLUDE VAT AT 15%

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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.

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Affiliated societies: £14.50 (including *Radio Communication*) **£8.70** (excluding *Radio Communication*)
(Subscriptions include VAT where applicable)

RSGB QSL BUREAU

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

A list of QSL Bureau sub-managers was published in the January 1983 issue of *Radio Communication*, and amendments are published under "Amateur Radio News".

RSGB NEWS SERVICES

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

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

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

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

EDITORIAL

The Cost of Amateur Radio

The fee for an amateur radio licence was raised on 1 June from £8 to £12. This represents an increase of 50 per cent since the last increase some two-and-a-half years ago, which might be considered to be excessive. The question arises, should we accept this increase as reasonable, or should the appropriate tables be pounded?

The purpose of our licence fee is, of course, to cover the costs of administering amateur radio by the Home Office (now part of the Department of Trade & Industry—see "Amateur Radio News"). It has to cover the cost of issuing the licence itself: it also has to cover the cost of a multitude of other activities. Can we put a price on these? Well, assuming a labour charge of £100 per day—if you think that is high, check your local garage regarding *their* rates—your licence fee corresponds to about one man-hour per year. To research and write a reply to a letter we can guesstimate to cost anywhere from £5 to £100; to deal with questions asked by, for example, MPs on behalf of members, or for a typical meeting with RSGB representatives, we can all too easily put at £500 a time. On top of this there are additional expenses such as were incurred by the official UK delegation to WARC '79 on our behalf; which do not appear in our accounts, but without which amateur radio would be much worse off. So how much is all this worth? Perhaps we should not ask.

The present increase was the result of a general review of licences by the Home Office —not just the amateur licence. Many other licences had comparable increases. A fair question to ask is what can we expect as a result of the increase? Some of the answers were given in the Home Office reply which followed the request for information from RSGB —briefly referred to in "Amateur Radio News" *Rad Com* July.

First, we can expect reduced delays in the issuing of new licences, rather than a deteriorating service. It must be recognized that amateurs requiring licences for the first time place an unusually heavy demand on the administration. This arises simply because many thousands pass their examinations at the same time and, having invested much enthusiasm and hard work in the task, quite naturally are anxious to get on the air as soon as possible. We are all very aware of the frustration and heartbreak that extended delays in the issue of licences have caused in the past. This has meant, among other actions, the Home Office employing additional staff to cope with peak loads—an expensive solution.

Second, we can expect further benefits in that, with the planned computerization of licensing records, future increases in licence fees are anticipated to be of much more modest proportions. Our own experience at RSGB HQ in dealing with similar problems has demonstrated the large savings that can be made by using effective data-processing techniques—a point we have frequently impressed on the Home Office. Spin-offs could well include the direct transfer of information on licence-holders' names and addresses, which would be of great value in, for example, enabling us to produce the *Call Book* more economically.

Third, the possibility of a compact licence document issued annually comes closer. This would replace the present system of a single licence with a worthless annual receipt (but only if requested)—a change for which the RSGB has been pressing for some years.

How then should we regard this increase in the fee? One point we could bear in mind is the corresponding fees in other countries—these range from less than £1 to £37 per year. A second is other costs of amateur radio, such as membership of RSGB and the cost of magazines, which are similar to that of the licence, or those of writing-off £1,000 of equipment over 10 years which, together with loss of interest, may well amount to a few hundred pounds per annum. Perhaps the latter is something else we should take a closer look at.

One of the more disturbing aspects of the increase is that the RSGB, as did all other licensees, learned of it at the eleventh hour. This is certainly not the way we would expect to hear of a change of this significance: we understand that the reason was simply the late approval of the increases, of which we had not been given prior knowledge. At our forthcoming meeting with the Home Office we shall raise the matter with a view to trying to get advance warning of such changes so that news can be made available in a more orderly manner.

D. A. E.

Amateur Radio News

Shuttle update

As mentioned in *Rad Com* June, the space shuttle mission planned for about 30 September will be taking amateur radio into space. An international scientific research facility known as Spacelab will be flying on STS-9, as the mission is known, and Dr Owen Garriott, W5LFL, will be aboard as a NASA mission specialist astronaut. He plans to use a handheld 144MHz transceiver during his off-duty hours, running 5W to a printed-circuit antenna placed in the upper crew-compartment window on the aft flight deck.

Crew members aboard the Spacelab flight work a 12h on, 12h off schedule, and use of the transceiver is limited to 1h/day. Most of the earth's land mass will be within line-of-sight transmission range of the spacecraft during a typical day, since the Spacelab mission will have an orbital inclination of 57°. Transmission and reception frequencies present a slight problem at present, however, since the proposal is for W5LFL (does he sign mobile or alternative or portable or what?) to transmit in the range 145·51 to 145·77MHz and receive in the range 144·91 to 145·47MHz, using fm —this poses some problems as far as Region 1 is concerned, and the Society has written to NASA to suggest some alternatives which are compatible with Region 1 band planning. More news will be published in next month's issue.

Garriott has said that he looks forward with great enthusiasm to working as many stations as his work schedule permits.

Oscar 10 in orbit

Still in space, the AMSAT Phase 3B satellite was successfully placed into orbit via an Ariane launch from Kourou at 1216·5 on 16 June. See *Ephemeris* in this issue.

Operation in the Channel Islands

The Society receives many requests for clarification of the rules governing amateur radio operation in the Channel Islands. This matter was recently taken up with the Home Office, and a reply has now been received. Basically, the amateur licence permits the establishment and use of a station at temporary premises or a temporary location in the UK for a period not exceeding four consecutive weeks, without previous notification to the general manager of the British Telecom Telephone Area. It does not absolve the licensee from obtaining any necessary consent from the owner of the site before doing so.

In the case of the Channel Islands, it has been necessary since 1973 for any amateur who proposes to operate /A or /P on any of the Islands in the Bailiwicks of Guernsey (which include Alderney and Sark) and/or Jersey to notify the respective Telecommunications Board of his/her intentions at least 48h before the station is established at the temporary site. This is necessary in order to avoid possible interference with radio systems on the islands, and so that the authorities can be in a position to investigate any interference which may occur.

Any request to operate from the Bailiwick of Guernsey should be addressed to: The Development Controller, Development Division, State Telecommunications Board, PO Box 3, St Peter Port, Guernsey. Similarly, any request to operate from the Bailiwick of Jersey should be addressed to: The Service Controller, Jersey Telecommunications Board, PO Box 53, Telephone House, St Helier, Jersey.

Reciprocal licensing

From feedback received at headquarters, some unfortunate owners of reciprocal callsigns are being mistakenly accused of being illicit users due to the unfamiliar format of their callsign under the new system. A reciprocal licence now takes the form of a G4 or G6 prefix to the owner's home callsign: for example, 6Y5WS would use the reciprocal callsign G4/6Y5WS when in England. It sounds a little strange, but callsigns of this nature are perfectly legitimate—they are not pirates!

Post-election changes

Following the general election on 9 June, it was decided that as of 11 June the Radio Regulatory Division of the Home Office would become part of the Department of Trade & Industry. It is the intention of the Government to reintroduce the Telecommunications Bill as soon as possible. On a related matter, the report of the Merriman Committee was imminent as we went to press, and news will be broadcast over GB2RS and recorded on the Headline News Service if it contains anything relevant to amateur radio. The Society made detailed recommendations to this committee, and its interim report was in favour of an allocation at 50MHz to the amateur service.

MBE for ZL2AZ

Tom Clarkson, ZL2AZ, was awarded an MBE in the New Zealand section of the Queen's Birthday Honours List published on 11 June 1983. He is well known as a former Director of IARU Region 3, and was a member of the WARC 1979 IARU team. The award is for "services to amateur radio".

GB2RS news

The features on some aspects of radio propagation, which are compiled by Charlie Newton, G2FKZ, and broadcast each Sunday on GB2RS, are proving very popular and will continue for some time. New readers are in the process of being appointed to fill gaps in the coverage, and a bulletin transmission at some time during the week from the headquarters station GB3RS is also contemplated if there appears to be sufficient demand. It may even be possible to broadcast a bulletin in Amtor, using FEC mode.

Feedback from listeners on one particular topic would be appreciated. We gather that listeners to the 3·5MHz transmissions in certain parts of the UK are suffering from interference from a facsimile transmission: it would seem that only the earlier broadcasts are being affected and that the problem varies with conditions. In order to minimize listeners' difficulties, it has been suggested to the 3·5MHz newsreaders that they may move frequency up or down from 3,650kHz to the extent of, say, 5kHz as they consider appropriate—it is appreciated that this only gives formal recognition to what already happens to some extent! We would be pleased to receive any comments concerning this problem, and would suggest to listeners that if their newsreader does not appear to be in his usual Sunday morning slot, a slight tweak of the vfo would be in order.

Society membership

Membership of the Society is continuing to grow, and there were 33,868 members at the end of June 1983.

Those members who are prevented from following normal employment due to ill-health or permanent incapacity may apply to the secretary/general manager to have their subscriptions waived: in such cases the Society will require a letter from the member's doctor stating the nature of the disability and confirming that it permanently prevents the earning of an adequate income.

Equally, those members who have reached State pensionable age and who have 15 years' unbroken membership of the Society behind them may apply to the secretary/general manager for a reduced subscription. This facility is intended essentially for those who feel that their pensions are such that this modest assistance is justified: however, it is appreciated that some "old timers" will wish to remit the full subscription, and we thank them for their continuing support.

UHF Compendium—or *Unterlage*

Parts 1 and 2 of the German *UHF Compendium*, translated into English and available as a combined volume from RSGB headquarters, continues to sell well: in fact the initial supply of about 80 was snapped up very quickly and they have now been reordered. By the time this is in print, they should be available again. In fact, a Part 3 is now available, but the catch is that it has not yet been translated into English . . . . . some 20 copies arrived at headquarters in error and, although they look most interesting, they would appear to require a good knowledge of technical German for full understanding. Any German-speaking uhf enthusiasts can obtain a copy of the *UHF-Unterlage, Teil 3* from the membership

services department at headquarters for £8 over the counter or £9.50 by post. Please do **NOT** order it from RSGB Publications (Sales).

2MT rides again

Members may be interested in the following background note to the relaunch of 2MT reported here last month. Marconi's Wireless Telegraph Co Ltd was allocated 2MT in the summer of 1920 to introduce news bulletins and for experimental transmissions. The permit did not, apparently, extend to broadcasting music, and when a Danish tenor sang "Dramma per musica" the licence was swiftly revoked! Following representations to the then Postmaster-General by the Wireless Society of London (now, of course, the RSGB) the company was authorized to re-commence transmissions. So the first scheduled entertainment broadcast in the UK took place on 14 February 1922 from Writtle, near Chelmsford: the wavelength used was 700m and the callsign 2MT. Transmissions eventually ceased in 1923 after some hilarious experiences which were described in *The Power Behind the Microphone*—the autobiography of the first chief engineer of the BBC, P. P. Eckersley.

As reported last month, the Marconi Radio Society has been granted the callsign G2MT for use at the Stanmore headquarters of Marconi Space & Defence Systems Ltd and it has been in use since 2 July 1983. The society is keen to establish contacts with amateur radio clubs affiliated to the BBC (the Ariel Radio Club) and with similar groups within GEC-Marconi.

QSL Bureau news

The QSL Bureau sub-manager for the G4GAA-GZZ sub-group is now Mr J. C. Terry, G4GEU, of 126 Dawberry Fields Road, Kings Heath, Birmingham B14 6NZ.

G4LAA-LZZ and G8UAA-ZZZ. Although Chris Lennox, G4LX, the sub-manager for these series, moved house a year ago, envelopes are still being sent to his old address but are no longer being redirected by the Post Office. His correct address is Ryme Cottage, Newton Kyme, Tadcaster, N Yorks LS24 9LS.

Interference Committee changes its name

The RSGB's Interference Committee has changed its name to EMC Committee, in line with the type of activities with which it is concerned. "EMC" is an abbreviation for Electro-Magnetic Compatibility, and is a topic of much concern to the professional electronic engineer: with the complexity of modern systems it is essential to ensure that there are no undesirable side-effects when one piece of equipment is in close proximity to another. To give an example, something like 2,000 man-hours were spent on emc tests on the Tornado air-defence fighter to make sure, for instance, that rockets were not fired when radio transmissions were made, and that the autopilot systems did not misbehave in the presence of strong rf fields.

The EMC Committee's job is not quite so onerous, but it is concerned with how domestic electronic equipment behaves in the presence of amateur transmissions and how these problems can be solved: in the long term, it makes representations and recommendations on standards.

GB3LL

There seems to have been a long-standing error in the repeater list printout published by headquarters. GB3LL is actually sited on the Great Orme at Llandudno and is on channel RB0: it moved from RB4 some time ago. We regret the error and trust that not too many users have been fruitlessly trying to raise the repeater on the wrong channel.

Contest log sheets

Members requiring a small quantity (less than 20) of either hf or vhf contest log sheets may obtain them free of charge from the membership services department at RSGB headquarters: a large self-addressed envelope stamped with 20p is required, however. Please remember to specify hf or vhf when writing in! Larger quantities of log sheets can be obtained by order, and details are given in the mail order price list.

GU on 50MHz

A new country is now active on the 50MHz band. GJ4ICD has relinquished his 50MHz permit, and was replaced by GU2HML with effect from 4 June 1983. GU2HML is the first station in Guernsey with a 50MHz permit, and this should be of added interest to permit-holders and listeners.

Courses for amateurs

In addition to its RAE courses, listed elsewhere in this issue, the Arnold & Carlton College of Further Education, Digby Avenue, Mapperley, Nottingham NG3 6DR, tel 0602 876503, will run the following courses from September 1983.

Construct-a-rig. Eight weekly classes commencing 26 September at 7pm. A simple QRP hf rig will be built on an individual basis in a group situation with expert help available. Components will be supplied at cost—just bring a soldering iron. Tutor: G4DVW. Fee: £6.75 plus cost of components. Enrol at college main building: (a) 10am-4pm, 12 September; (b) 2pm-8pm, 13 September; or (c) 2pm-8pm, 14 September.

French for radio amateurs. The first two terms will be aimed at the development of vocabulary and pronunciation, with lots of oral work. The third term will concentrate on the radio/technical side with G4NJH. Commences 21 September. Fee: £19.60. Enrolment as (b) and (c) above or at the first meeting.

The item "Want another ticket" in the June issue has brought the following comment from Dr R. Lampard, G4KBD/MM: "It would be helpful to point out that the use of vhf-only suffices for almost all the needs of small boat owners to use the marine band, and the cost is less than half that quoted. Courses and tests are arranged at many centres, including New Parks Community Project, St Oswald's Road, Leicester, where I have run a class for many years."

Stolen equipment

On 7 May, from a car at Brockenhurst, New Forest: Trio 2300, serial number 950427, and magnetic mount with 5/8 antenna. Information to Brockenhurst police, or G8UCX.

On 8 May, from a house in Dudley, W Midlands: Icom IC290E, serial number 14201011, and HM10 scanning microphone with broken ptt switch and case. Information to K. Mitchell, G4RIY, tel Sedgley 76178.

On 9/10 May, from a car at Llandudno: Trio TR2300, serial number 1050432; and VB300, serial number 1020082. Information to N Wales police, tel 0492 78241.

On 11 May, from a house in Sutton, Surrey: Trio Kenwood TS430S, serial number 30024; Icom IC290E, serial number 14201946, with desk mic; and Icom IC2E, serial number 11913998, with soft case, λ/4 whip and hand mic/speaker; SMC 13·8V 35A psu; Daiwa swr and pwr meter CN620A; and C7 Sony video. Information to D. R. Love, G4RBQ, 44 Rose Hill, Sutton, Surrey, SM1 3EU.

On 10 April from Swansea Rally: FT230R, serial number 2D030195. Information to GW4HSH, QTHR, tel 0792 404422.

During weekend 27-30 May from St Dunstan's College, Catford: Yaesu FT-One, serial number 1M010238; full coverage transceiver less 27MHz; Icom 2300, serial number 1050419. Information to Catford police.

From London SW12: Trio TR7800, serial number 1060025. Information to N. M. Spenceley, G8JUG, tel 01-580 4468, ext 4215.

"An error-resilient decoder for UOSAT spacecraft telemetry and experimental data"

The authors of this article, published in *Rad Com* January 1983, have received a number of reports on construction problems from readers. Most appear to stem from two sources, the non-locking of the phase-locked-loop, and the poor performance of the integrator. They make the following suggestions to improve these:

1. The value of C7 should be 0·22nF.
2. Fig 8. The labels "IC7 pin 5" and "IC7 pin 11" should be interchanged.
3. The circuit is sensitive to the polarity of the input signal. This can be rectified by installing a switchable inverter at the output of IC2 pin 3. This can conveniently be constructed using the spare EX-OR gate of IC6.
4. The use of multi-turn potentiometers for RV1-4 will make setting-up easier.
5. The production variations experienced with 4046 pll devices may result in difficulty in achieving lock with the published component values. In particular, C5 may need a slight change in value.

"The Triambic Keyer"

The author of this article, published in *Rad Com* November 1982, advises that there is an error in the circuit diagram on page 957. At the bottom left, immediately above IC24a, the expression 0V should read FGO.

Happenings in Japan

Considering that most Japanese vhf/uhf equipment has provision for repeater operation, it comes as something of a shock to realise that Japan has only just got its first repeater. This is known as TIARA, and is a uhf unit located at the Okura Hotel in Tokyo—it operates on 434·78MHz (input) and 439·78MHz (output). An 88·5Hz sub-audible tone is required for access.

About 130 repeaters in the 430 and 1,296MHz bands will shortly become operational in Japan, and the RSGB—both from contacts with staff and with the Repeater Working Group—has provided a good deal of information and practical advice on the network. TIARA, by the way, stands for Tokyo International Amateur Radio Association—it is a group of 80 foreign amateurs from 14 countries living in Japan. Visitors are welcome at their meetings, which are usually held on the last Friday in the month at the Okura Hotel.

"OK on the new call . . . . "

Should you obtain a new callsign, headquarters would like to know so that our records can be kept up to date. We would much prefer to have details of the change in writing, by postcard to the "Circulation Department". Please note that your new callsign may not appear immediately on the address label of *Radio Communication*, since these are normally produced about two weeks prior to delivery.

North of Watford?

The RSGB is often accused of being uninterested in amateur radio affairs north of, approximately, Birmingham—and some of our Scottish members feel left out despite the fact that a quarter of the headquarters staff and several volunteer members have made the annual pilgrimage to the Scottish Amateur Radio Convention each year for the last five years! So the "north of Watford" jibe is groundless, and to prove it a member of headquarters staff is giving a talk on the work of the Society to a group of clubs in the Caithness area later this year: other Scottish clubs may be visited if at all possible.

Oh, and by the way, Potters Bar is north of Watford . . . . .

Region 12 ORM?

It is proposed to hold a Region 12 ORM later in the year, probably at Inverness. Further details will be given in *Radio Communication* and on GB2RS as soon as the arrangements have been finalized. This will be the first regional meeting in this area for a number of years.

RAE tutor urgently required

Clapham-Battersea Adult Education Institute runs courses in amateur radio, and is in urgent need of a tutor to look after classes in Balham on Thursdays and in Clapham on Tuesdays. The classes run from 7.30 to 9.30pm, and will commence in September—any offers of assistance should be made to Mr Roger Kirkpatrick on 01-622 2965.

FCC change the rules

In the USA, some of the rules concerning the identification of transmissions were changed from 15 June. Users of rtty or fast-scan television will no longer be required to identify their transmissions in morse or plain language voice—they may choose whether to use one of these or to identify in the mode in use—and those using Baudot, ASCII or Amtor can identify in these modes. However, the morse or plain language requirement will still apply to facsimile and sstv transmissions.

As an aside, the maximum frequency shift for digital communication in the hf bands will be raised from 900 to 1,000Hz.

Radio museum in Orkney

A wireless museum has opened recently in Orkney, including among its exhibits early radio, television and marine communication equipment. Hundreds of Service personnel were stationed in Orkney during the second world war, and those wartime years are the backdrop to much of the display—the actual equipment used, together with original maps and photographs of the defences around Scapa Flow, can be seen on display. All the research and restoration was carried out by James McDonald, GM8BFG, QTHR, and visitors are most welcome. An illustrated booklet on the history of radio in Orkney, including the wartime years, is available from Mr McDonald at a cost of £1.75.

Open University ARC

The newly-formed Open University Amateur Radio Club is looking for members, anyone who is currently participating in Open University courses and who is interested in joining the club is asked to contact G4SFI on Telford 616611. The club is open to licensed amateurs and short-wave listeners alike.

Scarborough rally

The Scarborough ARS, which will not be able to hold its annual Scarborough rally this year because the site at the Spa is being refurbished and is not available, asks that the date of the 1984 rally, 29 July, is noted, and wishes to thank everyone for their support in the past. Any enquiries to the secretary, Mr N. Hill, G6CXK, 7 Harewood Avenue, Newby, Scarborough, YO12 6DH; tel Scarborough 60857.

Members of the TIARA Repeater Group and guests from JARL with their new repeater

Mobile Rallies Calendar

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

7 August—RSGB National Mobile Rally, Woburn.

14 August—26th Annual Derby Mobile Radio Rally, Lower Bemrose School, St Albans Road, Derby (off Derby Ring Road). Open 11am. Talk-in by GB3ERD on 144MHz and 432MHz. Free admission and parking. All the usual attractions including trade stands, large junk sale, prize draw, flea market, tables at £2 per hour (no traders) and refreshments. Ample accommodation if wet. Organized by Derby & District Amateur Radio Society. Further details from G4EYM or G3SZJ, QTHR, tel Derby (0332) 556875.

21 August—RAIBC/FRARS Hamfest '83, Wimborne, Dorset. Open 11am-5.30pm. Bournemouth & DRAIBC will be promoting the event, and the RAIBC Committee will be holding their agm there.

A large number of national and local traders will be present. There will be a special demonstration station, GB2FRH, and talk-in will be available on vhf and uhf. Details from Bob Burrows, G6DUN, QTHR.

28 August—BARTG Rally. Sandown Park Racecourse, Esher, Surrey. Details from Edward Batts, G8LWY, 27 Cranmer Court, Richmond Road, Kingston-upon-Thames, Surrey.

28 August—Preston ARS 15th Annual Mobile Rally. Note new venue at Lancaster University. Easy access, ample free parking, and free admission. Leave M6 at junction 33 and proceed north on A6 for 2 miles. Open 11am. Talk-in on 144MHz fm S22. Cafeteria. Licensed bar on campus. Bring & buy. All enquiries to Mrs D. Stevens, 13 Arrowsmith Close, Hoghton, Preston PR5 0DV, tel Hoghton (025485) 3304.

11 September—Telford Mobile Rally, Telford New Town Centre Malls, Telford, Shropshire (exit 12 off M6 on to A5, or A442, from N or S) Open 11am (10·45am for disabled). Talk-in via GB4TRG on S22, and SU8/20 fm. All the usual attractions. Catering and licensed premises on site. Parking and entrance free. Details from G8DIR, tel Shrewsbury 64273, G8UGL, tel Telford 584173, or G3UKV, tel Telford 55416. All QTHR.

24 September—Ballymena & DARS 10th Annual Rally, Ballee High School. Open 12 noon. Talk-in station on S22. Numerous trade stands, bring & buy stall, refreshments, ample car parking. Further details from GI4HCN, QTHR.

1 April 1984—White Rose ARS Rally, The University of Leeds. Details from A.N. Bramley, G4NDU, QTHR.

Special Event Stations

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

6 August, GB2PF
The Radio Club of Thanet will run this station at the Phoenix Fair, Ellington Park, Ramsgate, which raises money for local charities. HF and vhf rigs will operate from approximately 10.30am to dusk. Details from K.R. Lown, 119 Sea Road, Westgate-on-Sea, Kent CT8 8QE.

6 August, GB2MFD
Moray Firth ARS will operate this station at the Mosstodloch Annual Fair, near Elgin, Morayshire, from 1400 to 1630. It is hoped there will be hf and vhf stations on ssb, cw, fm and rtty. Other details from GM3SIM.

12 August, GB2IRC
This station will be operated by Ipswich RC from the site of the Ipswich Carnival in Christchurch Park. Details from J. Tootill, G4IFF, QTHR.

13 August, GB2TS
The station will be operated at the Tollerton Show by the York ARS. Operation will be on all bands. Details from G3WVO, QTHR.

13-14 August, GB2YFT
The station will operate from Yeovil Festival of Transport, Barwick Park, Yeovil, Somerset, on A37 road to Dorchester. Operation on 3·5-432MHz by members of the Yeovil ARC. Details from the sec G4JBH, QTHR, tel 0935 23873.

20 August, GB2MSS
The station will operate from the Mid-Somerset Show, Shepton Mallet, Somerset. Operation on 3·5-432MHz by members of Yeovil ARC. Details from sec G4JBH, QTHR, tel 0935 23873.

20 August, GB4WYP
The station, organized by West Metropolitan Police ARC, will operate as part of World Communications Year at a "Police Community Year" display at Woodhouse Moor, Leeds. It will be operational from 1300-1800h, and will be open to the public. Special QSL cards will be available. Details from West Yorkshire Metropolitan Police ARC, PO Box 9, Wakefield WF1 3QP.

20-21 August, GB4WBB
The Nene Valley RC will operate the station as part of the "anchor chain" celebrations for the Boys Brigade Centenary. It will operate from the club's permanent site in Finedon. Special QSL cards will be issued and swl reports are welcome. Operation will be on hf and vhf. Details from L. Parker, G4PLJ.

24 August, GB4GSS
The station will operate at the Gillingham & Shaftesbury Show to be held in Shaftesbury, Dorset. It is operated annually by the Blackmore Vale ARS and works all bands throughout the day. Special QSL cards for all contacts and swl reports. Futher details from G4SSP, tel Mere (Wilts) 860777.

27-29 August, GB4TCF
The station will operate during the National Town & Country Festival at the National Agricultural Centre, Stoneleigh, Warks, from 1800gmt 26 August to 1700gmt, 29 August. Operation will be on all hf bands and 144MHz, using various modes. There will be displays of home construction, computing in radio, rtty, amateur tv and microwave. All visitors welcome. Details from Roger Harris, G3ZFR, tel Coventry 365117.

Other Events

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

27 August - Scottish Amateur Radio Convention. Cardonald College, Mosspark, Glasgow, followed by dinner/dance in Bellahouston Hotel, organized by West of Scotland ARS. Details from GM4JDU, QTHR.

25 September - Welsh Amateur Radio Convention, Oakdale Community College, Blackwood. Details from R. B. Davies, GW3KYA, QTHR.

6-8 October - ARRA 12th Amateur Radio & Electronics Exhibition, Exhibition Centre, Doncaster Racecourse.

8 October - Midlands VHF Convention, British Telecom Training School, Stone, Staffs.

15-16 October - EI-GI Convention, Ballymascanlon.

10 December - RSGB AGM, IEE, Savoy Place, London.

28-29 April 1984 - RSGB National Amateur Radio Exhibition, National Exhibition Centre, Birmingham.

RAE Courses 1983-4

Bradford. Bradford & Ilkley Community College, Great Horton Road, Bradford, W Yorks BD7 1AU. Enrolment 6 September. Classes etc to be advised. Details from the college, tel 0274 734844.

Hemel Hempstead. Dacorum College, Marlowes, Hemel Hempstead. Enrolment 5 September. Classes Wednesdays, 6.30-9pm (and Mondays 6.30-9pm if there is enough demand), commencing 21 September. Course tutor C. B. Burke, G3VOZ. Details from the college, tel 0442 63771.

London. De Beauvoir Evening Institute, Tottenham Road, Dalston, London N1. Enrolment 19 September, 7-9pm. Classes Wednesdays, 7.30-9.30pm commencing 28 September. Course Tutor G4BZW, QTHR, tel 01-249 1843, from whom further details can be obtained.

London. Grafton RS/Islington Institute, Risinghill Street, London N1. Enrolment 19 September. Classes Mondays 7-10pm. Lecturer B. C. Bond. For details tel 01-485 7065.

Manchester. North Trafford College of Further Education, Talbot Road, Stretford. Enrolment 5-7 September. Classes Monday or Thursday evenings, 6-9pm. Lecturer J. T. Beaumont, TEng(CEI), MIElectE, MASEE, G3NGD. Details from the college, tel 061-872 3731.

Manchester. Pendlebury High School, Cromwell Road, Swinton. Enrolment early September. Classes Mondays, 7.30pm, commencing 26 September. Tutor P. Whatmough, G4HYE. Morse instructor W. Stevenson, G4KKI. Details from G4HYE, tel 061-794 3706 or from Swinton Adult Education Centre, tel 061-794 5798.

Nottingham. Arnold & Carlton College of Further Education, Digby Avenue, Mapperley, Nottingham NG3 6DR. There will be three courses: 1 May, RAE 1984 (30 weeks). Enrolment 12-14 September (check with college for times). Classes Wednesdays, 7-9pm, commencing 21 September. Fee £16.40. Tutors G4DVW and G4NZU. 2. Crash courses a) for December RAE. Enrolment as above. Classes Thursdays, commencing 22 September. Fee £7.07. Tutor G4DWW. b) for May RAE. Enrolment at first meeting, or before during college hours. Classes Thursdays, 7-9pm, commencing 26 January 1984. Fee £7.07. Tutor G4DVW. Above crash courses assume basic electronics knowledge. Further details from the college, tel 0602 876503.

Nottingham. Basford Hall, Stockhill Lane, Nottingham. Enrolment 12-14 September, 2-8pm. Classes Thursdays, 6.30-9pm. Tutor Geoff Tomlinson, G6DJQ. Details from the college, tel 0602 637316, or tel G4DVW, 0602 382509.

Nottingham. Hucknall College of Further Education, Portland Road, Hucknall, Notts. Enrolment 12-14 September, 2-8pm. Classes Mondays, 6.30-9pm. Tutor Alan Lake, G4DVW. Details from the college, tel 0602 637316, or tel G4DVW, 0602 382509.

Slough. Langley College of Further Education, Station Road, Langley, Slough SL3 8BY. Enrolment 6-7 September. Classes Thursdays, 5.30-7pm, operating techniques; 7-8.30pm, morse. Wednesdays, 7-9pm, theory. Students can choose which modules they take. Senior lecturer E. C. Palmer, G3FVC. Details from G3FVC, at the college, tel 0753 49222.

OBITUARIES

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

Mr K. Bull, G8FFQ
Ken Bull died on 19 May, aged 62. He operated mainly on 144MHz and was always experimenting with minibeams and home-made equipment. He was practising hard for his morse test at the time of his death.

Mr I. E. Godley, G4JRU
Iain Godley died on 20 February, aged 43. He had been a radio amateur for three years and was active on 7, 14, and 21MHz bands. One of his proudest moments came last year when his wife Pat, G4PJH, became a radio amateur with his help and patience in teaching. He was also a member of the local Cambridge & DARC.

Mr C. Hewins, G2QH
Clem Hewins, who died on 17 November 1982, did much in the development of the electret principle in hand microphones.

Mr J. Littlewood, G5LW
Joe Littlewood, who died on 2 April, was a member of the 7MHz "Crazy Gang".

Mr T. C, Platt, G2GA
Tom Platt died on 21 April, aged 74. He was a founder member of the Bury group of the RSGB and was town representative for many years before and after the second world war in which he served in the RAF as a morse instructor. He had not been very active on the air for the last few years and operated almost exclusively on cw, his perfect fist being one of the mainstays of NFD and other cw events until quite recently.

Mr H. A. Steele, G3HAS
Al Steele died on 18 April, aged 72. He had been active on many bands, particularly 3·5, 14 and 144MHz.

Mr A. H. Trigell, G3JAF
Art Trigell died on 3 December 1982, aged 65. A keen supporter of RSGB activities, he was a founder member and past secretary and office holder in the Lymington & DRS. His main interest was hf cw, notably dx working, and he had been a member of FOC. He played a prominent part in the early years of the WAB scheme, operating mobile from many unusual locations.

Mr C. L. Ward, GW5NF/G5NF
Charles Leon Ward died on 3 April. Although a white stick operator, he still worked the popular bands. Leon could be heard on most bands during spell of 55 years, building his own equipment until a few years ago. He was particularly noted for his pioneering of the vhf bands before and after the second world war. On 144MHz he was awarded the Italian Gold Medal for the first QSO with an Italian station, I1KDB.

Always willing to assist the enthusiast, he gave much of his time over the years in the need to maintain a high standard of operating and encouraging the would-be amateur to obtain his licence.

Also:
Mr J. B. Cooke, RS35167, on 13 May;
Mr B. Edwards, RS27732, in March;
Mr J. E. Jarvis, G3VUG, on 22 February;
Mr W. Robertson, GM4ON, in May;
Mr D. R. Savins, G4EXV, on 30 January.

COUNCIL PROCEEDINGS

A brief report of the Council meeting held on 28 April 1983

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

Apologies had been received from Messrs J. Bazley, R. G. Barrett, and K. A. M. Fisher.

Raynet frequencies
The President commented on the effect internationally of the incorrect statement on Raynet frequencies published under "QTC" in the May issue of *Radio Communication*. Mr Griffiths reported that Raynet was currently conducting a survey to ascertain how many groups were using the frequencies. Raynet then intended to ask Council to acknowledge during the period of change that the frequencies were being used by Raynet. He added that the problems appeared to have arisen through lack of communication between the Raynet and VHF committees.

Following further discussion, the Secretary suggested that a meeting of interested parties be held in order to resolve the question of Raynet frequencies on the 144MHz band, after which a suitably-worded note for *Radio Communication* would be produced. This was agreed.

Financial report
The hon treasurer circulated copies of his report, and the management account balance sheet to 31 March 1983, together with a summary.

Secretary's report
Mr Evans reported;
(i) The new IBM38 central processor unit had become operational ahead of schedule on 28 March and that the old cpu was being sold.
(ii) two members of the Home Office staff had visited HQ recently for an amateur radio briefing session. The visit had been most successful; and in fact they had asked to come again to see more amateur radio in action!
(iii) The editorial board had met for the first time and a number of changes would be noticeable from the June issue of *Radio Communication*.
(iv) The possibility of Class B amateurs using cw had received much publicity following questions in the House of Commons, and Council needed to discuss the merits of the Society putting a formal case to the Home Office.

Committee recommendations
(a) *Exhibition & Rally Committee*
"That the 1984 RSGB Convention should be held at the NEC, Birmingham, on the last weekend in April." This was agreed.
(b) *Interference Committee*
"That the name of the committee be changed to EMC Committee." (The initials standing for Electro Magnetic Compatibility). This was agreed unanimously.

Membership and representation
The following were noted:
(i) reduced subscriptions had been granted to eight members;
(ii) waived subscriptions had been granted to three members;
(iii) the appointment of the following area representatives: R. A. E. Hillson, G4OWX, Sheffield, R. W. Jones, G3YMK, Biggin Hill, A. R. Kiddle, G4HVC, Newark & district;
(iv) the affiliation of the following societies:
Bath & District ARC;
Bembridge School ARC, Isle of Wight;
Gruppo Radio—DLF, Trieste, Italy;
Lewes & District Radio Amateur Club;
Maltby ARS, Yorkshire;
Morecambe Bay ARS;
RAF Carlisle, Cumbria;
Stafford & District ARS;
Three Counties ARC, Hants;
UK Six Metre Group, Hayling Island, Hants;
YFC ARS, Haultwick, Herts.

Class B licensees/morse
Mr Pratt gave the background on this topic. When approached informally during April 1982, the Home Office said they would wish to give careful consideration to any formal Society proposals.

Since then the Licensing Advisory Committee had discussed the question in general terms, resulting in a paper prepared late last year being circulated to the LAC and Council with a request for comments.

An editorial in *Ham Radio Today* had prompted correspondence to the Society, Home Office and MPs, resulting in a question being asked in the House of Commons and the Home Office seeking the view of the Society. During the resultant informal meeting of representatives from the Society and Home Office, many aspects of the matter were debated. The present position was that the Home Office would consult with primary users of all bands above 144MHz to see if there were any objections (if there were, then only 144MHz and 24GHz could be considered) prior to any formal request from the Society.

Mr Baptiste said that before anything went to the Home Office formally, all definitive recommendations should come to Council. The proposal in question represented a major step in Society policy and must therefore come before Council first.

A short discussion followed on the subjects of novice licences and administration of morse tests.

Forward Planning Group
A recommendation from the FPG that the following sentence be inserted in Committee Standing Orders was approved unanimously:

"Where a change of chairman is involved, the Council will have regard to a specific recommendation from the Forward Planning Group, following consultation by the group with, *inter alia*, the existing chairman and full members of the committee concerned."

In answer to a question, Mr Baptiste confirmed that the Forward Planning Group was a permanent body and that membership was by invitation of the President.

Microwave manager's report
Dr Allaway queried a statement in the report from Dr Evans regarding a proposal for a Microwave Working Group. The following extract from the conference minutes was noted:

"The idea of establishing a separate Microwave Working Group (to be proposed at the next Region 1 Conference) did not receive much support. The VHF Working Group prefers to continue with the microwave managers acting as a sub-committee of the group. There is no reason why the microwave managers could not have specialist meetings in between conferences, if required. A precedent is the meeting of repeater managers in Paris, 1980."

VHF manager's report
Mr McClintock commented on the following, on behalf of Mr Fisher: Mr Fisher noted the success of the VHF Managers' Conference recently held in Zurich. Six matters, all of interest to the UK, had come under discussion: (a) repeaters, (b) beacon co-ordination, (c) 50MHz band plan, (d) Syledis, (e) emergency channels and (f) new locator system. A more detailed report was being prepared.

VHF Convention
This successful event had attracted 30 per cent more visitors than last year's convention, resulting in an improved direct surplus. Mr Baptiste undertook to write to Mr Stone, G3FZL, to acknowledge the work he had done in organizing this event.

Nominations for election to the 1984 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 1983 are as follows:

ORDINARY MEMBERS
Dr E. J. Allaway, G3FKM, who is not eligible for re-election under Article 26.
Mr J. Bazley, G3HCT, who is not eligible for re-election under Article 26.
Mr K. A. M. Fisher, G3WSN, who is eligible and willing to accept nomination for re-election.
Mr G. A. Griffiths, G3STG, who was co-opted during 1983 and who is eligible and willing to accept nomination for election.

ZONAL MEMBERS
Zone A: Mrs J. Heathershaw, G4CHH, who is eligible and willing to accept nomination for re-election.
Zone E: Mr R. G. Barrett, GW8HEZ, is to become the Society's President on 1 January 1984. This creates a vacancy on Council for a member to represent Zone E.

Nomination procedure
The vacancies on the 1984 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 nomination must reach the secretary at RSGB HQ not later than 10 October 1983. 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 684 for the composition of Zones A & E.)

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. Two members of Council are affected by Article 26 this year, as indicated above.

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, their respective nomination in writing. (As a safeguard it is recommended that each candidate be nominated by more than 10 members.)

The nominated member must also enclose:
(i) Written consent to accept office if elected.
(ii) A statement indicating if he/she will have passed his/her 70th birthday either prior to 1 January 1984 or within the three-year period commencing 1 January 1984. This information is necessary under the Companies Act.
(iii) A statement saying if his/her nomination for Council is for ordinary or zonal membership.
(iv) A statement declaring any commercial interests in the field of amateur radio.
(v) In order to assist the membership in voting, a candidate may use a maximum of 200 words as a statement of address which will be circulated with the ballot forms. This should be confined to biographical details. Clearly, experience in decision-making in organizations of similar size to RSGB (or larger) would be relevant and this should be stated. Contributions to the work of RSGB via, for example, membership of its committees, writing material for its publications or organizing its events should be stated.

Details should also be given of organizational experience in amateur radio at the local level. Prospective candidates will find it useful to have experience in Society affairs. 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.
(vi) A suitable black and white photograph (head and shoulders), if he/she wishes.

Complete nominations should be addressed to: D. A. Evans, Secretary, RSGB, Alma House, Cranborne Road, Potters Bar, Herts EN6 3JW, and must arrive not later than 10 October 1983. Please mark your envelope "1984 Council nomination". All nominations received will be acknowledged by return of post.

Members' Mailbag

"WE DON'T TALK TO YOU"

Sir—Years ago, as a lid operator, it became apparent to me that "ham spirit" was a singular quality which set amateur radio head and shoulders above most other hobbies. World-wide communication between individuals, free from the influences of ugly government policies and differing ideologies is a unique experience. I think of the countless Russians I have worked. I respect them as fellow hams and enjoy their company on the air. The irritations of the "Woodpecker" and the actions of our respective governments are beyond the control of the individual ham, and therefore outside the scope of a friendly QSO.

Recently I was saddened when answering an East German call; I was informed that "we do not talk to racist South Africa". I don't believe that this behaviour will contribute in any way to change in South Africa, but I have no doubt that it will change ham radio. At the time my thoughts were that perhaps the most infamous monument to the inhumane separation of peoples is the wall in Berlin. But, for the sake of good fellowship, these were thoughts not to be expressed on the air, and ZS5VS went QRT.

Roger Ingle, ZS5VS

We were saddened to receive this letter and trust that such events are very rare. It is interesting that the American amateur licence still prohibits communication with a few countries, even in 1983.

AMATEUR RADIO TODAY

Sir—On the above subject, raised by GW4ALG, M. S. Stewart and G3BHK, I am inclined to agree that the daunting complexity of equipment nowadays has made black-box operators of most of us. Good luck to the constructors, but surely, out of choice, they don't have much time to do anything else.

In my own experience, after many years of trying to build "bigger and better rigs", I gave up in 1977 and went on 2m; I was absolutely staggered at the vastly-improved vhf commercial equipment available at reasonable prices, and my amazement continues today. To my mind, this hobby of ours was also greatly assisted at the time by relaxation of the licensing conditions relating to portable and mobile operation, which before then were tiresomely stringent.

So much for vhf, which brings me to hf, a subject on which I am much less enamoured! I view with alarm the multiband multimode transceivers and other gear now offered to hf enthusiasts, and wonder how many newcomers can possibly afford this sort of outlay? It seems to me that manufacturers of hf equipment are steadily pricing themselves out of the amateur market, and I can only hope that in their own interests they give a long hard look at future prospects. The obvious solution would seem to be to restrict the number of modes and/or bands available in manufactured equipment, with a reduction in the number of tiny knobs, push-buttons and other gimmicks.

Yes, you've guessed it, I operate cw-only on hf, with a cw transceiver which was withdrawn from the market two years ago due to "lack of demand"! But joking apart, the A1A mode gives me real pleasure, and I can thoroughly recommend it to any newcomers.

Finally, may I congratulate you on the subtly improved editorial layout evident in your June issue.

Rod McMillan, G2CWY

Certainly the average price of commercial equipment, not just for the hf bands, is creeping up all the time. There ought to be a market for basic hf or vhf equipment which does not contain a couple of microprocessors, whose signal-handling and sensitivity are beyond reproach, and which does not cost a fortune. Alternatively, however, why not build? The recent membership survey suggested that many Society members still built some of their amateur station at home, and this is all to the good.

Sir—I enjoyed the different look to *Rad Com* June 1983, especially the comments after members' letters. This helps to activate somebody to write in and express his own view, and also the members' questions can be answered there and then.

However, I would like to comment on one of the comments made by G3BHK. Being a 15-year-old schoolboy, I can assure Les that most young amateurs like me are not financially solvent, neither can we afford to buy new equipment outright without the considerable help of our fathers.

James Frenzel, G4SNK

We sympathize with G4SNK, but buying new equipment is emphatically not the only way to get on the air—as we said above, what's wrong with building your own? One learns a tremendous amount about radio and electronics in doing so, and the spirit of the hobby stays alive. One or two reactionaries at RSGB HQ would like to see at least one major home-brew project in all amateur stations!

Sir—I read with interest G3BHK's comments on why the RAE appears easier to candidates these days. He maintains that the modern student enjoys a better understanding of electronics, and consequently has a greater knowledge before he even starts his studies.

Although undoubtedly true, his statements cloud the real issue, which is that the RAE *has* become easier to pass.

A comparison between the December 1967 (which I sat) and that of last December is truly startling. With the older style of paper, the candidate was required to allocate time to each question, have a reasonable command of English, legible handwriting, and remember "from the top of his head" circuit diagrams and formulas. Furthermore he had to pay some attention to layout and be skilled in doing sketches and calculations.

Conversely his modern counterpart is required only to "shade" with a pencil the correct answer from four possible options. Even a candidate with zero knowledge must, by law of probability, obtain a 25 per cent mark. Also, how much easier it is to have a readymade "crib" sheet containing formulas and diagrams, which in effect is what the modern paper has become.

It was with considerable foreboding that I then went on to read GU6BGI's article "Confessions of an RAE instructor". If a teenage instructor, however gifted, is able to take six students for only 12 two-hourly sessions, and then obtain a near 100 per cent success rate, it bodes ill for the technical standard of the future radio amateur. One wonders how they would have fared in the RAE of 10 years ago!

The Home Office doubtless encourages a "simple" RAE in order to legalize the would-be "pirate" and illicit cb fraternity, and of course the additional licence revenue is always welcome.

However, I feel that it is not in the interest of amateur radio generally to have vast numbers of licensed operators with little or no technical expertise, and I hope that the C&G will restore the RAE to its once adequate standard.

C. J. Osborn, G3XIZ

Two other letters this month have said more or less the same thing—any comments?

THE NEW LOOK

Sir—I very much like the new look of the June issue of *Radio Communication*.

"HF propagation predictions" in red and green are more helpful. "Technical Topics" is better for being longer, but pages 512/513 were a waste of "TT" space—otherwise very good.

P. J. Turner, G8TSY

Several letters in this vein have been received. We are pleased that members like the changes. G3VA says the item on pages 512/513 was appreciated by many readers.

FOR G6PUR READ G6PUS

Sir—I noted with interest in your May issue that some callsigns are being pirated. On 8 November 1982 I received my callsign G6PUR; however, persistent rumours about pirating of this callsign were confirmed when, in a QSO with G8BDZ, he confirmed that he had a contact with another G6PUR.

I contacted the Home Office, who said they had issued by mistake the wrong callsign to myself. To this day I have been G6PUS.

I wonder how many other duplicate callsigns have been issued by the temporary staff taken on in the rush of 1982! If you think you are being pirated, it's probably best to check if you have the correct callsign to begin with!

M. Holloway, G6PUS

An interesting point. We would have thought such an occurrence rare, but we would like to hear of any other examples of similar problems. Our feeling is that the situation with regard to the issue of amateur licences has improved considerably since the problems last year.

IN LIGHTER VEIN

Sir—Amateur antennas on car roofs can lead to interesting experiences. Yesterday I pulled in to the side of a street in Douglas, and suddenly the back door opened and a smart gentleman with a briefcase got in, shut the door and asked to be taken to Lakeside Gardens.

I suggested he had got into the wrong car, and he replied: "Aren't you a radio cab?" I answered "No", and he asked what the aerial was on the roof. I explained what it was, and he rather sheepishly apologized and exited gracefully.

E. H. Brooks, GD4 HOX

Did he offer you a tip . . .?

HF NFD OPERATING

Sir—I was constrained to assist on HF NFD this year at G6HH/P. Never before have I experienced such disgust at the disgraceful attitude of some groups. Yes, we did hear the remarks being passed on the air! The arrogant, intolerant, dot-spewing antics of some of the machine operators we attempted to contact were astounding. If such is the general rule of the votaries of Samuel Morse, I feel we had better devote ourselves to participation in vhf contests, where one can be tolerant, polite, gentlemanly, helpful to the neophyte, *and still get a good score*, as witness the record of G6HH in these vhf events.

If any of our operators on vhf behaved like some of the smoke signal "experts" we heard on HF NFD, they would soon be suffering from an exceedingly fat ear.

WOUFFHONGS ALL ROUND!

I remain, and intend to remain, an efficient Class B licensee.

John Ridd, G8BQX

MEMORIES RECALLED

Sir—Your recent item and photograph from my "successor", Colin, 9M2CR, with his 10W of Amtor, reminds me of an earlier Malayan initiative which may be of interest to some. After three years working as VS2CR on other bands, I began to work on the new 21MHz band in 1952. I was told, with no means of checking, that I was the only station on that band in Southeast Asia. My first UK contact was with G3EXR, followed by G2BJY, G5DQ and G2PL, on cw, on 17/8/52, using a longwire, 60W and an SX28 receiver. My first contact with Scotland was with GM3CSM on 14/9/52. I was located at Batu Gajah, Perak.

With greetings to Colin, he may be interested to know that I type this on the same machine —then new—on which I typed the draft constitution of the Malayan Amateur Radio Transmitters Society while staying at the Lone Pine, Batu Ferringhi, Panang. You will see, sir, that my typing has not greatly improved.

John Hemphill, GM3CTG

THE ANTENNALAB

Tony Bailey was first licensed in 1967, after several years as an swl, and has always been interested in home-construction. After many years on top band he moved to vhf/uhf, where he became one of the first stations on 432MHz ssb using homebrew gear. He is a founder and honorary life member of the Mid-Sussex ARS.

He is well known as a homebrew designer and author of constructional articles, and was awarded the Ostermeyer Trophy for his work in this field in 1981 and 1982. His interests in the hobby are varied, having tried nearly all aspects, and he was the first editor of *Oscar News* for several years. By profession a chemist, he has recently turned to freelance writing and now runs his own business.

PART 1

A state-of-the-art digital wattmeter, automatic vswr indicator and peak power monitor

by A. L. Bailey, G3WPO*

Introduction

Over the years many designs have been published for rf wattmeters and vswr bridges. At the simple end there are circuits which use a sampling line to monitor forward and reflected powers, with a relative power scale sometimes added, and maybe one switched or two separate meters for the indicators. These suffer from varying sensitivity because as the input frequency is increased, the length of the pick-up line becomes a more significant part of a wavelength. A vast improvement can be made by using a broadband current transformer as the sensing element, enabling constant calibration over a wide frequency range.

One range of commercial meters uses a dual pointer system to eliminate the need to calibrate the vswr section, and there is at least one commercial "automatic" vswr bridge which electronically carries out this calibration, enabling the display of vswr over a wide power and frequency range without any operator intervention. A number of these latter circuits have been published in the amateur press.

The instrument to be detailed utilizes this automatic principle and is an extension of another piece of test equipment previously described by the author, but employing modern semiconductor technology to present the power and vswr displays in non-standard formats.

As far as the author is aware, the digital wattmeter is unique in amateur circles, and there appear to be few commercial equivalents. The meter will display the power output of a transmitter over a 2–54MHz range from 1 to 400W, in either rms or peak modes, to a resolution of 1W ± 1 digit. Either forward or reflected power may be displayed.

An automatic vswr bridge is incorporated, with no adjustments required over the same frequency range, and for powers of 4–400W output. The display is in l.e.d. bargraph format, using a logarithmic conversion which expands the scale at the most wanted lower end. For all practical purposes this type of display is as useful as a meter, with the added advantage of an immediate visual warning if the vswr rises suddenly. An automatic alarm is also possible, coupled to one of the vswr level display segments.

To complete the design, another bargraph display is used as a peak monitor for ssb transmissions. This can be set to indicate any overdriving of the transmitter output stages, thus reducing the likelihood of splatter etc on today's crowded bands.

All functions are monitored by further l.e.d. displays, including the input levels to the automatic circuitry.

The only items required to calibrate the entire instrument are a multimeter, and the loan of another power meter against which the final power calibration can be made.

Alternative forms of the Antennalab

This article will describe the circuit and construction of the complete instrument, with additional information to describe the "Digiwatt", a smaller and simplified version of the Antennalab, containing only the digital power measuring feature.

PCBs will be available from the author for both versions.

Circuit description

The complete circuit is shown in Fig 1 and can conveniently be split into five sections:

1. RF sense head and buffers.
2. Power measuring circuit
3. VSWR measuring circuit
4. Peak monitor
5. Power supply and status indicators.

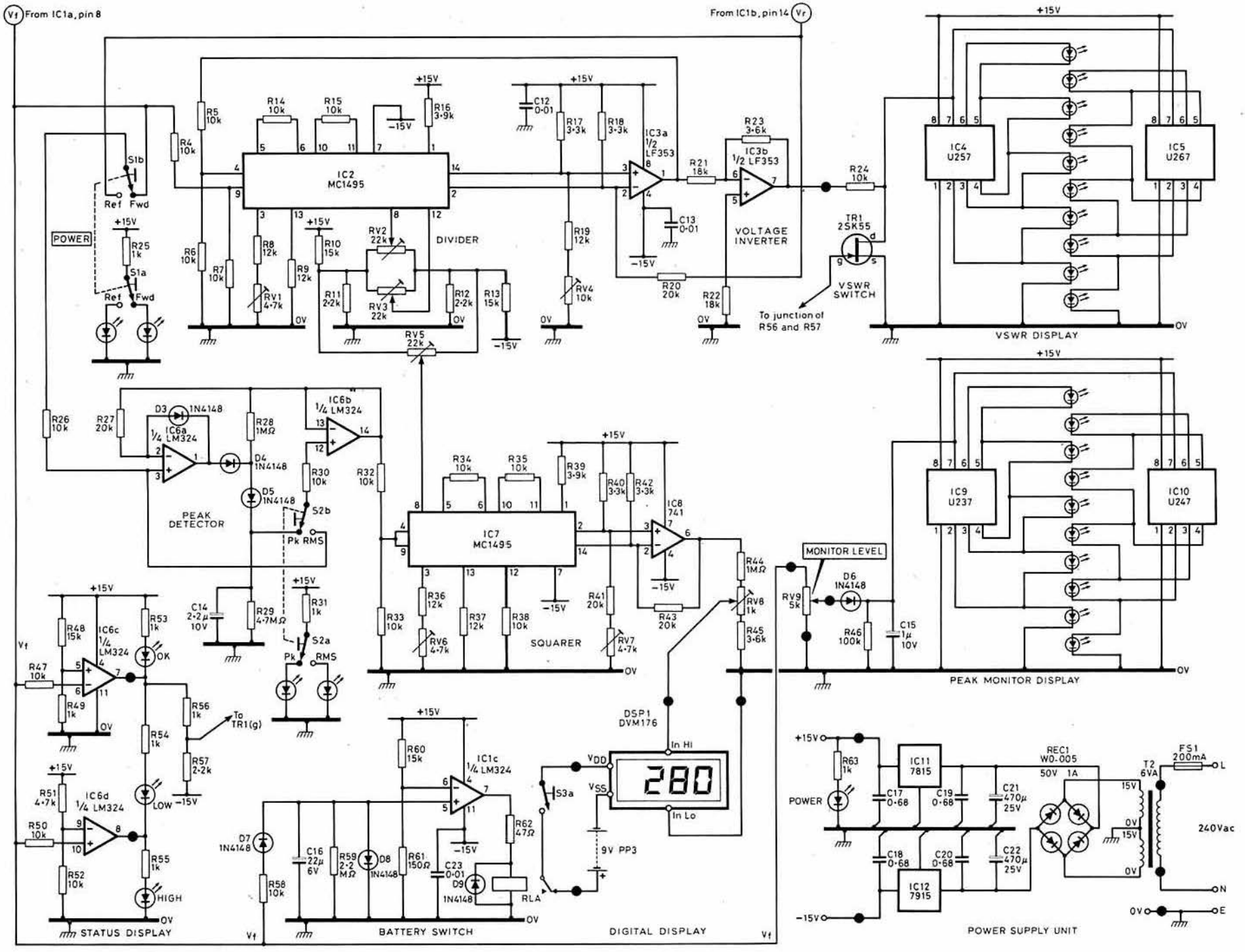
The rf sense head

The principle of the broadband current transformer has been used in many designs as a means of generating the required dc voltages to drive vswr and power measuring circuits. The principles were set out very clearly by W0INK [4] who also gave some formulas for calculating the component values, many of which are reproduced here.

Fig 2 shows the essential components of an rf sense head. A short length of coaxial cable is used as a one turn primary for the current transformer T1. This is a ferrite toroid through which the coaxial cable passes, with the secondary consisting of a number of turns of insulated wire wound evenly round the toroid itself. If the outer braiding of the coaxial cable is earthed at one end, then coupling to the transformer is by the magnetic leakage current from the line. This improves the null obtainable on reflected power against that using a single wire primary.

Fig 1(a). Antennalab circuit diagram (continued overleaf) ▶

*20 Farnham Avenue, Hassocks, West Sussex BN6 8NS.


From IC1a, pin 8
From IC1b, pin 14
IC2 MC1495
DIVIDER
IC3a 1/2 LF353
IC3b 1/2 LF353
VOLTAGE INVERTER
TR1 2SK55
VSWR SWITCH
To junction of R56 and R57
IC4 U257
IC5 U267
VSWR DISPLAY
POWER
S1a
S1b
Ref
Fwd
PEAK DETECTOR
IC6a 1/4 LM324
IC6b 1/4 LM324
IC6c 1/4 LM324
IC6d 1/4 LM324
IC7 MC1495
SQUARER
IC8 741
S2a
S2b
Pk
RMS
IC9 U237
IC10 U247
PEAK MONITOR DISPLAY
MONITOR LEVEL
OK
LOW
HIGH
STATUS DISPLAY
To TR1(g)
IC1c 1/4 LM324
BATTERY SWITCH
S3a
9V PP3
RLA
DSP1 DVM176
In Hi
In Lo
DIGITAL DISPLAY
IC11 7815
IC12 7915
REC1 W0-005
50V 1A
T2 6VA
FS1 200mA
240Vac
POWER SUPPLY UNIT

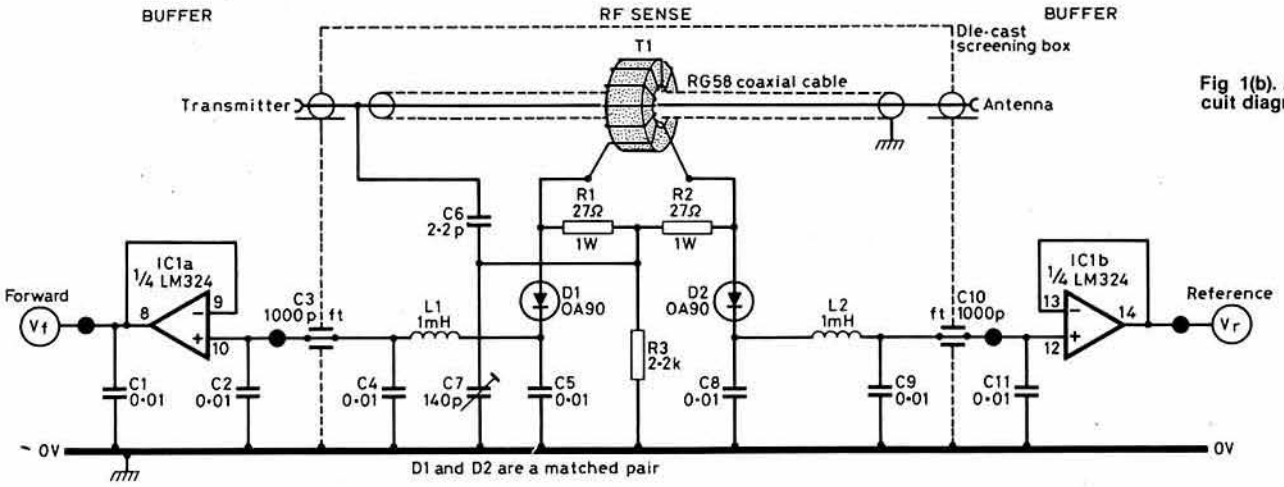


Fig 1(b). Antennalab circuit diagram (continued)

A resistive centre tap (R1/R2) is used as the secondary load. A voltage is produced at each end of the secondary winding, both of equal amplitude but 180° out of phase with each other. If a small proportion of the rf voltage present on the line (arranged to be equal to one half of the secondary voltage under matched conditions) is sampled by C1/C2 and fed back to the centre tap, then the out-of-phase voltage at one end of the winding (V ref) will be cancelled and the in-phase voltage (V fwd) doubled.

Diodes D1/D2 and their associated components form peak detectors, providing two dc outputs proportional to the forward and reflected currents present on the line.

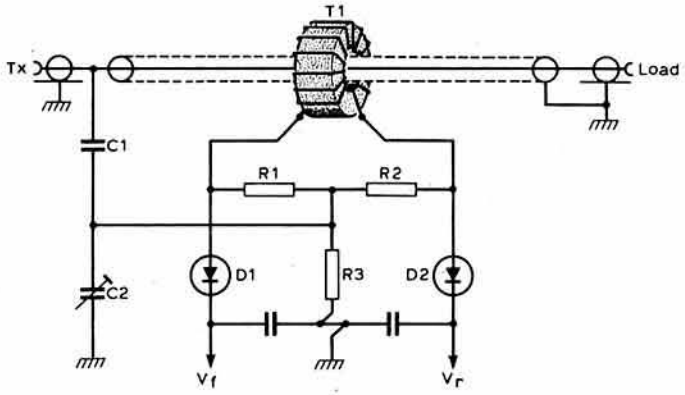


Fig 2. Current transformer basics

For true current transformer action it is essential that the reactance of the secondary winding is at least five times that of the characteristic impedance of the line being sampled at the lowest frequency of interest. Conversely, operation of the transformer at high frequencies is limited by the interwinding capacitance of the secondary, which implies as few turns as possible, and by the capacitive reactance of the sampling capacitor (C1). These conflicting requirements can be overcome by selection of a toroid core with a high value of inductance/turn.

This necessitates the use of a ferrite core, as dust iron cores cannot provide enough inductance without an abnormally large number of turns, which limits the performance at hf. The author tried a number of transformers using Amidon T50-2 dust iron cores as recommended in several published designs—at best these gave a poor balance, with varying results obtained on different samples of the same core.

The frequency coverage of the transformer is thus governed by the number of turns on the secondary. In the case of the core specified, if the lowest frequency is defined as 1·8MHz, then the maximum obtainable is 54MHz with this particular circuit configuration. The number of turns needed is given by the formula:

$$N = \frac{R}{E_d}\sqrt{\frac{P}{R_L}}$$

where E_d = voltage developed across secondary;
P = power output of transmitter to be measured;
R_L = characteristic impedance of line.

The design criteria established for the electronic circuits require a maximum input voltage of 10V, and the basic instrument is to be capable of measuring 400W output. For lower maximum powers, the following calculations can easily be amended to suit other requirements. So, given that we choose two 27Ω resistors for the secondary load:

$$N = \frac{54}{10}\sqrt{\frac{400}{50}} = 15 \text{ turns}$$

The inductive reactance of this winding is given by:

$$X_L = 2\pi fL$$

The inductance of the winding is:

$L = N^2 A_L$, where $A_L = 1{\cdot}9\mu H$/turn for this core,
so $L = 427\mu H$

Plugging the values into the formula gives an inductive reactance of 4,830Ω at 1·8MHz, far greater than five times the 50Ω line impedance.

The next stage of the design is to calculate the values of C1 and C2. Either can be made variable for balancing, but it is more convenient to have the larger value variable (C2). The value of C1 needs to have an impedance of at least 10 times Z_0 or 500Ω at 54MHz, or 6pF. A value of 2·2pF was chosen to allow some margin. The value of C2 is given by:

$$C2 = C1\,\frac{(2R_L\,N - 1)}{R}$$

$$= 57\text{pF}.$$

The diode capacitance is about 2pF maximum, and C2 should be greater than 25 times this, so the value is satisfactory.

So, in summary, the calculated values are:

R = 27Ω each
L = 15 turns on toroid
C1 = 2·2pF
C2 = 56pF.

The peak detecting diodes, D1/2, are germanium point-contact types, and should be matched at mid-frequency range for similar forward voltage output to avoid imbalance errors using the circuit of Fig 3.

The whole of the above assembly should be contained in a screened enclosure, with a fairly symmetrical layout to aid balance. A printed circuit board is used to allow reproduceability.

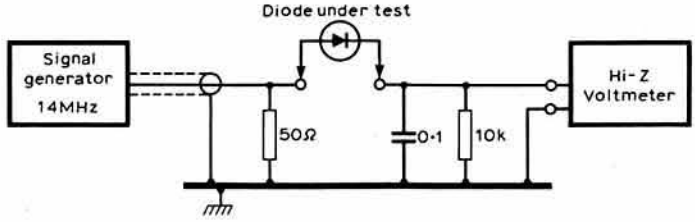


Fig 3. Circuit for matching diodes

The actual sense head circuitry is given in Fig 1(b), with liberal decoupling used. The diode outputs have to be loaded as lightly as possible, so the dc outputs are buffered at high impedance by IC1a and b, part of an LM324 quad op-amp, both connected as voltage followers. These provide the required high-impedance input with a low impedance output to drive the remainder of the circuitry. All of this circuit, except for the op-amp, is located within a small die-cast box for rf screening, with the rectified voltages brought out via 1,000pF feedthroughs. Adequate decoupling of the op-amp inputs and outputs is provided on the pcb in case of any stray rf.

Power measuring circuitry

Outputs from IC1 are routed via S1, which selects either forward or reflected voltages to the input of IC6a and b. The configuration used was chosen because it provides equal voltage outputs under single tone conditions on both peak and rms, and avoids the necessity for two sets of calibration presets.

In rms mode, IC6a is effectively out of circuit, and IC6b functions as a straight voltage follower. In peak mode the input is applied to IC6a and, via the steering diodes, charges the long time constant network of R29/C14, the maximum voltage reached being that of the highest peak in the incoming waveform. D5 prevents the circuit discharging back through the op-amp.

At this point an output voltage is available proportional to the power output, but cannot be used to drive a digital display directly as this requires a conversion involving a square of this voltage if the linear scale of the voltmeter is to read the power output correctly. To get over this problem, a monolithic four-quadrant multiplier type MC1495 (IC7) is used.

Basically, this ic will provide a dc output current which is proportional to the sum of two input currents and a preset reference current, ie its output current is the product of two input currents. If the two inputs are tied together and a single current introduced, then the output is the square of the input currents, and can be used to directly drive the digital display. The design data provided by Motorola are extensive and outside the limits of this article, so readers are advised to consult the data sheets if they are interested in the theory of operation.

The circuit parameters were set for a maximum of 5V at each input (pins 4 and 9), so a resistive divider R32/33 is needed to reduce the 10V maximum available from the rf sense head. The reference current into pin 13 is fixed at approximately 1mA by R37, while that to pin 3 is at the same current, but adjustable via RV6. This enables the scale factor (ratio of squared input voltages to the output voltage) to be adjusted during calibration; here set at 0·1 overall, ie for 10V from the sense head the output is 10V, and for 2V equals 0·4V. RV5 adjusts the offset of the y input op-amp (pin 4), and RV7 that of the output op-amp within the multiplier chip. In this instance the x input (pin 9) requires no compensation, as the offset does not contribute to the error term.

The output current from IC7 is a differential current between pins 2 and 14. This is converted to a single-ended output, referenced to ground, by IC8, a 741 op-amp, and provides the drive voltage for the digital lcd display.

LCD display module

For reasons of constructional simplicity, a digital panel meter module was chosen for the digital power display. This is type PCM176, and is wired as a self-contained three-and-a-half digit 199·9mV voltmeter, with its own voltage reference. Due to the internal construction of the module, it is not possible in this instance to use the same power supply for it as that of the rest of the circuit, so a small 9V battery supplies its power. However, at a consumption of 1mA this will have a long life.

DO NOT ATTEMPT to connect the module's supply leads to the supply derived from the mains transformer, as this will lead to rapid destruction of the module!

To conserve the battery life to the maximum possible, a further op-amp (IC1c) is used as a comparator, with pin 6 referenced at about 0·15V. The non-inverting input at pin 5 is driven from the forward voltage output, and, as soon as this rises above 0·15V, a miniature relay (RL1) is turned on by IC1c, and the battery connected to the display. D7/R59 and C16 constitute a time constant so that the display will remain on for a while once the rectified rf voltage has ceased, preventing continual switching of the display when using ssb or cw. D8 limits the maximum voltage at pin 5 to about 0·6V, ensuring a fairly constant on-time for the relay with the widely varying input voltage. Further economy is possible by switching off the display via S3 when it is not required, but leaving the vswr and peak indicators functioning.

The voltage output from the squaring circuit is divided down so that 10V is equal to 40mV, and a display of 400, by R44/45/RV8. This allows resolution to 1W. If power levels of 200W or less full scale are envisaged, then the display could read to 0·1W (with one of the decimal points enabled) so that 100W = 100·0mV.

However, a resolution of 1W in 200 is 0·5 per cent and the accuracy (linearity) of the squaring circuit when correctly aligned is only 0·75 per cent (neglecting the errors arising in the sense head and remaining circuitry) so this extra resolution is not really justified, unless for comparative purposes on an individual instrument. Also, as is typical with this sort of meter, the overall measurement accuracy of power is approximately ± 10 per cent, assuming that it is calibrated against another power meter of known accuracy.

Allowing for this latter limitation, for QRP work it would be possible to have a full scale of, say, 20W by changing the winding of the transformer secondary so that the 20W is equivalent to 10V of output. This would allow a resolution of 0·01W, which could be useful in getting the most out of a micropower rig!

VSWR measuring circuit

An automatic vswr measuring circuit was used to overcome the need to repeatedly calibrate the vswr scale while matching adjustments are made with an antenna tuning unit. This procedure consists of setting the indicated forward reading to fsd on an analogue meter, then switching to reflected to read the vswr from the scale. This has to be repeated every time an alteration to the power output is made, or else it is possible to end up tuning for minimum power output! In other words, the ratio of the two voltages is being determined, known as the reflection coefficient:

$$r = \frac{V\ \text{reflected}}{V\ \text{forward}}$$

This is then normally converted by calibration of the scale to vswr:

$$\text{VSWR} = \frac{1+r}{1-r}$$

The electronic conversion of the forward and reflected voltages to a ratioed voltage is achieved with a further MC1495 four-quadrant multiplier, IC2. However, in this case the two voltages need to be divided rather than multiplied. By placing the multiplier in the feedback path of an operational amplifier (IC3a), the two ics will then carry out a ratio or divide function, with the single-ended output current at pin 1 of IC3a being the ratio of the two input currents at IC2, pins 4 and 9. Again, for detailed explanation of this operation the data sheets should be consulted.

The output voltage at pin 1 of IC3a varies from 0 to − 10V, a negative output being necessary to ensure correct feedback around the loop. The bargraph display drivers require a positive voltage drive of 0–2V, so IC3b achieves this conversion as an inverting amplifier, the gain set at 0·2 by R21/23. These particular displays use driver ics originally intended for vu meter applications—in this instance this has the effect of expanding the scale at the low end, giving better resolution of the lower ratios where they matter most.

The maximum input voltage to IC2 is again set by design at 5V, requiring similar voltage dividers at pins 4 and 9 as for the squaring circuit of IC6.

In the case of the divide circuitry there is a minimum input voltage limitation, below which the error in the computed output voltage suffers a dramatic rise. At best the accuracy (linearity) of this circuit is that of the multiplier, quoted at two per cent. Below a voltage of 0·5V for the forward voltage at pin 9 of IC2 (or 1V ahead of the voltage divider) the errors rise rapidly to several hundred per cent. This places a practical limit on the minimum power level at which the circuit will be useful, in this case 4W.

The lower limit is detected by another voltage comparator, IC8c, whose output will switch low only when the voltage at pin 6 exceeds approximately 1V. This changes the bias conditions on the gate of fet TR1 (which is normally switched on, effectively shorting the drive voltage of the bargraph display to 0V) so that it no longer conducts and allows the bargraph to display. Erroneous readings are thus inhibited at low power levels.

Peak monitor

This aid was incorporated to help avoid an ssb transmitter from being overdriven with consequent distortion and annoyance to other band users. The principle is simple. The transmitter is tuned for normal maximum output in the cw or single-tone mode, and the display set with a potentiometer so that the last (red) l.e.d. is just fully illuminated. Then, when using ssb, the transmitter is talked up so that on speech peaks the last l.e.d. only just occasionally flashes. It is also useful as a tuning aid in conjunction with the digital power display.

A proportion of the forward power voltage is fed via RV9 to the input of the bargraph drivers, ICs 9 and 10, with a short time constant added by D6/R46/C15 to slightly lengthen the illumination time of the l.e.ds. The bargraph display is similar to that of the vswr circuit, but utilizes a linear change of voltage. The display can be disabled by turning RV9 fully anticlockwise.

Status indicators and power supply

The Antennalab is provided with a number of additional l.e.ds to indicate the status of the input voltage, and the mode of operation. The former have already been described, while the latter are simply connected via the three push-button switches. One l.e.d. is used as a power-on indicator to show that the instrument is connected to the mains, as it has no separate power switch.

All of these status l.e.ds, together with the two bargraph displays and the driving ics for the latter, are accommodated on another pcb which mounts

Components list

R1, 2	27Ω 1W
R3, 57	2·2kΩ *
R4, 5, 6, 7, 14, 15, 32, 33, 34, 35, 38, 52	10kΩ†
R8, 9, 19, 36, 37	12kΩ†
R10, 13, 48, 60	15kΩ†
R11, 12	2·2kΩ†
R16, 39	3·9kΩ†
R17, 18, 40, 42	3·3kΩ†
R20, 27, 41, 43	20kΩ†
R21, 22	18kΩ†
R23, 45	3·6kΩ†
R24, 26, 30, 47, 50, 58	10kΩ*
R25, 31, 53, 54, 55, 56, 63	1kΩ*
R28	1MΩ*
R29	4·7MΩ*
R44	1MΩ†
R46	100kΩ*
R49	1kΩ†
R51	4·7kΩ†
R59	2·2MΩ*
R61	150Ω*
R62	47Ω*

* Carbon film 0·25W 5%
† Metox 2% or better

C1, 2, 4, 5, 8, 9, 11, 12, 13, 23	0·01μF ceramic disc
C3, 10	1,000pF screw-in feedthrough
C6	2·2pF silver mica
C7	140pF mica compression trimmer
C14	2·2μF tantalum 10V min
C15	1μF electrolytic 10V min
C16	22μF miniature electro 6V
C17, 18, 19, 20	0·68μF tantalum 35V min
C21, 22	470μF 25V pcb electro 14mm dia max
RV1, 6, 7	ALPS 4·7kΩ cermet preset
RV2, 3, 5	ALPS 22kΩ cermet preset
RV4	ALPS 10kΩ cermet preset
RV8	ALPS 1kΩ cermet preset
RV9	ALPS 5kΩ linear potentiometer

TR1	2SK55 or similar fet
IC1, 6	LM324
IC2, 7	MC1495/ 1595
IC3	LF353
IC4	U257
IC5	U267
IC8	MC1741
IC9	U237
IC10	U247
IC11	7815
IC12	7915
REC1	WO-005 potted rectifier 50V 1A
D1, 2	OA91 matched pair (see text)
D3-9	1N4148
L1, 2	Toko 8BA 1mH rf choke
T1	15t 0·56mm enam copper wire wound on Fair-Rite Products ferrite toroid type 5961001101
T2	Drake PO615 0-15, 0-15V 6VA
RLA	Miniature type OUC
Display	Type DVM176 200mV fsd
L.E.Ds	All 5 by 2·5mm AEG flatface or similar: 14 green, 8 red, 6 yellow
Battery	PP3 and connector
S1, 2, 3	SUE two-pole c/o push/ push on 20mm spacing bracket
RF head enclosure	Die-cast box size 89 by 35 by 30mm
Case	Centurion Type DX2
F1	20mm 200mA fast in panel holder

Miscellaneous

Four 14-pin dil sockets
Four 8-pin dil sockets
Bezel for DVM (type BEZ-10)
50cm 0·56mm dia enam copper wire
Four 0·5in threaded 6BA metal spacers
Eight 0·25in 6BA bolts and lockwashers
Length of three-core mains cable 5A
0·25in aperture cable grommet
Knob (0·25in shaft)
40mm RG58 coaxial cable
Two SO239 single-hole sockets
Eighteen 0·1in pcb connection pins
Three 0·5in 6BA bolts
Six 6BA half nuts
Three 6BA lockwashers
Four stick-on rubber feet
Three knobs for push switches
Push-on heatsink for 7815

A set of three pcbs is available from the author for £7.50 incl p&p.

vertically against the front panel, avoiding a large number of interconnections back to the main pcb.

The power supply generates the +15 and -15V supplies required by the circuit, from mains input via transformer T2, which together with the rest of the psu circuit is mounted on the main pcb. The circuit is fairly standard, with two three-terminal voltage regulators stabilizing the raw dc supply. A panel-mounted fuseholder is provided for protection. As the circuit generates a fair amount of heat, ventilation holes are provided in the upper and lower panels of the case.

Construction

It is strongly recommended that the pcbs as given are used for the sake of reproduceability. These are available separately if required.

Main pcb (Figs 4, 5 and 6)

The following order of assembly should be adhered to:

(a) Insert and solder the connection pins and ic sockets, with the notches on the latter agreeing with the diagram.

(b) Insert and solder all fixed and preset resistors, and all diodes. Take care that Metox resistors are used where specified as these affect the stability of the calibration.

(c) Insert all of the short links on the top of the pcb. The long links are made on the underside after all other components are inserted.

(d) Insert and solder all capacitors, observing polarity of the leads where appropriate.

(e) Insert and solder the bridge rectifier (the long lead is the positive output) and the relay.

(f) Assemble the switches on the bracket, insert and solder making sure that the underside of the bracket and the back of the switch body are in contact with the pcb.

(g) Insert and solder T2 in place.

(h) Insert and solder IC11 and 12 with correct case orientation. Push the clip-on heatsink over IC11 (C19 will have to be bent flat against the pcb).

(i) Connect the remaining links on the underside of the pcb, using insulated wire.

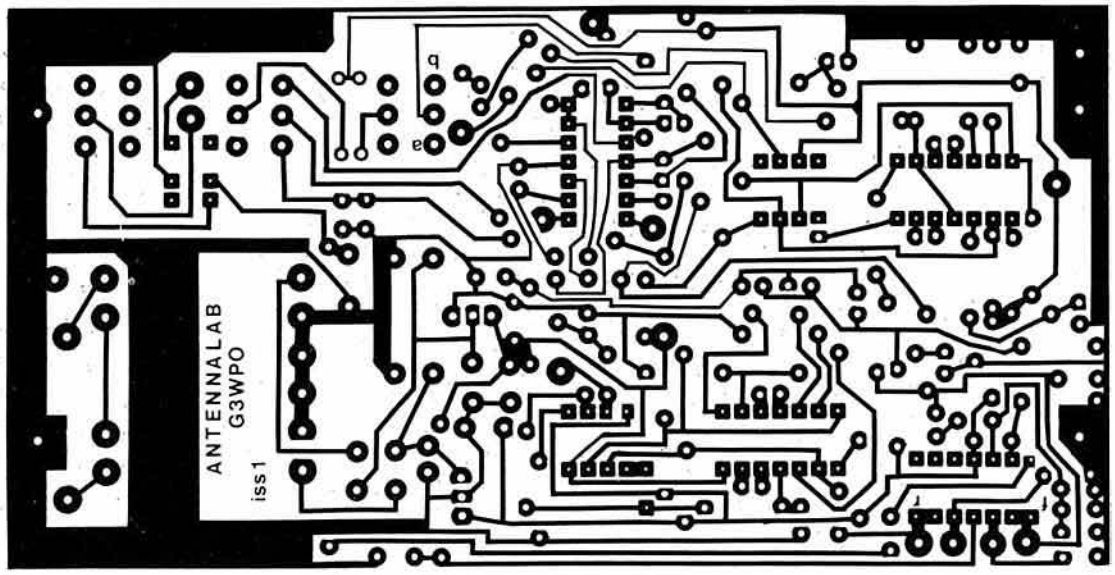


Fig 4. Antennalab main pcb

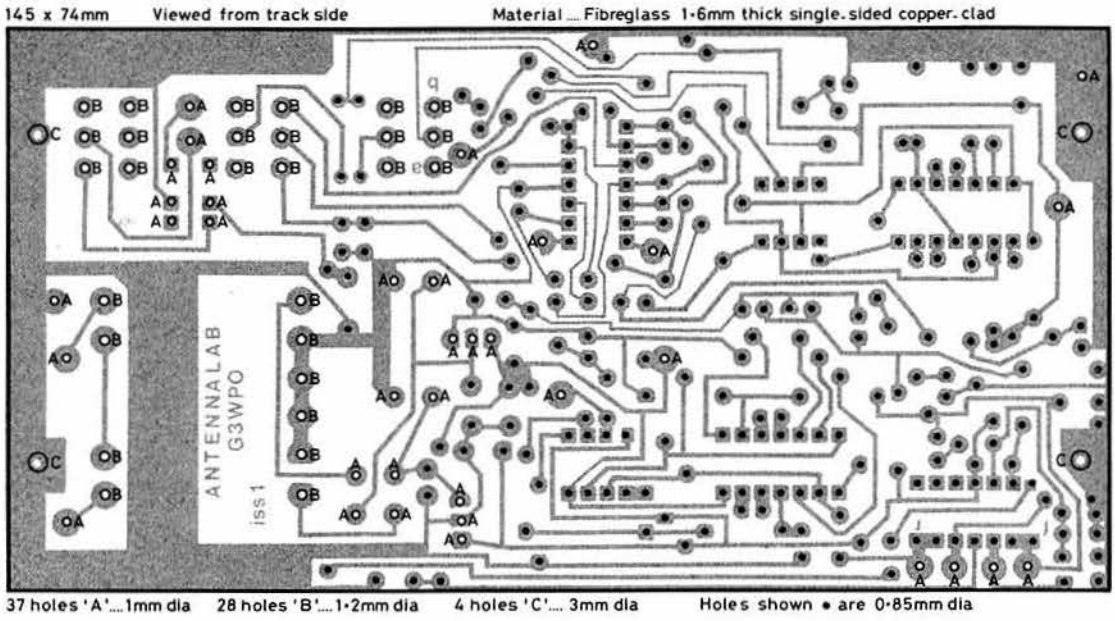


Fig 5. Antennalab main pcb drilling

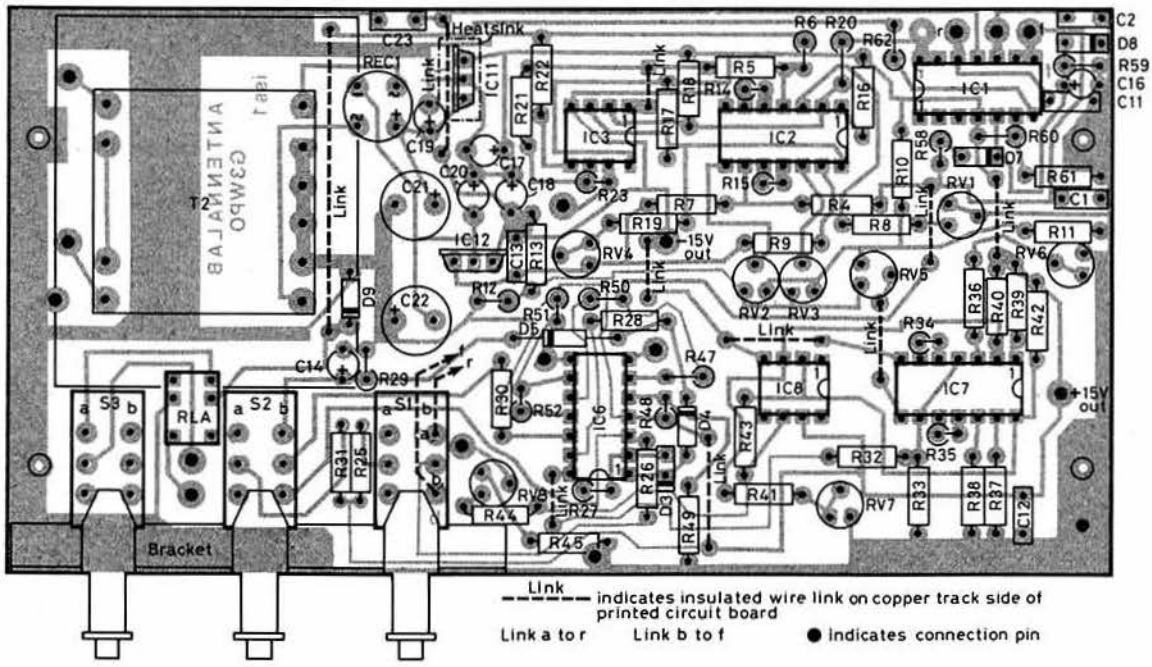


Fig 6. Antennalab main pcb component layout

Before proceeding further, check all components against Fig 6, and make sure there are no solder bridges between tracks or ic pads.

Next, temporarily connect the mains lead and check that the output voltages are +15 and −15V ±0·3V. It is important that the two rails are within 0·5V of each other as otherwise some difficulty may be experienced in aligning the circuits.

The ics can now be inserted into the sockets and the dc alignment started. Make up a temporary variable supply of 0–10V by connecting a 2·2kΩ resistor from the +15V supply to one end of the 5kΩ potentiometer (RV9), taking the other end of the potentiometer to 0V, and the wiper to a test clip.

VSWR section

(a) Connect a multimeter (to read −10V max) to pin 1 of IC3a. Connect the test clip to the V forward input pin, and connect the V reflected pin to 0V. Apply power, set the 5kΩ potentiometer to 10V and adjust RV2 for approximately 0V on the meter.

(b) Vary the 5kΩ potentiometer from 0·8 to 10V, and adjust RV4 until the meter gives a constant reading within these limits somewhere around 0V (not necessarily exactly 0V).

(c) With the potentiometer at 10V, readjust RV2 for 0V reading.

(d) Remove the V reflected pin link to earth and connect in parallel with V forward pin.

(e) Again vary the potentiometer between 0·8 and 10V, adjusting RV3 until the meter gives a constant reading near to, but not necessarily exactly, −10V. Then adjust RV1 for exactly −10V on the meter.

(f) Repeat steps **(b)** to **(e)** until no further improvement can be obtained (one or two repeats should be sufficient).

Power squaring circuit

(a) Attach the multimeter to pin 6 of IC8 (10V max).

(b) Connect the test clip to V forward input pin.

(c) With the potentiometer at 0V, adjust RV7 for 0V reading.

(d) Set the potentiometer to 1V output and adjust RV5 for 0·10V on the meter.

(e) Set the potentiometer to 10V and adjust RV6 for 10V on the meter.

(f) Repeat steps **(c)** to **(e)** until no further improvement can be obtained.

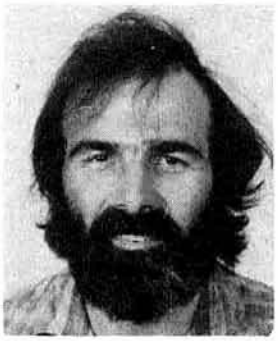
During these tests the relay should have been switching when the voltage input initially exceeded about 0·15V. Check also that pin 7 of IC6 goes low when the input voltage exceeds approximately 1V, and that IC6 pin 8 goes high when the input voltage exceeds 10V.

Two final adjustments remain when the unit is cased.

(To be continued)

THE MZ80K in the radio amateur's shack

by A. F. SINCLAIR, GM4BWT*



ALEX SINCLAIR is 39 years old, is married, and has two children. Having served in the Royal Navy and Merchant Navy, he is now employed by a national company as an engineer with telephone-related communication systems.

He is a founder member of the Edinburgh & District Amateur Radio Club, and has been a radio amateur since 1966.

The interface circuit

Listening on the air nowadays, it would appear that every up-to-date amateur has a ZX81 computer in his or her shack. This fact, coupled with the general sale of the ZX81—and the Spectrum from the same stable, ensures a plethora of programs (both amateur orientated, and for more sane purposes) for these machines.

There are, however, several other types of computer in use in shacks around the country, and one of the more popular is the MZ80K from Sharp, due probably to the efforts of Graham Knight, GM8FFX, in Aberdeen—the Edinburgh & District Amateur Radio Club alone can boast of three members using this machine. It was decided, therefore, to redress the balance somewhat by describing applications of the MZ80K machine in the amateur shack.

First we will deal with the IN/OUT circuitry of the computers and how to interface it with, and to, the outside world of amateur radio using a simple interface circuit; the emphasis throughout being to stick to the "kiss" principle advocated by GM3RFQ. A method of dealing with that other problem of computers in the shack, ie rfi, will also be described.

A	A15	A14	A13	A12	A11	A10	A9	A8	A7	A6	A5	A4	A3	A2	A1	AØ	G	D7	D6	D5	D4	D3	D2	D1	DØ
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
B	G	INT	G	MREQ	G	IORQ	G	RD	G	WR	G	M1	G	HALT	G	RST	G	G	G	G	*G	G	G	G	G

Fig 1. The 50-way connector on the rear of the MZ80K as seen from the outside

*23 Ravenscroft Place, Edinburgh.

The MZ80K is a Z80 cpu-based machine, with the monitor program in a 4k rom chip, a morse receive program and an rtty receive/transmit program described later use the resident monitor subroutines quite extensively for user inputs and display purposes. One big advantage of the MZ80K over the ZX81 lies in the fact that the screen display is memory mapped, and with the Sharp machine language tape etc, modification of the morse and rtty programs would be relatively simple, if desired.

The Z80 cpu lines are all buffered before going on their tortuous routes around the rest of the computer, including the 50-way bus connector at the rear of the machine—which is our gateway to the great outdoors, to coin a phrase. The various lines available at the connector are indicated in Fig 1, being viewed from the back of the computer on the *outside*.

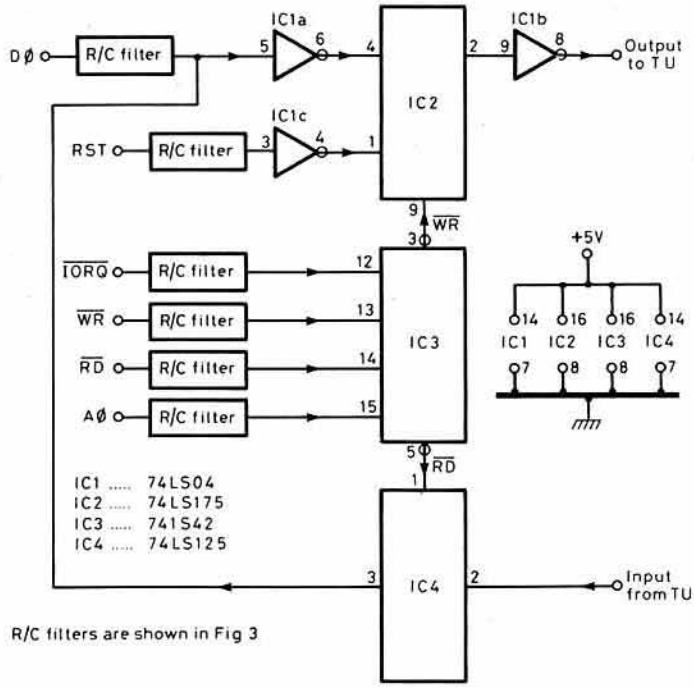


Fig 2. Circuit diagram for a simple I/O interface for the MZ80K providing one I/O line

The circuit shown in Fig 2 will allow the computer to interface with external devices or, in our case, terminal units for morse or rtty. Only one IN/OUT line is used for this purpose, although this circuit can deal with eight on its own, and it can be expanded, of course, by duplicating the hardware and using the other address lines from the computer.

The operation of the interface circuit is quite straightforward. When the

program being run (morse or rtty) is looking for an input from the terminal unit, the instruction IN A,(0) is passed to the Z80 cpu, and the $\overline{RD}$ and $\overline{IORQ}$ lines are enabled "low" while the A0 line goes "high". These signals feeding into IC3, a binary-to-decimal decoder, enable pin 5 of IC3 "low", in turn enabling IC4 and allowing the data from the terminal unit to be passed through to the computer on the D0 line. For morse or rtty reception only, neither IC1 nor IC2 would be necessary, since they are utilized on rtty transmit only.

When the computer wants to output data, the Z80 cpu is given the instruction OUT A,(0) which then enables the $\overline{WR}$ line "low" instead of the $\overline{RD}$ line, causing pin 3 of IC3 to go "low", allowing the data on the D0 line to be clocked through IC2 and on to the terminal unit. Two sections of IC1 are used to invert the data on the D0 line, and a third section inverts RST, to ensure that IC2 is reset at switch on.

To keep rfi to a minimum it is essential that the IN/OUT board and connecting cables to the computer are fully screened, and the input and output to the terminal unit taken from the interface board through feedthrough capacitors.

My own IN/OUT board was constructed on Veroboard about 2in square, mounted inside the computer as shown in the photograph, and hard wired internally to the appropriate points on the main computer board. This is not as difficult a job as you might think, and is well worth the effort. The two connections to the terminal unit are fed out via two feedthrough capacitors bolted through the back of the computer casing, and there is no trace of rfi on hf or vhf while operating. The 5V supply for the IN/OUT board can be taken from the computer 5V line, via a fuse, and each ic on the board should be decoupled with a 0·1μF disc ceramic capacitor across its supply pins.

The morse code program

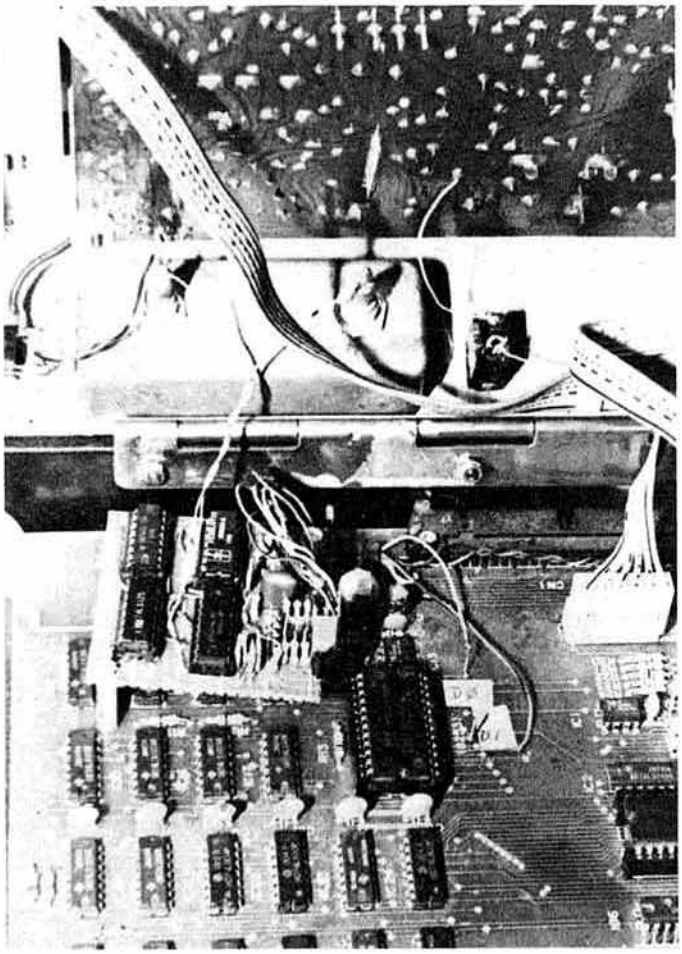
A program to receive morse only may seem rather strange in view of the fact that most of the commercial units on the market can transmit as well as receive the code. It was decided that, unless you can touch-type at 35 words/min while holding a verbal conversation at the same time, as GM3HUN does, then it is probably faster and easier to send the code with a key, as normal. However, sometimes a receive terminal can be very useful, especially if your morse is a bit rusty. It also allows confirmation of received handwritten morse when learning, or when trying to "up" your speed.

Having constructed the simple interface circuit, the computer can now be connected via a terminal unit to a receiver. With the machine code program, the computer will decode machine- or hand-sent morse code, tracking its speed automatically between 12 and 35 words/min initially, and display it on the computer screen.

The terminal unit is required to convert the received morse tones to a ttl compatible output, so that its output is a logic "1" with no signal present and a logic "0" with a tone present. If the receiver being used has a good cw filter, a very simple terminal unit would suffice, but in most cases an audio filter would help, followed by a pll tone decoder ic-based circuit.

Table 1. Morse machine code program for the MZ80K computer in "HEX"

3000	CD	4C	31	01	01	0C	21	00	00	CD	95	30	30	34	24	7C
3010	CB	3F	CB	3F	CB	3F	B8	38	07	CD	95	30	30	E5	18	F9
3020	CD	95	30	38	E9	2C	78	CB	3F	BD	38	0C	CD	95	30	30
3030	F4	7C	85	67	2E	00	18	D6	7C	CB	3F	B8	CB	11	26	00
3040	18	09	2C	7D	CB	3F	CB	3F	B8	30	18	CD	95	30	30	F2
3050	24	78	CB	3F	BC	38	29	CD	95	30	38	F4	7D	8C	6F	26
3060	00	18	DF	79	FE	01	28	06	CD	AB	30	CD	AB	30	2E	00
3070	26	00	CD	95	30	30	F9	24	78	CB	3F	BC	30	F4	18	A0
3080	78	CB	3F	80	BD	38	07	78	85	CB	3F	47	18	03	CD	AB
3090	30	2E	00	18	8B	C5	06	05	0E	00	DB	00	E6	01	81	4F
30A0	CD	DB	30	0F	10	F4	79	FE	03	C1	C9	C5	E5	79	01	32
30B0	00	21	E8	30	ED	B1	01	31	00	09	7E	CD	12	00	15	20
30C0	05	CD	06	00	16	28	E1	C1	0E	01	C9	00	00	00	00	00
30D0	00	00	00	00	00	00	00	00	00	00	00	D5	16	B5	15	20
30E0	FD	D1	C9	00	00	00	00	00	01	06	17	15	0B	03	1D	09
30F0	1F	07	18	0A	1B	04	05	08	19	12	0D	0F	02	0E	1E	0C
3100	16	14	13	30	38	3C	3E	3F	2F	27	23	21	20	2E	6A	2D
3110	4C	35	BA	7A	73	47	55	52	37	00	20	41	42	43	44	45
3120	46	47	48	49	4A	4B	4C	4D	4E	4F	50	51	52	53	54	55
3130	56	57	58	59	5A	31	32	33	34	35	36	37	38	39	30	3D
3140	2E	2F	2C	23	2D	3C	3F	3A	3B	29	22	2A	3E	16	CD	12
3150	00	11	00	28	CD	03	30									



IN/OUT board mounted in rear lefthand corner of MZ80K computer with feedthrough capacitors fitted in die-cast box bolted to rear panel of the computer. The actual connectors, outside, are BNC sockets. *Photo:* GM4IUS

The program is based on an article which appeared in *Wireless World* February 1981, describing a machine code listing and flowchart for the *Wireless World* Computer, which is also based on the Z80 cpu. Since the program is rather complex, and it is not necessary to know exactly how the program operates in order to get it to function, only a brief description of its principles will be given here. If any changes in the program are contemplated, the programmer should fully understand programming in machine code, and would be well advised to read the aforementioned article and understand it fully before attempting to modify the program. Although similar to the *Wireless World* program, substantial changes have been made to it, since the original presentation would not suit the MZ80K display format, and the program has been tidied up considerably by making use of some of the MZ80K monitor subroutines.

When initially set up, the program is set for 17 words/min. The morse character is recognized by the length of the dots and dashes comprising it; the beginning and the end of the character being signified by the lack of signal longer than the inter-element spacing of the character. As well as resetting the speed of the program to the received morse, the elements of each character are added together to give a "hex" number corresponding to it. For example, "dit dah" (A) will be converted to 06H, and "dah dah dit dit" (Z) will be converted to 13H. This "hex" value is then converted to the appropriate ASCII character using a look-up table, and so to the screen for display. If the character is not recognized, an asterisk will be printed. The table otherwise contains all the punctuation marks, double characters, letters A–Z and numbers 0–9. The program is run after loading by typing "GOTO $3000" and then pressing "CR".

A simple way to test if the program is working is to supply pin 2 of IC4, on the interface board, with +5V through a 1kΩ resistor, and insert a hand or electronic key between pin 2 of IC4 and 0V. Incidentally this will soon tell you how good your morse sending is, since the program will print what you actually send, and not what you may think you are sending.

Finally, the program speed will automatically follow the incoming morse

Table 2. RTTY machine code program for the MZ80K computer in "HEX"

```
2000  31 00 20 11 00 21 0E 00 21 98 D3 22 00 10 3E C6 CD DC 0D CD A6 0D 36 3C
2018  CD CA 08 FE 61 CA 00 00 FE C6 CA 00 20 FE CB CA 40 21 FE DC CA A0 22 00
2030  00 D5 C5 01 00 05 DB 00 1F DA 36 20 16 21 CD D9 20 DB 00 1F DA 36 20 16
2048  56 CD D9 20 DB 00 E6 01 81 0F 4F 10 F2 C1 D1 0F 0F 0F FE 1B CA E4 20 FE
2060  1F CA E9 20 81 5F 1A FE FE CA 18 20 D9 2A 00 10 FE FF CA B0 20 77 23 7D
2078  FE E8 CA 8B 20 36 F4 22 00 10 16 56 CD D9 20 D9 C3 18 20 11 00 D0 01 C0
2090  03 21 02 E0 36 0C 21 28 D0 ED B0 06 28 2D 36 00 10 FB 36 3C 22 00 10 21
20A8  02 E0 36 0D D9 C3 18 20 36 00 11 00 D0 01 70 03 21 02 E0 36 0C 21 78 D0
20C0  ED B0 06 78 2B 36 00 10 FB 2E 98 36 3C 22 00 10 21 02 E0 36 0D D9 C3 18
20D8  20 1E 23 1D C2 DB 20 15 C2 D9 20 C9 0E 20 C3 18 20 0E 00 C3 18 20 00 00
20F0  00 00 00 00 00 00 00 00 00 00 00 00 00 00 FE 05 FF 01 00 13 09 15
2108  00 04 12 0A 0E 06 03 0B 14 1A 0C 17 08 19 10 11 0F 02 07 00 0D 18 16 00
2120  FE 23 FF 2A 00 67 28 27 00 64 24 00 2F 61 4F 68 25 6A 69 22 63 26 20 21
2138  29 49 66 00 2E 2D 2B 00 3E 16 CD 12 00 3E 1F 47 CD 81 21 3E 08 CD 81 21
2150  3E 02 CD 81 21 CD B0 21 F5 CD 12 00 F1 16 22 5F 1A CD 6A 21 CD 81 21 C3
2168  55 21 F5 FE 80 DA 75 21 3E 1B C3 77 21 3E 1F B8 CA 7F 21 47 CD 81 21 F1
2180  C9 C5 06 05 4F AF D3 00 16 A9 CD A5 21 79 D3 00 1F 16 A9 CD A5 21 05 C2
2198  8E 21 3E 01 D3 00 16 FA CD A5 21 C1 C9 1E 11 1D C2 A7 21 15 C2 A5 21 C9
21B0  D9 CD CA 08 B8 CA B1 21 47 FE C9 CA 00 20 FE F0 CA B1 21 FE CD CA F3 21
21C8  FE C8 CA FA 21 FE C7 CA 5B 22 CD CE 0B D9 C9 21 A3 11 7E FE 0D CA F3 21
21E0  D9 CD 12 00 16 22 5F 1A CD 6A 21 CD 81 21 D9 23 C3 DA 21 D9 CD 06 00 C3
21F8  45 21 11 A3 11 CD 03 00 C3 B1 21 00 00 00 00 00 00 00 00 00 00 00 00 00
2210  00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 04 8D 00 94 89 00 9A 85
2228  8F 92 00 00 8C 83 9C 9D 96 97 93 81 8A 90 95 87 86 98 8E 00 00 9E 00 99
2240  00 03 19 0E 09 01 0D 1A 14 06 0B 0F 12 1C 0C 18 16 17 0A 05 10 07 1E 13
2258  1D 15 11 21 A3 11 7E FE 0D CA 77 22 D9 CD 12 00 16 22 5F 1A CD 6A 21 CD
2270  81 21 D9 23 C3 5E 22 D9 CD 06 00 3E 1F 47 CD 81 21 3E 08 CD 81 21 3E 02
2288  CD 81 21 CD 1E 00 CA 95 22 D9 C3 5B 22 D9 06 CB C3 B1 21 00 00 00 00 00
22A0  CD CA 08 FE 22 28 0E FE 21 28 26 FE 23 28 3F FE D0 CA 00 00 18 EA 3E 64
22B8  32 3D 20 3E B8 32 48 20 32 83 20 3E 0E 32 DA 20 3E FC 32 7E 20 3E 00 C3
22D0  00 20 3E 2B 32 3D 20 3E 56 32 48 20 32 83 20 3E 23 32 DA 20 3E F4 32 7E
22E8  20 3E 00 C3 00 20 3E 4C 32 3D 20 3E 98 32 48 20 32 83 20 3E 0B 32 DA 20
2300  3E FD 32 7E 20 3E 00 C3 00 20
```

Components list

IC1	74LS04
IC2	74LS175
IC3	74LS42
IC4	74LS125
R1	100Ω
R2, 5, 8, 11, 14	3·3kΩ
R3, 6, 9, 12, 15	6·8kΩ
R4, 7, 10, 13	220Ω
All resistors 0·125W carbon	
C1	220pF
C2, 3, 4, 5, 6	100pF
All capacitors ceramic plate	

speed changes, provided the change is not less than two thirds or greater than twice the speed it has adjusted to; eg, if copying at 35 words/min and the morse speed input is dropped to 12 words/min, the program will not adjust to this new speed. To reset the program speed to its nominal 17 words/min, tune to a continuous carrier, such as your calibrator signal, or otherwise present a logic "0" to the computer interface board.

It is hoped that a suitable morse terminal unit circuit and printed circuit board, using a very simple method of tuning-in the morse signal accurately, will be published later, with an rtty terminal unit, using the same unambiguous tuning indication, to follow.

The rtty program

RTTY has been in use by radio amateurs for many years, using Creed 7B machines and their ilk, but with the introduction of the microcomputer to the shack, the mechanical method of rtty communication, with its reams of paper and noise, is now being replaced with the silent, reliable vdu, along with its associated electronic hardware and relatively simple software.

The idea to implement rtty on the MZ80K computer originally came from GM4IUS, when he was developing a program for his ZX81 using a machine code program. The timing and the necessary serial-to-parallel conversion of the rtty code elements were provided in the hardware external to the computer. The main reason for this was the 1k of memory on the basic ZX81, which was insufficient for a complete transmit and receive rtty program including the serial-to-parallel conversion.

The MZ80K being a completely different kettle of "chips", with more user memory and a memory mapped screen, it was decided to develop a program using these extra facilities. The timing and serial-to-parallel conversion being implemented in the program, the monitor sub-routines in the MZ80K being used to service the screen display, and the other functions, all help a great deal in both simplifying and shortening the long machine code program which would otherwise be necessary.

As with the morse program, this program, because of its complexity, will also be simply outlined, with the explanation of the use of the program being emphasized. When the program run is started by typing "GOTO $2000" then pressing "CR", the screen will clear and a small cursor will appear in the bottom lefthand corner. At this time the program is in the receive mode, set to 45·5 baud, and via the interface board is looking for an input from the terminal unit. When the program recognizes the 11ms start half-bit, followed by the elements of the rtty character code and terminated by the finish half-bit, the code is converted to a printable character by a look-up table and displayed on the computer screen in the bottom lefthand corner. The cursor will change to a single dot, preceeding the character just printed, signifying the program is set to speed "1" (45·5 baud). The computer continues to monitor the input from the terminal unit, printing from left to right and scrolling upwards on the computer display. This simulates the hard copy output from a normal teleprinter, but of course the top line of text will eventually scroll off the top of the screen.

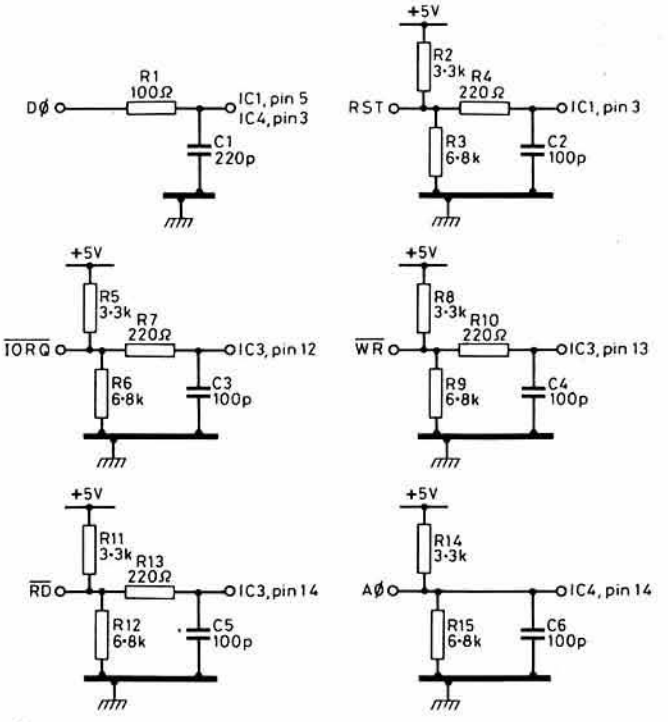
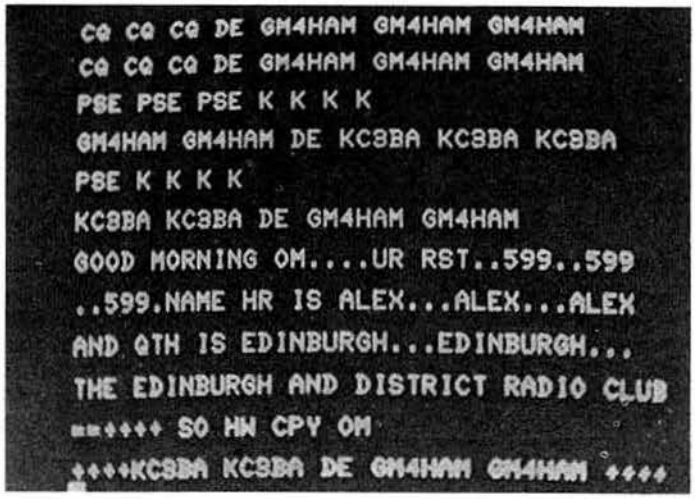
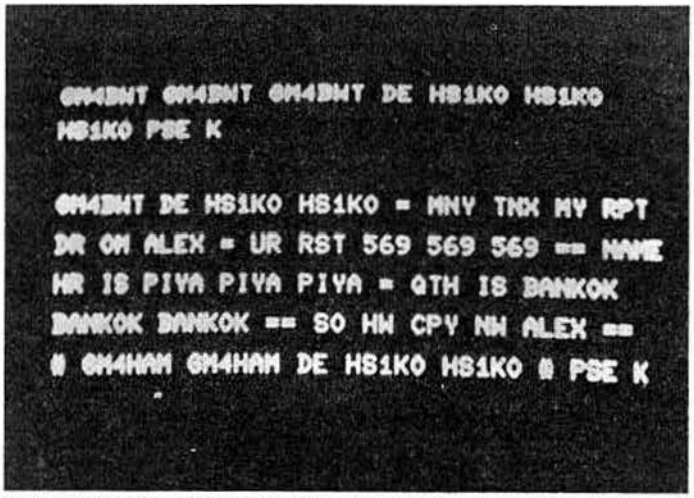


Fig 3. Filtering and buffering circuits used between the computer and the I/O circuit marked "R/C filter" in Fig 3



The start of an rtty contact with KC3BA on 14MHz on the MZ80K screen



Copy received from HS1KO during morse contact on 21MHz, on the MZ80K screen. Photo: GM4IUS

The output of the terminal unit should be "high"(1) for mark and "low"(0) for space.

To change the receive speed, press the bottom right graphics key during printing, or when the output of the terminal unit is "low". The printing will stop, then restart on pressing "1", "2" or "3" for 45·5, 50 or 75 baud respectively. Simultaneously the cursor will change to one, two or three dots to indicate the present speed of the program.

The changeover to the transmit mode is accomplished by pressing "SHIFT/BRK": with the terminal unit output "low" the screen will clear; press "SHIFT/CLR" and start typing out your message. The output from the interface board is now "high" for mark and "low" for space, and when fed to the terminal unit should be used to produce the appropriate tones for feeding to the microphone socket for afsk, or the "1" and "0" levels should be used to shift the vfo the required amount for fsk. The program transmits at 45·5 baud only, but can of course be modified for other speeds.

If, in the transmit mode, "R" is pressed and held down, followed by repeated pressing of "Y", the program will output the "RY"test signal. To return to the receive mode, simply press the "SML/CAP" key.

The program will also store a message in memory for transmission at any time; eg CQ or station details, up to 79 characters in length. To enter a message into the memory, go to the transmit mode, press "SHIFT/CLR" then "SHIFT/DEL", and a flashing cursor will appear at the top of the screen. Now type in your message, finishing with "CR". Press "INST/DEL" at any time, while in the transmit mode, to send it out. The stored message will be repeated until terminated by pressing the "SHIFT/BRK" key before the end of the text of the message, and keeping it depressed until a few seconds after it has finished, then carrying on typing normally. This message will stay in the program memory until "SHIFT/DEL" is again pressed while in the transmit mode, allowing a new message to be composed and typed into the program memory.

Finally, to return to monitor control on the MZ80K, press "!" during printing, or when the terminal output is "low" in the receive mode.

Many circuits have appeared for rtty terminal units in *Radio Communication*, and all will give good copy, the only requirement being that the terminal input and output on the computer side be ttl compatible. The transmit/receive changeover can be achieved simply by utilizing a switch to take the terminal unit output to the computer "low" when required; the other sections of the switch, or a relay etc, activating the transmitter and terminal unit appropriately.

Acknowledgments

Thanks are due to GM4IUS, GM8FFX and GM3RFQ for their invaluable help in assisting me to get this lot to work, and more importantly, forcing me to write about it. □

BOOK REVIEWS

Guide to RTTY Frequencies by Oliver P. Ferrell. 192 pages. Second edition, 1983. Published in USA by Gilfer Associates Inc (52 Park Avenue, Park Ridge, NJ07656) price US$9.95. Limp covers.*Confidential Frequency List* by Oliver P. Ferrell. 224 pages. Fifth edition, 1982. Published in USA by Gilfer Associates Inc, price US $0.95. Limp covers.

These are essentially data books for listeners interested in all those thousands of transmissions between the amateur bands. For the UK listener, the "legality" of deliberately monitoring most of the stations listed is, to say the least, open to question. Nevertheless callsigns and frequencies are often useful information—for example, one finds out that the strong time signals from RWM Moscow are not on 10,000kHz but on 9,996kHz. The rtty guide not only provides thousands of callsigns, locations, and type of service, but also the mode. Both books will fascinate those with general coverage receivers, though it is essential to remember that in practically all countries "anyone divulging the content of any non-broadcast radio transmission" is committing an offence—and that our own Wireless Telegraphy Acts are even more restrictive. The books are primarily intended for North American readers, and although containing very large numbers of stations (listed in both frequency and callsign order) are by no means exhaustive of transmissions that can be heard in the UK, many of which do not seem to be "registered" with the International Frequency Registration Board, at least not for all the frequencies they use. The rtty guide contains several useful introductory chapters, including a special article on rtty using the Cyrillic alphabet. There is also a full listing of the commercial Z-code. Oliver Ferrell has contributed many articles to amateur radio and other journals, including some early research into transequatorial propagation.

G3VA

Digital pll frequency synthesizers—theory and design by Ulrich L. Rohde. Published by Prentice Hall International, first edition 1983. 494 + XVIII pages. Hard covers, UK price £44.95.

Dr Ulrich Rohde, DJ2LR/W2, is an eminent design engineer whose position as a partner of Rohde & Schwarz, adjunct professor at the George Washington University, and president of a communications consultancy firm, has not inhibited him from continuing to provide outstanding articles on hf receivers and other topics in amateur radio publications. This new book on the theory and *practical design* of high-grade digital frequency synthesizers for communications equipment and signal generators, with its emphasis on detailed circuitry complete with component values etc, is an outstanding example of the type of handbook that practising engineers can use as a working tool in the secure knowledge that it is soundly based and an admirable starting point for custom designs. It is unfortunate, but perhaps today inevitable, that the cost will put the book beyond the reach of most individual radio amateurs. The formidable mathematical theory of phase-lock-loops is largely contained in the first section. Thereafter the basics of, for example, sideband noise in oscillators is presented clearly without excessive mathematics. A section on basic oscillator design deserves to be read even by those who have no intention of tackling complete synthesizers. The bulk of the mathematics, including computer programs, is in the extended appendix running to over 100 pages. A highly professional book but one that should be sought out in technical libraries by technically-minded amateurs who wish to gain a real insight into high-grade frequency-synthesis. For professional rf design engineers it could become an indispensable tool.
Contents: Preface; important notations; loop fundamentals (68pp); special loops (33pp); loop components (167pp), including oscillator design (36pp), reference frequency standards (34pp), mixer applications (3pp), phase/frequency comparators (30pp), wideband high-gain amplifiers (10pp), programmable dividers (47pp), loop filters (17pp), digital loop synthesizers (43pp), including multiloop synthesizers using different techniques, system analysis, micro-processor applications in synthesizers, transceiver applications; practical circuits (19pp) including single-loop 41-71MHz synthesizer, single-loop 72-92MHz, 25kHz step synthesizer, 75-105MHz multiloop synthesizer with 100Hz steps. Appendix, mathematical review (34pp), computer programs (76pp); bibliography (2pp); index (12pp).

G3VA

ATU ... or ASTU?

Louis Varney became interested in "wireless" in 1922 when 11 years old. Obtained "artificial aerial" licence 2ARV in 1928, then G5RV in 1929. DXCC No 64 in 1932. Founder member, FOC, 1947. Founder member, RAOTA (UK). Member, RAOTC (Australia). Member of RSGB Council mid-'sixties. Author of many articles published by RSGB on tvi suppression, transmitter design and antenna systems. Designed G5RV multi-band antenna 1946. Joined Marconi W T Co Ltd, 1930. Served in Royal Corps of Signals during second world war. Consulting engineer (telecoms), 1960-76. Speaks and writes French, Spanish, Italian and Portuguese. Hobbies: amateur radio, oil painting, horse riding and haute cuisine (learned while working in Paris). Has visited or lived in some 75 countries and has held licences or operated as guest operator in 55. President-for-life, Mid-Sussex ARS.

by LOUIS VARNEY, CEng, MIEE, AIL, G5RV*

WE ARE ALL FAMILIAR with the abbreviation atu and know that it stands for antenna tuning unit. However, except in the relatively rare case where an atu is used at the far end of a feeder in order, specifically, to tune the antenna to resonance at the frequency of operation, and to present a suitable impedance match to the feeder, it is normally connected between the output of the transmitter and the input end of the feeder in order to compensate for the reactive effect present at this point when a feeder is not correctly matched by the antenna. In this case, the atu is in fact tuning (or resonating) not just the antenna but the feeder as well, and should, strictly, be called an antenna system tuning unit or astu.

While not wishing to labour this point, it is evident from queries which the author has received over a long period that many amateurs do not appreciate its significance. While the use of a tuning unit at the transmitter end of a feeder and antenna system will enable the transmitter to work into a non-reactive load of an impedance (usually 50Ω) required to achieve maximum power output at a virtually 1:1 vswr, and thus satisfy the relatively stringent load requirements of a modern transistorized power amplifier, it cannot reduce or eliminate the possibly quite high vswr which may exist on the feeder. In the case of open-wire feeders (or 300Ω ribbon with "windows"), the power loss occasioned by such standing-wave conditions (in any reasonable length of such a feeder likely to be used by the average amateur) is negligible on all the hf bands up to and including 28MHz. However, when it is desired or imperative to use coaxial cable to feed an antenna which presents a more-or-less serious mismatch to the feeder on certain bands, the power loss in such a feeder may be unacceptable. Nevertheless, in many cases, even when using coaxial cable, the *extra* power loss due to a moderate vswr, compared to the inevitable loss on a given length of feeder at a given frequency—even when such a feeder is correctly terminated—is often only a fraction of 1dB and can be tolerated.

Reference to the *Radio Communication Handbook*, 5th edn, p12.28, Fig 12.45, or to the various antenna handbooks will enable such losses to be estimated. As an example, the power loss on a 100ft length of RG8U coaxial cable feeder correctly terminated in a 50Ω non-reactive load is 0·66dB at 14MHz. Reference to Fig 1 (a reproduction of Fig 12.45 referred to above) shows that, for a vswr of 3:1 the *extra* loss is 0·35dB. Thus, the *total* loss will be 1·01dB, which may be considered to be quite acceptable. The total loss for lesser lengths of this type of feeder under these conditions would be proportionately less; eg a 50ft length would have a total loss of 0·505dB.

Table 1 shows the basic characteristics and attenuation figures for five types of feeder widely used by radio amateurs, arranged in ascending order of power loss for a *correctly terminated* 100ft length on the five hf bands indicated. From this table it will be seen that, for a given frequency and length of feeder correctly terminated at the antenna, the losses compared to those of an open-wire feeder are approximately six times as great for standard 300Ω ribbon without "windows"; nearly 10 times for RG8U coaxial cable, 14 times for transmitter-type 75Ω twinlead (unfortunately not available in the UK), and 41 times for standard "receiver-type" 75Ω twinlead. The loss for 300Ω ribbon with "windows" will lie somewhere between the loss for open-wire feeder and that for 300Ω solid dielectric ribbon. Fortunately, in the average amateur antenna system—whether used to feed a typical Yagi or quad beam antenna, a simple dipole for a particular band or a trap-dipole for multiband use—the total length of feeder is unlikely to exceed 100ft, so that the losses, even on 28MHz, are

Table 1. Basic characteristics and attenuation figures for five types of feeder

Type of feeder	Z_o Ω	VF	Attenuation dB/100ft MHz				
			3·5	7	14	21	28
Open-wire	400/600	0·97	0·03	0·05	0·07	0·08	0·1
Ribbon*	300	0·82	0·18	0·28	0·41	0·52	0·6
RG8U coaxial	52	0·66	0·3	0·45	0·66	0·83	0·98
Twinlead (TX type)	75	0·71	0·29	0·49	0·82	1·15	1·4
Twinlead (RX type)	75	0·68	1·5	2·1	2·9	3·6	4·1

* Solid dielectric without "windows"

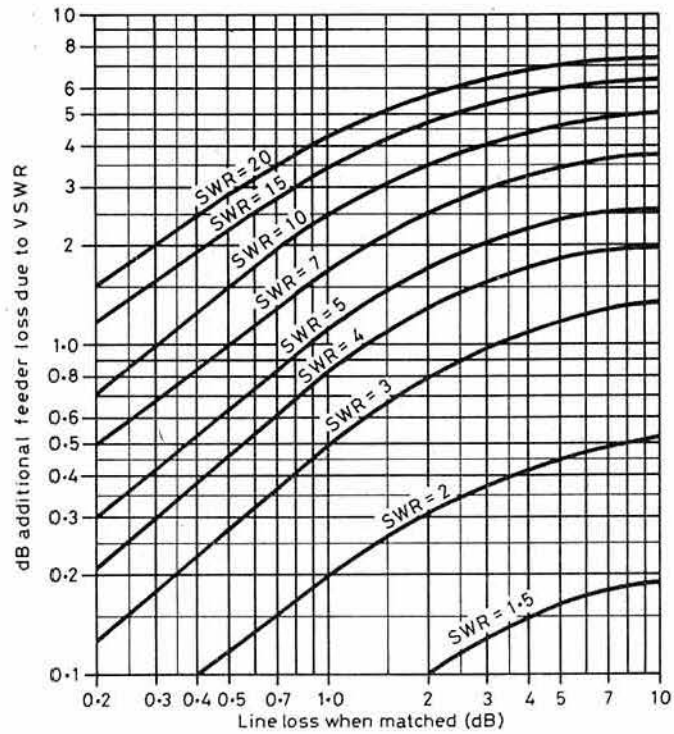


Fig 1. Curves of absolute power loss for any given swr and matched feeder loss (assuming that the generator, ie the transmitter pa output circuit, completely mis-terminates the feeder, the normal state of affairs)

*82 Folders Lane, Burgess Hill, W Sussex RH15 0DX.

acceptable provided that a feeder of suitable impedance to feed the antenna directly is used. In that case, no atu is necessary.

Nevertheless, even if the antenna is suitable for direct 50Ω coaxial cable feed, and the power loss in such a feeder under moderate vswr conditions is acceptable in itself, it must be remembered that many modern transceivers having a transistor output stage are fitted with a special alc circuit. This automatically reduces the transmitter power output when this stage is presented with a load impedance which is even moderately reactive, representing a vswr of more than about 1·5:1. Although such a power amplifier will continue to work even with a load vswr of 2:1 or more, as this figure increases the alc protective circuit will rapidly reduce the input (and thus the output) power of this stage until it is shut down completely. Thus, the acceptable feeder power loss is only one factor, and the effect of vswr on the alc protective circuit may be more important than the feeder loss. This may well, in itself, call for the use of a suitable astu to ensure that, whatever the feeder loss may be, the transmitter pa works into a 50Ω non-reactive load.

However, certain multiband antennas (such as the G5RV) which, while providing useful gain over a dipole or trap-dipole for dx working due to their "long-wire" effect as the operating frequency is increased, cannot present an impedance match to the feeder on more than one specific band. It is advisable, therefore, to use open-wire line or 300Ω ribbon with "windows", since the feeder, inevitably, will have a medium-to-high vswr on the other bands. If either of these types of feeder is used with the G5RV antenna, the usual 34ft "matching" section is included in the main feeder, and if the total length of this is made about 84ft from the centre of the antenna to the output terminals of the atu, the atu coils can be parallel-tuned on all bands. Under these conditions, the feeder loss—even at 28MHz—is negligible, and a non-reactive 50Ω load is presented to the transmitter on all bands.

The balun

At this point it is advisable to say something about the use and mis-use of this device. Where it is required to transfer from an unbalanced (coaxial) source of rf power into a balanced (or twin-wire) feeder correctly terminated at its far end, the use of a suitable balun having a 1:1 or other appropriate impedance ratio is perfectly satisfactory. However, an important fact which is widely unappreciated is that a balun cannot function correctly in the presence of a highly reactive load such as would be presented to it if connected to a balanced feeder having a medium-to-high vswr.

A vswr of about 2:1 is the most that a balun can tolerate. At higher vswrs than this, it will function inefficiently and introduce additional power loss into the system. It is under such conditions that the use of an atu of a suitable type is indispensable.

Types of atu

There are many types of atu circuit, and the choice of the correct type to satisfy the transmitter output stage requirements of load impedance and maximum tolerable vswr will depend, basically, upon whether the antenna is to be fed by coaxial cable (unbalanced feeder) or by one of the several forms of twin parallel conductor (balanced) feeder. Provided that the correct choice of the basic type of atu to suit the proposed working conditions is made, the actual choice of the particular type of atu circuit is largely a matter of individual preference.

Basic types

Unbalanced to unbalanced

Used with a transmitter having, typically, a 50Ω coaxial output to feed an antenna system using coaxial feeder which, for various reasons including multi-band operation, cannot present an acceptable impedance match to the transmitter on some or all of the bands to be used. Also, where it is desired to use an end-fed antenna with no feeder.

Suitable forms of circuit are the "T" and "L" networks. Fig 2 shows a typical "T" network, and the caption indicates the component values suitable for use on all bands from 3·5 to 28MHz. For 1·8MHz operation with an end-fed wire antenna of λ/4 or less length, a series-tuned LC circuit used with a counterpoise wire or a good direct earth connection is advisable. Alternatively, an "L" network as shown in Fig 3 may be used.

Unbalanced to balanced

This type, of which there are several possible circuit arrangements, is used to transform a 50/80Ω coaxial source to a balanced form of output suitable for use with a twin-conductor (balanced) feeder. However, unlike a balun,

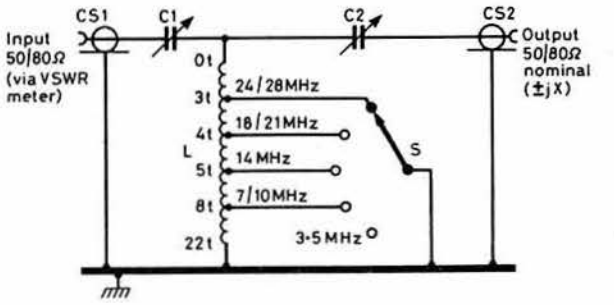


Fig 2. "T" network atu (unbalanced to unbalanced) suitable for 3·5 to 28MHz operation

C1, 2	160 or 200pF variable. Receiver type satisfactory for output power up to 100W
L	22t 18swg enam copper wire close-wound on 40mm id former. Taps, counting from top end of coil: 7/10MHz 8t; 14MHz 5t; 18/21MHz 4t; 24/28MHz 3t (On 3·5MHz the full 22t are used)
CS1, 2	Coaxial sockets (type SO239)
S	Single-pole five-way wafer switch. Ceramic wafer type preferred.
Note	It may be necessary to vary coil taps ± 1 turn depending on effect of metal cabinet and actual output load conditions.

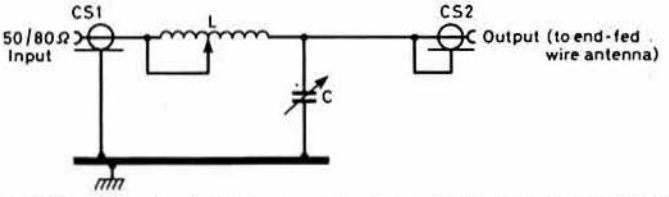


Fig 3. The "L" network atu. Component values suitable for 1·8 and 3·5MHz

L	Approx 14t 18swg enam copper wire c/w on 40mm id former. Optimum number of turns in use to be determined by trial and error
C	160 or 200pF variable capacitor, receiver type
CS1, 2	Coaxial sockets. CS2 must be insulated from the metal box or panel

it will deliver power efficiently into a highly reactive load such as that presented by a mis-terminated feeder having a medium-to-high vswr. Examples of such atus may be found in the various textbooks on the subject of antenna systems. A typical atu of this kind is that described in the author's article "A compact vswr meter and a useful atu", *Rad Com* September 1980. While referring to this article, it is opportune to offer the following extra information:

(1) The swinging link-coil arrangement, as shown in Fig 5 in the original article, illustrates a four-turn coil (L2). While this is suitable for use on 3·5, 7 and 10MHz, it has been found advantageous to substitute a three-turn

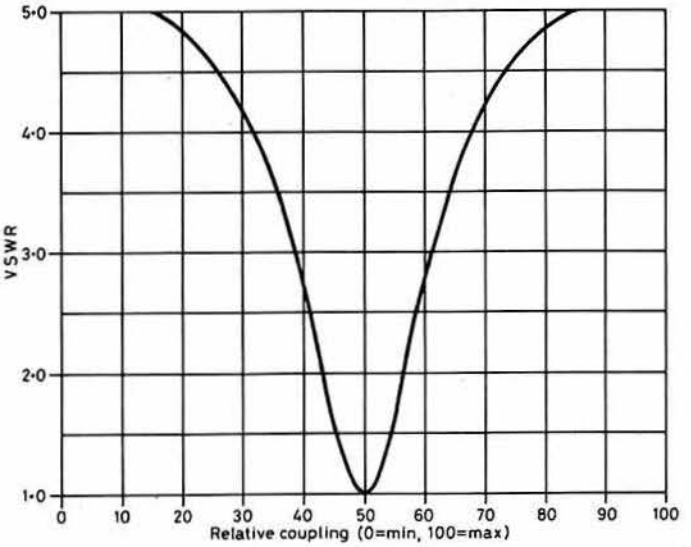


Fig 4. Optimum link-coil coupling angle. 14MHz atu coil 6 + 6t 10swg copper wire spaced wire dia. Feeder taps 2 + 2t. Link-coil 3t

Table 2. Optimum atu and link-coil values for 3·5 to 28MHz operation with G5RV antenna fed with 84ft open-wire feeder

Bands (MHz)	ATU coil turns	Wire swg	Coil id (mm)	Feeder tap turns	Link coil turns
3·5	17 + 17 c/w	14	63	7 + 7	4
7, 10	8 + 8 c/w	14	63	3 + 3	4
14, 18, 21	6 + 6*	10	38	2 + 2	3
24, 28	5 + 5*	10	38	2 + 2	3

* Turns spaced wire diameter

Note. The optimum feeder tap turns for each band or group of bands will depend upon the length and characteristics of the feeder for any particular installation and should be checked by trial and error for best results.

link-coil in order to obtain optimum vswr on the higher frequency bands. This may be achieved easily by fitting the link-coil supporting block with a pair of sockets, and the four- and three-turn link-coils with suitable banana plugs. If this is done, one can further improve performance by using the three-turn link-coil on 14, 18, 21, 24 and 28MHz.

Alternatively, a 500pF variable receiver-type capacitor may be connected between the lower ("earthy") end of L2 (the four-turn link-coil) and earth. However, this arrangement introduces an extra variable control which, from an operating point of view, may be unwelcome even though, once its optimum position for each band has been determined and calibrated, it can

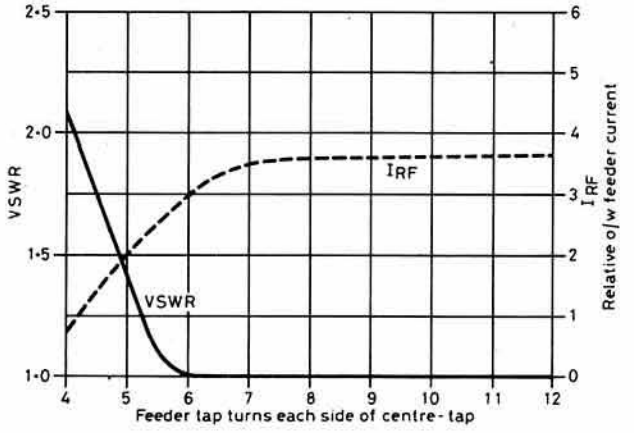


Fig 5. Selection of optimum feeder tap turns on atu coil, 3,650kHz. Conditions as Table 2

be re-set for any particular band in seconds. Table 2 shows the revised coil arrangements for each band.

(2) The importance of selecting the optimum link-coil coupling angle is illustrated by Fig 4, which shows very clearly the sharply-defined minimum vswr obtainable using a link-coil of the optimum number of turns for the particular frequency band. For each sampled coupling position of the link-coil, the atu tuning capacitor is, of course, adjusted so as to obtain the minimum vswr for that degree of coupling.

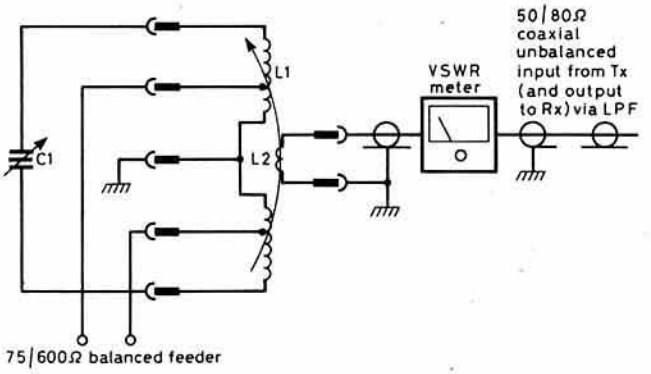


Fig 6. Circuit diagram of atu for all hf bands 3·5 to 28MHz. Unbalanced-to-balanced type

C1 200-200pF split-stator type variable (fitted with slow motion drive). Vane spacing (fixed to moving) 2mm or greater. Moving vanes insulated from earth
L1, 2 See Table 2

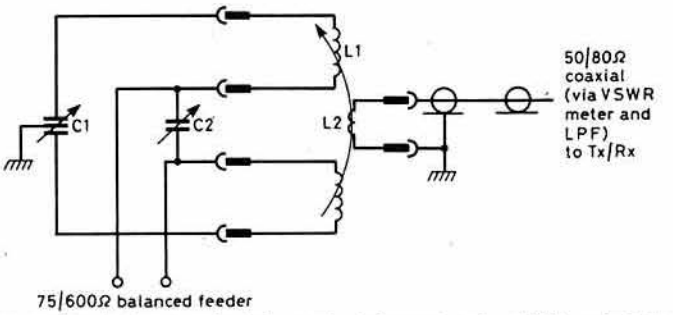


Fig 7. Circuit diagram of unbalanced-to-balanced atu for all hf bands 3·5 to 28MHz using variable feeder coupling capacitor C2 in place of coil taps

C1 200-200pF split-stator type variable (fitted with slow-motion drive). Vane spacing (fixed to moving) 2mm or greater
C2 3 × 500pF receiver type variable (sections connected in parallel). Shaft insulated from earth
L1, 2 See Table 2

(3) The selection of optimum feeder tap turns on the atu tuning coil is shown graphically in Fig 5. Although the graph was obtained by measurements made on 3,650kHz, it is representative of what happens on all the other bands. The optimum tap turns on each side of the atu coil centre will, of course, be different for the other bands. It will be seen that, as the coil taps are moved away from the coil centre, the vswr falls very rapidly to 1:1, while the rf current in the feeder rises rapidly and then flattens off. In the example shown, the optimum feeder tap positions are at 7 or 8 turns each side of the coil centre.

(4) Table 2 also shows the recommended atu tuning coil and link-coil arrangement permitting operation on the eight hf bands from 3·5 to 28MHz. Tests have proved that the G5RV antenna works very satisfactorily on the new 10, 18 and 24MHz bands with no modification.

(5) The use of a slow-motion drive for the atu tuning capacitor is advantageous.

Fig 6 shows the circuit of this atu for the reader's convenience, and Fig 7 shows a modification in which a three-section 500pF/section ganged receiver-type variable capacitor is used in place of the feeder taps on the coil L1. If this arrangement is used, the tune-up procedure is as follows. With the appropriate coil L1 for the band in use plugged in, and the swinging link coil L2 set at about half-mesh with L1, and C2 set at about half maximum capacitance, the tuning capacitor C1 is adjusted for resonance at the working frequency. This will be indicated by a reduction in I_{rev} (reverse current reading in the vswr meter). Then, the link-coil coupling is increased or decreased as required to obtain the lowest possible I_{rev}. Finally, the capacitance of C2 is varied gradually (restoring resonance of the atu by slight re-adjustment of C1) until I_{rev} is as low as possible. The scale readings of C1 and C2 and the position of L2 are then logged for each band so that subsequent re-setting of the controls for any band can be made in a matter of a few seconds. □

NEW PRODUCT

Buy a program and help the RAIBC

If you have a ZX81 with 16k ram computer and want to: (a) determine your QRA locator from latitude and longitude; and (b) use QRA locators to work out distance, bearing and points for contests, without writing programs yourself or typing-in published ones, R. A. Fuller, G8CEZ, can help you—and you can help the Radio Amateur Invalid & Blind Club into the bargain.

G8CEZ has produced a tape which carries programs to perform both these functions, and offers copies of the tape for sale at a price of £3.50, which includes not only the cost of postage and packing but a donation of £1 for the RAIBC.

Technical Topics

by Pat Hawker, G3VA

THERE IS a lot to pack in this month, but first some quotable quotes:

"It was the amateurs who discovered the extraordinary suitability of very short waves for long-distance propagation . . . . . no subject seems to have been more fortunate in the assistance rendered to it by amateur experimenters than that of wireless transmission"—Professor E. V. Appleton, FRS, of Appleton-layer fame, at a British Association meeting in Bristol, 1930.

Praise indeed, but even experts are not always so perceptive. Dick Biddulph, G8DPS, has drawn attention to an anthology compiled by R. L. Webber, *A random walk in science*, from which are taken: "I am tired of all this thing called science . . . . . we have spent millions in that sort of thing and it is time it should be stopped"—USA Senator Simon Cameron (1901).

"There is no plea which will justify the use of high-tension and alternating currents, either in a scientific or a commercial sense. They are employed solely to reduce investment in copper wire and real estate"—Thomas Edison, advocate of dc mains supplies in 1889.

"As far as sinking a ship with a bomb is concerned, you just can't do it"—USA Rear-Admiral Clark Woodward (1939).

"That is the biggest fool thing we have ever done. The bomb will never go off, and I speak as an expert in explosives"—USA Admiral William Leahy on the atomic bomb (1945).

"Even if the propeller had the power of propelling the boat, it would be altogether useless because the power being applied in the stern it would be *absolutely impossible* to make the vessel steer"—Sir William Symonds, Surveyor of the Royal Navy, on a proposal to drive a steamboat by a screw-propeller (1837).

And thoughts from other sources:

"The question is whether those at the very forefront of science can foresee the consequences of their achievements. The answer is an unqualified 'No'." Prof Marie Jahoda, 1982.

"Atomic energy which we may hope to see made available for human use . . . . . destined to provide the salvation of the whole human race"—A. A. Campbell Swinton, 1911, later to be first president of the Wireless Society of London.

THIS MONTH

Multiband arrays with "kiss"

As mentioned recently, Les Moxen, G6XN, moved house soon after the publication of his excellent *HF Antennas for All Locations* with the result that he needed to concentrate for a time on his own antennas for the new location. He decided that he not only wanted one (or possibly two) "ideal" antennas, but also the opportunity of tidying up several loose ends left over from all his previous work, with the aim of shedding still more light on the general concept of basic multiband beam arrays, including compact arrays of less than full size.

After an abortive effort involved, as he puts it, in trying to be too clever, he fell back on "kiss" techniques. When later, during a contact with an American station, he described his "kiss" approach, the American suggested the G6XN had basically re-invented the "G5RV" and could not be persuaded otherwise.

In a sense, G6XN feels that the link with a G5RV multiband dipole is a good introduction, since if one starts from a G5RV all one has to do is to add the requirements for beam operation, such as having at least two elements, keeping within certain limits of length and spacing, and taking appropriate steps to ensure correct coupling. At the practical level, and paying due regard to radiation resistance, required bandwidth etc, there would seem to be distinct advantages in feeding elements across the *ends* instead of the conventional centre-fed approach. With this approach, after suitably disposing of the feeders, one ends up with what looks like a *triangular* version of G6XN's earlier multiband loop antenna, as in Fig 1 (Fig 107, *Amateur Radio Techniques*, 7th edn, p308). With some additional guidelines the end result is a beam array able to compete with full-sized monobanders, yet extremely light, low cost and easy to build, since dimensions are non-critical and no adjustments are needed before erection. Thereafter everything can be done at ground level or even, in some cases, from inside the shack. As the beam is electronically reversible there is no need for heavy, bulky and expensive rotators; sufficient rotation can be obtained from two cords which can often be brought into and operated from the shack.

So far this may seem "kiss" all the way. However, there remain a few problem areas that will irk some users more than others. In particular *narrow bandwidth*. This can be overcome by building additional complications into the system, so letting in the usual compromises; however, since there is a wide range of options open to the user, the amount of extra bandwidth can be tailored to suit individual needs. For example, a cw operator will usually be far less concerned with antenna bandwidth than, say, someone wishing to make full use of all bands. It is also worth remembering an earlier G6XN precept: a lightweight two-element array at a good height is usually as good as or better than more elements nearer the ground.

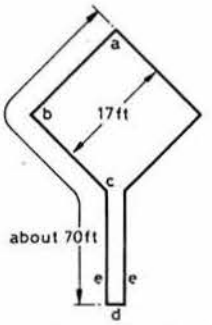


Fig 1. Multiband loop and stub element first described by G6XN in *Wireless World*, 1959. It resonates at 7, 14, 21 and 28MHz and is suitable as a quad-beam element on 14 and 21MHz. It can be fed with low impedance feeders at point d, or with 600Ω open line at about point e. A more detailed description can be found in all recent editions of *Amateur Radio Techniques*

G6XN has provided two practical examples of arrays based on these principles, and some general notes on the use of open-wire transmission lines etc.

(1) Modified VK2ABQ all-wire beam

The first example (Fig 2) is a two-element wire beam using G6XN's modified form of the VK2ABQ compact array. The centrepiece is formed from one of those rotating "washing line" appliances with its four arms extended by 8ft bamboo garden canes (see photograph on p174 of *HF Antennas for All Locations*) supporting a pair of 19ft elements (14swg) spaced 10ft. Wires (19swg) are dropped down from the ends of the 19ft elements to form right-angled delta loops with their lower corners about 5ft apart. From these corners open-wire line is dropped down to ground level (line formed from 16swg but heavier gauge wire would be preferable). Height of the

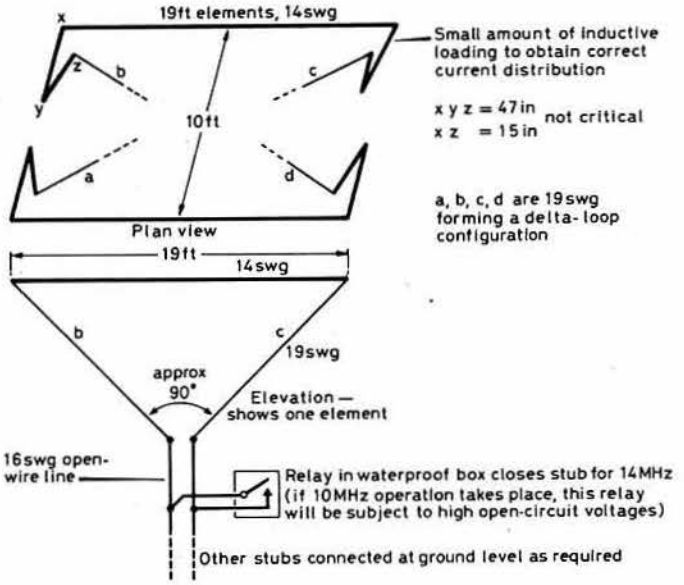


Fig 2. An example of the latest form of compact G6XN multiband all-wire beam based on the VK2ABQ form of construction. Main constructional details are similar to the photograph on page 174 of *HF Antennas for All Locations*

array is 42ft, and the two open-wire lines (about 110ft or 21swg) are taken back to the shack, one from each element.

For bypassing the rotating joint, line spacing is reduced to about 1·5in, with plenty of ceramic spacers over about 15in or so. Since the beam is reversible, rotation is limited to about 120°.

The elements are loaded by folds at the top corners so that *the current on 14MHz is zero at the centre of the sides of the loop*. This ensures that the sides do *not* radiate and *all radiation comes from the highest part of the system*.

Radiation resistance on 14MHz is about 44Ω for one element. This is a reasonable compromise, although difficulties could be expected to escalate fairly rapidly if the radiation resistance were further lowered by reducing the basic size of the elements.

The concentration of radiation from the highest part of the system is a major feature of this new beam *and applies to all versions*. Half of each side can be regarded as providing an inherent form of end loading.

On the adjustment and multiband use of this array, G6XN writes:

"Initially, stubs are connected at ground level so that resonances occur towards the lower end of each band, in the case of both elements. On 14MHz there is then a total of about 2λ of wire in the resonant loops, 3λ on 21MHz and 4λ on 28MHz. Operation is also possible on 10MHz with about 1λ of wire in the loop, some loss of effective gain and rather narrow bandwidth (not important on the narrow 10·1MHz band). Unfortunately for operation on 10MHz I had to climb a ladder to attach (and remove) the stubs; however, excellent signal reports were obtained from Australia, and about 12 to 15dB front/back ratio.

"The appropriate stubs can be selected by relays or manually. However, relay capacitance is not negligible, and I chose to restrict the use of relays to 14 and 21MHz only. This brings us to another very important point: as thus far described the design for 14MHz is marginal. By accepting this we reduce the weight, windage, visual impact and cost of the beam, and we are enabled to cover the widest possible range of frequencies with good gain on 28MHz and very useful performance on 10MHz. Unfortunately the useful bandwidth (without readjustment of stubs or by accepting losses) on 14MHz is not more than about 100kHz, and wet-weather effects can prove a nuisance.

"It is therefore important to use relays, at least for the 14MHz stubs; these can then be moved up the mast, exactly 0·5λ from their initial position. I found this had little effect on signal strength reports but null depths were greatly increased, eg from 15dB to over 30dB; adjustments became less critical and more stable, and the roughly doubled bandwidth proved a major asset. Null depths could have been increased equally well by increasing coupling (ie bringing the lower corners of the loops closer together), but with the resulting very narrow bandwidth, tuning would then be too critical for the extra null depth to have much practical value."

(2) An alternative array design

As mentioned earlier, there are a number of different options possible within the same basic concept. Les Moxen has also checked-out an end-fed

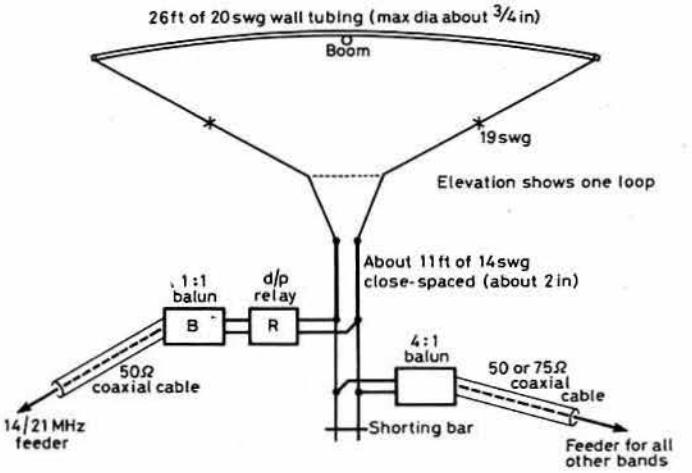


Fig 3. Another option for the G6XN multiband beam. This uses 26ft of tubing as the radiating element. On 14MHz all radiation is from the tubing forming the highest part of the system

beam using aluminium tubing for the horizontal span of the radiating element: Fig 3. Dimensions are chosen so that on 14MHz the current zeros occur at points X. There is then no radiation from the sides, all radiation is from the highest point in the system which in effect is the equivalent of two end-loaded dipoles spaced about 9ft.

The lower corners of the loops are brought in to about half this spacing, which provides extra coupling needed on all bands and also reduces the effective spacing at higher frequencies where the elements operate as loops.

The various changes of gauge shown in the diagram have the effect of bringing the first and second resonances closer together, so that in effect 21MHz becomes the second harmonic of 14MHz and the two resonances coincide when the relay contacts are made. The lower part of the system being high, impedance on these bands remains dead, and a reasonably good match is presented on both bands to the 50Ω coaxial cable. Either element can be driven, the other (also self-resonant) being correctly tuned to act as a reflector (the phase shift being provided by the additional coupling, not by detuning). However, fine tuning for the reflector is provided at the shack end of the feed lines.

With a height of 30ft the lower part of the feeder system can be reached from the ground for making small adjustments, resonances for 10, 18 and 28MHz being nearly coincident. Though designed primarily for 14 to 29MHz operation, fairly efficient operation is achieved on 10MHz with the bandwidth being just adequate for this 50kHz-wide band. It is important to note that because of the much higher radiation resistance on 25 to 28MHz (and in the case of 10 and 18MHz the narrow widths of the band) the additional length of feeder is not a disadvantage for these bands.

For 14MHz the length of the resonant part of the system should be kept as short as possible, since it is the ratio of radiation resistance to total length of conductor within the resonant loops which determines (approximately) the bandwidth and the extent of any losses. The higher this ratio, the smaller the antenna can be made for a given performance. Bandwidth can be expected to be about half that for a full-size monoband element on 14MHz. This should be adequate, although an atu and remote tuning of the reflector are desirable. For coverage of the whole of the 28MHz band some retuning is necessary.

General notes on multiband beams

G6XN has also put together some additional notes on the more general question of compact multiband beams, stemming partly from the response of readers of his *HF Antennas for All Locations*:

(a) Use of open-wire line. There is still a lot of resistance to this highly-effective system in the case of beam antennas, other than for some miniature beams; this opposition seems always to be directed against open-wire line as such but notably missing in the case of the G5RV dipole antenna which is very popular. It is to be hoped that this indulgence may be extended to beams based on the G5RV philosophy! The absurdity of much of the opposition to open-wire line is perhaps best illustrated by its apparent acceptability for minibeams (G4ZU, DL1FK) where there can be predictable swr values of 100 or more. G6XN is far from fussy about achieving low values of swr, but he feels this is ridiculous!

(b) Use of coaxial feeders. Advantageous or even essential in some cases. Using relays to switch stubs, G6XN notes that these could all be moved up

Table 1. Data for the semi-circular emgl antenna of Fig 5

Bands (MHz)	Semicircle length (l)	Coupling turn (U)	End capacitance (CA)	Bandwidth (—3dB points)		Efficiency (%)	Comparison with λ4 monopole
3·5/7	8·4m	1·68m	332pF	3·5MHz	5·7kHz	70	—1·91dB
				7MHz	67kHz	96	—0·55dB
7/14	4·2m	0·84m	184pF	7MHz	11·55kHz	77	—1·52dB
				14MHz	147kHz	97	—0·50dB
14/28	2·1m	0·42m	102pF	14MHz	24kHz	83	—1·22dB
				28MHz	323kHz	98	—0·47dB

the mast as close as possible to the elements and then switch into or across these stubs with the coaxial. Example **(2)** above has shown how two- or possibly three-band operation can be combined by using carefully-engineered multiple resonances, thus greatly simplifying the switching.

(c) There remains a lot of opposition to the use of an atu, possibly due to "fantastic" prices, but a simple pi-network for this type of application can be improvised easily and cheaply; using the new automatic swr meters, adjustment is very easy and quickly carried out.

(d) 14MHz quad loops with 0·5λ resonant feeders are quite easy to tune to 10MHz with series capacitors. In effect this invokes the same basic principles, with current zeros occurring in the middle of the lower sides. G6XN has found this works well and gain should be fully maintained at 10MHz (apart from the two small beams described earlier, G6XN has such a quad completely buried in a large beech tree.)

(e) Starting out from the arrangement of Example **(1)**, it is possible in principle to continue reducing the size but, as noted earlier, this leads to a rapid escalation of problems and should be kept as a last resort. Antenna "neutralization" soon becomes necessary, and although this presents few worries for monoband operation it would be difficult (if not impossible) to do this for five-band operation.

(f) There can be problems with loops fouling guy wires, but the situation is much the same as for the lower half of a quad. The use of reversible beams not requiring full rotation also helps. Currently, G6XN is adopting the same general principle but with folded dipole elements in planning a three-element "flat"design.

(g) With this approach relatively thin wire construction is acceptable for the loop sides, since current is low on 14MHz and radiation resistance high at the higher frequencies. Thick wire (requiring stronger construction) would be preferable for 10MHz.

It should be recognized that these notes cover only a few of the many possible options: for example, the entire system of Example **(1)** can be excited as a vertically-polarized antenna for operation on the lower frequencies.

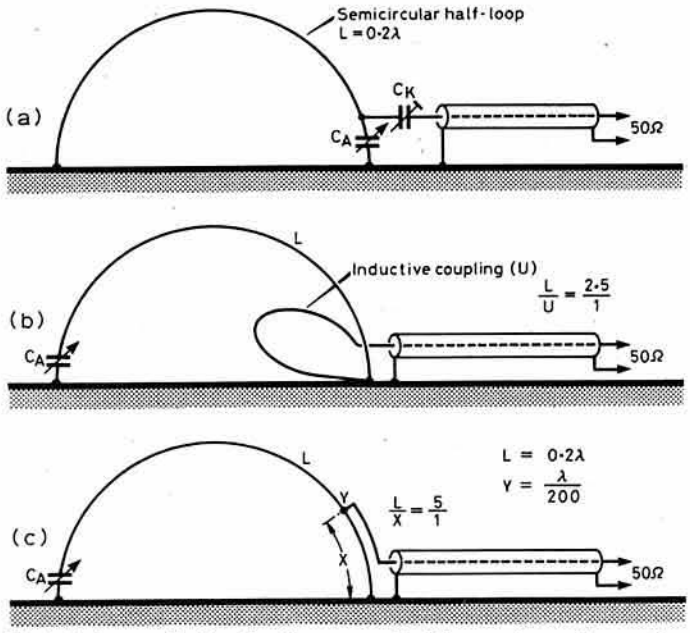


Fig 4. Various methods of feeding an emgl half-loop antenna: (a) capactive coupling voltage fed; (b) inductive coupling; (c) tapped impedance matching

The groundplane loop

In *cq-DL*, the monthly journal of the German DARC, Hans Wuertz, DL2FA, has been presenting a long series of articles on "The dx antenna and its image". Part 13, *cq-DL* No 5/83, pp224–5, is devoted to an antenna that I cannot recall having been described in British amateur radio journals: the electro-magnetic groundplane loop (emgl). In effect this is half of a full-wave loop antenna with the other half formed by the ground image. With a 0·2λ semi-circular half-loop for the lowest frequency, it is claimed that the antenna can be tuned effectively to cover a 2:1 frequency range (eg 3·5/7MHz) although it should be noted that the bandwidth, without retuning the loop, is very narrow. DL2FA presents information showing that the efficiency of the antenna, despite its reduced dimensions, is relatively high —and even on 3·5MHz can be less than 2dB down on a full-size λ/4 monopole, and only about 0·5dB down on the higher frequency band. Fig 4 shows several basic versions, featuring different forms of coupling.

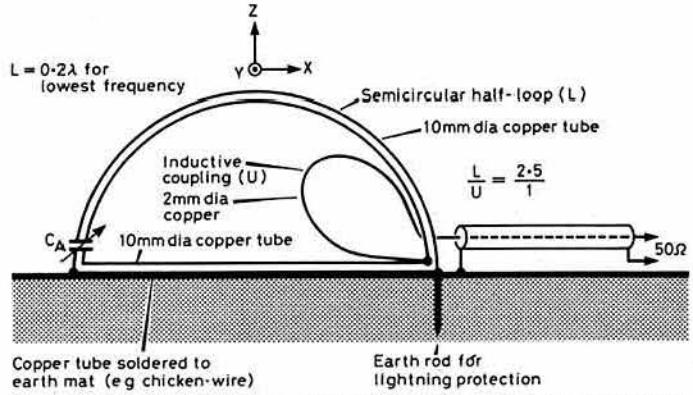


Fig 5. Practical example of an emgl half-loop antenna as described by DL2FA. Data is given in Table 1

Fig 5 is a practical design for which the data given in Table 1 applies, although the figures appear to be based on calculation. In practice, the groundplane is augmented by the 10mm diameter tubing, although radiation efficiency and vertical radiation pattern will presumably be affected by ground conductivity over the surrounding area.

Liniplex hf broadcast receiver

Brian Kendal, G3GDU, has drawn my attention to a new "Liniplex F1" broadcast receiver being introduced by the British firm Phase Track, of Reading, as a sophisticated, compact high-performance hf receiver having nine fixed (crystal-controlled) channels. It is normally set up to receive the principal BBC World Service channels between 5,975 and 25,650kHz. It is thus suitable, for example, for those travelling by air, on business or pleasure, who may wish to listen to this service from anywhere in the world.

The techniques used in this new receiver (which is in the £500 price-class) are of considerable interest, and include single-sideband (usb/lsb) synchronous demodulation of double-sideband a.m. broadcast transmissions with an advanced form of phased-tracked carrier recovery. It should be appreciated that ssb demodulation of an a.m. transmission requires the carrier insertion oscillator to be phase-locked to the original carrier, representing a very much tighter specification than we are accustomed to think necessary for ssb speech demodulation, although an accuracy of 1–2Hz is necessary for ssb music transmissions.

While I have no idea how well the new receiver performs in practice, it does seem worth quoting from the literature on what the firm proudly claims as "probably the most advanced hf broadcast receiver in the world". They explain the unconventional design as follows:

"Synthesizer techniques were discarded for this receiver because of their poor performance. Any user of synthesized hf communications receivers

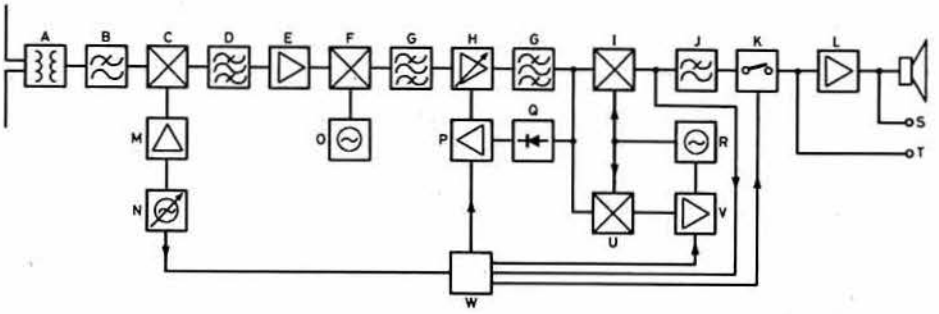


Fig 6. Block diagram of Liniplex F1 receiver. A—balanced antenna transformer; B—30MHz lowpass filter; C—double-balanced mixer; D—35·4MHz, B = 10kHz, 4-pole crystal filter; E—low-noise amplifier; F—mixer; G—455kHz i.f. amplifier; H—agc amplifier; I—a.m. dsb/ssb mixer; J—3·4kHz, 6-pole active lowpass filter; K—mute; L—audio amplifier; M—power amplifier, Po = +7dBm; N—9-channel crystal oscillator; O—34·945MHz crystal oscillator; P—agc feedback amplifier; Q—agc detector; R—455kHz voltage-controlled oscillator; S—output for headphones; T—output for external amplifier; U—mixer (functionally part of I); V—tracking control-loop amplifier; W—signal acquisition control system

will know the problems of noise and spurious responses which such receivers exhibit, but very important in this new receiver is the problem of microphony (phase-jitter).

"The satisfactory application of synchronous demodulation requires a degree of freedom from fm microphony which is practically impossible to obtain in ordinary synthesizers, but which is regularly achieved in simple crystal oscillators. This problem of microphony is not observed in conventional non-synchronous receiving techniques.

"In its specific application to BBC World Service reception, the limited channel capability is no drawback, and the use of crystal control gives the receiver a standard of performance, in such a compact form, which would otherwise be unthinkable.

"The carrier recovery technique is the result of a considerable amount of practical investigation. Momentary carrier fades hardly affect the unique fly-wheel synchronization system, and it is almost immune to interference.

"This receiver is also probably the first to make practical the application of ssb techniques to the reception of a.m. signals. This system has been made possible by the greater production accuracy of specially-developed thick-film circuits. In its overall performance the receiver is comparable with the best communications receivers."

The basic design of the double-conversion receiver (Fig 6) includes up-conversion to a first i.f. of 36·4MHz where there is a four-pole 10kHz bandwidth crystal filter. The second i.f. is at 455kHz, with a signal acquisition control system, tracking control loop amplifier etc.

Fixed-channel receivers have little application to normal amateur radio operating, but nevertheless the design concepts of this equipment seem worthy of mention. The use of switchable usb/lsb demodulation of a.m. signals provides a valuable method of minimizing the effects of adjacent channel interference. Perhaps I should stress that G3GDU is not connected with the firm but was struck by the degree of innovation in the design.

That "bfo" hiss—and bfo leakage

Don Sutherland, ZL2AJL, digs back five years to point out that an item in *TT* August 1978 (pp692-3) "Unwanted receiver and bfo hiss" displayed some confusion on my part in describing the causes of the increase in "hiss" that can so often be heard when an older communications receiver, with diode envelope detection, has its bfo turned on. Most of this hiss, he points out, does not come from the bfo but from an increase in receiver gain, and arises not in the bfo itself, but in the rf/mixer/i.f. stages. he writes:

"The reason for the noise increasing when the bfo is switched on is that the conversion efficiency of the detector (diode or whatever) increases when the bfo drive is applied. The truth of this statement can readily be demonstrated by varying the bfo tuning control; in the i.f. passband the "pitch" of the hiss is lowest, rising considerably (actually about an octave) when it is taken out to either edge. Furthermore, if the i.f. gain is reduced to zero the noise is effectively killed."

This is an interesting, and indeed frequently overlooked point, although I find in at least one service manual in my possession reference to an increase in gain of 15dB at 1kHz when the bfo is turned on.

Jan-Martin Noeding, LA8AK, draws attention to the problem of bfo leakage, which he regards as an important but seldom-recognized problem. He has for some time been endeavouring to improve the agc characteristics of his FT101B. This has not proved possible and the agc appears to be self-oscillating. It was, in fact, some time before he realized that the setting of the product detector balance had a very critical influence on the operation of the agc system, and that bfo leakage was a critical factor.

He removed the coaxial cable carrying the cio output from the final i.f. board. Without this connection, ssb could still be easily detected; even when the carrier frequency board was isolated and voltage to the oscillator buffer stage removed, there was still excessive leakage. With the calibrator tuned to provide a 1kHz tone, the i.f. signal appears like an a.m. signal, 20 to 30 per cent modulated. Attempts to improve isolation by adding additional chokes and capacitors to the dc supply voltage leads did not help, with much of the leakage apparently due to direct radiation.

LA8AK mentions that the subject of bfo leakage is covered in an article "Present-day receivers: some problems and cures" by WB0JGP and K8RRH (*Ham Radio* No 12/77). This article covers mainly the Drake R-C models, although these appear to be less affected by this problem than either the Heath HW-series or the Drake TR7. He stresses that a practical effect of bfo leakage is to cause distortion on high-speed cw signals, and generally to defeat the provision of a really good agc system. He suggests that possibly the only good solution would be to keep both the transmitter balanced modulator and the receiver product detector on the carrier-frequency oscillator board, and then use very good screening for this board. While it is sometimes suggested that it is impossible to have the crystal oscillator and balanced modulator on the same board, LA8AK has in the past built a 9MHz ssb exciter using a MC1496P device with filter and crystal oscillator and obtained at least 60dB carrier suppression on either usb and ssb.

Unless an improved agc system and reduced bfo leakage can be achieved for his FT101B/FT277, LA8AK feels that other modifications would not be worthwhile.

RF switches

George Jessop, G6JP, noted with interest the *TT* (May 1983) item referring to a *QST* article on the construction of rf switches suitable for high-power linear amplifiers or antenna matching units. This was because he had recently encountered the problem of finding a multi-position switch for an atu that would be readily available to other constructors, and had soon realized that suitable new switches have virtually disappeared from the market except at prohibitive prices, and "surplus" components are not always available just when you want them.

The result of this was that G6JP got busy resurrecting a form of

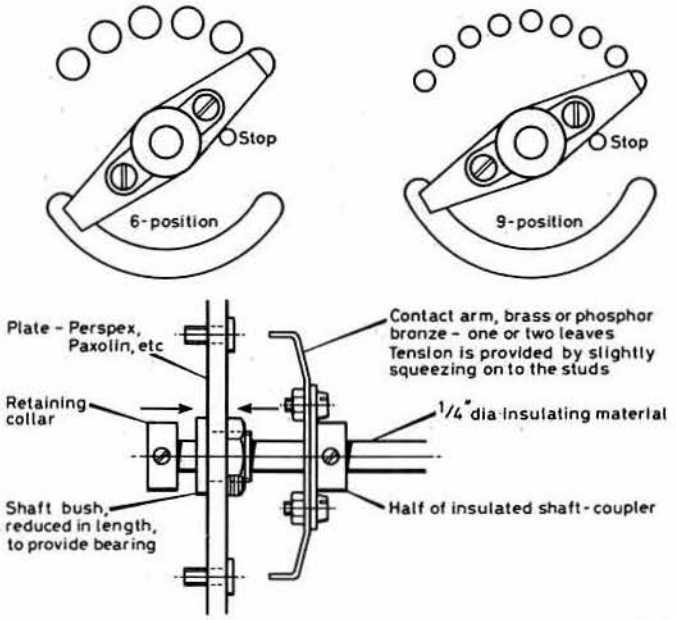


Fig 7. Home-made multi-position rf switch for atu or linear amplifier by G6JP. *Studs* 2, 4 or 6BA cheese-head screws with saw-cut removed. *Collector* sheet brass, 20swg, fixed with countersunk-headed screws filed flat. *Contact* sheet brass, one or two leaves as needed

home-made rf switch that he had first constructed in the 'twenties. It can be made on the kitchen table from usually available bits and pieces. Fig 7 shows the details and is largely self-explanatory.

Mixer for direct-conversion receivers

During the past few years it has been evident that amateurs in several of the East European countries have, perhaps paradoxically, become the bastions of what many people have come to regard as "traditional" amateur radio, with its emphasis on home construction, basic simplicity and continued predominance of cw operation. The prime reason for this would seem to be the non-availability in some of those countries of any factory-built equipment, the carefully-structured "incentive" licensing, the scarcity of advanced semiconductor devices, including large-scale-integrated components that would be suitable for frequency-synthesis, microprocessor techniques and the like.

Nevertheless one notes from scanning *Radio* (Moscow) that there have been some excellent designs for multiband transceivers for home construction, and anyone who works many Russian amateurs will be aware of the widespread use of groundplane antennas on the top of high-rise buildings, as well as other forms such as quad arrays and long-wire antennas.

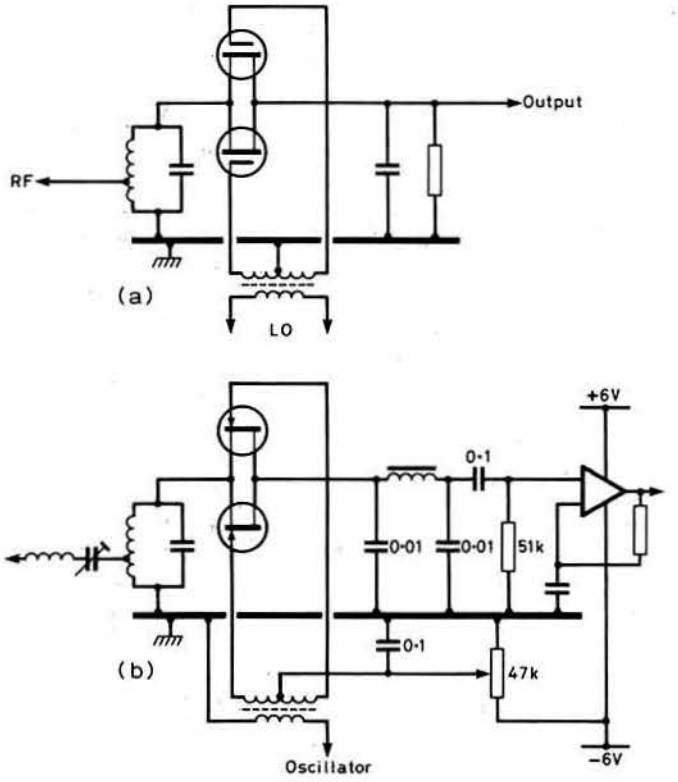


Fig 8. Mixer-demodulator for direct-conversion receiver as described by RA3AAE and UW3AX. (a) Basic principle of passive linear-resistance balanced mixer. (b) Practical circuit arrangement using junction fet devices

There is, however, something of a ferrite-curtain between the USSR and *Technical Topics* in the form of the Cyrillic alphabet, the different type numbers of semiconductor devices, etc. The result is that relatively few ideas published in the Russian magazine ever appear in *TT*. One exception, however, was the use of harmonic diode mixers (anti-parallel connected diodes) as first proposed by V. Polyakov, RA3AAE (*Radio* December 1976, *TT* April and July, 1977 etc). RA3AAE subsequently compiled a useful-looking 80-page book on direct-conversion (heterodyne) receivers, a copy of which came my way in 1981 when Boris Stepanov, UW3AX, a member of the *Radio* editorial staff, attended the IARU Region 1 conference in the UK.

I was therefore interested to note in *Radio* No 4, 1983, an article "A mixer for a heterodyne receiver" written jointly by RA3AAE and UW3AX. The diagrams show that this is a balanced *passive* fet mixer or product detector. Although similar mixers have occasionally been recommended for use in superhet receivers of wide-dynamic range as an alternative to doubly-balanced active or passive mixers, I cannot recall seeing a similar arrangement proposed for direct-conversion receivers. In effect it provides a mixer using linear resistive elements which, with suitable junction fet devices, should be capable of providing a wide dynamic range. Fig 8 shows the two diagrams from the article by RA3AAE and UW3AX, though the text remains wrapped in its protective Cyrillic coating.

It could be argued that there is no reason to suppose that this approach would be as good as, or better than, the use of a packaged mixer such as the MD108 or SBL-1; nevertheless it would seem to be an interesting suggestion.

Lightweight psus

Much of the weight of any transportable mains-operated equipment is contributed by the 50Hz transformer. Attempts to economize on the core rapidly lead to overheating and consequent poor reliability, though, for example, C-cores and toroidal cores are significantly less weighty than the traditional types. Even equipment designed for 60Hz mains supplies, as in the USA and Japan, can present problems when used in Europe; fortunately this is usually taken into account by firms manufacturing for export. Most equipment and psus marketed in Europe are designed for 50 or 60Hz, 110–120 and 220–240V ac mains, though care needs to be taken if you buy equipment outside of Europe, in 60Hz areas.

Aeronautical equipment has for many years reduced weight by using 400Hz systems, and there are still useful "surplus" equipments that require a high-frequency supply. For example, Kurt Bittmann, WB2YVY, in *Ham Radio* (March 1983, p58) provides details of a dc-to-400Hz-ac converter used to provide power to the servos of an ARC38A from a regulated 24V dc supply. He writes:

"Self-oscillating transformer circuits exist; however, they need special transformer ratios to work and, if loaded, they tend to change frequency or stop oscillating. A 555-oscillator chip with a driver and a push-pull output is another option, but I wanted something simpler.

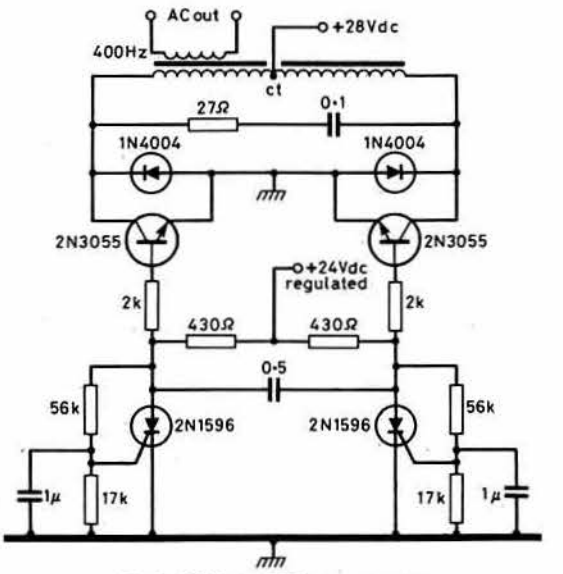


Fig 9. 24Vdc-to-400Hz ac converter

"The arrangement shown in Fig 9 works well and is not too elaborate. It depends on inherent unbalance to start. Any small scr (thyristor) will do.

"In the oscillator (McCartney and Ling) the voltage divider starts charging the capacitor until one scr breaks down, initiating oscillation. The transistors (2N3055 or equivalent) drive the transformer with a square wave. Little power is dissipated in the transistors, since they act primarily as on or off switches. The diodes from collector to earth suppress negative kickback voltages; a 27Ω resistor and 0·1μF capacitor dampen spikes."

This type of unit does not, of course, meet the "travelling" requirement for a psu that would convert 240V 50Hz into a 400Hz ac supply with, say, 50–100W rating, or alternatively a lightweight high-current 12V dc supply. In the past designs have been published for "transformerless" mains-operated valved equipment, using series-heater connections, but this does require safety precautions to be rigorously adhered to (remember that mains sockets are not always correctly wired in relation to "line" and "neutral" etc). I wonder if any reader has devised a really lightweight, compact, rugged yet entirely safe mains psu with 50W plus rating? □

4-2-70

*by Ken Willis, G8VR**

WITH THE WEATHER improving considerably during June, the bands became much more lively. There were some periods of good tropo, but the real news of the month relates to sporadic-E propagation, which not only gave many operators their first super-dx on 2m, but also provided some new records for the 50MHz band. The Phase 3B satellite is also circling the earth (See "Ephemeris"). Things are looking up!

Meanwhile the growth of interest in amateur radio, and the fact that Class B operators must use only certain vhf/uhf bands, is resulting in noticeable crowding on the 2m band in the southeast, and no doubt in other densely populated areas elsewhere. In the London area the calling channel (144·300MHz) is virtually busy all day long, with stations often having to queue up for a call. There is a great need for slicker operating procedures to reduce QRM, and, when space permits, some aspects of this situation will be addressed.

Expedition news

There will be another opportunity to work Andorra when G4IGZ and his wife Valerie, G8VAL, take their vhf and hf equipment there between 7 and 14 August. Calls will be C30AAR and C30AAS, with 400W p.e.p. on 144MHz, and 100W on 432MHz, both with 8XY antennas. They plan to use all main hf bands as well as 432 and 144MHz, and will monitor the vhf net on the hour for ms (and presumably other) skeds. A frequency of 144·400MHz will be used for ms ssb.

Sporadic-E

The sporadic-E "season" is generally reckoned to have begun when it affects the 2m band, but as has been pointed out before, Es propagation occurs quite frequently on lower frequencies as early as April. This year there was an interesting new factor in the existence of UK stations operating on 50MHz, and since Es is observed very regularly on this band, their experiences were expected to be very revealing. So far they have certainly not been disappointed, and 4m operators also have had little about which to complain. However, first of all, here is the news of 144MHz Es for the month of June. At 1345gmt on 6 June, I8TUS (IZ) made a brief appearance on the 2m ssb calling channel and was worked by G8VLL, G4NQC and G8VR, and possibly others. A few days earlier on 31 May, G3IMV heard a 45s "CQ" from HG7KSV, this time on 144·050MHz, but the Hungarian faded before John could call him. Whether this was Es or a long meteor burst is open to speculation, but on the same day Swedish stations had a definite Es opening to Romania, the Swedish stations working as far east as OE square on the Black Sea.

The first major 2m Es event of the year for the UK occurred on 7 June at around 1400gmt, when signals from 9H1 and IT9 started to be heard in the south. This opening went on for about an hour, during which time the signals from the Mediterranean, though not at all strong, enabled several UK stations to make good contacts. G4IJE and G6DME both worked a 9H4 in Gozo, a difficult square, and others presumably did the same. In Nottingham, Mark, operating G3UNU, was frustrated by being unable to hear the dx though he could hear the southerly stations working it.

Later the same day, around 1500gmt, stations in the West Country started to hear the 9H1s and IT9s at much greater strength than they had been copied further to the east. G6EQM (Plymouth) celebrated his first-ever Es opening by working 9H1BT, 9H1GB, 9H1FW, 9H1CD, IT9VHS and IT9DQZ using an FT480 followed by a Tokai linear and 21-element antenna.

On 10 June at around 1645gmt, CN8BA was heard on 144·300MHz, and G3WZT (Horsham) was delighted to work him for a new country, square and continent. Afterwards a call by G4IJE resulted in all information being exchanged, but the call was not fully completed.

A day to be remembered by many newly-licensed operators was 15 June when they had their first taste of Es. It started around 1500gmt, when G4IJE, hearing some "foreign-sounding ssb" just above the calling channel, sent a "QRZ" and was rewarded by a contact with SV4LD (LZ). At the same time G3BDQ (Hastings) was hearing the Greek stations and had some good contacts with them, though they were not audible in the London area.

The big event occurred at 1600gmt when 2m went wide-open to 9H1 and IT9. It all lasted until about 1730gmt, and scores of contacts were made with the Malta stations and with IT9, IC8 and Italy generally. At the cw end of the band, LZ1CD and LZ1AG provided several stations with a contact with Bulgaria, and YU was also worked. This opening extended quite far north—at least as far as ZO square. Many stations were ready for it, having monitored the fm broadcast band between 60 and 100MHz. However, it was interesting that when the opening was at its peak, Bands 1 and 2 were often quiet, indicating perhaps the very localized nature of Es. About an hour after the event closed, G4DHF in Lincolnshire worked YU2RKY (ID), and said that another YU had appeared on the calling channel at about the same time.

At about third hand, some really incredible contacts between Danish stations and stations far to the south have been reported, but until they have been confirmed it would be best not to mention them in any detail.

On 16 June at 1340gmt EA7AG and EB7NK, both in YW square, put in a brief appearance on 2m and were worked by a few lucky stations who heard them, among them G8LFB, G3UNU and G3IMV. There have also been several mini-openings, confined to small areas, which have provided short contacts with dx stations deep into Europe.

Listeners in the south may not have thought much was happening on 17 June, but further north, GM4IHJ (Fife) had been hearing Es on the fm and tv bands since early morning, and at 1632 it reached 144MHz and John heard DL, OE, and OK, all at once. He worked YU3BA (HF) and received a 599 report, plus a contact with DL1MAE (FI) off the back of the DL's beam as DL1MAE was working a UA3. John heard QSOs between UA and F, DL, and heard OKs and OEs calling French stations. During the evening of 17 June, this Es reached the south in a modest way, when G3IMV worked SP5AD(KM) and SP6AZT, both on cw, while G3POI worked SP5AD plus a UP2, again on the key.

GM4IHJ thinks that the Es persisted overnight since it was present at 98MHz (Italian fm) at 0730gmt next day. At this time, G3UNU worked an Italian on 2m.

In the late afternoon of 22 June a major Es opening to Yugoslavia, Romania and Bulgaria occurred. Many British stations, mainly towards the south, worked strings of YUs in JE, JF, KC, KD and KE squares, with very strong signals both ways. YO2IS was also active and worked by some British stations, and at least one LZ was also worked, with the best dx reported so far being from LB and LC square. The opening lasted for about an hour. In the previous opening on 15 June, G3PXT worked F0HI/FC (Corsica) while mobile, then came home and worked him again from the home station!

The incredible Es on 50MHz is detailed in the report for that band, and similarly for 70MHz. Those events, coupled with some information I have received from an experienced USA 50MHz operator, K7ZFG, and some observations by GM4IHJ, throw new light on sporadic-E, and in a future issue when space permits I will give an account of some theoretical aspects of Es which makes very interesting reading. When we finally learn what causes it, perhaps it will not be necessary to spend so much time just listening and waiting—and then contriving to miss it all anyway!

Tropo

June's better weather produced some good tropo openings into Scandinavia, Germany and up as far as the Shetland Islands, but the most notable opening was on 20/21 June when a coastal duct developed between the Faeroes and East Anglia. Three OY stations, one of them OY9JD, operated /P from the same site in WW square, and worked several G stations in the Norwich and surrounding area. G3PXT (ex-G8HWD) said that during the entire afternoon of 20 June the OYs were "end-stop" with him on 144MHz. They also had some 432MHz equipment with them and made contacts on this band with G stations. One of these was G3LQR.

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Aurora

With the solar cycle now well advanced on its downward path, the incidence of auroras has diminished considerably, and those massive events of 1981 and 1982 which seemed to embrace the whole of Europe are just a pleasant memory. Nevertheless, the sun never sleeps, so from time to time it will continue to produce auroras, and the need to maintain a 27-day chart is just as important in a quiet period as it is when auroral activity is at its highest. The last auroras reported in *4-2-70* were on 24 and 25 April, but there have been several since then, mainly of the "weak Scottish type" and often confined to the more northern latitudes. For those who like to keep their charts up to date, here is a summary of what has been reported, all on 144MHz:

24 April	1600-1900gmt. GI4TAP worked OZ4UV. GI6ATZ and GI4OMK worked only G and GM stations. QTF 10-20° GB3LER auroral.
25 April	1713-2245. GI4OMK worked GM and heard GB3LER with Au tone. GI4MUN, visiting the shack of GI6ATZ, worked LA7KK on cw by operating the toneburst button on the IC290E. GI4TAP worked LA8J, and SM5CBN. QTF 25°. Also reported by GM3XOQ, Shetland.
26 April	Weak afternoon aurora. GB3LER with Au tone. No contacts reported. QTF 20°
28 April	GI4OMK worked G8VXC (AL) on QTF 120° at 1147gmt.
29 April	1500-1800gmt. GM3XOQ heard, but could not work RQ2GAG and UP2BAB. GI4OMK worked LA8AE, SM5CBN, SM4COK and EI9MA (oil rig?) on QTF 15-20°. GI4TAP worked LA6HL, SM5AQJ, LA6HL, SM5AQJ, LA8AE, LA6VBA and SM5EFP. G, GW and GM also worked by the GIs.
30 April	GB3LER auroral at GI6ATZ at 0010gmt.
2 May	GB3LER auroral at GI6ATZ QTF 20° at 1730gmt. GI4TAP worked LA5IHL. GI4OMK worked GM4ILS QTF 20°.
4/5 May	GB3LER auroral at GI stations during afternoon hours, QTF 20°.
11 May	1600-1900gmt. GI6ATZ worked several G and GM, best being G6ECM (AL). GI4OMK worked several G stations on QTF 20°. GI4TAP said "best aurora this year" and worked on cw; LA9BM, LA1K, LA2RZ, LA4IDA, all on QTF 30°, SM4KUN, SM1BZA, UP2BKS, Y38ZA, all on QTF 35°; and DL9GS, SM7UQS, PA2UST, ON4ASL and ON7RB all on QTF 40°.
12/13 May	GB3LER auroral tone in GI on QTF 20°.
17 May	1600-1800gmt GI4OMK worked SM5CNQ, SM5MIX and OZ1CLL on QTF 25-55°. GI4TAP worked SM5KWU, SM6AFS, OZ3ZW, SM4PGR, SM6AEK, PA0NIE, OZ1CLL and DJ9YE.
20 May	GB3LER auroral tone in GI
22 May	GM3XOQ reported weak aurora but no dx heard. 1600-1800gmt, GI4TAP worked LA5IHL, SM4GUF, and SM5KWU (IT) and in second phase at 2244gmt, SM4COK, LA1GCA, SM5BEI (JU), SM6LIF, SM6CCO, SM6CEN, LA6HL, SM0RN, SM7GEP, SM4HFI, all on QTF 30°. GI6ATZ worked G and GM plus SM4IVE and commented on reverse doppler being observed on signals. GM4IPK worked into UR2 and RQ2.
23 May	1530-1710gmt. Weak aurora observed in GI with mainly GM but weak SM signals on cw.
24 May	1715-2200gmt in two phases. GI4TAP worked OZ1DOQ, OE3XUA, OK1ATQ (all QTF 70°) plus SM5MIX, SM5CNQ. GI6ATZ heard beacons DL0PR, GB3CTC and GB3VHF, all auroral, and worked many G stations in AL, ZL AM, plus GJ8SBT for a new country and F1CVU (AJ) as best dx.

It is felt to be useful to print these reports from GI stations in some detail to illustrate one or two points of interest. First, auroras are much more common than one might think, at least in certain parts of the country. The antenna bearings quoted (QTF) enable some indication to be made of the region of the auroral activity, though if the QTF of the station at the far end of the QSO were known, pin-pointing of the aurora would be possible by simple triangulation. Next, the value of cw as a mode for working auroras is brought out by the list of stations worked by GI4TAP, as opposed to what was worked by the stations using only ssb.

It is not necessarily a good thing to live in the far north to do well in auroras, even though they may be more frequently observed in such latitudes. Pete Weller, GM3XOQ, in Shetland, often hears less in an aurora than stations in the southern parts of the UK. For example, not until 10 June did he work his first USSR station through this mode of propagation. (The 10 June aurora with him came between 1340 and 1800gmt and he also worked SM1BSA, SM3COL, Y22IC and Y21TC). If the region of auroral activity occurs south of these more northern stations, it is virtually impossible for them to get a signal into the region at the correct angle of incidence to produce long-distance communication. For the same reason, the very northerly stations are seldom heard via aurora. Signals from squares above the "U" line are very rare indeed by this mode, and if any readers have heard or worked such areas, please let *4-2-70* know about it. GM3XOQ made a point of saying that in an aurora on 29 April he worked OY9JD (WV). Although they are not all that far apart, to hear the OY via aurora was unusual, though they have been heard in the south on occasions. OY9JD was also worked via aurora by a GM station on 23 May around 1700gmt, but no other details are to hand at present.

50MHz

The appearance of Es completely changed the pattern of 50MHz working by extending the range of both two-way and crossband working to a remarkable degree. In the early part of June, ZB2BL made numerous contacts on 50MHz with UK stations, the most notable on 3 June being with GW3MHW and GJ3YHU, both believed to be "firsts" on the band. This was followed by another one for the record books, a contact between ZB2BL and GI3ZSC, and afterwards both GI3RXV and G5KW worked Jimmy in Gibraltar. During that day the ZB2VHF beacon on 50MHz had been heard at 59 plus in the south of England; at G8VR it could be copied with a short screwdriver plugged into the antenna socket of a simple converter!

During the evening of 19 June, beacons from across the Atlantic could be copied, and by arrangements set up on 28MHz (which happily was open due to the Es conditions), VE1YX in Bridgewater, Nova Scotia, came on to 6m and worked G5KW, G4BAO, GJ3RAX, GU2HML and GI3ZMC, some very notable "firsts" across the pond on what appears to have been double-hop Es. All this happened just as we were due to go to press, so the information was taken off the air and some of the finer details are lacking. However, in a telephone call GJ3RAX said that he was using only 10W to a four-element Yagi for his contact. It is understood that VE1BNN was also worked, and a W2/Portable W1 was hearing the action.

On the morning of 20 June, CT1WB appeared on 28MHz announcing that he could work crossband 50/28, and proceeded to work several UK stations from VB square. This was around 0630gmt, and GM3WCS and GM4IHJ are both known to have worked him.

The next chapter in this exciting tale of events occurred late in the evening of 20 June when TF1T (Iceland) came up on 50MHz, for which he is apparently still licensed, and worked a number of UK stations crossband to 28MHz which was again open sufficiently to provide a talkback path. After UK tv closed down for the night, several stations came on to 50MHz to try to work him on the band before the Es faded out. G5KW and GU2HML succeeded for two new "firsts", while others heard and called the TF.

In between these highlights the normal ms and tropo skeds have continued. G4GLT has been making some tests with Holland. On four successive days, 24-27 May, he beamed towards PA and was copied on each day by Carlo Vervaet, an swl listener in BL60e, a distance of about 240 miles. Both ms pings and tropo were copied variously. On 7 June GW3MHW completed a 6/2 crossband contact with PA0XMA; G4GLT followed, receiving a 26 ms type report from the Dutch station since he was inaudible on tropo.

On 6 June G4GLT copied beacons 5B4CY, FY7THF and ZB2VHF at various times. He says that 5B4CY was copied by Es mode, but on 8 June FY7THF was 569 between 1918 and 1922gmt. This seems to be a long path for multi-hop Es, so other propagation mechanisms must be playing a part in keeping interest alive on this band.

During the month G4IJE had a crossband contact with YO2IS, 50/144 on ms cw. The path is 1,700km, and YO2IS copied 12 bursts from Paul plus many pings. Bearing in mind G4IJE's low antenna and power, the Romanian station's 300W to a 10-element antenna represent a gain advantage to him of some 20dB in erp, yet Paul copied very much less from him than was copied in Romania. This is an indication of the gain-advantage for ms working by going down from 144 to 50MHz, though only a very rough indication of course.

The most northerly of the 50MHz permit-holders, GM4FZH, has now increased his power by the addition of a 4CX250 amplifier, and has worked G5KW on cw (13 June). He has also worked G3LTF using ms, and has had crossband contacts with G3UKV and GU2HML, this being his furthest so far. Of interest too are his auroral contacts in May with GM3WOJ and GM4DIJ, both two-way on 6m. Other stations worked recently on crossband are G4JCC, GM3DOD and GM4LGM. (*Stop press:* Clive also worked GW4IIL direct two-way on the band.)

Another northern station, GM3ZBE, is constructing a six-element 21ft beam for the band. He also plans a new home-built transverter but says the FT620 is "not too bad." He has worked two-way with G3LTF, G4GLT, GM3OBC, and GM4DIJ. On 13 June early morning tropo conditions were favourable, and Alex worked G4IJE on cw. G4IJE reported some ms enhancement on the path and gave Alex 529, receiving a 339 report himself. On the same morning Paul worked GM4DIJ on cw, again with enhancement, and gave 549, receiving 319.

So the experiment continues, and the results to date must surely justify completely the decision to allocate these permits.

The Greenbank eme tests

Over the weekend of 14-15 May 1983, a group of American amateurs were able to take over the 150ft dish at the National Radio Astronomy Observatory, Greenbank, West Virginia, USA, for their own use. The occasion was to commemorate the 50th anniversary of the first-ever reception of galactic noise on a radio receiver by Karl Jansky, this generally being accepted as the beginning of the science of radio astronomy. The aim was to use the gain of this huge dish to enable amateurs around the world to communicate "off the moon", the 432MHz band being chosen for the tests. For those not versed in eme propagation, the path of a radio wave to the moon and back is full of obstacles in the form of losses of various sorts which introduce such severe attentuation that only stations with very high

radiated powers and extremely sensitive receivers can normally hope to use this means of communication.

However, if one very large antenna is introduced into the system, preferably fed by high power and connected to a state-of-the-art receiver, it puts less stringent demands on the station at the other end of the link. In view of the gain of the Greenbank dish and its sophisticated receiving equipment, it was hoped that several "normal" stations (eg with a single Yagi antenna) might be able to make two-way communication with Greenbank, which used the callsign K8HUH.

One of the pitfalls in eme communication is that the plane of polarization of the reflected signal (from the moon) can vary quite rapidly and randomly due to an effect known as Faraday rotation. Since very few stations have the means of changing their plane of rotation rapidly, this can introduce periods of very deep fading. The choice of polarization can therefore be crucial in eme work, and in these tests Greenbank used circular polarization to eliminate the Faraday effect, though most of those who called and worked them did not have this capability, and used linear polarization which, at best, cost them some 3dB.

The tests were remarkably successful. In 35h of operation, the Greenbank team worked 250 QSOs with 132 different stations in Africa (1), Asia (6), Europe (67), N America (54), S America (1), and Oceania (3). Other calls used by the team were W3IWI, WA4MVI, VK2BMZ and N4QQ, though the bulk of contacts were through K8HUH. British stations which worked the team were G3WDG, G4KGC, G3HUL, G3IOR, G3SEK, G4PMK, G3LQR, G4RFR, G4EZN, G3VBL and G3LTF, using a variety of antenna systems from dishes to single Yagis. JA0CJC was worked under a number of the calls using only 40W to an array of four Yagis.

The equipment at Greenbank comprised a solidstate 150W transmitter, mounted at the dish feedpoint, and an ultra-low-noise radioastronomy-quality receiver. G3WDG, who monitored them for much of the time, could just hear the Greenbank signals on his tropo system (multibeam, 1dB feeder loss ahead of Silverstone Electronics preamplifier) and said that although signals were strong, one or two eme "regulars" were louder. Those with tropo systems had to wait until the moon was low on the horizon in order to access it using horizontal beams with no elevation control.

It is appropriate to note that several UK stations on 2m have worked K1WHS, who uses a massive 240-element antenna from Maine, USA, by the same technique; ie waiting until the moon is low enough to be accessed by (typically) a 16-element Tonna. In this situation K1WHS provides the antenna gain and high erp which reduces the requirement at this end to make the QSO possible. Among recent stations to have made such a contact is GM4JJJ (Fife) who uses four 16-element Tonnas with elevation control and only 100W from a MM linear amplifier. He has heard several more eme signals, so hopes this year to have further contacts. However, many of the UK stations and Europeans who have worked K1WHS have used only a single Yagi, though with a little more than the 100W used by GM4JJJ and GM4IPK—both using four 16-element Tonnas with elevation control.

70MHz

The 4m band had a welcome boost from the advent of sporadic-E, with the ZB2VHF beacon being heard on a regular basis after about 24 May. Soon after, contacts two-way on 70MHz between G stations and beacon-keeper ZB2BL became quite frequent. G4IOQ (Oswestry) hearing the beacon on 50MHz on 25 May, changed to 4m and at 2018gmt worked ZB2BL, giving 58 and receiving 56. They then worked duplex, 4–6m, and Jimmy could hear his own voice coming back over the 4m path from Tony, G4IOQ. This was a good period for Tony, since on the previous day, he worked GU2MHL via aurora on the band, giving him two new countries in as many days, making nine in all. GW4HBK (Gwent) has worked ZB2BL crossband with Jimmy on 6m and the GW on 4m, while G4JCC has had about 10 two-way contacts with ZB2BL on the band.

G4IDE worked CT1WW crossband for his sixth country using this mode. Another contact 70–28 was with SM6PU, who sent an S9 report.

G4BAO worked ZB2BL two-way on 25 May at 2040gmt, and went on to work him crossband at 2041, with John on 4m and ZB2BL on 6m. John hoped this was the first two-way with ZB2 for 1983, but it seems that he was just pipped at the post by the G4IOQ contact some 22min earlier.

On the evening of 3 June ZB2BL was an incredible signal on 4m after a day of high Es activity on Bands 1 and 2. He worked many British stations, some of them running quite low power and using simple antennas. At G8VR he was S6–7 on an indoor dipole used to monitor fm broadcast signals, and he was S9-plus with several stations with "proper" antennas. Later that evening when tv closed down he went to 50MHz, and also made several 4–6 crossband contacts.

The 4m contest on 12 June was well supported but not favoured with exceptional conditions. Certainly no Es was present during the event, and the best dx heard in the south was from Cumbria and the Isle of Man.

Repeater news

Dave Preston, RS50604, who has reported his repeater-dx here before, has taken the RAE and hopes to have been successful. He has continued listening around the repeaters using an SR9 receiver and a DPGH2 colinear antenna, and on 5 June heard GM6WIX/P through GB3HH (R4), GM6FHR/P on GB3LM (R5), GW6UWT via GB3CF (R0) and later, LA4IW through GB3LM. All this was from a QTH near Nottingham; since Dave is only 14 years of age, by the time his licence comes through he should be quite an experienced operator. He has also shown how useful repeater listening can be in getting a measure of the scope of "lifts".

As reported on the GB2RS News Bulletin, GB3YJ (Leamington Spa) had to close down due to interference from public service transmissions above 146MHz. Until a change of site can be arranged, the group needs cavity filters to improve matters. Contact G6GSI, telephone 0926 36196.

The RWG will probably change its title to "Repeater Management Group" and have increased status with direct links to council. This reflects the enormous workload of the group, much of which falls on the capable shoulders of Mike Dennison, G3XDV. At a recent meeting of the group, a vhf repeater proposal for Brecon was accepted for channel R4, with the intention of starting up later this year.

After a two-year absence due to site problems, GB3HC (Hereford) is back on the air. Reports would be appreciated, sent to G3WRA, QTHR. Another meeting was held between the RWG and the Home Office recently, following which the Society's plans for repeater licensing for the next few years will be submitted to the authority. As a result of this useful meeting, vhf Phase 6 and uhf Phase 7 proposals should hopefully not be delayed much longer.

GB3FF (Firth of Forth), transmitting from the Craigkelly IBA television station, survived a lightning strike on 15 May which put four tv services off the air for some time while GB3FF soldiered on!

GB3CS will have an improved signal when an amplifier now under construction is completed, which will give an increase of about 4dB in output power. It is hoped to have the antennas re-orientated shortly.

GB3SB (Scottish Borders) may have a better antenna system shortly if plans to move it to a 750ft mast on Linden Moor, near Selkirk, come to fruition.

News from here and there

G8RWG is collecting information from amateurs interested in a quarterly publication containing details of dx worked through the various modes on the vhf/uhf bands. Anyone wishing to contribute, please contact him QTHR.

4-2-70 September 1982 mentioned a useful publication *The International VHF-FM Guide* privately published by Julian Baldwin, G3UHK, and Kris Partridge, G8AUU. An up-dated and expanded edition for 1983 is now available from G3UHK, QTHR, at a price of £2.30 incl postage. It provides a wealth of repeater information from around the world, as well as beacon lists and reciprocal licensing details, and should be of great value to all repeater users and those who drive a lot with fm equipment in the car, or who plan to take equipment abroad. This edition, the first since 1981, is some 20 per cent larger than the previous edition.

Tom Hook, G8DPB, of Dagenham, Essex, has for several years suffered a very serious sight problem, but this has not prevented him from building most of his equipment for use on 144 and 432MHz. He built a 10W p.e.p. polyphase transverter and 60W solidstate amplifier for 2m, feeding a homebrew 16-element G2BCX Yagi at 35ft. Even the mast and rotator were home-constructed. On 70cm he uses a solidstate transverter to a design by DC8NR, and a 2C39 amplifier due to DJ2PU. His only concession to commercial equipment is a 48-element Jaybeam for 432MHz. A member of Havering RC, his prowess in building equipment has been recognised by several awards of their Constructor's Cup, as well as the VHF Transmitting Cup and numerous certificates. He puts out a very good signal, and was recently among the dx in the Es openings, while in a similar brief event a couple of years ago he worked into Helsinki. Tom was reluctant to "blow his own trumpet", so it gives me great pleasure to do it for him and to congratulate him on his courage, ability and an abundance of the true amateur spirit.

The Cray Valley RS plans an activity weekend on 17–18 September 1983, with both 2m and 70cm bands being operated. Club station calls will be G3RCV and G8FCV, with QSLs being available for stations contacted and listener reports. Full details, including requirements for the Cray Valley Award from G6CSY, QTHR.

Deadlines

Please send all copy intended for the October issue to arrive not later than 23 August, late copy by 2 September. □

Microwaves

*by Charles Suckling, G3WDG**

Reception of UOSAT S-band beacon

On 19 May the 2,401·0MHz beacon was switched on for the first time for reception tests. With only about 2h notice, G3WDG and G4KGC managed to get their 13cm converter retuned for the UOSAT frequency, and were ready to listen about 5min before the satellite was due to come over the horizon! More or less on time the satellite was heard; it peaked about 15dB above noise in 2·5kHz bandwidth. The receiver consisted of a 2,320MHz GaAs fet preamp (3dB noise figure at 2,401MHz) and a dual-mode feedhorn (about 8dB gain), operated with linear polarization. Keeping the signal in tune was not too easy, as the doppler shift caused the received frequency to drift at about 500Hz/s. The fading due to the satellite's spin was very apparent—the signal disappeared completely into the noise four times during the pass.

Since G3WDG and G3KGC were going to the Belgian VHF Convention the next day, and the beacon was going to be left on for the weekend, it was decided to take the converter and antenna to Belgium for further tests. The beacon was heard again on 21 May during and after the convention, at similar strength to the first test. The opportunity was also taken to listen to a low elevation pass (3°) and the signal was heard, but considerably weaker than before (when the satellite elevation was 50–70°). On 22 May, ON6UG borrowed the receiver and antenna, and heard not only the data transmissions, as before, but also the "Digitalker". The photograph shows ON6UG holding the horn antenna in one hand, and a 2m fm handheld (the i.f. strip) in the other.

ON6UG with the equipment used to listen to the UOSAT beacon

In the week following the convention, ON6UG built a receiver consisting of an interdigital mixer and MGF1400 preamp. He received the beacon with his receiver shortly afterwards using a dish-feed as the antenna. Improved signals were obtained when he switched over to a homebuilt seven-turn helical antenna (left hand circular polarization). If the satellite passes close to overhead (elevation >40°), he can receive the data transmissions with a fully-quietened signal on fm.

Martin Sweeting, G3YJO, informs me that the current transmission schedule for the 2,401MHz beacon is as follows: the beacon will be switched on each weekend, Friday to Monday, provided that no further problems or power shortages occur.

*46 Windsor Close, Towcester, Northants.

3·4GHz dx test

On 6 March a QSO was made on 3·4GHz which came close to breaking the current world record on this band. The stations involved were ZL2ARW and ZL2TRV at Cape Reinga (at the tip of North Island) and ZL2AQE and ZL2TWS some 545km away at Mt Egmont. At the start of the test, signals were apparently rather weak and cw had to be used, but then signals improved so that eventually S9 signals on fm could be exchanged. Varactor multipliers with 1W output, 4ft dishes and interdigital converters were used by both stations, while ZL2ARW/ZL2TRV also had the benefit of a GaAs fet preamp. Many thanks to Bob Atkins, KA1GT, for passing on the above information, which originally appeared in the April issue of *Break-In*.

5·7GHz activity

A number of reports of 5·7GHz activity have been received recently; it is very good to see the activity on this band growing at last!

The first report came from G4FRE, who took his newly-built varactor multiplier to Belgium for a 5·7GHz dxpedition. On 22 May, operating as ON8QK/P from BK18f, he succeeded in working PA2DOL over a 150km path, which was the first-ever ON–PA QSO on 5·7GHz (and also the first QSO ever made in ON). On 25 May he was active from BL56j, and copied G3LQR at 6dB above noise. For these tests Dave was running 100mW output into a 0·7m dish, with an MGF1400 GaAs fet preamp and a G3JVL transverter on receive.

G3LQR reports that he and G3ZEZ have been carrying out a number of tests over the obstructed 50km path between their home stations. Weak signals were exchanged on a number of occasions, and improvements to the equipment were made, including the installation of a GaAs fet preamp at G3LQR, so that eventually a QSO was possible.

A record?

While operating G3IW/P during the first 10GHz cumulative contest period, G3KSU was visited by a peacock. Noises from the bird found their way onto Alan's transmission, and were heard at good strength by G6TEA/P (on Win Green) over a 78km path. G3KSU would like to know whether this is a record for a peacock?

IARU Region 1 microwave dx records

The following list of IARU Region 1 microwave dx records was compiled by SM5AGM, and published on 31 December 1982. The information below was extracted from the *YU VHF/UHF Bilten*.

1·3GHz Tropo	I0SNY-I2KSX/8	12.7.1982	1,433km
Moonbounce	PA0SSB-VK3AKC	22.2.1975	16,640km
2·3GHz Tropo	DL7QY-SM6HYG	31.7.1981	1,010km
Moonbounce	PA0SSB-W6YFK	5.4.1981	8,660km
3·4GHz Tropo	DL7QY-DF9LN	30.10.1981	566km
5·7GHz Tropo	DB6NT-PA2DOL	30.10.1982	525km
10GHz Tropo	I0SNY/EA5-IW0BFZ/O	10.7.1982	1,168km
24GHz Tropo	DJ2UH/P-DJ4YJ/P	21.2.1982	244km

Since the list was compiled, two of the records appear to have been bettered by the following contacts:

1·3GHz Tropo	G4KDH-OH0NC	15.9.1982	1,524km
2·3GHz Tropo	G4BYV-OK1AIY/P	30.10.1982	1,028km

Homemade semi-rigid cable

Hugh Staunton, G8SXL, has discovered a way of making semi-rigid cable, which may be of interest to anyone building G3JVL loop-Yagi antennas, or Alford slots. He has located brass tubing with an inside diameter of 0·125 ($\frac{1}{8}$)in, which is a good sliding fit over the inner of UR43 cable. The tubing has an outer diameter of 0·187 ($\frac{3}{16}$)in and is referred to as "air tubing".

Forthcoming convention

A microwave meeting is being organized by the Radio Club of Melun, France. It will take place at La Maison de la Culture et des Loisirs, rue du Colonel Picot, Melun, between 10am and 6pm on 23 October. Talk-in on 144·40 and 145·5MHz will be provided. Further information can be obtained from Ph. Millet, F6DPH, La Renardiere, Route de Sivry, 77770 Chartrettes. □

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

SINCE RESTARTING this column just over a year ago, the principal aim has been to provide information on a wide range of issues concerning amateur satellites. A major objective has been to try to indicate to the large number of non-satellite users that the main difference between terrestrial and satellite working is in the area of operating techniques and not a host of expensive additional equipment. One of the areas that has not yet been given much attention is in the reporting of activity through the various satellites. In order to present as wide a perspective as possible I would welcome reports on all aspects of operating, transmitting or receiving, with a mention of the type of equipment in use.

Satellite status reports

Oscar 10

On 16 June the much-delayed launch of the sixth Ariane took place from the island of Kourou in French Guyana. After two failures out of the first five attempts it was critical for the commercial future of the launch vehicle that no problems occurred this time. All appears to have gone very well with the launch, and both the Phase 3B satellite, now referred to as Oscar 10, and the European Communication Satellite ECS-1 were successfully placed into their initial orbit around the earth. The location of the launch site so close to the equator is ideal for satellites destined for the geo-stationary orbit (ie directly above the equator) and the inclination of this first orbit is only about 8·5°. The orbit is highly elliptical, with an apogee and perigee of around 35,600 and 200km respectively.

It was initially proposed that after a few orbits the on-board motor on Oscar 10 would be fired to raise the perigee to a height of around 2,000km, while at the same time increasing the orbital inclination to around 63°. The reason for doing this is that even at a height of 200km there is a considerable amount of drag on satellites caused by the upper atmosphere, and this can cause a rapid decay in the satellite orbit. Also, the higher the perigee the less time spent within the Van Allen radiation belt, where damage is most likely to occur to the satellite's electronics.

So much for the theory. In practice, when the satellite separated from the launcher and the other payload, its attitude was about 90° to the direction it should have been. The reason for this is not yet known, but the effect was that the on-board motor could not be fired because its thrust would have taken the satellite into entirely the wrong orbit. In addition, the solar array was receiving very little illumination from the sun and only producing around 10W dc to the satellite bus. This was not enough to enable the satellite magnetorquers to be used, which would have allowed the attitude to be corrected. Some three days after the launch it was being predicted that perturbations due to drag would in fact turn the axis of the satellite so that active re-orientation could be carried out, and hopefully the motor could be fired on or around orbit number 50. Since the period of the initial orbit was around 10·5h, the motor firing should have taken place 21 days after launch, ie around 7 July.

The transponders are unlikely to be switched on until the orbit manoeuvres have been completed and a thorough check of the satellite carried out. However, telemetry information is available on the general and engineering beacons, transmitted on 145·810 and 145·987MHz respectively. A summary of the initial orbit parameters is given in Table 1.

Table 1
Major orbital parameters of Oscar 10 one day after launch

EPOCH	83168·36 (ie 17 June 0834·4gmt)	**Perigee**	199·8km
Inclination	8·59°	**Period**	627·1min
Apogee	35592·6km		

Oscar 8

As reported last month, there are increasing signs that the useful life of Oscar 8 is nearing its end. It appears that one or more of the battery cells has failed, and even after long periods in the recharge mode the battery is not charging. This has resulted in erratic behaviour of the satellite which is able to function only when in sunlight. In order to permit meaningful assessment of the condition of the satellite, AMSAT has requested that no attempt should be made to access either of the transponders until further notice.

Oscar 10 in the final stages of completion with the Marburg AMSAT group, with DK4VW attending to the alignment of the liquid-fuelled apogee kick-motor. *Photo:* DK2ZE, September 1982

UOSAT

The University of Surrey team is continuing its efforts to rectify the problem with the gravity gradient boom, and learning a great deal about space dynamics in the process. A number of short deployments and retractions of the boom have been made, and the resulting effects on the satellite attitude noted. The weekend schedule for transmissions has become more regular, and usually comprises telemetry data and the bulletin board on 1,200 baud ASCII as well as the digitalker. The 2·4GHz beacon is now operational and reception reports would be welcomed by the university. On 21 June the hf antennas were deployed and the beacons subsequently activated. The 29,510 and 21,001kHz beacons were expected to operate on a continuous basis transmitting telemetry channels 00 to 09. Again, reception reports would be welcomed by the university.

RS

The Russian constellation continues to operate very well with generally uninterrupted service. In addition to the telemetry beacons, the robot transponders on RS5 and RS7 are active as well as the communication transponders on RS6 and RS8.

Other news

Returning to the subject of launch vehicles, a very interesting lecture "Developments in satellite launch vehicles" was presented recently by Mr R. McQueen of British Aerospace, at the Institution of Electrical Engineers. Mr McQueen outlined the capabilities of the space transportation system (shuttle) and Ariane—and indicated the cost to commercial users of putting satellites into orbit. In very broad terms the cost of placing a satellite into the geostationary orbit is around $35,000/kg for a typical communications satellite weighing around 670kg. As the demand for commercial satellites continues to increase, the availability of free launches for amateur payloads is likely to reduce substantially. With the prospect of having to pay several million dollars to launch future Phase 3 satellites, it may be necessary to have a major re-think on the funding of the amateur space programme.

Finally, I have been asked by Richard Limebear, G3RWL, to give a mention to members of the Southgate ARC who assisted in putting up antennas for the transatlantic links used for the Phase 3B launch net. □

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

SWL News

*by Bob Treacher, BRS 32525**

Reporting procedures

Speaking to a well-known QSL manager a short while ago, it became clear that several more hints on how to send QSL cards were necessary. One point to note when sending listener reports to stations who employ QSL managers is that the station is unlikely to actually see the report which you have sent, so it can be rather fruitless sending a very detailed report. The necessary information, ie time, date, frequency, tends to get hidden among the unnecessary information, ie QRM, QRN, other countries audible etc. It is therefore worth bearing in mind that the "six box" format of cards tends to be far more acceptable to QSL managers than the "open plan" type. It is also worth pointing out that information relating to the weather is again of little value on hf. One report seen recently said "WX: 1008 millibars steady, wind northerly, fresh, force 3-4, 13°C. Showers". Apart from taking up space which could be put to more worthwhile use, it provided little detail which would be of value to the recipient of the card. Thirdly, it is of no use to send a 59 report to a dx station who is working into G-land and putting at the end of your report, "I hope this report is useful"—because it will not be. The dx station knows he is 59, as he is working stations who are telling him so. Finally, if you need an 8P6 on 21MHz for a new country, or something similar, say so, as that will more than likely get you the desired confirmation.

Some of these problems may be forced upon the swl because of the format of the QSL cards on offer these days, so might it be time for some commercial concerns to sit back and reconsider their swl QSL card format?

VHF report

Still no major events to report, and at the time of writing, we are into mid-June. Some sporadic-E has been heard/worked but none of our reporters managed to catch it, due to their being at work. On 6 June an I8 in IZ square was worked from ZL square at 1330, and an HG6 worked from AL at 1514.

On 7 June at 1420 several 9H1s were worked by stations in YK and ZL squares. On 10 June at 1640, CN8BA was audible for a short period.

With no good tropospheric propagation, our reporters have had only an average month. Dave Whitaker, BRS25429, managed LA6HL in CS square, and Joan, BRS62088,heard F1CPX in AH square on 12 June. Martin Parry, BRS52543, caught several /P stations in northern France during the European Field Day Contest, and heard auroral signals on 11 and 17 May, with a GM in XR30b on 70MHz being his best catch. Martin had 16 countries on 144MHz, two on 432MHz, and four on 70MHz when he wrote, and he was hopeful of some Es to boost his 144MHz total.

Dave Whitaker provided an update on his QSL card returns for 144MHz reports. The figure now stands at 100, thanks to SM1PLU (JR32d), fittingly his best dx confirmation to date. Other choice verifications included LA6VBA (ES34h), SM6LPH (HS01a), and OZ1EYE and OZ6XR (both in FQ). David has received his 100 cards extremely quickly and this tends to prove the value of sending reports at vhf.

HF news

A distinct lack of reports this month. Martin Parry heard four new countries during May and early June—1Z9B, BV2B, VP8MS and S2BTF. Brian Wainwright, BRS44703, reported RG6GBQ, 7P8CL and 3A2CD on 28MHz. 21MHz had provided 9V1UU, 9M2LC and P29NSF, while 7MHz produced 9N1MM, PZ5JR and ZD7BW. Paul Crankshaw, BRS48909, was also brief, but he did mention 3·5MHz dx in the shape of ZS4PB, 5Z4DR and 7P8CM. 21MHz had provided DU6BG, HL1SF, YJ8TT and 5R8AL. 14MHz dx included CE0ERY (Easter Is), FG0GUL/FS, VY1CW, VK9NS and VR6TC. With Dave Whitaker on vhf, his only comments concerning hf were several verifications: DJ6QT/CT3 and UA2FCW on 1·8MHz; and F6FIC/TZ on 7MHz (for No 231 all-time).

Dave Shapiro, RS53844, was severely restricted in his listening habits last month by examinations. However, he had built an atu which had been performing satisfactorily, especially when used with his lf antennas. He was in the process of printing his own QSL cards, courtesy of his school's printing society.

Peter Lincoln, BRS42979, commented on TT0KP being active on 7 and 3·5MHz, but the general opinion is that he is a "pirate". RTTY confirmations arrived from VE1BWV and XT2AV. He unfortunately had one envelope returned unopened from 9V1VM, whose address in the *Callbook* seems to be wrong, as a note on the envelope from the postal services in Singapore said "insufficient address".

Robert Small, BRS8841, just met the deadline with the news of patchy conditions, but he said that 21MHz had shown up well to the Pacific with C21RK, FO8FO, T30DB and ZK2JS coming through. 28MHz also provided some interesting dx, and also some sporadic-E signals from around Europe, with DLs and OZs 59 + 20dB. A4XJQ, Z27JD, KP4AXC, VP2MIU, HV3SJ and FH8CB were noted as the best dx on the band in early June.

1983 HF COUNTRIES TABLE

(Starting score 150)

Station	28	21	14	7	3.5	1.8	Total	Mode
BRS 8841	133	178	201	130	120	31	793	ssb + cw
BRS 48909	120	176	186	113	99	29	723	ssb
BRS 44703	102	113	134	90	110	34	579	ssb
BRS 50134	88	128	137	95	97	26	571	ssb
BRS 52543	66	129	133	105	113	25	571	ssb
BRS 44395	78	122	131	85	57	29	502	cw
RS 49327	88	125	152	66	47	12	490	ssb
BRS 1066	69	95	109	99	67	36	475	cw
BRS 46084/707	100	147	141	59	20	0	467	ssb
RS 49875	68	115	139	52	22	5	401	ssb
BRS 25901	73	84	101	52	67	10	387	ssb
RS 53844	39	91	108	56	63	11	368	ssb
BRS 42979	45	56	78	45	58	22	304	ssb/rtty/sstv
ORS 45992/707	25	77	112	8	0	0	222	ssb
BRS 18529	14	17	38	46	87	17	219	ssb
BRS 25429	0	0	0	82	104	28	214	ssb
EI-835	21	46	89	22	23	3	204	ssb
BRS 62088	11	19	45	42	48	8	173	ssb

1983 UHF/VHF SQUARES/COUNTRIES TABLE

Station	70MHz		144MHz		432MHz		Total	Via
	Squares	Countries	Squares	Countries	Squares	Countries		
BRS 25429	0	0	78	10	0	0	88	Tropo
BRS 32525	0	0	35	8	8	2	53	Tropo
BRS 62088	0	0	18	7	0	0	25	Tropo

September reminders

A mixture of events in September, the traditional month when the hf bands come out of their summer doldrums, but as we will be further into the sunspot decline it will be interesting to see what transpires. The month starts on vhf with the European Open on 3/4 September. The Cray Valley SWL Contest takes place on 10/11 September (rules in this issue). We also have 28MHz slps on 3, 11 and 17 September (details in last month's column). Looking forward to early October, for uhf types the UHF Open is on 1/2 October, and for hf types the 21/28MHz SSB Contest takes place on 9 October.

Late vhf news

On 15 June the best Es propagation of the summer so far occurred. Stations on the south coast worked into SV at around 1500, and stations in Malta, Italy, Sicily and Bulgaria were later audible in G-land. From my QTH in AL square, the end of the event was caught, logging IC8EGJ (HA32g), IW9AMX (HY67b) and I8TUS (IZ52f). In ZN square, Dave Whitaker also caught the end of the event, logging IW9AIG (GY67d), IW0BJF(GB), IW8PCW (HY79a), I0KHY (GB) and, at 1722, LZ2VR. All was quiet again at 1730.

What were, for me at least, the best-ever tropo conditions into the Baltic area occurred on 19 June. Stations from DM, DN, EM, EN, EO, FN, FO and FP squares were all peaking S9 from 2030 until early the following morning. A few examples of dx heard are: PE1IHW (DM65h), DB8WZ (DM70b) PE1GBT (DN71a), DB4XC/P (DN68f), DG5BO (EM32b), DJ1KN (EN75g), DL5LAH (EO18g), DF2HC (FN31b), DJ7SW (FO51g), OZ5VHF (FP53a). Only one SM was audible however, SM7LH1 in GP square.

Finale

News, views, comments, and table scores for inclusion in the November issue should reach your scribe no later than Tuesday 20 September, with late copy by Wednesday, 29 September. □

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

RAYNET

*by Joan Heathershaw, G4CHH**

Humberside Raynet County Controller

On 5 May this year I went to the Home Defence College at Easingwold to give a talk on Raynet, with particular emphasis on Raynet activity in Humberside. This was part of a three-day study attended by about 50 assistant emergency planning officers (aepos†). From subsequent correspondence, my talk appears to have generated some enthusiasm for the Humberside approach to the problem of manpower shortage. For this reason I welcome the opportunity of writing the Raynet column this month to give a brief account of what I said, so that members may judge the merits of the Humberside solution for themselves.

For many groups during the past two years, Government plans for organization of voluntary effort in civil defence and peacetime emergencies have meant an increased involvement in county emergency planning. All counties have been instructed to set up an emergency communications network. In doing this, some counties are more advanced in their plans than others, depending upon the political views of the authorities. Humberside is one of the more advanced counties, with emphasis on peacetime emergency plans. A community adviser scheme has been in existence for two years, in which Raynet was introduced to the county at local level. A further development has been the need for a communications network between district and borough councils and the county co-ordination centre. For the past 18 months Raynet's efforts have been almost exclusively given to this task.

Five of the 11 communication centres (comcen) have been equipped with 70MHz links by teleprinter and 144MHz voice facilities for incoming/outgoing local traffic. There is a second 144MHz capability at the co-ordination centre to allow monitoring on any of the borough's frequencies. The voice, rtty and comcen procedure manuals have been produced. The standard message form to be used throughout the county has been particularly well received. But as we progressed, a serious problem presented itself—that of staffing requirements for the comcens. Even a successful recruitment drive directed at radio amateurs in Humberside would not ensure sufficient members to staff them and leave the necessary outstations and mobiles to gather information from the field.

There are at present six groups in Humberside, totalling 100 members. Each group's area is defined by borough or district boundaries. Although the groups maintain their own identity, this is mainly for administration purposes. The controllers meet at three monthly intervals, and Raynet acts as a county organization. Even so, the estimated staffing requirements for the 11 comcens over a 24h period, presuming three 8h shifts, were daunting:

96 licensed radio operators
6 rtty operators
96 clerical staff
30 switchboard operators
Total 228 communication personnel.

It was considered desirable that for a standard level of operating, training and administration, the county emergency communications should be provided by one identifiable organization. Raynet was established, and fitted the bill in all respects except number of personnel. So how to enlarge this trained nucleus?

Many comcen duties which do not require a licensed radio amateur are carried out by telephone and telex operators, message clerks and supervisory staff. Our first thought was to recruit non-radio amateurs into Raynet and train them for these duties, but I felt we could not justifiably load the RSGB administration of Raynet by more than doubling our number with members having no interest in amateur radio.

In fact, the responsibility for the county emergency communications network should lie with the people who require it, rather than those who provide it. What was needed was a scheme which would remove the responsibility for providing and administering the entire county emergency communication team from the Society and Raynet, but which would at the same time give credit to Raynet for its contributary part and leave it free to attend to other "users".

We proposed that the responsibility be accepted by the county authorities, in return for which the county would have control of its communications network rather than any individual or collective groups of communicators. Within a month of the proposal, the Humberside County Raynet Association—to which all Raynet members automatically belong—was approved by the county authorities, to be entirely administered and funded by the county. The officers of the HCRA being—president: chairman, Public Protection Committee; vice-president: chairman, Emergency Planning Sub-Committee; chairman, Raynet county controller; and secretary, aepo communications officer.

This had the immediate effect of trebling the amount set aside for the communications for the coming year. The subsequent publicity generated enquiries and requests for membership.

Raynet is committed to training the association's members, but it was first necessary to ensure that the trainers were capable of giving effective instruction and to devise the course the members would take. In this we were helped by the Advanced Training Wing staff at the Army School of

Members of the HCRA in one of the communication centres during Exercise Eascope 83

The wedding of Dr Timothy West, G4CTT, and Miss Patricia Hall at Hoveton, Norfolk, on 4 April 1983 was something of a Raynet event. G4CTT is North Norfolk group controller; in addition he owns Eastern Communications, and is a lecturer at several RAE classes in Norfolk—his wife took the RAE after attending one of his classes, and is awaiting her callsign. L to r: Paul Gunther, G8XBT; Stephen Fletcher, G4SFQ; Timothy and Patricia West; Noel Matthews, G8GTZ; Celia Willies, G6DFA, assistant area controller, Norfolk Raynet; and Doug Willies, G3HRK, area controller, Norfolk Raynet

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†Authorities represented at the study were:

Oxfordshire	Cornwall	Northumberland
Nottingham	Merseyside	Fife
Highland	Norfolk	East Midlands
Buckinghamshire	Essex	London (Hillingdon)
Berkshire	Cumbria	City of Westminster
Greater Manchester	Warwickshire	Northamptonshire
East Sussex	Dyfed	Staffordshire
West Yorkshire	Hereford & Worcester	Surrey
Powys	London (Hammersmith)	Hertfordshire
Gwynedd	Lincolnshire	
North Yorkshire	Humberside	

Mechanical Transport at Leconfield, Humberside, where Service instructors are trained. The association arranged for the eight appointed Raynet training officers to attend a weekend instructor's course which had been specially designed for us. As one of those who attended, I found it a very worthwhile exercise. Authorities in other counties can arrange for Raynet members to attend similar courses by contacting W.O. Dick Atterbury, G4NQI, 50 Grange Road, Leconfield, near Beverley, Humberside.

On completion of their training, the association members will receive a suitable certificate, and all members will be supplied with an identity card. We envisage a period of 12 months or longer before the scheme gets under way, starting with staff for the completed comcens. There is a great deal of work to be done, but the association teamwork has already been tested, in a small way but to good effect, during a recent two-day oil pollution exercise.

In his address to the Raynet Committee last year, Sir Leslie Mavor, Co-ordinator of Voluntary Effort in Civil Defence, said that some county emergency planning officers (cepos) report that Raynet is thin on the ground or non-existent. It is a case of the supply not reaching the demand.

It is true that Raynet cannot offer a standard service throughout the country (more's the pity) but it is also true that cepos do not require a standard service from Raynet ranging from almost total lack of to over involvement. The Humberside Raynet approach may be of help to those groups who find the needs of their cepos greater than they can meet, and be of interest to those cepos who discount Raynet as being too small an organization to be effective. □

QRP

*by Rev George Dobbs, G3RST**

IN THE MIDST of recent developments in our hobby which suggest to some that amateur radio is a "cheque book hobby" or "cb that gets further", one of the more surprising trends has been growing interest in QRP operation. When the G QRP Club was formed in 1974 it could muster 30 members, and within two years 100 members were on the books. In the first six months of 1983 600 new members joined the club. Other QRP groups around the world have also noted a growing interest in low-power amateur radio. Speculation about the motives behind this growing interest are perhaps pointless but one significant pointer is the appetite amongst new "QRPers" for circuitry and details of low-cost easy-to-construct equipment.

In this new column I hope to reflect the current trends in low-power amateur radio, with new opinions and views from the people involved in this branch of our hobby. But any column on QRP would not be complete without some technical content, so I intend to include small circuit ideas and technical snippets within the constraints of one page every other month. I welcome news, comments and ideas from readers, and suggest that they write to me should they wish to know more about the G QRP Club.

What is QRP?

What constitutes low power in amateur radio can be a matter of opinion and standpoint. We all know of the "Californian kilowatt' and the "top band ten watts". Some years ago the G QRP Club set levels, for its awards scheme, of 5W dc input or 10W p.e.p. The World QRP Federation (WQF), a group of QRP organizations formed largely through the work of G8PG, has set an international standard definition of QRP as 5W rf output or 20W p.e.p. Although this is the generally accepted definition, the G QRP Club awards still remain at the lower level, and individual awards and contests define the level as appropriate, in some cases with several classes of power.

These levels apply to the hf bands. The vhf bands are, as they say, another ball game; low power levels are commonplace and antenna gain plays a greater role. QRP operation, as encouraged by various clubs and groups, is a mainly hf bands pursuit, and a large proportion of it is cw. The accepted QRP calling frequencies on cw are 3,560, 7,030, 21,060 and 28,060kHz. The frequency of 1,860kHz is under debate, and WARC bands are still being explored for suitable frequencies, although there is some operation on 10,106kHz.

Only five watts?

There are many who believe that using low power on the hf bands today is spitting into the wind. Isn't this the age in which those who shout the loudest get the hearing? Think about it. Taking one S-point as being a 6dB change, looking at a decibel/power chart shows that 6dB is a fourfold power change. So in theory one has to increase power fourfold to gain one S-point. Conversely, dropping power from 100W to 25W means a loss of one S-point. Perhaps mere power is not the important factor that some think.

Fun rigs

A lot of the interest in QRP is centred around the construction of one's own equipment. Low power lends itself to ease and cheapness in radio construction. The equipment built and used varies from the sophisticated to the simple. In recent years a lot of operators have enjoyed building and using what can only be called "fun rigs". These are simple little transmitters or transceivers costing very little in money or time to build and capable of useful results on the bands. Their only problem seems to be that they are addictive. They are built, often as a casual sideline to the main station equipment, and the builder becomes so amused and hooked on gaining QSOs with them that the expensive Japanese grey box lies rusting on the back shelf.

Against the odds

QRP operation is a matter of low cost in an age of considerable expense, and low power in an era of "blast your way through". Are the odds too high? Well, certainly the QRP operator cannot bully his way into contacts. What QRP operation does is instill the operator with that combination of skill and cunning which was once the common factor of all amateur radio operation. Such methods should be the common currency of the amateur operator. At a risk of "teaching grandmothers . . ." here are some of the basics for venturing onto the hf bands with low power.

Begin by listening and reading the band. Too many operators just switch on, tune to what they take to be a clear frequency and call "CQ"—usually on top of me! Check who is working whom? Which countries are working G stations? What reports are the UK stations getting? Remember a QRP signal will be about two to three S-points down on the average UK signal. More listening and less operating is not a bad adage for any station of whatever power.

Avoid calling "CQ", but answer "CQ" calls or wait until the end of an existing QSO. Tail-ending—jumping in quickly at the end of a QSO—is a powerful tool for the QRP station, but do not forget to wait for the final "73" or dit-dit to be exchanged between the stations.

Do not show off your new bug key! Slow sending of a weak signal is much easier to copy than the virtuosity of the paddle pummeller. Try contests for picking up new countries on QRP; rf gain controls are often wide open and the participants are usually QSO hungry. Use no more than a "two by two" call, if the station has not heard you by then it is probably a lost cause. If the other station is dx or especially wanted, tell him that you are QRP. Under our licensing regulations it is illegal to use "G3RJV/QRP" but "G3RJV (space) QRP" is legal. Otherwise do not tell the other station you are QRP until he has given your report—the secretive approach is worth up to two S-points! In short, be alert, use good manners, and expect QSOs and the praise and respect of other station operators.

The tools of the trade

QRP operators use a whole variety of equipment; in many cases home-made, although there are commercial QRP transmitters and transceivers. As it progresses this column will deal with suitable equipment and circuit ideas. A common question seems to be: "Where can I get circuits of buildable equipment of a simple or low power nature?" There are plenty of circuits and ideas around if the amateur knows where to look.

Sadly, most of the best ideas seem to come from the USA, but more ideas and circuits are appearing in UK journals. The best single book in my opinion, is *Solid State Design for the Radio Amateur*, and *Solid State Basics* is a similar, simpler book. Both are published by ARRL and are obtainable from RSGB Publications (Sales). A large proportion of *Sprat*, the journal of the G QRP Club, is technical material with complete circuits for the home constructor. A whole range of other sources and resources exist which no doubt will be mentioned here in future. The *G QRP Club Circuit Handbook*, which was sold out almost before its first edition had been received from the printers, is being reprinted later this year. □

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The Month on The Air

*by John Allaway, G3FKM**

THE APPEARANCE of a major dxpedition on the bands often provides an incentive for the primarily ssb operator to have another go at cw in order to work a new country. Unfortunately, the chance to gain a convert to the mode is often lost because the dx frequency is a scene of chaos and confusion sufficient to deter even experienced operators because of a belief—increasingly held by dxpeditioners—that when it comes to sending morse, faster is better, and unreadably fast is best.

This policy is usually justified by its adherents on the grounds that "if you can't read 30wpm morse you don't deserve to work me" or "by ensuring that only 10 per cent copy my call and listening frequency I get a manageable pile-up". These people often take pride in the fact that they alter their listening frequency after every few contacts and send the new one only once!

There may be some merit in the first justification offered, but there is precious little in the second because the confused 90 per cent spend their time milling around the dx frequency sending "?", "call?", or "up?" or just calling blind. The potential cw convert, confronted by a wall of such noises, is likely to QSY rapidly back to ssb.

If dxpeditions are to fulfil their potential in getting people to "have a go" at cw, the operators must ensure, by slowing to a reasonable speed and keeping to the same listening frequency/frequencies, that everyone knows who they are and where they are listening.

(*Thanks to G3ZAY*)

G4LZD (Stephen J. Reading, 73 Mayflower Close, Townstar, Dartmouth TQ6 9JN), was MP4BDV and also an operator of the club station MP4BBA. He would like to locate any ex-MP4B, MP4T or MP4D of any era, or any ex-A4, A6, A9 or 9K2 operators, or indeed any ex-resident or ex-Serviceman of any nationality of the mentioned Arabian Gulf call areas who had no licence but has one now. He hopes to set up a regular net with present stations in the Gulf area to set up new friendships and renew old ones. If interested, please contact Stephen direct.

Another case of piracy – this time G4LUN reports the arrival of a batch of QSLs for "G4LUN/P". The pirate's name is Keith and he seems to use 14MHz ssb. The real G4LUN is not using hf at present.

DX news

According to *DX News Sheet* only KG4 stations with two-letter suffixes are located in Guantanamo Bay and they are allowed normal Region 2 frequency usage, not being restricted to FCC rules on band planning. The most active at the present time are KG4s DX, CD, GN, AW, CC, AH, WS and TM. KG4s AH and WS are interested in rtty, and TM favours 7MHz. QSLs for any may be sent via PO Box 73, FPO, New York, NY, 09573, USA.

HH2WL is now active on all bands 3·5 to 28MHz, with most operation on the latter. He will be there for some years. The special callsigns 5J1LM to 5J0LM and 5K1LM to 5K0LM have been issued to members of LCRA and will be in use until the end of the year to mark the 50th anniversary of the Colombian society.

VP8ANT now has a 3·5MHz antenna and should be looked for near 3,505kHz from 2100.

FO8JE is on 14,103kHz nearly every day from 0430. ZK9WCY was active for one day only, but Niue stations may continue to use the ZK9 prefix for the rest of 1983 to mark World Communications Year. Activity from Nauru seems to have increased recently, with C21BD active most days on 21MHz ssb from 1000, and working into Europe until 1500. C21RK is also often in the DK9KE Net on 21,157kHz, and both are newly-licensed Nauru residents. C21FS and C21KH, as well as the club station C21NI, are also quite active.

ZL2BKM/C, on Chatham Is, has been noted around 14,197kHz at 0600, and ZL4PO/C is often on 7MHz at the same time. Ian Anderson (formerly J87BD, GM4JAM, ZD9BT and VP8CZ) is on Tuvalu, and should have a T2 callsign by now. Initial operation will be QRP, but his normal equipment should reach him soon. Tom Christian, VR6TC, says that he is usually on 21,350kHz from 1645 on Fridays, and he has also been worked from the UK at 0730 on Sundays on 14,135kHz—this might serve as a reminder that much 14MHz dx will now tend to congregate below the new lower limit of the USA phone band at 14,150kHz. VR6KB is Tom's nephew and is at present only active on 14 and 7MHz—mostly on cw. According to *DX-NL*, VK9ZJ was replaced during June by VK9ZS who will stay until the end of the year.

In a letter to the *Long Island DX Bulletin*, K6DT (who had recently visited BY1PK) gave the information that BY1PK itself is being relocated on top of a new five-storey building in Beijing. The beam (a TH6DXX, soon to be replaced by a TH7) is on top of a 20ft tower which also helps to support a long-wire antenna. Operator Tong said that the new station would not be operational until late in the year, and he also said that ssb operation would be impossible yet. Tom Wong, VE7BC, operated from BY1PK from 30 March to 5 April, and then set up BY7RA in Gongdong —this is awaiting permission to operate. Equipment here consists of FT107, FL2500, TH6DXX, and a 500ft V-beam directed to N America. BY8AA has a Chinese a.m./cw transmitter, and Tom is trying to replace this with a transceiver. Another station planned is BY1QH, which should be on the air in a year's time.

A letter from Seiji Takayanagi, editor of the *Japan DX News*, says that JA1UT and JA1HQG met Prime Minister San Son of Kampuchea recently, and that there is a chance that an amateur radio station may be set up in XU in due course.

Those looking for Zone 23 or Mongolia on 7MHz might try looking in the 7,050–7,070kHz area around 2200 where JT1BG is looking specially for European QSOs.

JD1s currently active from Ogasawara include ALN, BAK, BAX, BBT, BBG, BCD, ALU and AMH. JD1YAM is on Io Island, and JD1s BAR and YAA on Minami Torishima. JD1s YAA and BBG often join the Japanese net on 21,200kHz at 1030.

Two Ugandan stations have been reported recently: 5X5BJ and 5X5FS, both on 14MHz ssb. From Togo, 5V7WI is said to be very active near 14,003kHz from 2300. 3X4EX is the new callsign of LA2EX/3X. In addition, WB8ZJW is going to Guinea for a long stay and is hoping for a licence, and DL5DAB/3X is hoping to receive a proper call soon. Ezzat,

Leading Belgian dxer Ghis Penny, ON5NT

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Ian, G4LJF, at the April meeting of the Kansai DX Club in Osaka

G4LJF with Hiro, JH3TKM, at his shack

SU1ER, and his daughter SU1MR, are on the air most Fridays and Saturdays from 1700 to 2100 around 7,080, 14,280, 21,280 and 28,580kHz. W3EHM (ex-CN8CO) is likely to be in Egypt for over a year and will be trying to get a licence. FR0FLO says that his mail is being interfered with and asks that no reference is made to "Reunion Is" or any callsign on envelopes sent to him. Cards should be sent to the address as given in "QTH Corner".

Overseas news

Les Hickingbotham, VS5LH, has returned home from Brunei and is on the air as G3HZG. Any outstanding QSL requests should be sent to him at the address in "QTH Corner". He has received some QSLs for VS5s sent to his Brunei address by the VS6 bureau (there is no VS5 bureau yet) and redirected by the new box number holder, and apologises for the fact that this will cause extra delay for some applying for Brunei cards via the bureau. Les comments that piracy on the high seas in SE Asia has now become much more prevalent and that the Maritime Mobile Net (better known as "Rowdys Breakfast Show") keeps those concerned fully informed on 14,310kHz at 2400.

Bob Parkes, well known as VS5RP, has now left Brunei and is living in Port Moresby, Papua New Guinea. He unfortunately missed the P29RP callsign by a month but has managed to acquire P29PR. Room is restricted so Bob does not expect to be as active as before.

Rey Marrero, CO2HQ, is a member of RSGB, and also of the Cuba DX Group. He would be very willing to contact anyone who wishes to work Cuba on any band. His QTH is Quintana 12401 Albado - Federacion Nacional Radioaficionados, PO Box 1, Habana 8, Cuba. Rey's QSL manager is WB6QPG.

Expeditions

LCRA announced at the Region 2 conference in Cali that 20 Colombian amateurs would be on the air from Malpelo Is for five days commencing 0000 on 12 October. They will be taken there by the Colombian Navy and will have four stations on the air which will operate on all the hf bands on cw and ssb, and also through satellites.

VP8ADE

The VP8ADE beacon, planned to be on 28,285kHz, and located on Adelaide Is, Antarctica, is back on the air with a new transmitter very generously donated by Pye Telecommunications and shipped out by the British Antarctic Survey. The old equipment had to be switched off because spurious signals coming from it were interfering with BAS communications. The new beacon has been noted very slightly off its nominal frequency.

Master morse

The shortwave service of Austrian Radio is running an instructional course in morse code. This is in four languages (German, English, French and Spanish) and consists of 30 15min lessons, and everyone can take part - even complete beginners. It is being produced jointly by the Austrian Radio Shortwave Service, Austrian ADXB, and OeVSV, the Austrian national society. Full details can be obtained by sending a few ircs to "Master Morse", ORF Shortwave Service, A-1136 Wien, Austria. Broadcast times as of 1 May were 0615 Sunday (on 6,155kHz) and 2245 Saturday (on 5,945kHz). It is believed that tapes are supplied as part of the course.

Welcome

This section has been missing for a few months due to the changes in the HQ computer, but the following (who joined during March, April and May) are no less welcome: CT1BOO, DL7AZ, EA1BGF, EA1OD, EA4BCD, EI5BBB, EI5DD, EI6AH, EI6EU, EI7FC, EI8I, K4JCA, KA6IYE, KB8Q, NE5O, ON4XN, OZ1L, PA0EHG, SM4EAC, VE2KW, VE7BYH, VK3ARZ, VK4LC, VP8AIB, VP8MT, W1GNC, WA1IVB, W6SAI, W0TN, YU1SM, YU1PKA, YU2LTT, YU3BH, Z24JE, ZB2HP, ZL1AVZ, ZL2AUP, ZS4RP, 5B4CW, 5N8SHE, 6Y5WC, and 9H1E. New non-licensed members include J. Ivory, S. Malone, W. Cousins, J. Earley (EI), S. Sevin, J. Kaeuffer, M. Limes (F), Gruppo Radio DF (I), K. Gotthardt (OE), M. Lahteenmaki (OH), J. Gille (ON) and J. Price (VS6).

British YL Association

G4EZI, secretary of BYLARA, has asked for some publicity to be given to this organization which was formed four years ago to "further yl operating in Britain and so promote friendship, stimulate interest and, in particular, encourage good operating techniques and courtesy to all operators at all times". It is open to everyone (of both sexes) and subscription is £2.50 per annum. BYLARA organizes regular nets as well as meetings at most rallies, and produces a quarterly newsletter. There is an activity day on the sixth of each month. Further information can be obtained by sending a sae to Diana Hughes, 3 Primley Park Crescent, Leeds LS17 7HY.

ISWL

The International Short Wave League is another organization which provides services, awards and contests—of particular interest to listeners but also useful to licensed amateurs. Details of membership are available from ISWL HQ, 88 The Barley Lea, Coventry, W Midlands.

DX mint stamps service

Dxers are able to save money on direct QSLing by sending mint stamps rather than ircs for return postage, and most dx stations use QSL managers in a comparatively few different countries. Nigel Cawthorne, G3TXF (Holt Cottage, Kingston Hill, Kingston-upon-Thames, Surrey KT2 7JH) maintains a stock of the appropriate stamps of OE, VE, OZ, F, DL, I, JA, EA, ZS, SM, HB and W, and can obtain others. Write or telephone for information (01-942 7853).

28MHz

A suggestion from G4OBK, who points out that the frequencies most used by the illegal cb intruders are the channels 28,005, 28,015, 28,025, 28,035 and (in the phone segment) 28,305kHz - the top channel on most cb sets.

QTH CORNER

C21BD	PO Box 225, Nauru.
C21RK	PO Box 139, Nauru.
G4JMB/CT3	via KB2XS, PO Box 1150, Princeton, NJ, 08540, USA.
FG0DDV/FS7	via W2QM, 151 Whitney Av, Pompton Lakes, NJ, 07442, USA.
FP0HSH, FP0HSP, FP0HSQ, FP0HST, FP0HSV, FP0HSW	via KC8A, 9487 Tonneberger Dr, Tecumseh, Mich, 49286, USA.
FR0FLO	H. Maudit-Larive, BP 200, Tampon 97430, France.
FY0HVL, FY0HVM	via F6AJA, 515 Rue du Petit Hem, Bouvignies, F-59870 Marchiennes, France.
JW0A	via LA5NM, Box 210, 9401 Harstad, Norway.
P29PR	R. Parkes, PO Box 1565, Boroko, Papua New Guinea.
DL6GBO/TY	Box 136, Bohicon, Benin.
ex-VS5LH	L. Hickingbotham, G3HZG, 95 Oakenshaw Rd, Redditch, Worcs, B98 7PR.
ex-VS5RP	(now P29PR - see above).
ZK1WL	via ZL3AFH, 168 MacKenzie Av, Christchurch, New Zealand.
ZV2ACZ, ZV2ADV	Box 07-0004 Brasilia, DF, 70.000 Brazil.
5W1DZ	via WB2LVB, 53 Whaley Av, Bethpage, NY, 11714, USA.
9H3BX	Bill Mahoney, 21 Lindale Close, Dalton-in-Furness, Cumbria LA15 8NL.
9V1VP	(15-17/3/83 only) K5YY, Box 5299, Little Rock, Ark, 72215, USA.

He therefore makes a point of using these frequencies whenever possible and suggests that others do the same!

In the **1983 countries table**, scores (to 23 June) were:

G3VOF - 167	G4GGY - 77 (ssb)	G4EHQ - 36
G3GIQ - 151	G4OBK - 71	G3PSM - 26 (cw)
G3KHZ - 132 (cw)	G4MUW - 70	G3JFF - 23
G3XQU - 131	G3TXF - 69 (cw)	G3XBM - 18
G3XBY - 101	G3XTJ - 66 (cw)	G4FVK - 16
G3KDB (cw) - 85	G4PKP - 49	G3KSH - 16
G3SXW - 81 (cw)		

Clipperton DX Club convention

Preliminary information on this increasingly popular event has been received from its secretary, F9IE, who says that it will take place this year in Raincy on 24 September. More details later, or from F9IE, 5 rue Fromagere, 91310 Linas, France.

Awards

Jamaica ARA Award 1983

This award is issued to commemorate Jamaica's 21st year of independence on 6 August. It is available to licensed amateurs for cw, phone or mixed modes, and contacts to be eligible must have taken place between August and 31 December 1983. Contact must be made with five different 6Y5 stations on any band, and QSLs or other written proof of contact showing time, date, band and mode must be in the claimant's possession. Applications should be made to Awards Chairman, Gerlan Burton, 6Y5AG, Box 214, Kingston 20, Jamaica, enclosing US $3 or 10 ircs and a 8 by 10in self-addressed envelope.

RAEM Diploma

Founded in 1972 in memory of Ernst Teodorovich Krenkel, who died in 1971. It is awarded for the establishment of two-way communication with Soviet stations within the northern and southern Polar circles. A total of 68 points is required—a QSO with RAEM when operated by Ernst counts as 15 points; with Antarctic stations and stations on ships in the Arctic 10 points; with stations on Arctic islands and with stations located north of 70° five points; and with other stations within the Arctic Circle two points. All QSOs must have been made since 24 December 1972 on cw (a contact with Ernst Krenkel may have any date), and contacts with RAEM since Ernst's death are not valid. Listeners may also apply, and all applicants should supply a list of QSOs set out by region and in alphabetical order of prefixes and full data. A list of QSLs certified by a national society awards manager (G3KDB for RSGB members), plus 14 ircs, should be sent to Central Radio Club, PO Box 88, Moscow, USSR.

P-10-P

For confirmed contacts/listener reports with one station with each of the prefix number zones in the USSR. For all cw or all ssb. Apply as above.

P-15-P

For confirmed contacts/listener reports with stations in each of the 15 republics of the USSR. All cw or all ssb. Apply as above.

WPX

An update on the requirements for this award has been received from K6ZDL. There is now a WPX Award of Excellence available for 1,000 prefixes mixed mode, 600 ssb, 600 cw, all six continental endorsements, and the five-band endorsements 3·5–28MHz. A special 1·8MHz endorsement bar is also available. For ordinary endorsements applicants should send an sae and US $1 or 5 ircs, for the plaque US $50, and for the 1·8MHz bar US $4.50. A number of prefixes have been deleted (some of the more recent being the DM and ZE series). Since 1 May 1981 USA stations operating in the continental USA are no longer required to sign as portable or mobile, so only the numeral in any suffix they use is accepted—K4IIF/NV2 would be K4 or K2. Foreign stations in the USA using their own call/W (or the prefix of their home call) will count as W plus the numeral—SM8XYZ/AL3 would be SM8 or W3 only. Copies of the latest WPX rules leaflet and application blanks are available from G3FKM (sae please).

Mary Rose Award

Please note that the award manager's address has changed and is now: V. G. Scambell, G3FWE, 50 Park Av, Widley, Purbrook, Hants.

Contests

European DX Contest

0000 13 August to 2400 14 August (CW)
0000 10 September to 2400 11 September (Phone)
0000 12 November to 2400 13 November (RTTY)

3·5 to 28MHz. Single-operator all-band and multi-operator single-transmitter classes. The latter may change band once in a period of 15min; however, a quick bandchange for working new multipliers is allowed. Single-operator entrants may only operate for 36h—the 12h of non-operation may be taken in up to three periods and must be shown in the log. European stations work non-Europeans and exchange RS/T plus serial QSO number (from 001), USA stations will also give their state. Each QSO counts one point, and a station may be worked on each band for credit. One point is also gained for each confirmed "QTC" sent or received. The multipliers are (for Europeans) DXCC countries (as per latest list) and JA, PY, VE, VO, VK, ZL, ZS, call areas and UA9/UA9, plus USA states. In addition to this the multiplier on 3·5MHz is multiplied by four, on 7MHz by three, and on 14, 21 and 28MHz by two. Additional point credit can be obtained by using the QTC traffic feature. A QTC is a report of a confirmed QSO that has taken place earlier in the contest and later sent back to a European station, and can only be sent by a non-European. It contains the time, callsign and QSO number of the station being reported (eg 1300/DA1AA/134). A QSO can be reported back only once and not to the originating station, and a maximum of 10 may be sent to one station—in more than one QSO if necessary. Separate logs must be used for each band—with 40 QSOs or QTCs per page, and a "dupe" sheet is required for each band where more than 200 QSOs have been made. Note that in the rtty event contacts between any continents are allowed, and the European *and* DXCC list will be used for multipliers. Log sheets and summary sheets are available from WAEDX-Committee, Postbox 1328, D-895 Kaufbeuren, FR of Germany, and photocopies of the rules from G3FKM (sae please). Closing dates are 15 September, 15 October and 15 December respectively.

LZ DX Contest

0000 to 2400 4 September

CW only. Stations may be worked once per band, 3·5 to 28MHz. Activity must be confined to the following band segments: 3,510–3,590kHz, 7,005–7,040kHz, 14,010–14,090kHz, 21,010–21,125kHz and 28,010–28,125kHz. Exchange RST plus ITU zone (UK is 27). Six points are awarded for working an LZ station, one for QSOs with own continent and country, and three for all others. Listeners count three points for two callsigns and two exchanges logged. 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 are to be submitted "in standard form" with separate sheets for each band. A summary sheet showing zones worked on each band and the usual declaration should also be included. State continent on log. Post within 30 days of the contest to BRFA Contests, PO Box 830, Sofia 1000, Bulgaria.

Around the bands

No G8KG summary this month, but the general feeling is that hf conditions have been quite reasonable, particularly during the weeks before this was being written. This month's contributors were: G2DHV, G4QK, G5JL, G3s GIQ, GVV, IMW, KHZ, SXW, YRM, G4EHQ, GW4KGR, G4s, LDS, MUW, NXG/M, OBK, GM4RFE, G4RVV and G5CFJ.

Stations listed in italics were using A1A.

1·8MHz. No report.

3·5MHz. 0200 *YV1NB.* **0300** OA4OS. **0400** CP8HD, PY1HF, PY4AP/PW8, ZP5PX, *4M3AZC.* **0500** *LU7XP.* **1900** *5Z4DR.* **2000** *PA0FRI/OD.* **2200** *DA1WA/HB0.* **2300** *ZP5XDW.*

7MHz. 0200 *N6YK/V2A.* **0500** *HC2SL, G4FAM/J6L, PY, VK, VP2MKY, VU2WC, ZL.* **0600** *CM6CD, LU6QI, PZ2AC.* **2200** *HZ1AB, V2AAW, ZD9BX, 4K1QAV.* **2300** *VK6HD, 4K1B.*

10MHz. 0300 Most W inc *W6-W7.* **0500** *XE2ABW, ZS5LB. 0700 HB0BFN/M, VK, ZL.* **2000** *KP2J.*

14MHz. 0300 VU2VS. **0500** VK (to 1000), ZL (to 0900), 8R1RBF. **0600** FO8JJ, *KH6,* W6 (to 0900), *G4HZI/5NO.* **0700** KH6LW/KH7, *TR8CE, YK1NK,* **0800**

A82LC, *KL7, SN0JP, N7EDM/ST,* VE8RCS. **0900** HC1JB, KH6LG. **1500** *JT1BH, OD5LX, YB0AFA.* **1900** *HL1CG,* VS5PP. **2000** A4XGY, VP8NY, *4K1F* (S Shetland). **2100** OH0AM, VP8MT, ZB2BL, 9N1MM. **2200** *KL7PJ.*

21MHz. 0000 KH6DD. **0600** *W6-W7.* **0700** 5N7HKR. **0800** *BY1PK, BY8AA,* JA, TL8ER, TR8IG, ZK2JS, 5Z4DD. **1000** C21BD, HL0CBD, JA, TJ1GH, TZ6FE, YJ8TT, ZK1CG. **1200** G4AVW/ST3. **1300** C21RK. **1400** AP2AC. **1500** FR7ZN. VS5GF, VS6DK. **1600** J28DM, JAs, JW0A, *N1BTP/WH0,* 9K2FX, 9V1VP. **1700** DU1MZ, FY0GS, S79WHW, *VP8ANT,* 7P8BX. **1800** C53R, *TR8JLD, TT8AD,* VU2RX, W6-W7, 9X5SL. **1900** HV3SJ. **2000** FG0HVL/FS, VP8LV, W6-W7, 5H3BM, 7Q7LW. **2100** *FK8AAA, JAs,* ZD7BW, ZL4OY/C. **2200** *HH2VP,* HZ1AB, J88AB, TR8DR, *V2AAW,* W1-W0, *5Z4MX.* **2300** HC1JB, T77C, YN1MAT.

28MHz. 0600 *4X4FU.* **0700** *9X5XL.* **0800** JA, *VK6CI.* **1000** *HZ1HZ, VKs.* **1100** C30LAA, DL, I. OH, SM, Y. **1400** 4X4KR, *5R8AL.* **1500** JY9CL, OY5NS, VP8AEN, ZS, *5V7WI.* **1600** HV3SJ, *OY1R,* VS5RB, ZD7BW. **1700** *CP7GM,* A82LC/EL2K. **1800** FY8AU, VP2s ED, MO. **1900** C30XA, *L8DQ* (= LU), 9X5MB. **2000** *HH2VP,* J73AJ, *V2AX, VP2MIU.* **2100** *CE, FM7,* OH0AM. **2200** FG0HVL/FS, *W9NXD/HR2.*

Thanks to the editors of the following for items extracted: the *DX Bulletin* **(K1IN),** the *Long Island DX Bulletin* **(W2IYX),** *DX News Sheet* **(G3XTT/G3ZAY),** the *Ex-G Radio Club Bulletin* **(GI3OEN/W6),** *Long Skip* **(VE3EUP),** *Lynx DX Group Bulletin* **(EA2JG/EA3CBQ),** *DX'press* **(PA0GAM),** *CQ Magazine* **(W1WY),** and *DXNL* **(DL3RK).**

Please send items for **October** by **2 September** and for **November** by **29 September.**

HF propagation predictions for August 1983

Using the table

The time is presented vertically at two-hour intervals 00(00)gmt to 22(00)gmt for each band.

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.

	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						11	111	32	13	556	656	885	756	544	445	789	864	211	112	478	53			4·
Malta						11	111	43	311	666	667	896	877	654	455	799	997	422	223	578	··4			25·
Gibraltar								11	1	255	554	884	743	765	555	799	997	532	223	589	··5	2		25·
Iceland										13	333	563	512	455	555	688	777	532	223	467	5·4	2		34
ASIA																								
Osaka						1	1			142	223	232		2	2	463				241				
Hong Kong						111	112	1		122	225	663	2		2	575				253				2
Bangkok						122	212	21	1	112	225	774	3		2	587	1			256				23
Singapore						123	221	1	2·1	112	224	651	3		2	576	1			256				23
New Delhi						223	223	3	211	112	225	774	62		2	588	4			257				24
Teheran				1	1	333	324	64	424	211	225	797	853		2	589	73			257	4			24
Colombo						223	324	1	211	112	225	675	62		2	588	5			257	2			24
Bahrain		1	1	1	1	334	435	631	534	211	225	788	863		2	589	73			257	5			24
Cyprus		1	1	21		445	545	762	646	655	556	898	986	322	234	689	873	1	1	368	·4			45
Aden		1	111	1	1	334	446	622	755	211	125	788	973		2	589	851			267	52			34
OCEANIA																								
Suva (S)									1	332	111	541	2	42	1	42		1		1				
Suva (L)					1	1		42	112	62		162	2	42		33		2		2				
Wellington (S)									1	431	11	51	2	42	1	241		1		22				
Wellington (L)					1			12	333	51		65	113	42		242	1	2		12				
Sydney (S)						111			1	542	122	112		31	2	453				251				2
Sydney (L)					1			2	311	33		55	1·1	32		163		1		141				
Perth						334	1		312	242	222	21	41	1	2	451	1			254				23
Honolulu								1		222	112	411	3	42	1	2		1	2					
AFRICA																								
Seychelles		1	111		1	334	546	41	324	211	225	786	863		2	588	84			267	5			34
Mauritius		1	112	1		334	556	63	515	212	225	787	853		2	589	851			267	52			34
Nairobi		1	222	3		334	557	831	635	311	125	788	985	1	2	589	872			257	54			24
Harare		1	223	41	1	344	567	861	845	521	224	798	987	2	1	589	884			257	55			24
Capetown		11	222	1		354	566	62	2	642	224	786	761	41	1	478	885	1		257	552			24
Lagos	1	233	51		1	253	457	971	874	631	114	798	997	41	1	479	785	2		257	552			24
Ascension Is	1	12	42			54	346	882	73	52	113	699	983	32		478	885	2		157	552			24
Dakar		111	43		1	153	345	882	874	652	111	689	997	42		378	885	2		57	5·2			24
Las Palmas			11			44	443	772	753	676	556	799	998	643	333	589	887	421	1	268	··4			3·
S AMERICA																								
South Shetland		21	1				456	64	1	2	224	786	632	11	1	467	775	2		135	4·2			2
Falkland Is		11	31			1	455	76	542	2·2	224	577	987	42	1	247	885	2		25	5·2			2
Rio de Janeiro		11	32		1	3	344	773	864	123	211	479	997	32		158	885	2		27	552			4
Buenos Aires		1	22		1	3	344	673	863	4·3	222	368	997	51		37	885	2		15	5·2			2
Lima			1		1		222	353	752	342	221	126	886	42		4	685	2		1	352			
Bogota			1			1	221	243	741	233	211	126	886	42		3	685	2		1	352			
N AMERICA																								
Barbados			1			2	221	353	742	233	211	147	986	42		15	785	2		2	52			
Jamaica							111	132	631	112	211	115	785	42		3	485	2			252			
Bermuda						1	111	132	631	113	211	136	785	32		14	585	2		1	252			
New York							1	122	52	2	221	135	674	21		3	475	2		1	42			
Mexico							1	121	42		221	112	464	31			155	2			22			
Montreal								11	51	2	221	135	674	21		13	475	2		1	42			
Denver									31		112	112	344	31			145	2			2			
Los Angeles									2		12	111	234	31	1		25	2			2			
Vancouver									1	1	12	111	124	31	1		14	2						
Fairbanks									1	221	112	211	113	42	1	21	1	1						

The provisional mean sunspot number for June 1983 issued by the Sunspot Index Data Centre, Brussels, was 90·6. The maximum daily sunspot number was 143 on 23 June, and the minimum was 59 on 30 June. The predicted smoothed sunspot numbers for August, September, October, November and December are, respectively: (classical method) 78, 76, 74, 72 and 71; (SIDC adjusted values) 80, 78, 76, 76 and 73.

Contest News

144/432MHz Contest results

This contest was enjoyed by most of the contestants, who seem to have found conditions variable from "flat" to "very good". For some it was the first attempt at a contest and, generally, the standard of log-keeping from these entrants was higher than from the regulars!

Part of the requirement for taking part in a contest is to carefully read the general rules. This event clearly illustrated that a number of group secretaries did not do this either prior to, or even after the event. A number of entrants will find their efforts are recorded only in the band results tables and in some cases this was caused by lack of attention to rules 4, 5 and 23a. Logs that were unscored, or scored using the wrong system, have been accepted as check logs.

The winner of the fixed station section was the North Bucks Contest Group, who used both bands to advantage to gain a clear lead over the single-operator entry of G3JXN. Congratulations and certificates go to both entrants, and also to the individual band leaders in this section.

In the all other stations section, the result was much closer, with the Radio Society of Harrow just managing to get the winning position, scoring at a higher rate per contact on both bands than the Hadrabs Contest Group. Congratulations and certificates go to both groups and to the next highest scoring stations on each band.

G3LCH

OVERALL RESULTS—FIXED STATION SECTION

Posn	Name of group or callsign	144MHz points	432MHz points	Total
1	North Bucks Contest Group	531	365	896
2	G3JXN	433	189	622
3	IBM London ARC	469	51	520
4	Denzil Contest Group	8	438	446
5	G6CHK	308	19	327
6	Newark & DARC	219	—	219
7	G4MUT	110	69	179
8	G4PRJ	122	—	122
9	GW6MLN	110	—	110
10	G8XWA	109	—	109
11	G8LVS	76	—	76
12	G8AKB	48	—	48
13	G3PBV	—	39	39
14	G8NMQ	26	—	26

OVERALL RESULTS—ALL OTHER STATIONS SECTION

Posn	Name of group or callsign	144MHz points	432MHz points	Total
1	RS of Harrow	989	1,000	1,989
2	Hadrabs CG	1,000	935	1,935
3	Flight Refuelling ARS	796	353	1,149
4	Mudhoppers	742	357	1,099
5	The Flowerpot Men	510	580	1,090
6	Hastings E & RC	967	—	967
7	Victory CG	848	107	955
8	Albright & Wilson ARS	575	284	859
9	Havering & DARC	460	389	849
10	Bournemouth RS	456	256	712
11	Derbyshire Hills CG	474	207	674
12	Portable ACT	455	203	658
13	East Kent RS	305	318	623
14	South Manchester RC	251	253	504
15	Leyland Hundred VHF CG	280	155	435
16	X-Kent University RS	420	—	420
17	Abingdon CG	103	235	338
18	North Wakefield RC	227	48	275
19	G6LVN/P	148	—	148
20	White Rose ARS	85	60	145
21	Stevenage & DARS	128	2	130
22	Bury St Edmunds RS CG	119	—	119
23	NW of Ireland ARS	72	—	72
24	Corby & DARG	53	—	53

432MHz FIXED STATION SECTION

Posn	Callsign	Points	QSOs	QRA	Best dx	Km
1	G4RZO	2,330	251	AL45	HB9MIN/P	651
2	G4FRE	1,021	108	AL07	HB9AEN/P	684
3	G3TGE	851	128	ZM77	HB9MIN/P	787
4	G3JXN	441	75	ZL39	HB9MIN/P	723
5	G3PBV	215	19	YK32	DJ5AP/P	899
6	G4MUT	163	41	ZL46	DL2KBB	497
7	G6CAQ	121	23	ZL39	HB9MIN/P	712
8	G6CHD	87	17	YN78	G4JAR/P	319
9	G6CHK	45	11	ZL27	GW3UEY/P	187

432MHz ALL OTHER STATIONS SECTION

Posn	Callsign	Points	QSOs	QRA	Best dx	Km
1	G4JNZ/P	3,402	296	ZK10	DG1NZ	812
2	G4JAR/P	3,181	289	AL47d	DK8MA/P	818
3	G8KQW/P	1,975	181	AN51	HB9MIN/P	844
4	G3LTY/P	1,801	177	AL56	DK8MA/P	829
5	G4OUF/A	1,650	154	ZM29	HB9AEN/P	820
6	G6BEL/P	1,326	132	AL17	HB9AEN/P	674
7	G4BCH/A	1,217	131	AL34	HB9MIN/P	680
8	G6TEA/P	1,201	115	YK30	DL6NAQ/P	354
9	G4POL/P	801	128	ZL15	HB9RDB/P	775
10	GW3UEY/P	967	115	YM54	HB9RDB/P	925
11	G4EKE/A	871	94	YK19	DJ5AP/P	875
12	G3UHF/P	862	126	ZN61	HB9MIN/P	930
13	G8ROU/P	707	111	ZN62	F1FHI	680
14	G3WFW/P	692	122	ZN53	F6APE	665
15	G4KKC/P	560	88	AL56	HB9AEM	638
16	G8BQO/P	529	89	YN38	F6APE	704
17	G4AXL/P	374	48	YP69	F6KBF/P	574
18	G8UML/P	366	57	ZK35	FIKNO	822
19	G8WRS/P	206	43	ZN23	F6KBF/P	376
20	G4IAU/P	165	45	ZN23	G4JNZ/P	332
21	G4RLB/P	118	27	ZO23	GW3VEY/P	288
22	GD3FLH/A	63	5	XO67	G6TEA/P	425
23	G3SAD/A	9	5	ZL10	G3GWB	62

144MHz FIXED STATION SECTION

Posn	Callsign	Points	QSOs	QRA	Best dx	Km
1	GD4IOM	5,496	508	XO67	EA2LY	1,197
2	G8ZHP	4,750	460	ZM29	F6EAH/P	845
3	G4DCV	4,431	437	AL67	HB9LE	725
4	G4PSX	4,105	448	ZL56	DG3NAW	836
5	G4NUT	2,919	425	ZM77	EA2LY	977
6	G3UKC	2,740	299	AL56	DC6NY	735
7	G6ECM	2,741	335	AL56	HB9RDB/P	626
8	G6CAQ	2,578	400	ZL39	EA2LY	887
9	G3JXN	2,384	308	ZL39	DG3NAW	785
10	DK3UX	2,342	174	EN20	OH5LK	1,276
11	G8MAG	2,230	261	ZM77	DF3HBF	680
12	G6CHK	1,695	348	ZL27	DK0OX	724
13	G4GTT	1,228	246	ZL38	HB9RDB	722
14	G4HVC	1,207	192	ZN77	DF4WH	622
15	GW4ALG	879	119	ZL37	HB9RCJ	870
16	G6HML	780	110	AM34	HB9RDB/P	753
17	G4PRJ	676	149	ZL68	GD4IOM	424
18	GM6LNM	627	57	XP07	G6HH/P	662
19	G8XWA	602	84	YO57	F1KBF	500
20	G8IGQ	597	127	ZM04	F6BQX	640
21	G8ZQB	596	145	ZM35	F1KBF/P	297
22	G8RRC	567	101	ZL40	HB9RDB/P	670
23	G4NRJ	512	80	ZM39	F1DED	430
24	G6DTD	506	110	YN48	PE0MAR/P	475
25	G6CHD	492	92	YN28	ON4XG/P	530
26	G8LVS	421	111	ZL08	F6BQX	529
27	G4MUT	605	111	ZL46	HB9RDB/P	724
28	G4PDP	327	60	ZM80	F6BQX	553
29	G6MCX	289	42	ZK03	F1EAN	480
30	G4RYV	279	55	ZL56	GD4IOM	400
31	G8AKB	266	52	ZM27	GI4OMK/P	405
32	G8UYD	175	35	ZN64	PE0MAR/P	382
33	G6TTW	153	29	XL29	GD4IOM	402
34	G8NMQ	148	38	ZL37	ON1BPU	302
35	G8IFF	145	39	ZM77	G4EVR/P	306
36	GW8XAN	118	30	YL34	F6BQX	532
37	G3FRE	47	11	AL07	G4NVA/P	243

144MHz ALL OTHER STATIONS SECTION

Posn	Callsign	Points	QSOs	QRA	Best dx	Km
1	G4PUB/P	10,121	835	AL47	DL2ZA/P	875
2	G3EFX/P	10,015	753	ZK10	DL2ZA/P	962
3	G6HH/P	9,794	745	AK14	DF9MV/P	880
4	G4LIP/P	8,594	710	AN61	F6BWF/P	867
5	G8LNC/P	8,589	782	ZK35	DL0AU/P	919
6	G4NXO/P	8,089	912	AL45	DL2ZA/P	912
7	G6SFR/P	8,058	668	YK30	DF3DD/P	876
8	G4ERP/P	7,889	862	YL10	EA2LY/P	946
9	G4DEZ/A	7,519	638	AL34	DL9CCA	833
10	GW3OXD/P	5,826	625	YM54	DL0ULK/P	1,009
11	G3PIA/P	5,292	679	ZL33	DF3TT/P	868
12	G8SJP/P	5,165	490	AN51	F6BWI/P	878
13	G6APZ/P	4,798	622	ZN62	F6EAH/P	965
14	G8HRC/P	4,661	449	AL17	HB9AJ	704
15	G4ERO/A	4,625	516	YK19	DF6WCY	908
16	G4NVA/P	4,608	602	ZN53	EA2LY/P	1,106
17	G6EZI/P	4,253	445	YK10	EA2VP	883
18	G3SFG/P	3,901	556	ZL29	DL0UL/P	792
19	G4NTG/P	3,812	474	YM36	DG9NO	1,261
20	G8SSS/P	3,525	326	YL72	EA2LY/P	1,093
21	G6EKR/P	3,095	336	AL56	DL2LZ/P	638
22	G8WXA/P	2,835	436	YW38	F1KNO	785
23	G3FVA/P	2,541	376	ZN61	HB9RDB/P	925
24	G4NOK/P	2,306	346	ZN23	F6BWI/P	945
25	G8COI/P	2,275	409	ZM71	HB9RDB/P	832
26	GI4OMK/P	2,208	231	WO40	F1GHP	1,010
27	G4DUR/P	2,032	280	ZO23	F6BQX	836
28	G4LAD/P	1,991	331	YO69	F6BQX	794
29	G4IXT/P	1,811	355	ZL17	DB5UT	599
30	GW4NFD/P	1,605	149	YL15	DF1JM	696
31	G4MJB/P	1,541	190	YP69	F6KBF/P	574
32	G6LVN/P	1,505	273	ZL79	DK2TO	632
33	GI6FJB/P	1,484	152	XO32	F1KBF/P	680
34	G8SAD/P	1,296	249	ZL10	HB9RDB/P	737
35	G6BSE/P	1,214	169	AM64	DF0RX/P	570
36	G4PSU/P	1,045	186	ZL15	EA2LP/P	1,275
37	G8LVQ/P	868	158	ZN23	GM3PDL	778
38	GI3CFH/P	733	65	WO25	F6BQX	950
39	G3GWB/P	502	90	ZM48	ON4YZ	485

Check logs gratefully acknowledged from: G3NJP/P, G4LRS, G6PQN, GW6MLN and G8MQV/P.

Low Power Contest 1983 results

From the comments provided with logs, this year's Low Power Contest was a real test of skill, as band conditions were judged to be poor. 3·5MHz never quite provided the stable conditions expected of it, and 7MHz suffered from long-skip, which meant that few inter-G contacts were possible. With reports of RST419 and 339 occurring in the majority of logs, it is perhaps not too

surprising that a number of scores are lower than those claimed. However, in view of the poor conditions, the standard of logging was quite good, although only eight operators had faultless logs.

UK entries were one up on 1982, with 22 logs received, but the overseas section only gained the support of four operators, one from each of DL, EA, EI and OZ. This year's UK winner was Alan Morgan, G8DV, whose 5W input from an Argonaut 509 and G5RV with an apex at 38ft beat the entry from Iain Robertson, GM4HBG/P, by only 25 points. GM4HBG/P claimed the best score, but after careful checking had to settle for second place. In the overseas section Dieter Dillenburger, DJ6FO, using a 6DQ6A outboard tx driven by an FTDX401 and an inverted-V, was a clear winner. In the 1W section, George Burt, GM3OXX/A, operating from Edinburgh, was again the winner. A homebrew transceiver and a 300ft long wire for 3·5MHz and a ground plane for 7MHz brought George home well clear of his two rivals G3LP and GI4GYE. Congratulations to the winners and thanks to everyone for supporting the event. Hopefully, conditions in 1984 will prove more advantageous and it will not be necessary to strain those ears to hear all the RST 419 signals in among the noise.

Subject to the approval of Council, G8DV will receive the 1930 Committee Cup.

Comments from entrants

"Using only 1W, it was interesting to be told by a DL to QSY as I was causing QRM"—*G3LP.*

"An enjoyable contest, though conditions could have been better—some signals were barely above the noise here"—*G2HLU.*

"What happened to 7MHz? Every time I listened on the band it was just a mass of DLs and other Europeans"—*G4ARI.*

"Much tougher than last year. Conditions were quite different—3·5MHz was not at its best, and 7MHz suffered from long skip (except during the mandatory midday break!). The going was particularly slow during the afternoon"—*G3DNF.*

"Met lots of other QRP stations, many for the first time. Pity that skip on 7MHz did not allow for inter-G working. The QRM from the HCC contest was a challenge . . ."—*G3IQF.*

"Had to search hard for Gs—contacts hard to come by"—*EI4DZ.*

"Conditions were poor from here on both 7 and 3·5MHz. Neither band really opened into G. Hope to do better in '84"—*GI4GYE.*

"Enjoyed the contest very much—though some "interference" by my xyl asking for help with car maintenance"—*DJ6FO.* BRS32525

SECTION A

Posn	Callsign	Power (W)	7MHz	3·5MHz	Total score
1	G8DV	5	165	865	1,030
2	GM4HBG/P*	2	605	400	1,005
3	G3AZ*	5	340	630	970
4	G4ERT	5	35	860	895
5	G3VIP/P	5	155	705	860
6	G4ARI	5	65	735	800
7	GM3OXX/A*	1	465	325	790
8	G3YNA	5	135	590	725
9	G3IQF	5	175	505	680
10	G2HLU	3	155	520	675
11	G3DNF	5	95	460	555
12	GW4IUK	5	0	485	485
13	G3KKQ/P	3	35	375	405
14	G3JKS	5	90	290	380
15	G4MPK	3	60	305	365
16	G3LP	1	45	315	360
17	G8PG	3	0	345	345
18	G3AWR	5	145	195	340
19	G4GWE	4	35	225	260
20	G4GIR	5	0	225	225
21	G4BGH	4	15	165	180
22	GI4GYE	1	75	75	150

SECTION B

Posn	Callsign	Power (W)	7MHz	3·5MHz	Total score
1	DJ6FO*	4	400	0	400
2	EI4DZ*	2	300	0	300
3	EA1ASG*	5	120	55	175
4	OZ5XT	5	55	0	55

*Certificate winners.

Check logs were gratefully received from G4BUO, PA0TA, YU3EOP, YU3TFW and Y27KL.

April 144MHz CW Contest 1983 results

This year's contest again attracted a substantial log entry; a number of stations entered for the first time, along with a handful of "regulars", proving the popularity of cw contests. Several brand new callsigns could also be heard, practising their newly acquired skills.

Unfortunately, conditions did not match the enthusiasm. They were generally described as below average or poor. All the same, with a lot of Continental stations active, as well as GM stations, most entrants could work some good dx contacts, and scores were only marginally down on last year's event.

Some stations reported "wide" signals and "horrible keyclicks" causing some QRM, but entrants did not indicate whether or not the offending stations were warned at the time and failed to take action, so no points were deducted. One log was received late (postmarked 17 May) and is entered as a checklog.

Again comments were received about the rule regarding giving full QTH details: G3NNG and G3BDQ were against it, while G3KZR considers QTH information as a "godsend for working out distances without a computer". G3NNG also considered contest reports to be a "farce" and suggests sending three random numbers instead, followed by the serial number. G4OUT requests that contestants supply information about the type of key used, to gauge the proportions of "handpumps" versus "elbugs", or indeed keyboards (he uses a hi-mound up/down HK703 key). GW4ALG suggests making this event a concurrent 144 and 70MHz contest. Comments please!

A great "thank you" to F6FLB/P, who sent a very good (all G-QSOs) checklog to demonstrate his interest in RSGB contests, as well as to G4NPM and G4NSE for their help with the adjudication.

Congratulations and certificates to go G4MDZ and G3BDQ as winner and runner-up in the single-operator section, and also to the winner of the multi-operator section, GD4IOM. *G4KGC*

MULTI-OPERATOR SECTION

Posn	Callsign	QTH loc	Points	QSOs	Best dx	Km	Power	Ant
1	GD4IOM	XO67d	1,021	83	F6CTW	762	100	2X16-el Y
2	G4LKM/P	YN38g	642	82	F6FLV/P	665	100	16-el Y
3	G4NUT	ZM77a	548	85	DL2OM	612	100	16-el Y
4	G3KUE/P	YO78d	520	70	F6KAW/P	515	100	14-el Y
5	G4NOK	ZN23g	399	71	F6KAW/P	457	25	16-el Y
6	G4EKT	ZN10f	344	51	G3LHJ/P	440	80	19-el Y
7	G4IBA	ZL74h	311	64	PA0FHG	431	100	16-el Y
8	G3LRS	ZM25f	119	25	G3DAO	297	50i/p	10-el Y

SINGLE-OPERATOR SECTION

Posn	Callsign	QTH loc	Points	QSOs	Best dx	Km	Power	Ant
1	G4MDZ	AL76b	918	94	Y23FG	731	100	2X14-el Y
2	G3BDQ	AK04f	874	93	GM4CXM	651	100	16-el Y
3	G3NNG	ZL23f	761	104	DL2OM	661	100	16-el Y
4	G3VER	ZL28j	532	81	DL2OM	589	100	10-el Y
5	G3LHJ/P	YK32h	517	59	G4NSE	464	100	12-el Y
6	G3JXN	ZL39e	496	72	DF9CY	593	100	11-el Y
7	G4RKP	AM49b	465	46	DL2OM	469	50	4-el Q
	GW4ALG	YL37e	465	69	DL2OM	737	100	8-el Y
9	G4HZF/P	ZN49g	427	61	G3LHJ/P	394	40	8-el Y
10	G6GN	YL48h	369	51	DL3EAG/P	600	70	16-el Y
11	G4IRX	ZM05g	368	59	PA3BRS	489	100	19-el Y
12	G3CCZ	AL04d	335	42	DF9CY	516	80	4-el Q
13	G3KZR	ZL68c	315	57	GM3WOJ	481	40	2X8 slot Y
14	G3BZU	ZK05b	312	61	DF2WW	603	100	14-el Y
15	G3FIJ	AK05e	209	31	GD4IOM	446	25	9-el Y
16	G4APL	ZL60j	202	45	GM3WOJ	479	120i/p	9-el Y
17	G3RZP	ZL31c	178	32	GD4IOM	343	15	9-el Y
18	G4OUT	YM20j	161	25	F6KAW/P	386	25	4-el Q
19	G4CWS	ZL55e	155	33	GD4IOM	398	1	10XY
20	G4PQX	YK38b	150	20	GD4IOM	421	100i/p	10XY
21	G3GC	YK07c	139	25	GD4IOM	381	2	5-el Y in loft
22	G4OTV	AL62f	103	39	G3LHJ/P	287	15	8-el Quagi
23	G2WS	YL56h	91	19	F6FLB/P	328	80i/p	5-el
24	G3ICH	KY04c	81	15	GD4IOM	396	10	5-el
25	G4ASL	ZL60g	23	11	F6KAW/P	177	10	9-el

70MHz Cumulative Contest results

Scores were lower than last year, although the number of contacts made was comparable, but with dx distances noticeably reduced. GM, GI, and EI stations were conspicuous by their absence from the logs. Conditions were described as being "typical mid-winter". Session Four was undoubtedly the best, with Three and Six also fairly good. Entrants should note that adjudication is aided if logs are sent for all the sessions operated in, not just the best three.

Turning to the equipment used, G4ERP/P used an FT101B, transverter and 4CX250B pa with 130W p.e.p. output into an 8-element Yagi at 45ft, with a 3N204/SBL1 receive converter. GD2HDZ had 80W p.e.p. input to a QQV06-40A, with a 4-element Yagi at 22ft, and 40673s in the receiver.

Comments from this year's logs included: "Activity was up on last year, but little dx about"—*G4ERP/P;* "Eight day cycle in 1984 please to encourage evening activity"—*G3UKV;* "Please keep timing and separation as is"—*G4FRE;* "Please repeat next year"—*G3BPM & G4CIZ.*

Congratulations to G4ERP/P and GD2HDZ, who will receive certificates.

G3XDY

Posn	Callsign	Points	QSOs	Sessions	Best dx	Km
1	G4ERP/P	676	141	1, 3, 4	GD2HDZ	300
2	GD2HDZ	525	51	2, 3, 4	G4FRE	456
3	G3UKV	480	90	2, 4, 6	G3YJX	290
4	G4LNV	433	81	4, 5, 6	GD2HDZ	387
5	G4FRE	416	68	1, 4, 5	GD2HDZ	456
6	G3NPI	371	83	3, 4, 7	GD2HDZ	336
7	G4APL	307	69	3, 4, 6	G3BOC	250
8	G3BPM	291	74	3, 4, 6	GD2HDZ	413
9	G4FRO	282	46	3, 4, 6	G6WR	341
10	G4AFJ	261	55	4, 6, 7	GD2HDZ	262
11	G4FOH	193	46	4, 6, 7	G3BOC	199
12	G4CIZ	133	40	3, 4, 6	G3UVR	256
13	G4MUT	124	44	2, 6, 7	G3ENY	159
14	G4EYD	103	36	4, 6, 7	G4RCE	245
15	GW4ALG	92	18	2, 3, 4	G3EDD	214
16	G4FMC	72	30	2, 4, 6	G3JXN	142

March 144/432MHz Listener Contest 1983 results

A close battle for first place from a disappointingly low number of contestants was won by BRS52543, who is to be congratulated and will receive a certificate. Several reasons have been put forward in recent listener events for the low number of entries, and the committee would like to have the views of listeners who do not normally send in entries in order to perhaps formulate rules for a more popular event for non-licensed RSGB members.

G3LCH

	432MHz		144MHz		Total
Entrant	Score	Points gained	Score	Points gained	points
BRS52543	27	177	875	1,000	1,177
BRS28198	152	1,000	152	173	1,173
BRS32525	—	—	771	881	881

ROPOCO 1 1983 results

The contest this year enjoyed good conditions and a 20 per cent increase in entries. Judging by the comments, all entrants drew some satisfaction from the 2h of message handling. If not at the top of the table, one can compete with one's locals or just get some valuable code practice.

Roger Western, G3SXW, just pipped Ian Frith, G4GIR, for first place, with G3NKS third. All three used dipoles. In all, 112 calls appeared in the logs, of which half were from the south and west and half from the Midlands and north. Three of the four GM entrants were within 10 points on claimed scores, so GM3OXC is the local winner. Also well-deserving of mention is G3MCK, the only entrant who lost no points in checking.

Garbling of postcodes was at the same level as in previous contests. Other problems occurred at the two /P sites, where the operators suffered from cold fingers early on, while a few entrants suffered from unmarked duplicates, a

couple severely. One entrant left out part of his log, almost causing a big loss of points to the eventual winner! However with postcode exchanges and 50 logs available for cross checking it was possible to restore the missing contacts. Only ROPOCO can do this.

Our Scottish entrants all request that the contest be put forward one hour, since they lose propagation to the South of England in the second hour and are in effect competing only with each other. Comments please from those South of the border with your entries to ROPOCO 2 in August.

G3XTJ

Posn	Callsign	Points	Posn	Callsign	Points
1	G3SXW	628	25	G4HZF	338
2	G4GIR	624		G4OKN	
3	G3NKS	606	27	GM3OXC	314
4	G4MCC (G4HIU)	588	28	G3SWH	312
5	G4NUT/A(G4BJM)	558	29	G3VFB	308
6	G3JJG	514	30	GM4EJI	306
7	G4BUO	500	31	G6UT (G4GHU)	304
8	G3YCP	496	32	GM4LGM	294
9	G4KGG	488	33	G3MKR	288
10	G3SYA	478	34	G3KTZ	286
	G3HQH		35	G3BPM	272
	G3JKS/P		36	G3HKO	268
13	G4KRS	470	37	G3WVG	252
14	G3SJE	460	38	G3AWR	244
15	G4ARI	446	39	G4KDL	236
16	G4IZZ	414	40	G3GMM	218
17	G4FDC	404	41	G4OOS	210
18	G3MCK	390	42	G4FNC	206
	G3SHY		43	G4RFA	200
20	G4EBK	386	44	G3COJ	176
21	G3CCZ	378	45	G4MUL	166
22	G3GC	356	46	GM4LVW	116
23	G3WRR/P	346	47	G4NSE	108
24	G3ZJK	342	48	G3JRM (G4RLS)	94

Check logs received with thanks from G3VDL and G4HZV.

432/1,296/2,320MHz Contest May 1983 results

This annual multi-band uhf event near the beginning of the portable season continues to be popular with multi-operator stations. Previously it has not attracted much support from single-operator stations, but a good entry was received this year, mainly from stations located at their home addresses. This indicates a general improvement in equipment and expertise of the home operator, particularly on 1,296MHz.

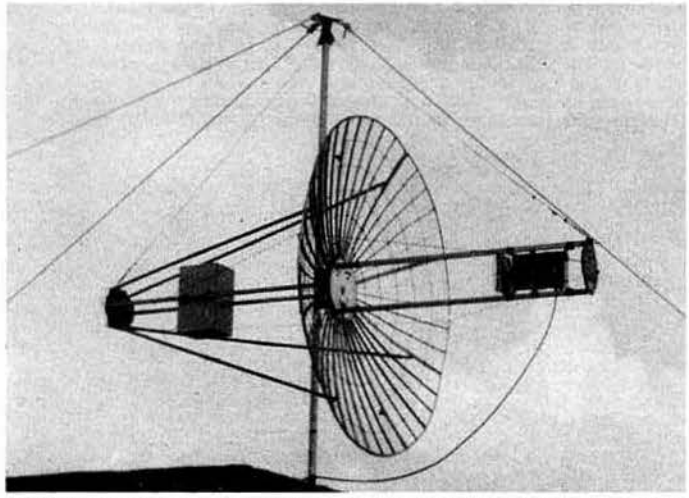
Conditions unfortunately did not match this increased activity, and most found only average propagation. QSB was very deep at times, but one or two short lifts were noted by several stations. This was typical for a weather chart with low pressure nearby and fronts moving through during the contest. Nevertheless, compared with last year greater distances were worked on all three bands. Particularly significant were the efforts of the G3ZIG/P team, who contacted seven Dutch stations on 2,320MHz.

Certificates will be awarded as per rule 9 to the winners and runners-up. A check log for 432MHz was received from G2DHV.

G3VPK

432MHz MULTI-OPERATOR SECTION

Posn	Callsign	Points	QSOs	QTH	RF(dBW)	Ant	Best dx	Km
1	G4LIP/P	3,038	242	AN61	+26	4×21Y	DF3AR	702
2	G4LOJ/P	2,505	193	AM07	+26	27QL	DB2GM/P	733
3	G4JAR/P	2,483	273	ZK05	+26	2×21Y	DC9BU/P	786
4	G4MRS/P	2,385	225	AM67	+26	4×17Y	DK0MB/P	590
5	GW8TFI/P	2,242	233	YL25	+26	4×16Y	DF3EE	689
6	G4SIV	1,057	111	ZM29	+23	4×21Y	DJ9DL	542
7	G3TQF/P	755	103	ZM27	+25	21Y	DF3EE	556
8	G3EFX/P	714	172	ZL26	+23	2×21Y	DF2KB/P	573
9	G8PQG/P	625	141	ZL15	+19	21Y	PA0DEL	426
10	G4DDC/P	601	131	ZL18	+14	2×19Y	PA0VVH	444
11	G3UHF/P	466	106	ZN61	+22	4×23Y	ON1BPU	455
12	G4ERP/P	426	80	YL10	+17	2×19Y	PA0EZ	491
13	G8OHM/P	345	82	YM50	+14	88MB	PE0MAR	420
14	G8SRC/P	198	48	ZL32	—	—	—	—
15	G4RNL/P	194	45	ZN31	+20	21Y	F1EBN/P	596
16	G8BBK/P	145	39	ZM70	+15	21Y	G3PBV	301



South Manchester RC's 1,296MHz 2m diameter dish antenna mounted on top of a wartime pill-box, the only flat surface for miles around! *Photo:* G4ROM

432MHz SINGLE-OPERATOR SECTION

Posn	Callsign	Points	QSOs	QTH	RF(dBW)	Ant	Best dx	Km
1	G8JVM	676	104	ZL31	+21	2×21Y	PA3AOH	576
2	G4NBS	325	82	ZL48	+23	88MB	DK7KB/P	552
3	G3PBV	174	18	YK32	+17	23Y	PE0MAR/P	558
4	G3JXN	160	46	ZL39	+21	21Y	PA0EZ	383
5	G4LRT	75	11	ZM45	+26	2×18Y	DB1BP	565
6	G6GJD	58	8	YN15	+15	2×48MB	G4JAR/P	339
7	G6CSY	56	10	AL51	+9	19Y	GW8TFI/P	326
8	G8DKK	41	13	ZL08	+18	21Y	GW4SSO/P	199

1,296MHz MULTI-OPERATOR SECTION

Posn	Callsign	Points	QSOs	QTH	RF(dBW)	Ant	Best dx	Km
1	G3XDY/P	16,532	79	AM67	+25	4×25QL	DL0HC/P	443
2	G4ANT/P	10,168	45	AM07	+20	4×25QL	DL0HC/P	459
3	G4ALE/P	9,884	59	ZK05	+25	4×23QL	DJ5BV	575
4	GW4BVY/P	8,331	42	YL25	+13	4×23Y	F6CER	536
5	G4LOH/P	6,465	45	ZM27	+25	2m dish	PA0EZ	404
6	G3FVA/P	4,429	38	ZN61	+17	6ft dish	G4ALE/P	255
7	G8DDC/P	4,212	51	ZL18	+14	QL	PE0FRE	347
8	G8SFM/P	1,643	16	ZL32	—	—	—	—
9	G4JWD/P	1,578	25	ZL26	+0	23Y	G3XDY/P	166
10	G8IUY/A	1,425	20	ZL47	+16	23Y	G4ANT/P	222

1,296MHz SINGLE-OPERATOR SECTION

Posn	Callsign	Points	QSOs	QTH	RF(dBW)	Ant	Best dx	Km
1	G3JXN	4,893	55	ZL39	+20	4×23Y	PA0EZ	383
2	G4LRT	1,845	23	ZM45	+15	27Y	GW4BVY/P	162
3	G3GRO	1,808	18	ZL80	+19	4×15/15	G3LRP	291
4	G4NBS	1,390	25·5	ZL48	+2	23Y	GW4BVY/P	177
5	G8DKK	1,270	20	ZL08	+17	25QL	G4ALE/P	114
6	G4PMK	991	16	ZL34	+14	23Y	G3XDY/P	179
7	G3WFM	620	16	ZL30	+15	23Y	G3DAH	99
8	G8SDK	329	5	AM53	+6	21Y	G4LOH/P	98
9	G3PBV	135	2	YK32	+5	15/15	GW4BVY/P	126

South Manchester RC members G4ROM on G3ZDM, waterproofing connectors on the 432MHz antenna, with G8RGZ giving instructions. *Photo:* G4MYB

2,320MHz MULTI-OPERATOR SECTION

Posn	Callsign	Points	QSOs	QTH	RF(dBW)	Ant	Best dx	Km
1	G3ZIG/P	2,433	13	AM07	+7	4ft dish	G4PUB/P	275
2	G4PUB/P	543	4	ZK05	+6	1·5m dish	G3ZIG/P	275
3	G4JDI/P	510	6	ZM27	+15	4ft dish	G3ZIG/P	145
4	G4ARD/P	491	9	ZL18	+12	Parabola	G4FRE	128
5	G4GZI/P	405	5	YM50	+5	4ft dish	G4PUB/P	166
6	G3WCB/P	118	2	ZM45	+3	21QL	G4LRT	80

2,320MHz SINGLE-OPERATOR SECTION

Posn	Callsign	Points	QSOs	QTH	RF(dBW)	Ant	Best dx	Km
1	G4LRT	336	5·5	ZM45	+9	42QL	G3BNL	95
2	G8DKK	104	4 (half QSOs)	ZL08	—	0·8m dish	G4PUB/P	114

OVERALL RESULTS—MULTI-OPERATOR SECTION

Posn	Group	Band position			Points
		432	1,296	2,320	
1	Norfolk VHF/UHF CG	2	2	1	2,440
2	Martlesham RS	4	1	—	1,785
3	Hadrabs & Addiscombe	3	3	2	1,638
4	SB & MH CG	5	4	—	1,242
5	Parallel Lines CG	1	—	—	1,000
6	Leicestershire SHF	7	5	3	850
7	Dunstable Downs RC	10	7	4	500
8	South Manchester RC	11	6	—	421
9	Harrow Reserves	8	9	—	330
10	South Birmingham RS	13	—	5	280
11	Abingdon CC	9	—	—	208
12	Swindon & DARC	14	8	—	164

OVERALL RESULTS—SINGLE-OPERATOR SECTION

Posn	Callsign	Band position			Points
		432	1,296	2,320	
1	G4LRT	5	2	1	1,488
2	G3JXN	4	1	—	1,236
3	G4NBS	2	4	—	765
4	G8DKK	8	5	2	630
5	G3PBV	3	9	—	285

144MHz Fixed Station Contest results—erratum

In the single-operator table on p532 of the June issue, a compilation error occurred between positions 20 to 36 inclusive. Entries listed in positions 20 to 27 should have appeared alongside positions 29 to 36, and entries in positions 28 to 36 should have appeared alongside positions 20 to 28. In addition, G4ATH/A, shown in position 31 in this table, should have been in position 33 in the multi-operator table.

Apologies to all concerned.

G5HD

November 144MHz CW Contest rules

There will be two sections in this event:
Section 1 — 24h; 1400-1400gmt, 5-6 November 1983
Section 2—6h; 0800-1400gmt 6 November 1983

This contest is timed to coincide with the Marconi Memorial CW Contest. Those wishing their logs to be passed on for this contest should enter distances in kilometres in addition to radial ring scoring.

The following general rules, published in the January 1983 issue of *Radio Communication*, will apply: 1, 2, 3, 4d, 5a, 6b, 7a, 9, 10a, 11a, 12b, 13-26. All entries and check logs to: VHF Contests Committee, c/o G.M.C. Stone, 63FZL, 11 Liphook Crescent, Forest Hill, London SE23 3BN.

ROPOCO 2 1983 rules

1. The general rules for RSGB hf contests, published in the January 1983 issue of *Radio Communication*, will apply.
2. **Eligible entrants.** All paid-up members of the RSGB resident in the British Isles holding a Class A licence. Single-operator entries only.
3. **When.** 0800 to 1000gmt, Sunday 28 August 1983.
4. **Contacts.** CW in the 3·5MHz band only. Entrants are requested to confine their operations to 3,520-3,570kHz. Send RST plus—for the first contact, entrant's own postal code; for the second and subsequent contacts, the postal code received in the previous contact. Contacts with European stations will not count for points.
5. **Scoring.** 10 points per contact.
6. **Entries.** Logs must be sent to D. J. Lawley, G4BUO, 220 Shipbourne Road, Tonbridge, Kent TN10 3EL, postmarked not later than Monday 12 September 1983.
7. **Awards.** Certificates will be awarded to the first, second and third placed entrants.

DF Qualifying Event Slade

Date: 21 August 1983
Map: OS Sheet 139 1:50,000 series Birmingham
Assembly: 1300bst for start at 1320bst
Location: Car park at Beacon Hill, ngr986 759.

Competitors requiring tea should notify Mr J. Drakeley, 186 Conway Road, Fordbridge, Birmingham B37 5LD, tel 021-770 3474, not later than 11 August 1983.

Cray Valley RS 13th SWL Contest rules

1. 1800gmt, 10 September to 1800gmt, 11 September 1983. Up to 18h logging may be done during this period, and a continuous rest period must be clearly shown. Multi-operator stations may log during the entire contest.
2. The contest is open to anyone in the world and there will be two sections (phone and cw), each with two categories (single-operator and multi-operator). The second category is open to two or more listeners or to clubs, and more than one receiver can be used.
3. The 1·8, 3·5, 7, 14, 21 and 28MHz bands may be used.
4. The practice of logging a series of contacts made by one station is deprecated. Log entries must not include the same callsign in the station worked column more than five times on each band.
5. Scores should be compiled as follows: one point for each station heard multiplied by the number of different countries heard on each band. A list of countries heard must be furnished and a separate log must be submitted for each band. Illegible logs will not be accepted.
6. The call areas of the USA, Canada and Australia will each count as a separate country ie, W1-0, VO1, VO2, VE1-8, VY1 and VK1-8. All other countries will be determined by the official RSGB/ARRL Countries List.
7. No CQ, QRZ or similar call will be allowed to count for points.
8. Log sheets are available from Owen Cross, G4DFI, 28 Garden Avenue, Bexleyheath, Kent DA7 4LF, who must be sent a large sae. It is desirable that entrants use official log sheets but entries on home-made log sheets will be accepted if the following information is given: date; time; band station heard; station being worked; report at swl's QTH. Points may be claimed only for stations actually heard and the callsign must be shown in full.

If points are claimed for both sides of a QSO, the callsign of each must appear in the station heard column.

9. Entries should be sent to the contest manager, G4DFI, at the above address, to arrive not later than 31 October 1983.
10. Certificates of merit will be awarded at the discretion of the board of the Cray Valley RS, and its decision will be final.

BARTG Spring Contest 1983 results

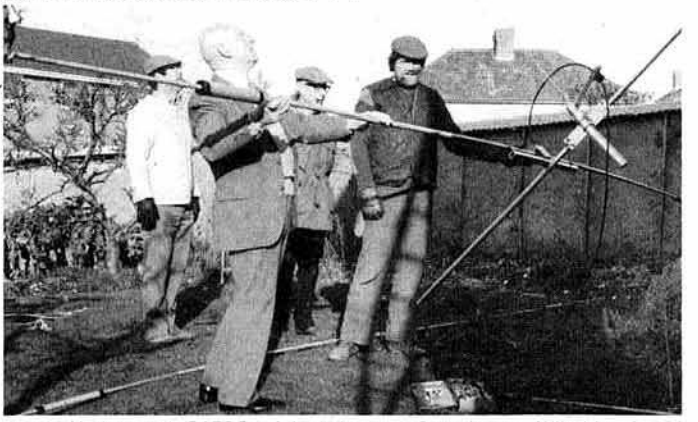
The following G stations were listed among the 103 entrants in the single-operator section: 11, GI4AHP; 19, GM3ZXL; 31, GW3EHN; 33, G4NYO; 71, G4MKO; 73, G4NJW; and 90, G3RDG. In the multi-operator section: 3, G3ZRS; 5, GW4RDO; 7, G4ALE; and 13, G4LLR/A. BRS31976 was ninth in the swl section.

A total of 144 logs was received, and 18 new Quarter Century Awards issued as a result of the contest. During the contest, rtty activity took place in the following countries: Alaska, Argentina, Austria, Australia, Barbados, Belgium, Brazil, Bulgaria, Canary Islands, Canada, Chile, Costa Rica, Colombia, Czechoslovakia, Denmark, Dominican Republic, Eire, England, Finland, France, French Guyana, German Democratic Republic, German Federal Republic, Greece, Greenland, Guernsey, Hawaii, Hungary, Indonesia, Israel, Italy, Japan, Kenya, Kuwait, Lebanon, Leichtenstein, Luxembourg, Macau, Malaysia, Martinique, Mauritania, Mexico, Monaco, Morocco, Namibia, Northern Ireland, The Netherlands, New Caledonia, New Zealand, Norway, Philippines, Puerto Rico, Romania, Sardinia, Saudi Arabia, Scotland, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Togo Republic, United States of America, USSR, Ukraine, United Nations (Geneva), Upper Volta Republic, Vanuatu, Venezuela, Wales, Yugoslavia and Zimbabwe.

Contests Calendar

6-7 August	YO DX *(Rules in July* MOTA)
13 August	European dx (CW) *(Rules in August* MOTA)
13-14 August	SEANET (Phone) *(Rules in July* MOTA)
14 August	70MHz Trophy & SWL *(Rules in June issue)*
21 August	DF Qualifying Event Slade *(Details in August issue)*
27-28 August	24th All Asian (CW) *(Rules in June* MOTA)
29 August	ROPOCO 2 *(Rules in August issue)*
3-4 September	144MHz Trophy & SWL (IARU) *(Rules in June and July issues)*
3-4 September	SSB Field Day *(Rules in May issue)*
4 September	LZDX *(Rules in August* MOTA)
10-11 September	Cray Valley RS 13th SWL *(Rules in August issue)*
10-11 September	European dx (Phone) *(Rules in August* MOTA)
11-12 September	International ATV *(Rules in May issue)*
18 September	DF National Final South Manchester
October/ November	432MHz Cumulative *(Rules in July issue)*
1-2 October	432-24GHz & SWL (IARU) *(Rules in June and July issues)*
9 October	21-28MHz Phone *(Rules in May issue)*
16 October	21MHz CW *(Rules in May issue)*
16 October	1,296MHz Cumulative *(Rules in July issue)*
5-6 November	144MHz CW *(Rules in August issue)*
6 November	LF CW *(Rules in April issue)*
12-13 November	Esperanto (ILERA) *(Rules from G4MR QTHR)*
12-13 November	Second 1·8MHz
12-13 November	European dx (RTTY) *(Rules in August* MOTA)
4 December	144MHz Fixed

ANTENNA ANTICS . . .



Austin Underwood, G3ESO, of Amesbury, nr Stonehenge, Wiltshire, found getting a Mustang three-element beam into the rotating position on the wall-mounted mast at the gable-end of his house was no ordinary task. Other members of Salisbury R&ES came to help as seen above, l to r: Jim, G4NLT; Bert, G2FIX (club sec); Peter, G3FGR; and Gary, G6NWE.

The plan of campaign having been decided, up went mountaineer G4NLT to the ridge with G6NWE on the ladder. The main problem was getting round the six-wire barrage of 415V three-phase, plus street-lighting. Altogether, no less than 18 wires cross his garden! Added to these, at right-angles to the 18, are a trapped wire five-band dipole (far left), an inverted V for 3·5MHz (second left) and 12 nylon guy ropes. A 144MHz 10-element parabeam is on the other gable end (right).

As well as swinging over the power lines, the three-element beam goes within 4in of the tv beam shown near the parabeam (and not a trace of tvi when operating!), when it is beaming east! *Photos:* G3ESO

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 in the **January 1984** 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 **17 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 W. R. Parkinson, G3FNM, 141 Norris Road, Sale, Cheshire M33 3JR. Tel 061 973 1472.

Accrington (NW Repeater Group)—18 August, 8pm. Globe Bowling Club, Willows Lane, Accrington. Sec Howard Aspinall, G3RXH.

Ainsdale (AARC)—2, 16 and 30 August, alternate Tuesdays (Noggin and natter), 8pm. Ainsdale Scout HQ. Details from sec John Wollaston, G6JOE, tel 0704 27219.

Blackburn (East Lancs ARC)—6 September (Surplus equipment sale), 7.30pm. Shadsworth Leisure Centre, Blackburn. Pro Graham Pountain, G4MWY, tel 0254 678933.

Bury (BRS)—9 August (Fox hunt), 2, 16, 23 and 30 August (Informal). Details from sec Brian Tyldsley, G4TBT, 4 Colne Road, Burnley, tel 0282 24254, or pro Malcolm Pritchard, G3VNQ, tel 0706 355922.

Leyland (LHRG)—8 August, 7.30pm. Astley Park Sports Club, Hallgate, Astley Village, Chorley. Sec Arthur Jolly, G4JCO.

Liverpool (L&DARS)—2 August (Natter night), 9 August ("Talk on df", by Bill MacKune, G8CFM), 16 August (Fox hunt), 23 August (Junk sale), 30 August (Isle of Man—preparation night), 8.15pm. The club has moved to temporary premises at the Childwall Community Centre, Hartsbourne Avenue, Childwall, Liverpool. Sec Gordon Purslow, G6MHG, tel 051-263 5837.

Preston (PARS)—11 August (Fox hunt), 18 August (Preparations for annual rally), 25 August (Fox hunt), 1 September (Preparations for SSB Field Day). Lonsdale Club, Fulwood Hall Lane, Fullwood, Preston. Contact George Earnshaw, G3ZXC, tel 0772 718175.

Warrington (UK FM Group Western)—4 August, 1 September. Grappenhall Community Centre, Bellhouse Lane, Warrington. Sec Gordon Adams, G3LEQ, tel 0565 4040.

Wirral (WARS)—3 August (No meeting), 17 August (Pre-SSB Field Day planning meeting), 7 September (Safety in the shack), 7.45pm. Minto House School, Birkenhead Road, Meols, Birkenhead. Sec Cedric Cawthorne, G4KFY, tel 051-625 7311.

Wirral (W&DARS)—10 August (Junk sale), 24 August ("Computers and amateur radio", by Paul, G4DLY, and Neil, G4AOR), 8pm. Irby Cricket Club, Irby Mill Road, Irby. Sec Gerry Scott, G8TRY, tel 051-630 1393.

REGION 2—RR D. S. Smith, G4DAX, Red Roof, Goathland, Whitby, North Yorks YO22 5AN. Tel 094-786 333.

Barnsley UK FM Group Northern—7 August, 7.30pm. The Royal Hotel, Church Street, Barnsley.

Halifax (H&DARS)—First and third Tuesdays in each month, 16 August (UK FM Group Northern, G4EZV), 7.30pm. Note a new venue and, according to the sec, a better pint). The Running Man, Pellon Lane, Halifax. Sec G4LEC, tel 0422 33080.

Halifax (Northern Heights ARS)—First and third Wednesday in each month, 10 August (Home wine making), 24 August (Visit to Radio Aire), 7 September (Visit by Lowe Electronics), 8pm. Bradshaw Tavern, Bradshaw, Halifax. Sec G6CJL. Tel Bradford 834442. Club net frequency is 145·275MHz.

Harrogate Repeater Group—By the time you read this the equipment should be at the site and may even be operational. Chairman G4ATZ.

Pontefract (P&DARS)—Thursdays, 11 August (DF hunt with Wakefield), 25 August ("Moding equipment for amateur use", by G3PTD), 8pm. The Carlton Community Centre, Pontefract. Sec G6PEX.

York (YARS)—Fridays, 7.30pm. United Services Club, Micklegate, York. Sec Keith Cass, G3WVO. The club will be running GB2TS at the Tollerton Show on 13 August, for which preparations are well advanced.

REGION 3—RR L. W. Craven, G4EQI, Grass Moor, Radford Road, Alvechurch, Birmingham B48 7DT. Tel 021-445 1347.

Atherstone (AARC)—11 August (Night on the air), 18 August (RSGB film), 7.30pm. Tudor Centre, Coleshill Road, Atherstone. Sec G6IQM, tel Fillongley (0676) 40946.

Birmingham (MARS)—16 August (Discussion evening), 7.30pm. 294a Broad Street, Birmingham B1. Sec G8BHE, tel 021-770 3474.

Birmingham (South Birmingham RC)—3 August (Natter night), 7.45pm. Hampstead House, Fairfax Road, West Heath, Birmingham B31. Sec G8RGQ, tel 021-459 8312.

Bromsgrove (B&DARC)—12 August ("Kidderminster repeater, GB2KR", by Paul Dowie, G8PZT), 8pm. Avoncroft Art Centre, Bromsgrove. Sec G4NWQ, tel 021-476 6965.

Coventry (CTARS)—1 August (Golf night), 8 August (Visit with Raynet), 15 August (Portable radio night), 7pm. Winfray Annexe, Coventry Technical College. 27, 28, 29 August (Amateur radio display, Town & Country Festival, Stoneleigh, Nr Kenilworth). Sec G8MFP, tel Coventry (0203) 542877.

Halesowen (MEB Sports & Social Club—Radio Section)—9 August ("HF aerials", by Peter Green), 23 August (General meeting), 8pm. MEBH/Q Social Club, Mucklow Hill, Halesowen. Sec G4RWH, tel 021-747 8784.

Hereford (HARS)—5 August (Club meeting). Lord Scudamore School, Friar Street. 19 August (Informal meeting). Antelope Inn, Barton Road, Hereford. Sec G4CNY, tel Hereford (0432) 273237.

Solihull (SARS)—16 August ("DF techniques", by G8AVX), 7.30pm. The Manor House, High Street, Solihull. Sec G4NRR, tel 021-707 3684.

Warwick (Mid-Warwickshire ARS)—2 August (Members' equipment demonstration), 16 August (Planning meeting for Town & Country Festival, Stoneleigh), 8pm. 61 Emscote Road, Warwick. Sec Carol, G6LKP, tel Southam (092681) 4765.

Worcester (W&DAC)—1 August ("Is your rig up to spec?" a test on rigs brought along), 8pm. Oddfellows Club, New Street. 15 August (Informal meeting), 8pm. Old Pheasant, New Street, Worcester. Sec G4NRD, tel Evesham (0386) 41508.

REGION 4—RR M. Shardlow, G3SZJ, 19 Portreath Drive, Darley Abbey, Derby DE3 2BJ. Tel Derby (0332) 556875.

Buxton (BARS)—9 August ("Amateur radio experiences", a talk by G5CP), 8pm. Egerton Hotel, 36 St Johns Road, Buxton. Sec Derek Carson, G4IHO, tel Buxton 5006.

Derby (D&DARS)—3 August (Bring & buy), 10 August (Rally preparation at Lower Bemrose School), 14 August (Rally), 17 August (Operating techniques and procedures, a talk by Tom Douglas, G3BA), 24 August ("All you ever wanted to know about radio but were afraid to ask!"—a technical forum), 31 August ("Computers and amateur radio", by G3VGW), 7 September (Junk sale), 7.30pm. 119 Green Lane, Derby. Sec Jenny Shardlow, G4EYM, tel Derby 556875.

Grantham (GRC)—16 August (RSGB tape slide lecture), 8pm. Shirley Croft Hotel, Harrowby Road, Grantham. Sec John Kirton, G8WWJ, tel Grantham 5743.

Grimsby (GARS)—11 August (RTTY demonstration) 25 August (Natter night), 7.30pm. Cromwell Social Club, Cromwell Road, Grimsby. Sec Reg Scarlett, G4HZF.

Ibstock (IARS)—2 August (General knowledge quiz night), 9 August (DF hunt), 16 August (Natter night), 23 August (Talk), 30 August (Outside supper), 7.30pm. Hastings Arms, Ibstock. Sec Ted Bowen, G4JKQ, tel Ibstock 60396.

Lincoln (LSWC)—10 August (Night on the air), 24 August (Night on the air), 8pm. City Engineers Club, Waterside South, Lincoln. Sec Pam Rose, G4STO, tel Gainsborough 788356.

Newark (N&DARS)—4 August (Activity night), September (Social evening), 7.30pm. Palace Theatre, Appleton Gate, Newark. Sec Roger Hiscock, G4MDV.

Stamford (S&DARS)—Meet at the Anchor Hotel. Information from sec David Bradberry, G4OZM (QTHR as G6HAV).

Wigston (WRC)—Has a new sec, Roy Tabberer, G6HAJ, tel Leicester 403107.

REGION 5—RR J. S. Allen G3DOT, 77 Rosslyn Crescent, Luton LU3 2AT, Beds. Tel 0582 508515 or at work 0582 21151, ext 200.

Cambridge (C&DARC)—Coleridge Community College closed during the month of August, but the following outside events have been planned: 7 August (Dress rehearsal for contest), 14 August (2m radio foxhunt), 19 August (Visit planned), 26 August (External social event). Sec Dave Leary, G8JKV, tel Swavesey 31120.

Capt "Steve" Stevenson, G3CLJ, receiving a pack of his favourite brew from Peter Cabbon, G4OST (r) on retiring as chairman of Chesham & DARS. ***Photo:*** **G6LKS**

Members of West Kent ARS at their agm in Tunbridge Wells. *Photo:* A Nevison, G4OSH

Cambridge (CUWS)—No meetings during the month of August. Sec T. J. Gleeson, G8TUG.
Dunstable Downs (DDARC)—12 August (Junk sale), 26 August ("Spark transmission", by G3WLM), 8pm. Chews House, Dunstable High Street. Chairman Clive, G4ENB, sec G8XTW.
Luton (Kent Process Controls ARC)—First Tuesday in each month. KPC Club House, Tenby Drive, Luton. Only open to employees of Brown Boveri or Brown Boveri Kent. Sec G3DOT.
Leighton Linslade (LLRC)—1 August (Usual meeting in the Vandyke Community College), 7 August (Visit to Woburn Rally), 14 August (70MHz contest, a joint venture with the Addiscombe club), 15 August (Meeting), 28 August (DF hunt No 9 and the last of the season), 7-10pm. Vandyke Community College, Leighton Buzzard. Sec Pete Brazier, G6JFN, tel Heath & Reach 270.
Peterborough (GPARC)—Southfields Junior School closed during August, but no doubt local social activities have been organized. Sec Frank Brisley, G4NRJ.
Shefford (S&DARS)—Club closed during the month of August. Sec Alan, G4PSO.
Wellingborough (Nene Valley RC)—3 August (Videos from CEGB: "Opportunity at Sizewell", "The Electric Wave" and "Safe Journey"), 7 August (Club visit to Woburn Rally), 10 August (Natter night and hf transmitting with the club call G4NWZ), 14 August (Club visit to Derby Rally), 17 August (Lecture by G3NVK on "Resonating aerials"), 24 August (Lecture by Dr J. Graham of CEGB on "Alternative power"), 31 August (Natter night and hf transmitting), 8pm. Dolben Arms, Finedon. Sec Lionel Parker, G4PLJ, tel Wellingborough 79539.

Club secretaries: I have had to bring the "deadline" in by a few days this month, due to a business trip abroad, so apologies to any club left out. If you have any "stop press' items, please make use of the RSGB's news headline and news on Sunday mornings. *G3DOT.*

REGION 6—RR F. S. G. Rose, G2DRT, 84 Cock Lane, High Wycombe, Bucks HA3 7EA. Tel Penn (049481) 4240.

Aylesbury (AVRS)—9 August ("Intruder watch", by Stan Cook, G5XB), 8pm. Stone Village Hall, Stone, nr Aylesbury. Details from sec Cathy Clark, tel 0844 61461.
Halton (RAF Halton AR&EC)—For details of meetings contact Sqn Ldr Tong-Gilchrist, G8BVJ, Airframe Training Squadron, ext 440 (Halton).
Harwell (HARS)—16 August (Opportunity to discuss technical problems), 7.30pm. Social Club, AERE. Contact Cliff Sharpe, G2HIF, tel Wantage 3497.
Milton Keynes (MK&DRS)—No meeting in August. Second Monday in each month, 8pm. For details contact Roger Date, RS48849, tel Bedford 711950.
Newbury (N&DARS)—No meeting in August. Note new sec, Mike Fereday, G3VOW, tel Newbury 43048.
Oxford (RAFARS)—21 September, 7.30pm. Civil Service Social Club, Marston Road, Oxford. Details from Eric Palmer, G3FVC, area rep.
Slough (Burnham Beeches RC)—First and third Mondays in each month, 1 August (A talk by G2FKZ on hf propagation predictions), 8pm. St John Ambulance HQ, Burlington Avenue, Slough. Sec Tony Alderman, G4LQD, tel 02814 3286.

REGION 7—RR to be appointed

Ashford (Echelford ARS)—25 August (Natter night), 12 September ("Meteor scatter and sporadic-E", by J. R. Matthews, G3WZT), 7.30 for 8pm. The Hall, St Martins Court, Kingston Crescent, Ashford, Middx. Club nets Sundays, 10am, 1·93MHz plus or minus QRM, Wednesdays 8-9pm, 144·575MHz fm. Sec Alf Othen, G8FSZ, tel Byfleet 48307.
Crystal Palace (CP&DRC)—20 August (A talk on a large professional communications system—subject to confirmation), 8pm. All Saints Parish Church Rooms, Beulah Hill. Sec G. M. C. Stone, G3FZL, tel 01-699 6940.
Wimbledon (W&DRS)—12 August, 26 August (Natter night), 8pm. St John Ambulance HQ, 124 Kingston Road, SW20. Sec G. Mellett, G4MVS.

REGION 9—RR W. J. Colclough, G3XC, Highview, Indian Queens, Cornwall TR9 6LL. Tel 0272 860485.

Camborne (CRAC)—4 August ("The potential of cb", by John Pover), 1 September ("Propagation", by David Blackford, G3NPB). Computer section: 15 August ("Printers", by Des Old, G3CZZ), 19 September ("Basic routines", by Bert Hammett, G3VWK), 7.30pm. Until further notice contact G3PEM, tel Penzance 3948, for location of club meetings.
Exeter (EARS)—8 August (Construction evening), 7.30pm. Community Centre, St David Hill, Exeter. First and third Mondays (Informal). Scout Hall, Emmanuel Road. Pro Andy Lake, G8YOA, tel Exeter 39597.
Exmoor (ERC)—Thursdays, 8pm. Loughrigg, East Street, South Molton, Devon. This season the club has entered two vhf contests, one was a battle against the elements in more ways than one! However it would appear it all ended on the brighter side. Homebrew is on the up-and-up with a club QRP all band transceiver. A fox hunt has been planned, date not available, and more contests are scheduled. Sec Peter Dixon, G4JBR, tel 07695 2738.
North Cornwall (NCRC)—First Wednesday in each month, 7.30pm. Warmington House, Camelford, north Cornwall. New details from agm: Chairman, G3LOV; vice-chairman, G4LXS; treasurer, G6LJQ; sec, G6JUN; pro, G8ZOK. After the agm the county controller for Raynet, G3XC, assisted by the group controller for the adjoining district, G3YJX, introduced Raynet to the club members. It is hoped to reactivate the North Cornwall Group in the future. Plans were made for the club to enter a contest, and for outdoor activity during the summer time. The morse classes, which have already started, will continue. Contact sec J. Finch, G6JUN, tel Camelford 213380.
Torbay (TARS)—Fridays, 7.30pm. Last Saturday in each month (Special meeting), 7.30pm. Bath Lane, rear of 94 Belgrave Road, Torquay. At the agm such confidence was expressed in the present officers and committee members that they were re-elected *en bloc*, and voting was unanimous. Les Mays, G2CWR, has resigned as AR. Thanks are due to Les for his work on behalf of the Society. Details of the club from Les Mays, G2CWR, tel 0803 558714.

REGION 10—RR to be appointed

Cardiff (CRSGBG)—8 August ("Second thoughts on anything"), 7.30pm. Pantmawr Hotel, Tyla Teg, Pantmawr Estate, Whitchurch, Cardiff. Sec Cyril Laws, tel Cowbridge 3212.
Swansea (SARS)—4, 18 August, 1 September (Preparations for HF SSB Field Day), 7.30pm. Lecture Room N, Fourth Floor, Applied Science Building, Swansea University. Details from sec GW4HSH, tel Swansea 404422.

REGION 11—RR B. H. Green, GW2FLZ, 1 Clwyd Court, Tan-y-Bryn Road, Colwyn Bay, Clwyd LL28 4AH. Tel 0492 49288.

Anglesey (ARG)—9, 23 August, 7pm. Primary School, Benllech, Anglesey. Sec Mr C. Williams, GW6DOK, tel Gaerwen 603.
Colwyn Bay (Conwy Valley ARC) (GW6TM)—No meeting for August. Please note new treasurer, Merfyn Jones, GW4NNL, tel 0492 30725. Previous treasurer retired due to ill health, the club thanks him for his past services. Sec Mr J. N. Wright, GW4KGI, 46 The Dale, Woodlands, Abergele, Clwyd LL28 4AH, tel 0745 823674.
Rhyl (R&DARC)—11 August (Activity night), 25 August (RTTY demonstration), 7.30pm. 1st Rhyl Scouts HQ, Tynewydd Road, Rhyl. Sec Mr B. Jones, 6 Rhodfa Maes Hir, Rhyl, Clwyd, tel 0745 37284.
Wrexham (WARS)—Wednesdays, twice monthly. Friends Meeting House, Holt Road, Wrexham. Contact Mr Peter Higgs, GW4IGF, tel Rossett 570212. Sec Mr N. Woods, GW4OXG, tel Wrexham 265325.

REGION 12—RR M. R. Hobson, GM8KPH, 4B Tummel Crescent, Pitlochry, Perthshire PH16 5DF. Tel 0796 2140.

Aberdeen (AARS)—Fridays, 8pm. 35 Thistle Lane. Please note secretary's new address: Don Travis, "Gorsedd", Kirkton, Chapel of Garroch,

GM4LVW demonstrating the use of the Apple 2 computer for rtty to GM4CUB and CM3THI at a recent exhibition held by the Ayr ARG. *Photo:* GM4PPT

near Inverarie, Aberdeenshire AB6 9HE, tel Pitcaple 251.

Elgin (Moray Firth ARS)—Wednesdays, 7.30pm. Club room, Moray College of Further Education, Elgin. Following recent agm president now Sim Barron, GM3SIM, sec Stan Bennie, GM4PTQ, treasurer, GM8RMR.

Invergordon (Easter Ross ARC)—Fridays, 7.30pm. The Community Room, South Lodge School, Invergordon. RAE and morse class available. Details from George, GM4DKL, tel 086284 2556.

Perth (P&DARG)—Tuesdays, 8pm. Perth City Sports & Social Club, Leonard Street. 25 & 26 August (The club will be running hf and vhf stations at the Boys Brigade Centenary Camp, Scone Palace. Visitors welcome.) Further details from Ron, GM4DQJ, tel 0738 52477.

Robin Powell, G3OGP, displaying the Meader Trophy awarded at the TVARTS agm. *Photo:* Victor Brand, G3JNB

REGION 16—RR T. D. Howe, G3PLF, 18 Vange Hill Drive, Basildon, Essex SS16 4DD. Tel 0268-24453.

Braintree (B&DARS)—1 August ("Operating practices and procedures", by G3YXJ), 15 August ("A history of teleprinting", by G3PED), 7.45pm. Braintree Community Centre, Victoria Street. Details from Jeff Roberts, G6OIX, tel Braintree 44857.

Chelmsford (CARS)—2 August (Slow scan tv), 7.30pm. Marconi College, Arbour Lane. Details from Andrew Mead, G4KQE, tel Silver End 83094.

Ipswich (IRC)—10 August (Planning for Ipswich Carnival), 13 August (Demonstration station at Ipswich Carnival, Christchurch Park), 24 August (Planning for Wheels '83), 28-29 August (Demonstration station at Wheels '83, Christchurch Park), 8pm. Club Room, Rose & Crown, Norwich Road. Details from Jack Tootill, G4IFF, tel Ipswich 44047.

Loughton (L&DARS)—5 August (VHF df test), 19 August (At the Wheatsheaf), 8pm. Loughton Hall, Rectory Lane. Details from Clive Knowles, G6FWT.

Norwich (Norfolk ARC)—3 August (Short meeting), 10 August ("Early days in radio", by G2FLC), 17 August ("Computers with display", by G6LUN), 24 August (Short meeting), 31 August (Short meeting), 7.45pm. Crome Centre, Telegraph Lane East. Details from Peter Forster, G3VWQ, tel Norwich 37709.

Vange ARS presenting a cheque for £332.06 to the RAIBC. The money came from the proceeds of the 1982 Vange Mobile Rally. L to r: Alan, G4OJH, chairman of Vange ARS; John, G3KYH, treasurer of RAIBC; and Albert, G4FMK, who has organized the rally for the past three years

Guernsey's four youngest radio amateurs, who together succeeded in making 788 scoring contacts with USA and Canadian stations during the ARRL DX Phone Contest in March. L to r: Tim Hodkinson, GU6JSC, (aged 14); Andrew Hamon, GU6TFE (14); Martin Van Grieken, GU6RIS (15); and Chris Winslow, GU6YK (16). *Photo:* Richard Allisette, GU4CHY

Stowmarket (S&DARS)—1 August ("Theory of fox hunting", by G4FAW), 7 August (Trip to Woburn Rally), 15 August (S&DARS fox hunt), 7.30pm. Red Cross Hut, Station Yard. Details from Martin Goodrum, G3ZQU, tel Stowmarket 676288.

Vange (VARS)—4 August (Junk sale), 11 August (Talk on preparation for the rally), 18 August ("Central heating", C. Alefs), 25 August (Talk by G3PLB), 7.30pm. Main Hall, Barstable Tenants Community Association, Long Riding, Basildon. Details from Mrs D. Thompson, 10 Feering Row, Basildon SS14 1TE.

REGION 17—RR H. G. Cunningham, G8FG, 235 Station Road, West Moors, Wimborne, Dorset BH22 0HZ. Tel Ferndown (0202) 876018.

Andover (ARAC)—2 August (Junk sale), 17 August (Natter night), 8pm. Wolversdene Club. Sec G4OZL.

Bournemouth (BRS)—First and third Friday in each month, 5 August (Talk by John Nelson, G4FRX, from RSGB HQ), 7.30pm. Kinson Community Centre, Kinson, Bournemouth. Sec G4EKE, tel Ferndown (0202) 877945.

Fareham (F&DARS)—Wednesdays, 3 August (Portable planning), 7.30pm. Portchester Community Centre, Portchester. Sec G4ITG, tel Fareham (0329) 234139.

Farnborough (F&DRS)—10 August ("Basic computers", by G6HIT), 24 August ("VHF propagation", by G3LTP), 7.30pm. Railway Enthusiasts Club, Access Road, off Hawley Lane, Farnborough. Sec G4BJQ, tel (0252) 543036.

Weymouth (SDRS)—2 August (Satellite tv), 7.30pm. Army Bridging Camp, Wyke Regis, Weymouth. Sec G3ZGP, tel Weymouth (0305) 912893.

Wimborne (FRARS)—7 August ("Colour tv decoding", by G8YCA), 14 August ("Nick's rambles", by G8MCQ), 21 August ("Hamfest 83", a new rally in the south), 28 August ("Video recording", by G8YCA), 7.30pm. Flight Refuelling Social Club, Merley, Wimborne. Sec G8VFY, tel Wimborne (0202) 882271.

REGION 19—RR R.J.C. Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ. Tel 01-989 6741.

Cheshunt (C&DARC)—3 August (2m portable on Baas Hill Common), 10 August (Natter night), 17 August (Equipment evening), 24 August (Another natter night), 31 August (Junk sale), 8.15pm. The Church Room, Church Lane, Wormley, nr Cheshunt, Herts. Details from Roger Frisby, G4OAA, tel 09924 64795.

Chiswick (ABCARC)—16 August ("The variable hf frame aerial", by G3OJX), Committee Room, Chiswick Town Hall, High Road, London W4. Sec W. G. Dyer, G3GEH, tel 01-992 3778.

Ealing (E&DARS)—Tuesdays, 8pm. Hanwell Community Centre, Room 5, First Floor, Westcott Crescent, Hanwell W7. Information on the new club premises (temporary) from B. Greenaway, G3THQ, tel 01-450 8259.

Edgware (E&DRS)—25 August (SSB Field Day briefing). The Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. Details from sec Howard Drury, G4HMD, tel Northwood 22776, during reasonable hours.

Havering (H&DARC)—3 August (Informal), 10 August (Talk on servos, by G8ZKZ), 17 August (Informal), 24 August (Pre-contest briefing for 2m), 31 August (Informal), 8pm. Fairkytes Art Centre, Billet Lane, Hornchurch, Essex. Details from A. Negus, G8DQJ, tel Upminster 24059.

Ilford (IGRSGB)—4 August (Comparison of modern recording techniques), 11 August (Natter night), 18 August (Bring a rig night, or is my rig on frequency?), 25 August (Talk on simple frequency calibration), 7.30pm. 50 Mortlake Road, Ilford, Essex. Sec G. Skeat, tel 01-590 3193. Chairman J. Hooper, G3PCA, tel 01-478 3741. All are welcome to attend this venue but please telephone first if you are a new member.

London (Civil Service ARS)—Hold their meetings mainly during the lunch hour at The Civil Service Rec Centre, Monck Street, Millbank SW1. No meetings in August. 5 September (Lunch time natter, with possibility of a lecture), 19 September

Two's company

A new husband and wife amateur radio team was formed recently when Mari Dixon received her callsign GM4SSI, following 12 years of persuasion by husband, Bob, GM3ZDH. The couple are well known in Scottish amateur circles, Bob having been based at the coast radio stations at Wick and Oban, and now operating from Glasgow. Bob, much to his pleasure, suddenly finds that the antenna system which was "good enough" for him suddenly isn't good enough for Mari! *Photo:* Ronnie Cowan, GM4SRL

("An illustrated look at Gough Island", by G3HPM). Details from G. Costin, G4GFU, tel 01-632 6444, daytime.

Southgate (SARC)—11 August (An open meeting, all are welcome), 8pm. St Thomas's Church Hall, Prince George Avenue, London N14. Pro John Fitch, G8EWG.

Stevenage (S&DARS)—2 August (Visit to Woolmer Green satellite tv reception demo), 9 August (DF hunt), 16 August (Constructors' evening), 21 August (Club picnic at Hampson Park), 8pm. TS Andromeda, Fairlands Valley Road, Shephall View, Stevenage, Herts. Morse classes at 7.15pm. Pro Trevor Tugwell, G8KMV; sec G4BGP, tel Baldock 893736.

Members' Adverts

CONDITIONS OF ACCEPTANCE

These subsidized flat-rate advertisements are accepted as a service to members of the RSGB only. They must be submitted on the Members' Ad form printed on the back of a *recent* address label carrier used to mail *Rad Com* to the advertiser: this will automatically provide proof of membership and should not be more than two months old. No acknowledgement of receipt will be sent, and advertisements not clearly worded or punctuated, or which do not comply with the conditions of acceptance, will be returned. No correspondence concerning this service will be entered into.

Trade or business advertisements, even from members, will not be accepted for "Members' Ads" but should be submitted as classified or display advertisements in the usual way. Traders who are members must enclose a signed declaration that the items for sale or wanted are part of, or intended for, their own personal amateur station.

The RSGB reserves the right to refuse advertisements, and accepts no responsibility for errors or omissions, or for the quality of goods offered for sale. Advertisements for citizens band equipment will not be accepted.

Warning. Members are advised that they should, as far as possible, ensure that the equipment they intend to purchase is not subject to a current hire purchase agreement. The "purchase" of goods legally owned by a finance company could result in the "purchaser" losing both the goods and the cash paid.

The current rate is £1 for 40 words or less: advertisements containing more than 40 words will cost an additional £1 for every additional 40 or less words. Each advertisement must be accompanied by the correct remittance, either as a cheque or postal order made payable to Radio Society of Great Britain.

Closing dates in 1983 for issues in brackets, are **24 August** (October); **22 September** (November); **20 October** (December); **17 November** (January); **15 December** (February).

Post to: MEMBERS' ADS, RSGB, 88 BROOMFIELD ROAD, CHELMSFORD, ESSEX CM1 1SS
Do not post to RSGB HQ or Advertising officer.

FOR SALE

Collins tx/rx, vgc, FC702 atu. *Wanted:* Drake atu MN2000. Any Collins radio, must be good cond. Collins linear amp. Tel Derby 557705.

MMT 432/144R 2m-70cm transverter, £110. G4SYK, QTHR. Tel 0992 468052, after 6pm, before 9.30pm, or weekends until 9.30pm.

Icom 710, as new, power supply, mic, £600. G6RDP, 66 Honeysuckle Road, Bassett, Southampton, Hants.

FT902DM, mint, used very little, orig packing, prefer buyer inspects/collects, £725. G4FXS, QTHR. Tel 021-458 3537.

Uncompleted 200W a.m. tx, QY3/125 final, would make good linear, heavy power pack, two Mullard design valve amps, anything else I can clear for space, first offer, £50. Transport locally or by arrangement. G3EFK. Tel Downland 51212.

Valves, klystrons, ics, transformers, QRO components, vhf components, cables, antennas, *Rad Com*, etc, lots of gear because emigrating. SAE list or phone for details. G3ZDN. Tel 0625 610686.

Heathkit RA1 rx, 10-160m, £40. MM144/50S 2m linear, as new, £70. Sell or part exchange for 2m fm mobile or 2m transverter to 10m. Peter Lewis, G6NSU, 18 Bittaford Wood, Ivybridge, Devon PL21 0ET. Tel Ivybridge 4030.

CDR 44 rotator, comp with controller, £40. Bound volumes of *Rad Com* 1966 to date, enquiries, sae. Various other items, sae for list. *Wanted:* BBC/B computer and system disc control. G3AAJ, QTHR. Tel 01-989 6741.

RF301 2-15MHz commercial ssb tx/rx, 100W op, matching atu, both manuals, digital tuning only, vgc, but needs electrical attention, cost over £4,000 new, £350 ono. G3GIQ, QTHR. Tel 01-567 6389.

Trio 2300, nicads, charger, reverse repeater, helical antenna, boxed, £100 ono. Drae 13·8V 4A psu, boxed, as new, £17. G6FXS, QTHR. Tel 01-360 5914.

Microwave Modules MMT 144/28 2m transverter, vgc, £60 ono. 10m fm tx/rx, 10W, 100kHz rpt shift, 29·500-29·690, mic, vgc, £40 ono. Standard C78 70cm fm, vgc, boxed, £160 ono. Buyers pay carriage. Tel Weymouth 786930.

TA33 tribander, £45. Four-over-four 2m beam, £6. Buyer collects. G2DTQ, QTHR. Tel 0922 415048, near Wolverhampton.

Yaesu FT200, FP200, good cond, works well, buyer collects, all xtals, £180. G3PJT, QTHR. Tel 022026 3137.

MML144/50S, used very little, will sell for £60 or exchange for SEM Tranzmatch, 160-10m or 80-10m. G4RND, QTHR (G6HHT). Tel 0254 399281.

FT290R, 2m multimode, mint cond, no mods. GM4OSS. Tel 0560 83800.

TS530, AT230, CT150 dummy load, CP5 five-band vert, all less than one year old, therefore pristine cond, prefer sell comp, nearest offer £650 secures. Can deliver. G4MNG, QTHR. Tel Harrogate (0423) 865203.

TR9130, psu, mobile attachments, used only three months, owner going hf, £420. Tel 0302 855676.

Eddystone rx Mk2, good cond, manual, £40. 68 Alexandra Road, Peterborough. Tel Peterborough (0733) 44437.

Telford TC10 Mk2 2m multimode tx, £35. SR9 2m rx, 10 channels fitted, vfo, £20 or £50 as a package. G3ZOG, QTHR.

RA17 Mk2 vfo, comp with valves, drive scale, £15. Redifon RX475, 250kHz-24MHz, £30. R101/ARN6 rx, £12.50. HF/vhf/uhf rx, SR250B, three i.f. boards, power supply, all transistor, requires front end, £12.50. Monitor unit, 1·5in crt, £8.50. Advance vvm, £12. Buyers collect. All ono. G3JTU, QTHR. Tel Daventry 2909, after 6pm.

HF5R five-band vertical antenna, with radial kit, £40. G4JKF, QTHR. Tel Gravesend (0474) 61296.

BC611 (US) parts available, covers, switches, antennas etc, last of second world war bulk parts. Send me your needs. Many technical manuals, tubes available, some back to first world war! Tony Grogan, WA4MRR, 5 Rollingwood Drive, Taylors, SC, 29687, USA. AC803 244 0324.

FL2100B linear, used once, mint cond, £280. Datong PC1 convertor, mint, £95 ono. G4PPU, QTHR. Tel 01-399 3844.

BBC B program, calculates formulae, listed RAE examination manual cassette, £8.50. TR2200G, fully xtalled, charger, £72. AR88D 6V power unit, £15. Hughes, Can-y-Gwynt, Flint Mountain, Flint, Clwyd CH6 5QG.

Yaesu FT480R multimode, mint cond, boxed, manual etc, hardly used, offers please. Tel Broadstone (0202) 699875.

144MHz linear power amp, receive preamp, MML 144/40, 10W in, 40W out, £40. Yaesu 2m linear amp FL2010 1W in, 10W out, £32.50. G3BDK, QTHR. Tel Towcester (Northants) 52309.

Mizuho MX2 2m ssb/cw handheld, new, £65. Matching linear rf amp, 0·4-10W, £30, together, £90. Yaesu NC1 psu/charger, for FT202, FT207, £20. Mobile handset (telephone type), £5. BNC/uhf rf connectors/adaptors, assorted, new, unused, £5 for 15. G4IYU, QTHR. Tel 021-520 6628.

ZX81 (16k) morse tutor and sender programs: (A) morse code tutor giving a choice of speed, figures, letters or mixed groups and a printout check at finish; (B) a keyboard sender program with adjustable speed and a memory recall facility (any length) to enable the ZX81 to be used as a morse sender, output via mic socket, both programs on one cassette, £3.75, plus post. Paul Martin, 3 Birch Close, Broadstairs, Thanet, Kent. Tel 0843 61448.

Daiwa SW410 vswr/power meter, vhf-uhf, 20/120W, £25 incl carr, high power coaxial relays, CX600N, N-type conns, silver-plated, one brand new, one used, £11, £8 incl p&p. 100+ pcs silvered mica caps, mixed, one per cent, £5.50. GM8JFZ NOT QTHR. Tel 03552-30860, evenings.

Liner 2 144MHz ssb tx/rx, £80. 70cm handportable on RB4, £50. 70cm mobile, RB2, RB4, SU18, SU8, £50. 70cm 24-el Parabeam, £20. Homebrew burglar alarm, £20. RX80 kit-built 80m ssb rx, £15. 107 Bysing Wood Road, Faversham.

Alas! new QTH proves unsuitable for 144MHz work, consequently following available: TR9130, three months old, unused, boxed, £400. 5/8 gutter mounting whip, unused, £10. HB9CV, unused, £10. Canon 814E autozoom electronic super-8 cine camera, 8x zoom, 1-1·4 macro, in case, boxed, unused. £135. Prinz 300 35mm colour slide projector, £15. Austrian rubber-armoured telescope, 30×75, by Swaroyski-Optik, Tirol boxed, perfect, fantastic power, resolution, alloy tripod, carrying strap, cost over £300, accept £160. G4PVV. Tel 0926 881507.

SEM Sentinel 100W linear, preamp, £65 incl carr. GM4NHL, QTHR. Tel 0847 65460.

Morse tuition programs on tape for VIC20, Spectrum, ZX81-1k, ZX81-16k (specify), full instructions, variable speed and run length, checks and scores your copy, characters come in five stages for easy, fast learning, £5 each. GW3RRI, QTHR. Tel 0286 881886.

Complete hf/vhf/uhf station: main items are Trio 120S, TS7800, R1000 transverter, 144/28 linear, D200S, AT230 tower, shack included plus all beams. Total value around £2,000 but would consider part exchange for Triumph TR6/Stag/Sunbeam Tiger. G4NGB, QTHR. For full details tel W. Gliddon, Woolacombe (N Devon) 870740 or daytime, Woolacombe 870234.

Silent key sale for GM4ON: TS520SE, £350. Trio JR310RX, £75. BC221 freq meter, £20. Mic MC50, £20. SWR meter, Daiwa CN620A, £40. SWR meter 25, new, £10. SEM Tranzmatch, £40. Phones, HS4, £7. All ono. KW Viceroy, offers. GM3UNJ, QTHR. Tel Leven (0333) 29596.

Morse tutor programs on cassette for 16/48k Sinclair Spectrum, teaches number and letter groups to above amateur exam standards, with on-screen readout, £4 post paid. M. Gathergood, 80 Moorfield Road, Denham Green, Uxbridge, Middx UB9 5NF.

TS130V tx/rx, SP120 spkr unit, Azden mic, new cond, £360. GM4DHJ, QTHR. Tel 041-889 9010 (Paisley).

BBC model B computer, 1·2OS, cover, programs, incl rtty, various games, books, etc, £325. ST5 tu for use with above, £35. 12in hi-res monitor, £75. G3PLX memory store, £40. Electronic keyboard, £35. G3KNJ, QTHR. Tel Watford 44069, after 6pm.

UK101 with cegmon, wemon, UK02 monitors, 32-line screen, pcbs for extra 8k memory, eproms, only £125, or exchange for 70cm gear. G6VQW. Tel 0926-25430.

Yaesu FRG7700, FRT7700, vgc, £230 ono. ADC stereo equalizer, 24 channel, £60. Sanyo spkrs, 40W 18 by 11 by 7in, stands, £30 ono. Brass morse key, £15. MM 2m converter, incl slim jim, 12V power supply, £15. Two-el dipole, band 2, length 5·5ft, £5. MFJ atu, £3. *Rad Com* July 1982–December 1982, 20p each. Slik 35S tripod, as new, £15. Collection preferred where possible. Tel Steve, Romford (70) 46228, 6pm–9pm, except Tuesdays.

Wood & Douglas 70cm six channel, RB0, RB2, RB4, RB14, SU8, SU20, tx/rx, search, toneburst, 3W pa, all built into one compact unit, 8 by 5 by 3·5in incl ls, requires 12V dc supply, £80. G3BDK, QTHR. Tel Towcester 52309.

Yaesu FT901DM, spotless, used little, £475, buyer collects or carriage extra. Yaesu power supply FP80A, £45. Post free. G3HS, QTHR. Tel 036-782 637.

Yaesu FT480RB multimode tx/rx, good cond, hardly used, handbook, £310 ovno. 7λ/8 mobile antenna base colinear, 8-el Yagi antennas, offers. Will negotiate if purchased with FT480R. Apply G8RGN, QTHR. Tel Bolton (0204) 793361.

Trio 2300 2m portable/mobile tx/rx, 80ch fm incl repeater offset, case, nicads, helical, as new, £115 ono. GW6UPB. Tel Barry 742989, or 742210.

Collins Navy rx 46159, 1·5–12MHz, power pack, 200 page instructions, £35. Army 19 set, 230V, spkr, £25. *Wanted:* info DST100 Mk3, 50kHz–30MHz. T. R. Salkeld, 814 Manchester Road, Castleton, Rochdale, Lancs OL11 3AW. Tel Rochdale 32759 or 47802.

Liner Two ssb tx/rx, wkg 2m, 10m, mount, mic, £69. Rotator, control, some cable, £29. Four-el quad, 2m, £12. Four new 600μF 300V capacitors, £9. HT transformer, £11. Post extra. G4ANW, QTHR. Tel 0983 866687.

Collins 75A4 rx, £250. Hallicrafters HT32B tx, £80. 100W hf linear inc ps, £60. 4MT 100W linear, ex ps, five-el 4m Yagi, £12. G4PLY. Tel 0458 43720.

Sony CXP101 compact disc player, four discs, absolute mint cond, manufacturer's full warranty applies, comp with all packaging, manual, accessories, only £550 ono. Buyer collects or will deliver for cost of petrol. G4IAC, QTHR. Tel Knowle 78218, anytime.

Daiwa SR9 2m rx, vfo, 11 possible xtal positions, five fitted—S20–22, wr, bc, as new, not 12 months old, with slide mount, buyer please collects, £35. Purchased tx/rx. Bob Taylor, 42 Langton Court Road, St Annes, Bristol. Tel 712751.

Kenwood TS520S, new cond, no mods, orig packing, boxes, etc, £290. TR9000 2m multimode, five memories, scan, two vfos, £190. Tel 01-952 9548.

Eddystone 888, good cond, £45. G3DJM. Tel 0202 485569.

Operator going QRT due to move to unsuitable QTH: comp Heathkit rig in wkg order as follows —SB101 tx/rx, SB400 tx, SB200 linear amp, HO10 monitorscope, comp with two mics, two headphones, antenna, long coaxial cable, manuals etc, 28 assorted new spare valves incl two 572B/T160L, three JAH6146XX, offers please. G4BML NOT QTHR. Tel Reading 475142.

FT101ZFM (Mk3 WARC), FAN101Z cw filter, mic, handbook, mint, hardly used, selling due to homebrew project, consider part ex for 2m gear, FT7/TS120V, £450. Iambic key/keyer, new, can't get used to it, £25. G4HWB, QTHR. Tel 061-653 7055.

Microwave Modules transverters, MMT70/144 (double conversion model) 10W out on 4m for 2m in, £85 ono. MMT432/144, switched 1·6MHz tx/rx shift for repeaters, 10W out on 70cm for 2m in, £125 ono. G4BFJ, QTHR. Tel Mike, Burgh Heath 60415.

Sommerkamp FT208R, seven months old, used twice only, comp with nicad, charger, carrying case, rubber antenna, earpiece, £180. Tel Langley Mill (07737) 63619, weekdays after 6pm.

Failed RAE—far too weary to try again. Selling FRG7 with fine tuner, handbook, orig packing, 144MHz converter, RSGB *Radio Communication Handbook*, 5th edn, total cost £215, offers £135. Tel Louth (Lincs) (0507) 604311.

Commodore Pet 2001 (metal case) updated with new roms to 3001, 14 tapes incl morse, rtty, manual, PET bible, all for £170 ono. 14-el Parabeam by Jaybeam, £15. G4SAF. Tel 0706 58201, anytime.

G2DAF rx/tx with psu, both using 455kHz mechanical filters, comp, fully wkg station, £120. G3TZE, QTHR. Tel Stowmarket 677108.

Marconi TF801D 10–480MHz counter output, £75 ono. TCS tx, offers. G3OXS, QTHR.

FT290R, all accessories, £250. F9FT Tonna 16-el beam, £25. RTTY Creed 444, tu, or separate, £70. DC-dc convertor for FT101ZD, boxed, £30 ono. G-whip mobile hf ant, £25. Various misc items. GM4OEZ. 2 Jubilee Terrace, Findochty, AB52QA. Tel Buckie 33002.

Atlas 210X 80–10m tx/rx, one owner, used little, as new cond, orig packing, £275 ono. Pye 4m base station, tx 30W fm, rx needs attn, £10. Pye W15FM Westminster, new 42–54MHz, comp, £70. Tel 021-747 4570, evenings.

TS130S, VFO120, AT130, PS30, SP120, MB100, MC30S, all brand new, boxed, £600, no offers. Tel 0786 70750, daytime only.

RSGB *Rad Com* 1951–63, 1968–80, *SW Mag* 1952–79. BC453. Panda lp filter 75Ω. Offers or w.h.y. G3AUZ, QTHR. Tel 0909 473893.

Trio TS530S hf tx/rx, 160–10m, incl new bands, digital readout, speech processor, 2×6146B pa, 220W p.e.p., mint cond, £465. G4AKW. Tel Colchester (0206) 211095.

Yaesu SP901 spkr, £20. A.M. board for FT101, unused, £13. G3HSC morse course records, beginners and advanced, £4. G4RPA. Tel Bognor Regis 862629.

Yaesu 480R 2m tx/rx, multimode, six months old, used only base station, £285. 2m 8-el 13V 6A psu, swr bridge, all for £320. G4DTI. Tel Wokingham 792102, evenings, weekends.

Yaesu FT101ZD, fitted fm, fan, mic, Mk3 model, MD1 base mic, SP901 spkr, FC707 atu, best offer secures or will split if enough offers. All mint cond, boxed, as new. Could deliver Essex or London. Tel 0279 441994, anytime.

Bearcat 220 a.m./fm vhf/uhf scanner (American version with 30–50MHz), fault in bandswitching circuit, full service and owner's manuals, mobile bracket, orig packing, any reasonable offers over £90. Can deliver after 20 September within 40 miles Dartford. GJ4ODX, QTHR. Tel 0534 43756.

Trio R1000, fm board squelch, vgc, £225. Pye Bantam 3ch, £15. *WW* teletext decoder, all facilities, wkg, in box, £50. Eddystone 770S uhf rx, offers. Eight MK4015N rams, £10. Seven MC6810 rams, £5. Two MC6800 cpu, £5. Twelve Intel D3621 proms, £5. HF linear board with ferrite beads, suitable *Rad Com, PW,* project, £5. G8NTH, QTHR. Tel Guildford (0483) 34954, after 6pm.

QTH: Dunlop, easy commuting Glasgow, Paisley, Kilmarnock, 7APT detached bungalow, 0·3 acre garden, two lounges, two bathrooms, five bedrooms, or four plus dining, shack in loft, 60ft tower, good neighbours, dg, gas ch, garage. GM4FGS, QTHR. Tel Dunlop (05604) 483, or Ayr (0292) 69141 (work).

B40 rx, 0·65MHz–30·5MHz, £30. Power supply, 4–15V, 10A, £10. Samwell Hutton wobbulator type 36A, £10. Buyer collects. G4TFI. Tel 0245 413249.

Datong morse tutor D70, only used for six weeks (successfully), orig box, packing etc, £45. G8ZCZ, QTHR. Tel 0344 771590.

C432 2W handheld, xtalled SU8, SU20, RB0, RB11, RB13, case, handbook, nicads, no charger, mic, no mods, £110 ono. Tel Reading (0734) 482559.

KW204, good cond, ptt mic, £125. Buyer to collect and air test by appointment. G3ADZ, QTHR Rugby.

TS820S, tx/rx, standby rig, mint, £395. Drake MN4 atu, £40. Datong gen cov converter, £80. Vibroplex key, used little, £20. G4EUU, QTHR. Tel Havant 483879.

Eddystone gen cov communications rx, mains model 840C, £50 ono. Prefer buyer collects or carriage extra. G3EJD, QTHR. Tel Boldon, nr Sunderland (0783) 367217.

Wide-spaced variable capacitors, ideal for hf linear, two types, 600pF or 200pF, £6.50 each. Antenna tuner units, contains 500pF variable, antenna loading coil, makes ideal L-match atu, for up to 250W, £4. New unused valves, 807, £1.50. EF50, £1. All items plus post. Paul Martin, G4AZC, 3 Birch Close, Broadstairs, Thanet, Kent. Tel 0843 61448.

Junk: large amount of junk box material, orig property of silent key, is available free to any genuine constructor who is willing to collect the lot from east Kent. G8BJP, QTHR. Tel 0843 31069, evenings.

SOTA 70cm linear, 5W in, 50W out, 2C39 final, used/t, integral mains power supply, very compact, 6 by 10 by 11in, £100. Cosmicar focussing lenses for Vidicon cameras, C-mount, 28mm and 35mm, £35 each. All items post paid. GI3MBB, QTHR. Tel Bangor (0247) 61946.

Morse tutor: software on cassette tape for Sharp MZ80K micro, random letter groups, numbers, punctuation, simulated GPO test, own text input, playback facility, £4. GM4NFV NOT QTHR. J. Clark, 1A Mitchison Road, Cumbernauld, G67 1AN.

2m handhelds: AR240, £120 ono. AR245, 5W recently re-aligned, £150. Both with chargers and rubber ducks. G4PKK. 17A Astonville Street, London SW18 5QT. Tel Steve, 01-870 1132.

FT290, six months old, nicads, power supply, 3A, charger, case, £225 ovno. G6PGQ. Tel Worcester Park (Surrey) (330) 5196.

FT290R, few months old, never been in mobile mount, never had nicads fitted, immac, £220-ish or would exchange for hf tx/rx with appropriate adjustment. G6AQZ, QTHR. Tel Lichfield (05432) 23608.

G2AKQ closed down, Hewlett Packard high quality counter, eight-digit 5382A, size 3·5 by 6·25 by 9·75in front to back, manual, cost £268, cond as new, £160. G2AKQ, QTHR. Tel Ringwood 5643.

Icom 701, 701PS/LS, comp, hardly used, A1, £500 ono. FT227R, scanner, A1, £150 ono. Jim Watt, 61 Sutton Park, Blunsdon, Swindon. Tel 0793 721046 or 0793 488388 ext 3901.

Datong FL3 multimode, auto notch filter, perfect cond, genuine reason for sale, £105. G4NGW. Tel Derby (0332) 513394, after 6pm.

Cossor CC302, 25W fm, 6ch vhf tx/rx, fitted marine channels 12, 14, 16, easily re-tuned for 2m, can deliver within 40 miles Dartford after 20 September, £50 ono. GJ4ODX, QTHR. Tel 0534 43756.

FT780 70cm multimode 10W, £295. Microwave Modules MML432/100 70cm 100W linear, £190. Both items used little, Wood & Douglas noise blanker SLF1, £3. G6VS, QTHR. Tel George, 0253 823541.

Selabs 1088 vdu, keyboard, an display, ASCII, Printicon tube, 64×17 lines, serial output, ex-Police computer, comp with all manuals, £35 ono. G3MSV, QTHR. Tel 0395 68259.

SSB filter LFC2A, comp with instructions for fitting to FRG7, unused, £4. FRV7700 vhf convertor, 140–170MHz, for use with FRG7700, as new, £50. Datong FL2 multimode filter, as new, £65. Tel Swainsthorpe (0508) 470273.

48-el 70cm beam (4×12), very heavy duty, cw matching harness (RG213), N-type conn, fully waterproofed, encapsulated coaxial joints, stainless steel fittings, too heavy for normal amateur masts, £50. G3JKV, QTHR. Tel 0306 884359.

Standard C146A 5ch 2W vhf fm tx/rx, mp and rf fitted, case, mic, base, charger, vgc, £50. G3XCE, QTHR.

Yaesu FRG7700, mint cond, 12ch memory, additional FF5 filter, dc facility, orig packing, manual, full demo possible, £320. SR9 fm monitors, 144–146, SR9 · marine band, 156–162MHz, two xtal, £35 each. Tel Marlow 2726, evenings.

Icom IC720, mint cond, ICPS20 power supply, spkr, ICSM5 base mic, the lot, £775. G4LYB, QTHR. Tel Haverhill 702852, after 6pm.

FT200, SP200, FC707, Adonis AM502 mic, the lot, £320, or will split. Buyer to collect or pay carriage. G4DPZ, QTHR. Tel 0787 476925.

Pye R140 hiband base rx less xtal, £30. Pye Pocketfone 70 high band less xtal, £40. G8HJJ NOT QTHR. Tel Reading (0734) 22566.

FT290R, nicads, mint cond, £190. Eight-el beam, rotator, £40 ono. G8ZTN NOT QTHR. Tel 0297 32406 (Devon).

SRX30D, used little, phones, orig packing, in need, so £150. BRS20106. 67 Leggatt Drive, Bramford, Ipswich, Must collect. Tel 0473-45829.

Welz SP300 1·8–500MHz three sensor swr/power meter, £70. Tono MR150W 144MHz linear, preamp, £125. Cushcraft 144MHz 20-el dx array, 14dBd gain, new, varnished, unused. £40. A. J. Davidson, 80 Gainsborough Green, Abingdon, Oxon OX14 5JN.

FT101ZD, six-band, matching FC901 atu, narrow cw filter, both as new, orig packing, manuals, offers around £525 the pair. G4ELY, QTHR. Tel 0734 694367.

Oric-1 programs, EDL vhf wavemeter, £10. Set of 10XAA nicads in case, £5. Morse tuition cassettes, new CA3014 if chip, £1.50. Various lps (please send sae), seven-seg displays, scrap pads, 5p each. G8NRJ, QTHR. Tel Andrew, 0502 4122.

Creed 444, untested, £10. Creed 7B, suitable for spares, £4. Would exchange 444 for wkg 7B. Buyer collects. G3BSO, QTHR.

TRS80 model 3 microcomputer, 48k twin disk RS232C, business model, fitted with shuffleboard (adds 16k so machine runs 64k cp/m) rf shield, cost £2,000, sell £1,400 ono. Tons of free software. Call for details. G4IAG, QTHR. Tel 05645 78218.

Ficord reel-to-reel tape recorder, 1·875, and 7·5in transistorised, needs 8V outboard batteries, comp with mic, manual, it is in mint cond, cost over £80, gift at £25 ono. GD3TIU, QTHR. Tel 0624-3417.

Trio 3200 70cm tx/rx, xtalled for SU8, 18, 20, RB2, 4, 11, 14, R14, £100. G8ZTN NOT QTHR. Tel 0297 32406 (Devon).

FT200, FP200 psu, fitted G3LLL clipper, comes with blower, swr meter, two spare sets pa valves, £175, no offers. Carriage extra at cost. G4AJJ, QTHR. Tel 0723 85212.

Sharps MZ80K computer, 48k ram, rtty interface, fitted tx/rx software, morse decoder software, some other software, magazines, asking £320 ono. Tel Atherton (0942) 891140.

FRG7, fine tune, no mods, mint cond, orig packing, £140 ono. Bearcat 100 handheld, 16ch programmable vhf/uhf rx, nicads, charger, leather case, mint cond, £280 ono. Tel 082347, 3562.

Trio TR7200G 2m fm tx/rx, external vfo, £150. ZX81, £30. Tel Andrew Clack, BRS51182, Erith (Kent) 30653.

FT290R Yaesu 2m multimode portable, incl nicads (2A hr), carrying case, Yaesu charger, in exc cond, orig packing, is an ideal tx/rx for new or old amateurs, £230, no offers. Buyer collects. G6EXC, QTHR. Tel 051-226 9853.

Yaesu FTDX401, matching vfo, 560W p.e.p., recently realigned, new pa valves, good cond, reason for sale, going mobile, £300. GM4SLY NOT QTHR. Tel 0292 314081.

Icom IC211E 2m multimode rig, immac cond, orig packing, no mods, repairs, marks, used little . . . no it's not later 251E, but that costs nearly £500, price £325, incl Securicor delivery to your door. GM8JFZ NOT QTHR. Tel 03552-30860, evenings.

FT707, FP707, MMB2, boxed, as new, £475. Possible delivery. Western Electronics 28-432 transverter, matches FT101 series, £60. SSM Z-Match atu, 160-10m, £38. Heathkit SB620 scan-alyser, £60. Datong speech processor, £25. *Wanted:* MM 432/1,296 or 384/1,152 varactor tripler. G3TBF. Tel 045382 4853.

FTDX100 80-10m hf tx/rx, 240/12V, manual, spare pa valves, £130 ono. Hamgear hf rx preamp, integral five range xtal calibrator, mains powered, £10 ono. G8SGW, QTHR. Tel 0793 693543.

TR9000 multimode, 2m, £300 ono. Hitachi HV62K cctv camera, lens, ideal for atv, £65. New 16mm cctv 'C' mount lens, £6.50. 30ft aluminium portable rotatable mast with guy wires, £30. Trio MC50 desk mic, stand, £13. Trio MA5 set of hf mobile antennas, bumper mount, Omni-match, £45. UHF coaxial relay switch, £10. Farnel 20A psu, 12V, £38. G6CUQ, QTHR. Tel 052-789 2282.

FTDX401, 560W p.e.p., good cond, wkg, spares, needs some alignment for top performance, £175. Eddystone 830/3/9, exc cond, £125. AR88D, £40. I1154, R1155 station, sae details. Offers. GR470 50ch vhf marine, £85. All collect. Cain, G3DVF, QTHR. Tel Alnwick 602487.

Western DX33 beam, £80 ono. Microwave Modules 435 tv, tx not used, £85. Datong morse keyboard model MK, as new, £75. Adonis desk mic (compressor selectable), £25. Yaesu dynamic mic, MD1, £30. G4OWM, G8XHB, QTHR. Tel 01-647 8399.

Offers invited for Collins KWM2A, MP1 mobile power supply, 136B2 noise blanker, 312B-5 station control, large quantity of spares. G3NFV, QTHR. Tel 0372 372587.

Trio 2300, comp with nicads, charger, rubber duck, tele, aerials, carrying case, manual, exc cond, in box, £125. 2-10m converter, £20. G6LGD. Tel Portishead (nr Bristol) 848128.

TS520S, vgc, £350. FT480R, case scratched by mobile mount, modified for listen on input by supplier, £270. Nine-el Tonna, rotator, £35. G2DYM trapped dipole, approx 80ft feeder, £30. G4JVX NOT QTHR. Tel 0257 480970 (Lancs).

FT101E, late model, mint cond, no mods, spare pa tubes (two sets), £340 ono. Prefer buyer inspects, collects. G3AJX, QTHR. Tel Winchester 61605.

TR7800, 2m, fm, 5 or 25W comp, handbook, workshop manual, mobile bracket, etc, £210 ono. G4DBI, QTHR Malvern (Worcs).

Keyer 1024, new, FC707 atu, like new, EK150 keyer, vgc. *Wanted:* Collins tx/rx KWM2 or 380, must be good cond. Beam ant, 10-15-20/Samson ETM 8C keyer, must be good. Tel Derby 557705.

C-mount lenses: Cosmicar f1.9, 25mm, £12. Lytar f1.8, 25mm, £14. Dallmeyr f1.5, 1in, £10. Dallmeyr f1.9, 3in, £25. Strand Fresnel spot, £22. Strand Junior flood, £17. Clamps, colour frames, mask, adaptors, etc. Lenses, plus post; lighting; buyer collects. G8AXC, QTHR.

Sommerkamp 788DX 10m all mode tx/rx, £260. Jenkins, RS51777. Tel Falkirk (0324) 26210.

Change of interest: used once Sankyo Sound XL320 Supertronic cine camera, 10/30mm zoom lens, super eight, case, hand mic, exchange with cash adjustment for amateur equip, 70cm or what have you. G6JND. Tel 051-489 7394.

Sharp M280K computer, 48k, software: three types of Basic, machine code, Pascal, Forth, Apollo word processor, 100 program library, mc games, cost over £500, accept £350, or possible exchange for Tower, triband beam or sstv. G6UKL, QTHR. Tel Tewkesbury 297579.

FT101B,160-10m cw filter, no mods, manual, YD148 desk mic, exc cond, £315. G3BDS, QTHR. Tel Worcester 424722.

FT901DM, £545. FV901DM, £145. FC901, £95. CPU2500RK, £150. MM2000, £95. YC305, £50. Standard handheld SRC830/M15 marine, ch5, 6, 9, 16, 25, base charger, £80. KW107 Supermatch, £60. Moscow Muffler WB1, new, duplicated gift, £95. ZX81, mains adaptor, 16k ram pack, Tandy cassette recorder, tape program of countries/prefixes, lot, £100. Sharp PC1211 pocket computer, cassette interface, £60. Nikon F, f1:1.4 50mm, £90. Polaris autozoom f4.5, 70-230mm, £45. Nikkor extension tubes K1, 2, 3, 4, 5, leather case, £15. Canon 110ED, flash, leather case, £45. Minox B, £50. Polaroid 350, portrait kit 581A, flashgun 268, £100. Complete audio/visual instrument flight (FAA IFR) training course, projector, manuals, etc, £125. No offers on above. Collect or carriage extra. 100's copies *New Scientist* free to collector. May, G3AAG. Tel Liss (073082) 2143.

Skyroamer hf band rx, £15. No38 set afv, £3. Eagle TE188 sig gen, 120kHz-260MHz, £30. Marconi monitor, needs attention, £5. Variac 0-270V output, £6. RT34-APS13, £2. Murphy lowband, £2.50. Various manuals, various pcbs. G8FRC, QTHR. Tel Reading 695697 for details.

Kenwood TS520SE, £230. TR2300 amp, bracket, £150. G8KW, £30. 18AVTWB, £70. Mobile ants, Osker SWR200 mics, spkrs etc, 25A psu, £30. Philips 10MHz db oscilloscope, £50. Mint equipment, inspect, collect. G5CDE. Tel Egham 33500.

Antennas: new, boxed, TET HB23SP, two-el triband, £60. New, boxed, isopole 144 base ant, £20. Used Moseley TA33JR, needs clean up, £30. Reasonable offers considered. G4NGX, QTHR. Tel Chris, 898 5417, evenings.

144MHz pa, 2W drive, gives 15W out, using 2N6081 transistor, £15. Leak through line stereo tuner, £15. Mutek 144MHz mobile halo, as new, £20, or exchange for good discone, eg Revco etc. G8PQG, QTHR. Tel Dave, Oxford (0865) 67165.

TenTec Omni D, new bands, £525. FT101 Mk2, used little, £325. Europa 2m transverter, £50. TA33, windswept but sound, £40. HF5 five-band vertical, used once, £45. Old centre spider quad, £30. New solidstate relays, 250V ac, 10A, control volts 3-20V, dc, £9 each. Tel Brookwood 6010.

Sony bw camera 100CE, auto sensitivity, 2x zoom, 16/32mm, 1·0V Pk sync negative 75Ω, built-in electret mic, comp with HVS2000P special effects generator, brand new, boxed, £125. G3XFN, QTHR.

Hi-mound morse key type HK702, £15. Datong morse tutor, £35. Edixa slr camera, case, spare 100mm lens, Weston V exposure meter, £50, or swop for QRP tx/rx. Tel Thetford 4483.

FT901DE, superb hf rig, fm, FC901 matching atu, YP150Z dummy load/wattmeter, £650. TR2300, HL32V 30W 2m linear amp, £130. All vgc. G4KUR. Tel Stuart, 021-704 1236, after 6pm.

Sommerkamp FT767DX mobile tx/rx, cw filter fitted, eight-band coverage from 3·5 to 30MHz, £350. G4NXZ, QTHR. Tel 0234 741736.

IC260E 2m multimode, 12W, with up/down mic, and hb 45W linear, 28V psu, £240, will split. G4DOV, QTHR. Tel Barry, Cheslyn Hay (0922) 414927.

2m linear MML144 100S, 10W in, 100W out, less than one year old, £95. 2m preamp MMA144V, £20. Six-el quad Jaybeam, £20. Packer Communications 2m atu AT145, £15. G6LPS. Tel Worcester (0905) 26171.

FT101E, cw filter, speech processor, recently realigned, modified for extra bands, 10, 18, 24MHz, by Holdings, £350. FT901DE fm unit, £480. Liner 2, 2/10m ssb preamp, £75. 12AVQ ant, £20. Buyer collects, G3HLP, QTHR. Tel Chester 46596.

FT708R, in orig packing, PA3 psu/charger, in mint cond, £195. Peter Crosland, Red Lion Cottage, Holt Heath, Worcester WR6 6TA. Tel 0905 620041, evenings, or 021-454 8585, days.

Creed TR101/2 desk-fax, £5 pair. 7B teleprinter, £23. 6S6 tape sender, £9. BC221 frequency meter, £18. Marconi vtvm, £3. TS87/AP wattmeter, £5. AN/APR4 search rx, 38-1,000MHz, £30. Panoramic adaptor, £10. Power supply, twin 0-30V, 1A each section, £18. G8FRC, QTHR. Tel Reading 695697.

Barlow Wadley XCR30, £90. Codar PR40 preselector, £8. Armstrong valved stereo tuner, Rogers valved amplifier for above, *Rad Coms* March '73-Dec '82, offers. All equipment vgc, no mods, buyer inspects and collects. Tel Medway (0634) 366373, after 7pm.

SB101, new 6146, HP23 psu, SB600 spkr, SB650 digital display, rf speech processor, mic, a.m./fm rx adaptor, all inter-connecting cables, manuals, £250 ono. HP13B dc psu, £50. G3MNV, QTHR. Tel 02372 4564.

Telequipment D31 dB scope, (true dB not chopped), £40. Pref buyer collects else carriage at cost. G8ATC, QTHR. Tel 051-709 6022, ext 2443, 9am-5.30pm.

Approx 150 radio and television valves, some dating back to around 1933, all brand new, boxed, £50 the lot. Some old radios, and an old television. G3YYG. Tel Uxbridge 39435, after 7pm please.

Trio R1000, exc cond, £190. Tel Long Eaton 65110.

HQ1 minibeam, £75. Hirschman rotator and support bearing, £30. Buyer collects please. G4SGV NOT QTHR. Tel Redditch (Worcs) 41158.

Mast: triangular galvanized 30ft, two 15ft sections, 15in sides, buyer collects, £60. G3BJB, QTHR. Tel 068 45 3946.

Behalf widow of G8WVP: FDK M750E, £170. Drae 13·8V/6A psu, £37. Sentinel 50 lin/p-amp, £53. MMC28/144 up-converter, £15. Himound HK707 key, £10. Practice oscillator, £6. Heathkit SW717 rx, £80 ono. Inspect and collect at G8AVI, QTHR. Tel 01-660 6727.

Pye F30 fm tx/rx, 12·5kHz on 2m, £180. Trio TR7800 144-146MHz fm tx/rx, 25W, £170. Jaybeam 4·3dB colinear, as new, £20. Pye dash mount Cambridge on 70·26 a.m., £12. G3XVL. Tel Chesham 784883.

TS830S, AT230, SP230, MC50 desk mic, Trio technical manual, any reasonable offer, will split if reqd. MM 144/28 transverter, used with above, £60. IC2E with built-in scanner, full accs, 10W linear, £150. G4MPE NOT QTHR. Tel 02602 70594.

Hustler (4BTV) five-band (10-80m) trapped vertical antenna (two spider tubes missing, otherwise ok), £45. G4GHG, QTHR. Tel Torquay (0803) 37050.

Oric 1 morse decoder and tutor program, send and receive up to 30wpm with full checking and verification, cassette, £4.50, incl p&p. G6IDQ, QTHR.

Heathkit HFW1 alignment oscillator, £15. Nascom 1, cased, S100 bus, 16k ram, 8k Basic, rtty rx program, £170. Two planes, two engines, 6ch radio control, four servos, many other parts, £130. Ilford Sportsman 35mm camera and lightmeter, £10. Kodak Ektra 32 camera, £5. Imperial electric typewriter, £25. Cherry qwerty keyboard, £23. Cambridge potentiometer type 44228, £15. Brother portable typewriter, £13. Motorola audio cassette interface M68CIM-1, £12. Mullard scope tube DG7-31, £8. Case printer 120, £18. G8EII, QTHR. Tel Letchworth 6324.

FT290R, mobile, mount, rubber duck, etc, Microwave Modules 30W linear MML30LS, £280, or swap FT221R, cash adjustment if necessary. Two Pye Bantams, high band fm, £25 each. GM4IKT. Tel 0875 813332.

FT290R, nicads, charger, carrying case, mobile mount, helical, £220. *Wanted:* Telescopic tilt-over tower, preferably local. Tel Norwich (0603) 614167.

Yaesu FT708, NC9C charger, PA3 adaptor, YM24 spkr/mic, MMB10 mobile bracket, mint cond, £185. G6EOA, QTHR. Tel 09274 22221.

HRO, 50kHz-30MHz, psu, £30. Class-D wavemeter, £10. vintage sets: Ekco (round) M22; M23; Ultra Tiger, 2V battery types, all orig, wkg, £10 each. Buyers collect. G3KTN, QTHR.

Heathkit HW101, cw filter, £100. Heathkit HW32A, 20m single bander, £40. Military version of Super Pro, TCS rx, both rough but wkg. Offers? G3XMM, QTHR. Tel Gloucester 33780.

TS830S, 14 months old, used very little, mint, £575. Yaesu FC107 atu, almost unused, mint, £70. MC50 mic, £20. FT290R, nicads, charger, mobile mount, carry case, all used very little, £250. G4EDQ. Tel Hook 2724, after 6pm or weekends.

Creed 7E Telex machine with tape perforator etc, £20. *Wanted:* buy or borrow to copy, manual for Pye Westminster Cambridge (a.m.) PR70. G8SNX, QTHR. Tel 0632 886608.

Azden PCS3000 2m fm mobile tx/rx, 25/5W, full scanning, eight memories, 12·5kHz step, etc, remote control cable ECK91, scanner mic. £150. G4NXZ, QTHR. Tel 0234 741736.

Yaesu FT107M internal power supply, as new, £500. G3USP, QTHR.

Trio TR7850 40W 2m fm mobile, used very little, immac, a bargain, £230. GW4HAT, QTHR. Tel Swansea (0792) 290770, evenings.

88mH toroids, American open pattern suit BARTG, ST5, DT600 etc, £2.25 each (incl). *Wanted:* SB220, L4B, TL922 or w.h.y? Chris Pedder, G3VBL. Thorncliffe, 5 Royalty Lane, New Longton, Preston, Lancs PR4 4JD. Tel 0772 612289.

Racal RA117 rx, all new valves, serviced, case, clean, tidy, £200. 4CX250B valves, new, boxed, £20. used, £5. Postage £1 each. Dummy load tubular glass resistors, 250W, 68Ω, 100Ω, 150Ω, £3 each incl postage. G8ZGK, QTHR. Tel Watford 40848.

Icom R70 rx, six months from new, fitted Icom FL44, 455, ssb filter to replace ceramic filter, superb performance, matching SP3 spkr, total retail today nearly £600, bargain at £450. Reason for sale, want Icom 720A tx/rx. G3RHM, QTHR. Tel 01-423 0306.

G2DAF tx Mk3, most parts incl chassis, panel, valves, filter, variables, £24.50. Similar tx Mk2, £18. Regulated psu 12/15V, 1A, no case, suit IC202, £7.50. Radiomobile lw/mw car radio, service sheet, vgc, £13. Xtals: 8007·96 (10X), 8025(243), 8006·62, £1.50 (3). 6010 (10XJ), £4 (10). 5875(243), 5800, 5852·25, £1.50 (3). 465kHz, £1.50. For filters: 6400 (243), £2 (5). 5295 (243), £2.50 (6). Valves: new QV03-10, QZ03-10, £3 each. 6SJ6 (C), £4.50 pair. Toshiba, £11 pair. KT66, £5 pair. AR88 types, £9.50 (14). PCBs for 160m ssb rx, circuit, £3. HB Slim Jim, £2. HB9CV, £3. G2HCV, QTHR. Tel 01-866 4871, home 01-952 7722, ext 200, work.

Heathkit HW100 tx/rx, SB600 spkr, HP23 psu built-in, HO10 monitorscope, HO13 panadaptor, £200. Icom IC260E 2m all mode tx/rx, £200. All equipment in good cond. G3FCT, QTHR. Tel 0795 532902.

TS180S, as new, WARC fitted, dfc, cw filter, £485. KW2000A, £130. Tel 01-570 7152.

TS120S, 270Hz cw filter, £325. Dentron GLA1000B hf linear, £225. Low pass Drake filter, TV3300LP. SEM Z-Match, £38. Katsumi keyer EK150, £42. All items as new. HQ1 beam, £68. Rotator AR40, £40. G4IBG, QTHR. Tel Hove (Sussex) (0273) 731391.

Mutek BF981 144MHz preamp, uncased, £10. Dressler amplifier preamp interface, £12. Datong morse tutor, £35. TenTec Century 21 cw tx/rx, 80-10m, £150. *Wanted:* 3kV feedthru capacitor. G4TFH. Tel. 01-885 1162.

National Panasonic tv radio cassette recorder, fm, lw, mw, sw, mains, car battery, £125. MM202 mobile safety mic, £14. 7λ/8 SMC 78F 2m mobile whip, less base, cable, £7. Buyer collects. G3JKN, QTHR. Tel Denham (0895) 832229.

35GHz klystron (7mm), 130mW, new, £10. Unfinished 2m nbfm synthesized rig, £25. Heavy duty psu, presently 5V at 8V but capable of 30A, £15. Many valves, klystrons, gear, other components, at low prices. Write or phone for list. G3ZDN. Tel 0625 610686.

Creed Envoy data printer, serial ASCII, 110 baud, incorporates tape punch, reader, offers. Pye Westminster W15AM, £50. PF2AM, £50. BC10A charger, £15. Heath freq scaler, £20. Avo sig gen, £10. *Wanted:* CV8884 crt. G3MNV, QTHR. Tel 02372 4564.

TS930S. Circumstances compel sale of my pride and joy, comp with inbuilt psu, automatic atu, matching mic, Matlock guarantee, great performer, pleasure to operate, £995 plus carriage (list £1,400). G2KF, QTHR. Tel 072-681 2337 (Cornwall).

FC707 hf atu, 10-80m, dummy load, brand new, few hours use only, £60. GM4CUX, QTHR. Tel 031-332 5300.

RTTY and Video Genie 1 computer, Catronics rtty terminal, all manuals, programs, leads, £100. Hitachi 12in monitor, £50. Unused Jaybeam 2m 6-el quad, £10. Tel Alan, 01-952 7711, ext 238, day, or 01-952 3848, evening.

Trio TS120S, Shure mic, mobile mount, dc lead, £330. G-whip, 80-10, £25. FT101B, exc cond, 250Hz cw filter, G3LLL double balance mixer, dc and ac power leads, £320. GW3XJC, QTHR (Mid Glam). Tel 0656 733729.

2m 100W amp, MML144/100S, £95. Valve 4CX150, base, £10. G4NRG, QTHR. Tel Brentwood 810831.

Yaesu FT7, mic, all 10m, mobile mount, never used mobile, £250. Yaesu FL110 100W hf linear, matches FT7, £80. 20A psu, fully protected, £70. G-whip multi mobile, 20-10m, 40m, base, £25 or all above, £375. Honda ED250E 12/24V dc generator, 250W, used little, £100. Prefer buyers collect or haggle on carriage. G4IDF, QTHR. Tel Worcester (0905) 20135, evenings, weekends.

Trio TR7730 25W 2m tx/rx, £150. Trio TR8400 10W 70cm tx/rx, £250. Both as new cond and boxed. Yaesu YM38 desk mic, £15. 5λ/8 2m mag mount, £8. SWR25 meter, £8. G4MUT, QTHR. Tel Reading (0734) 693766.

High gain 12AVQ vertical, used but good cond, £15. SML25 swr power meter, 3·5-150MHz, £5. G4GDQ, QTHR. Tel Lincoln (0522) 683456.

Liner 430 with preamp, vgc, hardly used, £110. G8ADD NOT QTHR. Tel Brian 021-422 5584, evenings.

2m antennas: 5-el Yagi 4-el quad, Emoto 102LBX rotator cables, used but perfectly serviceable, £40 lot (collect). Advance TCD500 uhf prescaler, 500MHz, exc cond, £35. Airspaced trimmers, new, exc, five butterfly, all presets, 40pcs, £5.50. GM8JFZ NOT QTHR. Tel 03552-30860, evenings.

60ft mast, galvanized, dismantled, in 20ft sections, will deliver in N Ireland, £200. Consider swop for Honda petrol generator or similar. Tel Strabane (N Ireland) (0504) 884343.

Transverters MMT432/28S 10m up to 70cm, £85. MMT70/28, 10m up to 4m, £85. 16-el Tonna Yagi, £20. G4NRG, QTHR. Tel Brentwood 810831.

National Panasonic computer controlled communications rx, continuous synthesized manual/autoscan tuning, lw/mw/sw/fm, programmable frequency/clock/timer/calendar function, one year old, absolutely immac, documentation, cost £2,250, cash urgently required, hence asking price, £1,200 ovno. C. Graham, G3XIG. Tel Crawley 547400.

10m fm rig, Icl, used little, £35 incl carriage, G4RSD. Tel Cromer 511459.

Trio R600 rx, unmarked, hardly used, orig packing, £200. Free delivery. Tel 0834 3057.

Yaesu FT280 2m multimode, 10W, vgc, £290 ono. Yaesu FT200, psu, hf tx/rx, must be seen to appreciate, MMA144V 2m masthead preamp, £20. GM4JJJ, QTHR. Tel New Oakley 852705, evenings.

FT-ONE, all options, £950. FC902 ant tuner, £75. FT290R, nicads, case, £180. Bencher BY2, £25. Chris Mouldings keyer, £18. HK707 key, £7. Headphones, £7. Datong D70 morse tutor, £35. 2m linear (suits FT290), £30. Deluxe mic, £30. Tono MR150W 2m linear, £95. Telereader CWR685E, £475. FT480R, mobile whip, boot mount, £290. Many other items for callers only, incl new car batteries. G3MEV, QTHR. Tel 0628 31119.

18AVQ hf trapped vertical, 10-80m, two radials per band for 10-40m, £38. UK101 computer 8k ram, extended monitor, assembler edit tape, games, the unit is housed in a professional case, £78. G4DOV, QTHR. Tel Cheslyn Hay 414927.

Drake R4C, mint, late ser No, five filters, 15 extra xtals, MS4 spkr, £325. Eddystone EC958/TE digital readout, one cycle, £600. EC940 gen cov, £120. Racal RA17 Mk2, £150. RA63, RA218, ssb adapters, £50 each. Trio AT130 atu, £60. VFO120, £55. Bird wattmeter, 2-30MHz 1kW element, 200-500kHz 25W element. All the above items in good cond, handbooks, carriage extra. GW3JAZ, QTHR. Tel Gresford 2584.

SOTA 100W pa/preamp, £85. High-band a.m. rt, 10W, 5ch, 12·5kHz, bw, xtal, wkg, Securicor relay, phone, £100. FT707, as new, six months old, £450. G8HED NOT QTHR. Tel 0782 519439, weekends.

Ali tube, 18swg, 0·75, 0·675in, 1in, recently dismantled, 10, 15m, homebrew Yagis, 1·5in x13ft booms, re-assemble for fb dx (inspect log!). G3MTU, QTHR. Tel Yateley 877485.

Kenwood 820S, mint cond, MC50 desk mic, mobile unit, fitted, £395. Big signal W2AU balun, 1-1, 50-75Ω, £8. Joystick mobile mount, £5. G3JWY, QTHR. Tel Leeds 863058.

Sharp MZ80K computer, 48k ram, basic SP5025 tape, orig box, instruction book, dust cover, £285. G4EHK NOT QTHR. Tel Appley Bridge 3320, after 6.30pm.

Dragon rtty program, many features, tape £12 incl p&p. Cartridge, £20. G4BMK, QTHR. Tel 0323 893378.

Teleprinter, Creed 7E, well constructed BARTG terminal unit, tape reader, £50. Paper rolls, £1 each. Valves: 572B, new £20. 2xPT15, 2xML6 (for T1154 tx), £20. Will split. 832As, £5. Bases, £1. G4GXM, QTHR. Tel Hitchin 53001.

G5RV trapped dipole, W2UA balun, covers 10-160m, as new, £15. G3YYG. Tel Berkhamsted 6938.

Tilt-down mast, 8m when erected, winch operated, £95. Buyer collect. Four 8m wooden two section masts, £12 each. Buyer collect or will deliver within 30 miles at cost. G4FDC, 5 Windmill Court, North Street, Tunbridge Wells, TN2 4SU. Tel 0892 41733.

SX200N scanning rx, four months old, only few hours use, £220 ono. Tel 0272 731569.

Field strength indicator, xtalled marine channels, 6, 12, 16, needs case, £25. GU3HKV, QTHR. Tel 0481 47278, 6-7pm only.

Console, 55 by 9·5 by 10in, sloping front, £15. Buyer collect or will deliver within 30 miles at cost. A. Korda, G4FDC, 5 Windmill Court, North Street, Tunbridge Wells, TN2 4SU. Tel 0892 41733.

TA32Jr, as new, bought two years ago, never used, orig packing, £90, no offers. Buyer collects. G3FAS, QTHR. Tel Whitby (0947) 602135.

FT221, Mutek front end board, digital readout, £330. G6CJB, QTHR. Tel 01-399 0190, daytime.

RA17A Mk 2, Marconi CRD150/22A & B, double diversity rx, S27D, 527C, Creed 75, Hustler mobile whip, 80, 75, 40, 20, 15, 11, 10m elements, quick mount, bumper mount, property of silent key, BRS31742. Contact G3SZJ. Tel Derby 556875.

WANTED

3032K Commodore PET or 4032K with any peripherals. FT75B with any vfo FP75, etc. Going rates paid by new station. Sig gen, 100Hz-150MHz. Logic checkers 14/16-way dil, ttl/dtl, cmos, or ttl/cmos logic pulser. Colour camera, video, similar Panasonic 3030E with power unit if available. ZX80A. G4IZW. Tel Ken, Newcastle-upon Tyne, (0632) 678828, anytime.

Attempting my own "real" radio collection. Good price paid for mint 19 sets, 38 sets, 1154, 1155, BC348, anything of this era accepted. W.H.Y? G3ZYC, QTHR.

Eddystone 888A rx, in good cond, will collect up to 50 miles. G3WZR, QTHR. Tel 03723-79741, outside working hours.

Crystal socket. Half-inch pin spacing (possibly 10XJ) and smaller xtal sockets. Speaker transformer, 10W 5kΩ approx primary. 2·5mH 150mA rf choke. Can you help please? G4BKM, QTHR. Tel Denham (0895) 834358.

Icom Inque IC700T tx in wkg order, unmodified, comp tx/rx outfit considered. Details to R. Gordon, G6FYW, QTHR. Tel 01-698 3880.

Chimneys for 4CX250Bs. 813s, 3-500Z etc, suitable hv and lv transformers. RF chokes. other linear parts welcome, Valve data and circuits, hv switches. Please write stating price. John Scott, 91 School Road, Peterhead, Aberdeenshire AB4 6BW.

For the wireless museum: old radio books, catalogues, magazines, service manuals, QSL cards, morse keys, valves, components, any old knobs! Plate neon tube. Collection arranged. Details please to hon curator, G3KPO, 34 Pellhurst Road, Ryde, IoW. Tel 0983 62513.

Back issues *Ham Radio* and *VHF Communications*. Good 2C39A or similar. G4AKL, QTHR. Tel 0327 857350.

Antarctica QSL cards: I will pay at least £1 each for cards from bases, supply ships, South Georgia, Sandwich Islands, Crozet, Heard, Kerguellen St Paul, New Amsterdam, Macquarie, Bouvet Islands. Send cards to G3BDQ, Whitefriars, Friars Hill Guestling, Hastings TN35 4ED.

G2DAF rx, in good cond, desperate to obtain a good one though will repair a faulty one. Sig gen and small scope. G3EXV, QTHR. Tel 0772 616929.

Manual/handbook for Belcom FS1007P, Yaesu FT2F; Trio VFO30G ext vfo; discarded FT2F, FT2FB (to cannibalize rx); good textbook on 6502 programming; modern stereo cassette deck/Dolby/metal. G4OJR, 122 Stradbroke Road, Lowestoft, Suffolk. Tel Andrew, 0502 4122.

Kenwood DG5 digital readout unit for TS520S, please state age and cond. G6JFJ, QTHR. Tel 0482 853276.

Two channel tx/rxs, BC1335, SCR509, SCR510, SCR506, SCR508, SCR528, SCR538. G4ARI, QTHR. Tel 0530 243258.

Wanted by ex-MN RO: marine morse key—preferably Marconi—in good cond. Someone somewhere must have one for sale. Will pay going rate for good one. G4MUH, QTHR. Tel 0387 3274, evenings.

Synthesized 2m handheld. Will swap excellent condition Fiat 500, low mileage, long MoT, 65mpg, can demonstrate, deliver/collect SE England if genuine interest. G3ZMC. Tel 01-668 4151 ext 441, daytime, Hurst Green (Sussex) 533, evenings, weekends.

Telequipment type 43 scope tube. External vfo for FTDX560. Yaesu monitorscope. Will collect. G4LMA. Tel John, Telford (0952) 59306, evenings only.

Datong D70 morse tutor, good cond please. GM8IFG. Tel Port of Menteith (08775) 663, evenings.

VF030G to suit TR2200GX, good wkg order essential. G6WKO NOT QTHR. Tel Harrogate 64480.

Mounting racks and cables for STC aircraft tx/rx type STR18 or advice as to where these might be obtained. Workshop manual and instruction book. Connecting cables for WS(CDN) No 29. Taylor, G3UCT, 8 Government House Road, York YO3 6LU.

Comparator ic SN72710 or block diagram and connections or info about equipment replacement—16k ram for ZX81. GM3UWO, QTHR.

Telescopic tilt-over tower, will dismantle and

collect, vgc only please, 40ft or 60ft post mounted. G4RTX. Tel 07917 62044, evenings.

Heathkit SB101/102 or any similar Trio/Yaesu tx/rx incl separates in exchange for my immac FT101Z (plus cash adjustment), six bands, mic, fan, dc converter, buying house hence need cash! G4HIY, QTHR (1983). Tel Crowmarsh (049169) 788.

Eddystone S640 front panel cabinet or complete defunct S640. Labgear switched pi-net coil model E5033. 9MHz ssb filter with carrier xtals. 2DAF xtals, 1,547kHz, 2,453kHz, 1,515 to 1,540 1,685 to 1,705kHz. All replies answered. G3ICH, QTHR.

Handbook or info or copies for Marconi Instruments digital multimeter TF2670. Info on the battery box 54462-011 and current shunt 54461-011 plug-on unit for same. G3BDK, QTHR. 1982. Tel Towcester 52309.

FL2100Z linear. G3OLB. Tel 0252 519834.

Servicing wanted at QTH Wembley, would appreciate help from conversant service man (cash payment). G4IQN, QTHR. Tel 01-902 4732.

KW107 Supermatch or KW E-Zee Match atu. G4PJY. Tel Oakham 2721.

Urgently: Yaesu matching monitorscope for FT902DM or FT101ZD but would consider others. CS401 switch, cheap. RTTY interface and program tx/rx for Sinclair Spectrum. G4TKP NOT QTHR. Tel Bob, Derby (0332) 683442.

Baird 30 line television, comp or parts, motor, synchronizer, disc, neon etc. (All parts once sold separately by Peto-Scott). Genuine enthusiast and BVWS member wishes to demonstrate television of the early 'thirties. G3XON, QTHR. Tel Stan, Guildford (0483) 36953.

Drake MS4 spkr, SCC4 xtal calibrator, B. Kemp. Tel Cambridge (0223) 64352, after 6pm.

G2DAF Mk2 rx, must be well constructed no clapped out models please. J. P. Wright, 44 Wilmott Way, Basingstoke, Hants. Tel Basingstoke 68649.

Any info on US Navy TBX4A tx/rx. Any accessories, esp psu. AC mains psu for Mk128 set. Set of spare rx valves for Mk123 set. 2E22 pa valves for AN/GRC9. Comp TCS series required. G3VKM, QTHR. Tel 050277 622.

2m equipment sought by newcomer with limited resources: mobile/home base. Multi-standard tv for dx, eg Plustron, JVC or Sinclair. G6LCE, 2 Hertford Close, Caversham Park, Reading RG4 0QL, Berks.

Ferrite rings, suitable for antenna noise bridge, or comp noise bridge if ferrite ring is in wkg order. G3RYY, QTHR. Tel Chorley (02572) 62250.

Yaesu YC7B digital display for FT7B. FP12 psu for FT7B. Tel Bill, 0908 368761, after 7pm.

FT221 or FT225, pref with Mutek front end board, Eimac SK600A or SK620A base, chimney, Burndept 24V 50Ω coaxial relay. If you can help then please contact G6DRT, QTHR. Tel Peter, 0323 832473 (Sussex).

Thoroughly technically competent om to undertake servicing and realignment of National HRO500 rx (pll). No mechanical faults, full manual, must have all test equipment. Ageing ham needs help. Cash for good job. Will deliver between London and Southampton or thereabouts. May, G3AAG. Tel Liss (073082) 2143.

Dymar 980 or similar handheld/portable, capable of 86·35MHz, for use by BRCS search and rescue group in Tamworth area, reasonably priced, group funds limited. Mrs Field, 23 Sorbus, Amington, Tamworth B77 4ER. Tel 0827 3098.

ATC Squadron has been given some "Ultra" pocket-size vhf tx/rxs type 4B7 PB2. Can you help with servicing info to buy or copy? Leslie Cobb, G3UI, 27 Moorlands Crescent, Halifax, W Yorks HX2 8AA. Tel Halifax 60574.

Eddystone 940 or 830/7 rxs in exchange for KW2000A tx/rx. Buyer inspects and collects. G6WTY, QTHR. Tel Malvern 4968.

Cabinet and front panel for AR88LF. Would consider defunct rx. Handbook for Cossor scope 1035 Mk2. G4MNB, QTHR. Tel Swindon 826325, evenings.

WS62 spares, WS18 case, WS88 afv, WS31 12V psu, WS17 case, handbook, WS19 variometer, A43 tr, spares for B47, junction boxes J1, J2, J3. Old diving equipment, Navy re-breathers Mk1 and Mk 2. Old diving books. G8MQT. Tel Terry, 07073 27233.

Cossor oscilloscope 1049 Mk3, manual, circuit diagram, service data etc, orig or copy, will happily pay all costs. Can photocopy your original. Can anyone help please? G4BKM, QTHR. Tel Denham (0895) 834358.

DG5 freq counter for Kenwood 530SE. RS54047. Tel Dave, Hull (0482) 571218.

4m fm rig required, must be in good wkg order and reasonable cond, preferably with handbook. G3VIE, QTHR. Tel Wokingham 784048.

Tripler: MMV1296 70-23cm varactor tripler. G4EGR. Tel Bristol 772804.

Circuits/manual—buy, beg, borrow. Telonic Instruments sweep sig-gen system comprising 3305 sweep, 3343 rf op, 3370 display processing, 3331 markers. Desperate! J. D. Jardine, 22 Ravens House Road, Dewsbury, Yorks. Tel Dewsbury 468876.

Urgent: KW109/KW107, will buy or trade. *For sale*: Drake C-line 10/15 3-el beam 218HS3T, rf wattmeter RW151D, Drake WH7 wattmeter, DGX2 discone, new, Pye 7A 12V psu. GI3ZSC, QTHR. Tel 08494 72378.

Compact lightweight tx/rx for use in glider, preferably aligned, 129·9, 130·1, 130·4, and 12V working. Mobile unit on same frequencies. Will collect or pay carriage. G8XUE, QTHR. Tel 0582 841574.

QSL cards from pre-war period, large or small accumulations, actual money paid for same! Please send, 'phone or write: Norman Field, G4LQF, 14 Regent Road, Harborne, Birmingham 17. Tel 021-426 3663.

FT225RD, preferably comp with manual, could collect reasonable distance Basingstoke. G3CBU, QTHR. Tel 0256 58921.

Good loving home offered to AR88D, must be very stable, of reasonable appearance. Tel with details and price. G6MOK. 01-561 0010.

One or more 50kΩ vitreous resistors, 100W a.m., ref 10C/1043, please, your price. G3HCV, QTHR.

By new G4: duobander or tribander hf beam. Rotator. Brian Hamilton, G4SZD, 13 Moorside, Spennymoor, Co Durham. Tel Spennymoor 816002.

Copy or original of manual for Eddystone EC10 Mk2 rx. J. Penzer, RS36439, Aspley House, 27 London Road, Twyford, Berks.

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SQ007	70cm 2 ele. phased swiss quad	66.99
SQ10	Swiss quad 10m	97.50
SQ15	Swiss quad 15m	105.90

ANTENNA SWITCHES

SA450	SO239 connectors, 1 in, 2 out	9.75
SA450N	N-type connectors, 1 in, 2 out	12.75

ROTATORS

KR250	Kenpro Lightweight 1-1½" mast	48.00
9502B	Colorotor (Med. VHF)	56.60
KR 400RC	Kenpro – inc. lower clamps	P.O.A.
KR 600RC	Kenpro – inc. lower clamps	P.O.A.

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BY1	Keyer Paddle (black base)	35.84
BY2	Keyer Paddle (chrome base)	43.72
BY3	Keyer Paddle (gold plated)	92.00
ZA 1A	Balun 3-5-30MHz for dipoles	15.00
ZA 2A	Balun 14-30MHz for beam ant	17.25

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202HD	Head set mic with control box and fet head	29.00
202HM	Headphones unit, fet mic with control box	39.00
202S	Flexible neck clip mic with control box	21.95
MS10	Mobile speaker and message pad, visor mount	16.25

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SP300	1.8-150MHz 20-200W-1kW PWR/SWR Meter	97.00
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SP15M	1.8-160MHz 5-20-200WW PWR/SWR Meter	35.00
SP45M	130MHz-470MHz POWER/SWR Meter	51.00
SP-10X	Compact version of SP15M	24.45
SP250	1.8-60MHz 20-200-2kW	49.50
SP350	1.8-500MHz 5-20-2kW	59.95
AC38	3.5-30MHz ATU 400W PEP (8 bands)	65.00
CT15A	15-50w dummy load. (PL259)	7.95
CT15N	15-50w dummy load. ('N' plug)	13.95
CT150	150/400w dummy load. Rated 250MHz (SO239)	35.50
CT300	300/1kW dummy load 250MHz (SO239)	49.50
CT03N	3W dummy load 1.3GHz ('N' socket)	30.00
CH20A	2 way coax switch 1kW 900MHz (SO239)	17.95
CH20N	2 way coax switch 1kW 1.3GHz ('N' socket)	31.95
TP05X	50-500MHz power meter with load	13.95
TP25A	50-500MHz 25W power meter with load	17.50
TP20G	30-1500MHz power meter with load	139.00
CA35A	Static discharge protector. DC 500MHz 300w SO239	10.75
CA23N	Static discharge protector. DC 1500MHz 300w 'N'	12.60

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MMT 70/28	4m Transverter for HF Rig	115.00
MMT 1296/144	23cm Transverter for 2m Rig	184.00
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MML 144/50S	2m 50W linear Amp (10W1/P)	85.00
MML 144/100S	2m 100W linear Amp (10W1/P)	139.95
MML 432/20	70cm 20W linear Amp (3W1/P)	85.00
MML 432/50	70cm 50W linear Amp	109.95
MML 432/100	70cm 10/100W linear Amp	228.65
MM 2001	RTTY to TV converter	189.00
MM 4001	RTTY transceiver	269.00
MM 400KB	RTTY transceiver with keyboard	299.00
MMC 50/28	6m converter to HF Rig	29.90
MMC 70/28	4m converter to HF Rig	29.90
MMC 144/28	2m converter to HF Rig	29.90
MMC 432/28S	7cm converter to HF Rig	37.90
MMC 432/144S	70cm converter to 2m Rig	37.90
MMC 435/600	70cm ATV converter	27.90
MMK 1296/144	23cm converter to 2m Rig	69.95
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MMD 600P	600MHz prescaler	29.90
MMDP 1	Frequency counter probe	14.90
MMA 28	10 meter pre amp	16.95
MMA 144V	2m RF switched pre amp	34.90
MMF 144	2m band pass filter	11.90
MMF 432	70cm band pass filter	11.90
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D70	Morse Tutor	56.35
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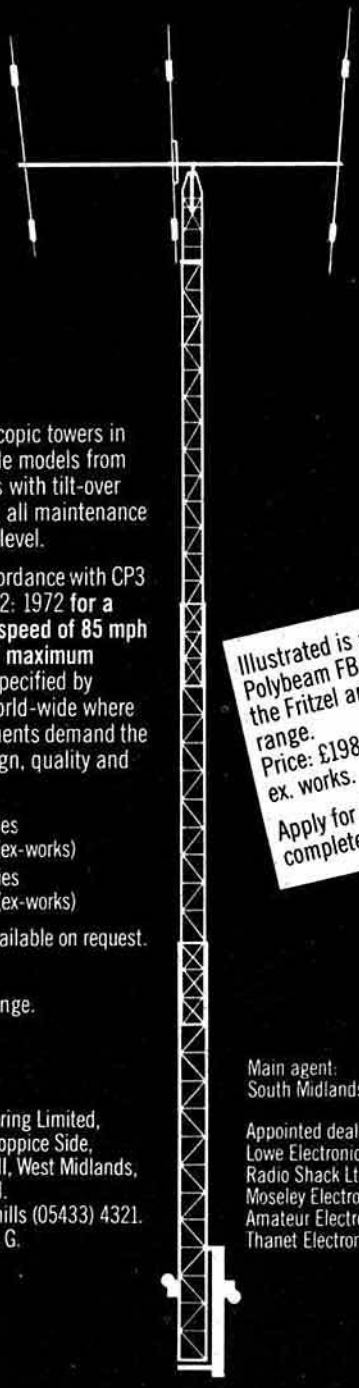

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LEE LONDON'S LEADING SUPPLIER OF — STANDARD ★ ICOM ★ YAESU ★ FDK ★ WELZ ★ J-BEAM ★ DATONG ★ HI-MOUND ★ TELECOMM ANTENNAS ★ COMMUNIQUE PRODUCTS ★ OSCAR METERS ★ AND MANY MORE TOO NUMEROUS TO MENTION ★ LEE

TELECOMM

TOP QUALITY MOBILE ANTENNAS

TA-301 2m ¼ wave with snap-in mount and cutting chart **£3.99**

TA-309 2m ⅝ wave 3dB gain with snap-in mount and cutting chart **£9.95**

TA-330 UHF 3dB gain with snap-in mount and cutting chart **£10.50**

TA-3MM Magnetic mount for the above supplied with coax cable and PL259 fitted **£9.75**

MASPRO ¼ wave mobile **£17.95**
FOLD DOWN Gutter mount for above **£7.50**

WE WILL MAKE HELICAL ANTENNAS TO YOUR SPEC. PHONE FOR REQUIREMENTS.

YAESU MUSEN

THE LARGEST RANGE IN LONDON! PHONE FOR PRICES!

HI-MOUND KEYERS

KH707	Straight Up/Down keyer	£12.00
BK100	Semi auto/mechanical bug	£17.88
HK702	Up/Down keyer on marble base	£22.43
MK702	Manipulator	£22.43
MK704	Squeeze paddle	£10.00
MK705	Squeeze paddle on marble base	£22.43

ALL PRICES INC. VAT. P&P 50p

ADONIS MICS

AM802/3 Desk mic	£59.95
AM502 Desk mic	£29.95
202S Boom mic	£23.00
202HD Headset	£34.44
202FX Swan neck	£37.80

ALL PRICES INCLUDE VAT P&P 50p.

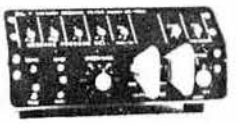
ICOM

FULL RANGE IN STOCK

SWR200B swr/power meter covering 3 200MHz 50/75 Ohm power range 3 30MHz, 20/200/2kW. VHF 2/20/200W **£40.25** inc. VAT. P&P 50p.

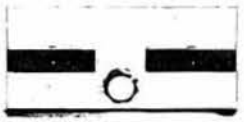
EK-150

A semi or fully automatic squeeze keyer producing dots and dashes in the precise ratio required for perfect code. The speed is adjustable from 0 60wpm. Power inputs 110/240V AC or 9-14V DC. **£74.75** inc. VAT. P&P £1.00.

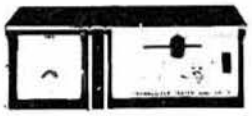


MK-1024

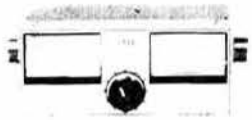
As EK 150 but with four memories each capable of storing 256 bits making a total of 1,024 bits. This can be recalled separately or in sequence for one lone message **£109.25** inc. VAT. P&P £1.00.



T-435: VHF/UHF swr and power meter with 2/20/120 watt through line power measurement **£37.50** inc. VAT. P&P 75p.



UH74 SWR and power meter switchable HF, 2m and 432MHz with remote head at **£16.95** inc. VAT. P&P 75p.



SWR25: This ever popular twin SWR and Power meter covers 3-5 150MHz at **£12.00** inc. VAT P&P 50p

DL-30 Dummy load 25W DC-150MHz **£6.00** inc. VAT. P&P 25p.
T-100 100W Dummy load DC-500MHz **£24.25** inc. VAT. P&P 25p.
T-200 150W Dummy load DC-500MHz **£34.50** inc. VAT. P&P 25p.

LARGEST STOCKIST OF MICROWAVE MODULES PRODUCTS

COAX SWITCHES

★ **SA-450** ★

High quality coax switch housed in a diecast box with S0239s

Frequency	3-5 500MHz
Loss	0-02dB
Weight	450gms
Max power	2-5kW
Impedance	50ohm

SA450 £10.24

CT-1 Coax toggle, 3 S0239s **£6.04** inc. VAT. P&P 25p.

CT-2 Coax toggle, 2 S0239s, 1 PL259 **£6.04** inc. VAT. P&P 25p.

TS-120 Coax slide switch, 3 SO239s **£6.75** inc. VAT. P&P 25p.

POWER SUPPLIES

PX402

PX402 13·8V dc 3A max fully stabilised power supply with overload protection **£19.95** inc. VAT. P&P £2.00.
PH5000 13·8V dc 5A continuous 7A max. Fully stabilised **£46.00** inc. VAT. P&P £2.00.
EP3000 25a Cont. 30a Surge **£96**
EP3010 as above, twin meters + variable.

10 m FM FOR ONLY £55!!

The Telecomm TC9000 FM CB transceiver will convert very easily into a sensitive 10m FM mobile set covering 29.310 to 29.700MHz in 10KHz steps. All that's needed is a crystal change and a retune.

We even supply the crystal FREE

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incl. V.A.T.

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9.30am-1pm Thurs.
10am-4.30pm Sat.

WOOD & DOUGLAS

NEW PRODUCTS are appearing— such as the 144LIN25B and MPA2. Send for further details

PROJECT	CODE	ASSEMBLED	KIT
70cms EQUIPMENT			
Transceiver Kits and Accessories			
FM Transmitter (0.5W)	70FM05T4	38.10	24.95
FM Receiver	70FM05R5	68.25	48.25
Synthesiser (2 pcb's)	70SY25B	84.95	60.25
Synthesiser Transmit Amp	A-X3U-06F	27.60	17.40
Synthesiser Modulator	MOD 1	8.10	4.75
Bandpass Filter	BPF 433	6.10	3.25
PIN RF Switch	PSI 433	9.10	7.75
Converter (2M or 10M i.f.)	70RX2/2	27.10	20.10
FM Package 2 (Synthesised)	70PAC2	163.00	128.00
TV Products			
Receive Converter (Ch 36)	TVUP2	26.95	19.60
Pattern Generator	TVPG1	39.95	32.53
TV Modulator	TVM1	8.10	5.30
3W Transmitter (boxed)	ATV-1	87.00	—
3W Transceiver (boxed)	ATV-2	119.00	—
Power Amplifiers (FM/CW Use)			
50mW to 500mW	70FM1	14.65	8.85
500mW to 3W	70FM3	19.65	13.25
500mW to 10W	70FM10	30.70	22.10
3W to 10W	70FM3/10	19.75	14.20
10W to 45W	70FM45	58.75	45.20
Combined Power Amp/Pre-Amp	70PA/FM10	48.70	34.65
Linears			
500mW to 3W	70LIN3/LT	25.75	18.60
3W to 10W (Compat. ATV1/2)	70LIN3/10E	39.10	28.95
Pre-Amplifiers			
Bipolar Miniature (13dB gain)	70PA2	7.90	5.95
MOSFET Miniature (14dB gain)	70PA3	8.25	6.80
RF Switched (30W Max)	70PA2/S	21.10	14.75
2M EQUIPMENT			
Transceiver Kits and Accessories			
FM Transmitter (1.5W)	144FM2T	36.40	22.25
FM Receiver	144FM2R	64.35	45.76
Synthesiser (2 pcb's)	144SY25B	78.25	59.95
Synth Multi/Amp (1.5W o/p)	SY2T	26.85	19.40
Bandpass Filter	BPF 144	6.10	3.25
PIN RF Switch	PSI 144	9.10	7.75
Synthesised FM Package (1.5W)	144PAC	138.00	105.00
Power Amplifiers/Linears			
1.5W to 10W FM (No Changeover)	144FM10A	18.95	13.95
1.5W to 10W FM (Auto-Changeover)	144FM10B	33.35	25.95
1.5W to 10W SSB/FM (Auto c/o)	144LIN10B	35.60	26.95
2.5W to 25W SSB/FM (Auto c/o)	144LIN25B	40.25	29.95
Pre-Amplifiers			
Low Noise, Miniature	144PA3	8.10	6.95
Low Noise, Improved Performance	144PA4	10.95	7.95
Low Noise, RF Switched	144PA4/S	18.95	14.40
SYNTHESISER ACCESSORIES			
Display Decoder/Driver	DISP1/2	22.60	16.10
GENERAL ACCESSORIES			
Toneburst	TB2	6.20	3.85
Piptone	PT3	6.90	3.95
Kaytone	PTK3	8.20	5.95
Relayed Kaytone	PTK4R	9.95	7.75
Regulator	REG1	6.80	4.25
Solid State Supply Switch	SSR1	5.80	3.60
Microphone Pre-Amplifier	MPA2	5.95	3.45
Reflectometer	SWR1	6.35	5.35
CW Filter	CWF1	6.40	4.75
TVI Filter (Boxed)	HPF1	5.95	—
MICROWAVE PROJECTS			
Microwave Drive Source	MD05T	29.50	20.40
Bandpass Filter	BPF 384	5.10	3.25
4M EQUIPMENT			
FM Transmitter (1.5W)	4FM2T	34.75	21.20
FM Receiver	4FM2R	61.65	43.15
Pre-Amplifier	4PA4	10.95	7.95
Pre-Amplifier, RF Switched	4PA4/S	18.95	14.40
6M EQUIPMENT			
Converter (2M)	6RX2	27.60	19.95

Enquiries by post should contain a SAE. Please restrict telephone technical enquiries between 6 pm and 9 pm in the evening on either 0256 24611 or 07356 5324. Access and Barclaycard orders can be taken on 07356 5324.

MAIN AGENTS: J. Birkett, LINCOLN 0522 20767
Darwen Electronics, LANCS 0254 771497
Amateur Radio Exchange, ACTON 01-992 5765
Wood & Douglas (Scandia) HM, SWEDEN 040 94 89 55

Prices include VAT at the current rate. Please add 75p postage and handling to the total order. ATV-1 and ATV-2 orders should include £2.00 for postage and insurance. Please allow 28 days for delivery if not stock at time of ordering.

UNIT 13, YOUNGS DEVELOPMENT, ALDERMASTON, READING RG7 4PQ

ANTENNES TONNA (F9FT)

YOUR NUMBER ONE CHOICE FOR 6m, 2m, 70, 24 and 23cm ANTENNAS

50MHz	L(M)	W(kg)	
5 element†	3·5	3·2	£34.30(a)
144MHz			
4 element	0·87	0·5	£14.95(a)
9 ele fixed	3·3	1·9	£17.71(a)
9 ele portable	3·3	1·7	£20.00(a)
9 ele crossed	3·5	2·0	£32.43(a)
13 ele portable†	4·5	2·5	£31.05(a)
17 ele fixed	6·60	4·5	£37.66(a)
435MHz			
19 element	3·2	1·1	£20.70(a)
19 ele crossed†	3·3	1·8	£34.27(a)
21 element	4·6	2·6	£29.67(a)
21 element ATV	4·6	2·6	£29.67(a)
144/435MHz			
Oscar Special			
9 & 19 element†	3·3	2·0	£34.27(a)
1,250MHz or 1,296MHz			
23 element	1·8	0·9	£25.90(b)
4 × 23 ele antennas – power splitter – stacking frame			£140.00(a)

Power Splitters 50Ω I/P & O/P
2 way 144MHz **£32.62(c)**
435MHz **£31.05(d)** 1250MHz **£26.45(d)**
4 way 144MHz **£37.37(c)**
435MHz **£35.78(d)** 1250MHz **£28.02(d)**
1296MHz **£28.02(d)**
Telescopic Portable Masts
4 × 1m **£18.68(a)**, 3 × 2m **£21.85(a)**
4 × 2m **£33.20(a)**
ANDREW HELIAX LDF4-50 COAXIAL CABLE
Attenuation per 100ft. 144MHz-0.8dB.
435MHz-1.6dB. 1296MHz-2.9dB.
£3.40 per metre(a). 'N' Type connectors for LDF4-50 male or female **£12.00**

†Denotes 50Ω ONLY – all others 50Ω or 75Ω impedance
MICROWAVE MODULES
ROTATORS · COAXIAL CABLES ETC

PLEASE ADD CARRIAGE AS SHOWN (a) £4.00. (b) £1.95. (c) £2.20 (d) £1.10 mainland only
Terms, cash with order. ACCESS, VISA – telephone your card no. **All prices include VAT @ 15%**
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H100 Super Low Loss 50Ω coaxial cable

Typical example:
Transmitter power – 100 watts (cable length 40m)

MHz	UR67	H100	
28	72W	82W	+14%
144	46W	60W	+30%
432	23W	43W	+87%
1296	6W	25W	+317%

See the detailed comparison in our advertisement of the March issue of Radio Communication *page 277*

PRICE 80p per metre (post 5p/m)
(10% off 50m—20% off 100m)
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W.H. WESTLAKE, CLAWTON, HOLSWORTHY, DEVON (0409 253758)

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VARIABLE CAPACITOR 10+10+20pf Direct Drive @ **£1.15.20 ASSORTED TANTALUM CAPACITORS** for **85p. VHF FETS** J304 @ **6 for £1,** J230 @ **25p** each. **RF CHOKES** 1U.H., 4·7U.H., 10U.H., 47U.H. All at **10p,** 100MH @ **20p. 25 VARI-CAP DIODES.** Assorted for **50p. PHILLIPS 500+500pf MEDIUM SIZE AIR SPACED VARIABLE @ £1.50. MOTOROLA 2N 5590** 10W, 175MHz, 13V @ **£4.75. X BAND VARIABLE ATTENUATORS** Type 6020/3 @ **£18. X BAND WAVE GUIDE TWISTS.** Square Flanges 12" long @ **£5.** 6011/2 SLOTTED LINES Less carrier @ **£85,** 6037/6 **WG12 TRANSFORMERS @ £15. 3" LONG WG16** SQUARE TO ROUND @ **£5. MINIATURE CERAMIC PLATE** 1·5, 1·8, 3·9, 4·7, 5·6, 6·8, 15, 18, 22, 27, 33, 39, 44, 56, 68, 100, 180, 220, 330, 1000, 1200, 1800, 3300, 4700pf, 0·01uf. All 63v.w. @ **25p doz. CERAMIC TRIMMERS** 2·5 To 6, 3 To 10, 4 To 20, 7 To 35, 10 To 40, 10 To 60pf. All at **15p** each. **MINIATURE 15pf AIRSPACED TRIMMERS** @ 20p, TETFER VHF 10pf @ **18p. HEWLETT PACKARD HOT CARRIER DIODES** 5082-2800 @ **40p. HC6U CRYSTALS** 3.495, 5.051, 6.017, 9.030, 10.0062, 10.1125, 10.125, 10,150, 10.212,10.514, 11.100, 15.300, 15.800, 18.006, 44.3, 45.9, 46.1, 46.5, 48.3, 50.1MHz All at **£1** each.
WOOD AND DOUGLAS KITS AVAILABLE TO CALLERS.

Please add 30p for post and packaging. Orders over £3 post free.

GW3SSY **AIRCOM of Abergavenny** GW4IHN
THE FRIENDLY EMPORIUM IN A TOURIST TOWN

Plenty for the XYL to do while you browse in stock—rigs and accessories, Microwave Modules, Jaybeam, rotators, etc.

Access and Visa welcome.
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HIGH QUALITY R.F. CONNECTORS AT CHEAP CONNECTOR PRICES

CONNECTORS SUFFIXED 'S' DENOTES SILVER PLATED ALL OTHERS ARE NICKEL PLATED WITH DELRIN INSULATOR

HIGH QUALITY NiCAD BATTERIES

FORMAT	CAPACITY	PRICES 1-9	10-24	25-99
AA	0.50Ah	0.90	0.85	0.82
*AA	0.50Ah	0.96	0.91	0.88
*½AA	0.25Ah	1.20	1.14	1.08
*½A	0.45Ah	1.53	1.45	1.38
*RR (sub C)	1.20Ah	1.70	1.61	1.52
C	2.20Ah	2.40	2.30	2.20
D (sub D)	1.20Ah	2.40	2.30	2.20
D	4.00Ah	3.50	3.32	3.15
*D	4.00Ah	3.59	3.41	3.24
*F	7.00Ah	6.85	6.50	6.20
*SF	10.00Ah	10.50	9.50	8.90
PP3	0.11Ah	4.35	4.10	3.85

*DENOTES SOLDER TAGS FITTED

NiCAD CHARGERS

AC.1	SAFT MAZDA AA charger, charges 1 to 4 AA cells	5.90
MC.2	ALTAI MULTICHARGER, charges 1 to 4 AA, C, D cells plus 1 PP3 cell	8.50
PC.3	SAFT MAZDA PP3 charger, charges 1 or 2 PP3 cells	6.90
MC.4	JECKSON MULTICHARGER, charges 1 or 2 AA, C & D cells	7.25
MC.5	JECKSON MULTICHARGER, charges 2 or 4 AA, C & D cells or 1 or 2 PP3 cells	8.50

FERRITES

Ferrite rings for TVI suppression (data supplied)

Small type, 1½"dia × ½" (FX1588 material)	0.42
Large type, 1½"dia × ½" (FX1588 material)	0.80
Ferrite Beads	
Single hole type 4mm dia (FX1115)	0.05
Six hole type 6mm dia (FX1898)	0.15

PREAMP TRANSISTORS

3SK88	145MHz, 26dB gain, 1·1dB NF	0.95
BF981	145MHz, 18dB gain, 0·7dB NF	1.20
BFR91	432MHz, 18dB gain, 1·9dB NF	1.35

R.F. POWER TRANSISTORS

MRF260	145MHz, 10dB gain, 5W output	6.56
MRF261	145MHz, 6dB gain, 10W output	8.74
MRF262	145MHz, 6·3dB gain, 15W o/p	14.40
MRF264	145MHz, 5·2dB gain, 30W o/p	15.26
MRF221	145MHz, 6·3dB gain, 15W o/p	17.60
MRF247	145MHz, 7dB gain, 75W o/p	40.74
MRF245	145MHz, 6·4dB gain, 80W output	44.25
MRF475	1·5-30MHz, 10dB gain, 12W PEP	4.95

All figures for gain and output power are minimum values, full data supplied with all orders. Send SAE for free data sheet on any of the above transistors.

OUR GUARANTEE

Our aim is to provide you with high quality products at realistic prices, to give you the best value for your money.

All products that carry our logo are designed and built by our engineers in the UK and carry a full 12 month guarantee which includes all parts and labour. We are so confident that our products are simply the best that we offer to repair your linear at component cost for up to 5 years from date of purchase. that means we will repair, calibrate and return to you free of charge.

All other products sold by us carry our standard 12 month guarantee.

UHF CONNECTORS

PLUGS

BU 01	PL259 for 0·4" cable (UR67)	0.50
BU 01A	Reducer for 0·2" cable (UR43)	0.11
BU 01B	Reducer for 0·25" cable (UR90)	0.11
BU 02	PL259 as BU01 with metric thread	0.75
BU 03	PL259 for 0·2" cable (UR43)	0.62
BU 04	PL259 push on connector for UR67	0.73
BU 05	PL259 elbow connector for UR43	0.79
BU 06	PL259 solderless connector for UR67	0.55
BU 07	PL259 solderless connector for UR43	0.55
BU08	As BU07 but push on type	0.99

SOCKETS

BU 11	SO259, 4 fixing hole type	0.42
BU 12	SO259 single hole inside nut type	0.55
BU 13	SO259 single hole outside nut type	0.55
BU 14	SO259, 2 hole fixing type	0.42
BU 15	SO259 inline socket for UR43	0.65
BU 16	Chassis mount elbow socket for UR43	0.85

COUPLERS

BU 21	SO259 back to back female	0.85
BU 22	SO259 back to back male	1.32
BU 23	SO259 elbow male to female	0.98
BU 24	Double female single male 'T' coupler	1.35
BU 25	Triple female 'T' coupler	1.55
BU 26	Female to female lightning arrestor	1.12
BU 27	Female to male lightning arrestor	1.30
BU 28	Triple female single male 'X' coupler	2.05
BU 29	Chassis mount back to back female	0.98

ADAPTORS

BU 35	UHF male to N male	N/A
BU 36	UHF male to N female	2.93
BU 37	UHF female to N male	2.93
BU 38	UHF female to N female	2.65
BU 39	UHF female to phono/car aerial male	0.65
BU 40	UHF male to phono female	0.65
BU 41	UHF female to 3·5mm jack plug	0.68
BU 42	SO259 to push on PL259 adaptor	0.85

ALSO SEE BNC ADAPTORS

BNC CONNECTORS

PLUGS

BB 01S	For 0·2" cable (UR43)	0.98
BB02s	For 0·25" cable (UR90)	1.05
BB 03S	Elbow for 0·2" cable (UR43)	N/A

SOCKETS

BB 11S	Chassis mount 4 fixing hole type	0.98
BB 12S	Single hole long thread type	0.96
BB 13S	Single hole short thread type	0.90
BB 14S	In line socket for 0·2" cable (UR43)	0.99

COUPLERS

BB 21S	Back to back female	1.24
BB 22S	Back to back male	1.90
BB 23S	Elbow male to female	2.17
BB 24S	Double female single male 'T' coupler	2.61
BB 25S	Triple female 'T' coupler	2.34
BB 26	Back to back female chassis mount	1.36

ADAPTORS

BB 31	BNC male to UHF male	1.63
BB 32	BNC male to UHF female	1.29
BB 33	BNC female to UHF male	1.45
BB 34	BNC female to UHF female	1.15
BU 35	BNC male to phono female	0.95
BU 36	BNC female to phono male	0.95
BU 37	BNC female to 3·5mm jack plug	1.15

ALSO SEE 'N' TYPE ADAPTORS

BL 01	30W dummy load PL259 connector	6.80
BL 02	5W lighted dummy load (PL259)	2.15
BL 03	2W dummy load PL259 connector	1.25

N TYPE CONNECTORS

PLUGS

BN 01S	For 0·2" cable (UR43)	2.45
BN 02S	For 0·33" cable (RG-5, 6, 21/U)	2.45
BN 03S	For 0·4" cable (UR67)	2.45
BN 04S	For 0·55" cable (UR83 & RG14/U)	2.93

SOCKETS

BN 11S	Chassis mount 4 fixing hole type	1.58
BN 12S	Chassis mount 2 fixing hole type	1.58
BN 13S	Single hole fixing type	1.25
BN 14S	Incline socket for UR67 cable	2.05
BN 15S	Incline socket for UR43 cable	1.86

COUPLERS

BN 21S	Back to back female	1.85
BN 22S	Back to back male	2.73
BN 23S	Elbow male to female	2.54
BN 24S	Double female single male 'T' coupler	3.75
BN 25S	Three female 'T' coupler	3.05

ADAPTORS

BN 31S	N male to BNC male	N/A
BN 32S	N male to BNC female	2.05
BN 33S	N female to BNC male	1.95
BN 34S	N female to BNC female	1.63

ALSO SEE UHF ADAPTORS

BC 01	Solderless inline splicer for UR43	0.45
BC 02	Solderless inline splicer for UR90	0.52
BC 03	Solderless inline splicer for UR67	0.58

BNOS 'A' SERIES POWER SUPPLIES

12/6A ★★NEW★★ **£48.30**
- ★ 13·8V, 6A continuous output
- ★ 7A maximum output current
- ★ 10A current meter
- ★ 10A output terminals
- ★ LED shut down indicator
- ★ Fully protected

12/12A **£86.40**
- ★ 13·8V, 12A continuous output
- ★ 15A maximum output current
- ★ Large 20A current meter
- ★ 15A output terminals
- ★ LED shut down indicator
- ★ Fully protected

12/25A **£125.45**
- ★ 13·8V, 25A continuous output
- ★ 30A maximum output current
- ★ Large 30A current meter
- ★ 30A output terminals
- ★ LED shut down indicator
- ★ Fully protected

12/40A ★★NEW★★ **£225.40**
- ★ 13·8V, 40A continuous output
- ★ 50A maximum output current
- ★ Large 50A current meter
- ★ Large output voltmeter
- ★ LED shut down indicator
- ★ LED out of regulation indicator
- ★ Output sensing terminals
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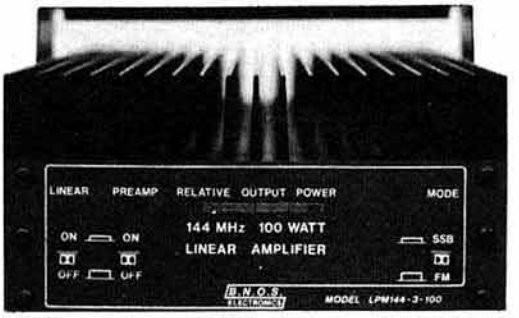

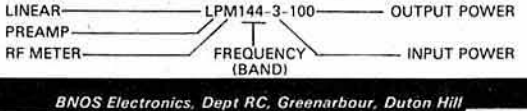

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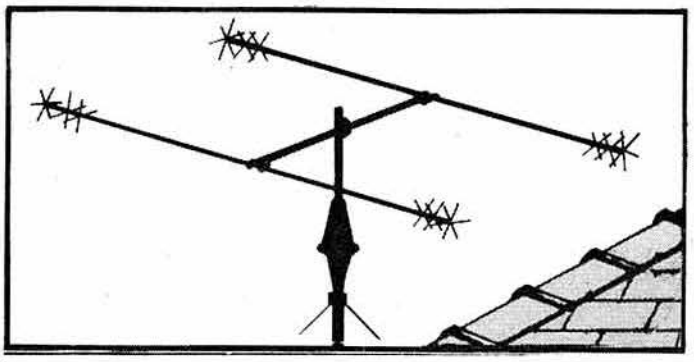

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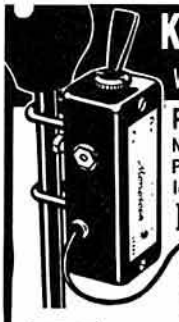

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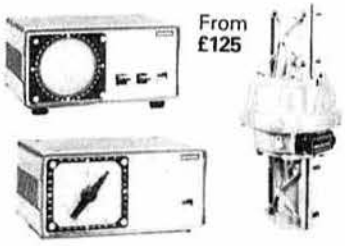

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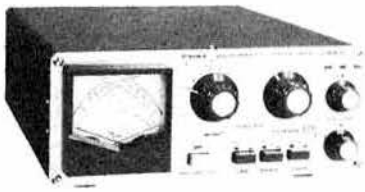

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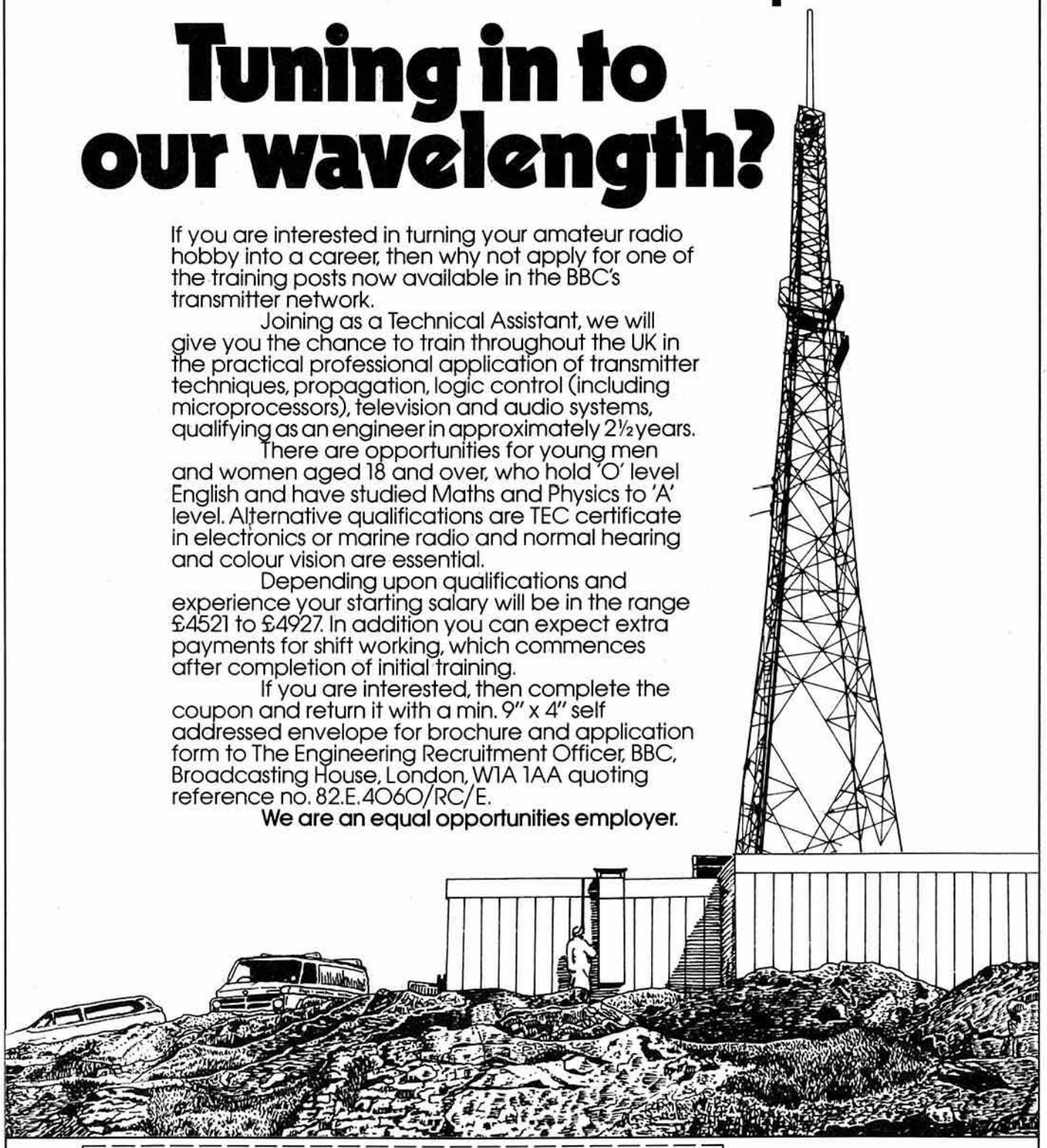

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FT-980

The FT980's innovative design boasts the highest level of microprocessor (80-85) control ever offered as a standard feature in an all mode, all solid state, amateur H.F. transceiver.

Every frequency related function is digitally synthesised permitting local or external control via a personal computer of: Mode, all VFO and memory functions, IF shift and width, clarifier, band limits, FSK shift—and more!

Two independent VFO's—multiple tuning methods including; flywheel knob, two speed scanning in 10Hz (also 5/500 KHz) steps and keyboard entry.

12 totally independent mode/frequency memories (whose contents can be checked even while transmitting) are provided.

Primary digital readout offers resolution to 100 or 10Hz is mode sensitive, displays offsets and even VHF frequencies when used with the matching transvertor. A remarkable secondary display indicates frequency change by scrolling sideways, with a scrolling cursor providing resolution to 1 KHz.

Two receiver front ends are provided, one for general coverage—150KHz to 30 MHz, the other for amateur bands only. Seven high IDss JFETs produce extraordinarily wide dynamic range and the employment of ten V.C.O's secures a high carrier to noise ratio —even in the adjacent channel.

The triple conversion design of the FT980 receiver (Ω 47 MHz, Ω 9 MHz, 455 KHz) incorporates four cascaded stages for all modes and can operate as standard on SSB, CW, AM, FSK and FM transceiving.

The transmitter covers all H.F. amateur bands in 500 KHz segments. Convenience features include: simultaneous measurement of forward and reverse S.W.R., or compression (RF processor) or Ic or Vc or output power or ALC (includes "easy adjust" peak hold facility), AMGC (reduces ambient noise on voice transmissions), and a transmission quality monitor (all mode IF demodulator).

With a P.A. rated for 560W dissipation 100W PEP is produced from a 24V line with 3 order intermodulation at typically −40dB. Full thermal (with blower and VSWR) protection (though power delivery is still 75% of full into a 3:1 VSWR!) are of course standard.

For CW, full break-in and calibrating (spotting —zero beating with other station) and choice of sidetones are fitted, and an inbuilt Curtis Keyer is optional.

Other FT980 features include AGC speed, tone, FM, squelch and centre zero meter, additional 'write' button for protected memories, display dim, dial lock, QSK linear provisions—the list is almost endless—Ask your authorised Yaesu dealer for a full colour leaflet or better still call in to him and try one out today!

GENERAL

Frequency coverage
Rx; 50 KHz—30 MHz (continuous)
Tx; 10-160M (9 bands)

Frequency accuracy
Better than ±3p.p.m (0-40°C)

Tuning steps
10Hz, 5 KHz & 500 KHz (band)
Direct/Computer keyboard entry

Modes of operation
J3E (LSB/USB), A1A (CW), A3E (AM), J1B (AFSK), G3E (FM); Rx & Tx

Power requirements
100/120-200/234 V 50/60 Hz
72VA Rx, 530VA Tx (100W out)

Dimensions (Ex/Inc projections)
370/380W x 157/165H x 350/465D mm
17Kg, Nett

Options

XF-455.8MCN	300Hz CW Filter
XF8.9HC	600Hz CW Filter
XF8.9GA	5 KHz AM Filter
MH-1-B8	Hand Scan Microphone
MD-1-B8	Desk Scan Microphone
D3000026	Curtis Keyer Unit
FIF-80	Computer Interface

RECEIVER

Sensitivity (2-30MHz)

J3E/A1A/J1B	:0.25μV	(2.4 KHz)
(10dB S+N/N)	0.16μV	(600 Hz)
	0.10μV	(300 Hz)
A3E	:1.40μV	(6 KHz)
(10dB S+N/N)	1.25μV	(5 KHz)
	1.00μV	(3 KHz)
G3E (12dB SINAD)	:0.60μV	(12 KHz)

Sensitivity (150 KHz-2 MHz)

J3E/A1A/J1B	:4.0μV	(2.4 KHz)
(10dB S+N/N)	2.6μV	(600 Hz)
	1.6μV	(300 Hz)
A3E	:22μV	(6 KHz)
(10dB 5+N/N)	20μV	(5 KHz)
	16μV	(3KHz)

Dynamic range
95dB in 300 Hz (max sensitivity)

Audio peak filter
350 Hz-1400 Hz

IF notch filter
500 Hz-2700 Hz (demodulated)

Audio
4-16 Ohms, 3W in 4 ohms (10% THD)

Image/I.F. rejection
Better than 70dB

TRANSMITTER

Power output
J3E/A1A : 100W(PEP)
A3E : 25W
G3E/J1B : 50W

Intermodulation (3rd Order)
Better than −40dB (14 MHz 100W)

Carrier suppression
Better than −50dB (peak output)

Sideband suppression
Better than −50dB (1 KHz tone)

Spurious radiation
Better than −50dB (peak output)

Audio response
Better than 250 Hz-2750 Hz @ −6dB

FM deviation
±5 KHz (maximum)

AFSK shift
170, 425, 850 Hz

Microphone impedance
600 Ohms nominal

Output impedance
50 Ohms nominal, unbalance

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