May 1982

RADio COMmunication

THE YAESU FT101ZD HF SSB TRANSCEIVER

THE SUBJECT OF PETER HART'S LATEST REVIEW

In this issue

Journal of the Radio Society of Great Britain

MICROWAVE MODULES LTD

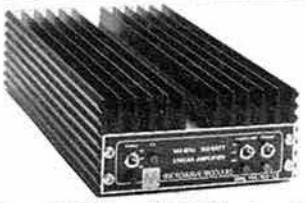
FROM THE HALL OF FAME

MML144/30-LS

Price: £65 inc VAT (p + p £2·50)

144MHz 30 WATT LINEAR AMP AND RECEIVE PREAMP
Switchable input, 1 or 3 Watts, suitable for use with rigs such as C58, FT290-R, TR2300 etc

MML144/100-LS



Price: £145 inc VAT (p + p £3)

144MHz 100 WATT LINEAR AMP AND RECEIVE PREAMP
Switchable input, 1 or 3 Watts, suitable for use with rigs such as C58, FT290-R, TR2300 etc

MMA144V

Price: £34·90 inc VAT (p + p £1)

144MHz RF SWITCHED LOW NOISE PREAMPLIFIER
Noise figure: 1·3dB max
100 Watts through power capability
Utilises 3SK88 MOSFET

MML432/100

Price: £228·65 inc VAT (p + p £4)

432 MHz 100 WATT LINEAR AMP
RF Vox, VSWR and thermal protection
Power gain: 10dB
Typical input: 10 Watts

MMT432/144-R

Price: £184 inc VAT (p + p £2·50)

432MHz LINEAR TRANSVERTER WITH REPEATER SHIFT
For use with 2 metre transceivers
10 Watts RF output, low-noise receive converter

MTV435

Price: £149 inc VAT (p + p £2·50)

435MHz 20 WATT ATV TRANSMITTER
Two channel, two video inputs, internal aerial changeover switching internal waveform test generator

MML28/100-S

Price: £129·95 inc VAT (p + p £3)

28MHz 100 WATT LINEAR AMP AND RECEIVE PREAMP
Suitable for 10 Watt transceivers RF Vox, switchable PA and preamp

MML144/100-S

Price: £129·95 inc VAT (p + p £3)

144MHz 100 WATT LINEAR AMP AND RECEIVE PREAMP
Suitable for 10 Watt transceivers RF Vox, switchable PA and preamp

MMS1

Price: £115 inc VAT (p + p £2·50)

THE MORSETALKER
Speech synthesised Morse Tutor.
2-20 wpm, variable group lengths, ideal for amateur, Post Office and Maritime Exams

OUR ENTIRE RANGE OF PRODUCTS WILL BE EXHIBITED AND ON SALE AT MOST OF THE 1982 MOBILE RALLIES BY OUR OWN SALES TEAM, COME AND TAKE A CLOSER LOOK

ALL MICROWAVE MODULES PRODUCTS ARE FULLY GUARANTEED FOR 12 MONTHS (INCLUDING PA TRANSISTORS)

Access BARCLAYCARD VISA
WELCOME

MICROWAVE MODULES
BROOKFIELD DRIVE, AINTREE, LIVERPOOL L9 7AN, ENGLAND
Telephone: 051-523 4011 Telex: 628608 MICRO G

CALLERS ARE WELCOME, PLEASE TELEPHONE FIRST

HOURS:
MONDAY-FRIDAY
9-12.30, 1-5.00

MAY 1982

VOLUME 58 No 5

RADio COMmunication

EDITOR
A. W. Hutchinson

Assistant editor
Miss S. M. Walker

Draughtsman
D. E. Cole

Editorial secretary
Mrs O. M. Ogles

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

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

Tel 0245 84938

Office hours: 0900 to 1700

ADVERTISING

Advertising, other than Members' ads, should be sent to:

M. J. Hawkins, G3ZNI,
Advertisement Officer,
RSGB,
35 Doughty Street,
London WC1N 2AE

Tel 01-837 8688

EDITORIAL CONSULTANT

J. P. Hawker, G3VA

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

RSGB Headquarters,
35 Doughty St,
London WC1N 2AE

Tel 01-837 8688

Business hours: 1000 to 1600

CONTENTS

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

All articles received are reviewed for technical merit by the RSGB Technical & Publications Committee, or an acknowledged expert on the subject, before acceptance. Payment 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.

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

ABC MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

29,080 copies per issue average circulation in 1981

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

NEW HF TRIO *pacesetter in amateur radio*

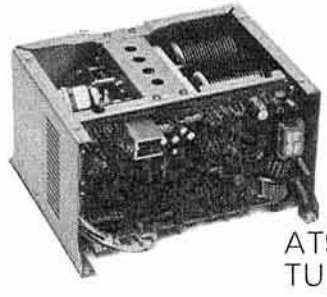
With the advent of amateur band transceivers/general coverage receivers in one package, the question all the inquiring Trio owners asked was "when will Trio produce their answer/equivalent to the FT-one?". We are delighted to say that it's here right now and, if previous experience is anything to go by, Trio have got it right first time (as always).

The basic package is apparently straightforward. The TS930S is all solid state, gives 120W out from transistors run from a 28V supply for "better than the rest" linearity; covers all amateur bands and general coverage from 150kHz to 30MHz; uses a built-in power supply; has digital readout; has twin VFO and multi channel memory facilities and so on and so on.

TS 930S

AMATEUR BAND
TRANSCEIVER
£1078.00 inc VAT
Carriage £5.00

SP930 SPEAKER



AT930 AUTO ANTENNA
TUNER UNIT

What makes the TS930S stand out from the rest is, once again, the Trio attention to detail. I have always said, Trio design their equipment to be used by the average amateur, whereas some rigs look like the control panels for the space shuttle. The acid test is to sit down in front of the TS930S and compare it *in use* to anything else. Notice how the RF and AF gain controls are together, as are the mic gain and carrier level controls.

Need the variable bandwidth? Trio have come up with the most versatile system ever, with completely independent adjustments for the upper and lower sides of the filter passband, so you can have any bandwidth you like anywhere around the signal you want – think about it.

Now switch on and operate on 14MHz. So simple, just touch the button marked 14. Need to go to 21? Just push the button marked 21. Compare that to some rigs which need four hands and a degree in computing science to even get switched on!

What about general coverage? Equally simple using the 1MHz step buttons. If you are on 14MHz and you need to listen to the 15MHz broadcast band just touch the 1MHz UP button and there you are. Keep going and you step right through the spectrum in 1MHz bands.

Now just mention some of the other features, look at the display which is bright white on a black background. Frequency readout is to 100Hz whilst the synthesiser tunes in 10Hz steps for true "VFO feel". Also included in the display are an analogue dial and the RIT offset in kHz away from dial frequency.

The memory facilities not only remember frequency but also mode in use, and because of the operating simplicity of the TS930S, you don't have to fill the memories with the amateur bands. RF speech processing is fitted together with tunable audio filtering and full break in keying for the real CW operator. The noise blanker system has switchable gate times to cope with not only impulse noise but also the infamous "woodpecker" *And it works.*

Finally, there is provision for fitting *internally* a fully automatic aerial tuner for the amateur bands.

Alan, just back from Tokyo where he tried out the 930, is walking about in a daze muttering, "I've got to have the first one." Judging by his impressons of the rig, it's simply fabulous and we can't wait. By the time you read this, we should have them on show (and in use), so come, see, try out the new leader in HF rigs. The family is now completed from TS130S/V through TS530S, TS830S to the amazing TS930S. There is now a rig to suit everyone in the Trio range.

LOWE ELECTRONICS Ltd

CHESTERFIELD ROAD MATLOCK DE4 5LE TEL 0629 2430/2817

NEW *from Trio for 1982*

The R-600 is a high performance general coverage communications receiver covering 150kHz to 30MHz in 30 bands, at an affordable price. Use of PLL synthesized circuitry provides high accuracy of frequency with maximum ease of operation.

R-600 FEATURES:
- 150kHz to 30MHz continuous coverage, AM, SSB, or CW.
- 30 bands, each 1MHz wide, for easier tuning.
- Five digit frequency display, with 1kHz resolution.
- 6kHz IF filter for AM (wide), and 2·7kHz filters for SSB, CW and AM (narrow).
- Up-conversion PLL circuit, for improved sensitivity, selectivity and stability.
- Communications type noise blanker eliminates "pulse-type" noise.
- RF Attenuator allows 20dB attenuation of strong signals.
- Tone control.
- Front mounted speaker.
- "S" meter, with 1 to 5 SIMPO scale, plus standard scale.
- Coaxial, and wire antenna terminals for 2MHz to 30MHz. Wire terminals for 150kHz to 2MHz.
- 100, 120, 220, and 240VAC, 50/60Hz. Selector switch on rear panel.
- 13·8V DC operation.
- Other features include carrying handle, headphone jack, and record jack.

R600

R600 RECEIVER. £235.06 inc VAT carriage £4.50

The TR-2500 is a compact 2 metre FM handheld transceiver featuring an LCD readout, 10 channel memory, lithium battery memory back-up, memory scan, programmable automatic band-scan and Hi/Lo power switch.

TR-2500 FEATURES:
- Extremely compact size and light weight 66 (2-5/8) W × 168 (6-5/8) H × 40 (1-5/8) D, mm (inches), 540g, (1·2lbs) with Ni-Cd pack.
- LCD digital frequency readout, with memory channel and function indication.
- Ten channel memory, includes "M0" memory for non-standard split frequencies.
- Lithium battery memory back-up, built-in, (estimated 5 year life) saves memory when Ni-Cd pack discharged.
- Memory scan, stops on busy channels, skips channels in which no data is stored.
- UP/DOWN manual scan in 5kHz steps.
- 2·5W or 300mW RF output. (HI/LOW power switch.)
- Programmable automatic band scan allows upper and lower frequency limits and scan steps of 5kHz and larger (5, 10, 15, 20, 25, 30kHz . . . etc) to be programmed.
- Slide-lock battery pack.
- Repeater reverse operation.
- Keyboard frequency selection across full range.
- Frequency coverage, 144·000 to 145·995MHz
- Optional power source, MS-1 mobile or ST-2 AC charger/power supply allows operation while charging. (Automatic drop-in connections.)
- High impact plastic case.
- Battery status indicator.
- Two lock switches for keyboard and transmit.

STANDARD ACCESSORIES:
- Flexible rubberized antenna with BNC connector.
- 400mAH heavy-duty Ni-Cd battery pack.
- AC charger.

TR2500

TR2500 HANDHELD TRANSCEIVER £207.00 inc VAT carriage £4.50

APPROVED TRIO DEALER

BIRMINGHAM
Ward Electronics
Soho House,
362-364 Soho Rd.
Birmingham B21 9OL
021 554 0708

BUCKINGHAMSHIRE
Photo Accoustics Ltd
58 High St
Newport Pagnell
Bucks. 0908 610625

EAST SCOTLAND
Jay-Cee Electronics
20 Woodside Way
Glenrothes
Fife KY7 5DE. 0592-756962

ESSEX
Waters & Stanton Electronics
Warren House
18-20 Main Rd
Hockley, Essex. 0702 206835

HAMPSHIRE
Telecomms
189 London Road
North End, Portsmouth
0705 60036/62145

LANCASHIRE
Stephens-James Ltd
47 Warrington Rd
Leigh
0942 676790

NORTH LONDON
Radio Shack Ltd
188 Broadhurst Gardens
London NW6 3AY
01-624 7174

SOUTH LONDON
Catronics Ltd
20 Wallington Square
Wallington SM6 8RG
01-669 6700

WALES
MRS Communications Ltd
76 Park Rd
Whitchurch, Cardiff
0222 616936

W. SUSSEX
Bredhurst Electronics
High St. Handcross
Haywards Heath
W. Sussex 0444 400786

YORKSHIRE
Leeds Amateur Radio
27 Cookridge St
Leeds LE2 3AG
0532 452657

NORTHERN IRELAND
Georgé Moore Electronics
7 Ravenhill Park Gardens
Belfast BT6 0DH
Belfast 647570

TRIO

As the appointed distributors for Trio, we recommend that you purchase your Trio equipment from an approved stockist (list above). Any stockist *not* on the list has no connection with the Trio UK sales and service organisation and cannot, despite claims to the contrary, offer any meaningful guarantee of backup service on Trio equipment.

NEW | UHF | VHF

I am sure that most of you are aware that I, as part of my job here at Lowe Electronics, am forced to take home the new pieces of equipment to evaluate on the air, to use in an amateur environment and to assist in the preparation of advertising material. I am sure you all sympathize with me and I am grateful for your understanding. However, a piece of equipment has just passed through my hands and, although the rig has returned whence it came, there still exists in my shack its aura. **What piece of equipment am I talking about?** well, since your have shown yourself as discerning by the mere mention of the word Trio, I will tell you – the new dual bander all mode 70cm and 2 metre transceiver: the TS780.

To put the rig in perspective, let me explain how 70cm came to be found in my shack.

As the proud owner of a TS700S all mode 2 metre transceiver, and urged on by local amateurs already using 70cm, I decided to splash out and join them. So I obtained a 2 metre to 70cm transverter. Unfortunately – and the fact that my location is some 800 feet above sea level – my 2 metre drive signal could be heard over the larger part of Matlock! Locals would complain, quite rightly, that they never knew whether I was on 2 metres or 70cms and a lot of calls to me went unheeded. After much deliberation and experimentation I gave up 70cm and parted with the transverter.

So I have my 48 element multibeam in position – UR67 coax ready but no equipment.

"Have a TS770", said John and Alan quietly one day. The new rig from Trio, both 2 metres and 70cm in one unit. Photos were studied and the great day came. Two rigs were specially flown in from Japan – one for the Radio Exhibition at Granby Halls the other, you guessed, into my shack.

The TS770 was, without a doubt, the finest piece of equipment that I had seen: multi-mode on both 2 metres and 70cms, memories programmable and not requiring crystals, the ability to operate cross band using the 2 VFOS, a frequency scan of the entire band for FM signals, a memory scan and last, but not least, the SSB search facility which enables one to scan 100kHz above the set VFO frequency. Add to this a rotator with the ability to continually rotate and you need never miss a 70cm sideband contact.

You may gather from the above that I was highly delighted with my 770. Indeed, when Trio produced the TS770E I didn't change rigs, feeling that the advantages gained were marginal and I, of course, had become very attached to my particular TS770.

However, with the arrival of the TS780, the dual bander rig has come of age, giving the two band multi-mode facilities of the original concept, plus a wealth of additional operating facilities. Taking a trip across the front panel of the rig we have the repeater facilities, a non-locking tone switch, ideal now that most repeaters are tone accessed and carrier maintained. The tone, of course, only works whilst the rig is in the FM mode. Below the tone switch is the TX offset switch giving plus or minus 600kHz or 1.6MHz, depending on whether 2 metres or 70cm is selected and last, but certainly not least, reverse repeater – **to my way of thinking proof that the TS780 was designed for amateurs by amateurs.**

The meter functions on receive as S.meter, ALC meter or as a centre meter, the function being controlled from a panel switch. On transmit the meter reads relative RF output. Immediately above the digital frequency and memory/VFO indicator are indicating leds: a "busy" led indicating in FM mode whether the squelch is open thereby, assuming the squelch level is correctly set, that the other station is transmitting. A "frequency lock" led tells that the F lock switch is pressed and VFO knob inoperative. The "on air" led indicates the rig is transmitting and the "offset" led reminds you that the TX offset switch is set to repeater.

The function knob enables either VFO A or B to be selected and also allows cross frequency and even cross band operation – but, please note, you cannot listen at the same time as you are transmitting: **the TS780 is still a transceiver and to do the above you will require two TS780's.**

The memory operation has been updated: instead of having to progessively move through the memory content in sequence, by means of a rotary switch any of the ten memories (two more than the TS770's) can be selected at will. Entering frequencies into the memory is easier, as anyone who has a TS770 series will explain. Two priority frequencies are included: 9 and 10. Push buttons to the left of the VFO knob allow either of the two programmed frequencies to be quickly selected, immediately cancelling the previous instructions given to the rig. Just the thing for local net frequencies. SSB mic gain needs no explanation, as does the AF/RF gain control.

On the same control knob as the squelch level is a switch enabling the frequency width of scan to be determined. Briefly, when the rig is set to scan either in FM, FM step or SSB mode you can determine the amount of band to be covered.

The ranges are 0.5, 1, 3, 5 and 10MHz, thus you can limit the rig to scan just the section of the band used by the mode you have selected. Example: scan width 0.5MHz, VFO set at 144.000, coverage – 144.000 to 144.5, mode side band – result: free scanning of the SSB portion of the band. On FM the scan locks if a signal is present. On SSB the scan does not stop but you are made aware that there is activity on the band.

Another new control on the TS780 is the IF shift. Available for some time on HF equipment to cope with crowded band conditions, obviously the Trio design engineers have recognised that the 2 metre SSB end of the band can become crowded during contests or when there is "a bit of a lift on". At these times a rig that has the "IF shift" facility will certainly "score points".

The send/receive Vox/Man, meter function, NB, low/high power switches are all well known and have been found on previous generations of Trio base station equipment and again require no explanation. I could say the same thing about the mode switch but here you will notice alongside the standard FM position another marked FM CH. Put the mode switch in this position and instead of a free-running VFO you have a mechanical "click" step feel, the frequency now moving in either 12.5kHz or 5kHz steps. Of course the rig will also scan in these steps, controlled either by the scan switch or the up/down shift microphone. **Again the Trio amateurs who design the equipment have here a major triumph.**

By now you may be seeing why I am so enthusiastic about the TS780 but there is still more to come. How about a memory scan system that will scan either the 2 metre frequencies stored in the memory or the 70cm ones or, if you wish, both. Well that's another feature of the TS780. **Add to this list variable VFO steps of either 20Hz or 200Hz,** a selectable braked feel to the VFO knob, rapid up and down MHz switching and you have the most comprehensive rig ever seen.

Too complicated some may say. Rubbish say I. Trio thrive on rigs designed to be simple to operate. Do you remember what John wrote in Rad Com about the TR7500 and its competitors? **And finally, how about a rig that without resorting to a MHz switch will, by use of the VFO knob, tune from 144 to 146MHz and from 430 to 440MHz – only one rig – the Trio TS780.**

Price £748.00 incl VAT (carriage £5.00).

on having used a TS780

EMPORIUM NEWS

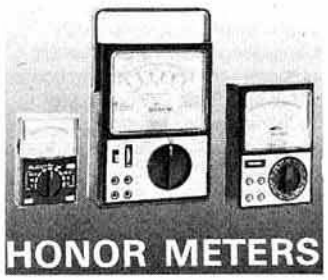
Well here we go again.

I wonder how many of you are taking advantage of the **superb conditions** that I hope we will be having when you get round to reading this issue of Emporium News. I am now writing the May issue and the calender in my shack says that it is only the beginning of March, **so please remember** with all magazines that the information is never completely up to date—indeed, it is usually two months old. Remember this especially when **new models** are being announced or there is a **change of price**. To really keep ahead on the amateur radio scene then why not telephone us or send for a complete set of catalogues. **Just enclose 70p in stamps** and don't forget to write your name and address clearly. Along with the information you require we will also enclose, when relevant, information on the latest special offers: for example, the handheld TR2400 which has just been for sale at £140—I am sorry no more are available, and the VFO 520's which Trio have found in a dusty long lost corner of their warehouse. **VFO 520's available at £73.50.**

My home station is giving me great pleasure. Recently I had the opportunity to use a Microwave Modules MM2000 RTTY decoder and having plugged the unit into the line out socket of the NRD515, switched to RTTY mode, flicked the bandwidth to 2.4KHz—**that reminds me**, I must get the 600Hz filter fitted—plugged in a super deluxe green screen monitor, (ring our computer lads for full details) **and lo and behold nothing!** One week later, I was politely told that my eyes were green, flickering and that my speech was definitely slurred.

However, I had finally tuned the entire band from 100KHz to 30MHz and I had at last found the transmissions for which I was searching—no, I am not at liberty to tell you the frequencies but will simply say that **"the 9 o'clock News"** will never be the same again.

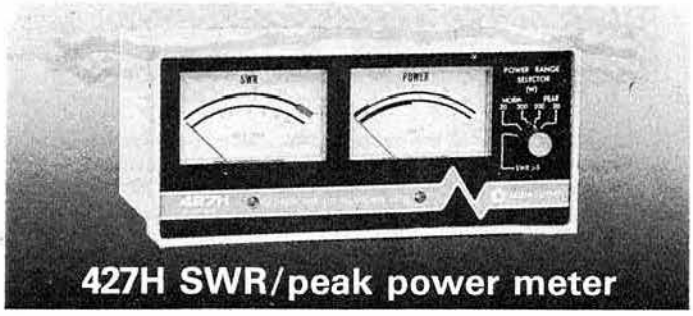
I received my copy of World Radio and TV Handbook, 1982 yesterday. **The NRD has received a good review** so the publication is definitely worth buying. Perhaps though I could enlist the help of all shortwave listeners. **W.R.N.O.**, a new commercial shortwave station in America, **"New Orleans"** to be precise, has commenced transmissions beamed towards Canada and Europe. However, Bob, my friend from the workshop, (another shortwave buff) and myself have not, as yet, heard these transmissions. It would be greatly appreciated if anyone had heard this radio station, **"The Rock of New Orleans"** and can remember its exact frequency if they could please drop us a line.



Our range of shortwave receivers is large. From the SRX30D at £215, the R600 from Trio at £235, the R1000 at £297, the R820 at £589.95 and last, but not least, the NRD515 at £1090. **All of them selected technically** as well as being good value for money. Of course the old adage applies, "You get what you pay for" but, joking apart, the SRX30D, as the least expensive general coverage receiver, takes some beating. **Just imagine** a pair of Trio deluxe headphones, HS5 at £21.85 or the economy HS4 at £10.35 to complete your station, a map on the wall, a long wire aerial out of the window, **a tin of coloured map pins to mark your progress around the globe** and well, I've said it before, "The world at your fingertips". Take a trip around the world courtesy of the multitude of shortwave broadcast stations.

To get the most out of your rig why not go mobile. The majority of base station rigs are, in fact, more than suitable for mobile operation. Indeed, most, if not all of them, come complete with mobile mounting brackets. Even those of you who own the very popular Trio TR2300 may not be aware that a mobile bracket and **matching linear amplifier** are available—I refer, of course, to the MB2 mobile mount at £17.71 and the VB2300 10 watt linear at £58. Even the handheld TR2500 is suitable for mobile operation. **A remote speaker** mike SMC25 at £14.49 and the mobile stand and power unit MS1 at £28.29, coupled with **the handheld provide a package that gives instant reliable communication.**

The VB2500 from Trio will allow the TR2500 to have its power boosted to 25 watts. **Come along to Matlock** and examine and use on the air the best in radio equipment. Anyway, back to aerials for mobile operation. Revco produce a range of amateur aerials, built to professional standards. The Revco range includes $\frac{5}{8}$ and $\frac{1}{4}$ wave whips together with body and magnetic mounts. **The latest Revco bases feature quick release aerials**—so whether you wish to avoid the vandal or you are equally well known by the proprietor of the neighbouring multi storey car park and **the local sales representative for a fluorescent tube manufacturer**, then peace and tranquillity is yours. The Revco $\frac{5}{8}$ whip and coil at £5.80, the $\frac{1}{4}$ wave whip at £1.30, the body mount base at £5.50 and the super deluxe magnetic base at the give away price of £18.35. Don't forget this bargain includes 3 metres of coax, not enough for a **Mercedes hearse** but just right for the family car. For those of you into gutter mounts we also have the now famous Hokushin range: the $\frac{5}{8}$ whip code 2E with foldover base at £8.80 and the $\frac{7}{8}$ whip code 2NE, again with foldover base at £13.00. For the real amateur,



the mobile operator on the 70 cm band, we have the 430E, $\frac{5}{8}$ over $\frac{5}{8}$ at £11.80 **and its big brother**, the 430 Oscar, $\frac{5}{8}$ over $\frac{5}{8}$ over $\frac{5}{8}$ at £15.50. Don't forget a $\frac{1}{4}$ wave whip on 2 metres is also a $\frac{3}{4}$ wave whip on 70 cms, so why not buy a new rig and move onto the mans band, that is 70 cm. **As a final point**, we do not recommend a $\frac{5}{8}$ 2 metre whip on a mag mount—**it will fall off.**

For the keen home brewer, one of the Honor meter range should be part of your collection of test equipment. Three models are available and all are at very low prices. **Ring Traci—you remember her, the girl with red toenails** and she will be delighted to send you a more informative leaflet. Just to whet your appetite: the meters come in three sizes and cost £5.75, £10.50 and £19.50 respectively. Whilst you are enjoying **the delightful voice of Traci** ask for a leaflet on power supplies or anything else which takes your fancy.

I hope by now the TS930S is on show at Matlock. Those of you who have heard **Alan G3MME** on the 80 metre band will agree with me what a superb signal the rig produces. Of course he also uses it **to listen to the Archers** each evening so, all in all, it really is a fine piece of equipment and as John says, **"well worth waiting for"**.

Anyway, that's about it for now as I have just heard a rumour that Anne is **printing £5** notes on the offset litho downstairs. Alan's made the plates so I suppose I shall have to go and tie up the bundles, so, until next time, gud DXes 73es FBYLS, XYLS, esFBOM, etc.

ICOM

TRIED, TESTED AND TRUSTED

The main problem that the amateur of today has to deal with is deciding just which rig out of the many excellent products available he is going to choose. Technology is advancing at such a rapid rate and getting so sophisticated that many cannot hope to keep up. Some go too far!

Perhaps one way of dealing with the problem is to look at just what each model offers in its basic form without having to lay out even more hard earned cash on "extras". The IC-720A scores very highly when looked at in this light. How many of its competitors have two VFOs as standard or a memory which can be recalled, even when on a different band to the one in use, and result in instant retuning AND BANDCHANGING of the transceiver? How many include a really excellent general coverage receiver covering all the way from 100kHz to 30MHz (with provision to transmit there also if you have the correct licence)? How many need no tuning or loading whatsoever and take great care of your PA, should you have a rotten antenna, by cutting the power back to the safe level? How many have an automatic RIT which cancels itself when the main tuning dial is moved? How many will run full power out for long periods without getting hot enough to boil an egg? How many have band data output to automatically change bands on a solid state linear AND an automatic antenna tuner unit when you are able to add these to your station?

Well you will have to do quite a bit of hunting through the pages of this magazine to find anything to approach the IC-720A. It may be just a little more expensive than some of the others – but when you remember just how good it is, and of course the excellent reputation for keeping their secondhand value you will see why your choice will have to be an IC-720A!

IC-PS15 Mains PSU £99

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

Fully synthesized – Covering 144 – 145.995 in 400 5KHz steps. (430-439.999 4E)
Power output – 1.5W with the 9v. rechargeable battery pack as supplied – but lower or higher output available with the optional 6v or 12v packs. Rapid slide-on changing facility.
BNC antenna output socket – 50 ohms for connecting to another antenna or use the Rubber Duck supplied (flexible ¼ λ whip – 4E)
Send/battery indicator – Lights during transmit but when battery power falls below 6v it does not light, indicating the need for a recharge.
Frequency selection – by thumbwheel switches, indicating the frequency. 5KHz switch – adds 5KHz to the indicated frequency.
Duplex simplex Switch – gives simplex or plus 600KHz or minus 600KHz transmit (1·6MHz and listen input on 4E)
Hi-Low switch – reduces power output from 1.5W to 150mW reducing battery drain.
External microphone jack – if you do not wish to use the built-in electret condenser mic an optional microphone speaker with PTT control can be used. Useful for pocket operation.
External speaker jack – for speaker or earphone. This little beauty is supplied ready to go complete with nicad battery pack, charger, rubber duck.

A full range of accessories in stock.		**£ p**
ICML1	10W mobile booster for IC2E	49 00
BP5	11 volt battery pack	30 00
BP4	Empty battery case for 6 x AA cells	5 80
BP3	Standard battery pack	17 75
BP2	6 volt pack	22 00
BC30	Base charger for above	39 00
BC25	Mains charger as supplied	4 25
DC1	12 volt adapter pack	8 40
HM9	Speaker microphone	12 00
CP1	Mobile charging lead	3 20
IC123	cases	each 3 60

All prices include VAT

The IC4E is going to revolutionise 70 CM!

ICOM

Amazingly small, yet very sensitive. Two VFO's, five memories, priority channel, full duplex and reverse. LED S-meter, 25KHz or 5KHz step tuning. Same multi-scanning functions as the 290 from mic or front panel. All in all the best 2M FM mobile ICOM have ever made.

IOW RF ouput on SSB, CW and FM. Standard and non-standard repeater shifts. 5 memories and priority channel.

Memory scan and band scan, controlled at front panel or microphone. Two VFO's LED S-meter 25KHz and 1KHz on FM – 1KHz and 100Hz tuning steps on SSB. Instant listen input for repeaters.

ICOM produce a perfect trio in the VHF base station range, ranging from 6 Meters through 2 Meters to 70 cms. Unfortunately you are not able to benefit from the 6m product in this country, but you CAN own the IC-251E for your 2 Meter station and the 451E for 70 cms.

Both are really well designed and engineered multi-mode transceivers capable of being operated from either the mains or a 12 volt supply. Both contain such exciting features as scan facilities, automatic selection of the correct repeater shift for the band concerned, full normal and reverse repeater operation, tuning rate selection according to the mode in use. VOX on SSB continuous power adjustment capability on FM and 3 memory channels. Of course they are both fitted with a crystal controlled tone burst and have twin VFO's as have most of ICOM's fully synthesized transceivers. There is now a superb low noise mast head pre-amp available for the IC-451.

The famous IC-240 has been improved, given a face lift and renamed the IC-24G. Many thousands of 240's are in use, and its popularity is due in part to simplicity of operation, high receiver sensitivity and superb audio on TX and RX. The new IC-24G has these and other features. Full 80 channels (at 25kHz spacing) are available and readout is by channel number – selected by easy to operate press button thumbwheel switches. This readout can clearly be seen in the brightest of sunlight. Duplex and reverse duplex is provided along with a 12½ KHz upshift, should the new channel spacing be necessary. The old IC-240 proved to be the most reliable rig we have ever sold – the IC-24G because it is so similar, looks like following the same pattern. Remember for mobile use a rig MUST be easy to operate to be safe. Send for technical details.

Thanet Electronics

THE AMATEUR'S PROFESSIONAL FRIEND

IC-730 The best for mobile or economy base station £586.inc.

ICOM's answer to your HF mobile problems – the IC-730. This new 80m-10m, 8 band transceiver offers 100W output on SSB, AM and CW. Outstanding receiver performance is achieved by an up-conversion system using a high IF of 39MHz offering excellent image and IF interference rejection, high sensitivity and above all, wide dynamic range. Built in Pass Band Shift allows you to continuously adjust the centre frequency of the IF pass band virtually eliminating close channel interference. Dual VFO's with 10Hz and 1KHz steps allows effortless tuning and what's more a memory is provided for one channel per band. Further convenience circuits and provided such as Noise Blanker, Vox, CW Monitor, APC and SWR Detector to name a few. A built in Speech Processor boosts talk power on transmit and a switchable RF Pre-Amp is a boon on today's crowded bands. Full metering, WWV reception and connections for transverter and linear control almost completes the IC-730's impressive facilities.

Super Linear IC-2KL £839.inc. Matching Power Supply IC-2KLPS £211.inc.

To compliment the excellent IC-720A HF Transceiver, ICOM have produced the IC-2KL linear amplifier. It is of a similar size and matches the IC-720A perfectly. It produces 500W output on SSB, CW, AM and RTTY needing 80-100W of drive. As with the IC-720A it will operate from 1.6MHz to 30MHz continuously at full output power, but you still need an antenna that matches. It will follow the IC-720A automatically changing bands WITH NO TUNING – the operating is done from the prime-mover.

This automatic facility can be overriden for use on rigs other than the IC-720A, but can be added to the IC-701 and the IC-730. The IC-2KL employs a heat pipe cooling system for the heatsink of the power transistors. This is a new technology used to transfer the heat, and has a high conductance, several hundred times that of copper, plus a very quick response.

The IC-2KL has a matching power supply the IC-2KLPS delivering 40vDC at 25A continuous for 10 minutes maximum.

IC-AT500 £299.inc. Automatic antenna tuner 100W version AT100 £249. inc.

The Automatic Antenna Tuners which put all the others to shame.

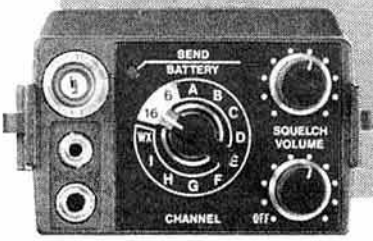
It was only when we started to use the new fully automatic antenna tuners from ICOM that we realised just how far ahead of their competitors they are! The very fast tune up time and simplicity of use make them a real worthwhile addition to any station even if the rest of your station isn't ICOM. If it is, then you have the added advantage of fully automatic band selection so that you can virtually hide it away in a cupboard if you want (though we think you will want to show it off).

Apart from its very rapid action and auto band selection facilities it will select the correct antenna for the band (up to four). The new bands are covered of course, but the AT100 does not cover topband, whereas the AT500 does.

Dual accessory sockets are supplied so that you can easily chain your IC-720A, (or IC-701 or IC-730) together with the IC-2KL and AT5 to produce what must be one of the most advanced automatic stations available.

Why not call us for more details or get your dealer to demonstrate one to you today?

A marine version of the IC-2E £199.+VAT.



12 Channels – Synthesised – No Crystals to buy!

ICOM are proud to introduce the IC-M12 which is the Marine version of the worlds most popular portable, the IC-2E. It uses all the same accessories, has the same exceptional receiver sensitivity and versatility of the 2E and it is HOME OFFICE APPROVED.

It is almost certain to prove the most popular Marine hand portable in the world. So if you are not in marine yourself why not tell your friends about it!

12 programmable channels which include the private ones.
£199 + VAT.

Trade Enquiries Welcome

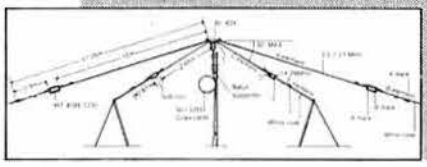
Free carriage on direct sales – call us.

Tono RTTY and CW computers
7000E-£550./9000E-£650.inc.

The TONO range of communication computers take a lot of beating when it comes to trying to read RTTY and CW in the noise. Others don't always quite make it!

Check the many facilities offered before you buy – especially look at the 9000E which also throws in a Word Processor. Previous ads have told you quite a lot about these products – but why not call us for further information and a brochure?

A new Trap Dipole!
£49.50.inc.



LOOK!

The MT-240X Multi-band trap dipole antenna (80m – 10m) is a superbly constructed antenna with its own Balun incorporated in the centre insulator with an SO239 connector. Separate elements of multi-stranded heavy duty copper wire are used for 80-40-15 and 20-10 Metres.

Really one up on its competitors. £49.50 inc. VAT

NEW! £699.inc. with built-in VDU

Following the success of the Tono 7000E communications computer, we are now able to announce the arrival of a completely new machine on the market. The CWR 685 Telereader.

Brief features are – Transmits and receives (via a suitable transceiver) CW, RTTY and ASCII (optional) – Built in 5" green display monitor. It will handle the alphabet, numerals, symbols and special codes on CW.

Speeds – CW – 3 wpm to 50 wpm with automatic speed tracking RTTY and ASCII – 45·45,50,56·88,74·2,110 and 300 bauds. (300 bauds speed is possible when external modern or TTL input is used).

Input – AF input for CW, RTTY and ASCII from phone Jack (usable from 8 to 1000 ohms, 30 mV to 2V.

Display outputs – RF output and composite video output 1V P.P 75 ohms. 6 memories – 32 chrs each.

Printer interface – Centronic compatable parallel interface built-in.

Output for oscilloscope – RTTY and ASCII impedance 200K ohm 1V P.P

Number of characters display – 512 characters x 2 pages – total 1024

Power source – 13.8 V.D.C.

Complete with full size keyboard.

Receive only version CWR 680 – £189 inc.

Prices of other Tono quality products
These prices may be subject to change, depending upon the state of the £.
All inclusive of vat.
Green display monitor CRT1200G £136.00
Dot Matrix Printer HC900 £590.00
Dot Matrix Printer HC800 £499.00
Printer socket SK7 £8.50p
Linear amplifiers:
UC70 430 MHz 55W + RX pre-amp £149.00
2M-50W (2M) £65.00
2M-100W (2M) + RX pre-amp £115.00
MR-250W (2M) + RX pre-amp £259.00
MR-28LB
(26-30 MHz) + RX pre-amp £65.00
Mast-Head Pre-amp:-
RX144 £65.00 – RX430 £70.00
(both include control and psu box)

You will get a good deal from Thanet – Call us.
Why buy from Thanet?
1. Full 2 years warranty on all equipment
2. Excellent back up and after sales service using fully equipped work shop.
3. ICOM trained technical staff
4. No charge for speedy delivery service
5. Avoid disappointment – buy from the experts with years of experience.

Instant credit available in most cases.
1. Phone us during office hours
2. Out of hours leave a message on our ansaphone stating clearly your name, address, day time telephone number and Access/Barclaycard number.
3. Write enclosing full details of your requirements together with payment, quoting call sign if possible.

Please note: Access/Barclaycard owners – goods must be sent to address registered with credit card company.

Thanet Electronics

143 Reculver Road, Beltinge, Herne Bay, Kent. Telephone (02273) 63859.

Agents (phone first – all evening weekends only, except Scotland)
Scotland – Jack GM8 GEC 031 657-2430 (daytime)
031 665-2420 (evenings)
Midlands – Tony G8AVH 021 329-2305
Wales – Tony GW3 FKO 0874 2772 or
0874 3992
North West – Gordon G3LEQ Knutsford (0565) 4040 ansaphone available

ICOM

All prices inclusive of VAT.

Remember we also stock Yaesu, Jaybeam, Datong, Welz, G-Whip, Western, TAL, Bearcat, RSGB Publications.

MAIL ORDER
FROM

by two way FREEPOST

MORSE KEYS		
HK 707	Straight Up/Down keyer	£12.27
BK 100	Semi-automatic mechanical bug	£22.12
MK 702	Up/Down keyer on marble base	£24.50
MK 702	Manipulator	£24.50
MK 705	Squeeze paddle on marble base	£21.72
EKM 1A	Morse code practice oscillator	£8.63
MK 1024	Automatic memory keyer	£135.13
EK 150	Semi/Automatic keyer	£74.75

LINEAR AMPLIFIERS		
2M10-80P	144MHz 10W input/80W output with 9dB preamp	£138.00
2M25-150P	144MHz 25W input/150W output with 9dB preamp	£184.00
2M10-150P	144MHz 10W input/150W output with 9dB preamp	£209.88
2M3-150P	144MHz 3W input 150W output with 9dB preamp	£209.88

ICOM	
IC 720 Allband Tcvr	£799.00
IC 730 10-80Mts inc WARC	£529.00
IC 290 2m mult mobile all mode	£329.00
IC 251E 2m Tcvr	£449.00
IC 451 70cms Tcvr	£539.00

SHURE MICS		
201	Hand ceramic omnidirectional high impedance	£17.38
202	Hand ceramic noise reducing high impedance	£18.21
401A	Hand controlled magnetic high impedance	£18.21
401B	Hand controlled mag. low impedance (200 ohms)	£18.21
444D	Desk adjustable height controlled magnetic	£39.96
526T	Desk controlled response transistor preamp	£51.30

DAIWA		
CNA	1001 Auto ATU 200W RMS	£139.00
CNA	2002 Auto ATU 1kW RMS	£192.00
CN	620A RF Power Meter 1-8 to 150MHz 1kW	£49.99
CN	630 RF Power Meter 140-450 MHz 200W	£69.00
SR11	Scanning Receiver	£49.00

STILL HELPING WHERE IT HURTS

Here's a list below to make buying easier for you —Work it out yourself—You'll see—it really is easy!

"And Guaranteed for two years"

Product	*Total Price*	*Deposit*	*12 Payments*
Yaesu FT 1	£1,295	£600	£57.91
Yaesu FT 902DM	£885	£399	£40.55
Yaesu FRG 7700/S	£329	£139	£15.89
Yaesu FRG 7700/M	£409	£180	£19.01
Yaesu FT 101ZD/FM	£665	£300	£30.41
Yaesu FT 101ZD/AM	£650	£275	£31.29
Yaesu FT 101Z/FM	£590	£250	£28.27
Yaesu FT 101Z/AM	£575	£225	£29.15
Yaesu FL 2100Z	£425	£185	£20.08
Yaesu FT 480R	£379	£185	£16.18
Yaesu FT 707	£569	£230	£28.27
Yaesu FT 290	£249	£120	£10.82
Standard C78	£219	£ 99	£10.04
Standard C58	£247	£107	£11.69

Write or telephone for full details

MICROWAVE MODULES	
MMT 432/28S	£149.00
MMR 432/144R	£184.00
MMT 28/144	£199.00
MMT144/28	£99.00
MMC 28/136	£27.90
MMC 28/156	£27.90
MMC 28/144	£27.90
MMC 144/any IF	£27.90
MMC 144/28LO	£29.90
MMC 70/any IF	£27.90
MMC 432/28S	£34.90
MMC 432/144S	£34.90
MMC 1296/any IF	£32.20
MMC 050/500	£69.00
MMA 28 preamp	£14.95
MMA 144V preamp	£34.90
MMV 1296/28	£32.20
MML 144/100 linamp	£142.60
MML 432/100 linamp	£228.85
MML 144/25 linamp	£59.00
MML 432/50 linamp	£119.00
MM 2000	£169.00
MMSI	£115.00

YAESU CONVERTERS 7700 Series	
Model A	£68.00
Model B	£75.00
Model C	£65.00
Model D	£72.00

ROTATORS	
Skyking SU 4000	£82.50
Hirschmann 250	£45.00
KR400RC	£92.50
AR40	£65.00
2" Bearing KS065	£16.50
1¼" Channel Master Bearing 9523	£13.50
Hirschmann S100 bearing	£16.50

UNADILLA/REYCO
Antenna Traps—
Precision moulded coil forms stainless —hardware—Aluminium tube irridit finish—Coated aluminium wire. Fully waterproofed.
Available 7/14/21MHz £12.99

W2AU BALUN
3·5/30MHz 2·5kW with Lightning Arrestor—Suitable Vees, yagis,
Doublets, Quads, etc. £12.99

JAYBEAM ANTENNAS	
TR3 HF 3 EL Beam	£184.00
VR3 HF 3 Band Vert	£48.00
LRI/2M 5 Ele Yagi	£14.00
8Y/2M 8 Ele Yagi	£17.50
10Y/2M 10 Ele Yagi	£42.50
5XY/2M 5 Ele X Yagi	£27.50
8XY/2M 8 Ele X Yagi	£34.00
X6/2M/X12/70cm Duo band X Yagi	£43.50
Q4/2M 4 Ele Quad	£25.50
Q6/2M 6 Ele Quad	£36.90
D5/2M Double 5 Slot Yagi	£22.85
UGP2/M Ground Plane	£11.90
Various harness available	

SWR/POWER METERS	
Welz SP 100 1·8-160MHz 3 ranges to 1kW	£59.00
Welz SP300 1·8-500MHz e ranges to 1kW	£79.00
Hansen FS 710 1·8-60MHz 1·5kW	£78.20
Hansen FS 500H 1·8-60MHz 2kW PEP meter	£60.95
Reece VHF 74 144-432MHz 10W	£17.50
Oskerbloc SWR 200 to 30MHz 2kW	£41.00
SWR 25 3·5-150MHz	£12.94

FDK Multi 700EX £189.00

FDK Multi 750E £289.00

Send 50p for our bumper bundle literature

No Quibble Guarantee
Same Day Despatch
All Items Advertised

Choose your AMTECH here

Amtech 100 Mobile Match	£16.95
Amtech 200 Random Wire ATU 10-160m 200W pep	£29.95
Amtech 300 Random and Coax Fed ATU 300W pep	£43.95
Amtech CW 250—The most outstanding CW filter available	£24.90
Amtech FM7: FM Demodulator for FRG7	£12.90

ANTENNAS
Wide range in stock including JAYBEAM—HYGAIN—GOTHAM—TELECON—HOKUSHIN etc.

Bantex ¾ mobile whip complete antenna £9.99
Bantex ¼ W mobile whip complete antenna £3.99

ALL ITEMS V.A.T. and CARRIAGE PAID

AMCOMM SERVICES

194 NORTHOLT ROAD, SOUTH HARROW, MIDDX.
Telephone: 01-864 1166, 01-422 9585

Opposite South Harrow Tube Station on Piccadilly Line

Showroom Opening Hours
Tuesday to Saturday 9-5.30

NO POSTAGE REQUIRED

AMCOMM SERVICES (R1),
FREEPOST,
HARROW HA2 0BR.

Please send me.....

at.....enclosed cheque/P.O. for

.....or charge my VISA/ACCESS

Nr.....

Name.....

Address.....

.....Post Code.....

WATERS & STANTON ELECTRONICS

18/20 MAIN ROAD, HOCKLEY, ESSEX. Tel: (0702) 206835

IF PRICES & QUALITY ARE IMPORTANT — — —

— — — READ ON!

EASY ORDER FORM ON PAGE 385

T1200 £179

- 142-148MHz FM
- 3 Watts or 1 Watt
- Programmable steps 5kHz-100kHz
- 10 memory channels
- Comprehensive scanning
- Ni-cad battery pack
- AC mains charger

Accessories: case and speaker mic

PALM II (mkII) £109

- 140MHz-150MHz FM
- 6 xtal controlled channels
- 600kHz repeater shift
- S20 and S22 fitted
- 1 Watt output
- Ni-cad battery pack
- AC mains charger

2M and 70cs — — — — — — — THE SENSIBLE APPROACH

70cms EXPANDER £199 2m M750E £289 PS750 AC PSU £66

With money getting tighter it's quite amazing that people will spend up to £800 in order to run all-modes on both 2m and 70cms Two separate all-mode rigs for 70cms and 2m may be a luxury but at a price. Not surprisingly more and more people are realising the true versatility in the M750E concept. Even the basic 2m all-mode M750E makes an £80 saving over the competition. Then for less than £200 you can enjoy all-modes on 70cms. That's half the price of any comparable all-mode rig. So forget the expensive options, get yourself an M750E set up and with the money you've saved, give the family a holiday—that's something that will meet with instant XYL approval!

GUARANTEED SAME DAY DESPATCH !

ON ALL IN STOCK ITEMS BARCLAYCARD & ACCESS TELEPHONE ORDERS WELCOMED

MONEY SAVERS

1kW 5-BAND DIPOLE with feeder

At last a 5-band dipole. Our unit is complete with 1kW traps, 14swg alloy wire, centre and end insulators, 50ft of UR43 with PL259, nylon rope and sundry wire clamps etc. Limited stocks at this price. These really are first class units that are beautifully finished and fully corrosive resistant.

80-10m
118ft long
£39
p&p £2

Ideal for use with WELZ AC38 ATU

NEW ADONIS MICS

Two new Adonis microphones for the modern generation of equipment. Both have high quality condensor inserts, feature up/down buttons for remote frequency control and have switchable response for FM/SSB. The 503 model also features a dual level compressor.

AM 303 £27.00 AM 503 £35.00

ADONIS HEADSET WITH MIC

At last, a quality headset and boom mic. purpose made by Adonis for Amateur Radio. Included is a Tx/Rx control box ideal for mobile operation with up/down frequency control buttons. Can equally be used for base stations and matches all current sets.

MM 202HM £39.00

CW ENTHUSIASTS—HOW'S THIS FOR VALUE? £31.95

Model EK121

Yes, it's true, this little unit has all the features you would expect from something costing a lot more. Built in paddle, dot memory for easy sending, semi or fully automatic switch settings, variable speed control, LED indicators, etc. It matches all modern transceivers and comes complete with instructions and can be either self-powered from HP7 cells or external DC supply.

COMPLETE MORSE TRAINING KIT

Following our successful offer last year, we've put together another little morse training kit. It comprises professional quality morse key, morse oscillator and RSGB morse code handbook. Send for yours today—it's a sound investment.

£19.95

WATERS & STANTON ELECTRONICS

18/20 MAIN ROAD, HOCKLEY, ESSEX. Tel: (0702) 206835

Dear Customer,

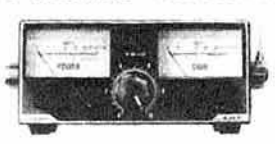
Many of you will have just received your new licences to which I extend my congratulations. At Hockley we have one of the widest selections of amateur radio equipment available. Product names include Trio, Yaesu, FDK, Icom, Welz etc, all with factory warranties and, of course, our own customer service department. As well as a large retail showroom, we also have an excellent mail order service so why not get in *touch*—*we* can offer a great deal!

Peter Waters

TRIO—FULL RANGE STOCKED

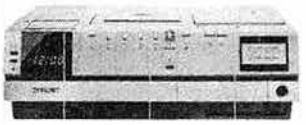
TS830S	160 10m transceiver 9 bands	£694.00	(5.00)
VFO230	Digital VFO with memories	215.00	(5.00)
AT230	All-band ATU power meter	119.00	(2.25)
SP230	External speaker unit	34.95	(1.50)
DS2	Optional dc pack for TS830S	43.95	(1.50)
DFC230	Dig fequency remote controller	179.00	(1.50)
YK88C	500Hz CW filter	29.60	(1.00)
YK88CN	270Hz CW filter	32.60	(1.00)
TS530SE	160 10m trans 200w pep digital	534.00	(5.00)
VFO240	External VFO	92.50	(5.00)
SM220	Station monitor scope	198.00	(5.00)
BS8	Pan display TS820/180/830	44.85	(.50)
BS5	As above for TS520	44.85	(.50)
R820	Amateur band receiver	589	(5.00)
YG455C	500Hz CW filter	61.00	(.50)
YG455CN	250Hz CW filter	65.00	(.50)
YG88A	6kHz AM filter	35.40	(.50)
TS180S	160 10m S/State transceiver	679.65	(5.00)
VFO180	External VFO	96.60	(1.50)
SP180	External speaker unit	36.80	(1.50)
AT180	Matching 200W antenna tuner	95.45	(5.00)
YK88C	500Hz CW filter	29.60	(.50)
YK88S	Second SSB filter option	29.20	(.50)
PS30	AC power supply for TS180S	88.50	(5.00)
TS130S	8 band 200W pep	525.00	(5.00)
TS130V	8 band 20W pep	445.00	(5.00)
DFC230	Dig frequency remote controller	179.00	(1.50)
TL120	200W pep linear for TS120V	144.00	(5.00)
MB100	Mobile mount for TS120/130	17.00	(1.00)
YK88C	500Hz CW filter	29.60	(.50)
YK88S	2nd SSB filter option	32.60	(.50)
VFO120	External VFO	85.00	(5.00)
SP120	Base station external speaker	23.00	(1.25)
SP40	New mobile speaker unit	12.40	(1.50)
AT130	100W antenna tuner	79.00	(1.50)
PS20	AC power supply TS120/130V	49.45	(5.00)
PS30	AC power supply TS120/130S	88.50	(5.00)
MA5	5 band mobile aerial system	88.75	(4.50)
TL922	160 10 metre 2KW linear	624.00	(5.00)
MC50	dual impedance desk microphone	25.75	(1.50)
MC35S	Fist microphone 50K impedance	13.80	(1.00)
MC30S	Fist microphone 500ohm imp.	13.80	(1.00)
LF30A	HF lowpass filter. 1kW	19.30	(1.00)
RD300	1kW oil filled dummy load	52.00	(1.50)
TS770E	2m/70cm all mode transceiver	785.00	(5.00)
SP70	External speaker unit	18.60	(1.00)
TR9000	2m synthesised multimode	374.00	(5.00)
TR9500	70cm all mode	449.00	(5.00)
BO9	Base plinth for TR9000	34.95	(5.00)
TR7800	2m FM synthesised mobile	284.00	(5.00)
TR7850	40w version of above	314.00	(2.50)
TR8400	70cm FM synthesized	334.00	(2.50)
PS10	AC psu for above	64.75	(2.50)
TR2300	2M FM synthesised portable	166.75	(5.00)
VB2300	10W amplifier for TR2300	58.00	(1.50)
MB2	Mobile mount TR2300/VB2300	17.70	(1.00)
RA1	Rubber flexible antenna	6.90	(.50)
PS1200	AC power unit and charger	29.50	(1.50)
TR2400	2m FM synthesised handheld	198.95	(5.00)
SMC24	External speaker/mic	13.80	(1.00)
ST1	Base stand and quick charger	45.00	(1.50)
BC5	12V quick charger	18.40	(1.50)
SC3	Soft carrying case.	11.50	(.50)
LH1	Hard leather holster	20.00	(.50)
PB24	Spare battery pack/charger lead	15.00	(1.50)
PL1	Spare power/charge lead	1.50	(.15)
R1000	Gen. Coverage Receiver	295	(5.00)
SP100	External speaker	26.90	(2.50)
HC10	Digital desk World Clock	58.75	(1.50)
HS5	Deluxe Comm. headphones	21.85	(1.00)
HS4	Standard headphones	10.35	(1.00)
DM801	Dip meter	60.00	(1.75)
TR7730	New 25W FM transceiver	247.00	(5.00)

VW3 SWR/PWR/FS METER 3-150MHz—RECOMMENDED



£11.95 + 60p p&p

VIDEO! SONY BETAMAX C5



SUPERB PICTURE QUALITY

The Sony C5 is acknowledged by those who know as the best video recorder on the market for **under £500.** Crisp, clear colour pictures combined with picture search and freeze frame make it an ideal machine for home and amateur TV use. The built in timer can be programmed up to 7 days in advance and, of course, all units come with Sony UK's own guarantee.

SONY COLOUR CAMERA

What better comparison to the C5 than Sony's colour camera the HVC3000P. Fitted with an f1·4 lens the camera has excellent low light performance operating at light levels of 35 lux and this giving excellent performance without the need for special lighting.

FDK THE NUMBER ONE FM RIG

M700EX 25 WATTS £199

Every so often a classic is born that outlasts and outperforms the competition. In FM radio the M700EX is just such a rig. Its the simplicity of design combined with rugged and total reliability plus a power output in excess of 25 watts that make it a rig of technical excellence. Then consider that it costs under £200, has limited scanning, and you'll start to see how it so quickly became Britain's number one selling FM rig. Send for colour leaflet today and learn more about the M700EX classic design.

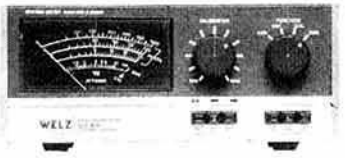
WELZ—IS THERE REALLY ANY OTHER CHOICE?

SP-45M SWR/PWR METER

The SP-45M has been designed for the VHF/UHF enthusiast who requires the means of accurately measuring true rf power and swr. The completely flat response means instant measurement from 140-470MHz. Full scale ranges of 3, 20 and 100 watts cater for most requirements.

CH-20N COAX SWITCH—Rated to 1·3GHz!

Here's a switch that is a must for UHF. Fitted "N" sockets it has an insertion loss of less than 0·1dB up to 1,300MHz and cross talk better than 50dB. There is certainly nothing else on the market that can touch this performance at this price!



Max power 1kW
Freq range 1·8MHz-160MHz

THE SUPERB SP200 EVERY SHACK SHOULD HAVE ONE!

£59 inc VAT

The SP200 is a highly reliable and accurate RF power and in-line SWR meter. It's specially designed sensing head has a flat response from 1·8MHz to 160MHz requiring no calibration. Simply connect it in the aerial line and whether you are on 160 metres or 2 metres, it will read true RF power. Also incorporated is a 2-way aerial switch and a 3-range power selector covering 20 watts, 200 watts and 1kW.

USE YOUR HEAD!

AZDEN PCS 3000

THE RIG WITH THE DETACHABLE CONTROL HEAD

£219

FREE CREDIT!

The electronics versatility combined with mechanical forethought of design has made the PCS300 a remarkable package at an incredible price. Its eight channel memory combined with 3 modes of scanning add up to a most practical design. Then consider its 25 watts plus of output power and its detachable control head feature and you'll see how easily it beats the opposition. Then there is those little extras; whilst competitors offer up/down frequency control from the microphone, the PCS3000 has added to this a remote volume control and reverse repeater button all in the palm of your hand. Don't delay, send today for full colour brochure.

AZDEN PCS 300 ONLY £184

We've really broken the price barrier with this brand new unit from Azden combining all the features you've ever wanted in a hand-held at an incredible inclusive price. Incredibly powerful, it will give over 3 watts output in the high power mode with ½ watt in the low power position. Coverage is 144 to 146MHz in 12½kHz steps, ideal for UK use. Tone burst and 600kHz repeater shifts are all included for any repeater in Europe. The clear LCD display is a mine of information, indicating frequency, memory address, repeater shift, bar "S meter" reading. RF output and low battery volts. The front panel key pad is of superior construction with a piezo bleeper indicating key entry on every function.
Comprehensive scanning facilities include band scanning and memory scanning plus programmable upper and lower band limits, with pause and auto resume. Unlike most rigs the memory back-up is permanently connected as it draws a miserly 0·01ma! Other controls include programmable repeater shift, dial illumination, key lock, PTT lock, etc.

NOW ICOM! HF & VHF

FULL RANGE IN STOCK — — —
— — — WITH FACTORY BACK-UP

Now you can buy Icom radio products from your favourite shop where amateur radio, good service and competitive prices all come together. All stock is supplied by the factory authorised distributor and, therefore, has full guarantee and back-up. Take your choice from the entire range and send sae for full colour leaflets.

IC730	HF Mobile TRx 80-10m 100W 12V	**£585 (n/c)**	**IC490E**	70cm FM/SSB/CW Mob. TRx 10W 12V DC	**£445 (n/c)**
IC720A	HF TRx + Gen Cov Rx 100W 12V	**£880 (n/c)**	**IC25E**	2m FM Mob. tran 25W 12V DC	**£259 (n/c)**
PS15	Matching psu for both above 230V AC	**£99 (n/c)**	**IC2E**	2m FM hand-held TRx 144-146MHz	**£159 (n/c)**
IC251E	2m FM/SSB/CW TRx 230V/12V	**£495 (n/c)**	**IC4E**	70cm FM hand-held TRx	**£199 (n/c)**
IC290E	2m FM/SSB/CW Mob. TRx 10W 12V DC	**£365 (n/c)**	**LC1/3**	Cases for above	**£3.50 (75p)**

YAESU—FULL RANGE STOCKED

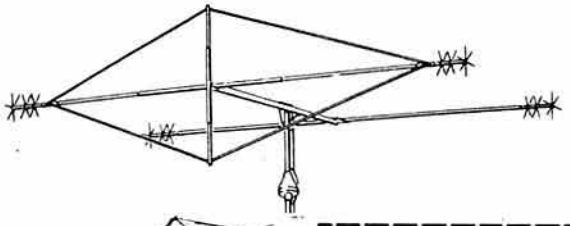
FT101ZFM	160-10m 9 band transceiver	590.00 (5.00)
FT101ZDFM	160-10m 9 band transceiver	645 (5.00)
DIGT 101Z	Digital unit for	90.00 (1.00)
DCT101Z	DC adaptor	42.50 (1.00)
FV101Z	Remote vfo	112.00 (5.00)
FANT101	Fab for 101 series	13.80 (1.00)
FT902DM	9 band AM/FM transceiver	885.00 (5.00)
FT902DE	9 band transceiver	790.00 (5.00)
FC902	9 band atu, swr/pwr etc	135.00 (5.00)
FTV901R	Transverter fitted 2m module	285.00 (5.00)
430TV	70cm module for above	185.00 (5.00)
144TV	2m module for transverter	100.00 (1.75)
70TV	4m module for transverter	80.00 (1.75)
YO901P	Monitor scope with pan, adap.	330.00 (5.00)
YO901	Standard monitor scope	256.00 (5.00)
FV901DM	Remote vfo for 901	260.00 (5.00)
SP901	External speaker	31.00 (2.00)
FL2100Z	9 band 1200W linear	425.00 (5.00)
FT107	9 band solid state 100W	725.00 (5.00)
FT107DMS	As above but with memory	799.00 (5.00)
DMST107	Memory unit	92.75 (2.00)
FV107G	Remote vfo for above	98.50 (5.00)
SP107G	External speaker	29.90 (2.00)
FC107G	Aerial tuning unit	112.70 (5.00)
FP107	230V AC power module	101.95 (2.50)
FP107EG	As above in cabinet	113.00 (5.00)
FT707	8 band solid state 100W	549.00 (5.00)
FP707	230V AC power supply	125.00 (5.00)
FC707	Aerial tuner (unbalanced only)	85.00 (2.00)
MR7	Metal rack for above	15.70 (2.00)
MMB2	Mobile mounting bracket	16.00 (1.00)
FRG7	0·5-30MHz receiver	199.00 (n.c.)
FRG7700	SSB/AM/FM recvr. dig. readout	329.00 (n.c.)
MEM7700	Memory unit for above	90.00 (1.00)
Converters for above:		
FRV770A	118-150MHz in stock	69.75 (1.75)
FRV7700B	50-60MHz & 118-150MHz	75.50 (1.75)
FRV7700C	140-170MHz	65.95
FRV7700D	70-80MHz & 118-150MHz	72.45 (1.75)
FRT7700	Receiver aerial tuner	37.85 (2.00)
FF5	LF filter for above	9.95 (1.00)
FT480R	2m all-mode transceiver	365.00 (2.00)
FP80A	230V AC power supply	63.25 (2.00)
FL2050	50 watt linear	126.50 (2.00)
FT780R	70cm all-mode transceiver	449 (2.00)
FT290R	2m all mode portable	249.00 (2.00)
NC11C	AC charger	8.00 (1.00)
CSC-1	Carrying case	3.45 (.50)
MMB-11	Mobile mounting bracket	22.25 (1.50)
FL2010	10 watt linear for FT290	64.00 (2.00)
NC/WSE	2 amp hour ni-cad pack	20.00 (1.75)
FT208	2m synthesized portable FM	209.00 (n.c.)
NC9C	AC charger	8.00 (1.00)
FT708R	70cm hand-held	219.00 (n.c.)
FP4	230V/4amp psu	42.95 (2.00)
FP12	230V/12 amp psu	86.25 (2.50)
YP150Z	150W dummy load power meter	92.00 (2.00)
YH55	Standard 8 ohm headphones	9.95 (1.00)
YH77	Lightweight headphones	10.00 (1.00)
QTR24D	World Ham clock	28.00 (1.50)
YM34	600/50k ohm base mic 8 pin plug	21.45 (1.00)
YM35	600 ohm hand mic. up/down 8 pin p.	13.80 (1.00)
YM36	600 ohm as above (no up/down)	13.00 (1.00)
YM37	600 ohm hand mic. 8 pin plug	6.90 (1.00)
YE7A	600 ohm hand mic. 4 pin plug	6.90 (1.00)
YD844A	600/50k ohm base mic. 4 pin plug	25.30 (1.00)

DATONG D70 MORSE TUTOR £49.00

STOP PRESS !
NEW TRIO TS930S
HF transceiver plus general coverage receiver **£1095**
Delivery May

Goods sent insured delivery anywhere in the UK. Heavy parcels—Securicor. Light parcels—post. Aerials. Atlas Express.

RETAIL HOURS
MON-SAT 9.00 am-5.30 pm
WED 9.00 am-1.00 pm
Callers welcome at our showroom
TEL 0702-206835



THE AMAZING HQ-1
"MINI-BEAM"
10-15-20M 1kW
6ft TURNING RADIUS

£115 £3.75 carr.

MAIL ORDER SLIP to: Waters & Stanton Electronics, Main Road, Hockley, Essex.

Name..... Goods required.....
Address..... .....
....
....
Please rush me the above. Cheque enclosed for £..... Please charge to credit card No. .....

AMATEUR ELECTRONICS UK

Your number one source for YAESU MUSEN

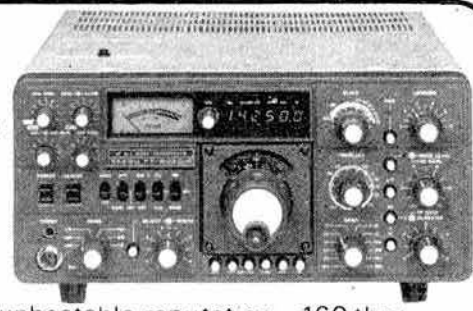
FT-ONE SUPER HF TRANSCEIVER

This is the latest and most exotic product from YAESU's superb design team. The new FT-ONE provides continuous RX coverage of 150KHz–30MHz plus all nine amateur bands (160 thru 10m). All mode operation LSB, USB, CW, FSK, AM, *FM • 10 VFO system • **FULL** break-in on CW • audio peak filter • notch filter • variable bandwidth and IF shift • keyboard scanning and entry • RX dynamic range over 95dB! and **NO** band switch!!! *OPTIONAL

FT-101ZD Mk III

YAESU's FT-101ZD **WITH FM** is the most popular HF rig on the market thanks to its very comprehensive specification and competitive price. Incorporates notch filter, audio peak filter, variable IF bandwidth plus many other features.

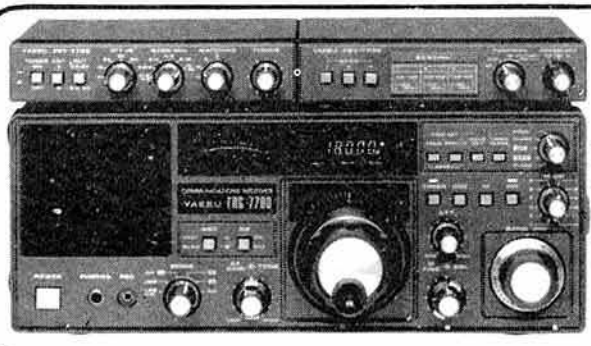
FT-902DM Competition grade HF transceiver



The YAESU world famous pace-setter with the acknowledged unbeatable reputation. 160 thru 10 metres including the new WARC bands. All-mode capability, SSB, CW, AM, FSK **and FM** transmit and receive. Teamed with the FTV-901R transverter coverage extends to 144 & 430MHz.

FT-707 All solid-state HF mobile transceiver

The definitive HF mobile rig, digital, variable IF bandwidth, 100 watts PEP SSB, AM, CW (pictured here with 12 channel memory VFO). Latest bands



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.

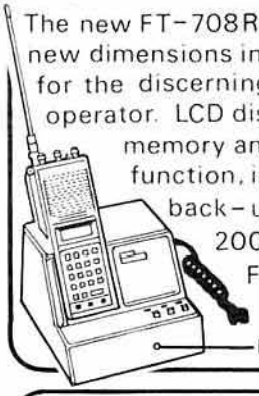
NEW! **FT-230R 25 watt 2metre FM mobile**

£239.00 Including VAT

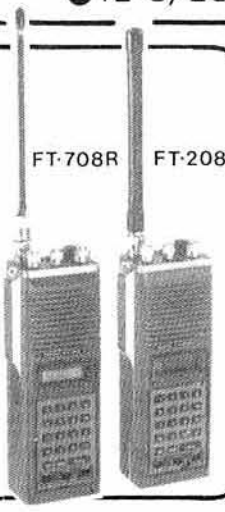
- Two independent VFO's
- 10 memories
- Priority function
- Memory and band scan
- 12·5/25 KHz steps
- Large LCD readout.

FT-708R and FT-208R
Synthesized UHF/VHF transceivers

The new FT-708R and FT-208R provide new dimensions in operating flexibility for the discerning 70 cm and 2m operator. LCD display, 10 memories, memory and bandscan, priority function, internal lithium battery back-up. RF output FT-708R, 200 mW low, 1 watt high, FT-208R, 300mW low, 2·5 watts high.



NC8 Charger DC PSU



FT-708R FT-208R

FT-480R High technology all-mode 2 metre mobile

The most advanced 2 metre mobile available today – USB, LSB, FM, CW full scanning with priority channel, 4 memory channel, dual synthesized VFO system.

FT-780R
All-mode 70 cm mobile

4 memories, memory and bandscan from microphone, conservative 10 watts out – All the features of the FT-480 on 70cm.

FT-290R
All-mode 2 m portable

10 memories, 2 VFO's, LCD display, C size battery, easy car mounting tray, 2·5 watts out.

AGENTS

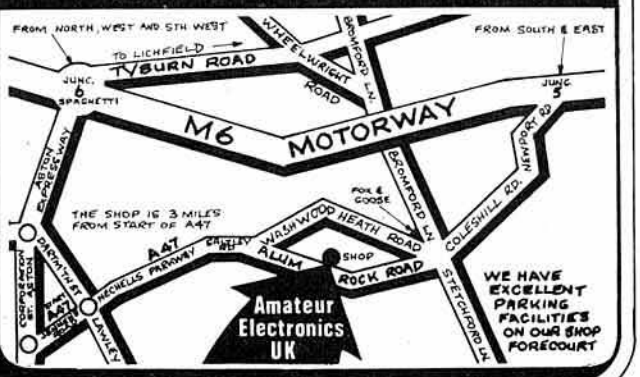
NORTH WEST – THANET ELECTRONICS LTD. GORDON, G3LEQ. KNUTSFORD (0565) 4040.
WALES & WEST – ROSS CLARE, GW3NWS. GWENT (0633) 890 146
EAST ANGLIA – AMATEUR ELECTRONICS UK – EAST ANGLIA. DR T THIRST (TIM) G4CTT. NORWICH 660865, 0692
NORTH EAST – NORTH EAST AMATEUR RADIO. DARLINGTON 0325 55969
SOUTH EAST – AMATEUR ELECTRONICS. UK – KENT KEN McINNES. G3FTE. THANET (0843) 291297

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

Access BARCLAYCARD VISA

or attractive H.P. terms readily available for on-the-spot transactions. Full demonstration facilities. Free Securicor delivery.

WHERE TO FIND US



Amateur Electronics UK
508-516 Alum Rock Road·Birmingham 8
Telephone: 021-327 1497 or 021-327 6313
Telex: 337045
Opening hours: 9.30 to 5.30 Tues. to Sat. continuous – CLOSED all day Monday.

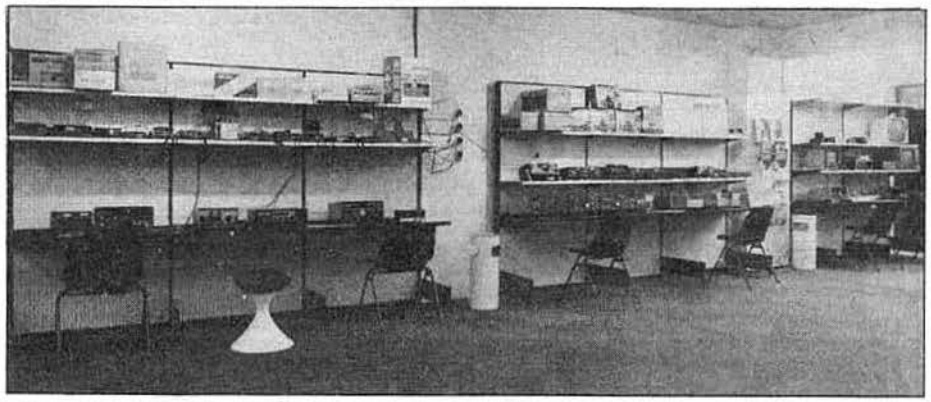
AMATEUR RADIO EXCHANGE

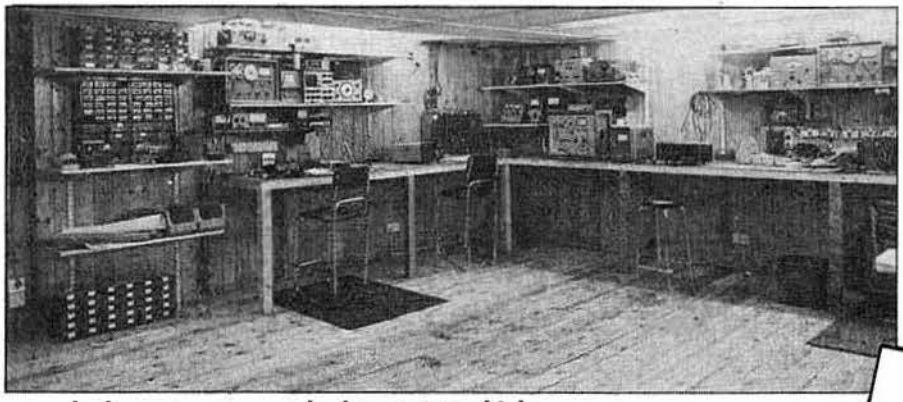
YAESU · ICOM · TRIO/
KENWOOD · BEARCAT
STANDARD · DATONG
MICROWAVE MODULES
WOOD & DOUGLAS
DRAE · G-WHIP · JAYBEAM
AEA · PACKER · TONO
WELZ · TASCO

Best for choice

Best for service

Best for price and secondhand deals

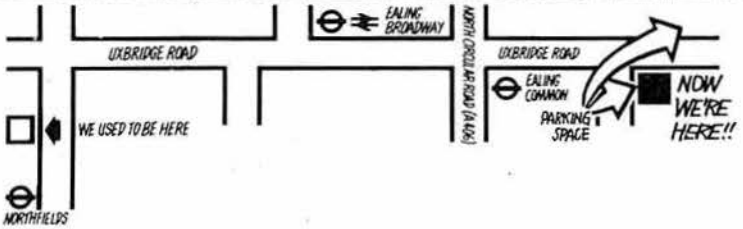




↑ *Eight bays for you to test and compare rigs before you buy.*

← *A look at the superb facilities in our servicing section.*

Phone for stock and delivery position on any of the above manufacturers' ranges and for up-to-date price information.



BEST FOR MAIL-ORDER TOO!
Phone by 2pm for same-day despatch ex. stock

373 UXBRIDGE ROAD, ACTON, LONDON W3 9RH
Tel: 01-992 5765/6/7 *Just 500 yards east of Ealing Common station on the District and Piccadilly Lines, and 207 bus stops outside.*

136 GLADSTONE STREET, ST HELENS, MERSEYSIDE Tel: 0744 53157 *Our North West branch run by Mike (G4NAR), just around the corner from the Rugby Ground.*

Closed Wednesday at Acton and Monday at St Helens, but use our 24-hour Ansafone service at either shop.

SMC SERVICE

Free Finance on many items. Two year guarantee on Yaesu. Free Securicor on major Yaesu items. Access and Barclaycard over the telephone. Biggest Branch, Agent and Dealers network. Ably staffed, courteous, Service Department. "B Services" Securicor contract at £3.90!! Biggest stocks of amateur equipment in UK. Twenty-four years of experience

FREE FINANCE

On regular priced items from: Yaesu, Ascot SMCHS, CDE, HyGain, Channel Master, Hansen, SMC, MFJ, KLM, Mirage and Hy Mound, on invoices over £100 SMC offers Free Finance! How is it done? Simple, pay 20%, split the balance equally over 6 months or pay 50% down and split the balance over a year.

You pay no more than the cash price!!

GUARANTEE

Yaesu's *own* warranty does not extend outside Japan. Repairs are the responsibility of the UK retailer. SMC's two year guarantee is backed, as UK distributors, by daily contact with the factory and many tens of thousands of pounds of spares and test equipment. Avoid hawkers offering sets without serial numbers, spares, service or advice back-up.

WIDE COVERAGE ALL MODE RX; FRG7700 £329inc.

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, 48MHz first IF.
- ★ 1kHz digital, plus analogue, display.
- ★ Inbuilt quartz clock/timer.
- ★ No preselector, auto seleted LPF's.
- ★ Advanced noise blanker fitted.
- ★ Antenna 500Ω to 2MHz, 50Ω to 30MHz.
- ★ 20dB pad plus continuous attenuator.
- ★ Switchable A.G.C. Variable tone.
- ★ 110 and 240Vac and 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.

GENERAL COVERAGE RECEIVER; FRG7 £199 inc.

VAT @ 15% & SECURICOR

- ★ 30MHz to 500kHz in One MHz bands.
- ★ SSB (LSB/USB), CW, AM.
- ★ Sensitivity AM; 0.7 μV 10dB S/N at 30%.
- ★ Selectivity; ±3kHz at −6dB.
- ★ Stability; 500Hz after 30 minutes.
- ★ Triple conversion, drift cancelling.
- ★ Direct frequency readout to 5kHz.
- ★ Fine tuning control.
- ★ AGC; DC amplified, 3 stage control.
- ★ AF; Powerful 2 watts of audio.
- ★ Forward facing internal speaker.
- ★ Record socket "volume independent".
- ★ Well calibrated "sharp" preselector.
- ★ AM automatic noise suppression circuit.
- ★ Antenna Hi to 1.6MHz, 50 ohm to 30MHz.
- ★ 3 position RF attenuator.
- ★ 3 position AF filter (LP, WBP NBP).
- ★ 110/240V and 12Vdc. ac.
- ★ Lights; battery economy switch.
- ★ Illuminated edge type "S" meter.
- ★ 2IC, 9FET, 13 Tr, 16D (9Ge, 5Si, 2Z).
- ★ Weight; 7Kg (without batteries).
- ★ Dimensions; 340W × 153H × 285Dmm.
- ★ Optional battery holder.

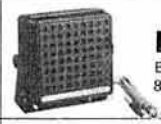
YD148A £21.10
Desk microphone 500 ohm/50K. p&p free
Adjustable swan neck type.

YM21 £13.80
Hand microphone 600 ohms p&p free
Switchable noise cancelling element.

YH55 £10.00
Padded headphones p&p free
Low impedance ¼" jack.

YD844A £25.30
Desk microphone 500ohm/50K. p&p free
Heavy cast type construction.

YE7A £6.90
Hand microphone 600 ohms p&p free
Standard 4 pin connector



FSP1 £9.95
External mobile speaker p&p free
8 ohms impedance

MMB1 £24.15
Mobile mounting tray for all p&p free
full size HF Yaesu transceivers.

QTR24D £28.00
World time clock p&p free
Quartz controlled movement.

FF501 £23.00
Low pass filter p&p free
Fc 30MHz, 1kW PEP

SOUTH MIDLANDS COMMUNICATIONS LTD

S. M. HOUSE, OSBORNE ROAD, TOTTON, SOUTHAMPTON, SO4 4DN, ENGLAND
Tel: Totton (0703) 867333, Telex: 477351 SMCOMM G, Telegram: "Aerial" Southampton

GRIMSBY
S.M.C. (Humberside)
247A Freeman Street,
Grimsby, Lincolnshire,
Grimsby (0472) 99288
10-6 Tuesday-Saturday

STOKE-ON-TRENT
S.M.C. (Stoke)
76 High Street,
Talke Pits, Stoke
Kidsgrove (07816) 72644
9-5.30 Tuesday-Saturday

LEEDS
S.M.C. (Leeds)
257 Otley Road,
Leeds 16, Yorkshire.
Leeds (0532) 782326
9-5.30 Monday-Saturday

CHESTERFIELD
S.M.C. (Jack Tweedy) LTD
102 High Street,
New Whittington, Chesterfield.
Chesterfield (0246) 453340
9-5 Tuesday-Saturday

WOODHALL SPA
Business transferred
S.M.C. (Humberside)
247A Freeman Street
Grimsby, Lincolnshire
Grimsby (0472) 99288

— SMC AGENTS QTHR —

Bangor	John	GI3KDR	(0247) 55162	
Tandragee	Mervyn	GI3WWY	(0762) 840656	
Edinburgh	Jack	GM8GEC	(031665) 2420	
Stourbridge	Brian	G3ZUL	(03843) 5917	
Redcar	Simon	G4EQS	(0642) 480808	
Buckley	Howarth	GW3TMP	(0244) 549563	
Neath	John	GW4FOI	(0639) 55114/2942	
Jersey	Geoff	GJ4ICD	(0534) 26788	

FT ONE £1,295 inc. VAT @ 15% & SECURICOR

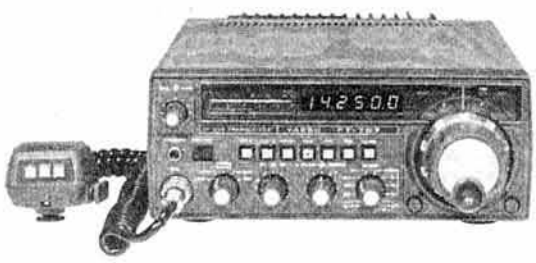
*Option

- ★ 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.
- ★ Digital plus analogue frequency displays.
- ★ VOX built-in and adjustables.
- ★ 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.
- ★ 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.

FT101ZD £635inc. VAT @ 15% & SECURICOR

- ★ 160-10 metre (including 10, 18, and 24MHz).
- ★ USB-LSB-CWW-FSK-AM multi-mode.
- ★ Full broad band "no tune" power amplifier.
- ★ 240W PIP. 75 per cent power output at 3:1 VSWR.
- ★ 12 memory channels with clarifier on memory.*
- ★ Up/down scanning control from microphone.*
- ★ Variable IF bandwidth—16 poles of selectivity.
- ★ Bandwidths: 6kHz*, 2.4kHz-300Hz, 600Hz-300Hz*.
- ★ Selectable CW "fixed" widths CW-W and CW-N.*
- ★ Tunable Audio Peak (AFP) and Notch filter.
- ★ Diode ring mixer for very high Rx dynamic range.
- ★ Noise blanker—front panel adjustable threshold.
- ★ AGC; slow-fast-off. Attenuator 0-20dB switchable.
- ★ RF speech processor fitted—front panel adjustable.
- ★ Digital (100Hz) plus analogue frequency displays.
- ★ Semi-break in with side tone. Vox built in.
- ★ Choice of built-in or separate power supply units*.

FT707 £569inc. VAT @ 15% & SECURICOR



S.M.C. 2 YEAR GUARANTEE AND FREE FINANCE AVAILABLE

- ★ 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.

FT902DM £885inc. VAT @ 15% & SECURICOR

*Option

- ★ 160-10 metres including new allocations.
- ★ Variable IF bandwidth 2.4kHz down to 300Hz.
- ★ Selectable CW fixed bandwidth CW-W and CW-N*.
- ★ Semi-break in with sidetone for excellent CW.
- ★ Digital plus analogue frequency displays.
- ★ 180W PIP and −31dB 3rd order intermod.
- ★ RF speech processor fitted—adjustable level.
- ★ VOX built-in and is adjustable from the front panel.
- ★ Wide dynamic range for big signal handling.
- ★ High usable sensitivity, for those weak ones.
- ★ Superb noise blanker—adjustable threshold.
- ★ Attenuator; 0-10-20dB, AGC; slow-fast-off.
- ★ Clarifier (RIT) switchable on TX, RX or both.
- ★ Low level transvertor drive output facility.
- ★ Universal power supply 100-234V AC and 12V DC*
- ★ Incredible range of matching accessories
- ★ 6 models: Digital/Analogue—AM/FM options.

FT107M £725inc. VAT @ 15% & SECURICOR

*Option

- ★ 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 blanker with local loop AGC.

VHF/UHF MOBILES—SIX OF THE BEST!

A GIFT!

70cms, SSB, £129.00 inc.!!
KLM JUMBO (Liner 430) 432.00-432.48MHz

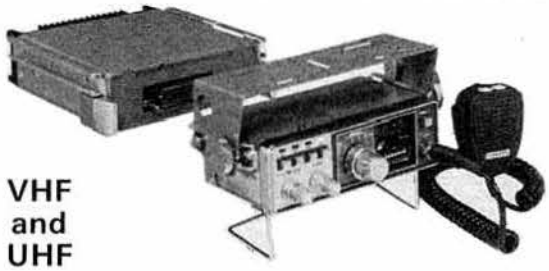
Plus further 480kHz band (430 up fitted), USB/LSB, 10W PEP, Auto Scan ± 10kHz, semi break-in CW, FET RF and mixer, RIT.

NEW YAESU

2m, 25W, FM, £239 inc.
FT230R 6" × 2" × 7", 12½/25kHz, ±600kHz, special LCD

display, 10 memories, memory and band scan, RX priority feature, two independent VFO's, etc, etc.

FT720RV £245 inc VAT @ 15% & SECURICOR



VHF and UHF

FT720RV	Transceivers 2m 10W complete	245.00
FT720RVH	Transceivers 2m 25W complete	255.00
FT720RU	Tranceiver 70cms 10W complete	265.00
FT720R	Control head for transceiver deck	115.00
720RV	Transceiver deck only 2m 10W	130.00
720RVH	Transceiver deck only 2m 25W	140.00
720RU	Transceiver deck only 70cms 10W	150.00
S72	Switching box (between two decks)	55.00
E72S	Extension cable, 2m long	15.00
E72L	Extension cable, 4m long	20.00
MMB3	Mobile Mounting bracket for deck	5.00

FT720 Control Head
- ★ Four easy write-in memory channels
- ★ Rx Priority channel (auto check)
- ★ Scanning, band/memory, empty/busy
- ★ Up/down tuning/scanning from mic.
- ★ Optically coupled tuning control
- ★ Manual and automatic tone burst
- ★ String LEDs for 'S' and PO, 7 status LEDs
- ★ 1½W of audio to internal/external speaker
- ★ 3·3 (4·3)" D × 6" W × 2 (2·2)" H
  720RV 10W deck. **720RVH** 25W deck
- ★ 144-146MHz (144-148MHz possible)
- ★ 12½kHz synthesizer steps, 600kHz shift
- ★ 0·3μV for 20dB quieting
- ★ Rx 0·5A, Tx RV 3·5A, RVH 6·5A
- ★ 5·8 (6·5)" D × 6" W × 2 (2·2)" D
  720 RU 10W, 70cm, deck
- ★ 430-434MHz
- ★ 25kHz synthesizer steps, 1·6MHz shift
- ★ 0·5μV for 20dB quieting
- ★ Rx 0·5A, Tx 4·5A
- ★ 5·8 (6·5)" D × 6" W × 2 (2·2)" D
  S72 Switching box
- ★ Pushbutton band change
- ★ Auto change of steps/splits

FT480R (2m) £379 inc. VAT @ 15% & SECURICOR

- ★ USB-LSB-CW-FM (A3j, A1, F3).
- ★ 30W PIP A3j, 10/1 W out A1 F3.
- ★ Bandpass filter no tune design.
- ★ Bandwidth 2.4kHz and 14kHz at −6dB.
- ★ Semi break in with side tone.
- ★ Very bright blue 100Hz digital display.
- ★ Display shows Tx & Rx freq (inc RIT).
- ★ String LED display for "S" and PO.
- ★ Digital receiver offset tuning.

- ★ Advanced effective noise blanker.
- ★ Memory scanning with slot display.
- ★ Up/down tuning/scanning from mic.
- ★ Priority channel on any memory slot.
- ★ Satellite mode allows tuning on Tx.
- ★ Scanning for busy or clear channels.
- ★ Size (Case): 8.3" D, 2.3" H, 6.9" W.
- ★ LED's; "On Air" Clar, Hi/Low, FM mod.
- ★ Matching PP80 Mains PSU available.

FT780R (70cm) £449 inc VAT @ 15% & SECURICOR

- ★ 144-146MHz (143.5-148.5MHz possible).
- ★ Excellent dynamic range and sensitivity.
- ★ FM; 25, 12½, 1kHz steps.
- ★ SSB; 1,000, 100, 10Hz steps.
- ★ Any TX Rx split with dual VFO's.
- ★ ±600kHz standard repeater split.
- ★ Four easy write-in memory channels.

FT480R

- ★ 1·6MHz shift now available.

- ★ FT780R 1·6 fitted 1·6MHz Shift **£459** inc.
- ★ 430-434MHz (440-445) possible.
- ★ GaAs Fet RF for incredible sensitivity.
- ★ NMOS four bit micro control.
- ★ FM; 100kHz, 25kHz, 1kHz, steps.
- ★ SSB; 1,000, 100, 10Hz steps.
- ★ Repeater access by use of dual VFO's.
- ★ Four easy write-in memory channels.

FT780R

SPRINGTIME—TIME TO BE THINKING HAND PORTABLE

LOW PRICE

FT207R £169 inc.
VAT @ 15% & POSTAGE

- ★ 144-146MHz (144-148 possible)
- ★ 12.5kHz synthesizer steps
- ★ 4 bit CPU chip for freq. control
- ★ Keyboard entry of frequencies
- ★ Keyboard lockout safety features
- ★ Digital display to hundreds of H_3
- ★ Display auto shutdown timer
- ★ Four Channels of memory
- ★ Memory back up disable
- ★ Up/down manual tuning

- ★ Bandscan for busy or clear channels
- ★ Memory scanning features
- ★ ±600kHz split built in
- ★ Any split + or − programmable
- ★ Easy change NiCad pack
- ★ BNC antenna connector
- ★ "On Air" and "Channel Busy" LEDs
- ★ Built in condenser microphone
- ★ 200mW AF to internal/external speaker
- ★ External speaker/mic available
- ★ 2.5/0.2W of RF output
- ★ Rx; 35mA squelch, 150mA full vol.
- ★ Tx; 250mA low, 800mA high
- ★ 0.3μV for 20dB quieting
- ★ Double conversion 10.7MHz and 455kHz
- ★ D.T.M.F. encoder built in
- ★ 1.7 (2.2)" D × 2.5 (2.7)" W × 6.7 (7.2)" H
- ★ C/w NiCad pack, helical and case

FT290R MULTIMODE PORTABLE/MOBILE £249 inc.
VAT @ 15% & SECURICOR

- ★ 144-146MHz (144-148 possible)
- ★ Multimode USB, LSB, FM, CW
- ★ 2.5W PEP, 2.5W RMS/300mW out
- ★ LEDs, "ON AIR", "BUSY" MC meter; S.PO
- ★ Integral telescopic antenna
- ★ Bandwidth 2.4kHz and 14kHz @ −6dB
- ★ Optically coupled main tuning
- ★ 100Hz backlit LCD Frequency display
- ★ 10 memory channels "5 year" backup
- ★ FM: 25kHz and 12.5kHz steps
- ★ SSB: 1kHz and 100Hz steps
- ★ Any TX/RX split with dual VFOs
- ★ ±600kHz repeater split 1750kHz burst
- ★ Up/down tuning from microphone
- ★ AF output 1W @ 10% THD
- ★ 58 (H) × 150 (W) × 195 (D) (1.3kg)
- ★ Rx, 70mA, Tx; 800mA (FM maximum)
- ★ Mobile bracket available

2 Yr. GUARANTEE AND FREE FINANCE AVAILABLE

★ FT790R SOON ★ (JUNE/JULY)

FULL RANGE OF MATCHING ACCESSORIES

- ★ Matching 10W linear Amplifier available
- ★ 8.5-15.2V DC External (not included)
- ★ 8 'C' NiCads or Drys (not included)
- ★ SMC 2.2 A/Hr NiCad **£2.70** inc

FT208R (2m) £209 inc.
VAT @ 15% & POSTAGE

- ★ 4 bit CPU chip frequency control
- ★ Keyboard entry of frequencies/splits
- ★ LCD digital display with backlight
- ★ Ten channels of memory
- ★ Memory back up five-year lifetime cell
- ★ Up/down manual tuning
- ★ Manual or auto scan for busy/clear
- ★ Priority channel with search back
- ★ Memory scanning feature
- ★ Scan between any two frequencies
- ★ Auto scan restart
- ★ Quick change NiCad pack
- ★ 1,750Hz tone burst
- ★ Built in condenser microphone
- ★ 500mW to int/ext speaker
- ★ External speaker/mic available
- ★ Keyboard offers 16 tone DTMF
- ★ 168(H) × 61(W) × 39(D)mm
- ★ C/w NiCad pak, helical

FT708R (70cm) £219
inc VAT @ 15% & SECURICOR

- ★ 144-146MHz (144-148 possible)
- ★ 12.5/25kHz synthesizer steps
- ★ Any split + or − programmable
- ★ ±600kHz repeater split
- ★ 2.5 or 0.3W RF output
- ★ Rx: 20mA squelch 150mA max AF
- ★ Tx: 800mA at 2.5W RF
- ★ 0.25μV for 12dB SINAD
- ★ Dual conversion 16.9MHz and 455kHz

- ★ 430-440MHz (440-450 option)
- ★ 25kHz synthesizer steps
- ★ Any split + or − programmable
- ★ ±7.6MHz EU split standard
- ★ 1W or 100mW RF output
- ★ Rx; 20mA squelch, 150mA (max AF)
- ★ TX: 500mA at 1W RF
- ★ 0.4μV for 12dB SINAD
- ★ Dual conversion 46.255MHz and 455kHz

FREE FINANCE AVAILABLE—TWO YEAR GUARANTEE

SOUTH MIDLANDS COMMUNICATIONS LTD

S. M. HOUSE, OSBORNE ROAD, TOTTON, SOUTHAMPTON, SO4 4DN, ENGLAND
Tel: Totton (0703) 867333, Telex: 477351 SMCOMM G, Telegram: "Aerial" Southampton

GRIMSBY
S.M.C. (Humberside)
247A Freeman Street,
Grimsby, Lincolnshire.
Grimsby (0472) 59388
10-6 Tuesday-Saturday

STOKE-ON-TRENT
S.M.C. (Stoke)
76 High Street.
Talke Pits, Stoke
Kidsgrove (07816) 72644
9-5.30 Tuesday-Saturday

LEEDS
S.M.C. (Leeds)
257 Otley Road,
Leeds 16, Yorkshire.
Leeds (0532) 782326
9-5.30 Monday-Saturday

CHESTERFIELD
S.M.C. (Jack Tweedy) LTD
102 High Street,
New Whittington, Chesterfield.
Chesterfield (0246) 453340
9-5 Tuesday-Saturday

WOODHALL SPA
Business transferred.
S.M.C. (Humberside)
247A Freeman Street
Grimsby, Lincolnshire
Grimsby (0472) 99288

— SMC AGENTS —

Bangor	John	GI3KDR	(0247) 55162	Stourbridge	Brian	G3ZUL	(03843) 5917	Buckley	Howarth	GW3TMP	(0244) 549563
Tandragee	Mervyn	GI3WWY	(0762) 840656	Redcar	Simon	G4EQS	(0642) 480808	Neath	John	GW4FOI	(0639) 55114/2942
Edinburgh	Jack	GM8GEC	(031665) 2420					Jersey	Geoff	GJ4ICD	(0534) 26788

ASCOT

These are a complete range of mobile antenna accessories developed and manufactured in the UK.

They are extremely rugged, designed to withstand extremes of weather using: fine stainless steel whips, A100 nylon bases, chrome plated brass ferrules, heat treated silver plated beryllium copper contacts and polished stainless steel shock springs.

From the list below, choose the base (¼, ⅜, ½) choose the whip (long or short) and the cable assembly required (cable or magnetic). Then add an accessory if required.

340	Base. Stand 1/4λ 60-550MHz	£2.30	£0.40
310	Base. Swivel 1/4λ 60-550MHz	£4.20	£0.40
344	Base. Sprung 1/4λ 60-120MHz	£6.50	£0.52
440	Base. Stand 5/8λ 145MHz	£2.70	£0.40
330	Base. Swivel 5/8λ 145MHz	£5.00	£0.40
341	Base. Sprung 5/8λ 145MHz	£7.30	£0.52
350	Base. Fine tune 1/2λ 145MHz	£7.30	£0.52
351	Base. Sprung 1/2λ 145MHz	£8.05	£0.63
057	Whip, tapered SS 127cms	£1.95	£0.98
056	Whip, parallel SS 63cms	£0.75	£0.75
085	Mount cable 5/8 & 1/4λ	£3.05	£0.63
085LR	Mount cable 5/8 & 1/4λ	£3.85	£0.63
092	Mount Mag. 5/8 & 1/4λ	£10.75	£0.86
084	Mount cable 1/2λ	£5.00	£0.63
088	Mount cowl 1/2λ	£5.75	£0.40
091	Mount Magnetic 1/2λ	£10.75	£0.86
089	Gutter clip adaptor	£5.00	£0.63
093	Boot lip adaptor	£3.80	£0.52

NB: PRICES INCLUDE VAT AT 15%
Carriage extra, mainland rate shown, max £1.73

hy-gain

The TH3jnr is a 3 element triband (10-15-20m) beam whose compact design (longest element 24·2ft, boom 12ft turning radius 14·3ft) makes it ideal where space is the limiting factor. Separate and matched air dielectric Hy-Q traps are used for each band giving a 52ohm fed with a 1·5:1 VSWR at resonance, 8dB Av gain, 25dB F.B. ratio and a power handling of 600W P.E.P. By using a 1¼in boom the antenna presents only 3·4sq ft of surface area (equals 87lb of load at 80mph). The mast to boom clamp accepts 1-1¾in masting and, like all the hardware, is Iridite treated to mil specs.

12AVQ	Vertical 10-20m inc.	£43.13	£1.73
14AVQ/WB	Vertical 10-40m inc.	£58.08	£1.73
18AVT/WB	Vertical 10-80m inc.	£90.85	£1.73
14RMQ	Roof mounting Kit	£30.48	£1.73
18V	Vertical 10-80m inc.	£31.97	£1.73
18HT	"HY Tower" 10-80m	£320.85	£12.54
103BA	3 Ele Yagi 10m	£60.38	£1.73
105BA	3 Ele Yagi 10m	£112.70	£3.16
153BA	3 Ele Yagi 15m	£74.75	£2.36
155BA	5 Ele Yagi 15m	£135.13	£4.77
203BA	3 Ele Yagi 20m	£159.85	£3.97
204BA	4 Ele Yagi 20m	£217.35	£5.87
205BA	5 Ele Yagi 20m	£281.75	£7.59
402BA	2 Ele Yagi 40m	£201.25	£5.23
DB10/15A	3 Ele Yagi 10-15m	£146.05	£3.91
TH3JNR	3 Ele Yagi 10-15-20m	£159.28	£2.47
TH2MK3	2 Ele Yagi 10-15-20m	£136.85	£2.59
TH3MK3	3 Ele Yagi 10-15-20m	£205.85	£4.66
TH5DXX	"Thunderbird" 5 Ele	£228.85	£5.41
TH6DXX	"Thunderbird" 6 Ele	£281.75	£6.97
HYQUAD	2 Ele Quad 10-15-20m	£240.35	£4.89
18TD	Dipole Tape 10-80m	£80.39	£2.30
BN86	Balun 1:1·3 30MHz	£15.53	£1.15
LA1	Lightning Arrestor	TOS	£0.75

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

J-BEAM

FOUR METRES			
4Y/4M	Yagi, 4 element	7·0dB £22.43	£1.73
PMH2/4M	Harness 2 way	£13.23	£1.44
TWO METRES			
HO 2M	Halo, head only	3·0dB £5.17	£0.63
HM 2M	Halo, 24in mast	3·0dB £5.75	£0.75
UGP 2M	Ground Plane	0·0dB £10.92	£1.73
C5 2M	Colinear omnivert	4·8dB £47.72	£1.73
5Y 2M	Yagi 5 element	7·8dB £12.07	£0.58
8Y 2M	Yagi 8 element	9·5dB £15.52	£1.73
10Y/2M	Long Yagi, 10 element	11·4dB £33.35	£1.73
14Y/2M	Long Yagi, 14 element	13·0dB £36.00	£1.73
D5/2M	Yagi, 5 over 5 slot	10·6dB £21.85	£1.73
D8 2M	Yagi, 8 over 8 slot	12·3dB £29.32	£1.73
PBM10 2M	10 element parabeam	12·4dB £39.67	£1.73
PBM14 2M	14 element parabeam	13·7dB £48.00	£1.73
Q4 2M	Quad, 4 element	10·0dB £25.87	£1.73
Q6 2M	Quad, 6 element	12·0dB £33.92	£1.73
5XY/2M	Yagi, 5 element cross	7·8dB £24.72	£1.73
8XY/2M	Yagi, 8 element cross	9·5dB £31.05	£1.73
10XY/2M	Yagi, 10 element cross	11·3dB £40.82	£1.73
PMH2 C	Harness, Cir. Polar	£8.05	£0.52
PMH2 2M	Harness, 2 way	£10.92	£0.86
PMH2 2ML	Harness, 2 way long	£11.92	£1.15
PMH4 2M	Harness, 4 way	£25.00	£1.73
SEVENTY CMS			
C8/70	Colinear vert.	7·8dB £54.05	£1.73
D8/70	Yagi, 8 over 8 slot	12·3dB £22.43	£1.73
PBM18/70	Parabeam 18 element	14·9dB £27.60	£1.73
PBM24/70	Parabeam 24 element	dB £36.80	£1.73
MBM28/70	Multibeam, 28 element	dB £18.40	£1.73
MBM48/70	Multibeam, 48 element	15·7dB £31.05	£1.73
MBM88/70	Multibeam, 88 element	18·5dB £42.55	£1.73
8XY/70	Yagi, 8 element cross	10·0dB £36.80	£1.73
12XY/70	Yagi, 12 element cross	13·0dB £46.00	£1.73
PMH2/70	Harness 2 way	£9.20	£0.75
PMH4/70	Harness 4 way	£19.55	£1.44
TWENTY THREE CMS			
D15/23	15 over 15 slot	15·0dB £36.80	£1.73
CR/23	Corner reflector	dB £35.08	£1.73
PMH2/23	Harness 2 way	dB £27.60	£1.73

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

Kenpro

KR600RC
£132.25

360° round type meter
Max. load 200kg.
Rot. 600kg/cm, brake
4,000kg/m.
1½in-2½in masts
Lower casting optional.

KR400RC

360° round type meter.
Max. load 200kg.
Rot. 400kg/cm, brake
1,500kg/cm
1½in-2½in masts.
Lower casting optional.

KR500

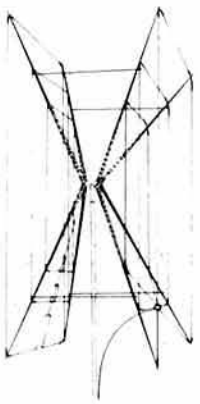
Elevation Rotator (180°).
Up to 50kg of Load.
1¼in-2¼in mast.
1¼in-1¾in boom.

KR250
£44.85

Twist and switch controller.
Rotator 200kg/cm.
Brake 600kg.
1in-1¼in masts.

NB: PRICES INCLUDE VAT AT 15%
Carriage free (post or road) mainland only

Gem Quad



A light strong, boomless, quad antenna covering 10-15-20m. The centre spider is aluminium and the spreader arms (13·6ft and 2·2lb) are of a glass fibre tridectic construction. (Thin rods forming a triangle with tape criss-crossing for light, rigid, low wind resistance structure.)

The double cone shape offers optimum spacing between loops and maintains these critical measurements even under severe weather conditions. This optimum spacing provides "monobander" performance; high gain, maximum capture area, low angle radiation, low SWR and good F/B and F/S ratios. The toroidal balun supplied provides single 50 ohm coaxial feed on all bands, with no lossey coils, traps or switches.

2 element 18' × 18' × 9¼'; TR 9¼'; 8dB Gain; 25dB F/B
3 element As 2 ele plus 6·5 boom; 8·9dB Gain; 30dB F/B.
4 element As 2 ele plus 13' boom; TR 22'.

GQ2E	2 Ele Antenna	£142.60	£4.31
GQ3E	3 Ele Antenna	£215.05	£7.42
GQ4E	4 Ele Antenna	£286.35	£8.11
GQCK1	Conversion Kit 1 Ele	£72.45	£3.34
GQCK2	Conversion Kit 2 Ele	£143.75	£5.41
GQSPIDER	Centre piece (spare)	£30.19	£1.43
GQSPREADER	Spreader Arm (spare)	T.O.S.	

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

CDE

AR40
£65.55

Accurate, silent self-calibrating control box. Dial up desired beam heading, push knob; motor rotates to that position and then switches off.

CD45
£113.85

Large illuminated meter gives read out of antenna heading at all times. Armature brake. Low voltage meter. Handles antennas to 8½sq ft.

HAM IV
£189.75

Large illuminated meter gives read out of antenna heading at, all times. wedge solenoid brake mechanism. Handles antennas to 15sq ft.

T2X
£270.25

Large illuminated meter gives read out of antenna heading at all times. Wedge solenoid brake mechanism. Handles antennas to 30sq ft.

NB: PRICES INCLUDE VAT AT 15%
Carriage free (post or road) mainland only

SOUTH MIDLANDS COMMUNICATIONS LIMITED

BRANCHES: CHESTERFIELD · HUMBERSIDE · STOKE · LEEDS

VERSATOWER

TELESCOPIC & TILTOVER RADIO TOWERS 25-120 FT

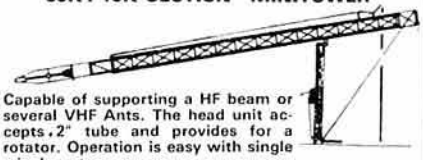
Below is a photograph of the versatowers chosen for the important approach lights for Manchester Airport. Be sure of quality and reliability by using the original Versatowers achieved through twelve years of continuous development which has produced a range of over 50 models, all of which, being made in England, conform to the current B.S.S., requiring minimum designed wind speeds of 85mph and up to 117mph.

Before purchasing a Tower, we strongly recommend consulting one of our engineers for advice regarding the most suitable combination for an installation. *It would be incorrect to nominate a specific headload as this is dependent upon load distribution, geographical location and siting.*

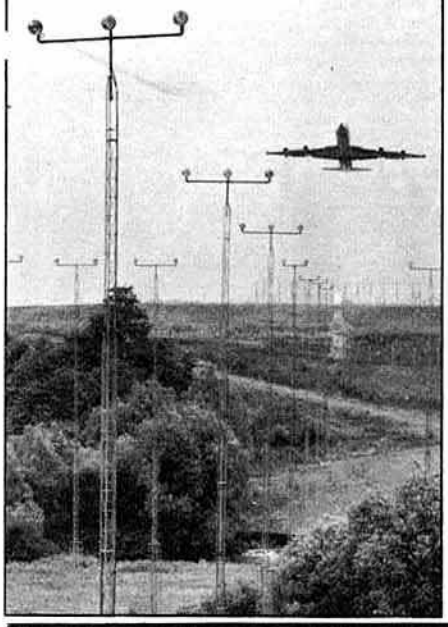
SEND NOW FOR SPECIFICATIONS/PRICES

They cost less than you would expect:
Post mounting 30ft inc. VAT **£388.35**
Post mounting 60ft inc. VAT **£533.83**

'30ft': 10ft SECTION "MINITOWER"



Capable of supporting a HF beam or several VHF Ants. The head unit accepts 2" tube and provides for a rotator. Operation is easy with single winch system.



HANSEN

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

The Hansen range covers 20 quaity models with top-of-the-line the FS710. This is a flat frequency response, peak envelope power and R.M.S. in-line wattmeter with many novel features. Most notable being the 'power independent' SWR scale—no forward power calibration knob, just direct reading SWR.

FS710; PEP AUTO-SWR RMS LEVEL
FS710 £78.20

FS710H: 1·8-60MHz. 15, 150, 1·5kW
FS710V: 50-150MHz. 15, 150W
V.S.W.R: 4:1 and to 20:1
Accuracy: ±7% of FSD
Impedance: 50 52 Ohms
Connectors: SO239
Power: 240 Volts AC 50Hz
Weight: 3·lbs (1·5Kgs)
Size overall: 8 × 4 × 5½"
Size Meter: 2 × 3½"
Time Const: PEP follow 4 second

FS500 £60.95

PEAK READING LEVEL RESPONSE
FS500H 1·8-60MHz 20, 200 & 2kW
FS500V 50-150MHz 20 & 200W
Power ±7% FSD. SWR 1:1 5:1
Size: 8 × 4 × 5½"

FS600 £44.85

PEAK READING LEVEL RESPONSE
FS601M 1·8-30MHz 20 & 200W
FS601MH 1·8-30MHz 200 & 2kW
FS602M 50-150MHz 20 & 200W
FS603M 430-440MHz 5 & 20W
Power ±10% FSD. SWR 1:1 3:1
Size: 6½ × 2½ × 4½"

FS300 £40.25

LEVEL RESPONSE, LARGE METER
FS300H 1·8MHz 20, 200 1kW,
FS300V 50-150MHz 20, 200W FSD
Power ±10% SWR 1:1·3:1 ±10%
Size: 8 × 4 × 5½"

FS7 £35.65

VHF/UHF WATTMETER & BRIDGE
FS7 145MHz & 432MHz 5, 20, 200W
Power RMS ±10%. SWR 1:1 3:1
Power Max: 144MHz, 200W
432MHz 20W
Size: 6½ × 2½ × 4½". 'N' type sockets

FS711 £32.20

REMOTE INDICATOR TYPE
FS711H 1·8-30MHz 20 & 200W
FS711V 50-150MHz 20 & 200W
FS711U 430-440MHz 5 & 20W
Power ±10% SWR 1·1-3·1 ±3%
Indicator 5 × 2½ × 1½"
coupler 3½ × 2½ × 1½"

FS5E £32.20

INDEPENDENT TWIN METER
FS5E 3·5 150MHz 20, 200 & 1kW
Power RMS ±10%. SWR 1:1 5:1
Power Max: 1kW 3·5-30MHz
50W 50-150MHz
Size: 7 × 3 × 3½". 'On the Air' LED

FS300M £31.05

LEVEL RESPONSE, POWER & SWR
FS301M 1·8-30MHz 20, 200W
FS301MH 1·8-30MHz 200, 2kW
FS302M 50-150MHz 20, 200W
Power ±10%. SWR 1:1 3:1 ±3%
Size: 6½ × 2½ × 4½"

SWR3S £23.00

WIDE RANGE POWER & SWR
SWR3S 3·5-150MHz 20 & 200W
Power RMS ±10%. SWR 1:1 3:1
Power Max: 200W 3·5-30MHz
50W 50-150MHz
Size: 6 × 2½ × 2½". Antenna/switch

SWR50B £23

TWIN METER, RELATIVE POWER
SWR50B 3·5-150MHz Scaled 1kW
Power RMS ±20%. SWR 1:1 3:1
Power Max: HF 1kW 1:1. 300W 3:1,
VHF 50W
Size: 6 × 2½ × 2½". 'On the Air' LED

NB· PRICES INCLUDE VAT AT 15%
Carriage free (surface post) worldwide

SMC-HS

HF, VHF, UHF ANTENNAS MOBILE VERTICALS

SMC-HS Mobile Antennas, 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) except the 78B which has an inbuilt ball in case the mount is fitted askew.

Model	Band	Gain	Type	Power	Length	Price
20SE	20m		(½λ)	100W	1·72m	£13.80
15SE	15m		(½λ)	130W	1·72m	£12.65
10SE	10m		(½λ)	100W	1·72m	£12.65
4E	4m	0dB	½λ	150W	1·03m	£7.48
2H/PL	2m		(⅝λ)	50W	0·17m	£3.45
2QW	2m	0dB	¼λ	200W	0·49m	£2.30
2VF	2m	3dB	⅝λ	50W	1·06m	£10.35
2NE	2m	3dB	⅝λ	150W	1·30m	£6.33
78SF	2m		(½λ)	100W	1·42m	£11.50
78F	2m	4·5dB	½λ	100W	1·75m	£11.50
78B	2m	4·5dB	½λ	150W	1·72m	£12.65
70N2M	2/70	2·7dB 5·1dB	(½λ) 2 × ½λ	100w	0·89m	£14.38
258	70cm	5·5dB	2 × ½λ	100W	0.9m	£11.50
358	70cm	6·3dB	3 × ½λ	100W	1·36m	£14.38

Model	Description	Price
SOWM	**Wing Mount.** SO239M upper SO239 under adjustable angle	£3.35
TMCAS	**Boot Mount** c/w 6 mtrs RG58 and PL259 plug	£7.65
GCD SOCA	**Gutter Mount** deluxe cast type c/w 4 mtr cable assembly and PL259	£6.90
SOMM	**Magnetic Mount**c/w 4 mtrs RG58 and PL259 plug. *For use with smaller antennas only*	£8.45

An alternative mounting for any of the two metre antennas listed above is the BSD stainless steel bumper strap at **£7.75** plus the HS88BK extension tube at **£17.65** which raises by 80 cms and decouples the base of the antenna.

Also fitting the bumper mount is the 10 foot, 3 section (quick disconnect and fold over jointed) mobile colinear element which provides about 7dB of gain for **£28.35** (ills. right).

For operation on 2 metres and 70 cms the dual band 70N2M is an elegant solution particularly when combined with the HS770 diplexer which provides 50W power handling, 30dB isolation between transceivers with an insertion loss of only 0·5dB for **£13.80.**

Mainland delivery: accessories £0.65, antennas £1.73

NB: PRICES INCLUDE VAT (AT 15%)

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

B. BAMBER ELECTRONICS

WHOLESALE & MAIL ORDER SPECIALISTS

PHONE BARCLAYCARD OR ACCESS NUMBER FOR IMMEDIATE DISPATCH

RADIOTELEPHONES

PYE WESTMINSTER W15 AMD mid band multi-channel sets only. No mikes, speaker, cradle or leads. **£45.00** plus VAT.

PYE WESTMINSTER W15 AMD mid band crystalled and converted to 129·9MHz, 130·1MHz and 130·4MHz. Very good condition. **£140.00** each plus VAT.

PYE WESTMINSTER W15 AMD High band and low band available. Sets complete but are less speakers, mikes, cradles and LT leads. **£70.00** each plus VAT.

PYE WESTMINSTER W30 AM Low band sets only, no control gear. Sets complete and in good condition. **£45.00** plus VAT.

PYE BASE STATION F30 AM Low band and high band available with and without T/T. Prices from **£220.00** plus VAT.

PYE RTC Controller units for remotely controlling VHF and UHF fixed station radio telephones over land lines. **£20.00** each plus VAT.

PYE PC1 Radiotelephone controller, good condition, 2 only at **£50.00** each plus VAT.

PYE MOTOFONES MF5 AM Low band, sets complete but poor condition, hence **£25.00** each plus VAT.

PYE CAMBRIDGE AM10D, dash mount sets complete and in good condition but untested. **£40.00** each plus VAT.

PYE CAMBRIDGE AM10B Boot mount sets, high band sets only, no control gear, good condition. **£25.00** each plus VAT.

PYE REPORTER MF6 AM high band sets, complete but less cradles. Few only **£150.00** each plus VAT.

PYE EUROPA MF5 FM Low band sets complete but less mike and cradle, **£90.00** each plus VAT.

PYE EUROPA MF5 UHF Mobile sets complete but less mike and cradle, **£90.00** each plus VAT.

PYE OLYMPIC F200 Base station, high band AM, good condition. **£180.00** each plus VAT.

PYE R412 UHF Base station receiver. **£120.00** plus VAT.

PYE F460 UHF Base station complete and good condition. **£150.00** plus VAT.

PYE PF2 UB Ideal for conversion to 70cm. These sets are in good condition and are complete with mike, battery and aerial. **£80.00** each plus VAT.

PYE BC10 A Battery chargers for PF2, with battery adaptor. **£25.00** each plus VAT.

PYE POCKETFONES PF1 Suitable for 70cm, supplied with batteries and service manual. **£25.00** plus VAT.

*PLEASE NOTE all sets are sold less crystals unless otherwise stated. Carriage on RT equipment—Mobiles **£2.00** each, Base stations **£15.00** each. Red Star available at cost.*

Kobishi Regulated Power Supply 13·8 volt 5/7 amp. Made in Taiwan. **£14.95**

Gould 25 Watt miniature switching power supplies 5 volt 5 amp. **£25.00**

Volstat Constant Voltage Transformers 190-260 volt input 240 volt RMS output. 250 watt. **£45.00** each.

Casio FX8100 Scientific Calculator 46 built-in scientific functions **£24.95**

Eagle TI206 2 Station Intercom operates from PP3 batteries, 15 metres of cable supplied. **£6.95**

I.C. Test Clips 28-way and 40-way, gold plated **£2.30** each.

Equipment Wire size 7/0.2 mm, colour yellow 500 metre reels **£5.00** each.

Mains Isolating Transformers 500 VA 240 volt input, 240 volt C. T. output housed in metal box but less lid. **£15.00** each.

PYE AM WESTMINSTER SPARES

(High band and Low band available)

Receiver RF Board **£10.00** each
Receiver 10.7 IF Board **£8.00** each
Receiver 455KHz IF Board **£8.00** each
Receiver Osc. Multiplier Board **£5.00** each
Receiver Squelch Board **£5.00** each
Receiver Audio Board **£10.00** each
Transmitter RF Driver Board **£5.00** each
Transmitter PA Board **£10.00** each
Transmitter Audio Board **£8.00** each
Modulation Transformer **£5.00** each

TRANSISTORS & ICs

AN103	**£2.78**	UPC1156H	**£4.26**	2SC1307	**£3.00**
AN612	**£3.45**	CA1458E	**£0.75**	2SC1449	**£1.67**
BA521	**£4.16**	MSM5807	**£5.87**	2SC1675	**£0.75**
LA4031P	**£3.21**	LM383T	**£3.82**	2SC1678	**£2.67**
LC7120	**£5.87**	UPD2816C	**£15.81**	2SC1923	**£0.43**
LC7130	**£5.93**	AN7150	**£3.97**	2SC1945	**£2.97**
MB3712	**£4.71**	PLL02A	**£4.97**	2SC1969	**£2.93**
MC1496P	**£2.63**	MRF475	**£3.05**	2SC2029	**£2.60**
TA7130	**£1.93**	2SC495	**£1.10**	2SC2078	**£2.90**
TA7205	**£3.72**	2SC496	**£1.31**	2SC2166	**£2.73**
TA7222	**£4.07**	2SC710	**£1.80**	2SC2314	**£1.41**
TA7310	**£2.78**	2SC1096	**£1.72**	2SK34	**£1.90**
TC9100	**£7.91**	2SC1173Y	**£1.69**	2SK45	**£1.85**
UPC575C2	**£3.86**	2SC1306	**£2.73**	2SK19	**£1.85**

ACCESSORIES

PL259/6 Ant. Plug for RG58 Cable	46p
PL259/9 Ant. Plug for RG8 Cable	46p
PL258 Double Female PL259 Back to Back	46p
M563 Double Male PL259 Back to Back	76p
SO239 Chassis Mount Socket 4 Hole	46p
M358 PL259 'T' Three Way Adaptor	£1.48
Lightning Arrestor PL259 Back to Back	£1.80
CB4 4-Pin Mike Plug	72p
4-Pin Right Angle Mike Plug	£1.30
CB5 5-Pin Mike Plug	72p
5-Pin Din Mike Plug	35p
3·5mm Ext. Speaker Jack Plug	20p
Cig. Lighter Plug with Lead	£1.10
60 amp Alternator & Generator Noise Filter	£2.30
3 amp Hot Line Filter (Fits on back of rig)	£2.95
Fuses 2, 3, 4, 5 amp 20mm or 1¼". Per pack of 10	£1.40
Nickel Cadmium Batteries "AA" size	£1.15
TR175 7 volt Battery for Power Mikes	£2.53
SWR25 SWR/PWR Twin Meter	£12.95
Hansen FS 5 E	£29.95
Hansen SWR 50 B	£22.95
5 Watt Public Address Horn	£4.95
12/15 Watt Public Address Horn	£9.95
SMCL 150PL 150 watt Dummy Load	£15.65
CB 707 5 Watt Dummy Load	95p
DL30 30 Watt Dummy Load	£6.45
Heavy Duty Gutter Mount	£3.25
Hirschmann Ro 250 Rotator	£49.50
SL100 Support Bearing for Hirschmann Rotator	£15.00

GOOD SECONDHAND EQUIPMENT ALWAYS WANTED FOR CASH

ALL PRICES QUOTED INCLUDE P/P AND VAT UNLESS OTHERWISE STATED

BARCLAYCARD VISA

5 STATION ROAD, LITTLEPORT, CAMBS CB6 1QE

PHONE: ELY (0353) 860185

Access

COUNCIL

President
E. J. Allaway, MB, ChB, MRCS, LRCP, G3FKM

Executive vice-President
R. G. Barrett, GW8HEZ

Immediate past-President
B. O'Brien, G2AMV

Honorary treasurer
P. F. D. Cornish, FCA, G3COR

Ordinary members
J. Bazley, G3HCT
R. Bellerby, MA, BSc, FBIS, G3ZYE
D. S. Evans, PhD, BSc, FIM, G3RPE
K. A. M. Fisher, TEng(CEI), MIPRE, G3WSN
G. R. Jessop, CEng, MIERE, G6JP
G. I. Knight, GM8FFX
T. I. Lundegard, G3GJW
D. M. Pratt, BTech, CEng, MIEE, MIERE, G3KEP

Zonal members
Zone A. J. Heathershaw, G4CHH (Mrs)
Zone B. H. S. Pinchin, BSc, MBIM, G3VPE
Zone C. W. J. McClintock, G3VPK
Zone D. L. Hawkyard, G5HD
Zone E. R. G. Barrett, GW8HEZ
Zone F. I. J. Kyle, GI8AYZ
Zone G. F. Hall, GM8BZX

REGIONAL REPRESENTATIVES

Region 1 – W. R. Parkinson, G3FNM. Tel 061-973 1472
Region 2 – D. S. Smith, G4DAX. Tel 0947 86333
Region 3 – *(Post vacant)*
Region 4 – M. Shardlow, G3SZJ. Tel 0332 556875
Region 5 – J. S. Allen, G3DOT
Region 6 – F. S. G. Rose, G2DRT. Tel 0494 814240
Region 7 – P. J. Walker, G8HMG. Tel 0737 64035
Region 8 – K. A. Crouch, G8KEN. Tel 0303 55241
Region 9 – W. J. Colclough, G3XC. Tel 0726 860485
Region 10 – P. A. Jones, GW4HAT
Region 11 – B. H. Green, GW2FLZ. Tel 0492 49288
Region 12 – *(Post vacant)*
Region 13 – A. B. Givens, GM3YOR
Region 14 – V. Kusin, GM4HCO
Region 15 – J. T. Barnes, GI3USS. Tel 0247 3948
Region 16 – T. D. Howe, G3PLF. Tel 0268 24453
Region 17 – H. G. Cunningham, G8FG. Tel 0202 876018
Region 18 – W. Ricalton, G4ADD. Tel 067 088 259
Region 19 – R. J. Broadbent, G3AAJ
Region 20 – B. L. Goddard, G4FRG

HONORARY OFFICERS

Aerial Planning Panel co-ordinator – R. W. Price, G4BSO

Audio Visual Library co-ordinator – D. Simmonds, G3JKB

Awards managers – **hf** – P. Miles, G3KDB
vhf – Jack Hum, G5UM

Intruder Watch organizer – S. Cook, G5XB

Microwave manager – D. S. Evans, G3RPE

Observation Service organizer – D. M. Pratt, G3KEP

Slow morse practice transmissions organizer – M. A. C. MacBrayne, G3KGU

Trophies manager – P. A. Miles, G3KDB

VHF manager – K. A. M. Fisher, G3WSN

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

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

ANNUAL SUBSCRIPTION RATES

UK corporate: £14.50, incl VAT.
Overseas: £14.50.
Associates under 18: £5.80.
Family member: £5.80.
Students age 18 to 25: £8.70 *(Applications should give the applicant's age at last renewal date and include evidence of student status).*
Affiliated societies: £14.50 (including *Rad Com*); **£8.70** (excluding *Rad Com*).

RADIO SOCIETY OF GREAT BRITAIN

(Limited by guarantee)

Registered office: **35 Doughty Street, London WC1N 2AE**

Telephone 01-837 8688. Telex 25280 (RSGBHQ G)

Founded 1913. Incorporated 1926. Member society, International Amateur Radio Union

PATRON: HRH The Prince Philip, Duke of Edinburgh, KG

The national society representing all UK radio amateurs

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.

GENERAL MANAGER AND SECRETARY
D. A. Evans, G3OUF

EDITOR
A. W. Hutchinson

RSGB HEADLINE NEWS

Tel 01-837 4118

By telephoning the above number, members can receive up-to-date amateur radio news of immediate interest from a three-minute recording. This is updated on Tuesdays and Fridays, or more frequently as necessary.

RSGB SUNDAY NEWS BROADCASTS

These broadcasts are made every Sunday morning, giving almost complete coverage of the British Isles. Stations broadcasting them (particulars below) use the callsign GB2RS.

The purpose of these news broadcasts is to provide an outlet for amateur radio news items which cannot wait for the next issue of *Rad Com*. Items for inclusion should reach RSGB HQ by letter (marked "GB2RS news") or telephone before 10am on Wednesdays, although no guarantee of inclusion can be given. Once broadcast, items are not usually repeated.

INTENDED RECEPTION AREA	NORMAL READER	RESERVE READER	LOCAL START TIME
Frequency: 3·640MHz. Mode: ssb			
NE Scotland	GM3HGA	GM3VEY	1130
Frequency: 3·650MHz. Mode: ssb			
SE England	G2MI	G4ARZ	0900
Midlands	G2CVV	G8QZ	0930
SW England/Wales	G8ML	G3JFH	1000
Northern Ireland	GI3GAL	GI3SXG	1030
NE England	G5VO	G3MCF	1100
E Scotland	GM4CUZ	GM4FLP	1430
Midlands	G8QZ	G2CVV/G3SZJ	1800
Frequency: 3·660MHz. Mode: ssb			
Central Scotland	GM3TCW	GM3ULP	1130
Frequency: 7·0475MHz. Mode: a.m.			
UK (from Northern Ireland)	GI3GGY	GI2DHB	0900
UK (from N Midlands)	G3LEQ	G2CVV	1100
Frequency: 144·250MHz. Mode: ssb (horizontal polarization)			
N from Carlisle	G4LAA	(Vacancy)	0930
SW from the Midlands	G3BA	G3KQF	0930
NE from S Devon	G3CHN	G3PBV	1000
NW from Manchester	G3SMT	G4IAL	1000
NNW from Cleveland	G4JJB	G8FTZ	1000
W from Carlisle	G4LAA	(Vacancy)	1030
SE from Lincoln	G3NRO	G8OFQ	1030
SW from London	G3FZL/G3VAG	G3IIR	1030
S from Aberdeen	GM8GHV/GM8MBP		1030
W from Bristol	G4CJZ	G3ZWY	1100
W from Bangor, Co Down	GI3TLT	GI3SXG	1130
Frequency: 145·525MHz (S21). Mode: fm (vertical polarization)			
Cornwall	G2ABC	G3NPB/G3VGO	0930
Hampshire, north	G8CKN	G3PZN	0930
Suffolk	G3ZNU	G4FSG/G4FZZ	0930
Leeds	G3SPX	G8XGN	0930
Co Down	GI3WEM	GI4DOR	0930
Edinburgh	GM4EHO	GM4JFS	0930
E Cornwall/S Devon	G3ZYY	G4GWJ/G4KYY	1000
Londonderry	GI2DHB	GI4AHD	1000
London	G3FZL/G3VAG	G3IIR	1000
Birmingham	G3PWJ	G3BA	1000
Lincolnshire	G3NRO	G8OFQ	1000
Tyneside	G4FUT	G3WNR	1000
Glasgow	GM4HCO	GM4CXM/GM3VTB	1000
Elgin	GM4ILS	(Vacancy)	1000
Southampton	G8LVC	G8ADM	1030
E Sussex coast	G8SC	G3ZFE	1030
Bristol	G4CJZ	G3ZWY/G8NNU	1030
Manchester	G3LEQ	G3JWK	1030
Dumfries	GM8TKA	GM3MSG	1100
Brighton and coast	G3ZYE/G8GEZ	G4JGJ/MA	1100
Huntingdon, Cambs	G8BBK	(Vacancy)	1100
Jersey	GJ8KNV	GJ4ICD/GJ4JWA	1100H
Gwynedd	GW8TTM	(Vacancy)	1100
Clwyd/Merseyside	GW4IEQ	G8NNS	1100
Exeter	G3PBV	(Vacancy)	1130
Leicester	G4JYS	G4MFU	1130
Scarborough	G8XTL	G4EEV	1130

H = horizontal polarization

QTC
Amateur radio news

Radio Amateurs' Examination
Candidates for the Radio Amateurs' Examination on 17 May will be aware that there have been recent changes to the licence schedule which could affect the responses they give to some of the questions. As the examination papers were printed prior to the schedule changes, the following provisions are being made: in any questions where reference is made to classes of emission, both the old and the new designations of emission will be given. Questions requiring knowledge of licence power limitations below 1,000MHz will be discounted. *G3KEP*

QSL Bureau
Although the vast majority of members "play the game" as far as the QSL Bureau is concerned, the bureau is suffering from an increasing number of cards which have not been previously sorted alphabetically by prefix. Many of the senders are recently-licensed members, and they are requested to re-read the recommendations in the RSGB leaflet on how to use the QSL Bureau. Although the bureau does its best, it is necessary to stick to the simple rules, otherwise it can cause havoc and introduce delays.

Another point to bear in mind is that the bureau reserves the right to refuse oversized cards. It must be possible to send them overseas without folding, using our standard method.

The bureau will be closed from 29 May to 13 June 1982.

AMSAT—Phase 3B satellite
This satellite is expected to be launched on or about 6 July 1982, and the following frequencies have been proposed by AMSAT-DL.

B transponder

Uplink: 435·025–435·175MHz. Downlink: 145·975–145·825MHz.
General beacon: 145·812MHz. Engineering beacon: 145·990MHz.

L transponder

Uplink: 1,269·050–1,269·850MHz. Downlink: 436·950–436·150MHz.
General beacon: 436·04MHz. Engineering beacon: 436·02MHz.

Longleat Mobile Rally anniversary
On 27 June the Bristol RSGB Group will be celebrating the 25th anniversary of the Longleat Mobile Rally, and to provide something different and start an annual club competition it will be staging an antenna mast erection competition. Lord Christopher Thynne, the comptroller of Longleat Park Estate, has donated an excellent trophy, consisting of the family coat of arms mounted on an oak shield, which he will present to the winners. There will also be cash prizes.

Masts will be the usual "sectioned" "ali" tube and about 30ft in total length. The winners will be the team of four *bona-fide* club members who assemble and erect the mast to a good standard in the shortest time. Two teams will operate at the same time. Rules and entry forms may be obtained from sec G8GLQ. The group is also offering another special attraction—the appearance of the national championship-status Bristol Unicorns Youth Band, a 100-strong marching band which will perform several times during the day, marching and giving band concerts.

Talk-in by GB4LMR on S22 and SU8.

Thanet youth club
Members in the Thanet area may be interested to know that an amateur radio/electronics club for young people meets at the Quarter Deck Youth Centre, Margate, every Monday evening. It has a clubroom/workshop with a bench, a few tools, a number of components, instruments and magazines. Discussions and talks are held, and there is a growing interest in studying for the RAE.

The leader and organizer of the group for the past three years, Mr K. Smith, G3JIX, is giving up the post, and would like to hear from any adult radio amateur, licensed or not, who would consider taking over from him. His address is The Electronics Laboratories, The University, Canterbury, Kent CT2 7NT; tel Canterbury 66822.

RSGB REGION 1 LECTURE

"The conversion of electronic systems to silicon chips —the uncommitted logic array"

by Alan A. Shepherd, MSc, PhD, FInst P, managing director, Ferranti Electronics Ltd

8pm, Friday 28 May 1982

in the

Renold Building, University of Manchester, Institute of Science and Technology

Sackville Street, Manchester

Admission to RSGB members by ticket obtainable free of charge by sending an sae to RR1, W. R. Parkinson, G3FNM, 141 Norris Road, Sale, Cheshire M33 3JR.

UMIST is located in the centre of the city within a few minutes walk of Piccadilly railway station and bus terminals. Free car parking is available in UMIST open car park, Charles Street, opposite the multi-storey car park. Talk-in on 144 and 432MHz.

Light refreshments will be available.

Retirement of Colin C. Lindsay
Colin Lindsay, who has been the *Radio Communication* advertisement representative for almost 10 years, has been compelled on medical advice to take an early retirement—by just a few months; it having been his intention to retire at normal retirement age after completing the December 1982 issue. He brought to the Society over 30 years' experience in the advertising field, which played no small part in the increased amount of advertising placed in the journal in recent years.

During his service the average number of advertisement pages rose from 19 to 65 per issue (old size), and the average of 54 of the larger size pages per issue in 1981 reflected this continued growth in advertisement space. The resulting income from advertisements has made a considerable contribution to the Society's finances in recent years, and on behalf of the members our grateful thanks are extended to Colin Lindsay for his work on their behalf.

Although he will no longer be handling the advertisement pages, Colin will continue to place his knowledge and experience at the disposal of M. J. (Mike) Hawkins, G3ZNI (RSGB membership services officer for the past four years) who has been appointed advertisement officer and has been learning the "tricks of the trade" from him for the past two months.

We wish Colin Lindsay improved health in future in order that he may enjoy to the full a long and happy retirement.

The late Edgar Wagner, G3BID
The Radio Amateur Invalid & Blind Club has received from the executor of Edgar Wagner's estate a legacy of £500 "to assist the blind to enjoy the hobby of amateur radio" and would like to record its thanks. G3BID was for many years a keen supporter of the RAIBC and its activities for disabled and blind people.

(Mrs F. Woolley, G3LWY
RAIBC secretary

A holiday in Denmark
The family of OZ2FL, near Copenhagen, invite an English boy 11–12 years old for two weeks' holiday 25 July–8 August. They have an English-speaking 11-year-old son. Contact G2FUX, QTHR.

Looking ahead

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

28 May – RSGB Region 1 lecture, Manchester.
19 June – RSGB HF Convention, Belfry Hotel, Oxford.
11 September – Scottish Amateur Radio Convention & Exhibition, Aberdeen.
26 September – Welsh Amateur Radio Convention, Oakdale Community College, Blackwood, Gwent. Details from GW3KYA.
9 October – Midlands VHF Convention, Wolverhampton Polytechnic. Details from J. P. H. Burden, G3UBX.
4 December – RSGB AGM, IEE, Savoy Place, London.

RSGB HF CONVENTION 1982

Belfry Hotel and Conference Centre, Milton Common, Oxford

Saturday 19 June 1982

- One-day exhibition and lecture programme
- Home-constructed QRP equipment display
- QRP demonstration station GB2HF on all bands (including 10MHz)
- Film shows
- Trade exhibition
- RSGB bookstall

PROGRAMME

1000	Convention opens
1015	Film shows commence
1100-1200	Lecture: "HF antenna systems in theory and practice—including the new 10, 18 and 24MHz bands", Louis Varney, G5RV
1415-1600	Lecture: "HF receivers—simple or complex?", Pat Hawker, G3VA
1600-1700	Committee forum with Dennis Andrews, G3MXJ (chairman, HF Contests Committee), John Allaway, G3FKM (hf manager), and Peter Miles, G3KDB (hf awards manager), chaired by John Kay, G3AAE (chairman, HF Committee)
1800	Convention closes

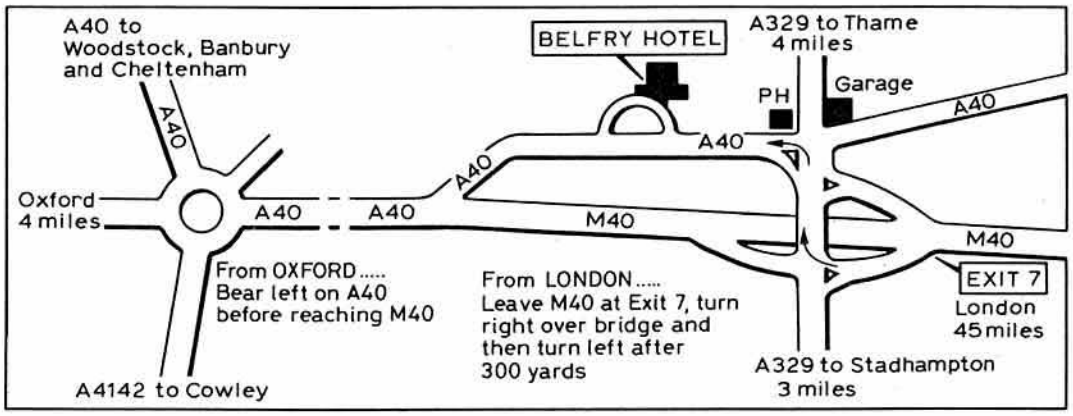
The equipment display and demonstration station will be presented by the G-QRP Club.

Licensed refreshments will be available during the day, together with a limited number of snack lunches. The hotel restaurant will be open if more substantial meals are required.

The venue is located about nine miles south-east of Oxford and very close to junction 7 of the M40. Adequate car-parking facilities are available and there is a bus service to and from Oxford.

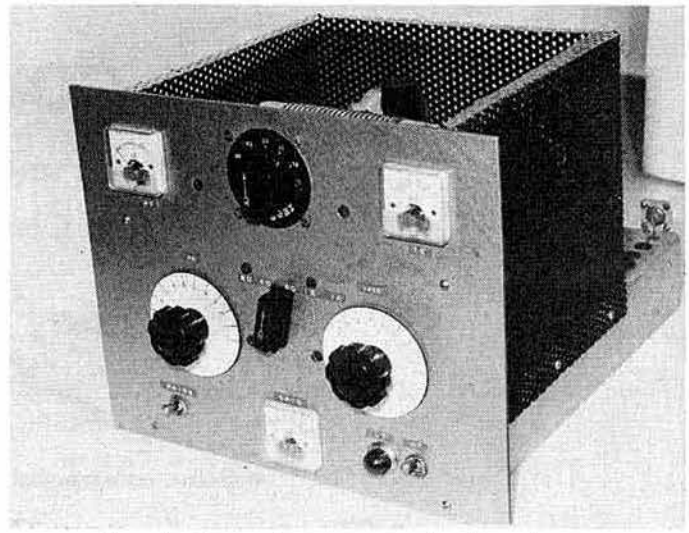
Admission is £1, payable at the door.

HOW TO GET THERE



A low-budget hf linear amplifier

by E. J. HATCH, CEng, FIEE, G3ISD*



View showing panel arrangement and perforated screen

Introduction

There is a school of thought which persistently brands the use of linear amplifiers as "unsporting", as if they confer an unfair advantage. It would be equally logical, or illogical, according to one's point of view, to apply the same reasoning to the use of high-gain antennas, or even a better-than-average location. The author's justification for possession of a linear amplifier was mainly the challenge presented in the planning and construction, and even the debugging of the home-built variety, to say nothing of the greater satisfaction to be obtained from the operation of self-built equipment.

The words "low budget" in the title suggest that it should be inexpensive to build, because almost everything is likely to be acquired second- or third-hand to keep expenditure low. It would be difficult to be innovative with an hf linear which uses valves, and reference to the circuit diagram will show that this design would win no prizes for originality. However, it works, and may encourage others contemplating such a venture.

Circuit

This is shown in Fig 1, and uses tried and trusty 813s in grounded grid, which is a simple and reliable arrangement and has the advantage that no screen or bias supplies are required. Furthermore, the usual transceiver with 70-100W output will drive the amplifier to 1,000-1,200W input depending on ht, so that at the maximum permitted output of 400W p.e.p., the amplifier is well under-run with increased reliability.

With such a simple circuit there is little which calls for comment. The 50pF capacitors between grid and filament are necessary for stability on 28MHz and must be mounted at the valveholder connections. Note the 1Ω resistor from grids to earth; this provides a low impedance dc path to aid stability, and also acts as a shunt to double the range of the grid milliammeter from 50 to 100mA. It was fortunate that the meter resistance happens to be 1Ω.

The connection of the anode current meter in the ht supply to the valves will not meet with universal approval, and many would no doubt prefer to see it connected at a point of low potential. It has proved to be quite satisfactory when using a plastic-cased instrument but, if preferred, it may be connected as shown in Fig 2. L6 is not essential, but is included as a safety

*147 Borden Lane, Sittingbourne, Kent.

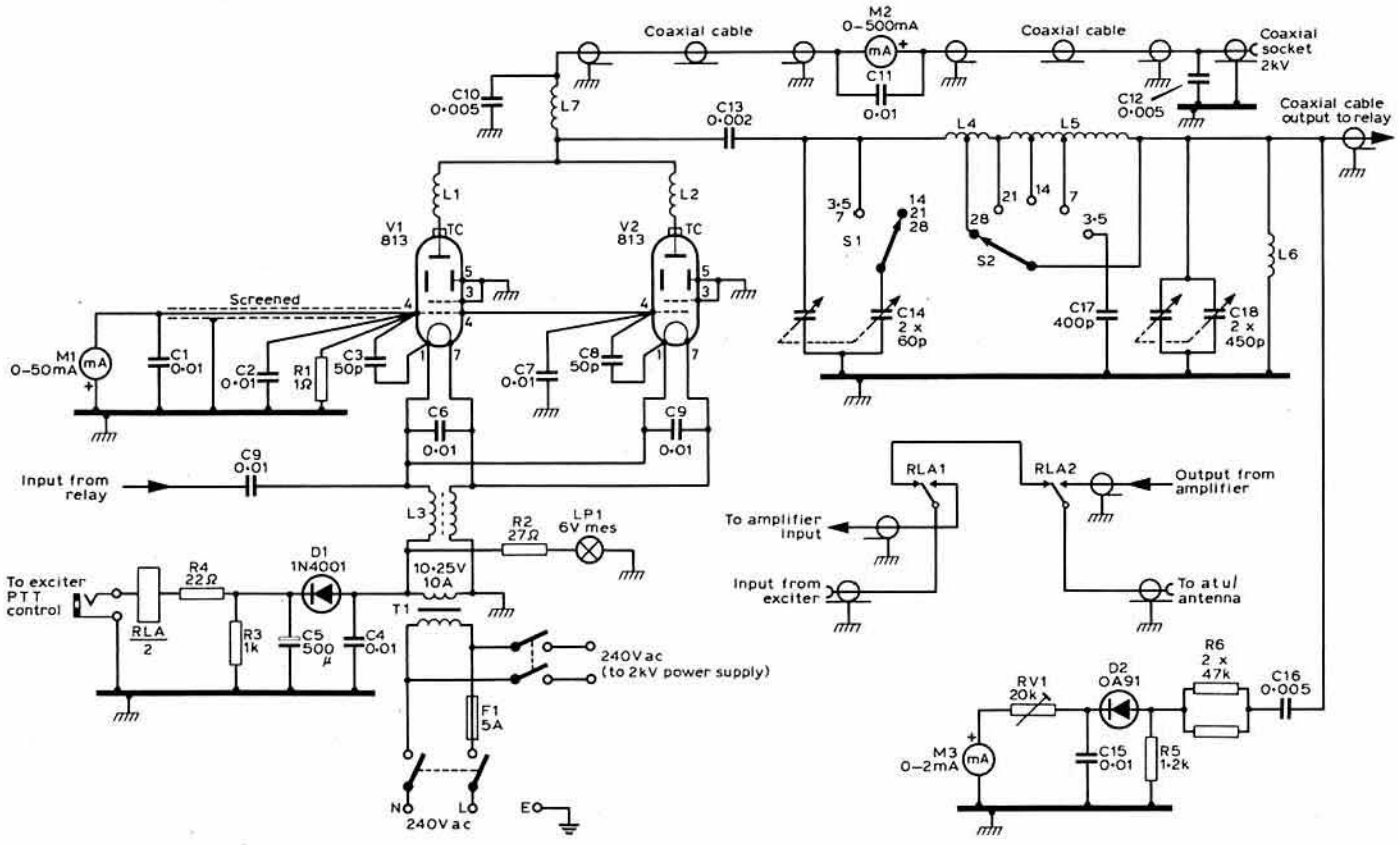


Fig 1. Amplifier circuit diagram

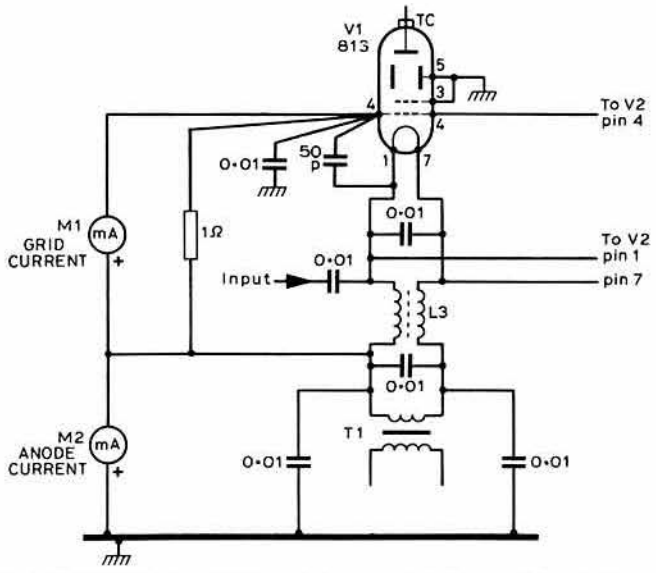


Fig 2. Alternative anode current meter connection. Note that a separate relay supply may be required with this arrangement

measure. In the unlikely event of the anode coupling capacitor breaking down, the antenna would become "alive" at 2kV, but the inclusion of L6 will short-circuit the ht supply and cause the fuse to blow.

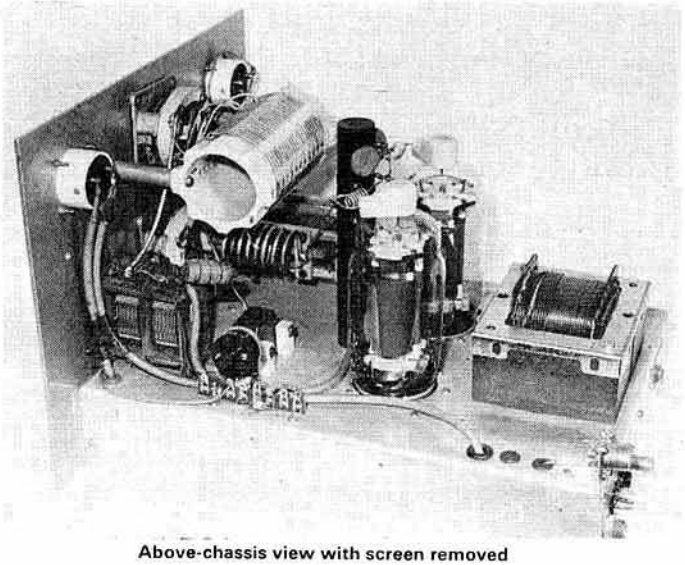
The rf output indicator may be omitted if an external instrument is available. It was included to fill a hole left by a redundant screen current meter, following initial experiments with an alternative design.

It will be noted that the new 10, 18 and 24MHz bands have not been included. This is because the amplifier had been completed and in use for over a year before their introduction was even mooted. The existing coil taps will not cover the new bands, so that to include them will entail the use of a bandswitch with extra positions, together with additional coil taps. The latter can be determined experimentally without difficulty with the aid of a gdo.

Components

None of the components is unique, and the likelihood is that, with the exception of the anode and filament rf chokes, all may be found in one's own and friends' junk boxes, or at one or other of the frequent amateur rallies.

The anode rf choke is based on that described in [1], and must be checked for series resonances within the amateur bands before installation. This is done by short-circuiting the choke and checking with a gdo. No chances can be taken; if an unwanted series resonance *is* present, the choke will certainly burn out in a more or less spectacular manner.



Above-chassis view with screen removed

Components list

R1	1Ω 1W 1% (see text)	**C1, 2, 4, 6, 7, 9, 11,**	
R2	27Ω 1W 5%	**15, 19**	0·01μF 350V disc
R3	1,000Ω 0·5W 5%	**C3, 8**	50pF 350V mica or ceramic
R4	22Ω 1W 5%		
R5	1,200Ω 0·5W 5%	**C5**	500μF 25V electrolytic
R6	2 × 47,000Ω 1W 5%	**C10, 12, 16**	0·005μF 3kV disc
R7	35Ω 10W wirewound	**C13**	0·002μF 5kV disc
R8	6,000Ω 5W wirewound	**C14**	120pF variable (see text)
R9-30	330kΩ 1W 5% carbon	**C17**	400pF 2·5kV mica
RV1	20,000Ω	**C18**	2 × 450pF variable
D1	1N4001	**C20**	33μF 150V electrolytic
D2	OA91	**C21-26**	100μF + 60μF 450V electrolytic (see text)
D3	1N4007		
D4-19	1N4006		
S1, 2	(See text)	**L1, 2**	6t 16swg 0·37in dia 0·75in long
RLA	12V dc (see text)		
RLB	240V ac	**L3**	Filament choke (see text)
T1	10-25V approx (see text) 10A	**L4**	21 and 28MHz coil (see Appendix 2)
T2	1,500V 250mA secondary (see text)	**L5**	3·5, 7 and 14MHz coil (see Appendix 2)
M1	0-50mA (see text)	**L6**	RF choke 1·5-2·5mH 300mA
M2	0-500mA		
M3	0-2mA	**L7**	Anode rf choke (see text)
V1, 2	813	**LP1**	6V mes
		F1	5A

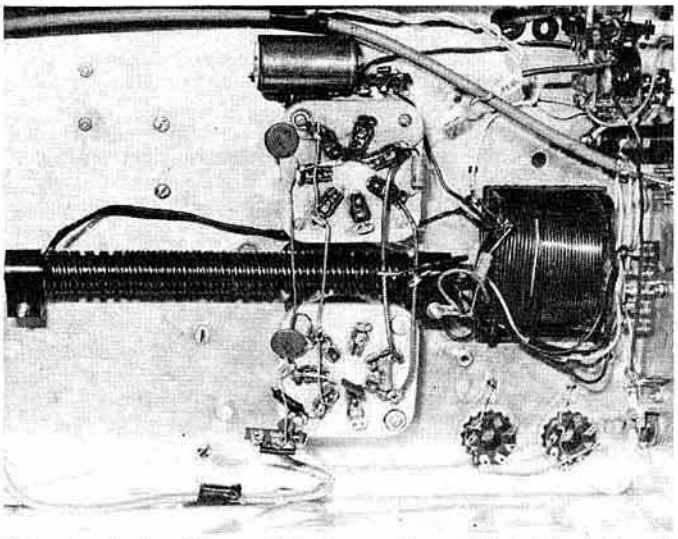
The filament rf choke consists of 28 bifilar turns of 14swg enamelled copper wire spaced to fill an 8 by 0·625in ferrite rod, allowing space for supporting clips (pvc) at the ends. Ferrite rods of this size are not easy to find, but the choke is not critical, and 0·5in diameter rod would be equally suitable. Alternatively, two 0·375in diameter rods could be taped together and used.

Because of the inescapable high minimum tank circuit capacitance (valve capacitance plus C14 minimum capacitance plus strays), an ideal tank Q of, say, 12, cannot be obtained on 14, 21 and 28MHz. The use of a switched split-stator or two-gang capacitor (C14) is, therefore, a compromise attempt to reduce minimum capacitance. The capacitor actually used is a second world war surplus USA item which was at one time commonly available from TU5B tuning units. It is a 120pF capacitor with the stator support bars sawn through to convert it to two 60pF. Once again, acknowledgement is made to [1].

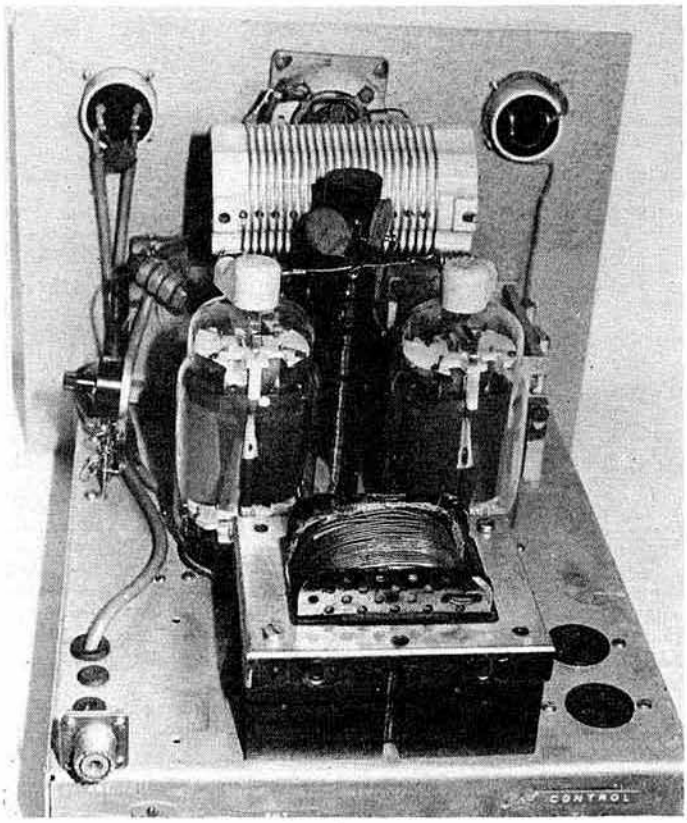
Two separate single-pole, heavy-duty ceramic switches from the same item of surplus were used for S1 and S2, although a single two-pole switch would be preferable if a suitable one were available. In view of the high rf potential and current present, these switches must be absolutely first class, with ceramic insulation and heavy contacts.

The antenna changeover relay is an octal-based item removed from case and base, and mounted on spacers. The quality of relays varies; choose one that appears to be of good construction, avoiding bakelite moving-contact insulation.

If a three-gang 450pF capacitor is available, it may be used as C18, in which case the 400pF capacitor C17 can be omitted. However, if C17 is used it should be a mica transmitting type capable of carrying at least 2A at 3·5MHz. Once again, the TU5B was the source.



Below-chassis view. The small tubular capacitors visible in this photograph are listed as disc ceramics in the components list. The two octal valveholders are redundant



Rear view

The filament transformer was originally a 50V item which was rewound for 10V 10A. It occurred to the author afterwards that the filaments could have been connected in series, when all that would have been necessary was the removal of secondary turns to give 20V. If this approach is adopted, the filament choke may be wound with 16swg wire.

Construction

Older members of the RSGB may recognize the layout in the photographs as identical with that of a linear amplifier described some years ago in the *RSGB Bulletin* [1]. This makes use of a 14 by 10 by 2·5in chassis, and 12·5 by 10 by 0·125in panel, and results in very good screening because only anode circuitry appears above the chassis. However, fashion being what it is, this has a somewhat outdated appearance, but it should be possible to adopt a modern "low profile" arrangement, provided full attention is paid to screening and ventilation. Remember that each valve has a 50W filament and will also dissipate around 90W on its anode even when undriven. Natural ventilation is adequate with the arrangement shown, but a small fan or blower would be necessary if the top of the screening were enclosed. The valveholders are recessed so that the tops of the 813 metal base shells (which must be earthed) are level with the chassis.

Constructors of reasonable experience will not need detailed assembly instructions, but short, direct wiring should be employed, especially at rf. Be sure that there is a 10V supply at the filament terminals, bearing in mind that there will be about a 0·25V drop in the filament rf choke. For voltages above 1,000, the author favours television coaxial cable, with Belling-Lee connectors. The two tank coils and the anode choke are all mounted mutually at right-angles to each other.

Debugging

The only real problem encountered was with the anode parasitic suppressors. These were included as a precaution, and originally consisted of 2W carbon resistors (two 100Ω in parallel) with 6t of 0·375in diameter 16swg tinned copper in parallel. On 21 and 28MHz the resistors smoked ferociously, as they also did with progressively fewer turns. Increasing the number of turns to 10 or 12 stopped the overheating, but reduced the efficiency on 28MHz to an unbelievable 10 per cent or so. Various combinations were tried without success, and at this point frustration set in to the extent that the project gathered dust for some months. A chance QSO with a W revealed that he had had the same problem with a similar amplifier, until in desperation he left the suppressors out altogether with no ill effect.

Table 1. Capacitor settings

Band	3·5MHz	7MHz	14MHz	21MHz	28MHz	28·5MHz
C14	6	4	5	2	6	5
C18	7	7	6	6	5	5

On both capacitors, 10 corresponds to maximum capacitance

At about the same time a US General Electric design was found which used chokes only, with no resistors, and this was the compromise finally adopted. This is described at some length to indicate that similar trouble may be experienced, but that it can be overcome with persistence.

Feedback into the exciter occurred on 21MHz, until the overall perforated aluminium screen was fitted, thus proving that it should have been provided in the first place.

During this trouble-shooting period, a monitor scope was found to be an invaluable tool, displaying various "funnies" until they were eliminated.

Operation

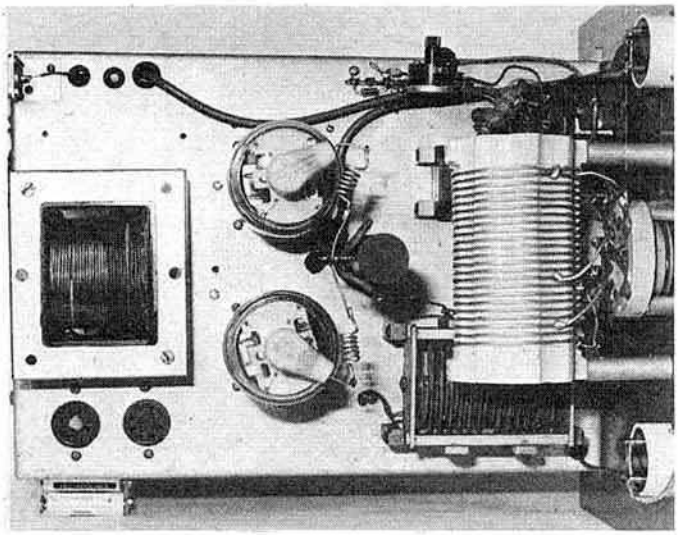
Table 1 shows the capacitor settings for the prototype running into a 50Ω dummy load, and is for guidance only. The author's practice is to load the exciter (FT101ZD) into the 50Ω dummy load before switching in the linear. In this way the exciter is matched to the antenna when the linear is switched out. Of course a mismatch is presented to the exciter when driving the linear, but ample driving power is nevertheless available. On 28MHz the exciter pa tuning may need slight readjustment for full drive. If an exciter with a solidstate pa is used, a suitable matching network will no doubt be essential.

For an output of 400W p.e.p., about 600W input is required at 3·5 and 7MHz. This is achieved by "talking up" the anode current to about 150mA, representing a true peak of about 300mA. On these bands the grid current meter will indicate about 15 to 20mA. Progressively greater drive is required on 14, 21 and 28MHz, with correspondingly greater input because of lower efficiency. The only way of being certain of the output power is by the use of a suitable output power meter, partly because grounded grid operation results in a proportion of the drive power being fed through to the output. In order to be sure of a clean output, it is not possible to over-emphasize the desirability of a monitor scope. Failing this, it is necessary to rely on really critical reports.

TVI

Although no claims are made, it so happens that no trace of tvi is observable either on an ancient black and white tv monitor which is 3ft away from the linear, or on the family colour receiver. Tests, without a low-pass filter, were carried out at about 1·2kW input on all bands, using a three-element triband beam directed toward the house, and a trap dipole. This is an arduous test because the monitor tv always displays a poor picture due to operation from a low-gain antenna lying on the ceiling joists above the shack.

To achieve this result, it was necessary to employ ferrite rings in the antenna coaxial cable of both tv receivers, as well as in the mains lead of the monitor. No doubt a large amount of luck is involved, for which the author is profoundly grateful!



Top view

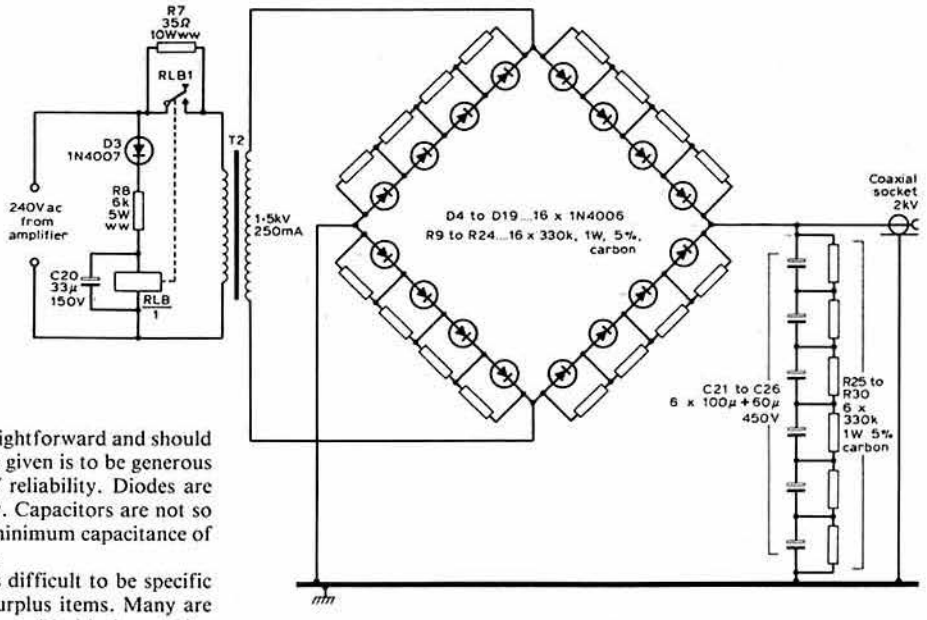


Fig 3. Circuit diagram of 2kV power supply

Power unit

Fig 3 shows the power unit in use. This is quite straightforward and should present no difficulties. The only advice that can be given is to be generous with the diodes and capacitors in the interests of reliability. Diodes are cheap, and four 1N4006s per arm is not too many. Capacitors are not so cheap, but sufficient should be used to result in a minimum capacitance of 25μF, and a minimum 10 per cent voltage derating.

Apart from the 1,500V secondary winding, it is difficult to be specific regarding the ht transformer rating when using surplus items. Many are likely to have centre-tapped secondaries for use with bi-phase valve rectification, and by using the whole of the secondary winding with a capacitive filter the dc voltage is $2\sqrt{2}$ times the half-secondary ac voltage. To maintain the transformer's original VA rating it would in theory be necessary to reduce the current rating by at least the same factor. However, because surplus ex-services transformers are invariably generously rated for continuous service, and because the ssb duty cycle can be assumed to be not more than 50 per cent, it is reasonable to assume that a transformer originally rated at 250mA would be satisfactory.

The primary relay arrangement is to reduce switch-on surge, which makes life easier for the rectifier diodes and also enables a far smaller mains fuse to be used. The relay is a 240V ac octal plug-in type, and with the values of R and C used, the delay is about 1s. R is chosen so that the relay draws its normal 240V ac operating current, and C then determines the delay.

Although it seems obvious, a note of warning should be sounded to emphasize the care needed when dealing with high-voltage supplies. *Always* switch off the ht before making any adjustments, and allow the ht capacitors to discharge through the 813s, then remove the mains plug.

Remember that 2,000V can be lethal!

Conclusion

The more erudite will seek in vain for detailed analysis of valve characteristics, impressive charts, and measurements based on the use of spectrum analysers and professional oscilloscopes, because the author does not have access to such "goodies". However, for those not willing or able to spend several hundred pounds for the commercial article, this is perhaps an acceptable substitute. It is at this point that acknowledgement should be made to the good friends who searched their junk boxes for some of the components. They would blush if identified, but mention must be made of George Costin, G4GFU, who took the excellent photographs.

Reference

[1] "The G2DAF Linear Amplifier", *RSGB Bulletin* April 1963.

Appendix 1. Anode choke construction

Total of 300 turns of 32swg enamelled wire close wound on a 1in diameter by 6·5in Tufnol rod, sectioned as follows: 165 turns, 65 turns, 35 turns, 20 turns and 15 turns, with 0·125in between sections. The 165-turn section is the ht end. Secure winding in position with polystyrene cement. Soldering spills may consist of pieces of 16swg-tinned copper lightly tapped into 0·0625in holes drilled into the side of the former. Rod or tube of ceramic or other material may be used.

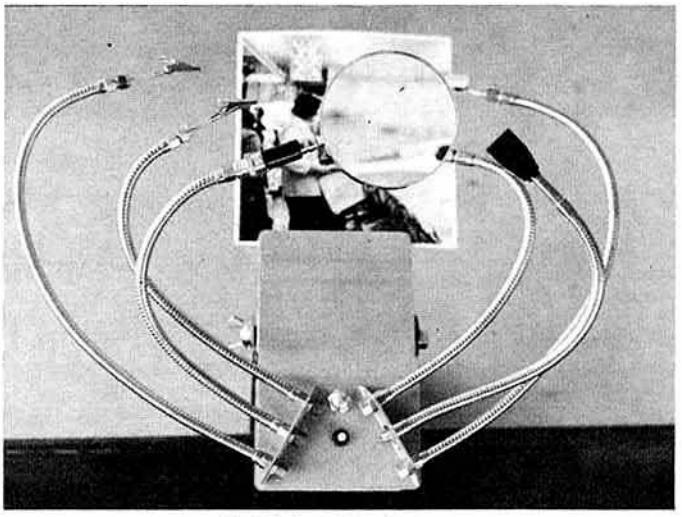
Appendix 2. Tank coil details

Full winding (23t) of 16swg tinned copper on Eddystone 2·5in diameter ribbed and grooved (6t/in) ceramic former, tapped at 3t for 14MHz and 9t for 7MHz. The final turn at the 3·5MHz end is permanently short-circuited. The 21 and 28MHz coil is self-supporting and consists of 8t of 10swg silver plated copper, tapped at 3·5t for 28MHz. The internal diameter of the latter coil is 1in, and spacing between turns is equivalent to wire diameter.

NEW PRODUCT

The Minibench system

The Minibench system is a miniature bench which incorporates a 5in rubber-lined jaw which may be preset to a given opening. The work-piece can then be clamped in position and a number of flexible arms, up to six, may then be brought into position. Some are adapted to hold small items using small electrical crocodile clips. Another flexible arm incorporates a 12V lighting system complete with transformer and switch, while a further arm holds a magnifying lens (50, 75 or 100mm diameter). The system can be mounted upon a rotating turntable giving 360° of rotation. An important aspect of the system is that, having set up the work-piece together with components held in position, one is then able to adjust the inclination of the work, without disturbing the setting, to suit the angle preferred by the operator. Further information from Absonglen Ltd, PO Box 13, Hereford.

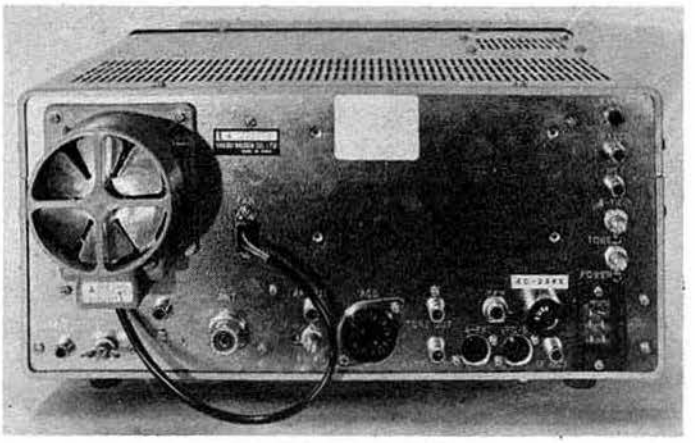


The Minibench system

EQUIPMENT REVIEW

The Yaesu Musen FT101ZD hf transceiver

by P. J. HART, BSc, G3SJX*



Rear view of the FT101ZD

Introduction

Ever since the original version appeared during 1970, the FT101 series of hf transceivers has been one of the most popular available. The latest in this series are the FT101Z (analogue frequency readout) and the FT101ZD (digital frequency readout). Comparing these latest versions with the earlier versions shows how far this series of transceivers has evolved—they have very little in common. The earlier versions (FT101, FT101B etc) used a double-conversion design with intermediate frequencies of 5,520–6,020kHz and 3,180kHz. The FT101Z and FT101ZD are essentially single-conversion designs with an i.f. of 8,988kHz and a greatly extended number of facilities. The mechanical construction is also totally different. The earlier versions used plug-in boards and edge connectors extensively with interconnections routed via the main chassis. The latest transceiver uses mainly fixed boards with plug and socket interconnections.

The FT101Z and FT101ZD cover all WARC 1979 allocated hf bands and give nominally 100W output power. Valve driver and pa stages are used with semiconductors (largely discrete) for all other functions. The basic transceiver operates from ac mains and covers ssb and cw operation. Optional extra facilities at added cost include boards for a.m. or fm operation, 12V dc inverter board, fan, and narrow bandwidth cw filters. A large range of accessories is available and, in addition, all the accessories intended for the FT902 are compatible with the FT101Z and FT101ZD. These include analogue and digital remote vfos, speakers, antenna tuner, monitor scope and panadaptor, transverters for 50, 70, 144 and 432MHz, rtty demodulator and linear.

The sample obtained for review comprised an FT101ZD with fm board, fan, and 350Hz cw filter as fitted options.

*42 Gravel Hill, Addington, Croydon, Surrey.

Principal features

This transceiver incorporates all the features which are generally regarded as standard on modern hf transceivers. Full coverage of the nine current and future hf allocations is provided in 500kHz tuning ranges, with 28–30MHz covered in four bands. Principal features include clarifier (irt) operation on both receive and transmit, three-position input attenuator, two age time constants plus off, noise blanker, speech processor, variable bandwidth i.f. 300Hz–2·4kHz, audio peak and notch filters, metering of three functions, and full cw and ssb vox controls.

The rear panel includes the following connectors: antenna socket, antenna outlet for external receiver, low power rf output for transverter operation, key jack, remote vfo, transmitter af input, receiver af output, wideband i.f. output for panadaptor or spectrum analyser, fan power and eleven-pin accessory socket providing relay control switching and control for the pa valve heaters. The accessory socket no longer provides power outlets as on earlier versions.

Description

In common with most Yaesu equipment, the transceiver is sturdily constructed and well engineered. A substantial chassis system is used with a diecast front panel, and the 10 boards are interconnected by plug and socket flying leads. The transceiver measures 34·5 (w) by 15·7 (h) by 32·6cm (d) and weighs 15kg; similar in front panel size to the earlier FT101 but a little deeper. It is not as small as some transceivers, but a mains psu is built-in and the front panel size enables full-size knobs and switches to be used. The controls are generally well laid out, but the cluster of four dual-purpose vox, drive and gain controls on the top left-hand corner of the front panel can be fiddly to use. All controls are mounted on the front panel, and a 9cm

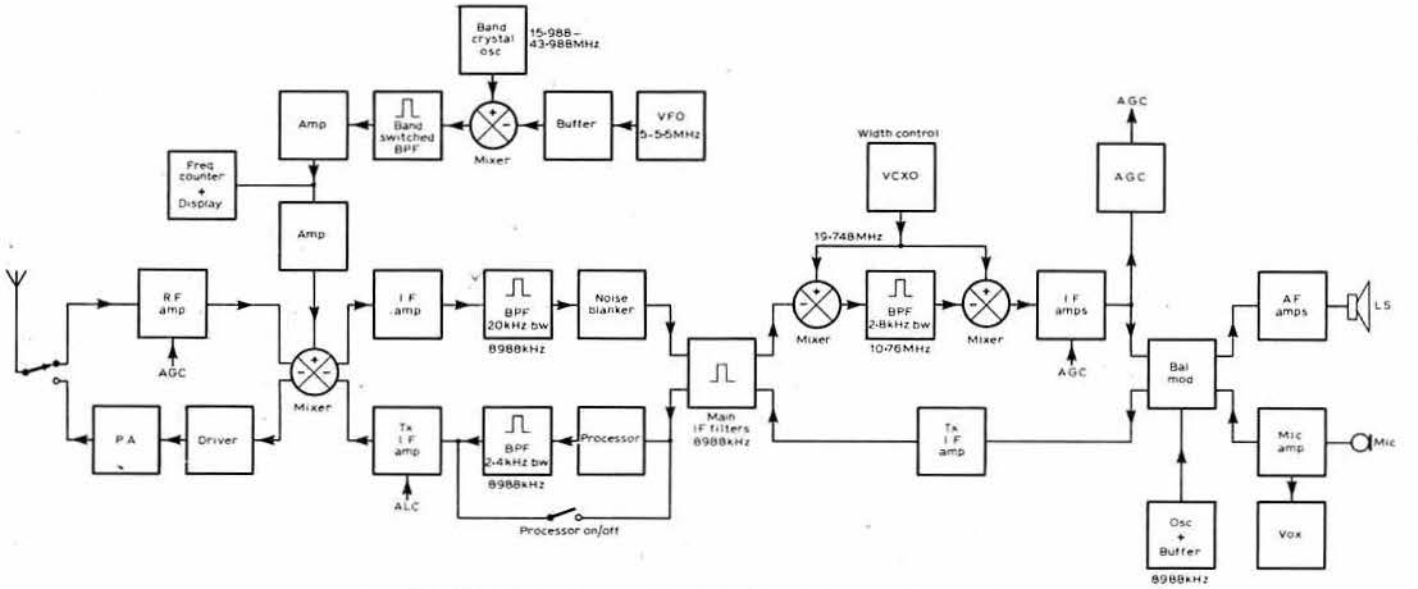


Fig 1. Simplified block diagram of the FT101ZD omitting fm and a.m. sections

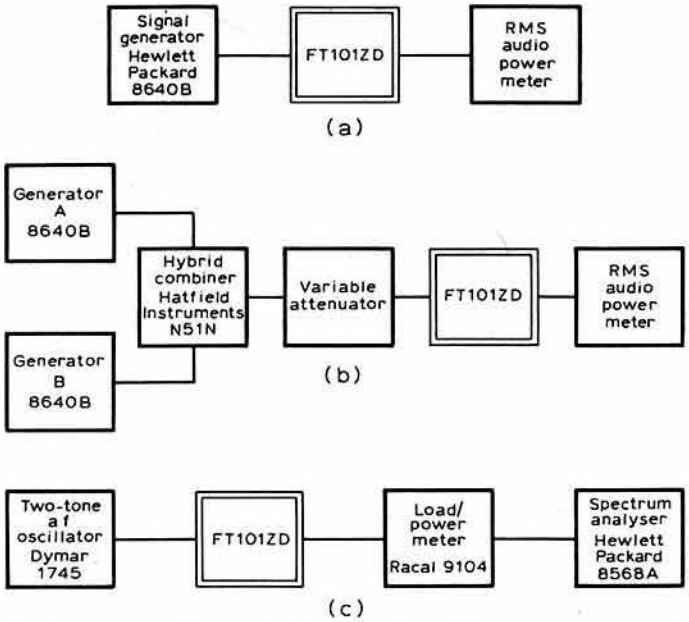


Fig 2. Test arrangements. (a) Single generator receiver measurements. (b) Two generator receiver measurements. (c) Transmitter measurements

diameter speaker is mounted in the top of the case. As usual the key jack is relegated to the rear panel—the reviewer would much prefer to see this located on the front panel. The tuning rate is 17kHz/revolution of the 50mm diameter control knob.

A block diagram of the FT101ZD is shown in Fig 1. On receive, incoming signals are amplified in a dual-gate mosfet rf amplifier and converted down to the i.f. of 8,988kHz in a Schottky diode double-balanced mixer. Resonant circuits tuned by the preselector are located at the input and output of the rf amplifier. The i.f. signal is amplified by grounded gate fet amplifiers and filtered to a bandwidth of 20kHz before passing through the noise blanker to the main i.f. block filters. The variable i.f. width function is achieved by mixing the i.f. signal up to 10·76MHz, passing through an additional 2·8kHz wide crystal filter and then mixing back down to 8,988kHz again. The same local oscillator is used for both conversions and hence no net change in frequency results. By altering the frequency of this oscillator by ±3kHz, the overall passband shape can be modified as described in [1]. The 8,988kHz i.f. signal is further amplified and demodulated before passing to the audio amplifier and switchable peak and notch filters. On a.m., a separate detector is incorporated. On fm the i.f. signal, before passing through the ssb filter, is converted down to an i.f. of 455kHz, where it is filtered, amplified, limited and then demodulated.

On transmit, dsb is generated at 8,988kHz using the same balanced modulator as is used for the receiver detector. The dsb signal is amplified, passed through the main ssb filter and, with the processor off, further amplified and converted to signal frequency. With the processor switched on, the 8,988kHz ssb signal is further amplified, limited and filtered before being converted to signal frequency. The signal frequency mixer is the same mixer as is used on receive. The main amplification at signal frequency is achieved using valves, a 12BY7A driver and two parallel 6146B pa valves. Selectivity at signal frequency is achieved by resonant circuits at the input and output of the driver, tuned by the preselector control and also the pi-tank pa output circuit. On both a.m. and fm separate microphone amplifier, oscillator, modulator and amplifier stages at 8,988kHz are used which feed the transmitter drive into the signal frequency mixer.

The local oscillator injection for the receive/transmit signal frequency mixer is derived from the premix unit. The vfo tuning 5–5·5MHz is mixed with one of 12 crystal oscillators (a separate oscillator for each band) using an integrated circuit double-balanced mixer. The local oscillator output is then filtered using band-switched filters and amplified to provide a suitable injection level for the signal frequency mixer.

Measurement technique

The measurement technique adopted was substantially the same as that described in [1]. Unless stated otherwise, all measurements were made on ssb with the audio gain set to give 100mW af output. In all cases signal input voltages are quoted in pd across the antenna terminal. A block diagram of the measurement arrangements is shown in Fig 2. A single signal generator was used to evaluate sensitivity-based measurements and spurious responses, including S-meter calibration, agc performance and selectivity. Two coupled signal generators were used to evaluate signal handling, ie measurements on blocking and intermodulation.

Table 1. Receiver measurements

Frequency	Sensitivity on ssb for 10dB s+n:n	Input for S9
1·8MHz	0·16μV (−123dBm)	7·5μV
3·5MHz	0·14μV (−124dBm)	4·8μV
7MHz	0·13μV (−125dBm)	4·3μV
10MHz	0·13μV (−125dBm)	4·1μV
14MHz	0·11μV (−126dBm)	4·0μV
18MHz	0·11μV (−126dBm)	3·7μV
21MHz	0·11μV (−126dBm)	4·1μV
24MHz	0·10μV (−127dBm)	3·8μV
28MHz	0·11μV (−126dBm)	5·0μV

Table 2. Receiver measurements

Frequency	Image rejection	8,988kHz i.f. rejection
1·8MHz	98dB	118dB
3·5MHz	99dB	115dB
7MHz	85dB	93dB
10MHz	66dB	82dB
14MHz	73dB	114dB
18MHz	61dB	115dB
21MHz	64dB	115dB
24MHz	53dB	119dB
28MHz	51dB	118dB

Receiver measurements

Sensitivity

Sensitivity measurements were made at a signal-plus-noise-to-noise ratio of 10dB with the af filter, width and input attenuator switched off. The results are shown in Table 1. On the higher frequency bands the receiver exhibits a noise floor of −135 to −136dBm in ssb bandwidths, or a noise figure of approximately 5 to 6dB. This is very sensitive for an hf receiver. Sensitivity measurements were also made at 28MHz with the receiver switched to fm; in this case the signal generator was frequency modulated by a 1kHz audio tone to give a peak deviation of 3kHz. The sensitivity for 10dB s+n:n ratio was 0·13μV, and the ultimate signal-to-noise ratio of about 40dB was achieved with input levels greater than 10μV.

The accuracy of the input attenuator was checked on 7MHz. In the 10dB position, the attenuation was measured as 9·3dB, and in the 20dB position as 18·4dB.

S-meter calibration

The input signal level required to give a reading of S9 is shown in Table 1. At 7MHz the S-meter calibration was:

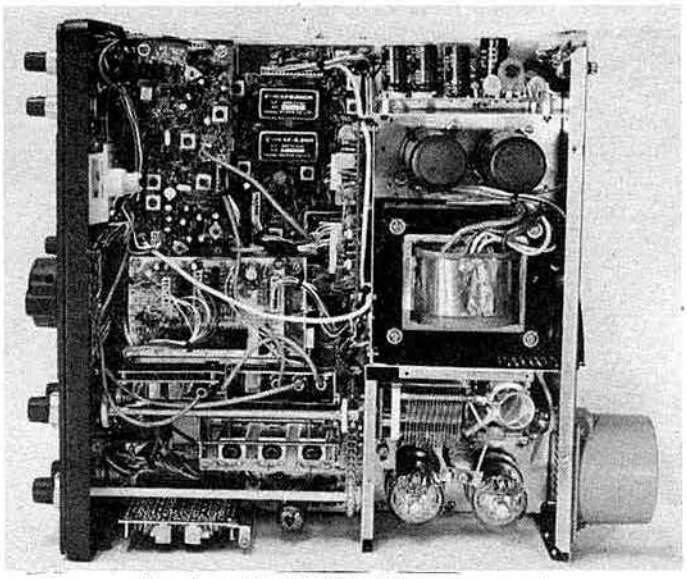
S-reading	Input signal	Relative increase
S3	1·1μV	
		2dB
S5	1·4μV	
		4dB
S7	2·2μV	
		6dB
S9	4·3μV	
		30dB
S9+20	140·0μV	
		26dB
S9+40	2·8mV	
		17dB
S9+60	20·0mV	

Spurious responses

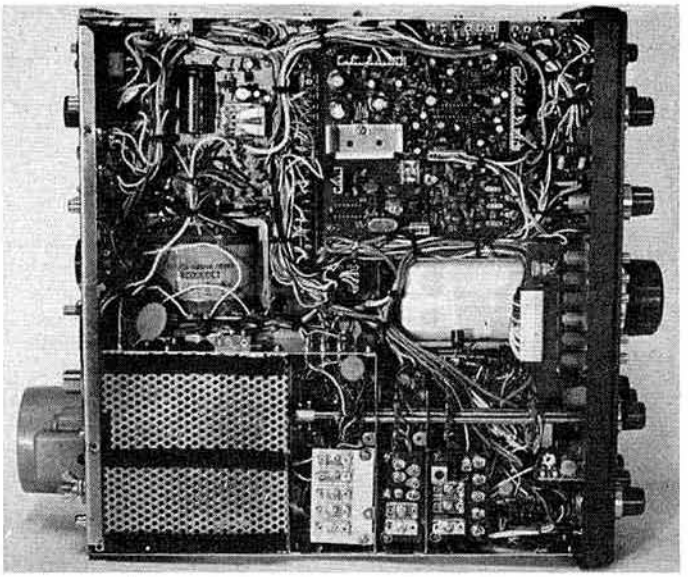
The 8,988kHz i.f. rejection and the primary image rejection at 17,975kHz above the frequency to which the receiver is tuned are shown in Table 2. These levels are all measured by setting the signal generator to give the required spurious response at a level giving 10dB s+n:n ratio and relating this level to an on-tune signal of 10dB s+n:n ratio. Rejection of the 10·76MHz i.f. was greater than 125dB on all bands, except on 10MHz where a figure of 88dB was measured.

To check for internally-generated spurious signals, the antenna socket was terminated in 50Ω and the receiver carefully tuned over each band. There was no spurious response which was strong enough to move the S-meter, and of the eight spurii logged, the three strongest were located in the 28MHz band.

Other spurious responses were checked by setting the signal generator on



Top view of the FT101ZD with cover removed



Bottom view of the FT101ZD with cover removed

either side of the on-tune frequency and noting the amplitude for any responses obtained corresponding to an S1 meter reading. The generator was tuned from 100kHz off frequency down to 1MHz (ignoring generator harmonics) and from 100kHz off frequency up to vhf.

Frequency	Worst response	Other responses
1·8MHz	No response measured up to 250mV	
3·5MHz	No response measured up to 250mV	
7MHz	7mV	One up to 250mV
10MHz	80mV	Two up to 250mV
14MHz	4mV	Three up to 250mV
18MHz	Two at 80mV	Three up to 250mV
21MHz	14mV	Nine up to 250mV
24MHz	10mV	Several 15 to 70mV
28MHz	2·5mV	Several 7 to 70mV

AGC performance

The agc performance was measured at 7MHz. The threshold was found by slowly increasing the input signal until the af output ceased to rise linearly with the input. This occurred at about 1·2μV. A further 10dB increase in signal above this level resulted in a 1dB increase in audio output, and a further 110dB increase in signal resulted in a further 0·7dB increase in audio. The attack time was measured as about 5ms, and decay times as 20ms in the fast position or 300ms in the slow position.

Signal handling

Measurements on signal handling properties were made at frequencies of 7 and 28MHz using the test arrangement shown in Fig 2(b).

Blocking was evaluated by setting generator A on-tune at a level of 500μV. Generator B was set 50kHz off frequency, and the level increased until the S-meter just started to decrease. This occurred at a level of 60mV on both 7 and 28MHz. Repeating the measurement on 28MHz with 100kHz frequency offset gave identical results.

Third-order intermodulation distortion was measured by setting the two generators 20 and 40kHz away, respectively, from the frequency to which the receiver was tuned, and increasing the levels equally until a third-order intermodulation product was generated in the receiver passband at a level giving an s+n:n ratio of 10dB. This occurred when each generator was set to give a signal input to the receiver of −49·7dBm (730μV) on 7MHz or −49·3dBm (760μV) on 28MHz. This corresponds to a third-order intercept of −12dBm on 7MHz and −11dBm on 28MHz (See [1]). Referencing the above measurements to the noise floor of the receiver gives a spurious-free dynamic range of approximately 83dB.

Cross-modulation and reciprocal mixing measurements were not performed.

Reducing the rf gain control did not improve the intermodulation performance, and the noise blanker had little effect on strong signal performance except when the threshold control was fully turned up. At this setting, the intermodulation performance was noticeably degraded.

Audio power output and distortion

The maximum audio power output into a 4Ω load was measured as 2W before the onset of clipping. An output power of 2·5W was obtained at 10 per cent distortion. Maximum audio output could be achieved with a 0·35μV input signal.

Selectivity

The i.f. selectivity curve was plotted by tuning a signal generator across the receiver passband and noting the level required to give an S-meter reading of S2. It was found possible to measure about 70dB down the skirts of the filter before reciprocal mixing, generator noise and signal overloading problems became apparent. The results for both the ssb filter and the 350Hz cw filter were:

Response	SSB filter bandwidth	CW filter bandwidth
−3dB	2·2kHz	200Hz
−6dB	2·4kHz	300Hz
−20dB	2·8kHz	500Hz
−40dB	3·2kHz	800Hz
−60dB	3·5kHz	1,100Hz
−70dB	3·7kHz	3,000Hz

The total passband ripple on the ssb filter was about 3dB, and the skirt response was symmetrical. The gain using the cw filter was 6dB lower than using the ssb filter. The cw filter also exhibited a number of spurious responses between −50 and −70dB.

Transmitter measurements

CW power output

Adopting the tuning procedure described in the handbook for maximum power output gave the following results:

Band	Power output	Anode current
1·8MHz	108W	270mA
3·5MHz	114W	260mA
7MHz	107W	260mA
10MHz	110W	260mA
14MHz	110W	270mA
18MHz	107W	270mA
21MHz	100W	250mA
24MHz	102W	260mA
28MHz	80W	230mA

The drive control may be used to reduce the power output virtually to zero and hence set the power output on 1·8MHz to 8W (9dBW).

Harmonics and spurious outputs

Harmonics and other spurious outputs were measured on cw at full power output.

Band	Harmonics	Other spurii
1·8MHz	−43dB	Less than −80dB
3·5MHz	−43dB	−78dB
7MHz	−46dB	−50dB. −80dB at lower power
10MHz	−49dB	−62dB
14MHz	−58dB	Less than −80dB
18MHz	−52dB	−24dB. −40dB at lower power
21MHz	−49dB	−63dB
24MHz	−32dB	−55 to −65dB
28MHz	−50dB	Several −60 to −70dB

On 7 and 18MHz substantial reductions in spurious outputs could be achieved by reducing the power output slightly. The figure of −24dB to −40dB for spurious output on 18MHz is not surprising and is the inevitable consequence of using a 9MHz i.f.. This spurious signal is the second harmonic of the i.f. and cannot be reduced by signal frequency selectivity. The only solution is to use a balanced mixer, which is used in this transceiver, and to operate the mixer in as linear a manner as possible. The mixer linearity improves at reduced power levels, and hence the dramatic improvement in spurious output.

SSB power output and distortion

The test arrangement for making ssb measurements is shown in Fig 2(c); 600Hz and 2kHz equal amplitude audio tones were used. Measurements were made with the processor switched off and adopting the tuning procedure described in the handbook. In all cases the intermodulation product level is quoted with respect to the amplitude of either tone of the two-tone test signal.

Band	Power output (p.e.p.)	Third-order ips	Intermodulation products at ±10kHz	±20kHz
1·8MHz	32W	−38dB	−80dB	−80dB
3·5MHz	100W	−32dB	−80dB	−80dB
7MHz	100W	−25dB	−80dB	−80dB
10MHz	100W	−25dB	−70dB	−80dB
14MHz	100W	−26dB	−80dB	−80dB
18MHz	100W	−28dB	−80dB	−80dB
21MHz	100W	−22dB	−70dB	−80dB
24MHz	100W	−24dB	−75dB	−80dB
28MHz	80W	−26dB	−75dB	−80dB

On 1·8MHz 100W p.e.p. output can be obtained at −22dB ip level.

With the speech processor in operation it is important not to overdrive the pa as intermodulation product levels as high as −12dB can be generated.

The carrier suppression was −56dB and the sideband suppression at 1kHz was −66dB, both measured with respect to 100W output.

Audio response

The transmitter audio response with the processor off was measured as 300 to 2,700Hz between the −6dB points. The microphone sensitivity was such that 4mV audio input gave full output with the processor switched off. The microphone input impedance is 600Ω.

Frequency stability

The frequency drift was measured in the transmit mode on 28MHz with the pa heaters switched off and the low-level rf output connected to a frequency counter. After allowing an initial 5min warm-up period, the transceiver drifted 240Hz during the first 15min, a total of 450Hz during the first hour and 120Hz during the second hour.

Low-power (transverter) output

A low-power output facility is provided, coupling to the pa grid circuitry through a 10pF capacitor. Although the output impedance is high, in most cases a 50Ω load impedance will probably be used. On 21, 24 and 28MHz, 150mW output power into 50Ω is available. On bands below 21MHz the available power reduces rapidly. With a 50Ω load connected to the low-power output socket, a slight difference in preselector tuning between transmit and receive is obtained. It is probably advisable to unplug any leads connected to this socket when not required.

On-the-air results

The transceiver was used from the home location for a period of two months which also encompassed operation in two contests—AFS and ARRL CW. It is largely to the credit of this transceiver that 160 contacts were made in AFS and 1,400 in the ARRL event.

The receiver generally performed very well. The sensitivity on 28MHz was perfectly adequate, and on the lower frequency bands, with 20dB attenuation, clean results were obtained. Careful use of the attenuator was essential for best results. The noise blanker was effective but could generate signal-handling problems if the threshold control was advanced too far. The width and audio filter controls have their uses, and the notch filter was found to be particularly useful.

On transmit good clean reports were received on ssb, with most stations contacted preferring the processor switched on. The preselector tuning was rather critical on the lower frequency bands, requiring repeaking after a frequency shift of only a few kilohertz. Preselector drift with temperature or time was also experienced. FM on 29MHz was also used and gave good results.

Several stations who were also using the FT101ZD were worked. In all cases the owners were entirely satisfied with the performance and the reliability. Mobile operation was not contemplated. The size of the transceiver together with the power consumption due to the valve driver and pa stages dictates that it is more suitable for home station use.

Microphone and headphone accessories

A number of microphones and headphones marketed by Yaesu are suitable for use with the FT101ZD. Two types of microphone and two types of headphone were provided with the review transceiver, and the following purely subjective observations were made.

Of the headphones, the YH55 with full-size ear muffs provided complete isolation from external noise, gave excellent communications quality with low distortion at high volume levels, but had a rather high clamping force on the ears which would probably reduce with use. The YH77 lightweight headphones are suitable for use where complete isolation from the outside environment is not required. They were comfortable to wear, but were less sensitive than the YH55 headphones—requiring more audio gain—and, at little more than average listening levels, the audio stages in the FT101ZD overloaded causing distortion. Using the headphones in conjunction with hi-fi audio equipment showed that the frequency response of the YH55 is largely tailored for communications use, whereas the YH77 gave full hi-fi performance.

The microphones were evaluated during local contacts. Very complementary reports were obtained using the YE7A dynamic microphone, particularly with the processor on. The YM21 noise-cancelling microphone was generally regarded as lacking punch, being described as rather "thin" with the noise-cancelling switched off and "woolly" with the noise-cancelling on. However, it is understood that this microphone really comes into its own in noisy mobile environments.

Conclusions

The FT101ZD is provided with an accessory plug, two phono plugs, a spare fuse and a 63-page manual. Full operating instructions are given in the manual together with installation instructions for the various options. Circuit descriptions with diagrams and photographs of the various boards are given, together with alignment details and a full parts list. The circuit description and the overall block diagram do not agree in several places. The block diagram appears to be of an earlier version.

The basic FT101ZD is about £635 incl VAT, and the analogue dial version, the FT101Z, is about £559 incl VAT. The various options are extra.

Acknowledgements

The transceiver used in this review was kindly loaned by South Midlands Communications Ltd of Totton, Southampton. The reviewer would like to thank G3UFY and G3WBN for their critical on-the-air comments, and fellow members of the Addiscombe Amateur Radio Club for their comments on the performance during the ARRL CW contest.

Reference

[1] "The Icom IC720A hf transceiver," P. J. Hart, G3SJX. *Rad Com* February 1982, pp129-33.

A power fet amplifier for 144MHz

by G. R. JESSOP, G6JP*

THE RECENT ADVANCES made in the development of fets into the power field have given rise to considerable interest in them as possible replacements for the usual bipolar devices. The amplifier described here makes use of these medium-power devices, and also includes a simple preamplifier for reception with a gain of 15dB, together with relay switching from transmit to receive.

The complete circuit (Fig 1) includes a 5dB attenuator in the input to the amplifier, making it suitable for a transceiver with an output of approximately 10W. For lower powers this attenuator can be omitted and the full 10dB gain of the amplifier can be realized.

Fig 2 shows the component layout of the whole unit, which is built onto a heatsink of approximately 6 by 4·5in. It is designed to be mounted vertically and attached to its power supply unit in order to give adequate air flow over the heatsink surface. Switching of the amplifier is accomplished in the bias supply rather than in the much higher current main supply, and this can be more readily achieved from within the driver transceiver.

Construction

Details of the construction are given in Figs 3 and 4, which show that the heatsink forms the basic component, to which U-sections are bolted along its length. These sections provide the sides if the unit is to be used with a remote power unit, or alternatively allow a means of fixing the unit to an integral power supply.

The general arrangement of the copper clad boards is in the form of a "railway station", the two main platforms are of double-sided glass-fibre material, while the input and output circuit boards are of single-sided material with various gaps made in the foil. All the boards are distanced from the heatsink by spacers so that the connections from the amplifier fet lay flat on the copper surfaces. The main boards of the unit have their two sides connected together either by rivets or short pieces of thick copper wire in addition to the connections made by the fixing screws and spacers. The input and output connectors are BNC flange fixing, using 8BA 0·25in screws and half nuts which allow free space between them and the boards.

A thin brass screen is fitted across the fet to separate the input and output circuits; suitably bent copper or aluminium may also be used for the screen. The input and output relays are bolted directly to the relevant board by long 6BA screws with half nuts at the top or free end.

Bypassing of the gate and drain circuits is arranged in the conventional manner using several different values: 1,000pF feedthrough used as stand-off, with disc ceramics of 0·01μF and 0·1μF in parallel. The only other bypass capacitors used are two of 100pF, connected directly from gate to earth, which were found to improve the amplifier's stability and linearity. The bias circuit is a simple potential divider with a 250Ω adjustable component near the earth end.

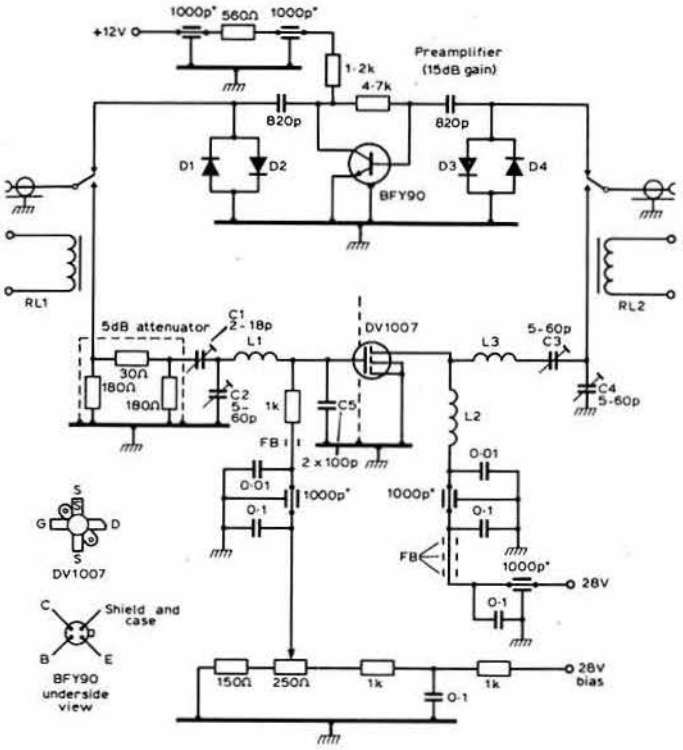


Fig 1. Circuit diagram of the amplifier. L1, 2t 16swg 6·3mm; L2, 5t 18swg 6·3mm; L3, 2t 16swg 9·6mm; D1-4, IN914 or IN4148; FB, FX1115 bead; RL1, 2, 176Ω 12V type 951.
***1,000pF feedthrough**

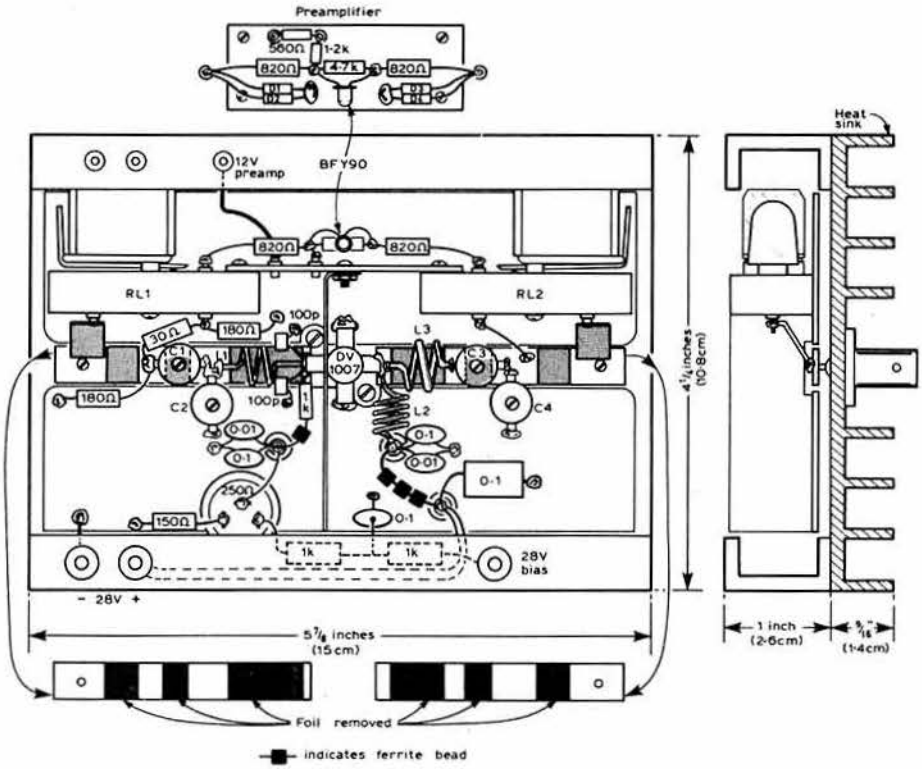


Fig 2. Component layout

*32 North View, Eastcote, Pinner, Middx.

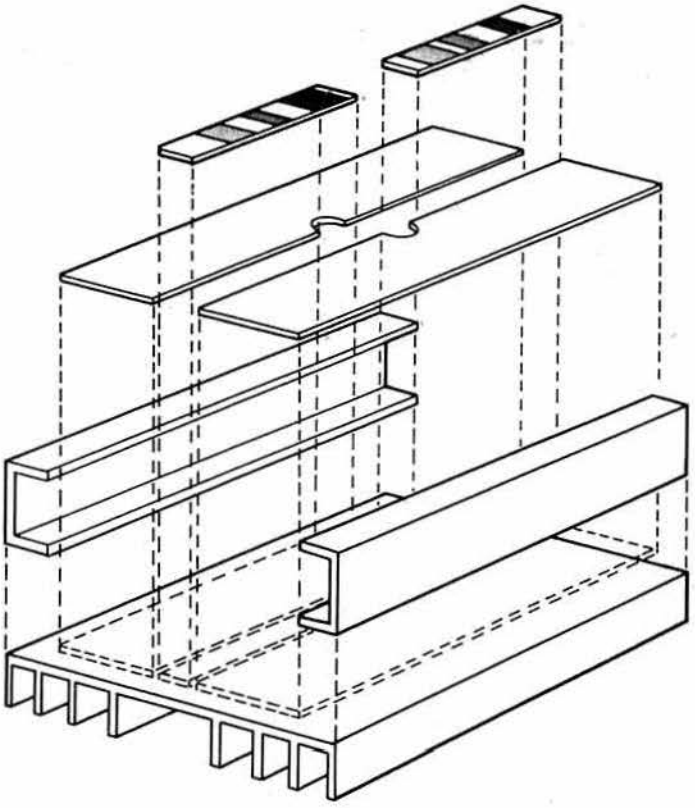


Fig 3. Constructional details

Performance

Mode A: FM. Class C. V_{DD} = 28V. I_{DQ} = 200mA*

Drive power	Power (load)	Efficiency
2W	22W	55 per cent
3W	32W	55 per cent
4W	40W	55 per cent
5W	44W	55 per cent

Mode B: SSB. Class AB linear. V_{DD} = 28V. I_{DQ} = 200mA*
Drive power: 2·5W p.e.p. **Power (load):** 25W p.e.p.
Third-order intermodulation distortion −26dB, measured with respect to one tone of a two-tone test signal (−32dB if measured with respect to p.e.p.).
With a 5dB input attenuator in circuit: drive power, 9W p.e.p.; power load, 25W p.e.p.; efficiency, 33 per cent
Harmonics under either 40W fm or 25W p.e.p. conditions.
Second harmonic output: −54dB. Third harmonic output: −48dB.

*Bias adjusted to give 200mA quiescent current (approximately +3V)

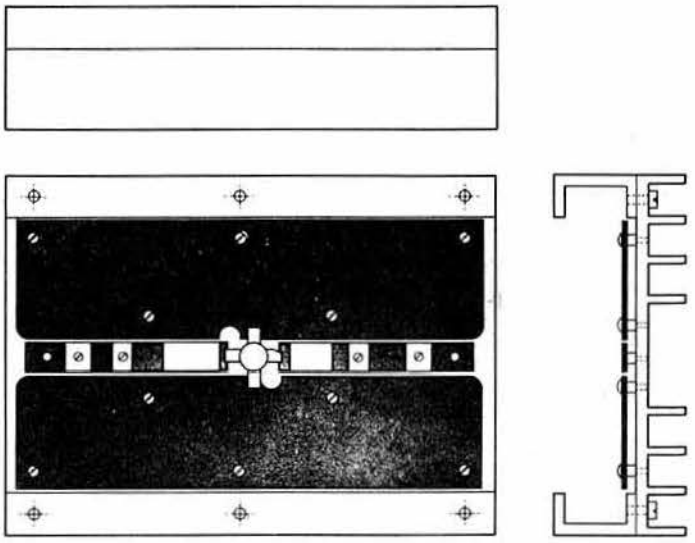
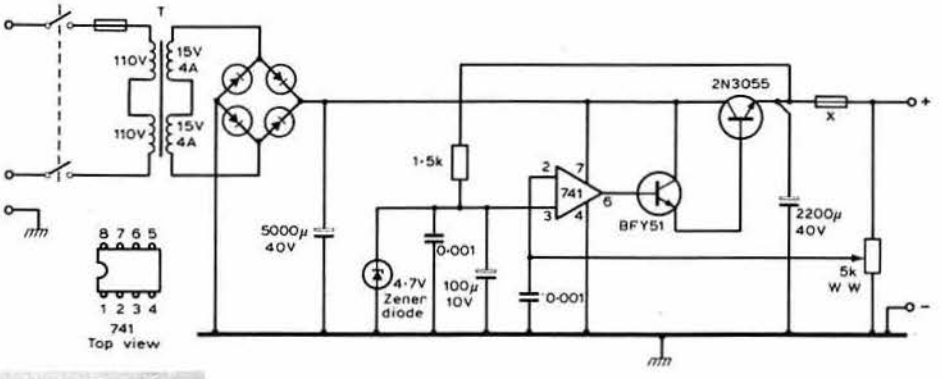
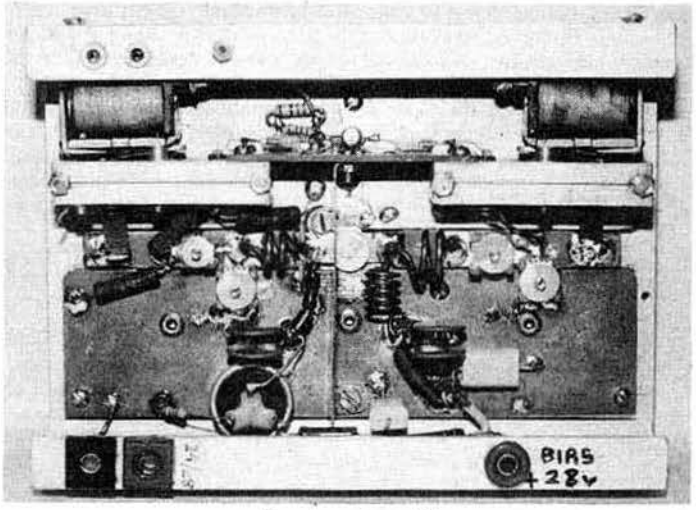


Fig 4. Constructional details

Fig 5. Amplifier power supply circuit





Top view of amplifier

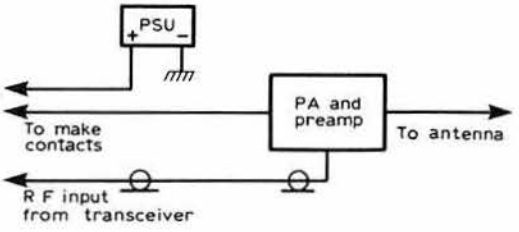


Fig 6. Interconnections

The relay supply can conveniently be taken from the 28V supply with a suitable resistor to drop the excess voltage to 24V to suit the relays connected in series. A diode is connected across the 24V terminals, and the 12V supply to the preamplifier may also be taken from the 28V supply if a series resistor and a 12V zener diode are added.

Although plugs and sockets have been used in the prototype, alternative arrangements may of course be used, especially if the amplifier is to be completed as a unit with a separate power source. □

TECHNICAL TOPICS

Pat Hawker, G3VA

COMMENTS CONTINUE TO COME IN on the subject of the decline of home-construction, though some of the backward nostalgic glances seem rather to underestimate the amount of factory-built equipment (mostly receivers but also some transmitters) that *was* available from about 1936 onwards. We may not have had Yaesu, Icom or Trio around then, but the products of National, Hammarlund, Hallicrafters, RME, Howard, Tobe etc were flowing in from the USA, and local products included Eddystone, Premier etc marketed by such firms as Webb's Radio, Radiomart, ACS Radio etc. In the USA, Art Collins was building up a reputation for well-designed amateur transmitters (receivers came much later) and on both sides of the Atlantic the Meissner Signal Shifter vfo was beginning to show that one need not stick rigidly to a limited number of crystal frequencies in order to have an acceptable note. But all such rigs were almost as far beyond the limited budgets of the younger newcomers as the £1,000-plus hf transceivers are today. I remember that I got a home-built eco into action on 14MHz in August 1939 just in time to work my first South Americans (admittedly one gave me a T7) before the big close down.

Home-built transmitters

Ray Cracknell, Z22JV (better known as ZE2JV for his many years of valuable pioneering work on transequatorial propagation) was, like myself, one of those who came into amateur radio along the path of the now long-defunct AA (artificial aerial) licences—but he has stuck to his early experience and never used anything other than homebrew equipment, either for transmitting or receiving. He comments:

"I agree that all newcomers would like one of the latest ssb transceivers, and many expect to work the world with no more effort than erecting a dipole. I guess we were much the same in the 'thirties but it was then a case of 'when needs must, the devil drives', and I imagine that the thrill I got out of saving up 7s 6d for my first 6L6 was equivalent to what current newcomers get out of their first 'black box'. It is very easy to poke fun at the old AA system and the fatuous screeds that one had to produce in order to progress to a radiating (10W) 'full' licence. As an educationalist I often wonder if the old system—which virtually ensured that one was able to build and operate a transmitter before getting the full licence—was such a bad one. It could be argued that it was a lot better than mugging up just enough theory (plus some of the regulations) for a written or multi-choice examination and then forgetting it as soon as the examination is over."

Z22JV has recently completed a new exciter unit for 28MHz based on a design in *Radio Communication Handbook* (5th edn, p6.127) but incorporating some mixer ideas from *TT* January 1971 and *ART*. This equipment has proved very successful and he feels a brief mention of some of these modifications may be of interest to readers who, like himself, prefer separate receivers and transmitters rather than the ubiquitous transceiver. Z22JV has sent along a rough copy of the full circuit but this cannot readily be fitted into *TT*, though some details are shown in Figs 1 and 2. The unit is a hybrid design using integrated circuits, discrete bipolar and fet transistors and five valves (6CB6 9MHz amplifier, 6AK5 19MHz amplifier, 12AT7 mixer, 6CB6 28MHz amplifier, and 28MHz 6360 driver providing output to the separate linear amplifier). Z22JV writes:

"Basically the unit was designed around the Plessey SL6000 devices and a Seiwa 9MHz eight-pole crystal filter which arrived complete with carrier crystals but with no data. The plea for information with a wad of international reply coupons brought no response (poor show for a *Rad Com* advertiser!) resulting in much subsequent labour.

"(1) The carrier crystals produced frequencies which were 1·3 and 1·4kHz too high when used in the 2N3810 circuit of Fig 6.199. Since they were evidently intended for series-mode and 32pF loading, replacement of the fet oscillator with a bipolar device (BF197) was essential.

"(2) Working into a conventional RC load, the frequency response of the filter proved most unsatisfactory, pinched and lop-sided. It took a long time to arrive at the circuit of Fig 1. The optimum load impedance was very low indeed (two-turn link to 9MHz tuned circuit on 0·25in former). It is possible that the input circuit to the filter may also not be ideal, but since the response is good and drive adequate, it was left as originally designed.

"(3) An audio oscillator unit providing 500, 1,000 and 1,500Hz was designed for me by ZS6PW. With switched sidebands this provides a cw facility and a built-in check on the passband. The time-constant and frequency-response CR network around the SL6270c af amplifier were likewise optimized for me by ZS6PW and differ significantly from those quoted in *RCH* for the SL622c.

"(4) Not wishing to chance any pulling of the oscillator frequency, I replaced the ferrite transformer with a 2N3819 source follower. Drive for the mixer was still more than adequate (100mV).

"For the vfo-mixer-driver circuitry the cross-coupled form of double-balanced mixer was used: Fig 2. Both the transistor and valve mixers work well, are very stable and delightfully easy to use. I consider them ideal when mixers operating in the 100 to 1,000mV and 1 to 5V range, respectively, are required."

Z22JV also noted the following points:

"*(a)* Biasing is very important. Class B bias with no signal applied is essential for optimum performance. Biasing conditions shown in the original diagrams were not found satisfactory.

"*(b)* It is far better to carefully match transistors or valves than to use a balancing potentiometer; in these applications fine balance was not necessary.

"*(c)* Since the configuration represents virtually a push-push doubler to each input, a tuned circuit or filter is essential in the anode/collector circuits. Without one, the even order harmonics of both input signals could be very troublesome and responsible for the instability noted in the original *TT* notes.

"As with all of the old ZE2JV equipment, no printed circuit boards were used, instead point-to-point wiring with modular construction was employed. Each sub-unit has its own little screened metal box and is then assembled on a baseboard (0·375in blockboard covered with aluminium foil with metal front panel)."

Z22JV warns that his circuit diagrams were prepared without checking each component value and there may be some errors; nevertheless these notes should prove of interest to others and provide a useful up-dating of what is now a relatively old *Handbook* design. The detailed circuit diagrams of the sine-wave generator and keyer, and the ssb generator are unfortunately too complex for inclusion in *TT*.

Dealing with broadband amplifiers

Despite their sensitivity to swr, the broadband-type of power amplifier is now being used widely in hf transmitters—and this trend is expected to intensify in future. At some time in the not very distant future, the use of resonant tank circuits, pi-networks etc may even be delegated only to the history books. However, for the interim period, Brian Castle, G4DYF, draws attention to a clear and useful explanation of the fundamental differences between broadband transistor amplifiers and resonant-tank valve amplifiers. This is set out in full in the *Owners Manual* of the KW Ten-Tec Argosy transceiver. He comments: "This is a masterly and readily understandable explanation of why solidstate rigs can be damaged by

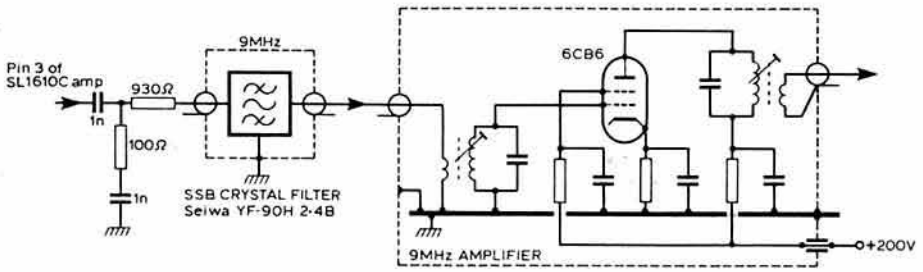


Fig 1. To overcome problems of poor ssb filter response when working into a conventional RC load, Z22JV devised the arrangement shown, using a two-turn link to the 9MHz resonant circuit

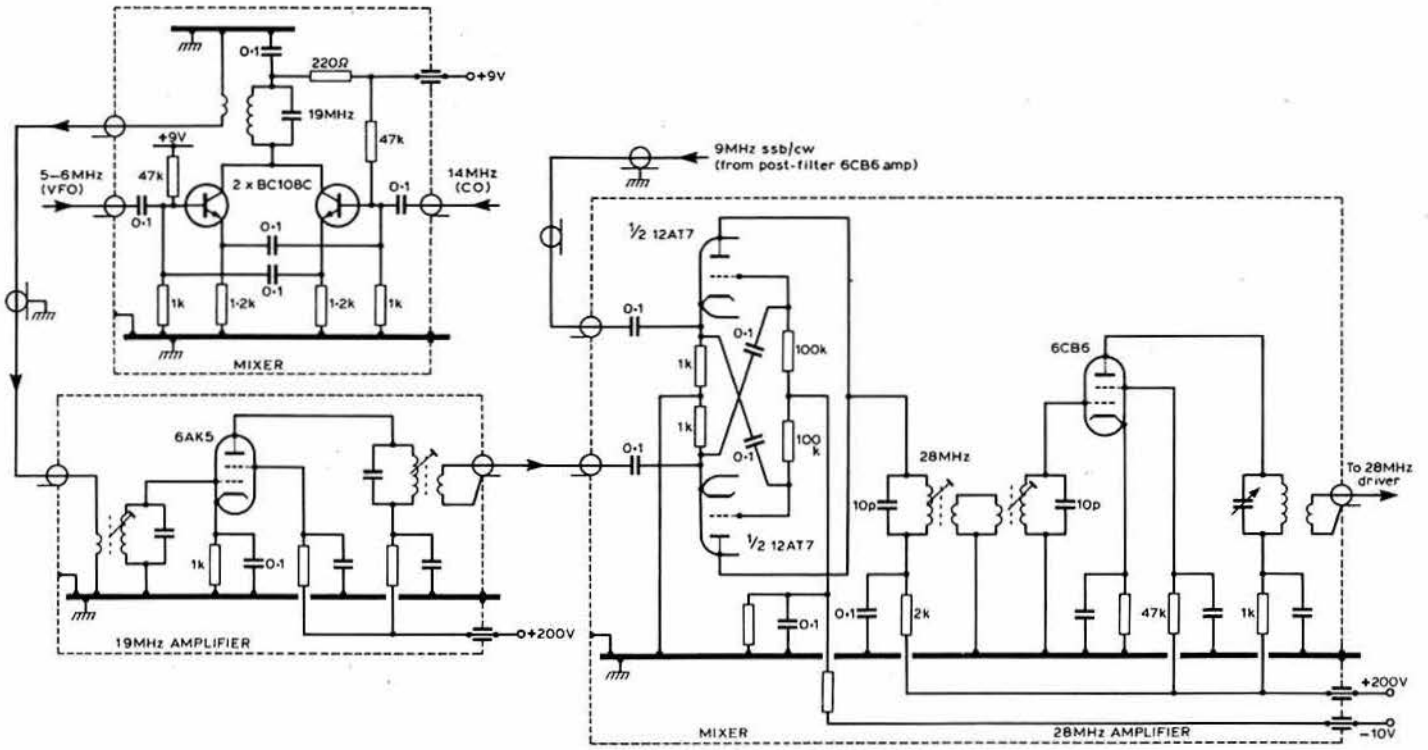


Fig 2. The two cross-coupled double-balanced mixers used in Z22JV's home-built 28MHz ssb/cw exciter. The low-level mixer producing 19MHz output uses a pair of BC108c transistors, while the higher-level mixer producing 28MHz output uses a 12AT7 twin-triode. Care is needed to ensure correct biasing

incorrect loading . . . as secretary of the West Kent Amateur Radio Society, which has recently purchased an Argosy, I feel such guidance should be studied by all those using solidstate rigs."

The "Technical Facts of Life" section of the manual runs to about a thousand words of advice. Here we can only paraphrase some of the main points.

(1) With valve amplifiers, the internal dissipation, with drive applied, depends on both the tuning of the tank circuit (so that it presents a high impedance) and the load applied. Valve amplifiers must be tuned to dip as quickly as possible; otherwise the high out-of-resonance anode current may damage the valve.

(2) With a solidstate amplifier, without load, but with drive, there is no resonant high impedance to limit the collector current, and all this power is dissipated in the transistors (and in the Argosy this may cause the power supply circuit breaker to trip). Output impedance is very low (typically 4–5Ω) and is transformed *up* to 50Ω in a fixed ratio design; any reactive component in the load impedance is similarly increased and applied to the collector. Some reactances, particularly inductive reactances, may give rise to parasitic oscillation.

(3) To prevent parasitic oscillation, either the antenna system must be adjusted to present a (near) 50Ω non-reactive load. While this can usually be done by antenna adjustment at specific frequencies, a matching network may be necessary to achieve this over a wide band (eg the American 3·5–4·0MHz band).

(4) With valve amplifiers, cathode emission will limit current. Transistors have collector internal impedances of only a fraction of an ohm and may seek to pass very high currents, particularly with mismatched loads well below 50Ω. (Protection may be provided by electronic circuit breakers built into the power supply or by fast-acting magnetic breakers).

(5) Note that an swr ratio indicates *either* a higher than matched *or* lower than matched impedance. For example, an swr of 3:1 may mean the transceiver is "seeing" 150Ω *or* 17Ω. A 17Ω, but not a 150Ω, impedance is likely to cause the circuit breaker to trip. An swr reading gives no indication of the reactive component, nor can it separate a resistive from a reactive load. Such a meter is calibrated for a purely resistive load. An swr bridge should therefore only be used as an indicator when attempting to adjust the antenna system to a pure 50Ω resistive impedance at the transmitter output socket.

(6) With low output impedance, transistors tend to act as a constant voltage source. In other words, the rf output voltage is roughly constant regardless of the load impedance. Output *power* depends on the load value, increasing as the load impedance falls. A 17Ω load (3:1 swr) will seek more power from the amplifier than a 150Ω load (again 3:1 swr). Thus the amount of power delivered efficiently to a load changes with load value. Unless the load is reasonably near the design value, the transistors will heat up unnecessarily *without delivering any more power to the antenna.*

(7) Automatic load control (alc) serves three major functions in such a transceiver as the Argosy. *(a)* It assures maximum power from the power amplifier without careful adjustment of input drive; *(b)* it prevents the amplifier from being overdriven into non-linear, distortion-producing conditions; and *(c)* it serves as a power limiting device which protects the output transistors. While alc can do *(a)* and *(b)* very well, it can cope only partially with *(c)*, which is why current limiting or circuit breakers are needed.

(8) Note that alc does not sense the power into the final amplifier; load conditions can exist where alc does not limit transistor dissipation (eg where there is a highly reactive load). Since it is not possible to make a highly reactive load absorb power, the alc light does not come on, even though high power is being drawn and dissipated as heat in the transistors. If the amplifier is repeatedly tripped without the alc indicator coming on, the load represented by the antenna system (or atu) needs changing.

It will be noted that what this advice amounts to can be summed up simply as saying that a broadband solidstate amplifier must "see" a resistive load fairly close to its design value (usually 50Ω). Protective circuitry can prevent damage occurring, but the advantages of broadband (non-tuning) operation, with rated output power, are unlikely to be achieved unless correctly matched.

DX and the simple antenna

From time to time it has been noted in *TT* that simple hf antennas, including long wires, large loops, dipoles and verticals, are well capable of providing worldwide contacts, including (reasonably often) those with the type of dx rarity that attracts the notorious pile-ups. This view has recently been receiving support also in the *Rad Com* "Your opinion" column. But it would be a brave (or foolhardy) writer who would normally suggest that a simple antenna, in difficult urban or suburban conditions, can still yield very high dx scores over short periods of time. Yet a score of some 270 countries, and over a hundred on 7MHz, has recently been achieved by Laurie Margolis, G3UML, using simple tree-supported antennas. While there are many who are coming to believe that amateur radio has become rather too obsessed with country-chasing for its own good, this feat merits serious technical consideration. G3UML writes:

"Some two years ago I resumed operation from Hendon, NW4—a very

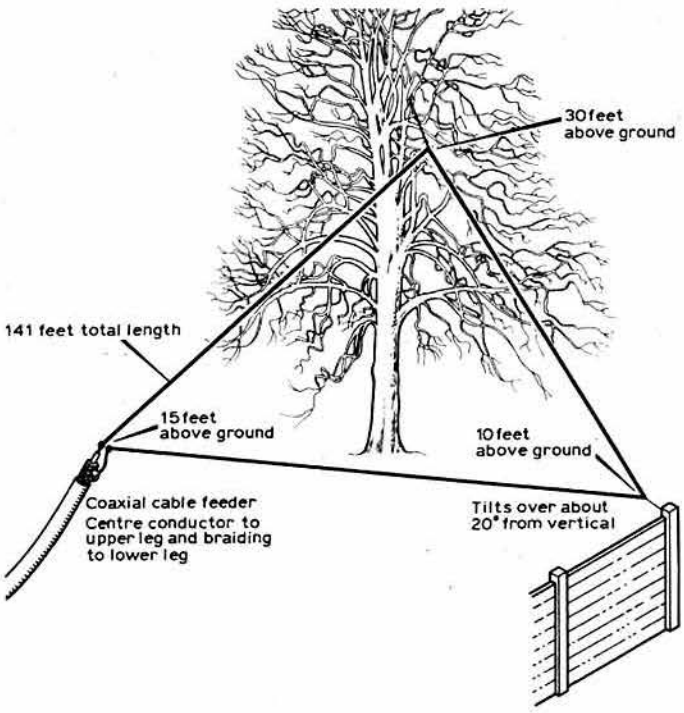


Fig 3. The inverted tree-supported delta loop that has brought G3UML some 115 "countries-worked" on 7MHz ssb in the past couple of years

ordinary London suburban location—after a year off the air. Previously I had worked from Essex using a TH6 beam, 60ft high, to compile a dx score over the years of 330-plus countries.

"Lack of space (and cash) dictated an altogether less ambitious antenna system. I use three separate dipoles, within a couple of feet of each other, for 14, 21 and 28MHz. These are about 25ft high, slung between the roof guttering and a convenient tree. For 7MHz I have an upside-down delta-loop with the apex at about 30ft (Fig 3). My rig is Heathkit SB401-200-303.

"I was apprehensive about the dx possibilities of such modest antennas, so different from the TH6 set-up. I need not have worried. In almost exactly two years I've worked 270 countries, entirely on ssb, including 115 countries on 7MHz. Only about half-a-dozen countries have been heard but not raised; S9-plus reports from every part of the globe; most dxpeditions worked; only in really horrendous pile-ups have my calls been wasted. With such an antenna farm it has all been totally surprising—and terrific fun.

"To those wanting to work dx in such circumstances, I would offer the following advice: *(1)* use as much power as money and licence regulations permit; *(2)* use resonant single-band antennas that do not require an atu; *(3)* make maximum use of dx nets, lists and helpful locals (and ensure they remain helpful by not making a nuisance of yourself); and *(4)* take care when setting up simple antennas, and make sure your measurements are correct (though mine are fashioned from 1943-vintage Army-surplus antennas fed with brown television-type coaxial cable!).

"The 7MHz antenna of Fig 3 (suggested to me by GW3AX) has an swr of less than 1·5:1 (if I dare mention that in *TT*!). Pruning is very easy because of the accessibility of the feedpoint. Very little directivity has been noted, and signals seem about level with those of G stations using wire or vertical antennas and about 2–3dB down on those with 7MHz beams. It makes a good receiving antenna on any band, mf or hf, it takes up less horizontal space than a dipole and needs less feeder. The formula 1007/MHz (ft) proved slightly long but readily pruned. It would make a cheap and simple antenna for any band."

Potential of the G5RV antenna

B. A. Austin, ZS6BKW, and senior lecturer at the University of the Witwatersrand, Johannesburg, is in the fortunate position of being able to carry out professional research into ideas that come from his hobby. Recent mention in *TT* of the use of the G5RV centre-fed antenna on 10·1MHz encourages ZS6BKW to make a preliminary report on some computer investigations that he has been carrying out that underline the still unexplored potential of this antenna (Fig 4). He writes:

"I have used a G5RV antenna at home in an inverted-V configuration for many years, and its basic effectiveness is beyond doubt. My approach has been the standard one: approximately 31·1m (102ft) top, fed at the centre by an electrical λ/2 of 300Ω ribbon feeder (approximately 10·4m multiplied by the velocity factor of the cable for 14MHz) and then any convenient length of 72Ω balanced twin line.

"The G5RV represents a clever idea and has, I feel, some unexplored potential. To investigate it further I wrote a program in Basic for the Data General Eclipse machine in the department. The input data required are the values of the top section (the "antenna") for any given length, L1, and operating frequency. Such information is available in the literature (my source was Appendix 4 in *Antennas and Waves—A Modern Approach* by R. W. P. King and C. W. Harrison, published by the MIT Press, 1969). This provides free-space data but is a good point at which to start. The effects of 'real' earth below an antenna are very well documented in the literature, and use of that data plus some 'in situ' measurements of my own will form a further part of the research programme.

"First of all the results so far obtained show conclusively that Louis Varney's initial dimensions were not far off the mark! Fig 4 shows the theoretical antenna used for the computer results, together with some computer print-out.

Print-out No 1

Computer listing of vswr versus frequency for G5RV-type antenna of following specification: L1, 31·1m; L2, 10·366m; Z2 300Ω; Z4, 72Ω.

Frequency (MHz)	VSWR	Frequency (MHz)	VSWR
3·65	6·3286415	18·1	24·420945
7·05	5·825977	21·2	4·7205896
10·13	37·072547	24·9	1·3276165
14·2	1·9552423	28·5	38·633995

Print-out No 2

Specification: L1, 32·737m; L2, 10·366m; Z2, 300Ω; Z4, 72Ω.

Frequency (MHz)	VSWR	Frequency (MHz)	VSWR
3·65	3·5608961	18·1	23·268652
7·05	5·1625437	21·2	7·92111
10·13	41·554876	24·9	6·2673029
14·2	5·6544082		

Print-out No 3

Specification: L1, 27·9m; L2, 13·6m; Z2, 400Ω; Z4, 50Ω.

Frequency (MHz)	VSWR	Frequency (MHz)	VSWR
3·65	11·779485	24·9	1·869093
7·05	1·8361328	28·0	10·239141
10·13	88·172538	28·5	4·1535267
14·2	1·2883087	29·0	1·8422786
18·1	1·6040507	29·5	4·9340089
21·2	67·694191		

"I have considered eight frequencies covering the amateur hf allocations (in South Africa *all three* new bands were released to us from 18 January 1982). The specific frequencies examined were: 3·65, 7·05, 10·13, 14·2, 18·1, 21·2, 24·9 and 28·5MHz.

"The results of the first print-out show that the G5RV, as designed, will work 'well' on 14 and 24MHz when the matching section is 300Ω and the feedline is 72Ω. On the 10 and 28MHz bands the swr rises very rapidly (37 and 39). On the other frequencies the swr is quite manageable; on both 3·5 and 7MHz the swr is around six.

"The criterion used here for judging relative performance is 'swr' simply because this is an easily-measured parameter and indicates the range of load impedances presented by the antenna system to the transmitter. The frequent references in *TT* to the unwarranted reverence with which low swr is often treated are wholeheartedly supported!

"However, if an 'end-effect' connection of about five per cent is made, and the electrical length *increased* to 32·737m (as in the second print-out), the system becomes much less attractive. For example, on 14MHz the swr rises to 5·65. This suggests that a shorter antenna top (L1) would be better. The computer program allowed L1, L2, Z2 and Z4 all to be changed, and all combinations to be tested. The third print-out is interesting because it shows that a *theoretically* improved system would result with: L1, 27·9m (note *no*

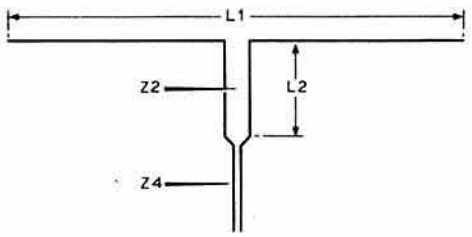


Fig 4. The basic G5RV-type antenna arrangement for which the dimensions L1 and L2 and balanced feeder impedances Z3 and Z4 have been subjected to computer analysis by ZS6BKW for all hf bands, including 10, 18 and 24MHz

end-effect connection); L2, 13·6m (electrical length); Z2, 400Ω; and Z4, 50Ω.

"Then if one takes an swr criterion of less than or equal to 2:1, such an antenna should provide a very good match on 7, 14, 18, 24 and 29MHz (rather than 28·5MHz). In arriving at these results, I limited the options for Z4 to 50Ω and 72Ω for obvious reasons; I allowed Z2 to vary in 50Ω steps from 300 to 600Ω.

"I would stress these are preliminary results only, and the work is continuing, but I do believe that they give some useful idea as to how a G5RV-type antenna should behave over the hf spectrum. There are obviously applications other than amateur radio for such types of 'multi-frequency' (but not 'broadband') antennas, and the work will look at all possibilities with the aim of a detailed article if results should justify this. In the meanwhile the preliminary results may be of interest to members."

It is perhaps relevant to note that *QST* recently contained a suggestion that a somewhat similar form of antenna was in fact recommended for commercial communications applications in the 'thirties by Collins Radio, but no reference was given.

One point brought out by ZS6BKW is that the 3λ/2 relationship (third harmonic) between 7 and 21MHz can be upset in a G5RV antenna by the effect of the matching stub, L2. A low vswr on 7MHz does *not* imply that a low value will be achieved on 21MHz, and similarly with 3·35MHz or (in this case) 3·65MHz and 10·13MHz. In all three calculated examples the vswr on 10·1MHz is very high; this does not mean that the G5RV cannot be used on 10·1MHz, but it does suggest strongly that it requires an effective antenna matching unit. With recent solidstate transmitters (particularly with broadband power amplifiers) the vswr needs to remain below 2:1 over the bands (or sections of the band) in use.

Variac applications

If you live, as so many of us do, in a typical residential area some distance from the nearest 11kV power-line sub-station, you soon discover that the mains supply, by the time it reaches your shack, is more than likely to have only a nominal relationship to "240V ac" during much of the day, though often showing a marked tendency to increase late in the evening as your neighbours retire to bed. Fortunately, modern equipment is a good deal less sensitive to mains voltage variations than in the past when some amateurs found it advisable to monitor the supply voltage and to make any necessary corrections.

This was done, if they were lucky enough to have such a beast, with a continuously adjustable variac transformer. However, since high-wattage variacs have never been particularly cheap, various alternative systems, such as switchable auto-transformers using the multi-tap primaries or (preferably, since greater power could be handled in this way) the low-voltage heater secondaries of standard mains transformers, were employed to add or subtract a few volts to or from the supply to their equipment.

Broadcasting and commercial transmitting stations often incorporate automatic voltage regulation to keep the supply to within ±0·5 per cent of the correct phase voltage (240V) as compared with the statutory voltage limits of ±6 per cent (Electricity Supply Regulations, 1937). Such an "avr" may have a rating of 150kVA three-phase for a 25kW uhf television transmitter.

It has, in fact, been quite some time since I have seen any mention of the much lower-power, manually adjustable, variac transformers in connection with amateur radio. However, Geoff Light, ex-VE3ABW, now living in France, has come up with a reminder of their continuing value for a variety of applications around the shack. He writes:

"A simple piece of equipment which I have had for some years and could not now do without, comprises a plywood panel carrying a variac permanently connected to the mains supply, through a switch. Its output is indicated by a voltmeter (moving iron, 300V fsd, accurate) and an ammeter (rectifying type, ranges 2·5A and 0·25A fsd) also mounted on the panel. The output is available on a couple of sockets, and a pair of terminals. This was originally put in because of the frequent need for such a unit when dealing with various items of household electrical equipment which land on the bench for attention from time to time. But other uses have disclosed themselves:

(1) As a crude but rapid means of measuring capacitors and chokes.

(2) For finding the voltages of unknown transformers.

(3) As a means of keeping the soldering iron at its correct temperature.

"In connection with **(3)** this requires a supply of 185V to the soldering iron. Virtually all soldering irons tend to run too hot. The makers and retailers do not want people returning irons complaining that they run cool, so they deliberately make them run hot. For many years I filed away at tips until finally it at last sunk in that the iron was running too hot. Now, at the correct temperature, it is capable of running continuously for days and yet staying nicely tinned!

Meter tips and topics

Geoff Light, ex-VE3ABW, used to be professionally concerned with meters and measurement, and has some useful comments to make on this subject.

Over many editions *ART* has included a brief note on a suggested technique for protecting sensitive microammeters. However, this puts forward the view that the more sensitive a meter movement is, the lower the voltage drop across it. VE3ABW points out that this is *not* the case: "Suppose for the meter movement you reduce the wire size and get twice the number of turns in the same volume as before, the fsd current will be halved but the dc resistance of the winding will be much increased so that the fsd millivolts-drop will remain much the same. It is very difficult to get the voltage drop across a sensitive meter to less than 5mV. Most are between about 10 and 30mV, whatever the fsd current, and they are normally 'swamped' by a series resistor before shunting so that the actual voltage-drop is about 50, 70 or 100mV in order to reduce the effect of temperature.

"Again, the *ART* note implies that a meter should not be expected to stand a temporary overload of much more than about twice fsd current. This is much too modest. A good moving coil meter should momentarily stand 10 fsd, often 50 or 100 fsd without bending the pointer! Such overloads cannot be sustained for too long because of damage due to heating.

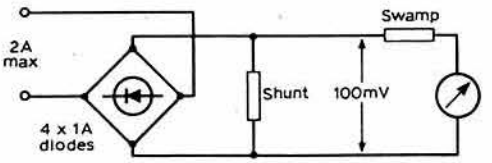


Fig 5. Use of silicon diodes to form a simple linear ac ammeter without the requirement for current transformers

"One thing to watch out for is meter 'cooking' due to rf. In the presence of a strong rf field, the meter will not deflect or rattle or show any outward indication of its ordeal; it just gradually dies as the rf heating softens the springs. Any meter used in a transmitter should, as a matter of course, be shunted with a mica capacitor, although even so there is a risk of the coil resonating at hf.

"Why any amateur should use an expensive, sensitive galvanometer in a Wheatstone bridge is another thing that beats me. I always used a 'magic eye' with as much amplification in front of it as I needed; much cheaper and virtually unbreakable.

"And as someone who remembers the 'twenties and using a whole trayful of ex-ht accumulator glass jars in order to make an electrolytic rectifier that weighed about 20lb and even when new was limited to about 90V at 20mA, the availability today of all the marvellous, little, cheap silicon rectifiers continues to astonish me. They simply invite the easy production of *linear* ac ammeters using the bridge arrangement shown in Fig 5. The essential point to note is that the shunt *must* be connected after the bridge rectifiers. With silicon diodes there is rather more voltage drop than customary in ac ammeters but, if you know about it, it hardly matters—and this simple arrangement avoids all the problems of current transformers!

"Which reminds me of a hint on how a 'half-turn' can be put on to a current transformer. This can be very useful, for example, in a multiplier having a 10A range, and can even make the difference between needing 5,000 or 10,000 turns on the secondary! Conventionally, *about* half the flux goes through each leg of the core, but this is imprecise. Two 'half-turns' (Fig 6), one on each leg and correctly connected, force the legs to divide the flux equally.

"Finally, a comment on paper tubular capacitors. Personally I never found a source of British-made capacitors of this type which did not leak badly after a few years. American-made paper capacitors are far superior,

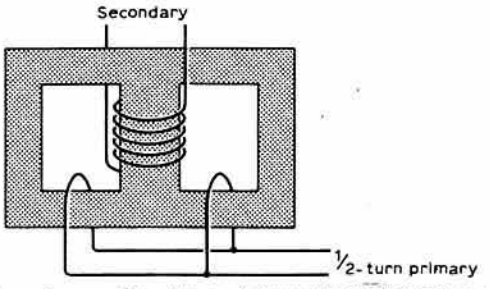


Fig 6. Technique for providing the equivalent of a "half-turn" on a current transformer ensuring equal division of the magnetic flux in both legs

particularly Aerovox, whose capacitors are superb. I still have some wartime 2μF, 1,000V capacitors with no detectable leakage and which are quite happy across 5,000V. I have never had one break down, and they seem equally effective on ac. Fortunately, I bought a box of surplus capacitors of this type; I also find their tubular types similarly uniformly excellent."

Add-on S-meter

The limitations of most conventional S-meters for other than providing a rough guide to the comparative strength of incoming signals are well known, while adapted business-type equipments may lack even this facility. Dr Noel Evans of Ulster Polytechnic, for example, recently required a portable direction-finding uhf equipment for tracking animal- and water-borne (buoy) transmitters suitable for use with a Pye uhf Pocketphone. This called for a highly-directional antenna and a sensitive carrier-level indicator, equally useful for antenna adjustment etc. In a preliminary report on this project he writes:

"Most current 'personal' radiotelephone receivers are designed for nbfm reception, with a limiting-type detector and no agc line capable of being used to monitor incoming signal strength. Many, however, are double-conversion receivers having a low second i.f. in the range 100 to 500kHz: Fig 7. An outboard i.f. amplifier and amplitude detector may be readily constructed for use with such a unit. For the PF1 Pocketphone the take-off point was from the collector of TR7 (maker's circuit diagram). The positive 9V rail for the op-amps came from the receiver's supply, with the negative rail from a separate PP3 battery.

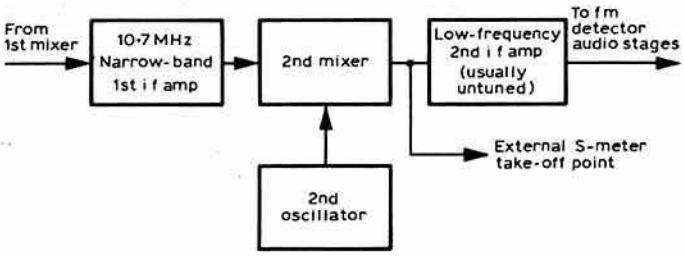


Fig 7. Typical double-conversion uhf hand-held receiver showing take-off point for S-meter

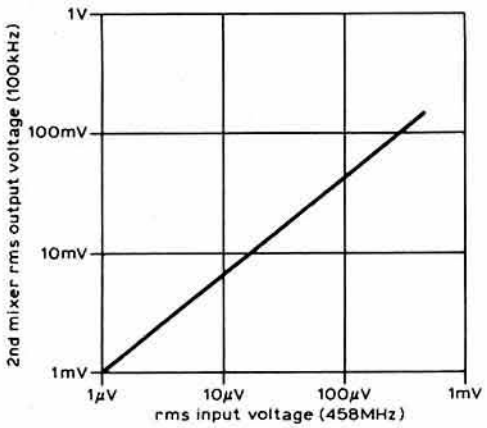


Fig 8. Receiver sensitivity characteristic showing relationship between input signal and the rms output voltage after the second mixer

"Fig 8 shows a typical sensitivity plot obtained from the PF1 receiver, and Fig 9 shows the linear signal strength meter as used; a fixed-gain buffer amplifier is capacitively coupled to the mixer output, with a sensitivity control feeding a switched high/low gain stage. With this arrangement the detector meter indication may be kept nearly mid-scale when searching for a peak with a hand-held antenna. For such applications as antenna adjustment a log-scale meter might be preferable for making comparative antenna measurements."

Soldering wheezes

In *TT* November 1979, Dr Gerald Bulger, G3WIP, drew attention to an editorial in *The Lancet* commenting on the problem of the fumes given off by fluxes used in soldering. It was noted that even the cored solders commonly used for electronic assembly work contained colophony, which can after a time cause or aggravate the coughing, wheezing and tightness associated with an asthmatic sensitivity. *The Lancet* recommended efficient exhaust ventilation as a first step, with the industry continuing to seek a safer flux.

G. H. Williams, G3YCP, reports that after making a series of enquiries, he finds that Multicore are now marketing an "Xersin" cored solder that appears to have far less effect on those subject to colophony asthma.

Valve endings?

A few years ago my son returned from a closing-down sale of one of those much-missed Lisle Street "surplus" stores, carrying in triumph an enormous Mullard valve well over 1ft long. "They don't make 'em like that any more," he grinned. Since then this impressive virility symbol has been treated almost as an objet d'art, displayed prominently on a suitable pedestal!

I don't in fact know whether Mullard do still make a few MZ2-250 high-power audio valves for such applications as wired distribution systems, but the firm has announced that its large Blackburn factory, the largest valve factory in the UK, has now been turned over to making other products. In the 40 years since it was set up in the days of the famous red EF50 rf pentodes that formed the heart of so many wartime radar units, it produced more than one-thousand-million valves and used, in the process, two-million miles of wire, 25,000 tons of glass and some 20,000-million metal parts. Even before that the company had produced the "PM" series of Philips-Mullard valves, and back in the days of the original Mullard Radio Valve Company had been responsible for the R7 valves of 1920.

Not everyone, of course, will lament the virtual end of UK domestic valve production—but at least some will. The view has been expressed several times in *TT* that for the *home-construction* of transmitters of more than about 10W input, valves are "incomparably superior" to solidstate, but not every reader agrees.

One who does is an Australian "audio amateur", Douglas Bolton, who in a letter in *Wireless World* March 1982 writes: "For the kitchen table hobbyist as well as for those with a reasonable home electronic workshop, valves are, to quote Al Rechner, VK5EK, 'incomparably superior'. Valved equipment as a rule means more work in construction than a solidstate equivalent (my *bete noir* is the laying down of heater wiring) but is generally easier to get going, and going properly. Valves, possibly due to their tighter spread of characteristics, are often more predictable than transistors, and short of wiring the heaters to the mains or a low impedance ht supply, are notably tolerant of abuse resulting from wiring errors or component failure. Valve circuits are, with rare exceptions, ac-coupled throughout, and the effect of any failure or mistake is usually confined, as far as fault-finding is concerned, to the stage in which it occurs. Transistor circuits, by contrast,

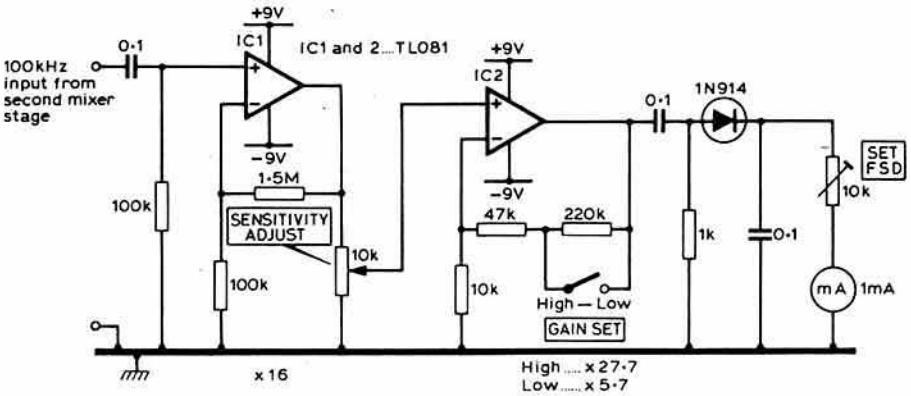


Fig 9. Linear signal strength meter as used for "tracking" purposes. For some applications a logarithmic characteristic would be more suitable

are predominantly direct coupled . . . a fault condition in an early stage, and multiplied by the gains of later stages, appears at the output as a frequently catastrophic and/or expensive aberration, the true source being masked by the effect of dc negative feedback. And tracing 'what goes to where' on an even moderately complex pcb puts one in mind of the Jacques Tati film sequence of M. Hulot vainly searching for the end of a convoluted garden hose in the midst of a monstrous cock-up of a fireworks display . . . have we really gained by the transition to solidstate?"

Douglas Bolton goes on to point out that the best high fidelity audio amplifier he ever made, or heard, was one consisting of EF86 driver, 6SN7GT floating paraphase splitter, pair of 2A3s in class AB1 and 24dB of feedback around the audio output transformer. He quotes measured performance figures in support of this statement!

"Ugly" construction projects

Another current debate which may be written off by some as the nostalgia of the greybeards is the question of using one-off printed circuit boards for so many construction projects with point-to-point wiring scorned as old-fashioned. For instance, the December *TT* included some notes taken from a *QST* article by Wes Hayward, W7ZOI, and his son Roger, KA7EXM, in which he described the "Ugly Weekender" portable solidstate transmitter. W7ZOI has now supplied some of the background to his thinking on this subject. He writes:

"This all started a couple of years ago. I had many years earlier described a transceiver in *QST* ('The Micromountaineer') that was extremely simple, and hence, rather popular. However, no pcb information was ever presented. The design later appeared in several issues of the ARRL *Radio Amateurs Handbook* and in *Solid State Design for the Radio Amateur.* Many requests for board information were received, none of them was answered with more than some words of encouragement. I then realized that the reason for the requests was not the added strength etc, provided by the boards. Rather they came because the readers were unwilling to do the *thinking* required to produce their own layouts. A 'monster' had been created, and I had been part of the 'dastardly' deed. The 'Ugly Weekender' was an initial attempt towards redemption. The theme was repeated in the design for a 'progressive receiver' in the November 1981 issue of *QST.* More plans in the same direction are in the pipeline.

"The one place where I find etched boards to be of great value is not, as you suggested last December, in receiver circuits. I do receiver-like work professionally (spectrum analyser design at Tektronix) and do 'ugly' breadboarding all the time. However, I do find that etched boards are quite worthwhile for circuits containing many digital integrated circuits which are terribly boring to build without a pcb. Even there I have used 'ugly' methods for many digital projects. The dip ic devices are placed on a ground plane, like a dead beetle with legs pointing upward. Some pins are bent to hit the ground foil and soldered. Others are soldered to bypass capacitors. The combination then fixes the pills in place, providing support for the rest of the circuitry. About half of the frequency synthesizer I use in my present receiver is built this way."

"Kiss" and solidstate

Wes Hayward, W7ZOI, with Doug De Maw, W1FB, was responsible for the excellent ARRL publication *Solid State Design for the Radio Amateur.* This was described in *TT*, February by Bob Connell, G4JQY, as "my bible . . . with that book, a reasonable voltmeter and a signal generator, anyone with half an interest in (solidstate) homebrewing need not question the wisdom of having a go. So one should take heed when W7ZOI, in connection with *TT*'s advocacy of "keeping it simple" comments that one needs to be careful in applying too rigid a "simplicity" test to transistor circuitry. He writes:

"There is a danger in the 'kiss' philosophy, although generally I am in favour of this. The danger comes if one takes a look at a circuit diagram from the same viewpoint as one using valves. Traditionally one valve was used for each function, and a count of the number of valves was a reliable measure of the complexity of the circuit. It was also a measure of the expense. This is not the case with transistors. The Ugly transmitter (*QST* August 1981) is an example of the difference. One could have built such a low-power rig with only three transistors; one for vfo, one for driver, and the third as power amplifier. However, I would maintain that the Ugly design is actually more simplistic. With more stages the gain per stage can be much less; this means that negative feedback can be applied in each stage, providing unconditional stability that is not sensitive to layout.

The keying is done with an extra switching transistor, so allowing the keying envelope to be carefully shaped and providing "textbook" waveforms. "It's all done by design. Then the rig can be put together with the minimum of fuss and provides reliable service."

W7ZOI mentions that one detail of the Ugly rig has caused some problems: this is the operation of the vfo at the output frequency. Shielding and buffering is mandatory to prevent the output frequency differing slightly from the "spotting" frequency; this can be solved by having the vfo at half-frequency, which requires more components but eliminates the need for shielding and isolation. A "kiss" component-count test would favour the published arrangement. "But which is really the simplest?" he asks.

QRP for beginners

In suggesting that projects based on crystal-controlled transmitters of extreme low power (well under 1W) are not an ideal "first home-construction project for beginners" (*TT* December 1981), I appreciated that my comments might be misinterpreted as being directed against QRP generally, although I tried to make clear that this was not my intention. What I was really trying to say was that for the amateur who previously had had very little, if any, practical experience of two-way cw operating on the hf bands, and had only a moderate antenna, flea-power on a fixed frequency, far from encouraging him, could have the effect of sending him back permanently to a black box and a microphone.

On the other hand, a vfo or vxo controlled rig with a dc-input (if one can still think in those terms!) of, say, 3 to 10W, or better, say 5 to 20W, can provide an almost ideal introduction to the cw-end of most hf bands—and at the same time show that home-construction is not only interesting in its own right but can provide a low-cost communications facility of real potential. After gaining experience such an operator may then feel far more confident in going either way: increasing power to say 50 to 150W, or going down to vfo/vxo flea-power for what is sometimes now called "QRP-sport" operating.

29MHz Oscar d-c receiver

Some years ago John Young, BRS33339, described a useful 3·5MHz direct-conversion receiver for the novice (*Rad Com* October 1973 and recent editions of *A Guide to Amateur Radio*). The latest issue of the always-lively *Oscar News* (No 36, Winter 1981) published by AMSAT-UK, includes a

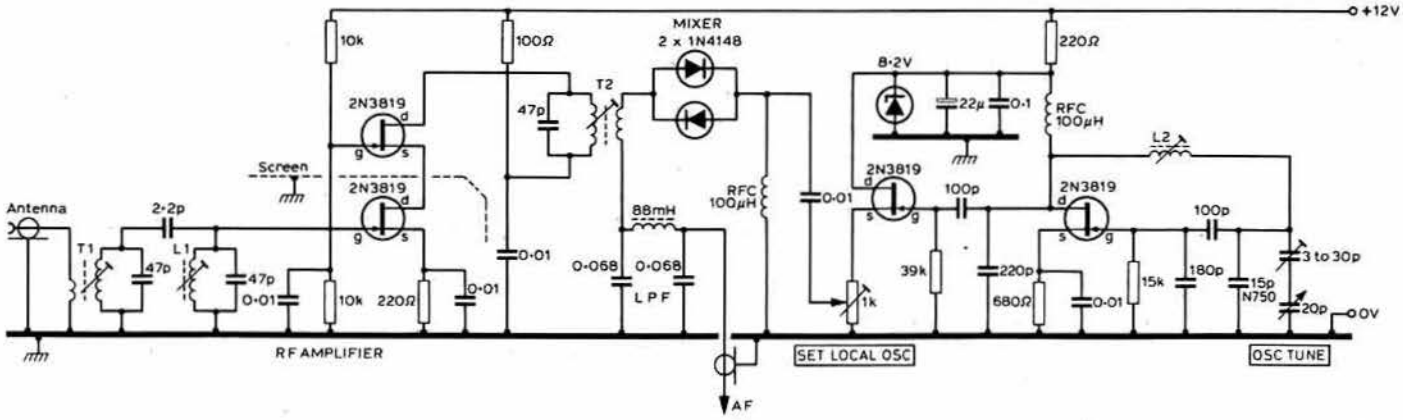


Fig 10. Oscar (29MHz) direct-conversion receiver showing rf stage, diode harmonic detector and oscillator. T1, T2, L1 34swg enam wound on 0·2in formers, 10t each. T1 link winding 3t, T2 link winding 4t. L2 12t 34 swg enam on 0·37in former. Note vfo operates at half signal-frequency. Coil forms and variable capacitor available from Watford Electronics, and other components from Riscomp, Duke Street, Princes Risborough, Bucks

design by him of a useful-looking 29MHz d-c receiver intended primarily for the reception of signals coming down from the Oscar or RS satellites, but suitable, of course, for other applications.

The rf section uses two 2N3819 fets in a cascode arrangement followed by the Russian-style anti-parallel harmonic diode product detector. This means that the Vackar-type vfo/buffer, using two more 2N3819 fets, tunes 14·70 to 14·75MHz. Fig 10 provides the circuit diagram of these stages; for details of the high-gain af stages and additional constructional information see *Oscar News*.

Power supply for intermittent loads

A novel 12V power supply arrangement was outlined recently in the "Circuit Ideas" section of *Wireless World* February 1982, page 42. This is a mains psu intended to power continuously circuits that require extremely little power, but intermittently present a much higher load. The attraction of the new arrangement is that during the small-load periods the power is supplied from an electrolytic capacitor "store", the unit taking no power from the mains supply.

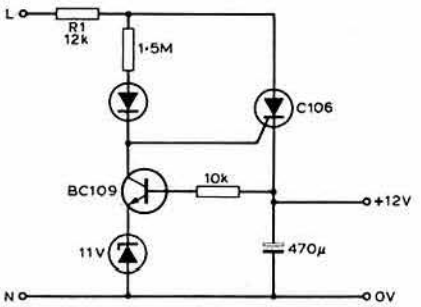


Fig 11. Low-loss power supply technique for loads that represent only nominal power for most of the time but occasionally require greater power

Fig 11 shows the basic idea. When the voltage across the reservoir capacitor drops below 12V, the transistor turns "off" and the next half-cycle of the mains supply triggers the thyristor (scr) which fires to recharge the capacitor. R1 limits the maximum current available.

The arrangement shown is of the "live chassis" (non-isolated type) and was designed for cmos circuitry that takes only about 1μA on stand-by but occasionally requires considerably more to operate a relay. But one suspects that the basic idea could be extended to more demanding applications.

High intercept-point mixer

High-performance receivers for both hf and vhf ideally require double-balanced mixers of extremely wide dynamic range, with the requirements for vhf even more demanding than on hf, since the difference between the weakest and strongest signals is often greater on vhf. While mixers based on various types of vmos and power fets have for several years been regarded as optimum, the diode-quad is the more common choice, particularly with the availability of packaged units such as the Anzac MD108 and the Mini-Circuits SBL-1.

Peter Hart, G3SJX, draws attention to a new Mini-Circuits doubly-balanced packaged mixer, type VAY-1, capable of providing quite exceptional results between 1 and 500MHz, although such devices are priced for professional applications (about $80 each) and it should be noted that these mixers call for a high-level local oscillator input (about +27dBm). The new unit is thus of academic rather than practical value to amateurs, but is interesting in showing what can now be achieved when it comes to intercept point, third-order intermodulation suppression and conversion compression point. The specifications for the VAY-1 show that third-order intermodulation distortion can be suppressed by some 76–80dB; conversion loss is typically 6dB; second- and third-order intercept point +47 and +38dBm respectively; and the critical 1dB compression point is not reached until the rf input exceeds +24dBm. If you are in any doubt as to the significance of these characteristics, have another look at Part 1 of G3YGF's survey of 144MHz preamplifiers (*Rad Com* November 1981).

Making the most of dry cells

Some useful observations on the running of a powerful mf receiver (taking an average current of 50mA) for from 2 to 12h daily were made in a letter in the January *Wireless World* by G. S. Maynard. He makes comparisons of the service obtained from SP cells (standard leakproof carbon-zinc), HP cells ("high-power" carbon-zinc), PP cells ("power-plus"), and alkaline cells. The PP cells, introduced recently, should not be confused with the 9V transistor batteries such as the small PP3 battery as used for 30 years. These cells, he notes, do not drop below 1·1V (on load) until about 95 per cent discharged; whereas at 95 per cent discharged SP cells were down to 0·7V, HP cells 0·9V, and alkaline 0·7V. However, when PP cells near the end of their life, the output drops sharply and the cells tend to become "noisy".

A significant observation is that in a stack of, say, six cells in series (to provide a nominal 9V), for all types of nominally-similar cells, it will be found that *one or two cells are likely to discharge completely well in advance of the others*—each cell will have a different useful working life. This makes it well worth checking individual cell voltages (on load) and then replacing only the weakest. In this way each cell can be replaced when it has reached the appropriate end-point voltage and, in effect, is fully discharged. G. S. Maynard finds that by following this procedure the useful average lifetime of SP cells can be increased by 50 per cent, HP by 20 per cent, PP by 5 per cent, and alkaline cells by 45 per cent at average supply potentials of 6·6V, 7·4V, 7·8V and 6·9V respectively. This practice not only achieves an appreciable saving of running costs but results in a more consistent supply potential than where all cells are replaced at the same time. But for those making heavy use of such cells it may also be worth trying "dirty dc" recharging—or investing in rechargeable nicads.

Tips and topics

John Patrick, G3TWG, echoes the feeling that 10·1MHz provides an excellent band on which to try your hand at simple home-built equipment, including the classic form of low-cost cw rigs based on frequency multiplication rather than heterodyne frequency conversion. He also favours generous use of valves in hybrid designs and high-efficiency Class C power amplifiers. (Am I alone in regretting that the changes to the licence schedule not only remove the simple and easy way of measuring transmitter power, ie dc input, but also reduce the incentive to achieve good energy conversion!). G3TWG uses the high-stability G3PDM Vacker fet vfo, but tuned to 3·3MHz and with its power derived from the 6·3V ac heater supply used for the valves (voltage-doubled and stabilized). Then come the valves: EF80 buffer, EL95 tripler, 6146 power amplifier; in his case all from a convenient junk box. However, G3TWG willingly yields pride of place in the revival stakes to the GW station who has a tritet crystal oscillator (2·5MHz crystal) with a 10W power amplifier in an all-valve rig. It all goes to show that you do not have to have a rice box to enjoy pleasant cw contacts on 10·1MHz while at the same time exploring the pleasures of home-construction.

When soldering in confined places, components can be protected by wrapping some aluminium foil around them.

Brian Johnson, G3LOX, notes that the restriction of legal cb antennas to 1·4m base-loaded elements has meant that some retailers have been disposing of their stocks of well-made 8ft 6in tunable whip antennas at bargain prices. He finds that with a little adjustment two of these units can make a very effective 28MHz dipole for loft-mounting etc.

Ross Bradshaw, VK8RB/G4DTD, makes the following points: (1) a multiband centre-fed doublet, such as the one shown in the October *TT*, does really need a "suitable" atu; not all are. His Diawa CN217 atu could not get the swr lower than 3:1, too high for his solidstate rig, although his old KW107 ("sold alas!") could have coped; (2) first eight production batches of the FT101Z had a progressive series of modifications as spelt out in the service manual—Yaesu say the first two figures in the serial number will tell you in which batch your model was made (eg 200059 would be in lot 20); (3) a faulty driver valve in the FT101Z can apparently cause some odd effects, including some on the receiver; when checking out the receiver it is worth trying the effect of removing the driver valve.

Laws of experimental physics

Murphy's discovery that if anything can go wrong it will go wrong at the most inconvenient time is well known to every field day operator. With acknowledgement to *Break-in*, some of the other laws of experimental physics and radio include:

Mrs Murphy's Law: "Murphy always was the optimist".

Pudder's Law: "What begins well ends badly" and the corollary: "What begins badly ends badly".

Sattinger's Law: "It works better if you plug it in".

Jenkinson's Law: "It will never work".

The Harvard Law: "Under rigorously-controlled conditions the device will do what it damn well pleases".

Smith's Law: "The man who smiles when things go badly has thought of someone to put the blame on". □

4 - 2 - 70

John Morris, G4ANB*

Aurora

As mentioned briefly last month, there was a useful auroral opening on 144MHz on 22 February, and several more reports have since been received. For GM4CXM (XP09g) the event started at 1759gmt with a contact with SM5CNQ (HS46e). This was followed by several good dx contacts, the best being UP2BJB (LP06d), a distance of 1,706km, and SM4FXR (HT57g). Conditions became quiet again at about 1915gmt.

On the opposite coast of Scotland, GM8OEG near Dundee noticed what was possibly a second phase starting at 1943gmt. A few moderate dx contacts were made, including F1KBF (BI0lj), before the aurora disappeared at 2035gmt. The anomalous propagation returned from 2210-2309gmt, bringing mainly G and near Continental stations, but also SM7FMX (GP35j) and DJ0UO (DL25j). The best for G4KLN (ZN23a) were SM5DFF (IS31c) and UP2BFR (LP29b).

A very good opening on 1 and 2 March was noted by several correspondents. There was a fairly quiet first phase during the late afternoon of 1 March, bringing only moderate dx. The best for GM4CXM, for example, was LA9BM (EU32g) at 1545gmt. The main opening started at about 2230gmt and lasted continuously until around 0300gmt in the early morning of 2 March, with some variations in timing across the country.

GM4CXM filled nearly three pages in his logbook between 2252 and 0218gmt, working stations in 12 countries—not including Scotland—on the way. Some of the particularly notable ones were Y22ME (HM53e), OK8BAA (JJ13b), SM7GEP (HR24e), UQ2GLO (KQ49g), SM6IHF (GS23g), OZ3ZW (FO18e) and SM0HAX (JT51b), all on cw.

On ssb, GM8OEG found several more southerly Continental stations, as well as many Swedish and West German. Among the best were SM7HFW (GQ69d), F6GGF (ZI12j), OZ1GSH (EQ04h), SM7EML (HQ73j) and DG4NAE (EJ06e). At 0050gmt DK1BM (DM67) mentioned that he had just come off cw after having worked 100 stations, including 15 UAs. The best contact for G4ASR (YM76d) was with OZ1CLL in GP locator square, 1,060km away.

GI8UPV (XO3lg) was also on the air until the small hours of the morning. Many Netherlands and German stations were worked, the best being DF2HC (FN31b) and DF9CY (EL02e). GI8UPV also found a smaller event during the afternoon of 2 March and made several PA, ON and DL contacts.

A view of what the opening was like from Finland has been provided by Arto Harjula, OH6GJ, who was operating the station of the Radio Club of the Helsinki University of Technology, OH2TI (MU65g) during the event. DK and PA stations were audible for long periods, and about a dozen contacts made. For three periods of about 10min each G stations were audible at good strength, but it was very difficult to penetrate the pile-up of closer SM and OZ callers. Eventually GM3COX (YP21g) and G4KLN (ZN23a) were worked, the latter for OH2TI's twentieth DXCC country on 144MHz. The distance for each of these contacts was around the 1,740km mark. Among those who were heard but could not be raised for a contact by OH2TI were EI4AZ, GI4BXB, G4UBX, G4IJE, G3LTO, G3UVR, G3LQN and G3NSK. With a bit more luck in penetrating the pile-ups any of these could have been worked, and so the operators of OH2TI are eagerly awaiting the next opening. The equipment at OH2TI consists of a Drake 4B line with homebrew transverter running 100W output, and a BF981 preamp. The antenna system is four 12-element NBS Yagis.

The excellent OH2TI-G4KLN contact mentioned above also represented a new and long awaited country for the UK station. For G4KLN the opening lasted from 2230 to 0330gmt and brought contacts with SM, LA and OZ in QTH locator squares as far afield as JT, plus many others in the UK and nearer European countries. Besides OH2TI one of the best was UQ2GLO (KQ49g).

Moonbounce

Stuart Jones, GW3XYW, near Swansea, has become the first Welsh operator to receive the "Worked All Continents" certificate for 432MHz. The six stations worked by eme for the award, with the antennas they were using, were: North America—K5JL, 16 W0EYE Yagis; South America—YV5ZZ, 16 21-element Yagis; Europe—OK3CTP, 16 F9FT 21-element Yagis; Africa—ZE5JJ (now Z25JJ), 9·7m dish; Asia—JA6CZD, 9m dish; Oceania—VK5MC, 6m dish. GW3XTW uses a 6m dish. He has expressed his thanks to the dedicated operators who keep some of the continents active on eme, in particular YV5ZZ, Z25JJ and VK5MC, without whom WAC would not be possible on uhf.

Among the other stations recently worked via the moon by GW3XYW were YU1PKW on ssb, and VE4MA on cw on 5 February; G3LTF and JH1OFX on cw on 6 February; and YU1AW on 6 March. Work is now slowly proceeding to convert the station for 1,296MHz eme.

G3WDG and G4KGC in Towcester have been using their 4m dish successfully for 1,296MHz eme for some time, and recently decided to try it on 432MHz. They did not expect great results, as the dish is much smaller than the "magic" 10λ minimum diameter criterion, but the sun noise looked good and so the system was assembled for the activity weekend on 5-6 March. On literally the first press of the key they heard their own echoes (theoretically at 0·8dB S+N/N in 100Hz) reasonably well. Listening around, LX1DB, K4QIF, W5FF, W6ABN, W1JR, KA0Y, DL9KR, K3NSS and G3LTF were copied.

Contacts with KA0Y and DL9KR were successfully completed with O/O reports in each case. During a sked on 7MHz the next day DL9KR reported that the 432MHz eme signal from G3WDG had actually reached S4 and, surprisingly, was stronger than those from many eight-Yagi stations. G3WDG was also copied by DF7VX, who was using only four Yagis.

From these early results it would seem that a 4m dish *is* a practical antenna for 432MHz eme, and it could well be the smallest dish ever used for this type of operation. G3WDG puts its performance in the same league as eight Yagis, but with the big advantage of being able to rotate polarization.

To minimize "neighbour QRM" the dish is hinged so that when not in use it lies on its back and is virtually invisible. It takes about 30min to push the antenna up into position and get the station on the air. Although it does not have the same performance as the 6m dish G3WDG had become accustomed to using at G3OUR, the visual impact of the 4m dish is much less and it is considerably easier to build, mount and fit into an average-sized garden.

GM4IPK in Edinburgh is planning to set up a 144MHz eme station in Scotland. The planned antenna system is four 16-element Yagis at about 9m agl, with KR600 and KR400 rotators for control of azimuth and elevation respectively. Heliax cable will be used for the short run from the antenna to the shack. The first stage will be to get the receiving side operational so that signals can be heard off the moon. GM4IPK has not yet decided what masthead preamplifier to use and would welcome advice and suggestions.

The Lunar Letter, published by KI7D, is a non-commercial monthly newsletter devoted to 144MHz eme. KI7D is always on the lookout for new countries and stations that can be worked off the moon, and would like to see more smaller stations trying eme skeds with some of the large systems now being used in North America. *The Lunar Letter* is designed to be a forum for exchange of news, information and sked requests. European stations can receive copies by sending 10 saes plus a suitable supply of ircs or equivalent to the distributor: Rick Beatty. WB7DTI, 426NE 156th, Seattle, Washington 98155, USA. Items for inclusion in the newsletter should be sent to: Bill Canton, KI7D, Rt7 Box 7137P, Nampa, Idaho 83651, USA.

Repeater news

The first repeater in the UK, GB3PI (R6, Barkway, Herts) has been licensed for just about a decade. During this time it has been run by a group of amateurs from a well-known company in the Cambridge area, with considerable help from the company itself.

It has recently been reported that GB3PI may soon have to find a new

CONTRIBUTOR WANTED

The contributor of *4-2-70* for the past two years—John Morris, G4ANB—has decided to relinquish this task because of pressure of personal commitments in other fields. We will be sorry to lose his services as a regular and dedicated contributor whose "copy" always arrived "clean" and on time.

Applications are invited from active vhf operators who feel they may be able to succeed G4ANB in reporting the many operating facets of the vhf spectrum, and who have the time and writing skill to devote many hours every month to filling three pages with news and comment. Applications should be addressed to: The Editor, RSGB, 88 Broomfield Road, Chelmsford CM1 1SS.

*c/o RSGB HQ, 35 Doughty St, London WC1N 2AE.

home, along with the two other repeaters run by the same group, GB3PY (RB14, near Cambridge) and GB3PT (RB12, Barkway), the only currently operational rtty repeater. As it is probable that any new site will have to be paid for on a commercial basis a contingency fund has been set up to help finance the move, and any donations would be gratefully received. The fund is being administered by Chris Goadby, G8HVV, 4 Rowan Close, Bottisham, Cambridge, Cambs CB5 9BN.

The Central Scotland FM Group, which runs GB3FF (R4, Burntisland, Fife) and several other repeaters, is collaborating with the Highlands & Islands Repeater Group, which manages GB3HI (R4, Island of Mull), in searching for a solution to the co-channel interference which occurs between the two units. A simple channel change for one or the other has been ruled out as it would simply cause interference elsewhere. Similarly, no alternative sites have been found for either unit that would not give seriously degraded coverage. The favourite solution at the time of writing is a channel swop between GB3FF and another repeater; possibly GB3GN (R7, Aberdeen).

GB3SY (RB6, Barnsley) came on the air from its new site on 17 February.

G8XIO has reported that during the heavy snow of 13 December GB3SN (R5, Fourmarks, Hants) was used as an emergency communications channel. One station acted as control, collecting and giving out traffic and weather reports, and several mobiles who found themselves stranded in the snow were able to call for help.

GB3ANG

If all has gone according to plan a new 70MHz beacon, GB3ANG (70·060MHz, YQ35c) should be operational by the time this is published. The intention was to install the beacon on 11 April, weather permitting, on the same 365m asl site as the 144·975MHz GB3ANG transmitter.

The new 70MHz unit has several novel features. It runs 27W rf output, split between two antennas. Most of the power, 20W, goes to a four-element Yagi beaming SSE for normal tropo indication. The remaining 7W is fed to a two-element beam pointing due north. This is designed to give improved indication of auroral conditions.

The keyer is also very unusual. To encourage meteor scatter activity on 70MHz and give operators a chance to test equipment for receiving fast cw the callsign and QTH locator are transmitted at two speeds. First they are sent nine times in rapid succession at 100wpm, followed by once at 12wpm for we mere mortals to copy. This sequence is repeated continuously. The keying is by ordinary on-off cw, mode A1A, as opposed to the fsk, mode F1A, more commonly found on beacons. This was chosen to make the fast cw sent by the beacon as similar as possible to normal amateur ms transmissions, allowing it to be deciphered by standard methods, such as using a multi-speed tape recorder.

Meteor scatter propagation works very much better at 70MHz than at 144MHz, as those who have carried out a few experiments will enthusiastically testify. There can be little doubt that the only reason it has not taken off in popularity on the lower band in the same way it has on the higher is lack of opportunity. The distance from one end of the UK to the other is conventionally considered to be just about at the *lower* limit for ms. When this is taken in conjunction with the lack of European dx on 70MHz it is hardly surprising that only a few bold experimenters have been prepared to invest the time and effort needed to carry out tests.

The conventional wisdom is, however, being increasingly challenged. Techniques such as tilting the antenna upwards, or even pointing it straight up into the sky, have been used for successful "short dx" ms contacts on 144MHz and there is every reason to believe that these methods will work at least as well on 70MHz.

The new beacon presents an interesting opportunity to test this and to investigate just how *short* a path could be worth trying, and will hopefully lead to a few more actual contacts being made by ms on 70MHz.

During the visit to bring the 70MHz beacon on the air it was also planned to revamp the antenna system and change the feeder cable on the 144·975MHz transmitter at GB3ANG. The new antenna is a four-element Yagi beaming SSE, mounted on the same building as the 70MHz antenna. The new arrangement should improve the 144MHz signal to the south.

As mentioned above, all of this work was planned for 11 April, but between the time of writing and then unforeseen delays could occur. For the latest information listen to GB2RS or try the RSGB Headline News Service on 01-837-4118.

Reception reports for the 144MHz beacon would be welcomed by the beacon keeper, GM8BXZ, and for the 70MHz unit by GM3WOJ (both QTHR).

To complete the set at GB3ANG a proposal has been submitted for a 432MHz beacon on the same site. The proposed frequency is 432·990MHz and if approved the beacon will run 10W to a nine-element Yagi with about 10dB gain. The antenna will be mounted at 7·5m agl and with a beam heading of 170°. As on the 144MHz beacon the keying will be by conventional fsk, mode F1A. The timescale for the uhf beacon coming on the air is unknown at the time of writing.

Predicting sporadic-E

Back in November 1981 I mentioned some hints on predicting 144MHz sporadic-E openings which were provided by Dennis Boniface, G4DSC, and promised that they would be revealed in the spring of this year, ready for the *Es* season. Well, here they are, along with an idea from Roger Barker, G4IDE.

The basic technique used by both G4DSC and G4IDE is to monitor the lower frequencies for evidence of *Es* propagation. If the propagation starts to move to higher frequencies, then it is time to start warming-up the 144MHz rig. The problem is, what frequencies should be monitored and what transmitters can be relied upon to be on the air? The answer is generally broadcast stations, tv or fm sound. G4DSC uses both:

"I have a Band 1 tv and a three-element beam. Using this I can tell which direction the *Es* is likely to come from and watch it increase in strength. Then I check the fm broadcast Band 2, 88–104MHz, using a portable radio and an *outside* dipole, which is far better than using the radio's telescopic whip by itself. A dx-tv and dx-fm set-up is really a must if one is to be successful on *Es*, especially on the short openings of only a few minutes, when telephone warnings come too late."

Most of western Europe uses the same fm sound broadcast band as the UK, 88–104MHz, and the sudden appearance of Spanish or Italian signals in this range has started "panic stations" for many operators. In eastern Europe (except Yugoslavia and East Germany) fm broadcasts use the band 68–73MHz, and a receiver for this range may not be available. However, G4DSC has found that tv Ch R5 sound on 99·75MHz can be heard very well on a normal fm broadcast receiver when the propagation is open to the east. Some of the countries using Ch R5 tv are Czechoslovakia, Rumania, USSR, Poland and Bulgaria.

When *Es* looks likely and no general coverage vhf receiver is available the technique is to look round 100–104MHz, which is at the moment generally clear of strong UK broadcasts, for openings to the south and southeast, and also on 99·75MHz for propagation to the east.

The best arrangement, of course, is a dx-tv set-up and a general coverage vhf receiver. The problem then is the time involved in tuning over the spectrum and identifying the origins of the many sound and tv broadcasts that may be detected. Until last May the system used by G4IDE was an NSF varicap tuner feeding a Murphy dual-standard tv, an Eddystone 770R vhf receiver, and a 144MHz transceiver. Following a discussion with G8BHH he decided to try feeding the 36MHz output from the tuner to the Eddystone. The a.m. detector output from the receiver was then displayed on an oscilloscope, and the time base of the oscilloscope used to sweep the varicap.

The result was a "poor man's spectrum analyser", covering about 45–105MHz, with a displayed bandwidth fully variable from about 1–60MHz. The system proved so effective that G4IDE spent the first few openings of 1981 watching, quite fascinated, as the various tv and fm signals floated up and down. The success of this approach can be gauged by the fact that G4IDE noted *Es* on 74 days during 1981, and never missed a 144MHz opening. He has come to the conclusion that the muf can rise very rapidly from about 80MHz, and once *Es* propagation is present at this frequency it is well worth listening on 144MHz.

Operating sporadic-E

The 1982 sporadic-E (called "Es" for short) season should be just about starting when this is published. Many new—and some old—licensees will receive their first experience of *Es* on 144MHz during the coming summer and so a few hints about operating techniques for this most exciting of all propagation modes may not come amiss.

Es consists of intense ionization in the "E" layer of the ionosphere which can give rise to vhf propagation over many hundreds of kilometres. With a good opening the result can make 144MHz sound more like a crowded hf band. Signals are generally undistorted and frequently very strong, but can also be subject to deep and rapid fading. The propagation can appear very suddenly at 144MHz, last anything from a few seconds to several hours, and disappear just as rapidly. For many operators the first encounter with *Es* comes literally out of the blue when a voice speaking a strange language suddenly appears at S9. Unlike aurora, *Es* is effective on all transmission modes, including ssb, fm and cw.

The main rule when operating in *Es* is "be clear, be quick". Remember that the station at the other end of the contact may be vhf-only and not used to making contacts in English, and the opening itself could disappear at any time. Therefore only the basic information of callsign, report and QTH locator should be exchanged. Do *not* exchange names, rig details, etc; that can wait for the QSL card. (I have ingrained on my memory the first time I

heard an SM on Es. The Swedish station very politely—and in impeccable English—gave his name, locator, QTH, rig, and then disappeared frustratingly into the noise before the contact could be completed.)

Send the information rapidly, but do not rush. A report sent once clearly and steadily is much more likely to be copied correctly than the same information garbled twice. Whether phonetics should be used is a matter of opinion; some operators claim they take up too much time. On the other hand, with a callsign like "G4ANB" which gets variously mis-read as "G4AND", "G4AMB", or several other variants when not sent phonetically, I always use phonetics as it can save time in the long run, and ensures that the other station has the right thing in his logbook. When using phonetics, stick to the recommended "Alpha, Bravo, Charlie . . ." alphabet.

Inevitably Es brings pile-ups, and it can be difficult for any but high power, well-sited stations to get a look-in. For the best results do not just sit on one dx station joining vociferously but unsuccessfully in the cacophony raised by each "QRZ", but tune around, looking for other, perhaps weaker stations to call. There are low or moderate power stations in Austria, Hungary, Yugoslavia, Italy, even northern Africa, all of whom are just as keen to work you as you are to work them. While tuning, jot down the callsign and frequency of any station heard so that you can come back a few minutes later for another try if the first attempt at calling is unsuccessful.

Once the contact has been completed move away quickly (if it is the other station's frequency) to give both the dx station and yourself the chance to make more contacts. Long and cordial farewells will not advance the cause of international relations if they take up precious Es time. Even if it is theoretically your frequency it will often be found that as the contact ends the dx station will be called by many others, especially in the case of a particularly exotic or rare location. If this happens give way gracefully; by the time the argument is over the propagation will probably have disappeared. Conversely, when tuning into the middle of a contact make sure that it is the dx station's frequency before calling, otherwise he is likely to have moved away.

Keep calls short. More time has probably been wasted by the disreputable practice of waiting for the pile-up to die down and then putting in a call at the end than any other. This just leads to an interminable racket through which the dx station is completely inaudible, so that *nobody* gets a contact. "CQ" calls should also be kept short, and used with discretion.

With Es, as with any other propagation mode, to work the very best dx involves pushing the propagation to its limits, so that stations at the very limit of what can be worked are likely to be weak.

Above all, stay on your toes, keep well aware of what is happening on the band, and be prepared to switch rapidly from one beam heading and frequency to another at short notice.

In preparation for an opening it may well be worth keeping a packet of biscuits and a bottle of orange juice, or other beverage, beside the rig in case of a long session!

Reporting sporadic-E

For amateurs—at least vhf enthusiasts—sporadic-E is good news, bringing dx contacts well beyond normal range. For professional users of vhf Es is a nuisance, producing occasional, unpredictable co-channel interference between stations many hundreds of kilometres apart. Thus for differing reasons amateurs and professionals alike would like to know more about the behaviour of Es, how often it occurs, how long it lasts, and so on. From 1982 onwards the RSGB and CCIR (the "research arm" of the ITU) will be developing a study of vhf Es propagation.

The extent of Es openings observed on 144MHz greatly exceeds that predicted using the method currently recommended by CCIR. Studies of major openings are in progress using data supplied on IARU Es propagation report sheets, but one topic not being closely studied at present is the duration of particular events. This is important to services in bands near to 144MHz as the acceptability of interfering signals can depend on the length of the interference bursts. The small amount of information given by CCIR on this topic all relates to 40 to 70MHz and it would be a valuable contribution to the replanning of various services following the WARC to have data available for higher frequencies.

The information needed is the length of time from the first observation of an Es signal until it finally fades into the noise, with short fades being ignored. In particular the durations of signals from two or more distant stations which are fairly close to one another, say within 100km, would be of most interest. Such reports will contribute to a probability distribution giving "event duration longer than . . ." information. Successive reports relating to stations in different areas will allow the movement of Es ionization to be examined.

This study will be in support of the excellent work currently being carried out within IARU Region 1 by many amateurs, whose reports are co-ordinated by the DUBUS team and F8SH. All reports will be interchanged between IARU, DUBUS and the RSGB. The present IARU Es report form will continue to be used and will be supplemented by a new form available from the RSGB.

Copies of the new Es reports form are being distributed throughout IARU Region 1, and within the UK can be obtained by sending an sae to RSGB HQ or by visiting the RSGB stand at exhibitions throughout the year.

Contests

Mediterranean VHF-UHF Contest

1600 5 June to 1600 6 June

CW, ssb and fm only on 144 and 432MHz. Fixed, portable and swl sections. Repeater contacts are invalid.

This contest takes place over the first weekend in June each year. Amateurs in any country may take part but only contacts with stations in the Mediterranean area count for points. It may well be worth having a look in that direction for a few dx contacts during the contest period, especially if there is sporadic-E about or tropo conditions are particularly good; both of which are very possible at this time of year. The exchange is RS/T plus serial number, starting from 001 on each band, and QTH locator.

In case there is a good opening and any reader wishes to submit an entry, scoring is one point/kilometre and separate logs for each band should be sent to: EA6URE, Baleares, PO Box 34, Palma de Mallorca, Spain, to arrive by 31 August. As well as certificates for the leading entrants in each section there will be an award for the best dx contact.

30 and 10 years ago

"G5ZT/T (Eggbuckland, nr. Plymouth) had been radiating TV on 433 Mc/s every evening for a fortnight when, on April 3, his telephone rang and he was delighted to receive a report from a viewer at Plympton, a few miles distant. Thus occurred what is probably the first amateur TV report in this country. . . .

"Flash! Excellent two-way Amateur Television was established on May 1st, 1952, between G5ZT/T and G3BLV/A/T. Both stations were operating in Plymouth on 430 Mc/s. The transmissions were witnessed by representatives of the National and Local Press."—G2UJ in *Around the V.H.F.s*, May 1952. The G3ZT/T-G3BLV/A/T contact was probably the first ever two-way atv exchange in the UK.

"Late June or early July is the target date for the launch by NASA of ITOS-D, the Improved Tiros Operational Satellite, and with it the latest Oscar package, Orbital Satellite Carrying Amateur Radio, to be known after launch as Oscar 6."—G5UM in *Four Metres and Down*, May 1972.

Scatter

Sporadic meteor conditions (ie outside the regular showers) were reported to have been generally poor in February, but improving towards the beginning of March. During the first week of the month G4ASR in Hereford worked SM3UL (IV square), LA9BM (EU) and DL6DAE (EL).

GM4IPK (YP05h) has appealed for more G stations to turn their beams to the north more often: "One classic reply to one of my calls came from a certain G6 station who was just getting ready for bed and was turning his beam to the north to put it into the wind."

The Örebro radio club, ÖSA, will be holding its annual vhf-uhf-shf convention on 11-13 June in Ånnaboda, a sport and recreation area about 25km northwest of Örebro City, in southern Sweden. Over the past few years several UK amateurs have attended the Ånnaboda meetings and have reported an interesting and thoroughly enjoyable time. Details can be obtained from Lars Wåhlström, SM4AXY, PO Box 39, S-71015 Vintrosa, Sweden; tel (Sweden) 019-94789.

Members of the Hadrabs Contest Group will be operating from Andorra as C31XV/P from 6 to 11 June. High-power equipment for vhf and uhf will be available, and the operating frequencies will be 144·185 and 432·185MHz for both ssb and cw. Priority will be given to 432MHz when conditions permit. No skeds will be made in advance, but can be made during the expedition on the 14MHz vhf net, or on vhf/uhf for the band not being worked. Copies of the operating schedule may be obtained by sending an sae to G8APZ, QTHR. QSL cards for the expedition will also be handled by G8APZ.

There were good tropo conditions to France on 432MHz on 9 February. The best dx for G4BPY (YM30d) was F6DGS (AG19) at 2023gmt.

The deadline for this month's *4-2-70* coincided with the VHF Convention, which was bigger and better than ever, and most successful. Next month's *Rad Com* will contain a full report.

Please send all contributions for July to arrive at RSGB HQ by **14 May** (late news by **24 May**) and for August by **11 June** (late news by **21 June**).

SWL NEWS

Bob Treacher, BRS32525*

Participation in contests

Each year the RSGB provides a wide and varied menu of hf contests designed to stimulate those who are interested in contest working. The majority of contests also offer the swl an opportunity to get involved. However, in recent years the number of swls entering the major contests —21/28MHz and 7MHz—has decreased, while other contests attract no listener entries at all. The Society's HF Contests Committee is concerned that so few swls are submitting logs. It would like to know what deters swls from entering and what incentives would attract more to take an active part.

There is little doubt that contest operation sharpens up listening habits and helps to prepare for the day when the swl will use the hf bands as a G4. Contests can be fun, exciting, frustrating, and will improve listeners' knowledge of the bands and of propagation conditions. But most of all, they will improve their skill and ability to copy QSO details quickly and accurately. It is this which will help them obtain a high score and hopefully a certificate as well. Why not seriously consider entering the next hf contest and judge for yourself how interesting and rewarding it can be? Additionally, any ideas, groans or moans about swl participation in contests should be addressed to the HF Contests Committee, care of your scribe. Constructive comments will most certainly be considered. In the meantime, how about participating in the series of set listening periods which were publicised in March? This is a good stepping stone from which to start and, should your appetite be whetted, you might have a go at one of the bigger contests scheduled for later in 1982.

The HF Contests Committee has changed the rules regarding the frequency of logging each G-station participating in contests, and has introduced a new rule regarding multipliers. The rules for this year's 21/28MHz SSB Contest can be found in "Contest News" and reflect these changes.

News from overseas

Eric Trebilcock, BCRS195, who has been mentioned in recent columns, wrote from VK-land to say that his first "mention" in a radio journal was some 50 years ago, but still to be featured today gives him great pleasure. He remarked that in the pre-war years 7MHz was a far better band than it is now but, for reasons unknown, VKs do not chase dx on 7MHz today. Eric suggested that they were really missing out, as almost daily he can hear European signals on both the long and short paths, but especially the latter, during our evenings around 1800–2100. Eric is still extremely active, sending dx information to magazines, monitoring the 28MHz beacons, and sending swl reports. He even has younger listeners and licensed amateurs asking him for dx tips. Keep it up, Eric!

Knowing what you need

DX chasers are unanimous in repeating the need for accurate and easy-to-follow records to show what is still needed in the way of countries on each of the bands. Many listeners now have similar records, thanks mainly perhaps to the all-time list. For those who cannot afford the expensive USA-type of record books or have not got an RSGB Countries List, why not draw up your own? Possibly one of the more clear, concise and easy-to-read systems which shows at a glance exactly which countries are needed on which band is as follows (those who monitor 10MHz will obviously include a seventh column):

	28MHz	21MHz	14MHz	7MHz	3·5MHz	1·8MHz
CR9	√	√	√			
CT1		√	√	√	√	
CT2	√		√		√	
CT3	√	√	√	√		
CX			√	√		
C21			√			
C31		√	√	√	√	√

For those who collect QSL cards, the format could be altered to include columns for "QSL cards received" on each band, and possibly shown by different coloured ticks.

* 79 Granby Road, Eltham, London SE9 1EH

1·8MHz

There were several interesting reports on top band activity. They covered the 1·8MHz SSB Contest mentioned briefly last month, activity in general, and the WPX Contest at the end of March. Brian Wainwright, BRS44703, mentioned ZB2FX, C31SD and IR8ONU for three new countries on the band to take him to 36 heard all-time.

Graham Powell, RS46228, sent a comprehensive report on his activities during the ssb contest. In 7·5h listening, he heard 78 QSOs involving stations in 26 countries. New countries included EA6, UR2, GI, F and W. Three Ws were logged—W8LRL, N4WW and K4CNW.

Kevin Cooke, BRS45466, had been "getting used" to 1·8MHz. Never having listened to the band, his first session provided 16 countries. Roger Pols, BRS31440, had also spent time on the band. Most of the dx already mentioned was heard, but Roger also listed EA8QL, RQ2GFQ and UB5FDF.

Peter Norris, BRS47513, heard ZB2GW make his first QSO on the band on 3 February. It is good to know that there are now several stations on the band from ZB2. IR8ONU has I0JX as his QSL manager. G4JRN from the Portland lighthouse also found his way into Peter's log. He also heard OK1AVG using a TS520, which it seems was a gift from some VE operators. Peter remarked that if they wanted to show their appreciation to an swl, he would like an NRD515 to accompany his new 1·8MHz homebrew atu!

On the QSL card front, Brad Bradbury had received one from VE1BWB. WPX activity on 1·8MHz seemed fairly sparse. As most of the multipliers could be worked on the other bands, it is perhaps not surprising that activity seemed poor. Many of the now regular Europeans were active. The best dx reported at the time of writing was W8LRL, 5/6 at 0002. Also noted were LX1PD, OZ1LO, RD6DNE, UA2FCW and 9H1CG. Any reports of Caribbean activity will be mentioned next month.

HF news

KP2A/KP1 from Navassa Is was the pick of the March dx reported. QSL cards for the expedition, and also for the KP2A/6Y5 operation, should go via WB2MSH with at least two ircs for an airmail reply.

Brad Bradbury, BRS1066, entered BERU with pleasing results, and heard VK9NS on four bands. He also required just one QSL card—from Utah—to have at least one from each USA state. Dave Whitaker, BRS25429, complimented 28MHz on its excellent behaviour in early March! He managed JD1BAT, YJ8RG, XZ9A, 3D2WR and 5W1DQ for five new countries.

"Where is A92?" asked several reporters. From 1 March, A92 replaced A9X as the prefix for Bahrain, so that A9XP is now A92P. Roger Hunter, BRS50157, wondered which country SL2CR came from. The SL prefix is allocated to military stations in Sweden. P. Johnson, BRS41331, queried the QSL card route for 4K1A. From your scribe's information his manager is UA3XBP.

Several band reports to close with. Robert Small, BRS8841, provided his usual comprehensive monthly report: 3·5MHz conquests in March were DA1HK/OD5, TI2APG, KP2G, PT2PPP, UH8YAG and 3V8DX (extremely quick QSL card via G3SVK); 7MHz had continued in good shape, providing CE0DFL, VP2MCK, ZD8MW (via G3GIQ), ZS6BCR and 9X5SL. Other reports mentioned: 28MHz—C53AD, P29CH, ZF2FL, 5H3TM and 9X5CL; 21MHz—CR9BK, DU6JM, JD1BAT and VS5DD; 14MHz—P29BS, VP2EX, ZD8TC, 4S7DJ and 5W1DQ.

First impressions on WPX were that 28MHz certainly took the star band rating. W6 and W7 stations were audible at 2100, and, in general, signals on the band were extremely loud. Many weird prefixes were there for the taking —CW3, IZ, R6, 4X1—no doubt there will be queries about many others! The largest QSO total reported so far was from the 28MHz station of VP2EC, who had worked 5,207 by 1715 on the second day of the contest! Pity the poor QSL manager!

Newcomers

A. Fowler, RS45194, lives near Newark, and has been attending the RAE class run by G4CCB. His receiving set-up comprises a Trio 9R59DS and a KW2000A with the transmitter demobilized. He prefers listening to cw QSOs on the higher frequency bands, but also has a crossed dipole arrangement for AMSAT and tv reception.

Roger Hunter, BRS50157, joined the Society in January. It is the second time the bug has bitten him, as he was also active a few years ago, and has interesting QSL cards from 1S1A and JY1. However, Roger's stay with this column will be short-lived as on 5 March he passed his morse test, and when he wrote was awaiting a GW4 callsign.

Stephen Evans, BRS50397, obtained a secondhand KW77 receiver soon after joining the Society. His first QSO heard provided VK4SU, and over about three weeks of listening Stephen had logged stations in 65 countries.

1982 HF COUNTRIES TABLE

Station	28	21	14	7	3·5	1·8	Total	Mode
BRS8841	151	121	170	102	82	9	635	ssb/cw
RS46228	103	88	152	118	92	26	579	ssb
BRS47745	88	106	120	101	98	26	539	ssb
BRS1066	88	82	104	75	61	37	447	ssb/cw
BRS44703	94	77	89	85	93	23	461	ssb
BRS31440	76	66	90	64	67	27	390	ssb
BRS35509	86	45	103	56	65	2	357	ssb
BRS48675	51	64	78	43	33	16	285	ssb
ORS45992/7Q	49	91	106	2	4	0	252	ssb
BRS30694	40	28	73	36	44	21	242	ssb/cw
BRS45466	36	32	47	39	50	16	220	ssb
BRS25429	0	0	0	99	85	25	209	ssb

Stan Clark, BRS48815, uses an FRG7 with an inverted-L antenna, a homebrew atu, and three λ/4 verticals for 28, 21 and 14MHz. He wrote a long and interesting letter relating what he had heard, but raised several queries which might have been intriguing others. A71AD (ex-A7XD) is perfectly legitimate and is located in Qatar. AD3R is located in the USA and is one of many short callsigns now in use there. The *World Callbook* is certainly a great asset to those who send QSL cards direct—RSGB Publications (Sales) has a supply. Lastly, "listening 7,199" etc is a term used when a station outside the USA is trying to contact amateurs in the USA. (USA amateurs cannot operate below 7,150kHz. Europeans transmit on, say, 7,085kHz and tune 7,199kHz for a reply.) This is a common enough practice and one which is used extensively on all bands by dxpeditions; for example, transmitting on 14,195kHz, and listening on 14,200–14,210kHz.

Paul Bispham, BRS49667, was intending to purchase an FRG7, but had one problem—finding the cash! However, he has learnt much from two local amateurs, G3VUS and G4DAD, and hopes to sit the next RAE.

Around and about

G4JLU wrote to your scribe concerning frequency allocations. He was to purchase an FRG7700 receiver for general shortwave listening, and needed information concerning any publication showing allocations down to 10kHz and up to 150MHz. Can any listener provide the information? G4JLU is QTHR.

Norman Henbrey, BRS28198, is a first-timer as far as *SWL news* is concerned, but he has been a keen listener for many years. His equipment list is quite formidable—an FRDX400, with converters for 70, 144 and 432MHz, an FRG7700 and a KW77. His antennas consist of an 8/8 slot-fed Yagi for 144MHz, a TA31Jnr rotary dipole for 28–14MHz, a 48-element multibeam for 432MHz, an 18AVT/WB ground-mounted with buried radials for 28–3·5MHz, and a 132ft long wire. Norman sent an all-time table entry which will be included when the table appears next in June.

David Whitaker, BRS25429, reports a bumper response to the White Rose SWL Contest. The results should be available soon.

Graham Powell, RS46228, now has 246 countries heard all-time, and so far in 1982 had heard 193 countries by early March. It should be noted that table scores should be with your scribe by the *first* copy date. Scores received at the late copy deadline cannot be included.

Roger Pols, BRS31440, agreed with BRS25172's comments regarding the modern licensed amateur being choosy about QSLing. However, he believes that the swl has a great disadvantage because no-one really *needs* his cards, however useful the information might be. He suggested that it might be time for a national society to sponsor an award for licensed amateurs based on the number of swl reports which that station answers. Certainly an interesting idea, but is it workable?

SLP

A reminder about the series of slps publicised in March. The next event is 21MHz ssb/cw, on 19 and 20 June. Consult p233 of *Rad Com* for the full details. A number of listeners have remarked that slps are a very good idea, stimulate activity, and tend to make people QSX on bands which they might otherwise tend to neglect. Hopefully, Paul Crankshaw will receive plenty of entries throughout the year.

10MHz

No reports as such this month, but John Sutton, BRS35509, and Jim Dunnett, BRS30694, have submitted figures for the table. As mentioned in the March issue, 10 entries will mean inclusion of the band in the 1982 table. For the all-time table, your scribe now has five entries for 10MHz, and one more will enable the band to be added to it.

Finale

That is all for another month. News, comments, and views for the July issue should be with your scribe no later than Monday **17 May**. Late news by Tuesday **25 May**. □

MICROWAVES

Charles Suckling, G3WDG*

2,304/2,320MHz

Following the loss of the lower part of the 2·3GHz band by German amateurs (and their subsequent move to 2,320MHz), a number of national societies in Europe decided to recommend a move to this frequency. Following requests in this column by the Microwave Committee for opinions on whether UK amateurs should also move to 2,320MHz, a number of replies have been received and all were in favour of the move. At its March meeting, therefore, the Microwave Committee decided to recommend that we should move to the new frequency as soon as possible.

Suitable crystal frequencies are 90·6667MHz (×24 = 2,176MHz for 144MHz i.f.) and 96·675 (×24 = 2,320·2MHz).

As yet, no formal band plan exists for the 2,320MHz band, but it is very likely that the lower frequency band plan will be adopted (2,320·2MHz as the narrowband calling frequency and 2,320·8–2,321MHz for beacons).

G4LRT and G3HWR have suggested that any future UK repeaters could use 2,304MHz as an input frequency with an output near 2,320MHz, as this would allow simple transmitters to be built based on the "universal" microwave drive frequency of 1,152MHz. The space between 2,304 and 2,320MHz could be used for simplex high-definition television. Any other suggestions for band planning this "new" band would be very much welcomed.

Beacon news

Two new beacons (GB3NWK and GB3FRS) have recently become operational on 1·3GHz. GB3NWK transmits on 1,296·810MHz and is located at Chelsfield, near Orpington, Kent (AL51b). It uses the site previously occupied by the 432MHz repeater GB3NK, which is 525ft asl. The transmitter consists of a modified Wood & Douglas MD05T drive source feeding a BPF433 bandpass filter into a 70FM10 10W pa. This drives a Microwave Modules varactor tripler followed by an interdigital filter. The rf output is 4W. The keyer unit employs ttl and a diode matrix store, and generates the following message every 40s: "GB3NWK AL51b Chelsfield". At present a temporary antenna system is in use, which consists of a single 15/15 slot-fed Yagi 20ft agl beaming WNW. It is hoped to install the antenna at the full height of 36ft in the near future, and there is also a possibility that a second antenna will be added to provide coverage in another direction. Other future plans are to upgrade the keyer system with a microprocessor to allow a varied sending sequence to be used, and the possibility of transmitting rtty.

The beacon keeper, G8BJG, would like to thank Wood & Douglas for assistance with the transmitter components, QSL Marketing Ltd for supplying the crystal, and G8CIU, G4GLN, G8CTT, G4EGU, G3TAA, G8JNZ, G8GGP and Jerry Wing for assistance both technical and financial. He would very much welcome reception reports of the beacon, and is QTHR. Already a number of stations have reported that the beacon is producing an excellent signal, including G4KNZ who has heard it consistently while driving through London and elsewhere.

GB3FRS at Farnborough, Hants, has also been heard by a number of stations following its recent appearance on the band. The technical details of this beacon—except for its frequency, which is 1,296·850MHz—were described in Microwaves (March 1982). Reception reports would be very much appreciated by the beacon keeper, G8ATK.

Satellite "beacon" on 2·3GHz

On 1 November 1981 G4MBS discovered a carrier on 2,304·000MHz while searching for the GB3NEW 2·3GHz beacon. Surprised when the signal did not key, he tried to beam up on it and found that he could not find any particular direction that was the best. Suspicious that the signal was due to some spurious in the equipment, he tried receiving the signal with a small dish at ground level, and more or less accidentally discovered that the signal was coming in from almost overhead!

*46 Windsor Close, Towcester, Northants

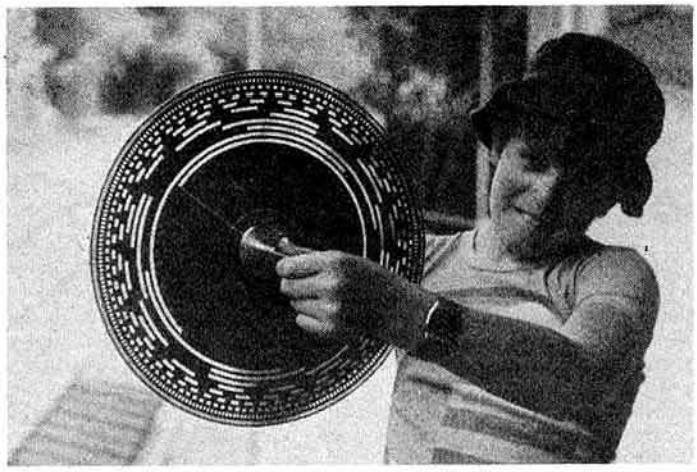
Prompted by suggestions from G4MBS, other operators also heard the signal, confirming that it was not due to some transmitter local to G4MBS. Also, the stations reported similar elevation and azimuth for the source of the signal, at a given time, suggesting that it was coming from a distant source, such as a satellite.

G4MBS and G4KGC began monitoring the signal on a daily basis, and found that the source of the signal moved slowly, and had some doppler shift (up to 10kHz), which suggested that the satellite was in a very high orbit. Also, the strength of the signal was not constant, and at some times became 10-15dB stronger. This was usually followed by a burst of "noise" (possibly high speed data) after which the signal disappeared. The time at which this occurred seems to be 4-5min earlier each day.

At the time of writing (22 March) the signal is audible from almost overhead for most of the evening. It is possible to hear it on an oil-can type dish feed (indoors!) at about 0dB s:n in 2·5kHz bandwidth. Using a dish antenna, the signal is very much stronger of course. So far, the source of the signal has not been positively identified, although there are some theories. Since it has been audible now for approximately five months, it seems to be here to stay, and is proving to be a useful extra beacon. It has already enabled one station (G3FYX) to tune up his 2·3GHz converter so that he could work G4MBS!

Photo feature

Now that the microwave operating season is here again, the writer would be very pleased to receive photographs of your microwave equipment (both portable and fixed) for inclusion in this feature.



Gray code shaft encoder used by Z25JJ to provide high accuracy indication of elevation and azimuth of his 32ft dish

This month's photograph shows Bernard Carey holding one of the homemade Gray code shaft encoder wheels used by Z25JJ to provide elevation and azimuth readout for his 32ft dish currently used on 1·3GHz eme. The wheel consists of an 11-level Gray code photograph sandwiched between two pieces of perspex. The master drawing took some 30 man-hours to draw! The code is read by an array of phototransistors, and after decoding provides an indication of angle to approximately 0·2-0·3° accuracy.

Full details of the Gray code system, including pcbs and encoder photographs, are obtainable from Peter Carey, Z25JJ, 10 Fairway, Northwood, PO Mount Pleasant, Salisbury, Zimbabwe.

Aircraft scatter tests on 1·3GHz

During a recent test on 1·3GHz over a very obstructed 60km path, G3WDG and G3OUF found that although G3WDG's 125W signal was audible all the time at G3OUF (by troposcatter), signals could only be heard for short periods in the reverse direction, due to G3OUF's low power (1W). During these brief periods the signal would build up and decay with considerable rapid fading in a few seconds. These brief enhancements were thought to be due to aircraft reflections, as often experienced on 144 and 432MHz.

It was decided to attempt an ssb QSO by adopting meteor-scatter "shower" type procedure: G3WDG transmitted just the two callsigns, listened for a few seconds and transmitted again, and so on. As soon as the signals started to build up, G3OUF replied with calls and reports etc. Unfortunately during the test, which was fairly late in the evening, the enhancements became much less frequent—the longest period between enhancements was 25min! However, the QSO was finally completed after 1h—the final enhancement allowed a two-way exchange of 73!

Forthcoming round table meetings

Two dates have been added to the 1982 microwave calendar. These are 12 June for a round table meeting in Sheffield and 13 June for a meeting in Winchester. Details of these meetings are available from G8AGN and G3JHM, both QTHR, respectively. A busy weekend!

That January opening

G4KKF (Durham) worked a number of dx stations during the 12 January lift. His log makes interesting reading: PA0FRE (CL), PA0WWM (CM), DK7LJ (FO), DK2NH (FN), PA0THT (DM), SM7DEZ (GP), DF3XU (FN), G3TDG (AL), OZ2OE (EP), OZ1OF (EQ), OZ9NI (GP), PE1THT (DM—200mW only!), and G4CCH (ZN).

All these contacts were made using only 2W to a homebuilt G3JVL loop-Yagi with FHJ-2 heliax cable. On receive, a single stage MRF901 preamp was used (optimized for best noise figure).

NEW PRODUCTS

Frémark crowbar overvoltage protection module

This module may be used to provide protection against overvoltage damage for any electronic equipment designed to operate from a 12-13·8V dc supply. It consists of a 25A stud-mounting thyristor scr, with a diode connected between gate and anode. If the voltage applied to the module exceeds the nominal trip voltage, the zener diode provides gate current to the thyristor and causes it to conduct and pull down the supply voltage.

The dimensions are 40 by 40 by 20mm, and the module plus in-line fuse holder and fuse costs £4.75 incl VAT and p&p. Available from Frémark Electronics, Unit 1, Strattons Walk, Melksham, Wilts SN12 6LA.

Evets audio compandor model C1

The function of the compandor is to increase communications efficiency on both transmit and receive by compressing and filtering the speech to yield a higher average transmit power. This directly improves the average signal-to-noise ratio at the receiver and, by expanding or decompressing speech on receive, re-establishes the original dynamic range of the transmitted audio —but without the background noise that would have been present had the original dynamic range been transmitted.

The Evets audio compandor

In a typical amateur radio contact, the transmit dynamic range is 40dB, the received peak signal to noise ratio is 10dB, only the louder sounds can be considered noise free, and much of the information will be "in the noise". With a compressor at the transmitter and an expander at the receiver, the compressor is adjusted to yield 10dB dynamic range output for a 40dB input range. If the transmitter is driven at the same peak power, the signal at the receiver will still yield a peak signal-to-noise ratio of 10dB, but virtually all the information is sent above the noise, and when expanded to the original dynamic range the speech will be essentially noise free.

The model C1 costs £125 plus VAT, and a receive-only version, the Evets Expander, is also available for swls. Obtainable direct from Evets Communications Ltd, 123-125 Green Lane, Derby DE1 1RZ, or trade outlets.

THE MONTH ON THE AIR

John Allaway, G3FKM*

A CODE OF PRACTICE for those aspiring to the position of "master of ceremonies" in charge of a "list" has been submitted by Martin Atherton, G3ZAY. It seems to the writer to contain many points which, if followed, would eliminate much of the heat from such a situation. It has to be accepted that there *are* times when the rare dx station actually insists on operating in this way—even though it is far from ideal. The points to be followed are:
(1) Never take a list more than a few minutes in advance.
(2) Never take a long list (30 is enough even if conditions are excellent and the distant station a good operator).
(3) Never keep the dx station waiting while you collect a second list. Get someone else, preferably in a different skip zone to do that while you run the first.
(4) Never take a list unless you have good two-way communication with the dx station.
(5) Insist that stations repeat the reports that they receive from the dx station so that you can verify that they have in fact received them properly.
(6) When stations have difficulty in copying their reports do not help them to guess by narrowing their range of choice. Do not make statements like "the first number was OK but you were a bit high on the second. . ." Do not give them more than two or three attempts.
(7) If you suspect a lucky guess (because perhaps there is a delay in acknowledging) ask the dx station to pass a different report as a test.
(8) Announce the arrangements for future lists and the number of stations remaining on the current list at frequent intervals.
(9) When running a dx net try to take check-ins at several different stages to cater for operators who were unable to make the original check-in time.

Please note that the QSL address for V3ME was given incorrectly as via G3OGO in March *MOTA*. This should have been via **G3OQO**—sincere apologies for inconvenience caused.

Expeditions

A group of Italian amateurs will be on San Pietro Is, in the Cheradi group in the Ionian Sea, from 28 May to 6 June. The callsign will be IJ7ET and the hf, vhf, uhf and shf bands will be used, as well as Oscar, with cw, ssb and rtty. QSL via the address in "QTH Corner".

GB4FIR will be operated by G3XZG and G3WUX from the island of Foula (in the Shetlands) between 8 and 22 June. All bands 3·5 to 28MHz will be used on cw and ssb. QSLs go to the address in "QTH Corner".

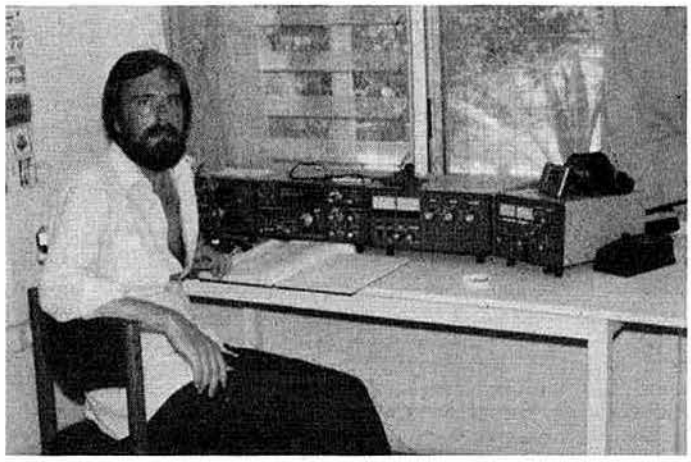
Iris and Lloyd Colvin concluded 24 days of operation from FY0FOL on 2 March after making over 11,000 contacts—the largest total at any recent stop. They lived in the beach house belonging to FY7YE, and mounted their antennas on the beach itself—the base of the mast being in the sea at high tide. Operation was assisted sometimes by FY7YE and FY7BW. No problems were experienced with the importation of their equipment—the French countries apparently requiring only that an amateur licence be obtained from France in advance. The Colvins moved on to the Netherlands Antilles to work as W6QL/PJ2.

The Wiesbaden ARC will be visiting Lichtenstein again this year—this time from 21 to 30 May. They will use the callsign DA1WA/HB0, and will be on all bands 1·8 to 28MHz, including the new ones. Schedules on 1·8MHz may be arranged via Claude Matchette, DA1PN, HHC, V Corps (G-2), APO NY 09079, USA.

According to *DX'press* N4NW should now be in Ghana for a two-year period. From there he hopes to visit 5T5, TZ, XT, 5U7, 5N, TT and several other W African countries. QSLs for any operations should be sent via AK3F (see under CN8BX in "QTH Corner").

SM0AGD will be joining the yacht *Marathon* following a visit to the USA due to take place last month. SM0MAQ is also on the boat and has been heard on 14,300kHz after 0400. It is hoped that visits will be made to the N Cook Is, Tokelau, Central Kiribati, Baker Is and W Kiribati. The operation will be helped by the N California DX Foundation.

VK2BJL, DJ9ZB, EA8AK and others will operate for five to seven days early this month from Mellish Reef. There should be four operators using two stations. Frequencies to be used are listed as 14,025, 14,195, 21,025, 21,295, 28,025 and 28,595kHz. This may be followed by a week's visit to Willis Is.



PA0GMM as T30BO—Tarawa Atoll, W Kiribati—using the station of T30DB (G3KCT)

PY0T is the callsign being used by PY1RR and PY1DOQ who are on Trindade Is until the end of this month. They plan operation on all bands 1·8 to 28MHz—look for them 25kHz above lower band edges on cw, and on 1,825, 3,800, 7,080, 14,300, 21,300 and 28,500kHz ssb. QSLs go to PY1VOY.

GM3YOR reports that in nine days of operation from Sierra Leone as 9L1SL he made 2,086 contacts with a total of 70 countries, using all bands 1·8 to 28MHz. Static proved to be a problem on the lower frequency bands, but DL, EA8, EA9, G, GM, KP4, OZ, UR and W8 were worked on 1·8MHz using a dipole and 9L1YL's FT101. The most consistent band was 21MHz, with exceptional openings into Japan from 0800 to mid-day. Operation was from the club station of the Sierra Leone ARS at Fourah Bay College, University of Sierra Leone, in Freetown, which is on a 1,200ft hilltop and has a 150ft mast to which Drew fixed his dipoles. The club had received a beam and rotator; however, the traps from the TA32Jr had been removed by the Customs and were proving difficult to replace.

Guido Ven den Berg, PA0GMM, has returned to the Netherlands after a most successful expedition to the Pacific area. He made 1,218 QSOs from KX6ZX, 740 from C21NI, 934 for YJ8VB, 3,164 from T2GMM, 2,006 from T30BO, and 3,233 from T32AE—a total of 11,295. He asks for patience by those waiting for QSLs. Conditions during his trip were very unstable to Europe, and on some days the opening was only for about 30min with "woodpecker" QRM, on others the band was closed. He used the TS830 and three-element beam belonging to the Vanatu ARS (YJ8DX), and on Tarawa the FT101ZD, FL2100Z and TH3Jr belonging to T30DB. At all other stops he used his own FT101ZD and a 12AVQ vertical.

DX news

Trinidad & Tobago is celebrating its 50th year of amateur radio, and stations celebrating the event will be using the 6Y50 prefix for the rest of 1982.

Another prefix change—this time in Bahrain. From 1 March amateur stations have been using the callsign construction A9 followed by the figure 2 and one or two suffix letters. In general the numeral "2" replaces the former "X" so that Ian Cable, formerly A9XBW, is now A92BW.

Stations in Mexico have been celebrating the 50th anniversary of LREM by using special prefixes—XE1 has been changed to 6D5, XE2 to 6E5, XE3 to 6F5, and XF4 to 6J5. *DX-NL* says that it is likely that the prefix series AM02 to AM09, and AO02 to AO09 will be heard in use by Spanish stations. Finally, CS is likely to be heard in use by Portugese stations. Some 15,000 contacts had been made by 1A0KM up to mid-February. Future activity will be announced in advance, and any unexpected appearance of the call on the bands treated with suspicion.

Those looking for confirmation for contacts made many years ago with VS9HRV, VS9KRV or DL5YT, should contact Ray Vasper (see under CN8BX in "QTH Corner") who still has his logs and some QSLs.

Three stations in Rwanda seem to be fairly active at present: 9X5WP, who seems to be found on most days near 21,405kHz from 1900; 9X5MH, who uses the vicinity of 21,280kHz between 1700 and 2000; and 9X5SL, who is to be found on Sundays at 1200 on 28,330kHz. From Burundi, Jerzy, 9U5WR, is reported to be found on 14,030kHz between 1700 and 2400, and in the 21,020–21,030kHz slot between 1730 and 1830. From Sierra Leone

* 10 Knightlow Road, Birmingham B17 8QB

QTH CORNER

CN8BX	via AK3F, M. Hayden, PO Box 573, Gettysburg, Pa, 17325, USA
GB4FOU	via G3XZG, 33 The Cornfields, Boxmoor, Hemel Hempstead, Herts.
DA1WA/HB0	via DJ0LC, Dr H. Jakobljevich, Am Weinberg 10, D 6200 Wiesbaden-Auringen, FR of Germany.
HV3SJ	via I0DUD, G. D'Aurelio, Via Antonio Fogazzario 87, Roma 00137, Italy.
IJ7ET	PO Box 136, I-74100 Taranto, Italy.
KP2A/KP1	via WB2MSH, H. Feltman Jr, 20 Progress Av, Woodbury, NJ, 08096, USA.
W6QL/PJ2	via YASME Foundation, Box 2025, Castro Valley, Calif, 94546, USA.
S79ARB	Box 710, Victoria, Seychelles.
SV8CS	via G3FNJ, N. F.Joly, 28 Oakington Av, Harrow, Middlesex.
T32AB	via N7YL, Janice Weaver, 1501 N. 22nd St, Las Vegas, Nev, 89101, USA.
V3ME	via G3OOO, D. Henley, 36 Main St, Newbold on Avon, Rugby, Warwicks.
ex-VK9ZD	now D. Shaw, VK3DHF, 9 Milton At, Heathmont, Vic, 3135, Australia.
VP2VHV	K9BJ, S. D. Clark, RFD 2-Box 131, Springfield, Ill, 62704, USA.
ex-VS9HRV	R. Vasper, Vale Close House, 31 Oakfield Rd, Forest Town, Mansfield, Notts NG15 0EJ.
3D6AK	via G3WPF, 105 Clarendon Rd, Hazel Grove, Stockport, Cheshire SK7 4NS.
7P8BX	Box 1264, Maseru, Lesotho.
9L1EX	Box 558, Freetown, Sierra Leone.
9X5MH	Box 491, Kigali, Rwanda.
9X5WP	PO Box 1, Nyanza, Rwanda.

LA2EX is now active as 9L1EX, mostly at weekends after 1300 in the 28,510-28,550kHz area.

5R8AL, in Malagasy, is now fairly active after 1500 on 21MHz, and keeps a schedule on Fridays at 1800 on 21,325kHz.

UA1PAM is active once more on ssb, and working lists of stations organized by UK3SAB, who acts also as QSL manager. This sometimes happens near 14,200kHz at 2000.

G3XBY reports that Ray, G3ZRK/SU, is looking for UK contacts and is to be found on 28,365kHz at 1000 on most days.

Activity from the Seychelles seems to be on the increase. S79ARB and S79WHW now have beams—the former is located on a hilltop 1,000ft asl. Three other stations—S79MC, S79NLB and S79RD—are all to be found on 14, 21 and 28MHz. S79MC asks for QSLs via AK3F, but the others should be sent via S79WHW, with an sae and ircs.

Another "deleted country"—this time Kamaran Is (formerly VS9K), which was taken off the DXCC list on 11 March 1982.

ZD9BV was mostly being found on Mondays at 1600-1900 and on Tuesdays and Thursdays between 1800 and 2200 on 21,338, 28,620 or 28,740kHz and had the attraction of a "list" operation at the time of writing. He has also been worked on 14,225kHz, and should be on cw in due course. ZD9BW is expected to come on the air in August.

Paul, G3XUD, (formerly VP8NS), commenced a two-and-a-half year tour of duty in Swaziland last November. He should be found on all hf bands 1·8 to 28MHz, both cw and ssb, with his new 3D6AK callsign.

Top band

Mick, VK6HD, intends to be active on this band again this year until 30 June, commencing 15min before sunrise in Perth each day. Sunrise times are: 11 May, 2256; 21 May, 2301; 1 June, 2309; 11 June, 2314; and 21 June, 2317. He will be found on 1,802 or 1,810kHz, and will move to 3·5 or 7MHz later. Since 6 November 1981 over 100 European QSOs have been made, but most of these were before New Year and conditions have deteriorated since to the extent that openings into Europe have only occurred about once every 14 days. UK stations worked include G3s GQF, IQM, ITH, KMA, LDI, MPN, MXJ, JMJ, PQA, RPB, RTY, RFS, RXH, SED, SFT, RPB, XTT, XWZ, YRO, ZRS, G4s AKY, BYG, DDS, IRN, GD4BEG, GI3OQR, GM3IAA, GM3ZSP, GM4ALK, GM4BFQ, GM4IPS, and GW3YDX. Heard but not worked were G3PU, G3SJJ, G4s AFS, and KUQ, GM3IGW, and GM3YCB.

A reminder that as from 1 January 1982 amateurs in ITU Region 1 (which includes the UK) are no longer permitted use of the segment 1,800 to 1,810kHz. UK amateurs may still use the rest of the band up to 2,000kHz and in due course 1,830 to 1,850kHz will become exclusive to the amateur service with the same power restrictions as the other lf/hf bands. It appears that Japanese amateurs will be using 1,810 to 1,825kHz when appropriate transfer procedures have been followed—at present they have been limited to the section 1,907·5-1,912·5kHz.

Swedish amateurs were allocated part of the band from 1 April and are now allowed to use 10W of cw only in the section 1,830-1,845kHz.

IRTS golden jubilee

This year the Irish Radio Transmitters Society celebrates its golden jubilee. Many special events and activities are planned. Among these is an expedition to the Aran Is off the west coast of Ireland. The expedition dates are 20 to 23 May. Operation will be on all hf bands, using both cw and ssb. The callsign used will be EJ0TS. The prefix EJ is generally reserved for offshore islands. The Aran Is group is good for the Islands of the Air Award (IOTA) and the reference for this is EU06.

Awards

The Mary Rose Award

For confirmed contact with 25 Hampshire stations—or with the Marconi club station (counting five points) and 20 Hampshire stations. These may be endorsed for single-band, single-mode, multi-band or multi-mode. Send certified list of log entries (by club or two licensed amateurs) plus five ircs (from UK) or 10 ircs (from elsewhere), to V. G. Scambell, G3FWE, Hon Sec, Marconi Radio & Electronics Club. Central QA Records, Browns Lane, The Airport, Portsmouth, Hants, PO3 5PH. The award is available to listeners.

The Gorchum 600 Award

This celebrates the 600th anniversary of the city of Gorchum in the Netherlands. Section 16 of VERON has issued this award, which consists of a copy of an ancient view of the city. Applicants on the hf bands require contacts with five members of the Gorinchem branch of VERON during 1982—a contact with PI4GAC (the club station) counts as two members. Send a list of QSLs certified by two other amateurs and Fl5, USA $3, or 10 ircs to: J. Kuijntjes, PE0JOK, v Hoornestraat 11b, 4206 XC Gorinchem, Netherlands.

21st Anniversary Award

This award from the RNARS requires contacts made between 1 June 1981 and 31 May 1982 (see June 1981 *MOTA* for full details). RNARS is making a special effort to activate the special GB callsigns during the last few weeks of this period to help those working towards the award. GB2RN, GB3RN, GB4RN, GB2MN and GB4WRN should all be on the air.

The Worked All LA Award

Revised rules for this certificate have been received. HF applicants living outside Scandinavia require evidence of having contacted all 19 counties in Norway since 1 January 1950. Any legal mode may be used but crossband contacts are not valid, and band/mode endorsements will be made if requested. Norwegian counties are as follows: A-Oslo, B-Østfold, C-Akershus, D-Hedmark, E-Oppland, F-Buskerzud, Z-Vestfold, H-Telemark, I-Aust-Agder, K-Vest-Agder, L-Rogaland, R-Hordaland, S-Sogn ag Fjordane, T-More ag Romsdal, U-Sør-Trøndelag, V-Nord-Trøndelag, W-Nordland, X-Troms, Y-Finnmark, JW-Svalbard/Bear Is, JX-Jan Mayen. Contacts with JW and JX may be used as substitutes for counties W, X or Y. Send certified list of data from QSLs giving date, time, callsign, signal reports and location of stations worked, plus NKr20 or 10 ircs to: NRRL Award Manager, Erik Jahnsen, LA7AJ, Kaupangruta 21, N-3250 Larvik, Norway. Applications using the old rules will be accepted until 31 December 1983.

Contests

All Asian DX Contest

0000 19 June to 0000 20 June (Phone)
0000 28 August to 0000 29 August (CW)

All bands up to 30MHz, except 10MHz. Single-band and multi-band single-operator, and multi-band multi-operator sections. Exchanges consist of RS/T plus operator's age (ladies send 00). Non-Asian stations work Asian stations, and contacts on 1·8MHz count three points, on 3·5MHz two points, and on the other bands one point. The multiplier is the number of different Asian prefixes worked on each band added together. Note that QSOs with US military stations using the KA prefix do not count, and that JD1 stations on Minamitori Shima are not in Asia. Logs and summary sheets should reach JARL PO Box 377, Tokyo Central, Japan, before 30 September (for the phone section) or 30 November (for the cw section). Results will be sent to those enclosing sae and one irc with their entry. In the phone section of the 1981 contest G4BHI scored 9,591 points, and G3NFV 7,502—both in the multi-band section.

CQ WW WPX Contest (CW)

0000 29 May to 2400 30 May

1·8 to 28MHz, excluding 10MHz. Single-operator single- or multi-band. Multi-operator multi-band single- and multi-transmitter. Only 30h of the 48h contest period may be used by single-operator entrants. The 18h rest period may be taken in up to five periods and must be clearly indicated in the log. Exchanges consist of RST and serial number (from 001)—the serial number should continue into four digits should more than 999 QSOs be made. Contacts outside own continent count three points on 14, 21 and 28MHz, and six on 1·8, 3·5 and 7MHz. With own continent they count one and two respectively, and contacts with own country count no points but may be made for multiplier credit. The multiplier is the number of different prefixes worked, and each counts once only however many bands it is worked on. Stations may be contacted on each band for points. There is a QRPp section for stations with less than 5W output, in this case "QRPp"

HF propagation study

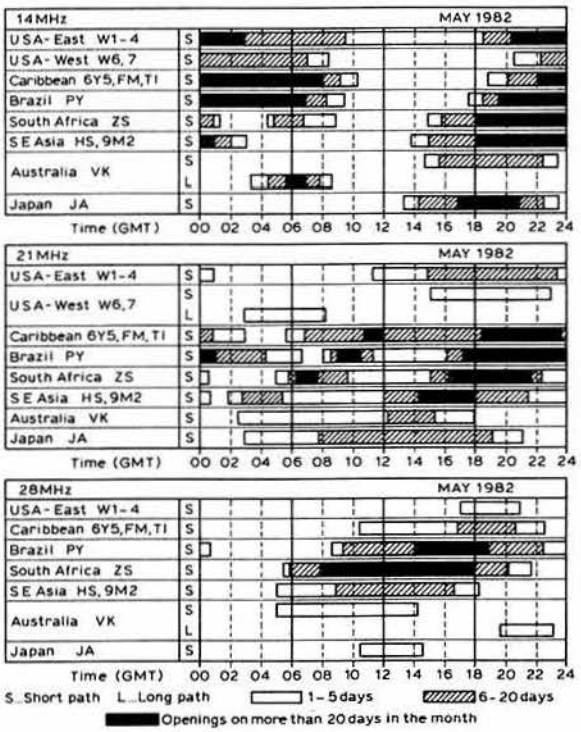
Band predictions for May 1982

	28MHz	21MHz	14MHz	10MHz	7MHz	3·5MHz
GMT	000001111122	000001111122	000001111122	000001111122	000001111122	000001111122
	024680246802	024680246802	024680246802	024680246802	024680246802	024680246802
EUROPE						
Moscow	.....	...12333342.	435666667887	875433334689	753111111368	42.....35
Malta	.....	...233444531	756776667898	998544345789	886311112478	++3.....4+
Gibraltar	.....	....1111121.	422566666886	987655445789	986432222478	++4.....4+
Iceland	.....	.....	1...23334553	643454445677	776422222346	443.....23
ASIA						
Osaka	.....	...133334231	....21.13674	351	21	.....
Hong Kong	....111121..	..1244446642	2...11.13687	365	142	.....
Bangkok	...12322221.	112345456753	51...1.13688	3.....477	145	2
Singapore	...23333321.	112345456762	51...1.13688	3.....477	1.....145	2
New Delhi	...23333321.	213335457763	74.....13689	61.....478	3.....146	3
Teheran	..133444442.	335544557875	974....13689	851.....478	62.....146	3.....3
Colombo	..133444421.	323445557775	84...1.13689	62.....478	4.....146	3
Bahrain	..1445545431	445544557887	974....13689	851.....478	72.....146	4.....3
Cyprus	...22333331.	324767777875	987544446799	985211113588	762.....257	53.....24
Aden	1.1445666533	756544557888	9851....3689	862.....478	74.....156	4.....23
OCEANIA						
Suva (S)	.....	....1111222.	..2431.1264.	..13.....32.	.....1..	.....
Suva (L)	3213.....54	446731...186	.15621..1551	..23.....32.	.....1..	.....
Wellington (S)	.....	....12222..21	114521.12463	..22.....341	.....11.	.....
Wellington (L)	3212.....33	66673.....87	346631..1475	.133.....342	..11.....11.	.....
Sydney (S)	...1111.....	..25543321.2	111521.13555	...2.....363	.....14.	.....
Sydney (L)	1.....2	533541....47	213631..1286	...3.....263	...1.....3.	.....
Perth	..13443.....	32456552.....	62.121.1244.	3.....464	1.....145	2
Honolulu	.....	11112211	.13321.123..	..33.....	..1.....	.....
AFRICA						
Seychelles	1.2444555333	756544557888	985.....3689	862.....478	73.....156	4.....23
Mauritius	2.1446666533	726545557888	9851.1..3689	873.....478	74.....156	4.....23
Nairobi	311445677744	866644457999	9972....3689	884.....478	762.....156	43.....23
Salisbury	31.445777755	975754557999	9984....3689	9861.....378	763.....146	44.....3
Capetown	...455777743	5..875557998	97.62...2689	9843.....378	773.....146	44.....23
Lagos	421355777864	986764457999	99862...2689	8863.....378	7731.....146	44.....3
Ascension Is	211.44556751	775375446997	998631..1689	9863.....368	7741.....146	44.....3
Dakar	311244576763	876775445898	99863....589	9863.....268	7741.....46	44.....3
Las Palmas	....1123332.	422466777875	998765555799	997532222479	88521....257	+52.....25
S AMERICA						
South Shetland	.....57775.	2557895	612.11..2689	8762.....367	7741.....135	44.....2
Falkland Is	2....1576752	832..4557898	997421..2579	8863.....258	7741.....26	44.....3
Rio de Janeiro	211..4566653	866335545798	998631...379	8863.....58	7741.....26	44.....3
Buenos Aires	21.1.3465652	8656.5555788	998621...1269	8863.....37	7741.....15	44.....2
Lima	1....1.233342	643353454467	998631....26	8863.....4	6741.....1	34.....
Bogota	1....2222332	632244444457	998631....16	78631.....3	5641.....1	24.....
N AMERICA						
Barbados	1...12233342	643355443467	998631....37	8863.....5	7741.....2	44.....
Jamaica	1111221	521124343346	897531.....5	68631.....2	4641.....	.4.....
Bermuda	1111221	521124333356	887531....26	78631.....3	5641.....1	24.....
New York	1111	41...2223345	786421....15	68631.....2	3631.....	.3.....
Mexico	111	31...1.232233	676431.....1	37631.....	1531.....	.2.....
Montreal	.....1.	31...1222245	776421....25	58631.....2	3631.....	.3.....
Denver	.....	2.....1112	56531...1..1	2563.....	.331.....	.....
Los Angeles	.....	1.....11122	35432...1...	.463.....	.131.....	.....
Vancouver	.....	1.....1	24432...21.1	.363.....	.131.....	.....
Fairbanks	.....	....1.....	123421..2211	.133.....	.....	.....

Summer conditions prevail in the ionosphere in May. The daytime frequencies are relatively low in the northern hemisphere, and the night-time frequencies are not as low as they were during the winter. The low daytime frequencies will be most noticeable on **28MHz** in traffic with North America. Traffic on this band will become less and less compared with that of the winter months, and may even only be possible on certain days. These worsening conditions will not be so noticeable in traffic with South America and Africa because the F2 mufs do not show any noticeable reduction in equatorial regions during summer. As usual, short-skip conditions will start in May, and they will facilitate sporadic contacts on **28** and **21MHz** with good results. These contacts will fade just as suddenly as they appeared. Changes on **21MHz** will be less severe, with traffic with eastern North America being possible on favourable days during the afternoon and evening, although it will most probably be best in the evening. Traffic with Australia will probably be possible on this band during the mornings via the indirect path.

Night-time will be the best time for dx on **14MHz.** On favourable days traffic with South Africa, South-East Asia, Australia and Japan will be possible during the afternoon. Traffic with Australia via the indirect path will be possible during the morning. DX traffic will be possible on **7MHz** when the path lies in darkness, but static and QRM will interrupt traffic. During the day this band will be most suited to local QSOs, and signals will be stronger, especially at mid-day, than on the **3·5MHz** band. The 3·5MHz band will provide good local traffic, and there will be no interruption by the dead zone during the latter half of the night.

Propagation predictions



must be clearly marked on the summary sheet and the maximum output power stated. Logs should have 40 QSOs per sheet and indicate multipliers the first time worked. An alpha-numerical check list of claimed prefix multipliers must also be included. Enclose summary sheet and the usual signed declaration. Official log and summary sheets are available from *CQ Magazine*, WPX Contest, 76 N Broadway, Hicksville, NY, 11801, USA, in exchange for a large self-addressed envelope and ircs. (*NB:* No forms for this contest are available from G3FKM). All entries must be postmarked no later than 10 July 1982 and "SSB" should be written on the envelope; they should be sent to the address given above.

Ibero-American Contest
2000 29 May to 2000 30 May
Phone only. Single-operator, 1·8 to 28MHz. Same station may be worked on each band for QSO and multiplier credit. Exchanges consist of RS plus serial QSO number (from 001), and each contact counts one point. The multiplier list is: CE, CO, CP, CR, C9, CX, C31, DU, EA, HC, HI, HK, HP, KP4, LU, OA, PY, TG, TI, XE, YN, YV, ZP, 3C and their DXCC dependencies. The final score is the total number of contacts from all bands times the sum of Ibero-American countries worked on each band. Post logs before 15 July to URE, PO Box 262, Granollers, Spain.

In the **1981 WPX SSB Contest** (single-operator section) UK scores were as follows:

G3VBL	(All band)	3,161,304 points	**G3NT**	(21MHz)	89,999 points
GM3RAO	(All band)	613,677 points	**GU3YIZ**	(7MHz)	111,600 points
GM4GPN	(All band)	392,472 points	**G3TKR**	(7MHz)	22,250 points
G3YWI	(All band)	196,819 points	**G4JQK**	(3·5MHz)	74,060 points
G2AJB	(All band)	67,392 points	G4IUF	(3·5MHz)	32,724 points

G3VBL was world 10th in the all-band section. At the time of writing, full results were not available but it was also known that **G6UW** came 11th in the multi-operator single-transmitter category with 5,674,515 points, and **GB4ANT** world fifth in the multi-transmitter listing with 11,334,124 points.

The IV Guide Dogs Competition
0000 4 June to 2400 6 June
Contacts to be made with authorized stations—each counts one point per contact per band per day. ED7PG and ED8URM must be worked and each counts as five points. Send RS plus serial number (from 001). To receive a diploma European stations need 30 points (claimed duplicates will be penalized 10 points). Post logs before 5 August to: URME IV Diploma "Perro Guia", PO Box 694, Granada, Spain. Listeners may enter.

World Telecommunications Day Contest
0000 to 2400 8 May (Phone)
0000 to 2400 15 May (CW)
Phone and cw, 3·5 to 28MHz. Single-operator multi-band and multi-operator multi-band. QSOs with own country count only for ITU zone multiplier, with other countries in same ITU zone one point, with other zones in same continent three points, and in other continents five points. Final score is total QSO points times number of ITU zones worked (each counts once only). Use separate logs for phone and cw. Specimen entry forms and log sheets are available from RSGB HQ. Logs must reach LABRE, UIT Contest Committee, PO Box 07-004, 70-000 Brasilia DF, Brazil, by 30 August.

Around the bands

In spite of the extremely early deadline this month information for this section was received from G2s BON and HKU, G3YY, G5JL, G3s BDQ, GIQ, GVV, LOL, LPS, NWG, XBY and YRM, GW4KGR, G4LRS, and RSs 1066, 30694 and 46228 to whom, many thanks.

Calls listed in italics were A1A.

1·8MHz. 0000 EA6, UA6, ZB2HD. **0500** IR8UNO, K4CNW, N4WU, W8LRL. **2200** *EA6FB, EA8YV, F0MB.*

3·5MHz. 0400 HT1MAT, SU2DX. **0500** W6KG/PJ2. **0600** *CN8AD,* J3AE, KP2A/KP1, VP2s *EV,* MF, VD. **0700** C6ADV, KH6XX, PR2DD, W1-W4. **0800** G3ZYY/KV4. **2100** DA1HK/0D5, 7Z2AP, 3V8DX. **2200** HV2VO, SV8CS, UD6s, VP8LP. **2300** A92NH.

7MHz. 0000 *HH2VP, KP2A/KP1, K5NA/KP2, UA0YAE, VK9YM, VP2ES.* **0100** *C53AP.* **0200** *VE7CC, 9J2BO.* **0400** *VE7IG.* **0500** *K7UR.* **0600** *EA9EU, KL7T, VK9NS, XT2AW, W6-W7, ZL,* HR5MVO/8R1. **0700** CE0DFL. **0800** HK0FBF, VK, VP2s EV, EX, ZL4OY/A. **1700** *4S7MX, 4X4VE/5N8.* **1800** FR7CE, SU1ER, UK0AMM, 9X5SL. **2100** *5Z4CS.* **2200** DF3NZ/ST2, ZD8MW. **2300** JY5US, *TU2IE, UA0BL, VK9XT, VK9XM,* VP8ANT, *K8WW/VP9, VP9AD, ZB2EO.*

10MHz. 0000 *CX5CF, FY7BC.* **1800** *VK, ZL, ZS6BWF.* **2300** *EA6KW, W6QL/PJ2.*

14MHz. 0000 9N1MM. **0200** C6ADV, 9H4B. **0400** VP5BAM. **0600** FK8BT, VK9NM/LH, ZK1CG/N Cook. **0700** FO8HG, AC3Q/KX6, ZL4OY/A. **0800** T32AB, VR6TC, YJ8MP, *5W1DC,* 6D5VIC. **0900** W6-W7, G5FF/3A, 9Y50FS. **1500** CR9BK. **1600** VU2AVG. **1700** JW0P, *KH6CC.* **1800** AP2ZA, *FK0AF,* J4FM, JT60AB, VK9XM, ZLs, *1A0KM,* 3D2GS. **1900** A71AU, *J28DP, KH6IJ, NL7G,* SU1ER, UA1PAM, VK9XM, VK9YM, *VS6EY,* OE1EHB/YK, ZLs. **2000** AH2L, EP2TY, *FR7CG, J3ABA,* P29FV, VK9NM/LH, *VP2MCW,* VP8AEN (S Ga), 4K1A. **2100** G3ZRK/SU, *VP8ANT,* 5V7HL. **2200** V2AO, 7X2KEM.

21MHz. 0700 AH8AA, JH6SOR/JD1 (Ogasawara). **0900** *EA9JZ,* 3V8DX. **1000** *J28CI,* JAs (until 1200), JD1BAT (Minamitorishima), JW5IJ, VK9NM/LH, *VK9NS.* **1100** J88AM, KL7JAA, ZK1CG. **1200** *J3AVT,* XT2BG, 5T5AY. **1300** *UA0YT,* W6-W7 (until 2030). **1500** VK9XT. **1600** *M1C, VK9XM.* **1700** KN2M/J6L, *VK9YM,* YB5AEU. **1800** EP2TY, KH6CF, ZD9BV, 4K1A, 5N0KUY, 6E5MX. **1900** 3X1Z. **2000** KP2A/KP1, *ZD8JGN.* **2100** VP8ANT. **2200** *VP2MIX.* **2300** CE0AE, VQ9CW.

28MHz. 0800 JAs (until 1000). **0900** H44CF, VS5JM, ZLs. **1000** PYs, *VK9YM,* YVs, *XT2AW, 5W1DC.* **1100** CX5RV, JY9RV, KC6JC, RA0LBB, UA4WBJ/U9G, VKs, *VK9XM.* **1200** AP2P, VK, *VK9YC, 3X1Z. 5H3BH, 5Z4CS.* **1300** VK9NYG. **1400** WB8LDH/J3, KP2A/KP1, VK9XT, XZ9A, 5H3DM. **1500** *FY0FOL,* HC1BO, *W6QL/PJ2.* **1600** *FR0GGL, 9L1SL,* KP2A/6Y5. **1700** A4XJQ, VP8LP, W6-W7 (until 2130). **1800** *KH6s CF, DRT, K9LA/V2A,* VP2ELP, YS1TG. **2000** ZD8JGN. **2100** ZL1DH (over South Pole).

Once again, thanks to the authors of the following for items extracted: *DX News Sheet* **(Geoff Watts)**, the *Ex-G Radio Club Bulletin* **(W3HQO)**, *Long Skip* **(VE3EUP)**, *DX'press* **(PA0GAM)**, *CQ Magazine* **(W1WY)**, *DXNL* **(DL3RK)**, the *Lynx DX Bulletin* **(EA1QF/EA2JG)**, the *DX Bulletin* **(K1IN)**, and the *Long Island DX Bulletin* **(W4UL/W2IYX)**.

Items for **July** issue to reach G3FKM no later than **26 May** please, and for **August** by **24 June**. □

BOOK REVIEWS

Amateur Radio Equipment Index by Colin Weston, GM3VAP. First edition, 1982. Published by the author (as "Amber Documentation Centre"). Eighteen duplicated, typewritten A4 pages in paper cover. £2 post free from 14 Abbotshall Place, Cults, Aberdeen AB1 9JB.

This is a straightforward index to about 200 articles published between 1970 and 1979 about factory-built or ex-Service receivers, transmitters and transceivers, compiled by an amateur who is a chartered librarian. Virtually all the references are to either *Rad Com* or *SWM,* with just a very few from a variety of other British publications. The articles are mostly equipment reviews or modification-type articles, though some are merely "new product" notices.

Such an index is clearly useful, but it must be noted that it covers only a single decade and only British publications. If you have access to a library to find these articles the chances are that it will also contain past issues of at least some of the American amateur journals such as *QST, Ham Radio, CQ* or *73.* A second edition covering 500 entries extending back to 1940 is promised (but still presumably British publications only). One also notes the absence of any cross-indexing between, for example, the Sommerkamp FT101 and the Yaesu Musen FT101 and little or no guidance is given on the scope of the original articles, which could mean spending a lot of time and effort tracking one down only to discover that it may not meet your requirement.

Beginner's Guide to Electronics revised by Owen Bishop. Fourth edition, 1981. Published by Newnes Technical Books. 240+viii pages (184 by 120mm). £3.60 (limp covers).

This edition "by" Owen Bishop seems to have confused even the publishers, who continue to list the authors as Squires and Deason. The original edition, in 1964, was indisputably written by T. L. Squires, and a substantial amount of this material still appears in a book that hopefully sets out to cover the whole gamut of electronics, from industrial applications, computers and microwave ovens to colour television and recording—with the more recent developments squeezed confusingly among now 20-year-old basic material. For example, computer memories jump from obsolete forms of drum stores to bubble memories (that may or may not become established in the future) with little about current practice.

Then again, should one still, in 1982, be told chauvinistically that "the idea of radar was first thought of in the 1930s by a group of British scientists"? The major British contribution, the cavity magnetron, is described but I find no mention of the klystron, either in its low or high-power forms. A whole page is devoted to the tunnel diode; it is suggested that modern colour television cameras now use a single vidicon pick-up tube (a system developed for space exploration not yet for broadcasting) etc. Nevertheless some sections are reasonably reliable, clearly illustrated and well presented.

This book is indeed a parson's egg, good in parts, but hardly to be recommended as an introduction to modern electronics for a class of readers who cannot be expected to distinguish the good from the bad.

Amateur Radio Equipment Fundamentals by Albert D. Helfrick, K2BLA. First edition, 1982. Published by Prentice/Hall International. 284+xiv pages (235 by 155mm), hard covers £14.20.

There is much to be said in praise of this new book about amateur equipment (*note* not covering antenna systems) once you get over the shock of the current high cost of new casebound technical books. It sets out in nine well-illustrated chapters a great deal of sound and thoroughly practical information (admittedly in the American style and idiom) about up-to-date designs and trends. Although the author accepts that many newcomers today seek information primarily about the why and how and which of factory-built equipment, and what to look for when choosing a factory-made rig, he does not subscribe to the "not-to-be-opened" black-box syndrome. Almost half of the book is devoted to rtty, sstv, "fast-scan tv", modernizing and restoring older equipment, hints on home-construction and nine constructional projects: d-c receiver; vfo; simple superhet; two-band solidstate transmitter giving about 20W output with 28V supply; crystal calibrator; 100W 3·5 and 7MHz linear amplifier using two S50-12 CTC rf power transistors; 21/28MHz cascode-fet preamplifier; and simple rtty terminal unit. This is neither a mathematical nor a designer's handbook but equally it is not *only* newcomers who will find the explanations provide a useful, up-dating insight into current hf and vhf equipment trends—but it is at a price that might make it a club library book first and foremost.

Contents: 1, *High-frequency receiver fundamentals* (48pp); 2, *high-frequency transmitter and transceiver fundamentals* (48pp); 3, *vhf and uhf transceiver fundamentals* (27pp); 4, *specialized forms of communications* (32pp); 5, *selecting a transmitter, receiver or transceiver* (17pp); 6, *modernizing and restoring older equipment* (17pp); 7, *home-construction of amateur radio equipment* (28pp); 8, *construction projects—transmitters and receivers* (37pp); 9, *construction projects—accessories* (23pp); *index* (4pp).

G3VA

OBITUARIES

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

Mr N. A. Carter, G3IQD

Norman Carter died on 5 February, aged 61. He had been treasurer and an active member of the Horndean ARC. He helped both newcomers to the hobby and its charities, in particular the RAIBC.

Mr T. N. Carter, G3BPV

Nick Carter died on 3 March. He had been a professional radio operator all his life, first as radio officer in the Merchant Navy, including war service, and then in coast radio stations. For a long time he was officer in charge of Portishead Radio, the British Telecom long-range maritime coast station. More recently he had played a prominent part in the UK efforts towards the establishment of the International Maritime Satellite Service. As an amateur he had been very active in the hf bands ever since coming ashore from the Merchant Navy, and more recently had been lecturing to an RAE class at Burgess Hill.

Mr E. R. Frarey, BEM, G3DMK

Bob Frarey died on 21 November 1981. He had been licensed for many years, and was involved with both RAIBC and RAOTA. He was well known on 144MHz in the north-east of England.

Mr A. Glassford, GW3ACF

Alan Glassford died on 19 March. He was RSGB area representative for Port Talbot, and a founder member of Port Talbot ARS. He helped many to obtain their amateur radio licences.

Mr D. T. Grafham, G3MKG

Don Grafham died on 22 January. He was a very active member of the Farnborough & DRS, an excellent cw operator, and a member of the society's winning NFD station, G3RRA/P. He had spent most of his working life in the RAF and at the time of his death he was working for British Airways.

Mr C. Hindle, G8JA

Clarence Hindle died on 18 February. He was a member of ELARC and RSGB, and was an ex-marine radio operator. He was very keen on cw operation.

Mr L. Spencer, G3TVB/VQ2LS

Len Spencer died on 13 February, aged 73. He was always an active member, having joined the Society in the 'fifties, while in N Rhodesia. He operated on hf and vhf and was well-known in many nets in south Devon.

Also:

Mr C. Davie, G3AMX, in January;
Mr H. J. Hurst, G3AKW, on 27 June 1981;
Mr M. D. Martin, RS24686; and
Mr E. G. Salter, RS40255.

CONTEST NEWS

21/28MHz Telephony Contest 1982 rules

TRANSMITTING SECTION

The general rules for RSGB hf contests, published in the January 1982 issue of *Radio Communication*, will apply.

1. **Eligible entrants.** British Isles: RSGB members only. Rest of the world: All licensed amateurs.
2. **Period.** 0700gmt to 1900gmt, 10 October 1982.
3. **Sections.** (i) Single operator; (ii) Multi-operator, multi-band only.
4. **Bands.** 21MHz and 28MHz only.
5. **Exchange.** RS plus serial number starting at 001.
6. **Scoring.**
   (a) British Isles stations for a contact with a station in the rest of the world will score three points. The RSGB Countries List will apply with VE, VK, W/K/N/A, ZL and ZS call areas counting as countries for this purpose.
   (b) Stations in the rest of the world for a contact with a station in the British Isles will score three points.

British Isles stations may not work each other for points or multipliers and stations in the rest of the world must only contact stations in the British Isles. **Duplicates:** any unmarked duplicates will be penalized at *10 times* the points claimed, and any log found to include more than *five* unmarked duplicate contacts for which points are being claimed will be automatically disqualified.

7. **Multipliers.** The total number of countries contacted on 21MHz added to the total number of countries contacted on 28MHz, then multiplied by the total of points scored on the two bands.

Multipliers for the rest of the world will be the total number of different G prefixes worked on 21MHz added to the number of different G prefixes worked on 28MHz, then multiplied by the total of points scored on the two bands.

British Isles prefixes are: G2, G3, G4, G5, G6, G8, GD2, GD3, GD4, GD5, GD6, GD8, GI2, GI3, GI4, GI5, GI6, GI8, GJ2, GJ3, GJ4, GJ5, GJ6, GJ8, GM2, GM3, GM4, GM5, GM6, GM8, GU2, GU3, GU4, GU5, GU6, GU8, GW2, GW3, GW4, GW5, GW6, GW8. Contacts with GB stations do not count for points or multipliers.

8. **Logs.** Log sheets to be headed: date/time gmt; station worked; RS and serial number sent; RS and serial number received; multiplier; points claimed. Separate logs are required for each band. Summary sheet showing multipliers worked on each band must be submitted.
9. **Declaration.** Each log must be accompanied by the following declaration: "I declare that my station was operated in accordance with the rules of the contest and in accordance with the requirements of my amateur licence." The declaration must be signed and dated.
10. **Address for logs.** RSGB HF Contests Committee, c/o Dr. E. J. Allaway, G3FKM, 10 Knightlow Road, Birmingham B17 8QB, England.
11. **Closing date for logs.** British Isles entrants should ensure their entry is received by 10 November 1982. Overseas entrants should submit their entries to arrive not later than 1 December 1982.
12. **Awards.** The Whitworth Trophy will be awarded to the leading British Isles entrant and the Powditch Trophy will be awarded to the leading British Isles entrant on 28MHz. Certificates will be awarded to those placed second and third overall. Certificates will be awarded to the leading station in each continent.

RECEIVING SECTION

Attention is drawn to the change in the note regarding the maximum number of times a station is logged. Rules as transmitting section except as below:

1. The general rules for RSGB hf receiving contests, published in the January 1982 issue of *Radio Communication*, will apply.
2. **Eligible entrants.** British Isles: RSGB members only. Rest of the world: All swls.
3. **Scoring.** British Isles swls should only log overseas stations in contact with British Isles stations participating in the transmitting section of the contest.

SWLs in the rest of the world should only log British Isles stations in contact with overseas stations taking part in the transmitting section of the contest.

Points scored by swls will be as in the transmitting section.

4. **Multipliers.** As transmitting section.
5. **Logs.** Log sheets to be headed: date/time gmt; callsign of station heard; callsign of station being worked; bonus points; QSO points.

A summary sheet showing multipliers heard on each band must be submitted.

Note: In the column headed "station being worked", the same callsign may only appear **once** in every **five** contacts logged **except** when the logged station is a new multiplier for the receiving station.

6. **Declaration.** Each log must be accompanied by the following declaration: "I declare that this station was operated within the rules of the contest and I do not hold a transmitting licence in any country of the world".
7. **Address for logs.** As transmitting section.
8. **Closing date for entries.** As transmitting section.
9. **Awards.** The Metcalfe Trophy will be awarded to the leading British Isles entrant. The Powditch Receiving Trophy will be awarded to the leading British Isles entrant on 28MHz. Certificates will be awarded to those placed second and third overall and to the leaders in each continent.

Summer 1·8MHz Contest 1982 rules

1. **Aim of contest.** To encourage the use of the 1·8MHz band.
2. **Eligible entrants.** Single or multi-operator. British Isles entrants must also be members of the RSGB.
3. **Period.** 2100gmt Saturday 26 June to 0100gmt Sunday 27 June 1982.
4. **Sections.** (a) British Isles stations; (b) Overseas stations (including EI).
5. **Frequencies/mode.** 1·8-2·0MHz cw only.
6. **Contest call and exchange.** CQ test, RST plus serial number starting at 001. British Isles stations must also give their county code as published in the January 1982 issue of *Radio Communication*.
7. **Scoring.** (a) British Isles section. Three points for each contact, with a bonus of five points for the first contact with each new British Isles county/region and the first contact with each new country outside the British Isles. (b) Overseas section. Three points for each contact with a station in the British Isles (not EI), with a bonus of five points for the first contact with each new county/region.
8. **Logs.** Log sheets to be headed: date/gmt; callsign; RST/number sent; RST/number received; code received; bonus; points.
9. **Declaration.** Each entry must be accompanied by the following declaration, signed and dated: "I declare that this station was operated strictly in accordance with the rules and spirit of the contest, and agree that the decision of the Council of the RSGB shall be final in all cases of dispute."
10. **Address for logs.** RSGB HF Contests Committee, c/o E. C. Hodson, G3XTJ, 20 Spencer Avenue, Palmers Green, London N13 4TR.
11. **Closing date for logs.** Logs must be postmarked not later than Monday 12 July 1982.
12. **Awards.** (a) Certificates of merit will be sent to the first three stations in each section and to the leading entrant from each overseas country. (b) A certificate of merit will be awarded to the highest placed entry from a station which has not entered the Summer 1·8MHz Contest before. Candidates for this award should mark their entries "First-time entrant". (c) A certificate of merit will be awarded to the highest placed entrant in the British Isles section who has reached pensionable age on or before 26 June 1982. Candidates for this award should mark their entries "Senior Citizens' Award".

21MHz CW Contest 1982 rules

1. The general rules for RSGB hf contests, published in January 1982 issue of *Radio Communication*, will apply.
2. **When.** 0700gmt to 1900gmt, Sunday 17 October 1982.
3. **Eligible entrants.** Single-operator stations only in the following sections:
   (a) British Isles section. RSGB members resident in the British Isles.
   (b) QRP British Isles section. RSGB members resident in the British Isles using less than 10W input.

Contests calendar

1-2 May	432/1,296/2,304MHz *(Rules in April issue)*
8, 16, 24 May, 1, 8 June	BATC Summer Cumulative *(Rules in April issue)*
8 May	World Telecommunications Day (Phone) *(Rules in May MOTA)*
8-9 May	CQ-M *(Rules in April MOTA)*
9 May	Port Talbot ARC HF *(Rules in April MOTA)*
9 May	DF Mid-Thames *(Rules in April issue)*
15 May	World Telecommunications Day (CW) *(Rules in May MOTA)*
16 May	10GHz Cumulative 1982
16 May	Region Round-up
16 May	LF Phone (WAB) (Rules for all WAB contests obtainable from D. Roberts, G4FQO, 12 Chestnut Ave, Cranwell, Nr Sleaford, Lincs NG34 8HT)
22-23 May	144MHz *(Rules in April issue)*
23 May	DF Rugby *(Rules in May issue)*
29-30 May	CQ WW WPX (CW) *(Rules in May MOTA)*
29-30 May	Ibero-American *(Rules in May MOTA)*
4-6 June	IV Guide Dogs *(Rules in May MOTA)*
5-6 June	NFD *(Rules in February issue)*
13 June	70MHz & SWL *(Rules in May issue)*
19-20 June	All Asian (Phone) *(Rules in May MOTA)*
20 June	10GHz Cumulative 1982
20 June	DF Dartford Heath
26 June	AGCW-DL VHF/UHF CW *(Rules in March 4-2-70)*
26-27 June	1·8MHz (Summer) *(Rules in May issue)*
27 June	VHF 2m/70cm Phone (WAB) *(See note after 16 May LF Phone)*
3-4 July	VHF NFD *(Rules in April issue)*
11 July	DF Coventry
11 July	10GHz Cumulative 1982
18 July	3·5MHz Field Day
25 July	DF South Manchester
1 August	432MHz Low Power
8 August	DF Salisbury
8 August	10GHz Cumulative 1982
15 August	70MHz Trophy & SWL
22 August	DF Slade
28-29 August	All Asian (CW) *(Rules in May MOTA)*
29 August	ROPOCO 2
4-5 September	144MHz & SWL
4-5 September	IARU 144MHz
4-5 September	SSB FD
19 September	10GHz Cumulative 1982
19 September	DF National Final, Colchester/Chelmsford
25 September	AGCW-DL VHF/UHF CW *(Rules in March 4-2-70)*
2-3 October	IARU VHF
10 October	21/28MHz Phone *(Rules in May issue)*
17 October	21MHz CW *(Rules in May issue)*
October/ December	432MHz Cumulatives
October/ December	1,296MHz Cumulatives
6-7 November	144MHz CW
6-7 November	Marconi Memorial CW
7 November	LF CW (WAB) *(See note after 16 May LF Phone)*
13-14 November	1·8MHz (2nd)
5 December	144MHz Fixed

(c) Overseas section. Licensed amateurs in all parts of the world except British Isles.

(d) QRP Overseas section. Licensed amateurs in all parts of the world except British Isles using less than 10W input.

4. Contacts between stations in the British Isles are not allowed. A cw contact shall consist of the RST report plus a progressive QSO number starting with 001.

5. Scoring: British Isles stations. Each completed contact shall score three points. The final score is the number of countries worked multiplied by the total number of points. For the purpose of scoring, the RSGB Countries List will apply with the exception that VE, VK, A/W/K/N, ZL and ZS call areas will count as separate countries. **Note:** different USA prefixes for the same district may not be counted more than once, eg W1, WA1, K1, N1, etc is a single call area for the purpose of scoring.

6. Scoring: Overseas section. Each completed contact with a British Isles station will score three points. The final score is the number of British Isles prefixes multiplied by the total number of points. British Isles prefixes are G2, G3, G4, G5, G6, G8, GD2, GD3, GD4, GD5, GD6, GD8, GI2, GI3, GI4, GI5, GI6, GI8, GJ2, GJ3, GJ4, GJ5, GJ6, GJ8, GM2, GM3, GM4, GM5, GM6, GM8, GU2, GU3, GU4, GU5, GU6, GU8, GW2, GW3, GW4, GW5, GW6, GW8. Contacts with GB stations do not score points or count as multipliers.

7. Duplicate contacts. Unmarked duplicate contacts for which points have been claimed will be penalized at *10 times* the claimed points. Entries containing more than *five* such duplicates will be automatically disqualified.

8. Entries should be addressed to Mr J. Bazley, G3HCT, Brooklands, Ullenhall, Solihull, Warwickshire B95 5NW, England. Entries must arrive no later than 31 December 1982 from overseas entrants, who are advised to submit their entries by air mail. British Isles entrants should ensure their entry is received by 22 November 1982.

9. Logs should be submitted on standard RSGB log sheets or A4 paper with a completed declaration cover sheet indicating antenna equipment and power used and *must include a separate list of countries worked as specified in rule 5 above.*

10. Awards. Certificates will be awarded to those placed first, second and third in the British Isles sections, and to the leaders in each continent in the Overseas sections.

70MHz & SWL Contest rules

0900-1600gmt 13 June 1982

The following general rules, published in the January 1982 issue of *Radio Communication*, will apply: 1,2,3,4e,5a,6a,7a,9,10a,11a,12a,13-26.

All entries and check logs to: VHF Contests Committee, c/o Mrs P. Suckling, G4KGC, 46 Windsor Close, Towcester, Northants NN12 7JB.

DF Qualifying Event Rugby

Date: 23 May 1982
Map: OS Sheet 152,1:50,000 series, Northampton & Milton Keynes
Assembly:1300bst for start at 1320bst
Location: Mid-Summer Meadow, Northampton ngr 763 599

Competitors requiring tea are asked to notify Mr D. Newman, Haynes House, 78 High Street, Whittlebury, Towcester, Northants NN12 8XJ, tel 0327 857 350, not later than 16 May 1982.

1981 Microwave Cumulative Contest

Due to an adjudication error, the G8SHF/P entry to the 24GHz section of this contest was omitted from the final table of results, published in March. He in fact shares the leading position with G4CNV/P (with 30 points). On 24GHz, G8SHF used a GDO33 Gunn oscillator and an 11in dish. His best dx was the 30km QSO with G4CNV/P.

Mobile rallies calendar

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

1-2 May—Spalding & DARS are unable to hold their usual rally because of non-availability of premises. They hope to hold the event as usual in 1983, but extend apologies to everyone who would normally attend the event and has been disappointed.

9 May—Lincoln Hamfest, organized by the Lincoln Short Wave Club, on the Lincolnshire Showground. Details to be announced. Contact J. R. Hunt, G3PVU c/o the club at the City Engineers Club, Central Depot, Waterside South, Lincoln.

16 May—Swindon & DARC Rally, Park School, Marlowe Avenue, Swindon, Wilts. Open 10am. Talk-in on 144MHz (S22) and 432MHz (SU8 or on GB3TD if possible). Ample car parking, refreshments, attractions for the whole family. Details from K. A. Saunders, G8SFM, QTHR, tel 06668 307.

23 May—Parkenaur Rally. Details from RR15, J. T. Barnes, GI3USS.

23 May—Barry College of Further Education RS Mobile Rally, Barry Memorial Hall. Open 11am-5pm. Talk-in on S22. Equipment for junk stand will be accepted from 10am. Bar and food available. Details from Peter Truberg, GW4JOG, tel 0222 763015.

23 May—The Northern Mobile Rally, The Great Yorkshire Showground, Harrogate. 10am-6pm. Ample car parks; bar; refreshments. Many attractions for the xyl and junior ops. Facilities for the disabled. Lectures etc. Further details from G8KRU, 14 Fieldhead Road, Guiseley, Leeds LS20 8DT. **Please note change of venue.**

30 May—Hull & DARS Mobile Rally, Hull University, Cottingham Road, Hull. Open 12am to 4pm. Details from H. Cunliffe, G6DUL, 142 Hall Road, Hull HU8 8SB, tel 0482 447355.

30 May—Plymouth RC Mobile Rally, School Hall, Tamar Secondary School, Paradise Road, Millbridge, Plymouth, Devon. Details from Julie Butcher, G4HKZ, QTHR, tel 0752 338417.

30 May—East Suffolk Wireless Revival, Sports Ground, Ipswich Area Civil Service Sports Association, Straight Road, Ipswich (adjacent Suffolk Show Ground). Attractions include transceiver clinic, antenna testing range, flea market etc. Further details later. Requests for stand space to George Spencer, G6CRN, 83 Tuddenham Avenue, Ipswich, Suffolk, tel Ipswich (0473) 218285. Other enquiries to Jack Toothill, G4IFF, QTHR, tel Ipswich (0473) 44047.

13 June—Elvaston Castle Mobile Rally, Elvaston Castle Country Park, 5 miles south-east of Derby on the B5010. Organized by the Nunsfield House ARC. Opens 10am. Talk-in on 144 and 432MHz. All the usual facilities including full on-site catering facilities. Further details from Ian Cage, G4CTZ, QTHR, tel Derby 71875 or 799452. Trade enquiries to Mr R. Woolley, G4HIJ, QTHR, tel Ashbourne 43241.

13 June—RNARS Mobile Rally, HMS Mercury. Open 10am to 5.30pm. All usual trade stands, and arena events. Talk-in on S22, 432MHz, and 3,660kHz after 0830. Raffle and picnic facilities. Details from A. G. Walker, G4DIU, 103 Torrington Road, North End, Portsmouth PO2 0TN.

20 June—Denby Dale & DARS Mobile Rally, Shelley High School, Skelmansthorpe, Nr Huddersfield. Open 11am. Talk-in on S22 and SU8. Details from J. Clegg, G3FQH, QTHR.

27 June—Longleat Mobile Rally. This will be the City of Bristol RSGB group's 25th event. Entertainment by The Bristol Unicorns Youth Band. There will be a mast erection contest, involving teams of four entrants, the winners of which will be awarded the "Longleat Trophy" presented by Lord Christopher Thynne. It is hoped that the President of the RSGB will attend. Preliminary enquiries for trade stands to, and further information from, B. L. Goddard, G4FRG, tel 0272 848140.

27 June—Rolls Royce ARC Mobile Rally, Rolls Royce Sports & Social Club, Barnoldswick (six miles south of Skipton, 12 miles north of Burnley, access from A59 and A56). Open 11am-6pm. All usual facilities—trade stands, refreshments, talk-in etc. Details and applications for booking forms etc from L. Logan, G4ILG, c/o 19 Fenton Avenue, Barnoldswick, Colne, Lancs BB8 6HB, tel Barnoldswick 812288.

11 July—Worcester & DARC Annual Mobile Rally, the High School, Ombersley Road, Droitwich. Talk-in on vhf and uhf. Attractions will include "strawberry fields", fancy dress competition, model aircraft and static displays by local organizations. Details from rally manager Tony Blissett, G8NSL, 26 Cherry Orchard, Holt Heath, Worcester, tel Worcester 620507.

18 July—Pembroke & DARC "Bucket & Spade Party". The Regency Hall, Saundersfoot. Open 11am. Talk-in on 144 and 432MHz. Details from GW3XJQ, tel 09945 267.

18 July—Sussex Mobile Rally, Brighton Raceground. Open 10.30am-5pm. Special event station GB2SMR will be in operation. Many attractions including free minibus trips to Brighton beach. Free parking. Bring the family for a day by the sea. Details from G3VBE, QTHR.

18 July—Cornish Rally, Technical College, Camborne, Cornwall. Details from Andy French, G8TUJ, 12 Pentalk Road, Camborne, tel 0209 717343.

19 July—Sussex Mobile Rally, Brighton Raceground, Racehill, Brighton, Sussex. Open at 1030h. Special event station, GB2SMR, will be operating talk-in on S22 and 432MHz. All the popular attractions, including mini bus rides to the beach. Free on-site car parking for 4,000 cars. Further details available from G. Miles, G3VBE, 65 Montgomery Road, Hove, Sussex, tel Brighton 778546.

25 July—Anglian Mobile Rally, Stanway School, Colchester, Essex. Open 10am-5pm. Talk-in on 144MHz. Further details from G3YAJ, tel 0206-39 3938.

25 July—Scarborough ARS Mobile Rally, The Spa Ocean Room, on the sea front. Open 10.45am. Talk-in on S22 and GB3NY (RB0). Usual attractions including bring-&-buy, plus 50th anniversary events. Help given to RAIBC members by prior arrangement. Further information from G4JAQ, QTHR, tel 0723 862638.

1 August—RSGB National Mobile Rally, Woburn.

8 August—25th Annual Derby Mobile Rally. Lower Bemrose School, off Derby Ring Road, just follow signs. Talk-in on 144MHz fm. Open 11am-5pm. Free spot prizes, free admission, parking. Many new attractions, plus all the old favourites. Details from Mike Darn, 22 Reservoir Road, Brockwell, Chesterfield S40 4HF, tel 0246 202690.

15 August—Preston Mobile Rally. Details to follow.

29 August—BARTG Rally, Sandown Racecourse, nr London. Details from sec Edward Batts, G8LWY, 27 Cranmer Court, Richmond Road, Kingston-upon-Thames, Surrey.

29 August—Torbay Mobile Rally. ITT Social Centre, Old Brixham Road, Paignton. Talk-in on S22 from 1000h. Ample free parking. Trade stands and used equipment stall, draws. RSGB book stand. Hot meals and bar facilities. Details from G4DZH or G2CWR. Trade stand footage applications from G4DZH, tel 0803 523063.

12 September—Fifth Telford Mobile Rally, Telford, Shropshire. Extended layout, about 40,000 sq ft. Varied attractions. Full catering and licensed premises on site. Over 60 stands. Free entrance and parking. Further details from G8DIR, tel Shrewsbury 64273; G8UGL, tel Telford 584173; or G3UKV, tel Telford 55416; all QTHR.

12 September—Vange ARS Mobile Rally, Nicholas School, Basildon, Essex. 10am-5pm. Talk-in on S22 with callsign GB4VMR. Many attractions including trade stands, bring and buy, raffle, door prize and refreshments. Details from Albert Smith, G4FMK, QTHR, tel 0268 683805.

19 September—Peterborough R&ES Mobile Rally, the Wirrina Sports Stadium, Bishops Road, Peterborough. Situated on the river embankment with plenty of car parking space. Open 10.30am till 5pm. Details from D. T. Wilson, G4KSW, 4 Conway Avenue, Peterborough, tel Peterborough 76238.

26 September—Harlow Mobile Rally, Harlow Sportcentre, Hammarskjold Way, Harlow, Essex. Bar, restaurant, parking, bring & buy, trade stands. 11am to 5pm. Details from Phil, G8FRG, QTHR.

Special event stations

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

GB4XRN, 1-31 May

Operating from local Scout HQ, Prestwood, Bucks, by ex-RN personnel—G4KGT (RNARS 1364), and G4IWC (RNARS 1340). May is the last month of the RNARS 21st Anniversary Year and the last opportunity to gain contacts for their Anniversary award. The station hopes to be operational on all hf bands and 144MHz, mainly on RNARS frequencies.

GB2RRM, 19 June

A station will be operated at the annual children's field day, in the Rolls-Royce Motors Social Club grounds, by licensed members of the company. Planned operation is on 3·5 to 28MHz and 144MHz. A special QSL card will be available and sent via the bureau; direct QSLs should enclose sae/ircs. Further details and direct QSLs from Dr Bryan Roe, G4LVR, QTHR.

GB8RB, June/July

Hornsea ARC will be operating a special event station on all bands for 14 days following the birth of the Prince and Princess of Wales' baby. A QSL card has been designed for the occasion. Details from Geoff Southwell, G4EKT.

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 July 1982 issue.

RSGB affiliated organizations are requested to report all programmes and news items to their regional representatives regularly. Information for inclusion in the **July** issue should reach them by **14 May**, and for the **August** issue by **12 June**.

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 (North Western Repeater Group)—20 May, 8pm. Globe Bowling Club, Willows Lane, Accrington. Sec H. A. Aspinall, G3RXH.

Ainsdale (AARC)—11, 25 May. Ainsdale Scout HQ. Sec Norman Horrocks, G2CUZ, tel 0704 77604.

Barnoldswick (Rolls-Royce ARC)—The club issues an open invitation to its annual "fox hunt" starting at 7.30pm on 5 May. The "fox" will be within a five-mile radius of Barnoldswick. Competitors will return to the Rolls Royce Sports Club for supper and presentation of prizes. Contact sec Leslie Logan, G4ILG, for further details, tel Barnoldswick 812288.

Blackburn (East Lancs ARC)—4 May (Subject to be announced, 1 June (DF contest), 7.30pm. The Shadsworth Leisure Centre, Blackburn. Pro Norman Jenkin, G4CGT, tel 0254 75037.

Blackpool (B & Fylde ARS)—4 May, 1 June. For venue and programme contact Jim Newland, G5ND, tel 0253 75037.

Bury (BRS)—11 May ("Contests", by J. D. Clifford, G4BVE), 4, 18, 25 May (informal meetings for members to participate in construction projects; station operation G3BRS and G6BRS; improve their morse proficiency, or just relax for a natter), 7.30pm. Mosses Community Centre, Cecil Street, Bury. Pro David Hensby, G8TKD, tel (daytime) Whitworth 2213.

Liverpool (L&DARS)—4 May ("RTTY and the micro", by W. G. Marsden, G8TIW), 11 May (Project night), 18 May ("Aerial circus"—video presentation), 25 May (HF NFD preparation), 8pm. The Conservative Rooms, Church Road, Wavertree. Sec Eric Grossmith, G3WOH, tel 051-426 3701.

Manchester (South Manchester RC)—7 May (Meat pie supper, an informal social evening), 14 May (Night df contest), 21 May (AGM), 28 May (Activity night), 4 June ("Biotechnology", by Joe Lenartowicz, G8RQZ), 8pm. Sale Moor Community Centre, Norris Road, Sale. Informal meetings in the club shack, same QTH, Mondays, 8pm. Sec David Holland, G3WFT, tel 061-973 1837.

Preston (PARS)—13 May (Subject to be announced), 27 May (HF NFD arrangements). St Mary Magdalene Church Hall, Farringdon Lane, Ribbleton, Preston. Sec George Earnshaw, G3ZXC.

St Helens (StH&DARC)—6 May (First 2m df foxhunt of the season), 13 May (Speaker to be arranged), 20 May (Video tape lecture), 27 May (VHF night on the air), 7.45pm. Conservative Rooms, Boundary Road, St Helens. Sec Paul Gaskell, G4MWO (QTHR as G8PQD), tel St Helens 25472.

Thornton Cleveleys (TCARS)—Sec Mrs Jen Ward, G8YOK, reports that the club now has a larger meeting room and extra accommodation where the club station, G4ATH, is to be installed using an FT101E and antenna donated by the widow of G4LEW. 7 May (Talk on dental equipment by Mr N. Watson), 14 May (The direct-conversion receiver described by Harry Gregory, G3GIY), 21 May (Demonstration of the new club station), 28 May (Talk by Eric Salisbury, G3AVT—subject to be announced), 8pm. Thornton Cleveleys Sports Centre, Victoria Road, Cleveleys. Tel sec Jen on Poulton-le-Fylde 890114.

Warrington (UKFM Group Western)—6 May, 3 June, 8pm. Grappenhall Community Centre, Bellhouse Lane, Warrington. Sec Gordon Adams, G3LEQ, tel 0565 4040.

Wirral (WARS)—5 May ("Radio-controlled model aircraft", by J. H. Mcleod, GW4KZC), 19 May ("Using the oscilloscope"—a practical demonstration and talk by Alan Smith, G4EFP) 2 June (NFD briefing), 7.45pm. Minto House School, Birkenhead Road, Hoylake. Sec Gordon Lee, G3UJX, tel 051-677 1518.

RR 1 would like to draw attention to the lecture arranged for members in the region which is to be held in Manchester on Friday evening, 28 May. Is your club organizing a group visit? Admission is by ticket, free of charge from the RR on receipt of an sae; see the notice under "QTC".

REGION 2—RR D. S. Smith, G4DAX, Red Roof, Goathland, Whitby, North Yorks YO22 5AN. Tel 094-786 333.

Doncaster (DMIofHEARC)—Details from sec Robert Lane, G8VLQ. Club call, G3UER. Following the club's AGM, subs have been fixed at £10. A 144MHz multimode is being bought, to keep the vhf and hf club stations separate. A full programme is being completed.

Halifax (Northern Heights ARS)—7.45pm. Bradshaw Tavern, Bradshaw, Nr Halifax. Sec G4CMK. The club project (a 144MHz receiver) prototype has been built, and a companion transmitter is under consideration. Raynet/React(CB) co-operation was discussed in their newsletter.

Halifax (H&DARS)—First and third Thursdays in each month, 3 June (Home Office—the inner workings), 7.30pm. Claremount Liberal Club, Claremount Road, Halifax. Sec G4LEC, tel 0422 33080.

Leconfield (Army School of Mechanical Transport ASMT/RCTARS)—A new club. Tuesdays and most lunchtimes. Signals Division, Normandy Barracks, Leconfield. CW classes, 1900h Fridays. Contact club sec Dick Atterbury, G6ESO, address as above, for up-to-date information.

Leeds (White Rose RS)—8pm. Moortown Rugby Football Club, Moss Valley, Alwoodly, Leeds 17. Sec G8UYZ. Club net 8pm, Thursdays on 3·7750MHz or 21·350, depending on propagation. The White Rose Rally, probably the biggest rally in the region, went with a swing again this year. Opinion seems to be that the venue is a great improvement and the rally was enjoyed by all who went. The only black spot in the day for RR2 was to have to realize that there are people associated with this hobby who get their kicks by jamming the talk-in station.

Pontefract (P&DARS)—13 May (Visit to Emley Moor), 27 May (Making printed circuit boards", by G3HCX and G4DTO), 8pm. Carlton Community Centre. Details from G4ISU, tel 0977 72784. The component fair, the region's first "event" of the year, was a great success, sec Niell says that a larger venue may be considered next year. The death of committee member Brian Hicks, G8BVH, was a great shock to all who knew him, the club and amateur radio in general has lost an enthusiastic worker.

Wakefield (W&DARS)—4 May (On the air/natter night), 18 May (Junk sale), 1 June (Foxhunt on 144MHz), 8pm. Holmfield House, Denby Dale Road, Wakefield. Sec G4BLT, tel Wakefield 255515.

York (YARS)—Fridays except the third in each month, 7.30pm. United Services Club, Micklegate, York. Sec Keith Cass, G3WVO. Feelings are still running high in York about the "HO fiasco". G3KWT recently gave a talk on Raynet.

Sometimes an RR hears nothing from the region for weeks, and the only conclusion one can draw is that everyone is happy. However, just let something go wrong, for example, the recent HO errors, and an effect akin to the start of World War Three is produced. RR2 got 47 phone calls in two days (and he did not start counting at first) at his QTH. The representation system is of course designed to take the heat off HQ, so perhaps it works. The concept of legislating by an entry in obscure periodicals in 1982 drew considerable comment, however, and many members in the region wondered if a more up-to-date system could be produced.

REGION 3—Acting RR H. S. Pinchin, G3VPE, 61 Cole Bank Road, Hall Green, Birmingham B28 8EZ. Tel 021-777 1320.

Birmingham (Midland ARS)—18 May (Demonstration of equipment by Amateur Electronics UK Ltd), 7.30pm. 294a Broad Street, Birmingham B1 2DS. Sec G8BHE, tel 021-422 9787.

Birmingham (South Birmingham RS)—Thursdays (HF night on the air), Fridays (Construction and morse classes), 7.30pm. 2 June, 7.45pm. Hampstead House, Fairfax Road, West Heath, Birmingham B31 3QY. Sec G8RGQ, tel 021-459 8312.

Bromsgrove (B&DARC)—14 May ("Aerials", by David Yates, G3PGQ), 28 May (QRP meeting), 8pm. Avoncroft Art Centre, Bromsgrove. Club net Wednesdays, 144·850MHz, 8pm. Sec G4LVK, tel 021-445 2088.

Burton-on-Trent (B on T&DARS)—12 May (Surplus sale), 19, 26 May, 2, 9 June, 8pm. Stapenhill Institute, Main Street, Stapenhill, Burton-on-Trent. Sec G3ACR, tel Burton (0283) 43118.

Coventry (CARS)—14 May (DF contest—160m), 21 May (Night on the air), 28 May (Quiz), 4 June, 8pm. Baden Powell House, 121 St Nicholas Street, Radford, Coventry. Sec G4HRY, tel Coventry (0203) 618648.

Hereford (HARS)—7 May ("Aerial circus"—video tape by Dud Charman, G6CJ), 21 May (NFD arrangements), 4 June, 5-6 June (NFD), 8pm. Civil Defence HQ, Gaol Street, Hereford. Sec G4CNY, tel Hereford (0432) 3237.

Malvern Hills (MHRAC)—11 May ("Matching circuits and swr", by Dave Yates, G3PGQ), 7.30pm. The Red Lion Inn, St Ann's Road, Great Malvern. Sec G4GFX, 9 Wyche Road, Malvern, tel Malvern (06845) 62900.

Redditch (RRC)—13 May (Natter night), 27 May (Surplus sale), 8pm. WRVS Centre, Ludlow Road, Redditch. Sec G3EVT, tel Alcester (0789) 762041.

Seen at the White Rose Rally 1982. Left: at the hf demonstration station manned by Mike Parker, G4IUF, of Harrogate, are (l to r) swl Ian Frazer of Baildon; Joe McLoughlin, G3NNR, and his wife Mavis, G8XZT, of St Helens; Steve Symonds of Baildon, and Pete Connors, G8LEF, of Huddersfield. Right: on the BYLARA stand are Mary Adams, G4GAJ, BYLARA president, of Cheltenham (1); Len Garrett, G3XAH, a visitor from Manchester; and Diana Hughes, G4EZI, BYLARA secretary, of Leeds. *Photos:* G4HSZ

Shrewsbury (Salop ARS)—13 May (Construction competition), 20 May (Natter night), 26 May (Surplus sale at White Horse Inn, Wenlock Road), 27 May (Natter night), 3 June ("Top band df", by Robert Vickers, G3ORI), 10 June (Natter night), 8pm. Albert Hotel, Smithfield Road, Shrewsbury. Sec G6AKE, tel Shrewsbury (0743) 66969.
Solihull (SARS)—18 May, 7.30pm. The Manor House, High Street, Solihull. Club nets (G3GEI), Fridays, 9.30pm on 1,960kHz and (G8ZLJ), Sundays, 9pm on S19 or next lowest vacant channel. Morse classes available. Sec G4JDL.
Stratford-upon-Avon (S-upon-A&DARC)—10 May ("Chassis bashing my way", by J. G. Harris, G8HJS), 24 May, 7.30pm. Bearley radio station. Talk-in on S22. Programme sec G6CWK, tel Stratford (0789) 68863.
Sutton Coldfield (SCRS)—10 May (Natter night), 24 May ("Experiences on 10GHz", by Dennis Morris, G3AYJ), 7.30pm. Central Library, Sutton Coldfield. Club net Mondays, except on meeting nights, 145·2MHz, 8pm. Sec G8TUR, tel 021-353 2061.
Worcester (W&DARC)—17 May (Informal evening at the Old Pheasant, New Street, Worcester), 7 June ("The ionosphere and all that", by Dr Alfrey), 8pm. Odd Fellows Club, New Street, Worcester. Sec G8TZE, tel Tewkesbury (0684) 293890.

REGION 5—RR J. S. Allen, G3DOT, 77 Rosslyn Crescent, Luton LU3 2AT. Tel 0582 508515.
Cambridge (C&DARC)—7 May (Talk on crystals, by G8XLE), 14 May (Informal and morse class, transmitter operating), 21 May (Visit to Applied Psychology Unit, details later), 28 May (Informal and morse class, transmitter operating), 7.30pm. Coleridge Community Centre, Radegund Road, Cambridge. Sec G8JKV.
Leighton Buzzard (LLRC)—10 May (Junk sale), 24 May (Ladies night and film show), 7pm. Van Dyke Community College, Room A64. Sec G8GIK.
Luton (Kent Process Controls ARC)—5 May (Film show). KPC Ltd Sports Club, Tenby Drive, Luton. Sec G3DOT, chairman G3TLE.
Nene Valley (NVRC)—This is a new club formed in the Wellingborough area, meetings first and third Wednesdays (Morse classes and lectures), second and fourth Wednesdays (Informal), 8pm. The Royal, Knox Road, Wellingborough.
Peterborough (GPARC)—27 May ("Long distance tv reception", by G8BKG), 7.30pm. Southfields Junior School, Stanground. Sec G8ZVW.
Peterborough (PR&ES)—3 May (Barbeque at the Cruise Club on the banks of the River Nene at 2pm). Sec G4KSW.
St Neots (SN&DARS)—10 May ("The way to 35,000ft", by Martin Apperly, G6FSU), 24 May ("Local tv and radio stations", by Mike Brown, G3UDP). Details from sec G4FOH.
Shefford (S&DARS)—6 May (Morse classes and procedure training), 13 May (Natter night), 20 May (Checking NFD equipment), 27 May (Contest planning). Sec G4DAQ.

REGION 6—RR F. S. G. Rose, G2DRT, 84 Cock Lane, High Wycombe, Bucks HP13 7EA. Tel Penn (049481) 4240.
Aylesbury Vale (AVRS)—18 May (Judging the construction contest). New venue: Stone Village Hall, Stone (two miles out of Aylesbury on the A418). Sec M. J. Marsden, G8BQH, tel 0296 641783.
Harwell (HARS)—18 May ("RTTY", by Mike Stevens, G8CUL, and Bryan Russell, G4CXJ), 22-23 May ("144MHz contest", by G3PIA), 7.30pm. East Wing Room, AERE Social Club. 31 May (Demo station, Harwell Village Feast). Sec Ann Stevens, G8NVI.
Maidenhead (M&DARS)—6 May (Visit to Police HQ, Kidlington, Oxford), 18 May (Preparations for HF NFD), 7.30 for 8pm. The Red Cross Hall, The Crescent, Maidenhead. Sec J. Patrick, G3TWG, tel Bourne End 25275.
Newbury (N&DARS)—8 June (G4FXB demonstration of amateur 625 tv). Details from G4JAL, tel Newbury (0135) 46078.

REGION 7—RR Pat Walker, G8HMG, 12 Brownlow Road, Redhill, Surrey RH1 6AW. Tel Redhill 64035.
Biggin Hill (BHARS)—The club is flourishing. 25 May ("IBA engineering") 8pm. Biggin Hill Memorial Library. Sec Ian Mitchell, G6EMW, tel Biggin Hill 75785.
Croydon (Surrey Radio Contact Club)—First and third Monday in each month, 24 May (Constructional contest), 8pm. TS Terra Nova, 34 The Waldrons, Croydon. Sec Ray Howells, G4FFY.
Guildford (G & DRS)—Second and fourth Friday in each month, 28 May ("Aircraft black boxes", by Phil Smith), 8pm. Model Engineers HQ, Stoke Park, Guildford. Sec Helen Davies, G8SXB, tel Aldershot 20384.
Guildford (GRG)—The group maintains the uhf repeater GB3GF. First Thursday in each month. Anchor & Horseshoes, Burpham, Guildford. Sec Dave Surey, G8GIA, tel Woking 22679. A very successful open meeting was held at Burpham Village Hall in March and the group plans social activities during the summer months.
Kingston (K & DARS)—19 May ("Metal bashing", by Don Shepherd), 8pm. "Alfriston", 3 Berrylands Road, Surbiton. Sec Robin Pellatt, G4LJI, tel 01-399 8113.
Redhill (Reigate ATS)—18 May (Louis Varney, G5RV, talks on "Aerials from 1927 to 1982"), 8pm. Constitutional & Conservative Club, Warwick Road, Redhill. Sec Chris Barnes, G8FEE, 25 Hartswood Avenue, Reigate RH2 8ET.

Would club secretaries please write or phone with details of forthcoming meetings or items of special interest by the date shown at the top of the "Club News" section.

REGION 8—RR K. A. Crouch, G8KEN, 14 Victoria Road, Capel-le-Ferne, Folkestone, Kent CT18 7HB. Tel 0303 55241.
Brighton (B&DRS)—Every second Wednesday, 19 May (Micro night), 7.45pm. 47 Cromwell Road, Hove. Details from Gee, tel Brighton 739841.
Burgess Hill (Mid-Sussex ARS)—6 May ("Forum on amateur matters", by G3YVR), 20 May (Construction contest), 3 June (TBA), 17 June (Windmills evening), 7.30pm. Marle Place, Leylands Road, Burgess Hill. Please note change of contact—it is now Bob Hodge, G4MMI, tel Hurstpierpoint 833559.
Chichester (C&DARC)—3 May (Club meeting), 17 May (Rod, G3YHM, will give a demonstration on club project and mods to save), 7.30pm. Spitfire Social Club, Tangmere. Details from G8FCX, tel Littlehampton 5082.
Eastbourne (Southdown ARC)—First Monday in each month, 10 May (British Telecom radio interference officer), 7 June (Open forum and demonstration of equipment), 7.30pm. Chasley Home for Disabled Servicemen, Southcliff, Eastbourne. Information from sec, tel 0323 643463.
Hastings (HERC)—Wednesdays, 19 May (Micro demonstrations), 7.30pm. Details from G8VEA, tel Hastings 216516.
Horsham (HARC)—6 May ("Automatic test equipment", by G4EUG), 1 June (Homebrew evening). Guide HQ, Denne Road, Horsham. Details from A. C. Wadsworth, G3NPF.
Maidstone (MYMCAARC)—Fridays, 28 May (AGM—please attend this meeting so that you can vote for the committee you want. If you do not attend and vote you cannot complain later), 8pm. First and third Fridays are for beginners. Further details from Graham, G4AXD.
Medway (MARTS)—2 May (This is the start of the second session of the jubilee celebrations with GB2MDJ and GB8MDJ on the air, at the Boot Fair, Kingsfrith Playing Fields, Gillingham—fun for all the family!) Please note new sec is Ruby Sivyer, G6DJV, tel Medway 61927, after 6pm.
Tunbridge Wells (West Kent ARS)—Fridays (Formal), 28 May (HF/VHF field days—final arrangements), 11 June ("Measuring ssb output power", Ian Keyser, G3ROO). Adult Education Centre, Monson Road, Tunbridge Wells. Informal meetings on intervening Tuesdays at Drill Hall, Victoria Road, Tunbridge Wells. The club has just purchased a KW TenTec Argosy transceiver. Details from Brian, G4DYF.
Worthing (WARDC)—4 May (Practical use of test equipment), 11 May (Question time), 18 May (How I started in amateur radio), 25 May (Spring auction), 7.30 for 8pm. The Pond Lane Amenity Centre, Worthing. Details from Joyce, tel Worthing 63062.
Thanet (RCT)—7 May (Talk on df hunting), 21 May (Tape talk), 8pm. Birchington Village Centre. Details from Ian, tel 0843 54154.

Councillor Laurie Smith, chairman of Thanet District Council, at the official handing over of the FT101ZD purchased with a grant of £600 from the lottery fund. On the right is Gerry Abrahams, G4KEJ, chairman of the club. ***Photo:*** **Christopher Gane**

From RR8—Will members please note that there are 18 affiliated clubs who could send in details of their meetings. Only 11 have reported this time, and in the previous few months. Ask your club sec why he has not sent yours in! *73.*

REGION 9—RR W. J. Colclough, G3XC, Highview, Indian Queens, St Columb, Cornwall TR9 6LL. Tel 0726 860485.
Camborne (CRAC)—6 May ("Beetling around Africa", illustrated talk by Peter King, G3WKP), SWEB Pool, Camborne.
Exeter (EARS)—10 May (Surplus sale), 7.30pm. Community Centre, St David Hill, Exeter. First, third and fourth Monday in each month (Informal). The Scout Hall, Emannuel Road, Exeter. Details from pro Geoff Draper, 1 Carlyon Close, Heavitree, Exeter EX1 3AZ.
Exmoor (ERC)—Thursdays, 8pm. "Loughrigg", East Street, South Molton. The club call is G8SSS. Sec Dave Jones, G6CHZ, 6 Priory Close, Pilton, Barnstaple, Devon, tel 0271 2724.
Exmouth (EARC)—12 May (Social evening), 26 May (Computers in amateur radio), 7.30pm. Rolle College, Exmouth. Sec Mrs J. R. Nicholson, G8XRR, 20 Palm Close, Exmouth, tel Exmouth 77263. New chairman Alec Jefford, G8GON.
Saltash (S&DARC)—7 May (Talk by RR, G3XC, "Amateur radio today and yesterday", with slides of local events), 21 May (Slide show and talk by Jack, G3TCJ, and Jean, G3TDN, on their holidays abroad), Toc H, Burraton, Saltash. Details from Kevin Hall, 12 Rashleigh Avenue, St Stevens, Saltash, Cornwall PL12 4NS.
Torbay (TARS)—Fridays, 7.30pm. Bath Lane, rear of 94 Belgrave Road, Torquay, Torbay. Torbay rally date now fixed for 29 August at ITT Social Centre, Paignton. Applications for space to sec G4DZH, tel Paignton 523063.

REGION 10—RR P. A. Jones, GW4HAT, 68 Pastoral Way, Tycoch, Swansea, SA2 9LY.
Swansea (SARS)—First and Third Thursday in each month, 7.30pm. Lecture room N, Applied Sciences Block, Swansea University College. Various talks and film/slide shows are being prepared but at press time no detailed schedule is confirmed. Club net each Sunday, 1000gmt 28·530MHz or 28·310MHz if QRM level is high. Net controller Cen, GW4BIQ. Licensed stations in the area are welcome to join in. Further details from Roger Williams, GW4HSH, tel Swansea 404422.

I am very concerned at the continuing lack of news and information from clubs in this region. I am aware that changes have taken place in meeting places and club secretaries but as yet have not been notified. If you wish me to publish your news etc, you must correspond otherwise this item for Region 10 will remain blank through no fault of RR10.

REGION 13—RR A. B. Givens, GM3YOR, 41 Veronica Crescent, Kirkaldy, Fife KY1 2LH. Tel Kirkaldy (0592) 200335.
Edinburgh (Leith Nautical College ARC)—Thursdays, 6.30pm. Leith Nautical College, 24 Milton Road East, Edinburgh 15. Although principally intended to further interest within the college, the club would welcome local radio amateurs and short wave listeners as members. Details from Michael Gathergood, GM4KFK, Halls of Residence, Leith Nautical College.
Glenrothes (G&DARC)—Wednesdays and third Sunday in each month, 19 May (Car treasure hunt), 7.30pm. Clubrooms, Provosts Land, Leslie, Fife. Details from GM8ZTV, tel Kirkaldy 203582.

REGION 14—RR V. J. Kusin, GM4HCO, 109 Weymouth Drive, Glasgow G12 0EL.
Ayr (AARG)—Fridays, 7 May (AGM), 21 May, 7.30pm. The Community Leisure Centre, 24 Wellington Square, Ayr. Details from GM3THI.
Dumfries (D&G REC)—First and third Monday in each month, 7.30pm. Cargenholm Hotel, New Abbey Road, Dumfries. Special event station, GB2DHE, will be active on Saturday 22 May during the Dumfries Hobbies Exhibition. Details from GM4NNC, ex-GM8TKA.
Glasgow (West of Scotland ARS)—Fridays, 28 May (AGM), 7.30pm. 22 Robertson Street, Glasgow. Morse classes for beginners each Friday. Details from sec GM4JDU.
Kilmarnock (K&LARC)—Tuesdays, 4 May, 18 May (AGM), 1 June, 7.30pm. The Broomhill Hotel, London Road, Kilmarnock. Details from sec GM3ZRT.

REGION 15—RR J. T. Barnes, GI3USS, Whitegables, 95 Crawfordsburn Road, Bangor, Co Down BT19 1BJ. Tel 0247 3948.

Ballyclare (East Antrim ARC)—Second Tuesday in each month, 11 May (Annual 144MHz df hunt, starting from Templepatrick M2 junction, all invited), 7.30pm, 22-29 May (Ballyclare Civic Week, club will be operating a demonstration station). Carntall Hall, Carntall Road, Mossley. AR GI4LKA. Sec GI4JXM.

Ballymena (BRC)—Thursdays, morse class, 8-9pm; Club meeting, 9pm. Sundays (Club get-together) 3pm. 70 Nursery Road, Gracehill. 19 September (Mobile rally). Details from sec GI4HCN.

Banbridge (Mid-Ulster ARS)—23 May (Annual Mobile Rally, at Parkanaur, 1pm), 5 December (AGM), 3pm. GI4BAC QTH. Details from GI4NVD.

Bangor (B&DARS)—First Friday in each month except June, July and August, 8pm. Sands Hotel, Seacliff Road, Bangor. 13 June (Annual mobile rally), Ardnavally Scout Centre), 1pm. Details from sec GI4JTF.

Belfast (CoBYMRC)—Tuesdays, 7pm; Saturdays, 2.30pm. 12 Wellington Place, Belfast. Sec Paul McTaggart, 4 Thirlmere Gardens, Belfast BT15 5EF.

Belfast (Queens UoBRC)—37 Fitzwilliam Street, next to Students Union, Club station GI3LLQ/GI6FQB on all bands, 3·5 to 432MHz. RAE and morse tuition available. Activities include electronics and computing. Details from chairman GI4MAC, sec GI4LGP, or GI6AGB, GI4FVM, GI6ETD and GI8MUO.

Larne (L&DARS)—Newly formed and will be applying for affiliation. Wednesdays, 6.30-9.15pm. Larne Tech College, Room 270. Morse classes available. RAE class in tech college. Programme being arranged. Details from sec GI4CPP.

Lisburn (Lagan Valley ARS)—Second Monday in each month, 7.30pm. Rathvarna Teachers Centre, Pond Park Road, Lisburn. A most successful hamfest was held on 5 March; over 200 people attended, and trade and bring & buy stalls were very popular. Sec GI8SXN.

REGION 16—RR T. D. Howe, G3PLF, 18 Vange Hill Drive, Basildon, Essex SS16 4DD. Tel 0268 24453.

Braintree (B&DARS)—3 May (Junk sale), 14 May (Social evening), 17 May ("GPO Maritime", by G3YEC). Braintree Community Centre, Victoria Street. Details from Alan Williams, G6CIV, tel Silver End 83516.

Chelmsford (CARS)—4 May ("Commercial radio", senior engineer Essex Radio), 1 June (Constructors' competition). Marconi College, Arbour Lane. Details from Andrew Mead, G4KQE, tel Silver End 83094.

Colchester (CRA)—13 May (Planning for NFD and Anglian Mobile Rally). Colchester Institute, Sheepen Road. Details from Frank Howe, G3FIJ, tel Colchester 70189.

Ipswich (IRC)—12 May ("Repeaters and their operation", by G3ZNU), 26 May (Final planning for ESWR), 30 May (East Suffolk Wireless Revival, Bucklesham). Club Room, Rose & Crown, Norwich Road. Details from Jack Tootill, G4IFF, tel Ipswich 44047.

Martlesham (MRS)—2 June (Noise figure measurements by members of MRS). British Telecom Research Labs, Martlesham Heath. Visitors are welcome but must contact G3ZNU for security clearance.

Norwich (Norfolk ARC)—Wednesdays. Crome Community Centre, Telegraph Lane East. Details from Paul Gunther, G8XBT, tel Norwich 610247.

Lowestoft (Pye RC)—14 May ("UOSAT", by G8ZWY), 3 June (Planning VHF NFD). As the Pye factory has now closed club membership is open to all. Details from A. Seago, G4KDL.

Vange (VARS)—6 May (No meeting (local elections)), 13 May (Station on the air), 20 May ("Oscar", by G4FUF), 27 May (HF NFD discussion). Main Hall, Barstable Tennants Community Association, Long Riding. 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.

Basingstoke (BARC)—19 May ("Getting going on 10GHz", by G4KNZ), 16 June ("The commercial approach to communications", by G4EFY), 7.30pm, Chineham House, Popley, Basingstoke. Sec G6CPA, tel Tadley (07356) 4964.

Bournemouth (BRS)—7 May ("Aids for the blind", by G4GTH and Dr Bryant), 21 May ("DF hunting", by G8EOJ), 7.30pm, Kinson Community Centre, Kinson, Bournemouth. Sec G4EKE, tel Ferndown (0202) 877945.

Fareham (F&DARC)—5 May (Natter night on the air), 12 May ("2m dx working", by G3VXM), 17/18 May (Porchester Arts & Crafts Exhibition—the club will be operating a special event station), 19 May (Club open night), 26 May ("6m operation", by G4JCC), 7.30pm, Porchester Community Centre. Sec G4IGT, tel Fareham (0329) 234904.

Farnborough (F&DRS)—12 May (Talk by Ron Ham), 26 May (Talk on the Basingstoke Canal and preview of the HF NFD), 7.30pm. Railway Enthusiasts Club, Access Road, off Hawley Lane, Farnborough. Sec G4BJQ, tel Farnborough (0252) 43036.

Gillingham (Blackmore ARS)—This society was formed at a local meeting held on 9 March. G4ILM was elected chairman, and G3WRV, sec. The club will meet on the second Tuesday in each month, 7.30pm, at the premises of Sherman Chemicals, Station Road, Gillingham. Amateurs in the North Dorset area interested in joining the club should contact Mike Turnbill, G4ILM, tel Gillingham (07476) 2318.

Guernsey (GARS)—Tuesdays and Fridays, 8pm. The Lodge, La Carbinerie, St Martins, 14 May (Radio controlled manhunt), 30 May (Members of the GARS will get as many of the islands of the Bailiwick of Guernsey on the air as is possible. Special QSLs available). Watch GB2RS news for latest details. Sec GU8OVO.

Horndean (H&DARC)—13 May ("Disc video", by G8HVO), 7.30pm. Merchiston Hall, Horndean. Sec G8GBM, tel Horndean (0705) 593429.

Isle of Wight (IoWARC)—Tuesdays and Fridays, 8pm. Unity Hall, Wootton Bridge. After a period of inactivity the IoWARC is back in full operation. The club will be using the club call G3SKY and hope to be active on rtty shortly. Sec G4MHE.

Poole (PRAC)—Last Friday in each month, 7.30pm. Poole Technical College. It is proposed to operate a station on Brownsea Is during the Dorset County Scouts Jamboree during the first week in August.

The Guernsey ARS RAE course in session. Instructor, John Morris, GU6BGI (16) explains a point to students Mark Trenchard (16) and Tim Hodkinson (13). John's six pupils achieved passes in 11 of the 12 papers they sat at the December 1981 RAE. Tim Hodkinson will be licensed as Britain's youngest radio amateur when he reaches the age of 14 in June. ***Photo:*** **GU8TGP**

Offers of help to G3PFM or G3OBD. Sec G8ZCG, tel Broadstone (0202) 693986.

Portsmouth (Marconi E&RC)—Last Tuesday in each month, 8pm. Broad Oaks Works Canteen, Portsmouth Airport. A special award is being offered, known as the Mary Rose Award, to support the Mary Rose project. Details from G8NEH, tel 0705 738067.

Southampton (SARS)—Wednesdays, 7.30pm. New venue, Bitterne Park Secondary School, Dimond Road, Bitterne, Southampton. Details from G4LDK, tel Bursledon (042121) 3451.

Weymouth (South Dorset RS)—4 May ("23cm operation", by G8MCQ), 7.30pm. Civilian Canteen, Army Bridging Camp, Wyke Regis. Sec G3ZGP, tel Weymouth (0305) 812893.

Winchester (WARC)—Third Saturday in each month, 8pm. The Log Cabin, Stockbridge Road, Winchester. Sec G6FBR, tel Winchester (0962) 66764.

REGION 18—RR W. A. Ricalton, G4ADD, 4 South Road, Longhorsley, Morpeth, Northumberland NE65 8UW.

Once again the above is all the information received from the affiliated societies and clubs in Region 18. If your club is affiliated, ask your sec what is wrong. Perhaps your club has no programme, if not, why not? You could suggest or better still arrange a lecture or other activity. Don't just leave it to the club officials—they may welcome your help. *RR18.*

Members of the Chelmsford Amateur Radio Club at a social evening held on 15 January at the Oakland Hotel, Chelmsford. Some 26 members attended this new venture

REGION 19—RR R. J. C. Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ. Tel 01-989 6741.

Cheshunt (C&DARC)—Please note that this affiliated society has changed its name to Cheshunt and District Amateur Radio Club—callsigns G4ECT and G6CRC. 5 May (Natter night), 12 May (RAE revision), 19 May (Equipment evening and RAE debriefing), 26 May ("Main frame computers", by Dave, G6CFW), 8pm. Church Room, Church Lane, Wormley. Sec Bob Gray, tel Dane End 203, or Jim, G3OJI, tel Ware 4316.

Chiswick (ABCRC)—18 May ("Interference on domestic entertainment equipment"—discussion), 7.30pm. The Committee Room, Chiswick Town Hall, High Road, Chiswick W4. Sec W. G. Dyer, G3GEH, tel 01-992 3778.

Edgware (EDRS)—13 May (Territorial Army communications (check venue with sec)), 27 May (Constructors contest and NFD briefing), 8pm. 145 Orange Hill Road, Burnt Oak, Edgware, Middx. Sec H. Drury, G4HMD, tel 01-952 6462.

Harrow (RSH)—7 May (Informal and practical), 14 May ("Video recording equipment"—talk), 21 May (Informal), 28 May (RTTY—talk and demo), 8pm. Roxeth Room of Harrow Arts Centre, High Road, Harrow Weald, Middlesex. A licensed bar is available for use of members, and is opposite the Alma pub. Details of meetings and pub crawls from Chris Friel, G4AUF, tel 01-868 5002.

St Albans (Verulam ARC)—25 May (Talk and demo of amateur television by Mike Hastings, G8ASI), 7.30 for 8pm. Charles Morris Memorial Hall, Tyttenhanger Green, St Albans, Herts. Informal meetings held second Tuesday in each month, RAFA HQ, New Kent Road, St Albans.

Southgate (SRC)—14 May (Crime prevention (make sure crime does not pay)), 7.30 for 8pm. St Thomas's Church Hall, Prince George Avenue, Oakwood N14. Sec John, G8EWG.

Stevenage (S&DARC)—First and third Thursdays in each month, 20 May (RTTY, error correction techniques", by G6CRF), 27 May (DF hunt), 8pm. BA Dynamics Ltd, Site B Staff Canteen, Gunnels Wood, Stevenage. Sec T. Bailey, tel 0438 62860. Morse classes are held at 7.30pm before meetings start.

SW Herts UHF Group (SWHUG)—This group runs the 432MHz repeater GB3HR on 433·350MHz. Output, 434·950MHz, input from Bushey Heath, Herts. Contributions to the above, GB3SWH, and GB3BH are always welcome. Brian G3THQ, or Trevor, G4HUJ, will willingly take any form of money: green or blue sterling notes, green dollars; and cheques in any currency!

Wanstead (ELGRSGB)—This group has recently had a change of officers and has not been able to give precise details of programme, except that on 21 May ("Early days of amateur radio", by G6NR and G3AMF), 3pm. The Green, Wanstead E11, 200yd from Wanstead underground station. Sec R. Matthews, G8VDD, tel 01-550 2579.

RR19 thanks those secretaries who sent in their "Club news" on time. The massive response to an ORM in North London or Herts brought in *four* replies, no more need be said on this subject.

REGION 20—RR B. L. Goddard, G4FRG, 2 Greenfield Park, Portishead, Bristol BS20 8NQ.

Bristol (BARC)—Tuesdays, 4 May ("Avon 82" preparation by G6AUR), 29-30 May ("Avon 82" Scouts Weekend), 7.30pm. c/o YMCA, Park Road, Kingswood, Bristol. Details from Trevor Cockram, G8GFZ.

Bristol (BGRSGBG)—24 May (Talk by Pat Hawker, G3VA), 7.30pm. Queens Building, Bristol University. Information from Chris Short, G8GLQ, tel 0272 621253.

Bristol (North Bristol ARC)—Fridays, 7.30pm. Self Help Enterprise, Braemar Crescent, Northville, Bristol. During the meetings in May the final preparations will be made for the special event station which will be operating in June at the Southmead Hospital League of Friends Fete. The last Friday meetings in the month will be for lectures and demonstrations. Details from Ted Bidmead, G4EUV, tel 0272 691685.

Bristol (Shirehampton ARC)—Fridays, 14 May (General discussion on tactics for VHF NFD), 7pm. Tyford House, High Street, Shirehampton. A picnic is being arranged for some time in June and special QSL cards are being printed for the QRP group. Information from Ron Ford, G4GTD.

Cheltenham (CARA)—6 May (Joint meeting with GCHQ and Smiths clubs), 21 May (Natter night), 7.30pm. The Old Bakery, Chester Walk, Clarence Street, Cheltenham. Congrats to Simon, G6AHX, on winning the CARA VHF Cup (65 counties, and 14 countries, and only licensed part of the year). Also to the club operators on coming first in the Verulam 1·8MHz and 144MHz contests. Please note that CARA now has a new sec, John Holt, G3GWW. Thanks to Grant, G4ILI, for keeping the newsletters coming during his spell, *RR20*.

Cheltenham (Smiths Industries ARC)—Second Thursday in each month, 7.30pm. This month the club is also meeting the Cheltenham club at their headquarters on 6 May. Information from Roger Hawkins, G8UJG, tel 0242 67 2175.

Gloucester (GARS)—Thursdays, 8 May, 28 May to 1 June (The society plans to put on a special event station for the Gloucester & District Scouts. 3 June (Equipment check for NFD), 7.30pm. Chequers Bridge Centre, Painswick Road, Gloucester. Some local visits are being planned and details will be given on GB2RS. Information from Tony Martin, G4HBV.

Portishead (Gordano ARG)—26 May (Talk on the RSGB by executive vice President Bob Barrett, GW8HEZ, 7.30pm. Ship Hotel, Down Road, Portishead. Details and information from John Davies, G3LJD.

Thornbury (T&DARC)—5 May (Talk on 2m converters), 2 June (AGM), 7.30pm. Thornbury Adult Education Centre, Thornbury. Sec Alan Jones, G8AZT.

Yeovil (Y&DARC)—6 May (AGM), 13 May ("A post look at sine waves", by G3MYM), 20 May ("The advantages of morse operation", by G3KSK), 27 May ("Receiver middles", by G3DSS), 3 June ("Electromagnetic radiation", by G3MYM), 7.30pm. Building 101, Houndstone Camp, Yeovil. Details from Don McLean, G3NOF, tel 0935 24956.

YOUR OPINION

RMS POWER

The Editor
Radio Communication

Sir—I am increasingly baffled by references in *Radio Communication* and elsewhere to rms power ("watts rms" etc). For instance, the South Midlands Communication Ltd advertisement on p1107 of the December 1981 issue offers a Hansen "in-line power/swr bridge" type FS710 which is a "peak envelope power and rms in line wattmeter . . ."

There does seem to be a widespread misconception about power in ac circuits. It is still the case that power in an electrical circuit is the *rate* of energy conversion. At any instant $p = v.i$, where p, v and i are instantaneous values of power, voltage and current. A problem arises in an ac circuit where v, i and hence p are all time varying. Consistent with the idea of rate of energy conversion, power in an ac circuit is specified as *average* power per cycle, be it at power, audio or radio frequencies. In a purely resistive ac circuit, irrespective of the current or voltage waveforms, the AVERAGE power is given by $P = V.I$ or $P = \frac{V^2}{R} = i^2R$ where V and I are rms values. (Isn't this why rms values of current and voltage are used in ac circuit theory?)

Take the case of a 1kW electric heater element, supplied with a sine wave of current at 50Hz from the mains. The power it dissipates varies 100 times per second between zero and a maximum of 2kW, but averages out over one complete cycle as 1kW.

In a similar way, a cw transmitter with 100W output peaks to 200W and falls to zero twice per carrier cycle. It similarly *averages* out at 100W over each complete rf cycle. If now that cw carrier has its amplitude modulated in some way, then another problem arises, because the average power per rf cycle now varies.

If an ssb signal has a peak envelope power of 400W, this means that, on peaks of modulation, the *instantaneous* value of power is varying from zero to 800W twice per rf cycle (ie an *average* of 400W over one complete rf cycle). This average power is also time-varying at the modulating frequencies.

The problem appears to be how to define (and measure) a time-varying average power. It is conceivable that the root mean square (rms) value of a time-varying rf average power could be specified, but for what purpose?

Heating (and overheating!) effects depend on energy, and energy is the time integral of power, which, in practical terms, is found by multiplying average power by time. I am still not clear how or why "rms power" is specified. As a "root mean square" value it would strictly be defined as $P_{RMS} = \sqrt{}$average value of P^2 where "P" is the instantaneous value of power. Now since $P = I^2R$ then $P_{RMS} = \sqrt{}$average value $(i^2R)^2$. Alternatively, it would be possible to specify the rms value of the time-varying average power P_{av}. In this case $P_{RMS} = \sqrt{}$av value of $(P_{av})^2$ in which case, since P_{av} = av value of i^2R, the rms power $P_{RMS} = \sqrt{}$av value of (av value of $i^2R)^2$. Consistent with this definition, perhaps we should specify "root mean square squared" (rmss) values of current!

If an rf power meter really is designed to measure watts (rms) and is used to measure the power output from an ssb transmitter supplying a two-tone test pattern output with a known 400W p.e.p., what power reading does it display? Not 200W, I hope, because that is the AVERAGE value over the modulation cycle of a time-varying average power.

To return to fundamentals, a watt is a watt is a joule per second, isn't it? Try calculating rms watts and then multiplying *them* by time and you don't get the correct amount of energy. I must still subscribe to the principle of conservation of energy, no matter in what circumstances—so, *average* power, please!

W. J. Omer, G3DOJ

WARNINGS

The Editor
Radio Communication

Sir—Far more serious than the schedule published in the *London Gazette* is a news item published in the *Daily Telegraph* of 9 March 1982.

This refers to a wife who set fire to her husband's train set, causing £4,500 worth of damage, and the break-up of the marriage. "It was some time before I realized how obsessed he had become," she said.

For "train set", substitute "amateur radio equipment"!

W. S. Smith, G3HHZ

Sir—Having read and enjoyed Roger Blackwell and Ian White's excellent and reassuring article "RF hazards and the radio amateur" (*Rad Com* February 1982) one is left only to speculate about a recent newspaper report concerning a number of former Foreign Office radio operators who have been awarded damages by the courts for impairment of their hearing caused—"by many years of listening through heavy interference".

Does this mean that future contest log sheets sent out by the RSGB will have to carry a government health warning?

Yours quietly,
Brian Grist, G3GJX

MEMBERS' ADS

CONDITIONS OF ACCEPTANCE

These subsidized flat-rate advertisements are accepted as a service to members of the RSGB only. They must be submitted on the Member's 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 acknowledgment 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 1982 for issues in brackets, are **19 May** (July), **17 June** (August), **15 July** (September), **25 August** (October), **23 September** (November), **21 October** (December), **18 November** (January 1983), **16 December** (February 1983).

Post to: MEMBERS' ADS, RSGB, 88 BROOMFIELD ROAD, CHELMSFORD, ESSEX CM1 1SS
Do not post to RSGB HQ or Advertising representative

FOR SALE

Xitex MRS100 cw/rtty tx/rx, various interfaces possible, mint cond, £85 pp. Tel 0463 41211.

Detached bungalow: three beds, two lounges, one leaded bay, other 17 by 12ft, kitchen, bathroom, Dolphin shower, separate wc, integral garage, gardens front rear, full gas ch, insulated loft, some double glazing, rear overlooking field, pleasant rural setting, four miles Leigh, five miles Bolton, near M6, M61, M62, good vhf site, carpets incl, garden shed, shack, £34,000 ono. G4IAV, QTHR.

Pye Westminster boot mount, W30AM, comp with control box, cable, mic, ant feeder, spkr, perfect wkg order on low band, F30AM base station, perfect, mic, £30 each ono. G4HBD NOT QTHR. Tel 0202 767583.

TR9000, super quality, reliability, performance, £315. MM144/100S 100W linear amp, 12dB preamp, perfect, £110. Pye vhf Westminster W15U, 6ch, fitted SU8, RB4, xtal toneburst, manual, £65. G4FGJ. Tel Oakley (Beds) 3304, evenings.

QTH: detached bungalow, Panfield, Essex; approx half acre garden, 28ft mast rotator, 9-el Tonna, three bedrooms, lounge, kitchen-diner, tiled bathroom, full ch, rear lobby with fuel store, second wc, workshop, detached garage, current planning permission, £45,000. Tel Braintree 24845.

VFO120 ext vfo for TS120/130, £55. Datong FL1 filter, £40. G3KHZ keyer, £7.50. G4CLF Helford 9MHz ssb board, XF9B xtal filter, £35. MMC144/28LO converter, £15. All ono. Tel 0453 833411, evenings/weekends.

Trio JR310 usb/lsb a.m./cw 80-10m, as new, in orig packing, fitted narrow filter, xtal calibrator, coaxial, phono antenna sockets, £90. G4IAV, QTHR. Tel 0942 870954.

Multi Palm 4, case, nicads, 7ch, £125. IC202, £100. TS120V, mic, TL120 linear, £395. All good cond, orig boxes. G4JNZ, QTHR. Tel 01-868 2159.

FT101Z, mic, fan, orig packing, immac cond, used little, going broadband, £450 ono. Amtech 300 atu, hardly used, as new, £30 ono. 1310 power supply, 13·8V, 10A, fully regulated, few months old, £30 ono. G4GKZ, QTHR. Tel 0785 43185.

T1200 2m fm 144-146, 400ch, 4W/1W, keyboard, good cond, case, helical, instruction manual, ac charger, dc-dc adaptor for mobile, wkg, bargain, £100. Smith, G8XMO, QTHR. Tel Worcester (0905) 357087.

G3PLX rtty vdu system, flashing cursor, keyboard, monitor, psu, terminal unit, will transmit and receive, £150. Four Eimac 4X150A, two silver-plated bases, new, unused, £5 each. G4DFU, QTHR. Tel Langley Mill 60334.

Eddystone EC10 transistorized gen cov communications rx, 550kHz-30MHz, receives a.m., cw and ssb, recently professionally overhauled, as new cond inside and out, comp with mains power supply unit, £95, carriage incl. Tel Sandwich 611627.

Navy rx, Murphy MR121, 60-500kHz, 1·5-30MHz, psu, diagrams, spare valves, £60 ono. Pye Bantam portable 2m fm, nicads, helical, diagrams, £35. Jaybeam 2m 5/5 slot, £12. Various valves, transformers. G8SSI, QTHR. Tel Martin, Croydon (01) 686 9646.

Trio/Kenwood TR9000, American model, no toneburst, easy mod, different scanning rates to UK model, BO9 base unit, PS20 (UK) mains psu, SP120 spkr, absolutely mint cond, used little, £325. Split considered. G3XTN, QTHR. Tel Ron, 0926 56862.

Trio JR310 rx, good cond, handbook, exchange for 2m or hf acc lin amp, rotator, etc. Anything genuine considered. Tel 0776 5205.

FDK Multi 700E, three years old, reasonable cond, no mods, new pa eighteen months ago, supplied without box, £100 ono. TR2200EX case, nine simplex, three repeater channels, helical, PL259, helical, nicads, earphone, charger, good cond. G8TVV, QTHR. Tel 0632 842495.

Radio beam and broadcast A.H. Morse, 1924, £2.75. *Radio Communication* bound vol 50 1974, vol 51 1975; *Bulletin* bound vol 29 1953, vol 30 1954, vol 31 1955. *Short Wave Magazine* bound vol 4 1946, vol 6 1948, vol 7 1949, £3 each. *Radio Communication Handbook* fourth edn, £6, incl p & p. G4DGR, QTHR.

IC215 15ch portable, nicads, extras, mint, £90. TI58 programmable calculator, navigation module, £40. Olivetti TE318 printers, £25 each. Data Anker 5-9ch tape punches (fast), cw tape, £6.50 each (data). Carriage at cost. G4GSY, QTHR. Tel Manchester (061) 761 5083.

Trio 2400 with accessories, other amateur items, send for list. Sell, or W.H.Y? *Wanted:* Datong FL2. Datong vlf, 70cm hand portable. 50MHz tx/rx. Heathkit OS2 scope. ICL termiprinter 70cm crossed Yagi. FT290R accessories. W.H.Y? G8IYK, 120 Birmingham Road, Redditch, Worcs.

AR240 handheld, nicads, charger, instrs, boxed, £100. Datong rf speech proc, instrs, £25. Shure 201 ceramic mic, as new, instrs, boxed, £10. Colt MKY200 broadband hf linear amp, integral preamp, power meter, solidstate, mobile bracket, as new, £100. Switched outputs 50W, 100W, 150W, 200W, £100. Liner 2, unmod, instrs, all accs, £85. G4DLA, QTHR. Tel Alsager (09363) 4148.

TR9000, 2m multimode, mint, £295. Yaesu FP12 13·5V-10A psu, mint, £55. MM 2m linear 40W, mint, £60. Yaesu mon scope YO100, mint, £95. Trio 2200GX handheld, 18, 23, R1, R5, nicads, charger, mint, £70. Yaesu SP101 spkr, mint, £18. Jaybeam 10-el Yagi, 2m, new, £18. 4m Yagi, new, £12. MFJ ant noise bridge, mint, £18. MFJ ssb filter, £5. Two transformers, 15V-15A, 20V-20A, £10 and £15. Carriage extra. G4GQH. Tel 0202 522796, after 6pm.

Yaesu FRG7700M (memory) trx, FRG7700 tuner, antenna, memory unit, six months old, guarantee, all for £350. Tel 01-942 9034.

VDU Hewlett Packard, green crt, variable persistance, pos or neg xyz and programmable inputs, £18. Regulated dc power supply, 0-800V at 0-1A, £15. Both metered with coarse/fine adjust, both ex-lab equipment. G3YYG. Tel Hemel Hempstead 64025.

Yaesu FR101D, rx, 2 and 6m converters fitted, £275. TM56B 2m monitor rx, 15 xtals fitted, £45. Tel 01-467 5908, after 6pm any evening.

FT227R, as new, mobile mounting, mic, £160 ono. TR2200, 6ch, damaged whip, otherwise OK, £50 ono. G3YTW, QTHR.

Eddystone 840C gen cov rx, fitted product detector for ssb, recently aligned, exc wkg cond, manual, £50. G8ZMZ. Tel 082285 3991.

Tower, 45ft heavy duty, hinged at base plate, top plate for rotator mtg, £80 ono. G3IKW, QTHR.

FT707, FC707, £490. FRG7700 with memories, FRT7700, FRV7700B, immac, £450. CNW418 atu/swr meter, £65. *Wanted:* SK620A mylar chimneys, silver electro-plating kit. G4MHM, G8WJA, QTHR. Tel 0789 296645 (Midlands).

Swan astro 102BX, PSU5, eight months old, as new, £595. Adonis mic AM502, £24. Heathkit valve voltmeter model V7AU, £20. Heathkit rc bridge model C3U, £20. G3XKF, QTHR. Tel Aylesbury (Bucks) 748256.

Trio TR7600 10W 144-148 fm tx/rx, just checked by Lowe, RM76 microprocessor control unit, six memories, scan etc, plus 35W pa, £185. G8SNF, QTHR. Tel Loughborough 218259, after 6pm.

Codar CR70A gen cov rx, 560kHz-30MHz, Codar preselector PR40, good cond, £40. Bromley, Kent. Tel 01-290 5827, evenings.

FRG7, £110. Liner 2, £70. Buyer collect. RS31379. Tel 021-429 6783.

Exchange Realistic PRO2001 scanning rx, 68-88MHz, 144-174MHz, 430-512MHz, fm, 16ch mem for 70cm walkie-talkie, Palm 4, TR3200 or similar. G4JRB, QTHR.

Atlas 180 160m to 20m mobile ssb tx/rx, £210. CD1014 dual beam oscilloscope, £60. Pye Westminster 6ch 2m/fm, £50. Trio 2200G 12ch, £60. IC240, £125. KW2000E, £290. G3PLR, QTHR. Tel 05827 66410.

Western Electronics alumast, two sections 10ft each, hinged base, used with standard scaffold pole, will support hf/vhf beam at 30ft, £75. Mosley Elan 3-el 10/15m beam, £65. G3SJH, 9 St Peter's Road, Birmingham 17. Tel 021-427 1115.

Teleprinter 7BRP cover, base, auto sender, £25. G4GEW, QTHR. Tel Downland (Surrey) 54388.

All the power you need, hb power pack, 6V 6A, 750V, 250mA, 315V, 120mA, 210V, 50mA stab 12V, 100mA stab bias −150V, 60mA, variable stab, individually switched, fused, one neat cabinet, £55. Buyer collect. G2CNN, QTHR.

Trio 7200G, fitted S20-24, R0, R3-7, £100. Hanson FS302M power and swr meter, 20-200W, 50-150MHz, £25. Both exc cond. 56 Weymouth House, Lichfield Street, Tamworth, Staffs. Tel Tamworth (0827) 50488, or (0827) 68576, after 7pm.

KW204 tx, KW202 rx, £350. Would prefer to sell as pair. TR2300, nicads, charger, case, orig packing, exc cond, £150. G4IVL, QTHR. Tel Tim, Rainham (Essex) 57906, after 7pm.

TS530S, mic, new February 1982, £490. Daiwa SR9 2m tunable rx with R6 xtal, new December 1981, £30. GM4DHJ, QTHR. Tel Paisley (041) 889 9010.

Trio TS770 multimode tx/rx, 2m and 70cm base station, 12V battery operation, £500. Matching spkr/psu, 12A, 13·8V, current limit, short circuit protection, £50. S. M. Sherratt, G8FAK, 32 Springfield Way, Cranfield, Beds MK43 0JN. Tel Bedford 751475.

Standard G58 multimode, 25W linear amplifier, mobile mount bracket, carry case, recharge batteries, £270. No offers, G6DAU. Tel Philip, St Albans 72528, evenings only.

Mobile omni-match LAR, £10, incl postage. Smith, 5 Stretton Avenue, Newport, Salop TF10 7SF.

2m high power amplifier made by Collins, heater, 1,750V transformer, two brand new 4CX250Bs, £125 ono. Cossor CC300 vhf fm 15W dashmount radiotelephone, technical manual, £30. Jaybeam 4-el quad, £12. G8DOI, QTHR. Tel Rugby (0788) 70584.

Solartron scope CD1212 dual beam, 24MHz, valved, large, eht transf dud, £30 or offers. Wandel Golterman sampling unit VZMG1 manual, £15. Cambridge Vernier potm, £15. Cambridge deflection potm, £8. Standard cell, inductor, capacitor, £4 each. G4KDV. Tel 0943 463083.

Realistic DX200 gen cov rx, four months old, as new, boxed, cost £160, £70. Sinclair ZX81 with 16k ram pack, Sinclair-built, as new, manual, tapes, bargain, £70. Tel Basildon (Essex) 416055.

Hammarlund HQ170A on Eddystone plinth, spkr fitted, clock timer, microwave, 2m converter, workshop user manuals, immac, £85. BC221 psu, charts, £12.50. Stephen James Mk2 atu, £12.50. Hamgear Mk2 preselector, £12.50. Tel Don, St Albans 61291.

Sony TC7662 professional reel-to-reel tape recorder, two track, 7·5 and 15in tape speed, 10·5in reels, two years old, exc cond, offers in region of £450. For more details tel Ferryhill (Co Durham) (0740) 51158.

70cm PF1, £25. PF2UB, £35. Both SU8. Pye

R460/T460 uhf base stn, £40. Aircraft 360ch vhf tx/rx, £50. One less pa, £45. Pye F27AM vhf base stn, £20. *Wanted:* TA32/33 triband beam and rotator. Tel 0892 870479.

FT101ZD, fan, manual, spare driver, pa valves, £430. Drake MN2700 antenna matching network, 2kW rating, £160. Both items in exc cond, orig packing, one owner. Tel 045-36 3994, after 6pm.

KW204 tx, exc cond, £150 or offers. G3ZQF, QTHR. Tel Medway (Kent) (0634) 723694.

HA600 rx, 0·15-30MHz bandspread, ham bands, bfo, tape 'phone skts, good cond, instruction manual, no mods, £30 ono. Will deliver London, Kent, Sussex, etc. Mark Corder, 68 Fairwater Avenue, Welling, Kent DA16 2HY.

Atlas 210X tx, 10-80m, ideal mobile or base, £230. PSU console 220CS, spkr, £50. KDK1015 2m fm, 144-148MHz, can be used on USA repeaters, £130. Grundig Satillit 2000, £125. *Wanted:* 25A psu. G3XMA, QTHR. Tel Coventry (0203) 410208.

Complete RAE correspondence course, £20 ono. *Wanted:* Info on Storno CQM39-125. Old copies of radio mags: *QST, Rad Com*, etc. Can collect/deliver Birmingham area. Tel Andy, 021-458 6652.

Marconi Atalanta mains rx, circuits meter, handbooks, revalved, serviced Marconi, £125. SRX30, atu, £95. AVO7, all accessories, £30. Please no time wasters. Cash collect. Tel Grimsby 882392.

Yaesu FRG7 fine tune, mint, eight months old, no mods, circuit and handbook, £135 ono. G4IXY. Tel St Albans 39908.

TR2400 sm handheld with case, charger, etc, £150. FT7, 80-10m, perfect cond, as new, orig packing, used as rx only, £260. G8MDP, QTHR. Tel Lindfield (04447) 2884.

TS700, good cond, s/tone, piptone, Lunar PA144 preamp fitted, going homebrew, thus sale, £250. G8RIR, QTHR. Tel 363-3220, after 6.30pm.

TR8400, £255. MMT28 432S transverter, £80. MMA144V 2m rf switched preamp, £20. Two MM1296 preamps, one with NE645, £23. One with NE578, £20. Jaybeam 15 + 15 for 1,296, £20 each or four for £75 incl support frame. Splitter available if required (extra). 4 × 26-el quad loops for 1,296, £45, incl support frame. Splitter available if required (extra). Eddystone 770R Mk2, 27-165MHz, ideal for sporadic-E spotting, £120. Prefer buyer collects larger items. Carr arranged at cost. G8JHL, QTHR Manchester area. Tel 061-792 2697.

TR2300, VB2300 matching amplifier, mobile mount, nicads, exc cond, orig boxes, comp, £175. MMS2 advanced morse talker, £110. *Wanted:* 2m multimode. W.H.Y? G6ECO, tel 0706 841665 (Manchester), weekends.

Yaesu FR50B hf rx, £60. Grundig Satellit 1400, £140. SR11 2m rx, six xtals incl, vfo, £65. TR2400, case, base unit, £155. G8IQV, QTHR. Tel Maidenhead (0628) 23738.

Icom 720A, £795. Yaesu FT480R, £295. Trio R1000, £235. All used very little. Trio TS120S, in vgc, £395. Pleased to give any on-air test required. G4HQ, QTHR. Tel 01-508 1620.

Exchange my Eddystone EA12 and KW204 for FT7 or FT7B, or £130 each, offers considered. G4EUW. Tel Brightlingsea (020630) 3071.

Racal RA17L comm rx, 500kHz/30MHz, wkg order, but needs alignment, comp with spare valves, technical manual, £150. Heathkit HR1680 ssb/cw rx, comp with manual, £100. Tel Borough Green (Kent) 883011.

FT101B, cw filter, orig packing, £320. FL2100B linear, orig packing, £280. FRDX400 rx, £120. SX200 scanner rx, £210. Ferg four-track tape recorder, £5. Transformer 2kV-0-2kV, £6. G4BXT, QTHR. Tel Dartford 77401.

Minibeam (G4MH), storm damaged but repairable, £20. Telford TC7 Mk2, tunable i.f. 28-30MHz, I can't get it to work, perhaps you can, £10. Prefer both items to be collected. G3ZOG, QTHR. Tel Sunderland (0783) 280080, 7-9pm or weekends.

Microwave Modules 10-2m transverter, £65 or swop for something interesting, eg ZX81 and psu, atu, swr power meters, frequency counter, 4m transverter, or w.h.y? A. Dyer. Tel Dunstable 65416.

IC255E, orig packing etc, £200. Trio 2300, case, mobile mount, helical, two battery packs, charger, reverse rpt mod, £135. G4MDZ, QTHR. Tel 0303 89 2003.

Sommerkamp TS280FM, hi-power, mic, Hokushin 7/8 gutter mount, both in exc wkg order, emigration forces sale, both for £140. Tel Verwood (0202) 825998.

FDK700EX 2m fm 25W, mint cond, six months old, £140 ono. G6EHL. Tel Horndean (0705) 596210, evenings, weekends.

Eddystone 830/9, 300kHz-30MHz, nine bands, a.m., cw, usb/lsb, superb rx, £185. 770R 19-165MHz, £100. Trio 2400 2m hh, new, £165. Datong PC1 hf converter, new, £100. MM144/28 2m converter, £20. *Wanted:* SX42 rx, S36, part exch? G4AFY, QTHR. Tel Kidderminster (0562) 753358.

FT101ZD hf tx/rx, new bands, 160-10m, fan, mic, cw filter, only used 30 times, like new, £540 ono. G4KHL, QTHR. Tel Fleetwood (039 17) 71586.

Datong morse tutor D70, £37. *Wanted:* KW EZee Match, fair price, postage paid. G4MPL. Tel Hull (0482) 812353.

Datong D70 morse tutor, boxed, £35, incl p&p. Learn morse faster than the issue time of the licence. G6CGH. Tel Derby 665847.

GEC RC411 professional rx, 10kHz-31MHz, in exc cond, £350. *Wanted:* Racal RA1772. G4FMB, QTHR. Tel 061-980 5662, after 6pm.

AR240A, charger, orig packaging, hardly used, bargain at £110 ono. G4CEN, 16 Ashdown Way, Saxon Meadows, Romsey, Hants SO5 8QR. Tel 0794 515912, after 6pm.

Trio TS820S, £475. ASR33 teleprinter, stand, sound cover, £125. KSR33, £90. TCL termiprinter, 300 baud, RS232 ASCII u/c l/c letter quality printer, keyboard, £225. P/ex d/beam solidstate scope or floppy and controller. Micro Consultants 15MHz eight-bit dac, data, 75110 line drivers, £12. Etbug1/2 5204 eproms, £8 each. 8-off 2102, £5. 2kV 10mA mains transformers, £2 each. *Wanted:* ttl, cmos, op-amp cookbooks, *Solidstate design for the radio amateur* (ARRL). Tel 01-890 2535, day, 078-42 51409, evenings.

FT101E, new valves fitted, spares, fan, manual, 12V capability, 10MHz transmit, otherwise unmodified, immac, £350. KW low pass filter incl free of charge. G4JDH, QTHR. Tel Brentwood (0277) 231461, 6-7pm.

Trio Kenwood TR7010 2m tx/rx, incl handbook, mic, power lead, installed Wood & Douglas preamp for increased sensitivity, mint cond, £110 ovno. G6BHN. Tel Mark, Sileby (Leics) 2291, after 7pm, Wednesday to Sunday.

Trio TS520S, cw filter, mic, four sets of new spare valves, never been used to transmit, exc cond, £325. SMC monitorscope, unused, £35. Yaesu FF501DX low pass filter, £12. Datong D70 morse tutor, £30. HK707 morse key, £6. SEM 'Z' Match atu, £20. Westclox No 9 morse key, ex-RAF, £8. Nagasawa NDK20 swr bridge, £6. Video Genie EG3003 16K ram, several programs, good cond, £150. Postage extra if applicable. G8VOD, QTHR. Tel Swindon (0793) 27913.

Cossor CDU150 oscilloscope, fault in eht supply, £50. BC221, charts, £20. Creed 7B, dc power supply, £20. G3LYP, QTHR. Tel High Wycombe 881298.

150W hf transistor linear, PW Trent design, in case, relays, £60. 80W 2m transistor linear, scs, £60. Exchange either for 4m transverter. Transformer 330-0-330 at 230mA, various lt windings, £10. G4IDE, QTHR. Tel Wolverhampton 781760.

TR2300, TR2400, both exc cond, orig boxes, TR2300 has MB2 mobile mounting bracket, RA1 helical ant, £140. TR2400, has SC3 carrying case, £150. G4KUC. Tel John, 061-427 5931.

Datong morse tutor D70, as new, practice key, G3HSC morse records, book, £37. UK101 computer, 8K basic, 8K ram, Cegmon handbook, amateur radio programs, a gift at £135, or exchange w.h.y. Tel Bolton (0204) 57775.

Electronic organ, full size, two keyboard, brand new, handbuilt with pedalboard, autochord, auto accompaniment, 30 rhythms, vibrato, reverb, electronic rotor effect, preset voices incl piano, inbuilt 17in spkr, worth over £1,000, but will accept £700. G8XUA NOT QTHR. Tel Leeds (0532) 673251.

ZX81(1K), program listings for freq, inductance, capacitance, reactance, coil turns, antenna calculations, £2 per copy. FT200 12V dc psu, £45 plus p&p. GM4BKR, School Cottage, Alvah, Banff AB4 3US.

EC10 Mk2 gen cov rx, mains and battery supplies, £75. Dymar vhf highband fm mobile, modified 2m, 5ch xtalled, £90 ono. 70cm 4CX250B pa cw new valve, base, needs psu, £80. G8DKK, QTHR. Tel Luton (Beds) 424809.

33ft two-piece steel antenna tower, takes extension pole, £250 ono. Companie Maritime trawler tx/rx, 1·6-2·0 xtal controlled, rx 500kHz-30MHz, 440V rotary converter requires 24V, offers. Tel Burley (04253) 2349.

MMT432/144R 70cm 2m transverter, as new, £130. TRS80 pocket computer, cassette interface, boxed, £70. 4CX250B 2m pa, self-contained internal psu, cased, needs finishing, £60. Spare ht psu, cased, £25. Will part exchange w.h.y. G4GZS, QTHR. Tel Rugby 815506.

IC240 2m fm mobile, 1yr old, all repeater channels, 12 simplex, preamp, exc cond. £130 ono. Pye Westminster 70cm, 6ch choice of xtals, control gear, good wkg cond, £90 ono. G3YXM, QTHR. Tel 021-747 4570, after 6pm.

FR400SDX, FL400, SP400, comp station, all options fitted, spare rx valves, finals, immac cond, in orig packing, manuals, completely unmodified, operational, £275. Prefer inspection or carriage at cost. GM4EVK, QTHR. Tel 0505 690712.

KDK2025 2m fm tx/rx, GPV5 vert and swr power meter, bought new January 1982, £150. G6CHB, QTHR. Tel 0632 462606.

ZX80 computer, both roms, 16K ram, compshop slow fitted, 1/0 port (needs attention), tapes, amateur radio programs, manuals, psu, leads, extras, £120 ono. Yamaha FS1E, 'P' reg, £130 ono. G6BAE, QTHR. Tel Tolleshunt D'Arcy 620.

Yaesu FT101B, comp with mobile leads, mic, manual, good cond, £300. Buyer collects. G4FZB, 53 Burford Road, Carterton. Tel 0993 842491.

AR88LF, manual, needs some attn, £20. *Radio Communication* 1968-80, casebound in 2yr vols, £25 ono. Tel Bookham 57051.

TS120V, fitted 500Hz cw filter, MC35S mic, £300. EK121 el-keyer, sidetone monitor, £28. MMC432/28S converter, £27. G3VWH, QTHR. Tel Shrewsbury 51833.

Eddystone 770R vhf rx, good cond, re-aligned, £75. Buyer collects. Tel Romsey (Hants) 517497.

RTTY system, HBR Electronics DM170 demodulator, TD224 video display, homebrew keyboard, professional key assembly, memory, afsk, only tv and rig needed to be on the air, £180. MM144/28 transverter, £70. G4AOK. Tel Tim, 061-928 4833.

Collins 30L1 linear amplifier, round emblem, comp with unused spare 811A tubes, £350. HAL DKB2010 dual morse/rtty keyboard keyer, as new, £85. KW108 monitorscope, £50. Prefer buyers collect. G3MRP, QTHR. Tel 021-783 4771, evenings.

Trio TS120V, immac cond, used little, MC30S mic, £290 ono. TL120 amplifier, still under warranty, £110 ono. G4KLI, QTHR. Tel Macclesfield (0625) 29748.

Realistic DX160 gen comm rx, good cond, £68 ono. Buyer collects. *Wanted:* Heath HW8 cw tx/rx. Tel Kingswinford (West Midlands) 295964, after 6pm.

Audio amps: Soundout Labs 260S 130wpc, £220; 420S 200 wpc, £330; both very solidly built. XLRs: new, with 2yr guarantee, 813s used, £3.50. Creed psu, 40V 4A, £5. Many bits of Rover 2000. Moss. Tel 01-337 7309 (Surrey).

Heathkit SW717 rx, ideal for a beginner, aligned by Heath, eight months old, £60. UL1000 variable preamplifier, almost new, £25. Owner completed RAE, applying for licence. Tel 04895 84934, after 6pm.

Icom IC25E, £220. 7/8 whip incl gutter mount, £14. Trunk mount, £5. All only few weeks old, exc cond, boxed. Going back to hf, hence sale! G4BKM, QTHR. Tel Denham (0895) 834358.

TS120S, 2yr old, used little, PS30 pwr supply, £400. Buyer to collect. G4KQG. Tel Nottingham 257396.

Yaesu FRG7 rx, well looked after (replaced by FRG7700), £130. RS50217. Tel Trevor, Brixham (Devon) 6795, evenings.

Telequipment scope D83, dual trace amp, type S2A timebase, £550 ono. Solartron CD1400 scope, two CX14L1 input amps, CX1443 time base, both with manuals, circuits, £70. Tel 0844 290352, after 7pm.

Hallicrafters SX43, seven-band, a.m./cw/fm, 0·54-110MHz, xtal phasing bfo, S-meter, matching cabinet spkr, service manual, *RSGB Bulletin* 1942-81, Avo electronic testmeter with accessories, Murphy vhf telephone MR800 (mobile), MR862 (fixed), with manuals, offers. Tel Luton 29470.

Mizuho SB2M, 144·2-144·4MHz, nicads, £75. Standard C146A 2m 2W handheld, S0, R6-7, S20, S22, helical/telescopic ants, tb leather case, nicads, £70. *Wanted:* Manual for BC342 rx. GW8GGW, QTHR. Tel 0978 820561.

Heathkit SB303 rx, £150. Heathkit HR1680 rx, matching HS1661 spkr, £110. Both in exc cond. Basic linear components with QY5500, base, transformers, capacitors, etc, £35. SL1600 multimode board, fitted relays, MD108, £7.50. Many other components, please enquire. GM3MQO, QTHR. Tel 0292 79245.

Daiwa SR9 2m tunable rx, fitted S10, S20 xtals, 12 months old, £35. Tel 0530 223308.

RF2800 National Panasonic rx, lw/sw, 150kHz-30MHz, a.m./ssb, fm, 87·5-108MHz double superhet, digital frequency display, mains or battery, comp in orig packing, instruction and maintenance manuals, cost £200, will accept £100. G8XDW, QTHR. Tel Stafford 40027, evenings.

Radio Communication August 1974-December 1981, in exc cond, comp, £35. Buyer collects. Tel Hythe (Kent) 68701, after 6pm.

Tektronix 545A scope, manual, will swop for FT707, IC730, TS130, or £500. Gordon Mackenzie, GM6GDA, Newton Mearns, Glasgow. Tel 041-639 3095.

Eddystone 770R rx, 19-165MHz, fm/a.m./cw, serviced by Eddystone, £100. Buyer collects or plus carriage. Tel Walsall 642509.

Icom IC2E, parting with much liked /P rig, gone /M, incl case, helical, charger, Icom 12-9V converter, exc cond, orig packing, costs £180 new, but only £135 ono. GM4JPG, QTHR. Tel Iain, 031-665 4281.

Yaesu FT301, all solidstate, 160-10m, 200W pa, rf speech processor, FP301 spkr/power supply, handbook, orig packing, £400. 18AVT five-band vertical, £40. Scopex 4D10 solidstate oscilloscope, 10MHz, dual beam, £140 ono. G4GPE, QTHR. Tel 0742 659812.

Heathkit SW717, gen cov communications rx, suit

beginner, vgc, manual, £65 ono. FDK Multi 750, mint, £220. SEM 2m linear, preamp, £30. ZL8, 8-el 2m Yagi, unused, £13. *Wanted:* MMT70/28. G6ANS, QTHR. Tel Brentwood 810831.

Racal communications rx RA17, rack mount, digital display, vgc, £200 ono. Genuine sale, small shack, need space, hoping to become licensed soon, can deliver. T. Clarke, RS47291, 1 Edward Close, Hucknall, Nottingham. Tel 0602 637385.

Mizuho SB2M 2m ssb portable, 144·100-144·350, 144·400-144·450, £50. AR88D, vgc, spare valves, handbook, fm discriminator, £50. Codar PR30 rf preselector, £8. Microwave Modules 70cm converter, 18-20MHz i.f., £8. G8XBH, QTHR. Tel Croydon (01) 689 2928.

JRC NHD515 memory unit, NVA515 spkr, boxed, as new, list price £232, save £82, the two for £150. W. Findlay, Spinneys, Towercroft, Eynsford, Kent DA4 0AS. Tel Farningham 863009.

AR240 handheld cw charger, helical case, £95. Wood & Douglas 70cm single channel tx/rx, kit on SU8, £70. G4KVI, QTHR. Tel Beaconsfield (04946) 3372.

FT200, FP200, all 10m xtals, Yaesu hand mic, £200. G4KXP, QTHR. Tel Wing (029668) 8820.

KW600 linear, new 572B, fb cond, £130. Western DX5V five-band vertical, handles 1,200W, as new, almost half price, £50. GM4LCP, QTHR. Tel 041-880 5904, evenings.

Trio 7200G 2m fm tx/rx, mount, mains psu, exc cond, £110. 2m converter, Microwave Modules i.f., 4-6MHz, £15. G4ABT. Tel Nottingham 234797.

Two Creed 7B teleprinters, £10 each. PSU for Creed, £5. Chokes 0·02H, 10A res 0·25Ω, £5. G3RFY, QTHR. Tel Bude (Cornwall) (0288) 2329, after 6pm.

Teac R. Tor tape deck, professional quarter track stereo model A3300, 10·5in reels, all solenoid controlled, domestic use only, mint cond, stout carrying case, leads etc, £350. *Wanted:* model 3340, same breed. G8VXQ, QTHR. Tel 021-705 3583.

IC211E multimode, Mutek 144S preamp, 28ft sectional pole, 12-el ant, £395 or exchange for hf tx/rx FT101ZD series or TS520S series, owner passed morse and wants to go hf. G6CZR NOT QTHR. Tel Callington (05793) 3169.

Heathkit HW8 QRP cw tx/rx, 80-15m, power supply, HWA71, manuals, used little for transmit, cost new £193, accept £90. G4ISO, QTHR. Tel Baldock (0462) 892765.

TR2200GX, 12ch, mobile mount, service manual, £95 ono. Tangerine computer goodies, please tel for details. KGM Vidiaids camera with manual, offers. G8ILB. Tel East Grinstead 25952, after 6pm and weekends.

LAR 7MHz dipole traps, never used, £7. SEM 80/10 transformer, Z-Match, as new, £40. SEM 144/28MHz mosfet converter, fb, £12.50. Postage at cost. G3OAZ, QTHR.

KW202 rx, still as new, surplus to requirements, handbook, £90. Tel 0752 365815.

Heathkit DX100U, ssb adaptor, buyer collect, £25. Trio JR500S rx, amateur bands 10-80m, 10MHz, exc cond, £60. KW E-Zee Match atu, £20. Heathkit HM11U pwr/swr meter, 160-2m, £10. All manuals, G3AQB, QTHR. Tel 0665 720116.

SSTV keyboard pcb, assembled and comp, edge connectors, data, S100 vdu board, (Ithaca audio), working perfectly, comp with data, driver software, both items, offers? *Wanted:* Philips G6 lopt, 9in video monitor. G8POO, QTHR. Tel 06615 3449.

FT480R Yaesu multimode, six months old, £295. G4GZA, QTHR. Tel Scunthorpe 763594.

R1000 Trio gen cov rx, good cond, QM70 144MHz converter, £200. Datong indoor active antenna, psu (AD270), £30. Buyers to pay carriage on both items. Bancroft, G8PPR. Tel Bradford (0274) 674396.

Immac KW202 rx, handbook, best offer secures. 146 copies *Radio Constructor* 1950-78, 204 copies *Practical Wireless* 1950-80, not 1978, offers. Collection preferred. QQV0320, unused, £5. Pair Goodmans audio acoustical resistance units, 172ARU, £3 each, £5 pair. G3OEI, QTHR.

Icom 202S ssb/cw tx/rx, as new, used few hours only, orig packing, accessories, £125 ono. Gnome Beta 2 bw enlarger, baseboard, condenser lenses, two stop 3·25in enlarging lens, vgc, £15 ono. Creed 7B in bits for spares, choke 8H, 150mA, £1. Transformer 200/215/230/245 pri sec, 6·3V 7A, 6·3V 2·5A, 5V 2·5A, 475/0/475. Carriage at cost, could deliver reasonable distance. Tel 0784 52823, after 5pm.

Lunasix 3 lightmeter, cw carrying case, instructions, exc cond, £25 ono. G3VVL. Tel Mark Moor 324, after 6pm.

IC701, IC701PS, good cond, £575 ono. FT280, 13V, 6A stab mains psu, vgc, £280 ono. G3XVR, QTHR. Tel Bracknell 84028.

Servicing instruments: Avo electronic testmeter, Avo capacity/resistance bridge, Avo sig gen, Evershed Vignoles 500V megger,in use until retiring in 1977, Tavasa whip antenna, five loading coils (four unused), any reasonable offers considered. G8KP, QTHR.

FT227R, 25/5kHz steps, scanner, psu, £160. Sinclair ZX81 1K, psu, £55. GW8OKR. Tel Brian, Cardiff (0222) 810999, daytime 9am-5pm only.

TA33J three-band beam, Europa 2m transverter, brass morse key, Lionel bug key, LLL speech proc, SB200 linear amplifier, Heath SB610 monitorscope, valves 4CX150s, BC221, 813 HTR transformer. Send for details. G3HHZ, QTHR Devon.

Trio TS830S, fitted cw filter, a very fine rig, going homebrew, £600. *Wanted:* 572B valve. ARRL *1973 Handbook.* Vertical antenna for 10, 15, 20m. G4IZG, QTHR. Tel 0903 41109.

Valves: 6D6, 6B7, 6C6, in orig boxes, unused, three of each only, £1.50 each plus postage. D. Collins, 26 Cynthia Road, Bath BA2 3QH. Tel Bath 330588, evenings.

Yaesu FRDX400 incl 2m, 4m, £100. Datong FL1, £35. PR30, £15. Microwave Modules converters: 144/14, £20; 432/28, £25; 1,296/28, £25. Nine-el Tonna 144, fixed, £15. Loop-Yagi 1,296, £20. HRO bs coils power pack, suit beginner, £20. Tel 01-985 3278, evenings.

KW Viceroy tx, 3·5-28MHz, £30. HRD/JNR rx 7GC coils, £15. Labgear 28MHz quad antenna, £10. Tripod sectional mast, 25ft, £15. Triplett sig gen type 1632, £5. Two txs W7944 with pp, W7946, £5. Buyers collect. G4LX, QTHR.

FT101ZD, six-band but with Yaesu 10MHz mod, £400. Homebrew TT21 linear (similar to handbook design), £30. G3XTT, QTHR. Tel 0954 210630.

Swan 100MX, 235W ip, 13·5V ssb/cw, superb hf mobile rig, incl mic, mobile mount, manuals, vgc, £310 ono. Scott, G4FOY, QTHR. Tel 0420 82855.

Yaesu FT101ZD fm Mk3, brand new, boxed, mic, earphones, £550. Trio R1000, vgc, 2m converter, rubber duck, bncs, £200. Both in orig boxes, with manuals. Tel 01-674 0947, office hours.

Hi-fi equipment, Rega R100 pick-up arm, £40. FRT3 moving-coil transformer, £40. Technics 300MC cartridge, SU300MC head amplifier, £140. Ultimo 20A cartridge, £25. SME 3009 arm, £35. Naim head amplifier, £25 or exchange hf gear or w.h.y? G6FGP. Tel Ebchester 561212.

TS520SE cw filter, fitted tx unused, rx seldom used, immac, as new cond, £400. GM6FFV NOT QTHR. Tel Dollar (025 94) 2350.

IC202S 2m ssb/cw tx/rx, extra xtal 144·9MHz, orig packing, exc cond, £120 ono. G4GMA, QTHR. Tel Kidderminster (0562) 515405.

"Voice" chess challenger, 10 levels of play, 45 different book openings, in briefcase style cabinet, psu included, £120 ono. Factory-built frequency counter, eight-digit readout, 0-600MHz xtal oven, hardly used, £95. B. Smith, G3WCY, QTHR. Tel Ruislip 32341.

Racal RX117, good wkg order, £290 ono. Daiwa SR9 2m rx, xtals S19-21, R3, R5-6, £40 ono. Hallicrafters S86 gen cov rx, good wkg order, but needs calibration, offers. Tel Cheltenham (0242) 33546, after 6.30pm.

FRG7 gen cov rx, £110. EDL144 100W 2m valve linear, £65. HW7 hf cw QPP tx/rx, 40/20/15m, £35. 16-el 2m portable Tonna, £25. Storno CQP562R handheld fm 420/470MHz, comp but needs xtals, £25. G4HSS, QTHR. Tel Runcorn (0928) 718382, evenings.

MMT144/28 transverter, £70. MMC144/28 converter, £16. Both exc cond. G4JTQ. Tel Kinver 2250.

SRX30, mint, £110. Heathkit GR64 rx, £20. Cantley, Norfolk. Tel Great Yarmouth 700344.

FT480R 2m multimode, 18 months old, auto toneburst, listen-on-input on mic, £270 ono. G4KWT NOT QTHR. Tel Reading (0734) 698526, evenings.

Katsumi electronic keyer EK150, 8-50wpm, 240V ac, or 12V dc, mint cond, £36. G3HRU, QTHR. Tel Leeds 677178.

IC240, good cond, mobile mount, orig packing, £130. Eddystone EC10 gen cov rx, £70. Uria gen cov rx, £25. Pye Ranger tx, wkg 2m, spares, £15. Buyers collect. G6ANP, QTHR (Nr Bristol). Tel 027583 2768, weekends only.

Trio 2400, ST1 base charger, case, spkr/mic, no mods, £210. G8ZSV, QTHR. Tel Bury St Edmunds (0284) 68262.

Yaesu FT202R handheld, 2m, 1W, spkr/mic, mains charger, £85. Class 'D' wavemeter, £8. Pye Vanguard AM25T, 6ch, £15. GM8JJN, QTHR.

Yaesu FT480R, handbook, psu, 8-el Yagi, 5/8 mag whip, new, £275. Sony 5in tape recorder (reel), £10. All plus carriage. Cash. G3OSH, QTHR. Tel Ilminster 3349, after 7pm.

BC221 incl psu, £10. KW Vanguard 50W cw/a.m. tx, £20. Trio 2300 incl charger, nicads, helical ant, mains psu, 5/8 mobile whip, swr meter, £130. All items in exc cond. G4JRH, QTHR.

TV gear: grand clear out sale. Cameras, monitors, mixers, over 30 items on list, sae please. *Wanted:* IVC VTR700 or 800 series. Claud Lyons avr model TS3S448. EMI 2001 spares. Cash waiting. G8GQS, QTHR. Tel Brian, 0427 3940.

FDK Multi 700E 2m tx/rx, 25W output, exc cond, £120. MM144V 3SK88 preamp, £20. G8TLV, QTHR. Tel Southend (0702) 333330.

17in vdu, £15. Friden five-bit tty, £10. CCTV camera, £20. Many valves, components etc, sae list. *Wanted:* 1in video tape. G8EIP, c/o 326 High Street, Berkhamsted, Herts. Tel Denis, Berkhamsted 4334.

FT277 (FT101), 160-10, all filters, mods, fan, £310. FR101, 160-10 plus 2 and 4, £210. FT207R whip charger, spkr/mic, £110. All with manuals, boxes, bits. Prefer buyer inspects/collects. G3HDB, QTHR. Tel 0926 53524.

TenTec Century 21 digital solidstate five-band tx/rx, matching atu, electronic keyer, exc no-frills cw tx/rx, £175. Heath HD1410 electronic keyer, fitted with relay for changeover keying. 4-35wpm, £10. G4LGK NOT QTHR. Tel 09062 4265.

EC10, gen cov, mains/battery psus, plinth containing 2m converter and S-meter, £60 ono. Ferguson stereo radio/record player with spkrs, £40. Citizen eight-track car player, pod spkrs, £15. G4CUS NOT QTHR. Tel Winchelsea (Sussex) 203.

TR7800 2m fm tx/rx, scanning mic, etc, nine months old, £210. GW3WSU, QTHR. Tel 0446 8261.

TA33 high power Mustang beam, £75. 30ft Versatower P30, 1yr old, £250. HW101, £175. *Wanted:* FL2100 linear or similar. G3SHL, 4 Main Street, Wilbarston, Market Harborough, Leics LE16 8QQ. Tel 0536 770939.

Trio TR9000, exc cond, 1yr old, in orig packing, never used mobile, £295. Trio 2200G, fully xtalled, usual extras, mains psu, £65 ono. G4ARO, QTHR. Tel 0293 29183.

Belcom Liner 430 uhf, ssb, tx/rx, 12W p.e.p., £65 ono. GI4HFB, QTHR.

FT101E, mint cond, spare valves, never used mobile, £390. G3PYP, QTHR. Tel Melksham 708816.

Heathkit SB200 hf linear amp, pair 572Bs in immac cond, £220 ono. *Wanted:* 40ft telescopic tiltover tower, prepared to collect and assist in dismantlement. GW3UZS, QTHR. Tel 0222 491046.

Century 21 communications rx (same as Lowe SRX30), used little, 0·5-30MHz, u/lsb, mains/battery, £110. Saunders, Feldings, Church Road, Rotherfield, Sussex. Tel Rotherfield (Sussex) 2265.

Two-el three-band quad glass fibre wrapped poles, alloy spider, new, £110. Two 10m handheld tx/rx, 3ch, squelch control, calltone, £100. G3XTU, QTHR. Tel 02302 4579, evenings.

FT101ZD Mk3, fm and new bands, 12 months old only, orig packing, handbook, mic, fan, leads, £550 ono. G4GKD, QTHR. Tel 0793 850056, after 6pm.

Europa "C" 2m (60W+) transverter for FT101s, £75. FT101Z etc, inverter for dc operation, £25. Amtech 100 mobile match, £10. Items are new, unused, carriage paid. Items held for seven days after advert appears, to allow for mail delays. G3ZDO, QTHR.

Trio 2200GX, nicads, charger, case, helical, telescopic, handbook, six S, six R channels, good wkg order, orig packing, £80. G8PMO, QTHR. Tel 021-444 1053.

TS510/PS510, cw filter, good cosmetics, £195. G2DYM 108ft 500W trap dipole, feeder, balun, £30. 6dB 2m colinear, £15. ~ 17ft base load vertical, 3 by 2ft radials, adjusted 28·5MHz, £15. All ono. Carriage at cost. Andrews, G4LKI. Tel Templecombe (0963) 70587, before 10pm.

FRDX400S multimode rx, 160-10m, all extras incl 2m and 4m wide and narrow cw filters, vgc, £150. Will deliver within 30 miles of Cannock or buyer collects. G4ENG, QTHR. Tel Dave, Cheslyn Hay 417477.

Eddystone 840C gen cov rx, £50 ono. 600kHz ssb gen, £10. Mullard Modules fm tuner, £5. *Wanted:* old slow motion dials made by Burndept or Indigraph. G3SSJ, QTHR. Tel Alresford (096273) 3816.

KW2000E psu, handbook, 4BTV ant, 80m resonator, Shure 201 mic, sp key, wavemeter class D, all in good order, £300. Buyer inspects and collects. G3TPN, QTHR. Tel 0385 884298.

Trio 120S, PS30 cw filter, MC35S noise cancelling mic, owners manual, workshop manual, vgc, need money for new project, £420. GW4KWV, QTHR. Tel 0656-880 723, after 6pm.

Yaesu FRG7000 rx, Microwave Modules MM2000 rtty to tv converter, Microwave Modules 144MHz mosfet converter, MMC144/28, Hygain 12AVQ 20/15/10m vertical, all exc cond. Tel Harding, Ingrebourne (Romford area) 45374.

Racal RA317 communications rx, vgc, handbooks, manuals, £350. G8PRR. Tel 01-340 4139.

Linear for your Icom IC202S or IC215E, Modular Electronics linear with rf preamp, 3W input for 25W output, £35 ono. G8SRE. Tel Ashford (Middx) 54823, evenings.

FDK Multi 750E, exc cond, boxed, all accessories, £230. G3AZT, QTHR. Tel Frilford Heath 390598.

TenTec Omni-C, as new, six months since new, used little, matching psu, £625. FT480R, as new, never used mobile, 1yr old, £300. Collection/delivery arranged. G3ICH, QTHR. Tel Hemyock 680234.

ZX81, 16K ram, various books, cassettes, £95, with free psu if collected. Twenty-four 4027 450m dynamic rams, £10, or will do straight swop—the lot for

TR2300 and w.h.y. G3MPE, QTHR. Tel Bracknell 50831.

101ZD, six-band, cw and ssb only, mint, buyer collects or arrange carriage, £475. G3HEZ, QTHR. Tel 0223 833350.

Yaesu FRG7 rx, mint cond, manual, orig packing, matching Partridge antenna downlead, £165. Yaesu FT221 tx/rx, mint cond, manual, accessories, comp, £300. Catronics frequency meter, up to 150MHz, manual, £75. G8KRK, QTHR. Tel Freeland 882605, after 7pm.

FDK750E, PS750E 144MHz multimode, as new, boxed, £295. FT7 portable station in briefcase, £250. Trio MC50 desk mic, £15. SR56 programmable calculator, £5. HW202 xtals: R3, S21, B7G 7MHz and 100kHz, £1 each. G4ILO. Tel 01-316 0054.

FT101B tx/rx, spare valves, £325. FL2100Z linear amplifier, £300. Magnum 2 2m transverter, plug-in to FT101 range, £40. Pair 572B valves, new, £35. Poulter, G3WHK, QTHR. Tel 01-330 5795, after 6pm.

Eddystone model EA12 amateur bands communications rx. Tunable i.f. slot filter, 100kHz xtal, audio filters for cw, all brand new valves, comp with orig large service manual, £125. G3PKR, 21 Lundy Drive, Hayes, Middx.

National HRO table mains unit 697, circuit, £6. HRO rack mounting mains unit, £5. Mains transistor test set, Beulah Electronics, external meter required, £5. *Wanted:* tuning scale, etc, for Bendix radio compass MN26C. G3MBL, QTHR. Tel 01-445 4321.

Icom IC22A 2m tx/rx mobile, fitted 14 channels, £75. Yaesu FT202R 2m handheld tx/rx, S17, S20-22, R2, R6, nicads, charger, £60. Mizuho SB2M 2m ssb/cw portable, £75. Bob Pearson, G6EKL. Tel Luton 863902, evenings, Garston (Herts) 74000, ext 442, office hours.

Icom IC701 hf rig, power supply, SM2 desk mic, offers. Hygain 18AVT/WB antenna, 50ft coaxial, offers. New Purbeck scope, offers. G8VPE, QTHR. Tel Great Yarmouth (0493) 728194.

Trio TR7010 2m ssb, extra xtals, perfect cond, £115. G3WBN, QTHR. Tel 01-654 2761.

TS700G, good cond, £250. Will consider exchange for hf gear. Consider sale or exchange all 2m gear for right hf gear. G8CAU, QTHR. Tel 0228 22583, after 6pm.

Yaesu FR101D, all filters, inc extra 350Hz cw filter, covers 4m and 2m, good cond, £295. FT221R, full set fixed channel xtals, service manual, £295.1980 USA and foreign callbooks, £6.50 each. G3PEK, QTHR. Tel 0244 300897.

Lowe SRX30 gen cov rx, exc cond, unmarked, incl orig packing, manual, £120. TM56B 2m monitor, comp with 14 xtals, exc cond, £75. Tel Bradford (0274) 596907, weekends or after 6pm.

MMS1 morse talker, just the machine to help for the G4 licence, the MMS1 could be yours for just £80, incl p&p. GD6CGL. Tel IoM (0624) 2705, after 6pm.

TS120V, 18 months old, used receive only, unmarked, mint cond, all orig packing, manual, etc, £295. AT10 matching atu, £50. G8CCI, QTHR. Tel Oxford 880229, evenings or weekends.

Oscilloscope EMI type WM16, uses plug-in amplifiers, dual beam unit, £35. Amps, £5 each. Marconi standard sig gen TF867A, 15kHz-30MHz, £20. G3JTQ, QTHR. Tel Ascot (0990) 26764.

RTTY: 88mH toroids. Having problems tuning them, if you can get hold of any, then buy a pair already pretuned with low loss, high stability capacitors. These are suitable for use with the BARTG ST5 terminal unit, just fit on the board and carry on building, in the knowledge that your filters are spot on at 1,275 and 1,445Hz, £7.50 pair. Phil Hodson, G8RBY, 43 Thorpe Road, Melton Mowbray, Leics.

Two Pye fm Bantams, one high band, one low band, comp nicads, mics, antennas, one high band set for spares, circuit particulars, £60 lot. Racal RA117, exc cond, offers. Redifon marine vhf radio telephone, £60. Tel 0903 66329.

R1000, few scratches on top otherwise vgc, £220. FR101D, few xtals, 4m board missing, appears tatty but works! £120. Q4/2M 2m quad, £15. Buyers collect. Tel Paul, Chipping Sodbury (0454) 310811.

Heavy duty commercial towers, three available, suitable for serious hf/vhf/uhf dxer, one 64ft, two 48ft or any combination in 16ft sections, triangular, 4ft wide at base tapering to 2ft at 16ft high and above, all galvanized steel, requires solid base, recommended for stacked/heavy antennas, unlikely to need guying, price £5 per foot, buyer collects (Woking). G3KMA, QTHR. Tel Chobham (09905) 8224.

Hallicrafters 3X100, exc cond, recently tested and realigned, auto-transformer incl, £60. Lafayette fm rx, 152-174MHz, HA52A, £10. Drake R7 service manual, new, cost £20, accept £15. All carriage extra. Cameron. Tel Stroud 3081, evenings.

TS130S with new PS30 power supply, £500. FT221, Mutek board fitted, £280. 12AVQ, £25. G-whip with 20, 40, 15, 10 and 80 coils, base, new, £30. AR240 hand held tx/rx, £150. The lot, £900 or £985 split. R. J. Beattie, GI4FME. Tel Cookstown 65413.

FT401 10-80m, cw filter mic, spare pa valves, £275. KW E-Zee Match, £25. Osker swr/power meter, £30. *Wanted:* TS520SE, AT200 tuner/power meter, TR2300. G4CTU, QTHR. Tel Kidderminster (0562) 3966.

Trio 7800, in exc cond, £200. SX200 scanner, Discone antenna, £180. Tel 0229 57359.

WANTED

Special communications Mk7 tx/rx (spy TRX), offers. Otto A. Wiesner, DJ5QK, Feuden Heimer St 12, D-69, Heidelberg, Germany.

B2 and A Mk3 suitcase radio or any other wartime suitcase/spy type radio. Any cond or incomplete welcomed. G8VDZ, QTHR. Tel 01-949 2317.

Teletype model 28 and Dubo TC10 terminal unit; handbook, service details. Prefer purchase but if loaned returned quickly with costs. Teleprinter handbook also wanted. Alec Clelland, DJ0FL, c/o 95 Lakeside, Eaton Drive, Kingston, Surrey. Tel 01-549 1626.

Loan or purchase manual for a Pye base station 450T. G6APJ, QTHR.Tel 0203 597411.

Mains pp for EC10 rx. *For sale:* Joystick vfa, Joymatch atu, £21. Factory assembled Cambridge lf converter, 100-600kHz, £12. G3JIC, QTHR.Tel St Helens (0744) 23916.

Meter for AVO CT38 30mA fsd. G3TND, QTHR.Tel 027-587 2241.

For the Wireless Museum: pre-war radio books, magazines, catalogues, QSL cards, Gamages catalogue, 1916 White valve, Mk3 aircraft tuner, any old knobs! Morse keys, mics. Collection arranged. Details please to hon sec G3KPO, QTHR. Tel Ryde (0983) 62513.

Old-timer QSL cards, pre-1930, still needed for research. I will pay up to £5 for 1924 cards and more for earlier. Antarctica cards incl supply ships, all periods. G3BDQ, "Whitefriars", Friars Hill, Guestling, Hastings, East Sussex.

Manual CR100, set of orig control knobs for AR88 or consider scrap AR88 for spares. Matching spkr and 'S' meter. 13 Oak Road, Scunthorpe DN16 2ER. Tel 0724 68146, late evening.

KW E-Zee Match atu, will pay up to £30 for one in good cond and wkg order. G3RUN, QTHR. Tel 03045 4276.

Please, have any members any international and local callsign books, plus any other material for my new swl station, willing to pay reasonable price plus carriage. Tel Chris, BRS50179, Radcliffe-on-Trent (Nottingham) 060-73 2027.

Suitcase or miniature tx/rxs; any spares, incomplete or damaged sets. WS62 with transistorized psu. WS (Canadian) No 29 connecting leads, etc. Army tx No 53. Any commercial/military mains a.m. fone tx or tx/rx. Taylor, G3UCT, QTHR. Tel Fleet (02514) 6998.

Circuit or manual for US oscilloscope OS26, USM24, buy or borrow, expenses paid. Line output transistor pnp for Russian tv Rigonda VL100. Hawkins, G3ZMC, QTHR. Tel Edenbridge 863005.

McMichael radios, radiograms, tvs, literature, etc, sought for museum. Also MH Components. G8IHF, QTHR. Tel Bagshot 74426, evenings.

2m converter board and fm board for Yaesu FR101S rx. G4KZZ, QTHR. Tel 0203 444160.

FV101B external vfo cw filter for FT101B, details and price to G3NPF, QTHR. Tel Horsham 66290.

Original mains power supply unit for BC221. Pair of 572B (T160L) in serviceable cond for KW1000. G3ADZ, QTHR. Tel Rugby 815222, evenings.

Manual and circuit diagram for Hallicrafters S40 rx, photostat acceptable. Wright, 44 Wilmott Way, Basingstoke, Hants. Tel Basingstoke 68649.

Varigap xtal holder, with or without xtal, any freq. W.H.Y? G3MCK, QTHR. Tel 0784 50600, evenings.

4-125 (QY3-125), 4-250, 4-400 valves and bases. G3AMF, QTHR. Tel 01-989 9224.

Valves type 4D32, DET18, TZ40, DA41, DA42, PX25, PX4, EL91, 6AM5, CV136, A3064, CV4014, 5763, 75C1, OA2WA, OA2, OB2WA, OB2, 13201A, S130, S130P, 6J5GT, EM34, Osram L21. Robert Coleman, 31 Kingfisher Road, Upminster, Essex RM14 1ER. Tel Upminster 21523, evenings.

Pye PE70B short wave rx, export model, must be in good cond. G4LJZ, QTHR. Tel Shepton Mallet (0749) 3690, after 7pm.

HQ1 mini quad, load coil for driven element, brass spokes to repair storm damage. Would consider purchase of incomplete/damaged HQ1. GM4HYE, QTHR.

Meter 500mA (or less), state size/shape. *For sale:* Mains transformers, meters, state wants. Parker, 133 Station Road, Cropston, Leicester LE7 7HH.

SB101 or HW101 in good cond, with power supply unit and manuals. G5HB, QTHR. Tel 0242 515052.

Gen cov hf rx, CR100, AR88 or similar. Will consider one needing attention. Will arrange collection reasonable distance from Preston. G4CF, QTHR. Tel 0704 893512.

Teac four-channel tape deck with simul-sync model 3340. *For sale:* twin channel four-track model 3300, in mint cond (see for sale ad). G8VXQ, QTHR. Tel 021-705 3583.

BPO type 610 key, in good nick. Marconi SH key in good cond. Details and price to GW4JKR, QTHR.

HF rx for young (poor) swl in wkg order. Can collect within 30 miles of Teesside. Copy of manual or circuit diagram for R115A rx. Costs reimbursed. G4DXP NOT QTHR. Tel Stockton (0642) 613 968, evenings.

Circuits, pcb track patterns for "homebrew" micro-based rtty, 6802 etc, for tv display. I have constructed the BARTG ST5 terminal unit. All mail answered. Have got 7400 interface for micro system. Paul Bown, 11 Bayview Crescent, Cromarty, Highland IV11 8YP.

KW107 Supermatch or KW Ezee-Match. BC221 with charts, GW4LVF. Tel Wrexham 755618, after 6pm.

Antenna dish, 6ft diameter or larger, operation instructions, service manual, for Mullard high speed valve tester. Bentley, 27 De Vere Gardens, Ilford, Essex. Tel 01-554 6631.

Exchange Cambridge xtals R3, R5 for S12 or any simplex or will buy. Cambridge handbook, borrow or buy. Low loss coaxial switch. G3GZQ, QTHR Devon. Tel 03644 3608.

Easibinders: old size for *Radio Communication* pre-1981, with or without magazines, state price. Trio BPF2A 2m bandpass filter. Dr S. M. Wood, G8OWI, QTHR. Tel 0532 33144, daytime.

Pye SSB130 power supply units, associated equipment, whips etc. John Eley, 5 Morgan Close, Saltford, Bristol BS18 3LN. Tel Saltford (022-17) 2818.

Old brass morse key in wkg order. FT101ZD, preferably with fan and fm. G4MUJ. Tel Lancing 3102.

VFO30G, to use with existing 2200GX for pensioner now partly disabled. Would consider purchase also of associated 2200GX if "no split" sale is required. G4GKI, QTHR. Tel Wirral (Merseyside) (051) 342 4470.

LOWE in LONDON

With an increasing amount of our business coming from the South of England, in particular around the London area we have, for your convenience, opened a shop in the city – not out in the suburbs but only three minutes' walk from Kings Cross Railway Station.

Now you have the opportunity to see and try out our full range of amateur, aircraft, marine and shortwave equipment before you purchase.

The shop is open from 9.30am to 5.30pm Tuesday to Friday and 9.30am until 5.00pm on Saturday.

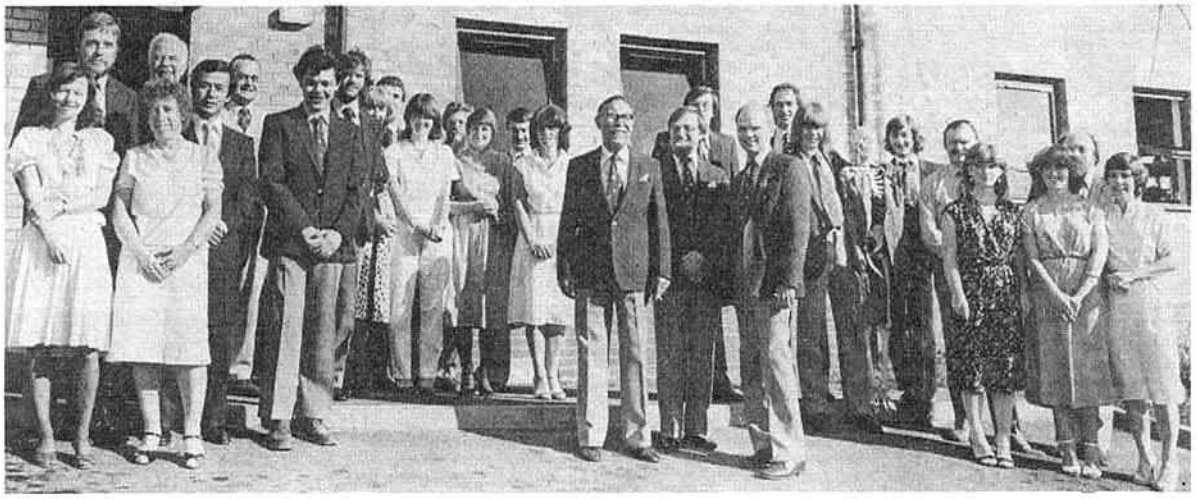
To check whether an item is in stock before your visit ring Andy on 01-837 6702 – however, please remember that all mail order and telephone sales are still being handled from Matlock.

For your added convenience, Andy is able to accept payment by Access, Barclaycard or, of course, by our very own Lowe Card.

All items purchased from London carry the renowned Lowe Electronics' guarantee and the London shop and its customers are backed by the now well-known facilities here at Matlock.

So, pay a visit to Lowe in London, situated on the lower sales floor of the Hepworth's shop at the corner of Pentonville and Caledonian Road.

tony & andy the london lads



the backup team at matlock

LOWE electronics

DO YOUR MAIL ORDER SHOPPING THE EASY WAY — THE BREDHURST WAY

To order any of the items listed below, simply write enclosing a cheque or phone and quote your credit card number—we'll do the rest!

Bredhurst electronics

TRIO R-600 £235.00

TRIO		£	Carr.
TS830S	160-10m Transceiver 9 Bands	694.00	(—)
VFO230	Digital V.F.O. with Memories	215.00	(2.00)
AT230	All Band ATU/Power Meter	119.00	(2.00)
SP230	External Speaker Unit	34.96	(1.50)
DFC230	Dig. Frequency Remote Controller	179.00	(1.50)
YK88C	500Hz CW Filter	29.60	(0.50)
YK88CN	270Hz CW Filter	32.66	(0.50)
TS130S	8 Band 200W Pep Transceiver	525.00	(—)
TS130V	8 Band 20W Pep Transceiver	445.00	(—)
VFO120	External V.F.O.	85.00	(1.50)
TL120	200W Pep Linear for TS120V	144.00	(1.50)
MB100	Mobile Mount for TS130/120	17.00	(1.50)
SP120	Base Station External Speaker	23.00	(1.50)
AT130	100W Antenna Tuner	79.00	(1.50)
PS20	AC Power Supply - TS130V	49.45	(2.50)
PS30	AC Power Supply - TS130S	88.50	(5.00)
MA5	5 Band Mobile Aerial System	86.00	(5.00)
MC50	Dual Impedance Desk Microphone	25.76	(1.50)
MC35S	Fist Microphone 50K ohm IMP	13.80	(0.75)
MC30S	Fist Microphone 500 ohm IMP	13.80	(0.75)
LF30A	HF Low Pass Filter 1kW	17.90	(1.00)
TR9000	2M Synthesised Multimode	371.00	(—)
BO9	Base Plinth for TR9000	34.90	(1.50)
TR7800	2M Synthesised FM Mobile 25W	284.00	(—)
TR7730	2M Synthesised FM Compact Mobile 25W	247.00	(—)
TR2300	2M Synthesised FM Portable	166.00	(—)
VB2300	10W Amplifier for TR2300	58.00	(1.50)
MB2	Mobile Mount for TR2300	17.71	(1.50)
RA1	Flexible Rubber Antenna for TR2300	6.90	(0.50)
TR2500	2M FM Synthesised Handheld	207.00	(—)
ST2	Base Stand	46.00	(1.50)
SC4	Soft Case	12.19	(0.50)
SMC25	Speaker Mic	14.49	(1.00)
PB25	Spare battery pack	22.30	(1.00)
MS1	Mobile Stand	28.20	(1.00)
TR8400	70cm FM Synthesised Mobile Transceiver	334.00	(—)
PS10	Base Station Power Supply for 8400	64.00	(2.00)
TR9500	70cm Synthesised Multimode	449.00	(—)
R1000	Synthesised 200KHz-30MHz Receiver	297.00	(—)
SP100	External Speaker Unit	26.90	(1.50)
HC10	Digital Station World Time Clock	58.80	(1.50)
HS5	Deluxe Headphones	21.85	(1.00)
HS4	Economy Headphones	10.35	(1.00)
SP40	Mobile External Speaker	12.40	(1.50)
ICOM			
IC730	HF Mobile Transceiver 8 Band	586.00	(—)
IC720A	HF Transceiver & Gen. Cov. Receiver	883.00	(—)
PS15	Power Supply for 720A	99.00	(3.00)
IC251E	2M Multimode Base Station	499.00	(—)
IC25E	2M Synthesised Compact 25W Mobile	259.00	(—)
IC290E	2M Multimode Mobile	366.00	(—)
IC2E	2M FM Synthesised Handheld	169.00	(—)
IC L1/2/3	Soft Cases	3.50	(0.50)
IC HM9	Speaker/Microphone	12.00	(0.75)
IC BC30	230V AC Base Charger and Hod	39.00	(1.50)
IC BC25	230V AC Trickle Charger	4.25	(0.75)
IC CP1	Car Charging Lead	3.20	(0.50)
IC BP2	6V Nicad Pack for IC2E	22.00	(1.00)
IC BP3	9V Nicad Pack for IC2E	17.70	(1.00)
IC BP4	Empty Case for 6 x AA Nicads	5.80	(0.75)
IC BP5	11.5V Nicad Pack for IC2E	30.50	(1.00)
IC DC1	12V Adaptor Pack for IC2E	8.40	(0.75)
IC ML1	10W Booster	49.00	(1.00)
TV INTERFERENCE AIDS			
Ferrite Rings 1⅛" dia. per pair		0.80	(0.20)
Toroid Filter TV Down Lead		2.00	(0.50)
Low Pass Filter LP30 100W		3.95	(0.50)
Trio Low Pass Filter LF30A 1kW		17.90	(1.00)
Yaesu Low Pass Filter FF501 DX 1kW		23.00	(1.00)
HP4A High Pass Filter TV Down Lead		5.95	(—)
ANTENNA BITS			
H1-Q Balun 1:1 5kW pep (PL259 Fitting)		9.95	(0.75)
T Piece Polyprop Dipole Centre		1.00	(0.30)
Ceramic Strain Insulators		0.40	(0.10)
Small Egg Insulators		0.40	(0.10)
Large Egg Insulators		0.50	(0.10)
75 ohm Twin Feeder - Light Duty - Per Meter		0.16	(0.04)
300 ohm Twin Feeder - Per meter		0.14	(0.04)
URM67 Low Loss 50 ohm Coax - Per Meter		0.60	(0.20)
UR76 50 ohm Coax - Per Meter		0.25	(0.05)

Please send total postage indicated. Any excess will be refunded.

RECEIVER			
R517	Airband Handheld	49.50	(1.00)
AR22	Amateur Band synthesised handheld	89.00	(1.00)
AR22M	Maine Band synthesised handheld	95.00	(1.00)
SX200N	Scanning VHF-UHF receiver	265.00	(—)
NICAD BATTERIES			
'C' Nicads 2·2 Amp-Hr (FT290R etc)		2.50	(—)
'AA' Nicads 500 mAmp Hr		1.00	(—)
DUMMY LOADS			
DL30	PL259 connector 30W max	5.00	(0.50)
DL60	PL259 connector 60W max	8.80	(0.75)
DL60N	N type connector 60W max	16.50	(0.75)
WELZ CT300 1 kW max		42.95	(1.50)
CONNECTORS – INTER SERIES ADAPTORS			
BNC Plug to SO239		1.75	
BNC Socket to PL259		1.75	
BNC Socket to SO239		1.75	
BNC Socket to N plug		3.50	
BNC Plug to N socket		3.50	
SO239 to N plug		3.00	
PL259 to N socket		3.00	

Minimum postage 30p—any no. of connectors.

DATONG D70 MORSE TUTOR
£49.45
inc VAT & carriage

DATONG PRODUCTS			
PC1	Gen Coverage Converter H.F. on 2M	120.75	(—)
VLF	Very Low Frequency Converter	25.30	(—)
FL1	Frequency Agile Converter	67.85	(—)
FL2	Multi-mode Audio Filter	89.70	(—)
ASP	Auto R.F. Speech Clipper (Trio or Yaesu Plug)	79.35	(—)
D75	Manually controlled R.F. Speech Clipper	56.35	(—)
RFC/M	R.F. Speech Clipper module	26.45	(—)
D70	Morse Tutor	49.45	(—)
AD270	Indoor Active Filter (inc PSU)	42.55	(—)
AD370	Outdoor Active Filter (inc PSU)	56.35	(—)
MK	Keyboard morse sender	129.00	(—)
Codecall	Selective calling device (Link prog)	27.60	(—)
"	" " " (Switch prog)	29.32	(—)
RFA	Wideband preamplifier	29.32	(—)
MPU	Mains power unit	6.90	(—)
MORSE EQUIPMENT			
MK704	Squeeze Paddle	10.50	(0.50)
HK707	Up/Down Key	10.50	(0.50)
EKM1A	Practise Oscillator	8.75	(0.50)
EK121	Elbug	29.95	(0.50)
EKM1A	Matching Side Tone Monitor	10.95	(0.50)
EK150	Electronic Keyer	74.00	(—)
ROTATORS			
KR250	Kenpro Lightweight 1-1½" mast	44.95	(2.00)
Hirschman	RO250 VHF Rotor	49.95	(2.00)
9502B	Coloretor (Med. VHF)	49.95	(2.00)
KR400RC	Kenpro - inc lower clamps	99.95	(2.50)
KR600RC	Kenpro - inc lower clamps	139.95	(3.00)
DESK MICROPHONES			
SHURE 444D Dual Impedance		33.00	(1.50)
SHURE 526T Mk II Power Microphone		46.00	(1.50)
ADONIS AM502 Compression Mic 1 O/P		39.00	(—)
ADONIS AM601 Compression Mic + Meter 1 O/P		49.00	(—)
ADONIS AM802 Compression Mic + Meter 3 O/P		59.00	(—)
MOBILE SAFETY MICROPHONES			
ADONIS AM 202S Clip-on		21.95	(—)
ADONIS AM 202F Swan Neck + Up/Down Buttons		30.00	(—)
ADONIS AM 202H Head Band + Up/Down Buttons		30.95	(—)

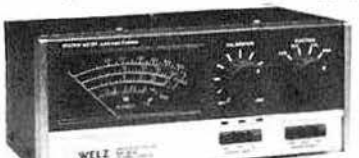
DRAE PRODUCTS – fully protected power supplies

4 Amp 27.95 (1.50) 12 Amp 69.00 (2.00)
6 Amp 44.95 (2.00) 24 Amp 99.00 (3.00)
VHF Wavemeter 130-450MHz 24.95 (—)

TEST EQUIPMENT			
Drae VHF Wavemeter 130-450MHz		24.95	(—)
FXI Wavemeter 250MHz MAX		33.00	(0.75)
DM81 Trio Dip Meter		59.75	(0.75)
MMD50/500 Dig. Frequency meter (500MHz)		69.00	(0.75)
Co-AXIAL SWITCH			
2 Way Diecast (V.H.F.)		10.00	(0.50)
2 Way Toggle (V.H.F.)			(0.50)
HELICAL ANTENNAS			
2M BNC or PL259 (state which required)		4.50	(0.50)
2M Thread for TR2300 or FT290R (state which)		4.50	(0.50)
70cm BNC		4.50	(0.30)

YAESU			
FT1	Superb new HF Transceiver	1295.00	(—)
FT902DM	160-10m 9 Band Transceiver	885.00	(—)
FC902	All Band A.T.U.	135.00	(1.50)
SP901	External Speaker	31.00	(1.50)
FT101Z	160-10m 9 Band Transceiver (FM)	590.00	(—)
FT101ZD	160-10m 9 Band Transceiver (FM) Digital R.O.	665.00	(—)
DCT101Z	DC/DC Power Pack	42.55	(1.50)
FAN101Z	Cooling Fan for 101Z/ZD	13.80	(0.75)
FT707	8 Band Transceiver 200W Pep	569.00	(—)
FT707S	8 Band Transceiver 20W pep	485.00	(—)
FP707	Matching Power Supply	125.00	(5.00)
FTV707R (2)	Transverter - 2M	198.00	(—)
FV707DM	Digital V.F.O.	203.00	(—)
FC707	Matching A.T.U./Power Meter	85.00	(1.00)
MR7	Metal Rack for FT707	15.70	(1.00)
MMB2	Mobile Mounting Bracket for FT707	16.10	(1.00)
FRG7	General Coverage Receiver	199.00	(—)
FRG7700	200KHz-30MHz Gen. Coverage Receiver	329.00	(—)
FRG7700M	As above but with Memories	409.00	(—)
FRT7700	Antenna Tuning Unit	37.00	(1.00)
FT208R	2M FM Synthesised Handheld	209.00	(—)
FT290R	2M Portable Synthesised Multi-mode	249.00	(—)
FT708R	70cm FM Synthesised Handheld	219.00	(—)
NC7	Base Trickle Charger	26.88	(1.30)
NC8	Base Fast/Trickle Charger	44.10	(1.50)
NC9C	Compact Trickle Charger	8.00	(0.75)
FBA2	Battery Sleeve for use with NC7/8	3.05	(0.50)
FNB2	Spare Battery Pack	17.25	(0.75)
PA3	12V DC Adaptor	13.40	(0.75)
FT480R	2M Synthesised Multimode	379.00	(—)
FT780R	70cm Synthesised Multimode (1.6MHz Shift)	459.00	(—)
FP80	Matching 230V AC Power Supply	63.00	(1.50)

FT290R	2M Portable Synthesised Multimode	249.00	(—)
MMB11	Mobile Mounting Bracket	22.25	(1.00)
CSC1	Soft Carrying Case	3.45	(0.75)
NC11C	240V AC Trickle Charger	8.05	(0.75)
FL2010	Matching 10W Linear	64.00	(1.20)
Nicads	2.2 AMP HR Nicads Each	2.50	(—)
FF501DX	H.F. Low Pass Filter 1kW	23.00	(1.00)
FSP1	Mobile External Speaker 8 ohm 6W	9.95	(0.75)
YH55	Headphones 8 ohm	10.00	(0.75)
YH77	Lightweight Headphones 8 ohm	10.00	(0.75)
QTR24D	World Clock (Quartz)	28.00	(0.75)
YM24A	Speaker/Mic 207/208/708	16.85	(0.75)
YD148	Stand Microphone Dual IMP 4 Pin Plug	21.00	(1.50)
YM34	As 148 but 8 Pin Plug	21.45	(1.50)
YM38	As 34 but up/down Scan Buttons	24.90	(1.50)
FDK VHF/UHF EQUIPMENT			
Multi 700EX	2M FM Synthesised 25W Mobile	199.00	(—)
Multi 750E	2M Multimode Mobile	289.00	(—)
Expander	70cm Transverter for M750E	219.00	(—)
STANDARD VHF/UHF			
C78	70cm FM Portable	219.00	(—)
CPB78	10W Matching Linear	67.50	(1.50)
C58	2M Multimode Portable	239.00	(—)
CPB58	25W Matching Linear	79.50	(1.50)
CM8	Mobile Bracket	19.95	(1.00)
CL8	Soft Carrying Case	6.95	(0.75)
C12/230	Charger	7.59	(0.75)



WELZ SWR/POWER METERS

SWR - POWER METERS			
Model 110	H.F/2M Calibrated Power Reading	11.50	(0.50)
SWR25	H.F/2M Twin Meter	11.50	(0.50)
UH74	2M/70	14.30	(0.50)
WELZ SP15M	H.F/2M 200W	29.00	(0.75)
WELZ SP45M	2M/70cm 100W	45.00	(0.75)
WELZ SP200	H.F/2M	59.00	(1.00)
WELZ SP300	H.F/2M/70	79.00	(1.00)
WELZ SP400	2M/70	59.00	(1.00)
DAIWA SW110A	H.F/2M	35.00	(—)
DAIWA CN620A	H.F/2M Cross Pointers	52.80	(—)
DAIWA CN630	2M/70 Cross Pointers	71.00	(—)

Buy it with Access

MAIL ORDER
Mon-Sat
9-12:30/1:30-5:30

All prices correct at time of going to press

BREDHURST ELECTRONICS
HIGH STREET, HANDCROSS, W.SUSSEX Tel: 0444 400786

RETAIL
Mon-Sat
9-12:30/1:30-5:30

BARCLAYCARD VISA

E&OE

MAIL ORDER

THE EASY WAY—THE BREDHURST WAY
TO ORDER ANY OF THE ITEMS LISTED BELOW SIMPLY WRITE ENCLOSING A CHEQUE OR PHONE AND QUOTE YOUR CREDIT CARD NO. —WE DO THE REST!

Bredhurst electronics

HIGH STREET, HANDCROSS, W. SUSSEX 0444 400786

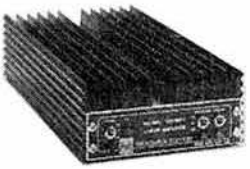
MICROWAVE MODULES, formed 1969, is a wholly independent BRITISH company manufacturing quality products to professional standards for the amateur market.
See Microwave Modules products in our showroom at Handcross or on the BREDHURST stand at the major mobile rallies throughout the year.

TRANSVERTERS

£184 inc VAT & carriage

MMT 432/144R
An easy way to operate extra bands using your existing transceiver. Linear transverter for operating on 70cm band using 2M transceiver nominal 10W output.

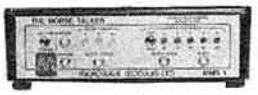
LINEARS



£145 inc VAT & carriage

MML 144/100 LS
Output power amplifiers combined with low noise preamplifiers. Ideal for use with 2M portables input power 1W or 3W. Output power 100W.

THE MORSE TALKER



£115 inc VAT & carriage

MMS 1
This unique product is a self contained SPEAKING MORSE TUTOR and as well as a random morse generator, the MMS 1 incorporates a microprocessor speech synthesis system which provides talk back of the morse after transmission.

AMATEUR TV CONVERTER

£27.90 inc VAT & carriage

Intended for use with a standard domestic UHF TV set to produce a high reliability receive capability for amateur television communication. Input frequency 430-440MHz. Output frequency Tuned to TV channel 35.

LOW NOISE PRE-AMP

£34.90 inc VAT & carriage

MMA-144V
This preamplifier is an essential addition for the serious operator. Gain is 15dB. Noise figure is 1-3dB max. This unit is designed to be left in the aerial lead at all times and will accept a through power of 100W.

FREQUENCY COUNTER

£69 inc VAT & carriage

MMD 050/500
0·45-500MHz in two ranges.
12V D.C. operation.
100Hz resolution on 50MHz range.
1kHz resolution on 500MHz range.

RTTY TO TV CONVERTER

£169 inc VAT & carriage

MM 2000
Simply connect between audio output of a short wave receiver and the aerial input of a domestic UHF standard TV set, connect a simple 12V dc supply, to enable a live display of "off-air" RTTY and ASCII.

CONVERTER

An easy way to monitor other bands using your existing receiver.

Listen to 2M amateur band on any shortwave receiver which tunes 28 to 30MHz.

MMC 144/28
£27.90
inc VAT & carriage

Listen to 70cm amateur band on any 2M transceiver or receiver. Input frequency 432-436MHz. Output frequency 144-146MHz.

MMC 432/144S
£34.90
inc VAT & carriage

Receiver Converters		
MMC 27/MW	27MHz to medium wave converter	19.95
MMC 50/28	6M Converter to HF Rig	27.90
MMC 70/28	4M Converter to HF Rig	27.90
MMC 144/28	2M Converter to HF Rig	27.90
MMC 432/28S	70cm Converter to HF Rig	34.90
MMC 432/144S	70cm Converter to 2M Rig	34.90
MMC 435/600	70cm ATV Converter—UHF TV	27.90
MMK 1296/144	23cm Converter to 2M Rig	59.80
Frequency Counters		
MMD 050/500	500MHz digital freq counter	69.00
MMD 600P	600MHz ÷ 10 prescaler	23.00
MMD P1	Frequency counter amplifier	11.50
Pre-amplifiers		
MMA 28	10M low noise preamp	14.95
MMA 144V	2M RF switched low noise preamp	34.90
MMA 1296	23cm low noise preamp	29.90
Various		
MMF 144	2M bandpass filter 40W	9.90
MMF 432	70cm bandpass filter 40W	9.90
MMR 15/10	15dB 10W attenuator	9.90

RUSH ORDER FORM

NAME.....
ADDRESS.....
.....
Tel No.....
Please send me.....
.....
☐ I enclose a cheque for £ :
☐ Debit my Access/Barclaycard number

Transvertors		
MMT 144/28	2M Transverter for HF Rig	99.00
MMT 432/28S	70cm Transverter for HF Rig	149.00
MMT 432/144R	70cm Transverter for 2M Rig	184.00
MMT 70/28	4M Transverter for HF Rig	115.00
MMT 70/144	4M Transverter for 2M Rig	115.00
MMT 1296/144	23cm Transverter for 2M Rig	184.00
Linears		
MML 144/25	2M 25W Lin Amp (3W I/P)	65.00
MML 144/40	2M 40W Lin Amp (10W I/P)	77.00
MML 144/100S	2M 100W Lin Amp (10W I/P)	129.00
MML 144/100LS	2M 100W Lin Amp (1/3W I/P)	145.00
MML 432/20	70cm 20W Lin Amp (3W I/P)	77.00
MML 432/50	70cm 50W Lin Amp (10W I/P)	119.00
Micro based products		
MM 200	RTTY to TV Converter	169.00
MM 4000	RTTY Transceiver	269.00
MMS 1	The Morse Talker	115.00

Data sheets available on request
– an SAE would be nice.
Above prices include VAT and carriage.

Buy it with Access

MAIL ORDER Mon-Sat 9-12:30/1:30-5:30

All prices correct at time of going to press

BREDHURST ELECTRONICS
HIGH STREET, HANDCROSS, W.SUSSEX Tel: 0444 400786

RETAIL Mon-Sat 9-12:30/1:30-5:30

BARCLAYCARD VISA

E & OE

STEPHENS-JAMES LIMITED

Access BARCLAYCARD VISA

TRIO TS-930S

TRIO R-600

TRIO TS-830S

TRIO TS-130S

NEW TRIO R-600 RECEIVER AT £235.00

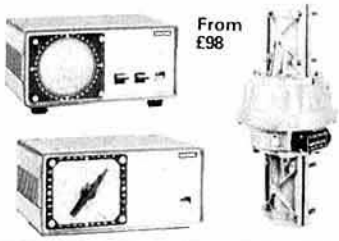
TRIO PRICES

Full Range of Accessories Available

TS830S	£694.83	TS530S	£534.98	TS130S	£525.00	AT130	£79.12	TR78500	£314.87
AT230	£119.83	VFO240	£92.92	TS130V	£445.05	TR2300	£165.00	TR8400	£334.88
SP230	£34.96	R820	£589.95	TL120	£144.90	TR2500	£207.00	TR9130	T.B.A.
VFO230	£215.97	TS180S	£679.00	SP120	£23.00	TR7730	£247.94	TR9500	£449.88
DFC30	£179.86	PS30	£88.55	PS20	£49.45	TR7800	£284.97	TS930S	T.B.A.

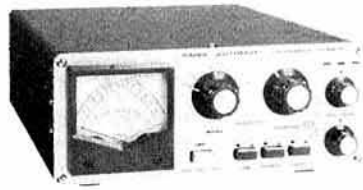
THE ONLY OFFICIAL STOCKIST OF TRIO EQUIPMENT IN THE NORTH WEST

DAIWA Full range of reliable antenna rotators



From £98

DAIWA AUTOMATIC ANTENNA TUNER/



CN1001A 200 watt £156.00
CN2002 2kW £228.00

YAESU
FRG7 Receiver £199.00

DRAKE
TR7 Transceiver and AC PSU £1,242.00
MN7 Antenna Matching Unit £124.20
R7 General coverage receiver £989.00
Other Drake equipment available to order.

STABILISED POWER SUPPLIES
Model 125 10-15V 5A £28.00
Model 156S 4-15V 6A Twin Meter £40.00
Model 1210S 4-20V 10A Twin Meter £75.00
Maximum ratings quoted.

STATION ACCESSORIES (inc post)
SWR 25 Twin meter £12.80
2-way Antenna switch (V2) £6.50
3-way Antenna switch (V3) £10.80
4-way Antenna switch (V4) £11.00
2-way Antenna switch (VHF) £11.00
DL50 50 watt dummy load 50ohm £7.00
Oscerblock SWR200B SWR/Power £49.00
FX1 Station Wavemeter £34.00
Wellz SP200 swr/power £49.95
HP4A High Pass Filter £6.00
50 watt Dummy Load 50ohm £7.25
Packer 2M Wavemeter £22.50
Daiwa CN620A £54.00
Full range of aluminium tubing, wall clamps, brackets "V" bolts for the caller.

TRANSCEIVERS AND RECEIVERS
SRX30 Solid State Receiver £158.00
SRX30D Digital Receiver £195.00
FRG7700 Receiver £329.00
SR9 2m FM Receiver £46.00
FDK750E Transceiver £289.00
FDK700E Transceiver £199.00

WELZ SWR MOTORS AND ATU'S IN STOCK
AR22 2m Handheld Receiver £85.00

HY-GAIN
12AVQ 10-15-20m Vertical Antenna £43.13
14VQ/WB 10-15-20-40m Vertical £60.38
18AVT5WB 10-15-20-40-80m Vertical £87.40

WIDE RANGE OF HY-GAIN BEAMS FROM STOCK

VARIOUS ANTENNA
HF5 vertical 10-through 80m £41.40
Discone 5 Antenna 50-480MHz £36.80
C4X 10-15-20m Vertical £46.00
HQ 1 Minibeam Tribander £106.00

Complete range of JAYBEAM HF AND VHF-UHF Antennas, send 15p for catalogue and price list.

COMPLETE RANGE OF DATONG PRODUCTS NOW AVAILABLE FROM STOCK

G-WHIP. Mobile Antenna Range
Tribander Helical 10-15-20m £25.30
LF Coils for above £6.56
LF Telescopic for coils £3.75
Standard Basemount £5.50
MultiMobile 10-15-20m £28.50
Coils for above £6.56
Extendarod £10.99
Flexiwhip 10m £18.00
Coils for above £6.56

FDK
Multi 700EX Transceiver £199.00
Multi 750 Transceiver £290.00

FULL RANGE OF PUBLICATIONS IN STOCK RSGB, ARRL, ETC.

NRD-515 RECEIVER

For the discerning DXER comes the modern NRD-515 general coverage receiver ● Full of all performance advantages offered by any receiver ● All modes of operation PLL Digital VFO ● Solid state ● Up conversion type double conversion ● Frequency coverage 100kHz to 30MHz ● LF/MF bands below 1·6MHz are clearly receivable through the use of a filter/tuned circuit ● Band Pass tuning ● Noise Blanker ● RIR ● Attentuator ● AGC ● Recording terminal ● Mute terminal, etc which permits operation with the NSD-505 transmitter or ant transmitter ● Optional: speaker, memory unit, cw filter available. PRICE **£1090.00** inc VAT

JRC NSD515 Transmitter. Matching unit to the NRD515 Receiver available shortly. 65 years of experience produces the finest "separates" available in the world to the Radio amateur who wants the best in Amateur Radio.

Shop Hours: Mon to Fri 9.30am to 5.30pm
Saturday 9.30am to 4.30pm ACCESS and Barclaycard facilities
HP terms arranged. Part exchanges always welcome
We are located on the A574. Turn at the Greyhound Motel on the A580 (East Lancs Road) and we are about ½-mile on right. No parking problems at any time. **SAE FOR S/H LIST.**

STEPHENS-JAMES
LIMITED
47 WARRINGTON ROAD
LEIGH WN7 3EA
ENGLAND
Telephone (0942) 676790

Lee Electronics Ltd

–IC2E–

- Fully synthesised 144-146MHz.
- 1·5 Watt RF power with 9V battery.
- ±600kHz switch for repeater use.
- Optional power packs available.
- Light weight only 450gms.
- High/low power switch.
- Supplied with helical ant.
- Full range of accessories available.

£159 inc. VAT and carriage.

SPECIAL OFFER!

–FT290–

- ★ 144-146MHz (144-148 possible).
- ★ Multimode USB, LSB, FM, CW.
- ★ 2·5W PEP, 2·5W RMS, 300mW.
- ★ 10 memory channels.
- ★ FM: 25kHz and 12·5kHz steps.
- ★ SSB: 1kHz and 100Hz burst.
- ★ Any Tx/Rx split with dual VFOs.
- ★ ±600kHz split, 1750kHz burst.
- ★ Matching 10W linear amplifier.
- ★ Up/down tuning from mic.
- ★ 8 "C" Nicads or Drys internal.
- ★ Scan on memory (+10kHz).

£249.00 inc. VAT and carriage.

–C8800–

FM VHF MOBILE TRANSCEIVER

Well, what can we say about this set? Standard Communications pride themselves on being one of Japan's leading manufacturers of professional VHF/UHF communications equipment with a reputation for excellent quality control, so all their know-how has gone into making a truly remarkable set with all the features anyone could need in a mobile unit (come in and see it for yourself).

£232.00 inc. FREE ANTENNA & SWR METER

–C78–

70cm FM PORTABLE

This has all the features of the C58 and uses the same range of accessories (with the exception of the linear amp) so you only need buy one set for both units. With 70cm getting more popular come in and try one.

£225.50 inc. VAT and carriage.

–C58–

2 metre MULTI-MODE

The C58 has all the features possible on a portable rig many of which some mobiles don't have. It's optional accessories allow it to be used in the car with a power output of 25W. Come in and compare this with the FT290, you may be glad you did.

£245.00 inc. VAT and carriage.

400 EDGWARE ROAD,
LONDON W2
01-723 5521 Tlx 298765

Allow 28 days for delivery

Buy it with Access

BARCLAYCARD VISA

NEAREST TUBE:
EDGWARE ROAD
PADDINGTON

BUSES:
6, 8, 16, 16A,
176, 616.

WOOD & DOUGLAS

4M FM equipment is now available from us in kit or assembled form. The price includes a crystal for 70·45MHz. Why not give this under-used band a new lease of life?

PROJECT	CODE	ASSEMB'D	KIT
4M EQUIPMENT			
FM Transmitter (1·5W)	4FM2T	34.75	21.20
FM Receiver	4FM2R	61.65	42.15
70cms EQUIPMENT			
Transceiver Kits and Accessories		£	£
FM Transmitter (0·5W)	70FM05T4	38.10	23.10
FM Receiver	70FM05R5	68.25	48.25
6 channel Transmit Adapter	70MC06T	19.85	11.95
6 channel Receive Adapter	70MC06R	27.15	19.95
Synthesiser (2 pcbs)	70SY25B	84.95	60.25
Synthesiser Transmit Amplifier	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 1 (Crystal Controlled)	70PAC1	135.00	100.00
FM Package 2 (Synthesised)	70PAC2	163.00	128.00
TV Modulator (for 70FM05T4)	TVM1	8.10	5.30
Power Amplifiers (FM/CW use)			
50mW to 500mW	70FM1	12.05	6.85
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
Combined Power Amp/Pre-Amp (10W)	70PA/FM10	48.70	34.65
Pre-Amplifiers			
Bipolar Miniature (13dB gain)	70PA2	7.90	5.95
MOSFET Miniature (14dB gain)	70PA3	8.25	6.80
RF Switched (25W 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 (2pcbs)	144SY25B	78.25	59.95
Synthesiser Transmit Amplifier	SY2T	26.85	19.40
Bandpass Filter	BPF 144	6.10	3.25
PIN RF Switch	PS1 144	9.10	7.75
Synthesised FM Package (1·5W)	144PAC	138.00	105.00
Power Amplifiers			
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) (O/P Changeover)	144LIN10A	26.80	19.87
1·5W to 10W (SSB/FM) (Auto Changeover)	144LIN10B	35.60	26.95
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			
10-channel Scanner	PROSCAN 1	23.70	15.56
Display Decoder/Driver	DISP1/2	22.60	16.10
GENERAL ACCESSORIES			
Toneburst	TB2	6.20	3.85
Piptone	PT2	6.90	3.95
Kaytone	PTK1	8.20	5.95
Economiser	BE1	4.80	3.50
Regulator	REG1	6.80	4.25
Solid State Supply Switch	SSR1	5.80	3.60
Microphone Pre-Amplifier	MPA1	5.40	2.95
Noise Filter	SLF1	5.95	4.40
Reflectometer	SWR1	6.35	5.35
CW Filter	CWF1	6.40	4.75
TVI Filter	70FI6P	4.20	3.40
MICROWAVE PROJECTS			
Microwave Drive Source	MD05T	29.50	20.40
Bandpass Filter	BPF 384	5.10	3.25

All prices include VAT at the current rate. Please add 70p to your total order for post and handling. Kits contain all pcb components but no external hardware. Crystals are not supplied for transceivers but are for converters, synthesisers etc. Kits when stock are 2-3 days, otherwise up to 28 days depending on component availability. Assembled modules 20-40 days depending on stock. Non-amateur frequencies can be supplied for assembled modules but we reserve the right to charge up to 20% excess to cover handling costs. All postal enquiries require an SAE please; a large one if full lists are required! *Non-technical enquiries only* can be taken 10am–4pm on 07356 5324. For technical information please call 07356 5324 or 0256 24611 between 7pm–9pm, as we are part-time.

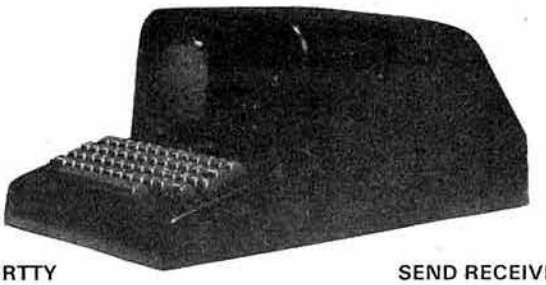
Kits are available from the following agents:-

Amateur Radio Exchange, Northfield Road, EALING. 01-579 5311.
J. Birkett, 25 The Strait, LINCOLN. 0522 20767.
Darwen Electronics, 13 Thorncliffe Drive, DARWEN, Lancs. 0254 771 497.
United Trading AB, Box 16024, 200 25 MALMO, SWEDEN. 040 94 89 55.

9 HILLCREST, TADLEY
BASINGSTOKE, HANTS RG26 6JB

new new new

THE MICRODOT



CW/RTTY SEND RECEIVE

All British Microprocessor Controlled Terminal Unit For CW and RTTY Featuring

Integral five inch VIDEO MONITOR. Professional KEYBOARD with numerous special functions. Real-time CLOCK. On board DEMODULATOR and MODULATOR (CW, FSK, AFSK). DECODE and ENCODE both CW (Morse) and RTTY (Baudot). Automatic SPEED TRACKING on receive. THREE SPEED SETTINGS on transmit for each mode. Both send and receive SPEED DISPLAY on screen. SCREEN STORE and RECALL function.
PORTABLE — runs from 13.8 Volts (ideal for rallies). Highly ROBUST in smart black cabinet with carry handle. Your CALL SIGN programmed in for 'DE' (Here is) function. SPECIAL FUNCTIONS include 'Quick brown fox' generator, 'QC CQ CQ' key, QRZ? (who are you) key. AR AS KN VA VE barred characters.

One year NO-QUIBBLE GUARANTEE

ALL THIS AT A MUCH LOWER PRICE THAN COMPARABLE IMPORTED PRODUCTS

£395 inc, VAT and carriage

(Dealer enquiries welcome)
For full technical specification write to:
POLEMARK LTD., 148-150 High Street, Barkway, Royston, Herts SG8 8EG.

WARD for TRIO

TS830S £694 160-10m + new bands

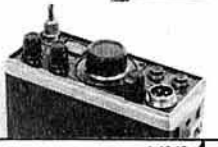
TS780 £748 2m/70cm

TS530S £534 160 10m + new bands

TR9130 2m all mode

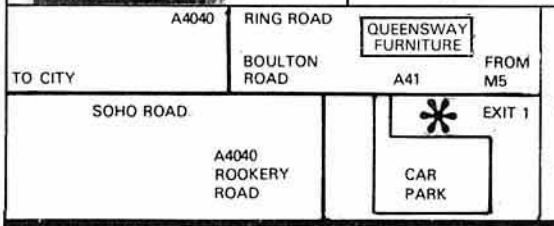
R600 £235 Receiver

TR9000 £359 2m all mode



TR2300 ONLY £166.75

SWR meters, GDO's, wavemeters
Trio ATU's, mics, speakers and headphones
Home computers and software
Apple II, Genie
Commodore VIC20 **£170**



OPEN TUES-SAT
Also evenings and weekends
Ring Tony G4CLX, on Kidderminster 851255

WARD ELECTRONICS

SOHO HOUSE (First floor), 362-4 SOHO ROAD, HANDSWORTH BIRMINGHAM B21 9QL. Tel: 021-554 0708

ALL-IN POLICY: ALL ADVERTISED PRICES INCLUDE TAX AND FREE DELIVERY (SECURICOR FOR RIGS)

ARROW ELECTRONICS LTD

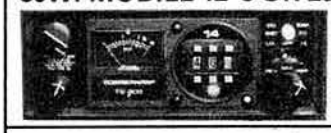
7 Coptfold Road, Brentwood, Essex CM14 4BN

Tel: 0277 226470 or 219435 Ansafone on 219435 Telex: 995801 (REF: A5)

Open 5 days a week. Closed Thurs.

ACCESS ● VISA ● INSTANT HP ● TWO YEARS' WARRANTY ● BEST TRADE-IN PRICES

NEW!! SOMMERKAMP'S LATEST 2 METRE 50W. MOBILE 12·5 OR 25kHz. **TS800**

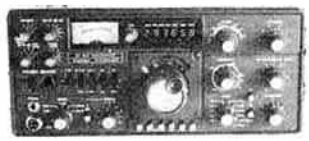


£ P.O.A.

NEW!! SOMMERKAMP'S **TS788** DXCC AM + FM + CW + USB + LSB. 10 METRE MOBILE WITH BUILT-IN LINEAR & DIGITAL FREQUENCY DISPLAY — REMOTE CONTROL MIC.

£359 inc VAT

DISCOUNT PRICE.
FT307DMS (FT107+) SOMMERKAMP.
FITTED: DMS UNIT + FP107 + PSU + MIC + CW/AM FILTER £899!!!



FT101ZD SERIES:

FT101ZD FM	£638
FT101ZD AM	£619
FT101Z FM	£564
FT277ZD AM INCL FAN & MIC	£639

FT290R — SOMMERKAMP. IMPROVED FET FRONT END. INPUT LISTEN PRICE INCLUDES NCIIC CHARGER £249

FT480R
—SOMMERKAMP
ALL-MODE MOBILE
144-148MHz £365

DISCOUNT
FT725RU
70CM FM 10W TO CLEAR LAST FEW £189

DISCOUNT
KENWOOD TR7730 25W MINI FM FEW ONLY £230

FT-ONE WITH ANCILLARY OPTIONS FITTED. STOCK DUE IN BY PUBLICATION DATE—PHONE FOR OUR BEST PRICE—0277 226470

FRG7700

FRG7700	Yaesu	£315.00
FRG7700	Sommerkamp with memory	£399.00
FRT7700	Tuner	£37.85
FF5	Filter	£9.95
FRV7700A	Converter	£68.75
FRV7700B	Converter	£75.50
FRV7700C	Converter	£69.00
FRV7700D	Converter	£66.30

2 Metre Handhelds

IC2E	Icom	£169
FT202	Yaesu	£109
TR2300	Kenwood	£160
TR2400	Kenwood	£185
AR245	5W.AOR	£145
FT208	Yaesu	£209

2 Metre Mobiles

C8800	Standard	£235
C58	Portable	£225
FT209R	Portable	£249
FT720RVH	Soka	£235
FT480R	Yaesu	£379
TR9000	Kenwood	£369
IC290	Icom	£359
TR7800	Kenwood	£265

70cm Mobiles

C78	Standard	£219
CPB78	Standard	£71.50
C7800	Standard	£247
FT720RU	Yaesu	£239

70cm Handhelds

FT708R	Yaesu	£219
FT404R	Yaesu	£199
IC4E	Icom	£209
FT708R	Yaesu	£219

HF Base Stn

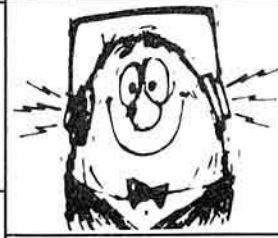
IC720A	Icom	£888
PS15	—	£99
TS830S	Kenwood	POA
FT902DM	Yaesu	£859
FT902DE	Yaesu	£713
FT107	Yaesu	£799
FL2100Z	Yaesu	£425
YK901	Yaesu	£115
YR901	Yaesu	£399
FC902	Yaesu	£135
YO901P	Yaesu	£330
SP901	Yaesu	£31
FF501	Yaesu	£22
FP707	Yaesu	£125
FC707	Yaesu	£85
FTV707	Yaesu	£90
FT707	Yaesu	£525

OUR SECONDHAND TRADE IN LIST ON REQUEST— SAE PLEASE:

FT7-B + VC7-B DIG DISPLAY SOMMERKAMP MOBILE/BASE STATION
SPECIAL OFFER
£475 THE PAIR

DUMMY LOADS
1kW MAX £35
"CANTENNA"
MAX 400 WATT. £14.95

BARGAIN CORNER
C58 ALL MODE PORTABLE 2M BY STANDARD £225



"PHONE YOUR ORDER FOR TODAY'S DESPATCH. ALL WE NEED IS YOUR ACCESS OR BARCLAYCARD VISA NUMBER. SMALL SPARES—PLUGS—AERIALS—PHONE FOR A QUOTE FOR THAT NEW RIG!"

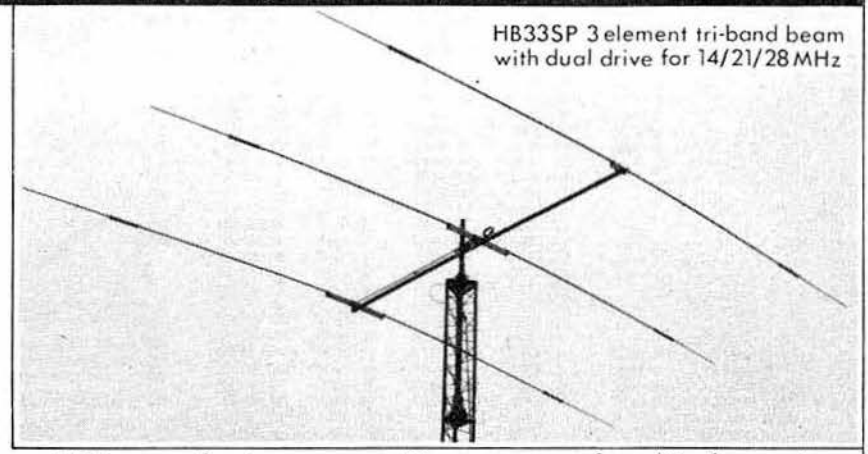
OUR 1982 LIST & SHORT FORM CATALOGUE FREE OF CHARGE—SAE APPRECIATED

ALL-IN POLICY: ALL ADVERTISED PRICES INCLUDE TAX AND FREE DELIVERY (SECURICOR FOR RIGS)

TET ANTENNA SYSTEMS
THE ANTENNA WITH THE DIFFERENCE

TET HF antennas are unique in that they employ dual driven elements with the following distinct advantages–

- **Improved gain over conventional arrays.**
- **Broader bandwidth with lower SWR.**
- **Enhanced front to back ratio.**
- **Better matching into solid state transceivers without an A.T.U.**
- **High power handling capacity.**



HB33SP 3 element tri-band beam with dual drive for 14/21/28 MHz

TET manufacture an exciting range of multi-element HF beams including superb monobanders plus HF verticals Also there is a full range of VHF/UHF antennas most of which have multi-element drive or distinctive technical features. An S.A.E.will bring you full details.

AMATEUR ELECTRONICS UK
508-516 Alum Rock Road, Birmingham 8
Tel: 021-327 1497 or 021-327 6313 Telex: 337045
Open: 9·30-5·30 Tues.to Sat. Closed all day Mon.

Access — Barclaycard VISA

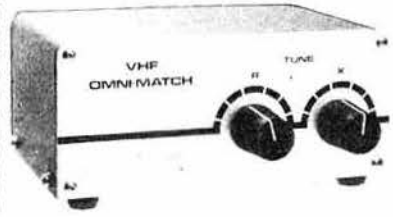
TET SOLE AGENTS

LAR MODULES LIMITED
60 GREEN ROAD
LEEDS LS6 4JP
Telephone
0532 782224

ANTENNA TRAPS
Three trap kits are now available. 7 MHz for traditional 5-band dipole 80-10m. 3·5MHz covers six bands 160-10m. 18/24MHz for new add-on or separate dipole for 10, 18 and 24MHz. Each set rated 500W and complete with end insulators and full instructions

7MHz . . . £17.20
3·5MHz . . £17.20
18/24MHz . £17.20

Dipole centre insulator £1.20



VHF OMNI-MATCH 144-174MHz. The ATU for the 2-metre man. Enables one antenna to cover the whole band. Ends laborious antenna pruning. Tunes out SWR at the operating position. Handles 750W **£34.90**

HF OMNI-MATCH 1·8-30MHz. Get full band coverage even with high Q antennas. Optimise whole antenna feed system. Avoid power reduction SWR can bring. Includes new bands. Handles 250W **£69.25**

- Order by post or phone your LAR Access/Barclaycard number
- All prices inc. of VAT
- Add £1.75 for p&p

Please send 60p for new Antenna Catalogue. 70 pages packed with information and know-how.
24 HOUR ANSAFONE

TRADE ENQUIRIES INVITED

R-X Noise Bridge

- **Learn the truth about your antenna.**
- **Find its resonant frequency.**
- **Adjust it to your operating frequency quickly and easily.**

If there is one place in your station where you cannot risk uncertain results it is in your antenna.

The Palomar Engineers R-X Noise Bridge tells you if your antenna is resonant or not and, if it is not, whether it is too long or too short. All this in one measurement reading. And it works just as well with ham-band-only receivers as with general coverage equipment because it gives perfect null readings even when the antenna is not resonant. It gives resistance and reactance readings on dipoles, inverted Vees, quads, beams, multiband trap dipoles and verticals. No station is complete without this up-to-date instrument.

Why work in the dark? Your SWR meter or your resistance noise bridge tells only half the story. Get the instrument that really works, the Palomar Engineers R-X Noise Bridge. Use it to check your antennas from 1 to 100 MHz. And use it in your shack to adjust resonant frequencies of both series and parallel tuned circuits. Works better than a dip meter and costs a lot less.

The price is $66 (U.S.) post free. Shipment by air parcel post. Price does not include duty or VAT.

Purchase factory-direct and save. Send money order or use your Access or Barclaycard. Our phones are open Monday-Friday 4pm to Midnight U.K. time.

Fully guaranteed by the originator of the R-X Noise Bridge. ORDER YOURS NOW!

Palomar Engineers

Box 455, Escondido, CA. 92025, U.S.A. Phone: (714) 747-3343

Western

CALL Western FOR YOUR YAESU AND TRIO REQUIREMENTS
A selection from the range . . . LOWEST PRICES . . . FINE SERVICE
YAESU WAS INTRODUCED TO THE UK BY 'WESTERN'.
BUY WHERE EXPERIENCE COUNTS!

YAESU EQUIPMENT

HF EQUIPMENT

Cat No.		Prices include carr/VAT	£
1265	FT-1	150kHz-30MHz TCVR	1240
1222	FT-101Z	Transceiver	539
1223	FT-101ZD	Transceiver	599
1224	FT-101Z/AM	101Z plus AM unit	555
1225	FT-101ZD/AM	101ZD plus AM unit, digital	619
1226	FT-101Z/FM	101Z plus FM unit	570
1227	FT-101ZD/FM	101ZD plus FM unit	635
1263	FV-101	Remote VFO	109
1274	FAN B	Fan for FT-101	13
1275	DC UNIT	DC/DC PSU for FT-101	40
1230	FT-107	Solid state broad band	699
1231	FP-107	PSU for FT-107	99
1232	DMS-107	Memory for FT-107	89
1264	FV-107	VFO for FT-107	95
1265	SP-107	Speaker	28
1266	FC-107	ATU	106
1268	FT-902DM	SSB/AM/FM TCVR	850
1244	SP-901	SPKR for 101Z/902	30
1267	SP-901P	Phone patch/spkr	55.20
1247	FV-910DM	Remote VFO for 901	250
1245	FC-902	ATU for 101Z/902	130
1269	FTV-901R	T.VTR plus 2M unit	270
1270	430TV	70CM unit for above	170
1271	144TV	2M unit for FTV-901R	95
1272	YO-901P	Monitor scope/pan AD	315
1239	FT-707	Mobile TCVR	549
1238	FP-707	AC PSU	119
1237	FC-707	ATU for FT-707	82
1273	MR-7	Rack for FT-707	15
1203	MMB-2	Mobile mount for '707'	16
1246	FL-2100Z	HF 1200W linear	399
1206	FRG-7	Receiver	189
1248	FRG-7700	Receiver	315
1255	RFV-7700A	CONV 118/130 130/140 140/150 MHz	69.75
1257	FRV-7700D	CONV 118/130 140/150 70/80 MHz	72.45
1254	FRT-7700	Antenna tuner	37

VHF EQUIPMENT

1233	FT-227RB	2M FM 10W TCVR	179
1234	FT-290R	2M multi-mode	235
1202	CSC-1	Case for FT-290R	3.90
1210	MMB-11	Mounting bracket 290	22
1211	NC-11C	Charger for FT-290R	8
1595	C NICADS	Set of 8 for FT-290R	21.20
1348	FL-2010	10W linear for FT-290R	62
1252	FT-208R	2M hand held	199
1251	FT-708R	70CM hand held	209
1236	FT-480R	2M all mode	360
1243	FT-780R	70CM multi-mode	435
1220	FP-80A	AC PSU, 4·5A	59
1200	NC-1	Desk charger	19
1204	NC-2	Charger	39
1201	PA-1	DC unit	19
1205	FP-4	AC PSU 4A, 13·8V	42
1258	NC-7	Base trickle charger	26
1253	NC-8	Base fast/trickle charger	42
1260	FBA-2	Battery sleeve for NC-7, NC-8	3
1262	NC-9C	Compact trickle charger	8
1349	FNB-2	Spare battery pack	17
1350	FL-2050	Linear amp FT-480R etc	120
1351	YM-24A	Spkr/mic, FT-208/708	16

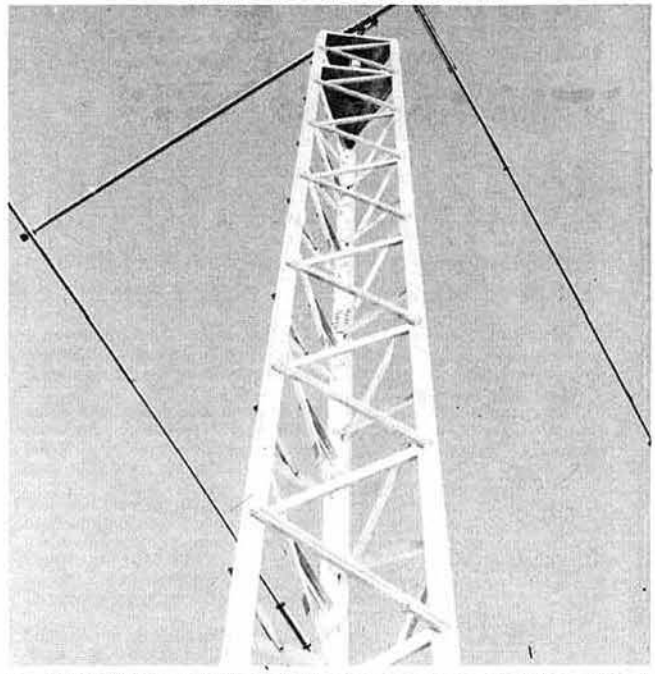
HEADPHONES, MICS, ETC

1208	YE-7A	Hand mic., 600 ohm	6.90
1213	QTR-24D	Quartz 24hr clock	27
1215	YM-36	Noise cancelling mic	13
1214	YM-35	Hand, scanning	13
1352	YM-37	Hand mic	6.90
1353	YM-38	Desk scanning	24
1221	YD-148	Desk mic	20
1216	YH-55	Headphones	10
1217	E72-L	Remote cable for FT-720	19.50
1218	S72	Switching box, FT-720	52

TRIO EQUIPMENT

1322	TS-130S	HF TRCVR	515
1324	TS-180S	Solid state HF	669
1326	TS-530S	Digital HF TCVR	529
1330	TS-830S	Digital HF TCVR	679
1332	R-1000	GEN coverage RCVR	295
1334	TR-2300	2M FM portable TCVR	164.95
1337	TR-2400	2M FM hand TCVR	195
1338	TR-7625	2M 25W FM TCVR + memory	215
1341	TR-9500	70CM FM/SSB/CW TCVR	440
1343	TR-8400	70CM FM mobile TCVR	289

ALUMAST



The **ALUMAST** is a 15" (375mm) wide triangular cross section lattice sectional aluminium mast based on a 10ft (3·05m) section length. It is supplied "knocked down" in a tubular carton for ease of transport, but can easily be assembled needing no special tools or skills. The system includes top plate with bearing sleeve, rotor plate and a choice of a fixed base frame (FB-1) or one with hinge joints (HB-1) to enable the mast to be pivoted at ground level. Guy brackets are available for use at heights above 30ft.

- **Made from high strength corrosion resistant alloy using WESTERN EXCLUSIVE 'W' section leg extrusions.**
- **Easy assembly using bolts and "Nyloc" locking nuts for security.**
- **Free-standing to 30ft (9·15m) with a typical tri-bander plus VHF/UHF antennas.**
- **Heights to 250ft (61m) with appropriate guy configurations (ask us for quotes).**
- **Lightweight—only 25lb (11kg) per 10ft (3·05m) section.**
- **30ft (9·15m) mast is delivered in a tube only. 10ft 6in (3·2m) long. 6in (0·126m) dia.**

A COMPLETE 30ft (9·15m) MAST for 375/PSS/3; FB-1; RMP-1; TP-1

£258.74

FULL PRICE LIST

375/PSS/3	30ft mast (3 sections)	207.00
375/PSS/1	Additional 10ft section	69.00
HB-1	Hinged base unit	34.50
FB-1	Fixed base unit	24.15
RMP-1	Rotor mounting plate	13.22
TP-1	Top plate with sleeve	14.37
GB-1	Guy brackets (set of 3)	12.65

All prices include carriage and VAT at 15%

Western Electronics (UK) Ltd FAIRFIELD ESTATE Tel: Louth (0507) 604955
LOUTH, LINCS LN11 0JH Telex: 56121 WEST G

OPENING HOURS: 09.00-12.30; 13.00-17.00 Mon/Fri; Saturdays 09.00-12.00

P.M. ELECTRONIC SERVICES

PRICES SHOWN EXCLUDE VAT

UK CUSTOMERS PLEASE ADD 15%

2 ALEXANDER DRIVE, HESWALL
WIRRAL, MERSEYSIDE, L61 6XT

Tel: 051-342 4443. Cables: CRYSTAL, BIRKENHEAD:

CRYSTALS MANUFACTURED TO ORDER

Prices shown are for "one off" to our standard amateur specs; closer tolerances are available. Please send us details of your requirements.

A Low frequency fundamentals in HC13/U or HC6/U

Total tolerance ± 100ppm 0° to +70°C

6 to 9·999kHz HC13/U	£32.80
10 to 19·99kHz HC13/U	£31.00
20 to 29·99kHz HC13/U	£23.08
30 to 59·99kHz HC13/U	£21.73
60 to 79.99kHz HC13/U	£15.69
80 to 99·99kHz HC13/U	£13.08
100 to 159·9kHz HC13&6/U	£11.32
160 to 399·9kHz HC6/U	£7.83
400 to 499·9kHz HC6/U	£7.00
500 to 799·9kHz HC6/U	£7.83

B High frequencies fundamentals/overtones

Adj. tol. ±20ppm, Temp. tol. ±30ppm −10°C to +60°C

800 to 999·9kHz (fund) HC6/U	£11.01
1 to 1·499MHz (fund) HC6/U	£11·25
1·5 to 2·59MHz (fund) HC6/U	£5.36
2·6 to 20·9MHz (fund) HC6/U	£4.87
3·4 to 3·99MHz (fund) HC18 & 25/U	£6.75
4 to 5·99MHz (fund) HC18 & 25/U	£5.36
6 to 21MHz (fund) All Holders	£4.87
21 to 25MHz (fund) ,,	£7.31
25 to 30MHz (fund) ,,	£9.00
18 to 63MHz (3 O/T)	£4.87
60 to 105MHz (5 O/T)	£5.61
105 to 125MHz (5 O/T)	£8.44
125 to 149MHz (7 O/T)	£8.62
149 to 180MHz (9 O/T)	£12.75
180 to 250MHz (9 O/T)	£13.50

Delivery—Mid range 1MHz to 105MHz normally 4/6 weeks. **Other frequencies** 6/8 weeks.

Holders—Low Frequencies 6 to 150kHz HC13/U, 150kHz to 3·4MHz HC6/U, 3·4MHz to 105MHz HC6/U, HC18/U or HC25/U, over 105MHz—HC18/U and HC25/U.

HC33/U (Wire ended HC6/U) is available on request as per HC6/U. HC17/U (Replacement for FT243) available as per HC6/U at **35p** surcharge on the HC6/U price.

Unless otherwise specified, fundamentals will be supplied to 30pf circuit conditions and overtones to series resonance.

CRYSTALS FOR MICROPROCESSORS

Please let us know your requirements eg 4MHz HC18/U.
1 off **£2.00**, 100 off **£1.10**, 1000 off **99p**, 2500 off **50p**.

ANZAC MD-108 DOUBLE BALANCED MIXER

5 to 500MHz supplied with full details for only **£6.95**.

COMMERCIAL AND PROFESSIONAL CRYSTALS

NEW FASTER SERVICE

We are now supplying crystals to most commercial and MIL specifications in the range 1MHz to 60MHz ordered in small quantities in 2½ weeks AT NO EXTRA CHARGE. We also have even faster EXPRESS SERVICES available for that VERY URGENT order.

We can also supply crystals for commercial applications e.g. Microprocessor, TV etc. at very competitive prices. Let us know your needs and we will send you a quote by return, alternatively telephone or telex our Sales Engineer Mr Norcliffe who is normally available in the office for technical enquiries between 4.30 and 6.30p.m.

TWO METRE CRYSTALS

CRYSTAL FREQUENCY USE (TX or and HOLDER) / OUTPUT FREQUENCY	4MHz-TX-HC6/U	6MHz-TX-HC25/U	8MHz-TX-HC6/U	10MHz-RX-HC6/U	11MHz-RX-HC6/U	12MHz-TX-HC25/U	14MHz-RX-HC25/U	18MHz-TX-HC25/U	44MHz-RX-HC6/U	44MHz-RX-HC25/U	52MHz-RX-HC25/U
144·4 (433·2)	b	c	b	e	e	b	e	e	e	e	e
144·800	e	e	e	e	e	c	c	e	e	c	e
144·825	e	e	e	e	e	e	e	e	e	e	e
144·850	e	e	e	e	e	e	e	e	e	e	e
145·000/R0T	a	c	a	c	c	b	e	b	e	a	c
145·025/R1T	a	c	a	e	e	b	e	b	e	e	e
145·050/R2T	a	c	a	e	e	b	e	b	e	e	e
145·075/R3T	a	c	a	e	e	b	e	b	e	e	e
145·100/R4T	a	c	a	e	e	b	e	b	e	e	e
145·125/R5T	a	c	a	e	e	b	e	b	e	e	e
145·150/R6T	a	c	a	e	e	b	e	b	e	e	e
145·175/R7T	a	c	a	e	e	b	e	b	e	e	e
145·200/R8R	a	c	a	e	e	b	b	b	a	e	c
145·300/S12	e	e	e	e	e	e	e	e	e	e	e
145·350/S14	e	e	e	e	e	e	e	e	e	e	e
145·400/S16	e	e	e	e	e	e	e	e	e	e	e
145·425/S17	e	e	e	e	e	e	e	e	e	e	e
145·450/S18	a	e	a	e	e	b	b	b	a	a	e
145·475/S19	a	e	a	e	e	b	b	b	a	a	e
145·500/S20	a	c	a	c	c	b	b	b	a	a	c
145·525/S21	a	c	a	c	c	b	b	b	a	a	c
145·550/S22	a	c	a	c	c	b	b	b	a	a	c
145·575/S23	a	c	a	c	c	b	b	b	a	a	c
145·600/R0R	a	c	a	c	c	e	b	b	a	a	c
145·625/R1R	e	e	e	c	c	e	b	e	a	a	c
145·650/R2R	e	e	e	c	c	e	b	e	a	a	c
145·675/R3R	e	e	e	c	c	e	b	e	a	a	c
145·700/R4R	e	e	e	c	c	e	b	e	a	a	c
145·725/R5R	e	e	e	e	c	e	b	e	a	a	c
145·750/R6R	e	e	e	c	c	e	b	e	a	a	c
145·775/R7R	e	e	e	e	c	e	b	e	a	a	c
145·800/R8R	a	c	a	c	c	b	b	b	a	a	c
145·950/S38	a	e	e	c	e	e	e	e	a	e	e

PRICES: (a) **£2.15**, (b) **£2.55**, (c) **£2.80** and (e) **£4.87**

AVAILABILITY: (a), (b) and (c) stock items normally available by return (we have over 5000 items in stock). (e) 4/6 weeks normally but it is quite possible we could supply from stock. **N.B.** Frequencies as listed above but in alternative holders and/or non stock loadings are available as per code (e).

ORDERING: When ordering please quote (1) Channel, (2) Crystal frequency, (3) Holder, (4) Circuit conditions (load in pf). If you cannot give these, please give make and model of equipment and channel or output frequency required and we will advise if we have details.

EXPRESS SERVICE

Many types of made to order crystals are available on our "EXPRESS SERVICE"—with delivery of three days on our class "A" service. Telephone for details.

70cm CRYSTALS

Due to the much higher multiplication involved compared with 2 metres all our stock 70cm crystals are to a much higher tolerance than our standard amateur spec. crystals.

We are stocking the following channels:—RB0, RB2, RB4, RB6, SU8, RB10, RB11, RB13, RB14, RB15, SU18 and SU20 TX and RX for use with: PYE UHF Westminster (W15U), UHF Cambridge (U10B), Pocketfone (PF1) and UHF PF70 Range and Storno CQL/CQM 662 all at **£2.55**.

For other channels and/or equipments crystals can be made to order to the same closer tolerances as our stock range at a cost of **£5.72** for frequencies up to 63MHz and **£6.58** for 63-105MHz or to our standard amateur specifications see "CRYSTALS MANUFACTURED TO ORDER" Prices opposite.

4m CRYSTALS FOR 70·26MHz—HC6U

TX 70·7825MHz and RX 67·7466MHz or 29·7800MHz **£2.55**.

10·245MHz "ALTERNATIVE" I.F. CRYSTALS—£2·55

For use in Pye and other equipment with 10·7MHz and 455kHz I.F.s to get rid of the "birdy" just above 145·0MHz. In HC6/U, HC18/U and HC25/U.

CRYSTAL SOCKETS (LOW LOSS)

HC/6U and HC13/U **25p** each, HC25/U **20p** each plus **20p** P&P (P&P free if ordered with crystals).

CONVERTER/TRANSVERTER CRYSTALS—HC18/U

All at **£3.00**, 38·6666MHz (144/28), 42MHz (70/28), 58MHz (144/28), 70MHz (144/4), 71MHz (144/2), 96MHz (1,296/432/144), 101MHz (432/28), 101·50MHz (434/28), 105·6666MHz (1,296/28) and 116MHz (144/28).

TEST EQUIPMENT FREQUENCY STANDARD CRYSTALS

200kHz and 455MHz in HC6/U **£3.50**
100kHz in HC13/U and MHz in HC6/U **£2.95**
5MHz in HC6/U and 10MHz and 10·7MHz in HC6/U and HC25/U **£2.80.**

AERIALS

MULTI-BAND INVERTED "V" TRAPPED DIPOLE

80 Thru 10m—Rated @ 2kW—Only 26m long.
Introductory offer **£32.00** + VAT (**£36.80** INC VAT) P&P **£2.50**

THE ARAKI RANGE OF AERIALS

10m whip only 1·3m long with magmount	**£18.00** P&P £3.00
10m whip only 1·3m long with guttermount	**£15.20** P&P £3.00
2m 5/8 λ whip with magmount	**£16.00** P&P £3.00
2m 5/8 λ whip with guttermount	**£13.20** P&P £3.00
2m 1/4 λ whip with magmount	**£12.50** P&P £2.50
2m 1/4 λ whip with guttermount	**£9.70** P&P £2.50
2m/70cm DIBAND whip with magmount	**£20.90** P&P £3.00
2m/70cm DIBAND whip with guttermount	**£18.10** P&P £3.00
2 Base Station Aerials	
2m 5/8 λ Ground plane 3·5db gain	**£18.95** P&P £3.50
2m 5/8 + 5/8 Colinear 6db gain	**£25.00** P&P £3.50
70cm 5/8 + 5/8 Colinear 5db gain	**£25.00** P&P £3.50

The Araki Range are handmade of top quality anti-corrosion treated aluminium or stainless steel.

TERMS: CASH WITH ORDER—MAIL ORDER ONLY. PRICES INCLUDE P&P (BRITISH ISLES) EXCEPT WHERE STATED OVERSEAS CHARGED AT COST.

PLEASE ENCLOSE S.A.E. WITH ALL ENQUIRIES

TMP ELECTRONIC SUPPLIES

STOCKIST OF YAESU, JAYBEAM, HY-GAIN, CDE, AMIDON CORES, KDK, FDK, RSGB BOOKS, MICROWAVE MODULES, ASP, HOKUSHIN, CUSHCRAFT, DAIWA, DENTRON, HANSEN

Full credit facilities; no interest HP terms
Licensed Credit Broker

AMSAT PRE-AMP KITS
back in stock. Complete kits to make the famous 28MHz preamplifier including PCB. £7.85 in VAT & postage

I can supply everything from a PL259 to an FT-1
SAE with all enquiries please

Unit 27, Pinfold Workshops, Pinfold Lane, Buckley, Clwyd CH7 3PL. Tel: Buckley 549563 (STD 0244)

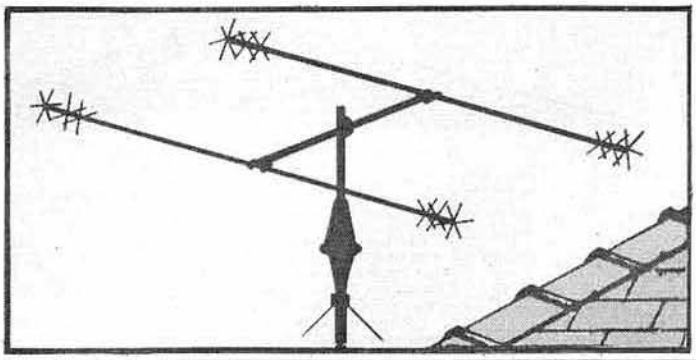
New opening hours: Tuesday-Friday 9.30-5.30; Saturday 9.30-4.00
Closed for lunch 1.00-2.15

LARGE PURCHASE OF RACAL EQUIPMENT

COMMUNICATIONS RECEIVERS. 500kHz—30MHz in 30 bands 1MHz wide. **RA17L—£175. RA117E—£225.** A few sets available as new **£75 extra. RA217** + Speaker Amplifier (RA317)—**£380.** All receivers are air tested and calibrated in our workshop, supplied with full manual, dust cover, in fair used condition. New black metal louvred cases for above sets **£25** each. **SIDEBAND CONVERTORS RA63—£50. RA98A**—SSB-ISB new and boxed—**£75. RA98D—£75. RA218**—SSB-ISB and fine tune for RA117—**£50. TRANSMITTER DRIVE UNIT MA79** 1·5MHz-30MHz SSB-ISB-DSB-FSK-CW—**£150. AERIAL TUNING UNIT** and protection unit **MA197B—£25** to **£50. DECADE FREQUENCY GENERATORS MA350B** (solid state synthesiser for MA79 or RA117-RA217-RA1217—**£150** to **£200. MA250**—1·6MHz-31·6MHz—**£150.** (New) **MA259G** precision frequency standard—5MHz, 1MHz, 100kHz—**£100** to **£250. RA70 and PV78** frequency shift convertor—**£50. DIVERSITY UNIT MA168** new and boxed, contains product detector for SSB and BFO—**£25. LF CONVERTOR RA137—£50** to **£75**—most above supplied with full manuals. **RACAL SPARES,** new and boxed—RA17L Chassis—**£20.** IF Strip—**£15.** Calibrator—**£8. OSCILLOSCOPES** COSSOR CDU150—35MHz—Twin Beam—Solid State—**£175** with manual. **EXTEL TRANSTEL MATRIX PRINTERS** 5 level baudot code, accepts speeds up to 300 bauds, supplied set to 50 and 75 bauds switched, tested with manual—**£165.** Latest Government release—**MARCONI SIG GEN TF955A2—AM and FM 1·5MHz—220MHz** covered in 5 bauds—crystal check facilities, supplied in A1 condition, tested, circuit and instructions—**£100. TEKTRONIX OSCILLOSCOPE 647 and 647A** Solid State 50MHz and 100MHz bandwidth—**£250** and **£350,** tested circuit and instructions. **RACAL COUNTER 836** (9036) 32MHz solid state—50mV—6 digit—tested, with manual—**£60** to **£75.** *Sae enquiries.*

JOHNS RADIO 84 WHITEHALL ROAD EAST, BIRKENSHAW, BRADFORD BD11 2ER. Tel: 0274 684007

THE G4MH MINI BEAM



SMALL SIZE, HIGH PERFORMANCE

PACKAGE: Beam, rotator, 15m coax UR43, 15m 5 core £155.00
AERIAL ONLY: ..... £ 82.50
SELF ASSEMBLY KIT: Coils, spokes etc., ... £ 65.00

SPECIFICATION:

Element length	11 feet	SWR at resonance	1·5 to 1:00 max
Boom length	60 inches	Power rating	1400 watts PEP
Turning radius	7 feet	Input impedance	50 ohms
Operating frequencies	10m, 15m, 20m	Wind resistance	80 mph
Forward gain (ref D pole = 1:00)	3·6 dB	Weight	14 lbs
		Rotator requirements	AR40

Distributed in the U.K. through our Agents:

South Midlands Communications Ltd., Southampton

Radio Shack, London.

Stephens James Ltd., Leigh, Lancs.

Amateur Electronics U.K., Birmingham.

Lowe Electronics, Matlock.

● Large range of equipment in stock: Yaesu · Trio · Bearcat · S.E.M. · J.Beam · G.Whips · SX200N · FT7B · FT107 FT902 DM · FT101Z · FT101ZD · FT707 · FT480 · FRG7 · FRG7700 Etc.
● Full range: SWR inds. coax, keys, books etc. ● Also on display: Micro Computers · Apple · Sharp Video Genie · ITT 2020 · Super Board · Commodore VIC 20
● Second hand equipment: Always large, ever changing stocks. S.A.E. for list. We buy second hand for cash.
● PX Welcome: We have Hi-Fi, Ham Radio, Computers and more.

Established 21 years with a knowledgeable staff to advise you. JIM G4MH, RAYG810F, CHRIS G8PUT, NORMAN G3WAH
Over 2,000 sq.ft. showroom area Open each day except Wednesday. Late night Thursdays till 8pm.

Amateur Radio Shop

4, CROSS CHURCH STREET, HUDDERSFIELD, W. YORKS.
TELEPHONE: HUDDERSFIELD (0484) 20774

THINK JAYBEAM— THINK CATRONICS

We generally have the wide range of 'Jaybeam' aerials in stock as follows:

FOR 2m Band:		FOR 70cm Band:	
C5/2M 5dB colinear	£47.70	**C8/70cm** 8dB colinear	£54.00
LR1/2M 4½dB Vertical	£25.85	**D8/70cm** Double 8 yagi	£22.40
5Y/2M 5 element yagi	£12.05	**PBM18/70cm** 18 ele Parabeam	£27.55
8Y/2M 8 element yagi	£15.50	**MBM48/70cm** 48 ele Multibeam	£31.00
10Y/2M 10 ele 'long Yagi'	£33.30	**MBM88/70cm** 88 ele Multibeam	£42.50
PBM10/2M 10 ele Parabeam	£39.65	**8XY/70cm** Cross 8 ele yagi	£36.75
PBM14/2M 14 ele Parabeam	£48.25	**12XY/70cm** Cross 12 ele yagi	£46.00
5XY/2M Cross 5 ele yagi	£24.70	**X6/2M/X12/70cm** Dual Band	£41.35
8XY/2M Cross 8 ele yagi	£31.00		
10XY/2M Cross 10 ele yagi	£40.80		
Q4/2M 4 ele quad yagi	£25.87		
Q6/2M 6 ele quad yagi	£33.90		
D5/2M Double 5 yagi	£21.80		
D8/2M Double 8 yagi	£29.30		
SVMK/2M Vert Mount Kit	£8.05		
UGP/2M Unipole	£10.90		
HO/2M Mobile 'halo'	£5.15		
HM/2M 'Halo' + 24" mast	£5.75		

PHASING HARNESSES:	
PMH/2C 2m circular	£8.05
PMH/2M 2m stacking	£10.90
PMH/70 70cm stacking	£9.20

MASTS and ROTATORS etc.:	
SPM 16' portable mast	£16.35
PME 4' extension	£2.75
9502 Rotator	£55.75

FOR 23cm Band:	
D16/1296 Double 15 yagi	£36.75

ALL PRICES INCLUDE VAT, but please **ADD CARRIAGE** as follows: Harnesses, halos and UGPs—£1.00. Other aerials and masts—UK mainland £5.50

Pay by Barclaycard, Trustcard, Visacard, Access, Eurocard, Master Charge, etc.; cash, cheques, HP or Catronics Credit Charge Card

Catronics

COMMUNICATIONS HOUSE
(DEPT. 202) 20 WALLINGTON SQUARE
WALLINGTON, SURREY SM6 8RG
Tel: 01-669 6700

Shop/Showroom open Monday to Friday 9 a.m.-5.30 p.m. (closed for lunch 12.45-1.45) Saturdays 9 a.m.-12.45 p.m.

PACKER COMMUNICATIONS

PC-934. The only UHF SWR meter for 144-1296MHz

£44.35
N or BNC connectors

VHF/UHF WAVEMETERS

Newly licenced? Remember you MUST have a wavemeter

WM2 for 2m	130-300MHz	£22.45
WM7 for 70cm	400-900MHz	£24.25
WM4 for 4m	60-150MHz	£22.45

Any two **£42.** All three **£59**

VHF/UHF ANTENNA TUNING UNITS

Improve that match! Get the most from your rig

AT-70 for 4m	SO239 (N, BNC + £1)	£21.85
AT-145 for 2m	SO239 (N, BNC + £1)	£19.95
AT-432 for 70cm	**NEW!** (N & BNC)	£27.35

Any two **£40.** All three **£59**

Buy your YAESU equipment from us. We offer competitive prices AND part exchange. Instant credit?—a pleasure!

Unit 4, Old Station, Coniston, Cumbria LA21 8HQ

Buy it with Access

Office (09664) 678

Home (0229 89) 448

BARCLAYCARD VISA

Despite attempts by one of our 'competitors' – no names mentioned (for the moment!!) to disrupt our component supplies, the bulk of our product range is available ex-stock. New this month is the GLNA 432u series of gasfet preamplifiers for the 70cm band. GLNA 432u-1 has a 0.8dB noise figure with 13dB gain typically, while GLNA 432u-2 exhibits 0.65dB noise figure for just a little more money. See them at the rallies and have a chat with one of our engineering staff – or give us a ring for details.
As some of you may be aware we have been having enormous problems getting sufficient HAG antennas due to the enormous demand for these antennas throughout Europe (yes even France!!!). HAG has assured us that they foresee no future delivery problems of such magnitude, so all things being equal we look forward to offering these fine antennas from an in-depth stock. Our telephone bill has soared trying to keep you the customer happy!
Stephen G8KQB

TLNA432 s– rf switched 432MHz preamplifier – **£49.90**
u– unswitched 432MHz preamplifier – **£24.80**
These preamplifiers are very high quality low-noise bipolar transistor amplifiers covering the entire 430-440MHz band. Their noise measure is typically 1.4dB and they have an associated gain of typically 12dB. The device used is a modern highly linear low-noise transistor providing better performance at uhf than elderly devices such as the NE64535 or consumer gasfets like the 3SK97. We have paid our usual attention to excellent bandpass filtering in this case using helical resonators to ensure superb performance. As it is not possible to retain this order of performance with pin-diode or low-cost relay switching, the switched version uses proper coaxial relays to enable 100w + power handling capability.

SLNA70 s– rf switched 70MHz preamplifier – **£33.90**
u– unswitched 70MHz preamplifier – **£20.38**
Our 70MHz preamps are both versions of our established market-leading SLNA 144 series 2m mosfet amplifiers. Performance figures are substantially as for the 144MHz units with the exception of the bandpass filtering which is even better!

BBBA500 u– broadband low-noise amplifier – **£20.38**
This amplifier is a broadband high dynamic range amplifier covering the 20-500MHz band. It has been tailored to the requirements of 'scanner' users but will find many other applications. The bandpass response has been shaped to reject below 20MHz in order to minimise problems with high-order intermodulation from the hf bands. We can on request provide a version with its lower 1dB point below 1MHz!

THE REST OF THE RANGE:

SLNA70ub	Unboxed SLNA70u	**£12.41**
SLNA144s	The best rf switched 144MHz mosfet preamp currently available!	**£33.90**
SLNA144u	The unswitched version of the 144s	**£20.38**
SLNA144ub	Unboxed SLNA144u	**£12.41**
BLNA432ub/1	1.5dB nf/14dB gain sub-min preamp (29 × 17 × 5 mm) for fitting inside transceivers	**£10.29**
BLNA432ub/2	1.3dB nf version of above	**£14.95**
TLNA432ub	Unboxed version of TLNA432u	**£18.50**
BLNA1296ub	1240-1325MHz 1.8dB/12dB gain connectorised pcb preamp	**£24.50**
BBBA860u	400-860MHz broadband low-noise amplifier 2.3dB nf/10dB gain at 860MHz	**£20.50**
XBPF1296ub	30MHz wide 1296MHz microstripline bandpass filter with <2.5dB insertion loss on ptfe/glass substrate	**£7.75**
XBPF700ub	470-860 MHz microstripline bandpass filter for use as a tvi filter or in dx-tv applications	**£2.10**
HALO144	The halo!	**£35.65**
RPCB144ub	FT221/225 front-end board. Still the best commercially available front-end for 144MHz, winner of most 144 MHz contests and international best seller!	**£64.50**

muTek also stocks Kungsimport antenna combiners and dish feeds, HAG antennas and all sorts of oddies for the serious vhf'er.
Phone for further details or send an sae with your query. Tnx!

All above prices include VAT at 15%.

Carriage on all items (except antennas and combiners) is now 70p.

muTek limited – the rf technology company

Bradworthy, Holsworthy, Devon EX22 7TU (0409 24) 543

Access BARCLAYCARD VISA

BRAND NEW COMPONENTS BY RETURN OF POST

VAT Inclusive Postage 15p (Free over £5). List Free

HIGH STABILITY MINIATURE FILM RESISTORS 5% Tolerance
¼W E24 Series 0·51R – 10MO. (Except 7M5, 9M1) **1p**
0·125W E12 Series 10R to 1M8. **2p**
0·5W E12 Series 1RO to 1MO. **1½p**
1·0W E12 Series 10R to 10MO. **3p**
¼W Metal Film E12 series 10R to 1MO. 5% **2p**, 1%. **3p**

Mullard Subminiature Ceramic Plate capacitors 100V E12 Series
2% 1·8pf to 47pf **3p**. 2% 56pf to 330pf **4p**. 10% 390pf to 4700pf **4p**

Plate Ceramic Capacitors 50V working for vertical mounting
E12 Series from 22pf to 1000pf then E6 series 1k 5pf to 47k pf. **2p**

Miniature Polyester capacitors 250V working for vertical mounting
·01, ·015, ·022, ·033, ·047, ·068 **4p**. 0·1 **5p**. 0·15 & 0·22 **6p**
0·33 & 0·47 **8p**. 0·68 (63V) **11p**. 1·0 **15p**. 1·5 **20p**. 2·2 **22p**

ELECTROLYTICS Wire Ended (Mfds/Volts)

·47/50 **5p**	10/50 **5p**	47/16 **6p**	100/25 **7p**	220/25 **8p**	470/40 **16p**
1·0/50 **5p**	22/16 **6p**	47/25 **6p**	100/50 **8p**	220/50 **10p**	1000/15 **15p**
2·2/50 **5p**	22/25 **6p**	47/50 **6p**	150/16 **7p**	470/16 **11p**	1000/25 **25p**
4·7/50 **5p**	22/50 **6p**	100/16 **7p**	220/16 **8p**	470/25 **11p**	1000/40 **35p**

TAG ENDED CANS: 3300/40 **60p**. 4700/16 **25p**. 2500 + 2500/63 **£1.00**.

TANTALUM BEAD ELECTROLYTICS Subminiature vertical Mounting (Mfds/Volts)

0·1/35 **14p**	2·2/35 **15p**	15/16 **20p**	22/16 **30p**	47/16	**80p**
0·22/35 **14p**	4·7/6 **14p**	15/25 **35p**	22/25 **35p**	68/3	**30p**
0·47/35 **14p**	4·7/25 **15p**	22/6 **20p**	33/10 **30p**	100/3	**35p**
1·0/35 **14p**	10/25 **29p**	22/10 **25p**	47·6 **30p**	200/16	**£1.20**

POLYSTYRENE Capacitors 63V working E12 Series Long Axial Wires
10pf to 820pf **3p** 1kpf to 10kpf **4p** 12kpf **5p**

TRANSISTORS

BC107/8/9 **12p**	BC547C/8C/9C	**7p**	BC212L	**8p**	BFY50/51/52	**18p**	BFX88 **25p**
BC147/8/9 **10p**	BC557C/58C/9C	**7p**	BCY70	**15p**	2N2926	**7p**	BSX19&20 **15p**
BC157/8/9 **10p**	BC182L,184L	**8p**	BF195&7	**10p**	2N3055	**50p**	BD135&6 **25p**

8 pin i.c.s. 741 **18p** 556 **24p** Holders 8 pin **9p** 14 pin **12p** 16 pin **14p** 28 pin **25p** 40 pin **40p**

DIODES (p.i.v./amps)

75/25mA 1N4148 **2p**	800/1A 1N4006	**6p**	400/3A 1N5404	**14p**	115/15mA OA91	**6p**
100/1A 1N4002 **4p**	1000/1A 1N4007	**7p**	60/1·5a S1M1	**5p**	100/1A Bridge	**25p**
400/1A 1N4004 **5p**	1250/1A BY127	**10p**	30/45mA OA90	**6p**	30/150mA AAY32	**12p**

Zener Diodes E24 series 400mW. 3V3 to 33V to 33V **8p**. 1 watt 3V9 to 33V **12p**
LEDs 3 & 5mm. Red **10p**. Green & Yellow **14p**. Grommets 3mm **1½p**. 5mm **2p**
Fuses 20mm glass 100mA to 5A. Q Blow **5p**. A/Surge **8p**. Holders **5p**. (p.c. or chassis)

The C.R. Supply Co, 127 Chesterfield Rd, Sheffield S8 0RN. Tel: 57771

GAREX (G3ZV1)

SX-200 N VHF/UHF AM/FM SCANNING RECEIVER
Covers 26-88MHz, 108-180MHz, 380-514MHz; AM & FM throughout. It scans, seeks, memorises and beats all the others. **GAREX** are the UK MAIN SERVICE & SALES AGENTS; no one else can give you a better over-all deal. Sae details.

VHF FM MONITOR RECEIVERS
SR-9 top-selling monitor: 2m FM with 144-146MHz full coverage VFO plus 11 xtal controlled channels, ideal for fixed, /M, and /P use. 12V DC operation **£47.50**.
MARINE BAND version, 156-162MHz, same spec and price.
CRYSTALS FOR NR-56, SR-9, HF-12, TM56B, SR-11 All 2m channels from 0 (145·00) to 33 (145·825) incl. at **£2.46** (+ **20p** post). Also Raynet, 144·8, 144·825 and 144·85. Over 40 popular marine channels at **£2.85** (+ **20p** post). Sae list.
RESISTOR KITS E12 series 10Ω to 1M, 61 values, 5% carbon film, General purpose ratings ¼W or ½W (state which). Replenishments available. Starter pack, 5 ea value (305) **£3.10**. Standard pack, 10 ea (610) **£5.55**. Mixed pack 5 ea ¼W + ½W (610) **£5.55**. Giant pack 25 ea (1525) **£13.60**.
NICAD RECHARGEABLES – physically as zinc carbon: (AA/U7) **£1.30**; C(U11) **£3.35**; PP3 **£5.55**. ANY 5 + : less 10%. ANY 10 + : less 20%.
GAREX FM detector and squelch conversion ready assembled with full fitting instructions. Tailor made, easy to fit design for AM Cambridge, replaces squelch board with minimum of other modifications **£5.95**. Transistor Vanguard (AM25T) version (modified squelch) **£6.60**. Vanguard AM25B (valve Rx) version **£5.75**.
PYE CAMBRIDGE SPARES (sae full list). Rx RF board 68-88MHz **£5.95**. 10·7MHz I.F. **£3.65**. 2nd mixer 10·7MHz to 455kHz **£3**. 455kHz block filter 12½kHz **£9.40** ditto 25kHz **£3** 455kHz AM I.F. **£3.65**. Audio bd **£1.95**. AM squelch **75p**. Many other PYE parts in stock.
Transistor Inverter P.S.U. ex-equip. chassis section. Self-contained, fully wired and tested with circuit.
Type A 12V DC input, 380V DC at 180mA output (smoothed). **£9.50**.
Type B 12V DC in, 260V 150mA out. **£6.95**. 24V versions also available.

MAIN DISTRIBUTOR OF REVCO AERIALS & SPECIAL PRODUCTS

PRICES INCLUDE UK POST & PACKING & 15% VAT

Access

GAREX ELECTRONICS, 7 NORVIC ROAD, MARSWORTH, TRING, HERTS HP23 4LS. MAIL ORDER ONLY

Phone 0296 668684. Callers by appointment.

BARCLAYCARD VISA

CLASSIFIED ADVERTISEMENTS

Classified advertisements **25p** per word, minimum **£4.00**
Box Number £1.00 extra to wordage or minimum.
Semi-display 1/8 page 2¼" × 3½" (57 × 91mm) **£70.00**
3/32 page 1⅝" × 3½" (42 × 91mm) **£54.00**
1/16 page 1" × 3½" (26 × 91mm) **£38.00**
Please write clearly. No responsibility accepted for errors.
Latest date for acceptance—7 weeks before 1st of issue month.
All classified and semi-display advertisements MUST be prepaid.

Copy and remittance to: **M. J. HAWKINS G3ZNI, RSGB, 35 Doughty St, London WC1N 2AE.** (Cheques should be made payable to RSGB.)

Members' Ads must be sent to the editor at Chelmsford.

FOR SALE

QSL CARDS printed to your own specifications on white gloss cards. Sae to Caswell Press, 11 Barons Way, Woodhatch, Reigate, Surrey.
TVI/AFI? Cure it with ferrite rings, 67p each incl postage. TMP Electronics, Unit 27, Pinfold Workshops, Pinfold Lane, Buckley, Clwyd, CH7 9PL.
AERIAL WIRE 14swg hard drawn copper, 70' coils £5.50 140' £8.90 incl postage. TMP Electronics, Unit 27, Pinfold Workshops, Pinfold Lane, Buckley, Clwyd, CH7 9PL.
QSL & LISTENER CARDS Quality printing on coloured gloss cards at competitive prices. Sae for sample S. M. Tatham "Woodside", Orchard Way, Fontwell, Arundel, West Sussex.
STATION LOGBOOKS £2.25 (callsign printed on front cover). Mobile Minilogs: 80p. Callsign Window Stickers: £1.50. QSL Cards sae samples. Beauprint (G3OYI), Meltham Road, Honley, Huddersfield.
QSL CARDS Quality printing on gloss or tinted cards. Sae for examples. Express Printing Services, 28 Payne Avenue, Hove, Sussex.
TRAP DIPOLES, CUSTOM BUILT, ANTI-TVI MODELS, Tx-ing, SWL-ing, 24' to 108'. Send sae for lists.—G2DYM, Uplowman, Tiverton, Devon. (Tel: 03986 215).
PERSONALISED QSL CARDS 1,000 £11, 5,000 £42, (sae for samples). Q/Cards, 89 Derwent Street, Blackhill, Consett DH8 8LT.
ICOM, TRIO/KENWOOD OWNERS. Very informative separate newsletters. Details sae to G3RKC, QTHR.
OPEN WIRE FEEDER 14/·0076 tinned copper, PVC insulated, super lightweight spacers. Any length, 450 or 600 Ohm (specify). 20p per foot, plus 75p postage. Thornfield Radio (G3LSL), Sibbertoft, Market Harborough, LE16 9UD.
DIY QSL's 100 mixed designs £1.90. 8 designs, coloured card. SAE samples. See us at HMS Mercury. RWW, PO Box 11, Romsey SO5 8XX.
FIND BEARING, DISTANCE, LATITUDE, LONGITUDE of any two points from qth locator or lat-long on your Nascom 2. Send qth locator plus £2.50. A.S., 16 Chapel Lane, Northorpe, Gainsborough, Lincs.
DIY QSL CARDS, the original. Just add your own callsign etc. Ideal for contest groups, dx-peditions, G8 soon to be G4. Also SWL design. 50 for £1.70, 100 for £3.00 inc p & p. Sae for samples. Also UHF high pass TVI filter £2.50 inc p & p. Lam Electronics (RC), 47 Golden Miller Road, Cheltenham, Glos. Tel: 0242 43891 (24hr).
MORSE KEYBOARDS, dual lever paddles. Sae, Dales Keycode, 6 Normanby Road, Northallerton, North Yorks DL7 8RW. 0609 5965.
RADIO BREAKERS YARD. Spares for Pye sets, Cambridge, Vanguard, Westminister etc. Tel: 0622-36697, G4GAV, Maidstone.
STAINLESS STEEL TUBES for masts and beams, light and easily joined with Yorkshire or Conex fittings. Phone K.T.C. Communications, Coventry 412397.
SSTV THE EASY WAY Robot 400 p.c. boards, genuine Robot manufacture—£72.50 (no VAT) including technical information and p & p. Also sets of memories (16 × 4030/4060) ex-equipment but guaranteed—£23 per set or £25 per set including sockets. Peter Burnett G4BLL, 7 Rydings Avenue, Brighouse, West Yorkshire HD6 2AJ. Tel: 0484 710474.
TRIO R1000 0-30MHz continuous with Mosley RD5 10-80 trapped dipole and extension speaker and 12V adaptor. £250. Biggs, Cwmbran NP44 4TS.
SALE FR/FT101 SSB & FM FILTERS (3·18MHz) 4 Pole 12KHz £10, 6 Pole 2·5KHz £10, 8 Pole 2·4KHz £18. S.H. Datong FL1 £49. G3LLL FT200 Clippers £25, P.C.B. wired complete for FT101 G3LLL Clippers £25. FM unit + rpt. shift FT101/E £39.99. All inc. V.A.T., Post 75p. Holdings, 39/41 Mincing Lane, Blackburn, BB2 2AF (0254) 59595/6.

WANTED

EQUIPMENT WANTED

SPOT CASH PAID FOR GOOD USED AMATEUR AND MARINE RADIO EQUIPMENT—OR—YOUR EQUIPMENT SOLD AT YOUR PRICE ON SMALL COMMISSION—NO SALE—NO CHARGE
TEL: AMCOMM: 01-864 1166, 01-422 9585

WANTED GERMAN MILITARY RADIO equipment of WW II vintage (receivers, transmitters, accessories, parts.) Good prices paid by collector. Write Box 185, c/o G3ZNI, RSGB, 35 Doughty Street, London WC1N 2AE.

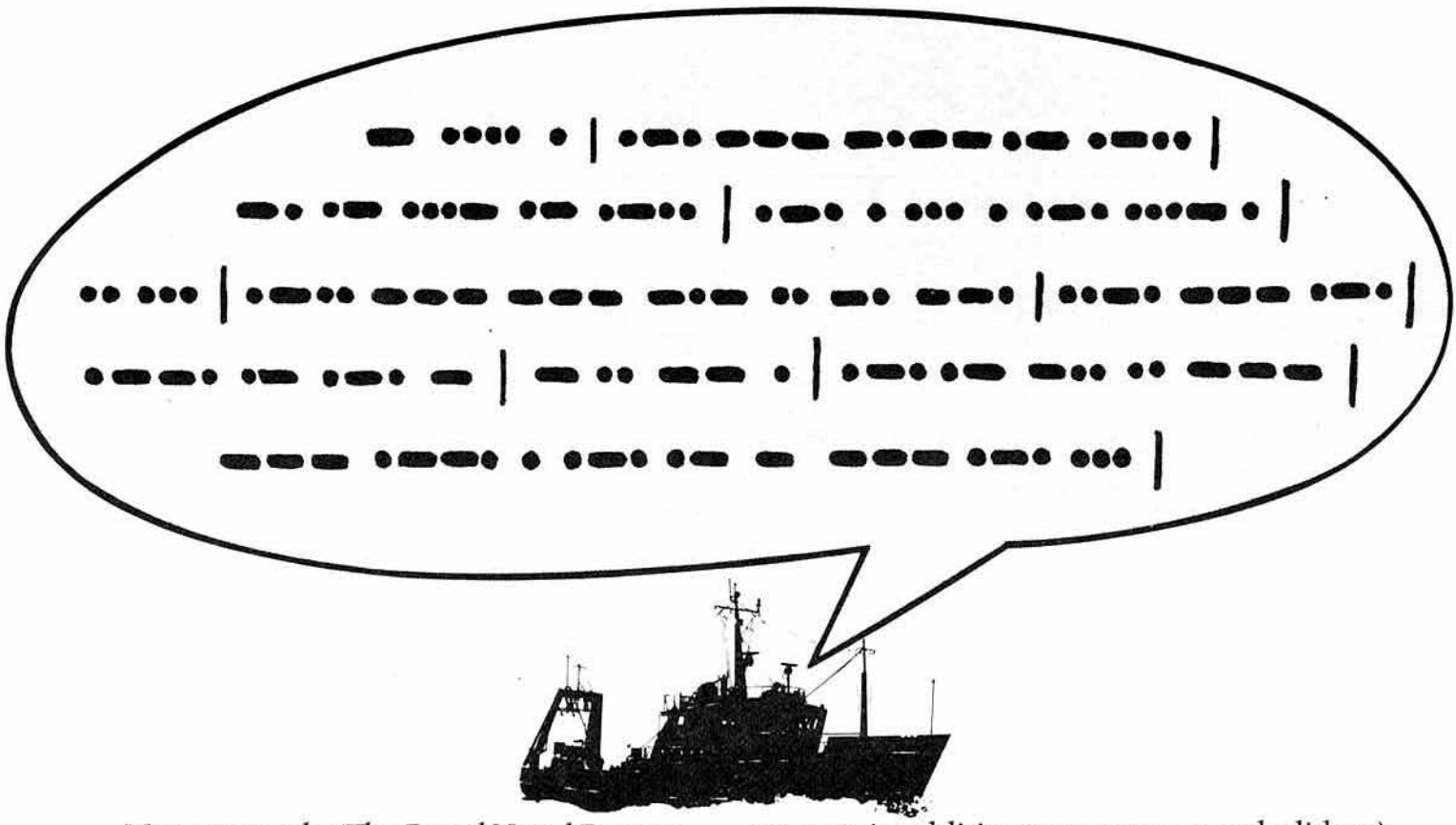
MISCELLANEOUS

COURSES—RADIO AMATEURS EXAMINATION. City and Guilds. Pass this important examination and obtain your licence, with an RRC Home Study Course. For details of this and other courses (GCE, professional examinations, etc) write or phone—THE RAPID RESULTS COLLEGE, DEPT JTI, Tuition House, London SW19 4DS. Tel: 01-947 7272 (9 am-5 pm) or use our 24 hr Recordacall Service: 01-946 1102, quoting Dept JTI.

HOLIDAY ACCOMMODATION

PEMBROKESHIRE—SOLVA. Enjoy your hobby on holiday. Luxury Holiday Homes on magnificent unspoilt coast. Near sandy beaches and secluded bays. Equipped and maintained to highest standards by resident owner. Colour TV, linen, fridge/freezer, central heating, washing machine, dryer. VHF and HF aerials available together with free use of HF and VHF equipment (FT101E, TR2400, Icom 260E). For free colour brochure—M. J. Probert GW4HXO, Ynys Dawel, Solva, Haverfordwest. Tel: 0437 721491.
BRIGHTON 10 MILES. Overnight accommodation, 18th century flint cottage. G4MUJ, Lancing 3102.
COME TO GD-LAND for your holidays. £6-£7 daily BB-EM. 3 minutes Douglas beach. Use of rig. GD3ZEX, Isle-of-Man, 0624 3286.
PAST PRESIDENT G6GR is retiring to join his daughter's established AA*, RAC* Hotel in sunny Torquay, where his Yaesu-equipped shack will be available for use by all licensed amateur visitors. You and your family will enjoy excellent food with choice of menus, well appointed bedrooms some with ensuite facilities, and quiet sunny gardens and patios. Dogs welcome, car park and on bus route. Brochure from Mr & Mrs Tolkien, Fairmount House, Herbert Road, Chelston, Torquay. Telephone 0803-605446.
CORNWALL, LITTLE MANHAY, HELSTON; (03265) 2044. Bed and Breakfast, Farmhouse A394, every comfort, radio shack available, discounts HAMS, R.SIGNALS, BURMA STARS,—STAN COTTON, G4FKJ.
BOURNEMOUTH "DOLBEDARN" PRIVATE HOTEL, 8 Grand Avenue, Southbourne, BH6 3SU. Between sea and shops. Residential licence, bedroom radio, call and tea-making facilities. Excellent food. Dinner, bed and breakfast from £9.00 daily. Bed and breakfast from £6.00 daily. 0202 424826, E W & J M Batten (G3BKN).
MARAZION, CORNWALL. Modern country chalet. Close to beaches. Fully equipped to accommodate up to six in comfort. G3UCQ, (0736) 752982.

INDEX TO ADVERTISERS



Message reads: 'The Royal Naval Reserve is looking for part-time radio operators'.

In return for your giving up a little of your spare time, the RNR will train you to be a specialist in communications.

You'll learn to operate radio equipment, radio telephones and teleprinters.

You'll learn to read Morse at 18 w.p.m., to touchtype and to handle all sorts of signal traffic.

(You'll also learn there's every opportunity of becoming an Officer.)

So much for the job description. What of your employers?

Well, the RNR is made up of volunteers who want to play an active part in Britain's naval defence.

It operates its own ships, the 10th Mine Countermeasures Squadron, as part of NATO's defence force. And it provides vital reinforcements of skilled manpower to the Royal Navy, at sea and ashore.

All we ask you to put in is a few hours each week, some weekends and 14 days each year (which we've found most employers will agree to in addition to your summer holidays).

You'll receive Naval pay during your weekend and annual training, a tax-free annual bounty, plus travelling expenses.

And, of course, you'll get every chance to make the most of the Navy's excellent sports and social facilities.

If you are between 17 and 33 and you'd like to find out more about the RNR, just

(Fill in the coupon.)

Captain R. G. Fry OBE, RN, Office of the Commander-in-Chief, Naval Home Command, HM Naval Base, Portsmouth PO1 3LR.

Please send me full details of joining the Royal Naval Reserve.

Name (Mr/Mrs/Miss)_____
(BLOCK CAPITALS PLEASE)

Address_____

_____

_____

_____

(Enquiries from UK residents only.) RC2

RNR

RSGB MAIL-ORDER PRICE LIST

RSGB PUBLICATIONS

Books	Non-members' price	Members' price
A Guide to Amateur Radio (18th edn, paperback)	£3.09	£2.78
A Guide to Amateur Radio (18th edn, hardback)	£6.57	£5.91
Amateur Radio Awards (2nd edn)	£3.41	£3.07
Amateur Radio Techniques (7th edn)	£6.20	£5.58
Amateur Radio Operating Manual (2nd edn)	£5.03	£4.53
HF Antennas for All Locations	£6.67	£6.00
Morse Code for Radio Amateurs	£1.31	£1.18
OSCAR-Amateur Radio Satellites	£4.54	£4.09
RSGB Amateur Radio Call Book (1982 edn)	£4.73	£4.26
Radio Amateurs' Examination Manual (9th edn)	£3.12	£2.81
Radio Communication Handbook (5th edn) Vol 1 (*Out of print*).		
Radio Communication Handbook (5th edn) Vol 2	£9.34	£8.41
Radio Communication Handbook (Vols 1 and 2 combined, paperback)	£11.15	£10.04
Radio Data Reference Book (Out of print)	—	—
Test Equipment for the Radio Amateur (2nd edn)	£6.07	£5.46
Television Interference Manual (2nd edn)	£1.95	£1.76
VHF/UHF Manual (3rd edn)	£8.99	£8.09
World at their Fingertips	£4.51	£4.06

Logbooks		
Amateur Radio Logbook	£2.45	£2.21
Mobile Logbook	£1.14	£1.03
Receiving Station Logbook	£2.72	£2.45

Maps, charts and lists		
HF Awards List	34p	31p
Great Circle DX Map (wall)	£2.12	£1.91
IARU Region 1 Beacon List	32p	29p
IARU QTH Locator Map of Europe (wall)	£1.37	£1.23
QTH Locator Map of Western Europe (wall)	£1.37	£1.23
QTH Locator Map of Europe (card for desk)	69p	62p
UK Beacon List	35p	32p
UK Repeater List	35p	32p
World Prefix Map (wall)	£2.23	£2.01

Miscellaneous		
"Amateur radio" (two colours) car sticker	63p	57p
"I'm on the air with amateur radio" (four colours) car sticker	84p	76p
"I'm monitoring ·5 are you?" (two colours) car sticker	68p	61p
QSL card holders	£1.14	£1.03
Radio Communication back issues *(As available)*	97p	87p
Radio Communication bound volume, 1978	£15.03	£13.53
Radio Communication bound volume, 1979	£13.75	£12.38
Radio Communication bound volume, 1980 (Parts 1 and 2)	£15.99	£14.39
Smith charts, pad of 25 (Chartwell D7510)	£2.23	£2.01

Members' sundries (members only)		
Radio Communication Easibinder (new size)	—	£4.24
RSGB badge car sticker	—	49p
RSGB hf contest log sheets (100)	—	£2.10
RSGB teeshirt (small, medium, large, extra large)	—	£3.13
RSGB tie (maroon, green, blue)	—	£3.09
RSGB station callsign plaque*	—	£6.13
Callsign lapel badge*	—	£1.96
Lapel badge (RSGB emblem, pin fitting)	—	68p
Members' headed notepaper (50 sheets) quarto	—	£1.00
Members' headed notepaper (50 sheets) octavo	—	68p

**Delivery approximately five weeks*

ORDERING INFORMATION

NON-MEMBERS. Use left-hand price columns. Note that members' sundries are only available to members of RSGB.

MEMBERS. Use right-hand price columns. Enclose with the order a recent *Radio Communication* address label as proof of membership.

PRICES. These include postage, packing and VAT where applicable. For airmail despatch, please ask for price before ordering. Goods are obtainable, less p & p, at RSGB headquarters between 10am and 4pm, Monday to Friday.

POSTAL TERMS. Cash with order. Stamps and book tokens cannot be accepted. Cheques and postal orders should be crossed and made payable to "Radio Society of Great Britain". Giro A/C No 533 5256. Please write your name and address clearly on the order, and allow up to 28 days for delivery.

OTHER PUBLICATIONS

Title	Non-members' price	Members' price
A Course in Radio Fundamentals (ARRL)	£3.24	£2.92
Active-filter Cookbook (Sams)	£12.71	£11.44
All About Cubical Quad Antennas (RPI)	£2.99	£2.69
Amateur Single Sideband (Ham Radio)	£4.60	£4.14
Amateur Television Handbook (BATC)	£2.39	£2.15
Antenna Anthology (ARRL)	£3.32	£2.99
ARRL Electronics Data Book (ARRL)	£3.60	£3.24
Beam Antenna Handbook (RPI)	£4.13	£3.72
Beginners Handbook of Amateur Radio (Sams)	£8.37	£7.53
Best of Oscar News (AMSAT-UK)	£1.64	£1.48
Better Short Wave Reception (RPI)	£3.42	£3.08
Care and Feeding of Power Grid Tubes (Varian)	£2.98	£2.68
CMOS Cookbook (Sams)	£9.70	£8.73
Design of VMOS Circuits (Sams)	£8.50	£7.65
Electronic Design with Off-the-shelf ICs	£7.86	£7.07
Electronics for the Amateur (Sams)	£7.81	£7.03
English-French QSO Language Instruction	£1.78	£1.60
FET Principles, Experiments and Projects (Sams)	£8.04	£7.24
Hints and Kinks for the Radio Amateur (ARRL)	£3.13	£2.82
How to Program and Interface Your 6800	£12.80	£11.52
IC Converter Cookbook	£11.51	£10.36
IC Op-amp Cookbook (Sams)	£11.87	£10.68
IC Timer Cookbook (Sams)	£8.76	£7.88
International VHF FM Guide (1981 edn)	£1.82	£1.64
Knowing Your Oscilloscope	£6.32	£5.69
Practical Antennas for the Radio Amateur (Scelbi)	£8.10	£7.29
Radio Amateur Callbook (1982 DX listings) (ARCI)	£14.42	£12.98
Radio Amateur Callbook (1982 USA listings) (ARCI)	£14.61	£13.15
Radio Amateurs Handbook 1982 (ARRL)	£8.90	£8.01
Radio Frequency Interference (ARRL)	£2.69	£2.42
Radio Transmitter Principles and Projects (Sams)	£6.28	£5.65
Radio Valve and Semiconductor Data Book (Newnes)	£4.44	£4.00
RTTY the Easy Way (BARTG)	£1.14	£1.03
SCRs and Related Thyristor Devices	£7.99	£7.19
Shortwave Listeners Guide (Sams)	£4.44	£4.00
Simple Low-Cost Wire Antennas	£2.92	£2.63
Single Sideband for the Radio Amateur (ARRL)	£3.32	£2.99
Solid State Basics (ARRL)	£3.93	£3.54
Solid State Design for the Radio Amateur (ARRL)	£5.64	£5.08
Son of Cheap Video	£7.12	£6.41
The ARRL Antenna Book (ARRL)	£4.05	£3.65
The Cheap Video Cookbook (Sams)	£5.47	£4.92
The Complete Handbook of Slow Scan TV (Tab)	£6.37	£5.73
The 8080A Bugbook (Sams)	£9.59	£8.63
TTL Cookbook (Sams)	£8.55	£7.70
TV Typewriter Cookbook (Sams)	£8.70	£7.83
Understanding Amateur Radio (ARRL)	£4.14	£3.73
World Atlas (RACI)	£1.91	£1.72
World Radio TV Handbook (1982 edn)	£11.15	£10.04
ZAPP—Impedance and Power Potential	£4.17	£3.75
6801, 68701, 6803 Microcomputer Programming	£11.28	£10.15
6809 Microcomputer Programming	£10.89	£9.80
80 Meter DXing (CTI)	£3.12	£2.81
8085A Cookbook	£11.34	£10.21

MORSE INSTRUCTION AIDS

G3HSC rhythm method of morse tuition

Complete course (Two 3-speed lp records and one ep, plus books)	£6.99	£6.29

On all overseas orders for G3HSC course, including orders from Eire, add £1.12 for additional packing and postage from supplier

MAGAZINE SUBSCRIPTIONS

QST (including ARRL membership). One year	£17.50	£15.75
Two years	£34.50	£31.05
Three years	£50.50	£45.45
By air via KLM (to W Europe only) one year	£23.75	£21.38

Send *QST* subscriptions to RSGB, 35 Doughty Street, London WC1N 2AE.

Ham Radio Magazine (per annum) (incl air delivery) . . £14.00
Subscriptions and changes of address for *Ham Radio Magazine* should be sent to: Ham Radio Magazine (UK), PO Box 63, Harrow, Middx HA3 6HS.

ORDER FROM: **RSGB Publications (Sales), 35 Doughty Street, London WC1N 2AE**
(Raynet supplies should be obtained from Mrs J. Balestrini, Merrivale, Willow Walk, Culverstone, Gravesend, Kent)

DATONG

YET MORE INNOVATION

New

MODEL DF
DISPLAY UNIT

DOPPLER DIRECTION FINDER

Model DF is a direction finding attachment for use with existing narrow band FM receivers and transceivers.

Two units, the display unit and the special antenna combiner convert your NBFM transceiver plus four omnidirectional antennas into a radio direction finder. A built-in r.f. activated antenna relay diverts the transceiver's output to the normal antenna during transmit or when the DF attachment is switched off.

Features

- Works with any existing narrow-band FM receiver or transceiver. No modifications are needed. The only connections required are to the external speaker and antenna jacks.
- Gives a clear directional readout on a circular array of sixteen bright green LEDs.
- Display holds last reading when signal drops out.
- Very easy to use and install.
- Only a single coaxial cable needed between display unit and antenna combiner.
- Professional quality at remarkably low cost. Display unit uses two PTH circuit boards. Gasket sealed combiner unit houses two conventional double-sided PCBs.

Applications

Model DF costs between ten and a hundred times less than conventional RDF systems, and therefore opens up new application areas for both professional and hobby users. Possible applications include:- VHF amateur radio, Citizen's Band radio, aircraft spotting, tracking gliders and light aircraft, locating lost model aircraft, private mobile radio systems, coastal and marine radio, tracking and locating anti-social radio operators, locating 'tagged' animals in the wild, helping to identify or trace unknown transmissions, law enforcement.

MODEL DFA2 COMBINER UNIT

A complete system needs the display unit and the antenna combiner plus four antennas mounted at the corners of a square spaced apart by 0.05 to 0.3 wavelengths.

For fixed station use, four dipoles are suitable while four magnetically mounted quarter wave whips are ideal for mobile use. Depending on the choice of antenna, the system will operate from 20 to 200 MHz.

Suitable magmount quarter wave whips are available from Datong for VHF use.

***BASIC DF SYSTEM** (Model DF display unit with Model DFA1 combiner. **£125.00** + VAT **(£143.80)**

***DF SYSTEM**, as above but with mobile version of combiner, Model DFA2 (as DFA1 but fitted with magmount and 4 metre coaxial downlead terminated with PL259 plug). **£131.00** + VAT **(£150.70)**

COMPLETE MOBILE DF SYSTEM (Model DF display unit, Model DFA2 combiner, and four Model MA1 quarter wavelength magmount antennas cut for 145 MHz). **£173.50** + VAT **(£199.50)**

* Antennas not included.

New

MODEL RFA

WIDE BAND PREAMPLIFIER - MODEL RFA

Eliminates separate tuned preamplifiers for each band.

Model RFA improves the sensitivity of any receiver or transceiver working in the range from 5 to 200 MHz. It connects in series with the antenna and built-in r.f. activated relay switches the pre-amplifier out of circuit during transmit or when the power is off.

Features:

- Extra wide bandwidth saves the cost of separate narrow band preamps.
- Handles strong signals without overload thanks to special low-noise negative feedback technique. Intercept point better than + 20dbm.
- Low noise figure.
- Carefully chosen gain level minimises receiver overload and cross modulation.
- R.F. activated bypass relay allows easy use with transceivers.
- Rugged diecast aluminium case with SO239 connectors and PTH printed circuit board.

Applications

Application areas include:- weak signal reception of all amateur and satellite bands from 5 MHz up to 200 MHz, long distance reception of VHF FM Broadcasts and VHF TV Signals, CB transceivers, private mobile VHF radio transceivers, reception of marine and aeronautical bands, VHF scanner receivers, compensating for signal loss in long antenna feeders.

The wide bandwidth of Model RFA makes it ideal for use with broadband antennas and scanner receivers.

Broadband Preamplifier, Model RFA: £25.50 + VAT **(£29.32)**

New

MODEL S
"CODECALL"

"CODECALL" SELECTIVE CALLING DEVICE - TAKES THE FATIGUE OUT OF LONG TERM MONITORING

"Codecall" is ideal wherever there is a need to monitor a well used radio channel for one particular call over long periods. "Codecall" gives the same convenience as a telephone bell, in that the receiver remains totally silent while monitoring. It therefore causes no disruption to other activities.

In fact the user can totally disregard the radio until a loud bleep from "Codecall" warns that the desired signal has been received. The loud intermittent bleep then continues, unless cancelled, for over ten minutes after the call is received.

"Codecall" ensures that the communications channel remains at full efficiency at all times. Without "Codecall" the desired call often blends into the general chatter and is missed by the listener, especially when the volume has been reduced to cut down the radio's nuisance level.

Features

- Each "Codecall" unit acts as a call generator and a call receiver.
- No electrical connection is needed at the transmitter, simply hold "Codecall" next to the microphone.
- At the receiver simply plug "Codecall" into the external speaker jack.
- Over four thousand different codes virtually eliminate the chance of false alarms.
- Internal 9 volt battery has long life since no current is used while monitoring a squelched channel.
- Works over any voice link, whether FM, AM, or SSB.
- Codes selected by either three 16-way switches (Model S) or by altering twelve internal wire links (Model L).
- Compact: only 4 x 2.4 x 1.05 inches.

Two Versions

Model S (as illustrated) has three 16-way rotary switches on the front panel giving a total of 4096 combinations immediately available. Model L has no switches, instead the code is set by altering twelve wire links inside the case.

Both models can be used in the same system. The switched version (Model S) is ideal where frequent code changes are required, whereas the linked version (Model L) is suitable where codes are not likely to be altered often, or for unskilled users who might accidentally set the wrong code.

Note: when used by UK Radio Amateurs all transmissions must be identified as required by the licence conditions.

"Codecall" Model L (Link programmed):
£24.00 + VAT **(£27.60)**

"Codecall" Model S (Switch programmed):
£25.50 + VAT **(£29.32)**

PRICES

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

FL1	59.00 (67.85)	AD370	45.00 (51.75)	RFA	25.50 (29.32)
FL2	78.00 (89.70)	AD270 + MPU	37.00 (42.55)	Codecall (Linked)	24.00 (27.60)
PC1	105.00 (120.75)	AD370 + MPU	49.00 (56.35)	Codecall (Switched)	25.50 (29.32)
ASP	69.00 (79.35)	MPU	6.00 (6.90)	Basic DF System ★	125.00 (143.80)
VLF	22.00 (25.30)	DC144/28	31.00 (35.65)	DF System ★	131.00 (150.70)
D70	43.00 (49.45)	DC144/28 Module	25.00 (28.75)	Complete Mobile DF System ★	173.50 (199.50)
D75	49.00 (56.35)	Keyboard Morse Sender	112.20 (129.00)		
RFC/M	23.00 (26.45)				
AD270	33.00 (37.95)				

★ See text for details.

DATONG ELECTRONICS LIMITED

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

Data sheets on any products available free on request – write to Dept R.C.

DATONG ELECTRONICS LIMITED
Spence Mills, Mill Lane, Bramley, Leeds LS13 3HE, England. Tel: (0532) 552461

YAESU MUSEN

GENERAL COVERAGE MULTIMODE HF TRANSCEIVER—THE FT-ONE

COVERAGE

Rx; 150KHz-30MHz. Continuous coverage.
Tx; 160-10m (9 bands). 1·5-30MHz Commercial.

MODES

All modes; AM, CW, FM, FSK, LSB, USB.
Tx and Rx on opposite sidebands possible.

FREQUENCY SELECTION

Multiple methods of frequency setting.
Main dial; "velvet smooth" 10Hz resolution,
Set MHz/R-Normal 20KHz/R-Fine 2KHz/R
Controls RIT—offset (synthesised clarifier).
Inbuilt keypad, direct digital entry to 100Hz.
Tuning/Scanning; Fast/Slow, Up/Down, Man/Auto.

RECEIVER

Receiver dynamic range up to 100dB.
Pair of low noise power transistors in RF.
Ring mixer with LO injection at +10dBm.
Advanced variable threshold noise blanker.
AGC: slow-fast-off. Squelch control.
Variable RF antennuator and RF gain circuits.
SSB; Variable bandwidth and IF shift.
3 CW and 2 FSK bandwidth positions.
300Hz, 600Hz, 2,400→300Hz, 6KHz, 12KHz.

TRANSMITTER

100W RF, (50% duty FSK) all solid state.
No preselector no "plate", no load controls.
Mains and 12VDC. Switch-mode PSU built in.
CW delay; adjustable through to *full break in.*
Electronic keyer built in. Drive level control.
Panel adjustable VOX. Signal monitor feature.
RF processor, Control concentric with mic gain.
Auto mic gain, reduces extraneous noises.

MEMORY

Two memory blanks (A&B) each with 10 slots.
Simplex or semi duplex A, B, RxA/TxB, TxA/RxB.
ANY frequency storable. For ANY Tx-Rx split.
RIT offset stored together with memory channel.

METERING

Two large meters (+3 digitals and 12 leds).
R.H. (Rx/Tx); 'S' (1-9, +60dB) and ALC level.
L.H. switched; Ic (20A) Vcc, Discriminator,
Compression (0-25dB), Forward, Reflected.
Digital readout to 100Hz. Analogue markings.
Dedicated digital readout of RIT to ±9·9KHz.
Digital readout of memory channel recalled.
LED's; Processor, Noise blanker, Auto mic gain,
Monitor, Peak—Notch filter, Scan, Transceive,
Tx-Rx Clarify, Dial Lock, Tx Disabled.

WORKING FOR OUR COMMON INTERESTS—at Yaesu Musen communication equipment is not a sideline but the only business. Over 130 licensed amateurs proudly produce the most diverse product line available, SSB, CW, AM or FM for mobile, portable or base use.

SOUTH MIDLANDS COMMUNICATIONS LTD
SM HOUSE, OSBORNE ROAD
TOTTON, SOUTHAMPTON SO4 4DN

SMC

YAESU MUSEN'S ONLY AUTHORISED UK AGENTS

G3FIK

AMATEUR ELECTRONICS UK
508-514 ALUM ROCK ROAD
ALUM ROCK,
BIRMINGHAM 8

Printed in Great Britain for the RADIO SOCIETY OF GREAT BRITAIN, 35 Doughty Street, London, WC1N 2AE
by E T Heron & Co Ltd, Essex and London