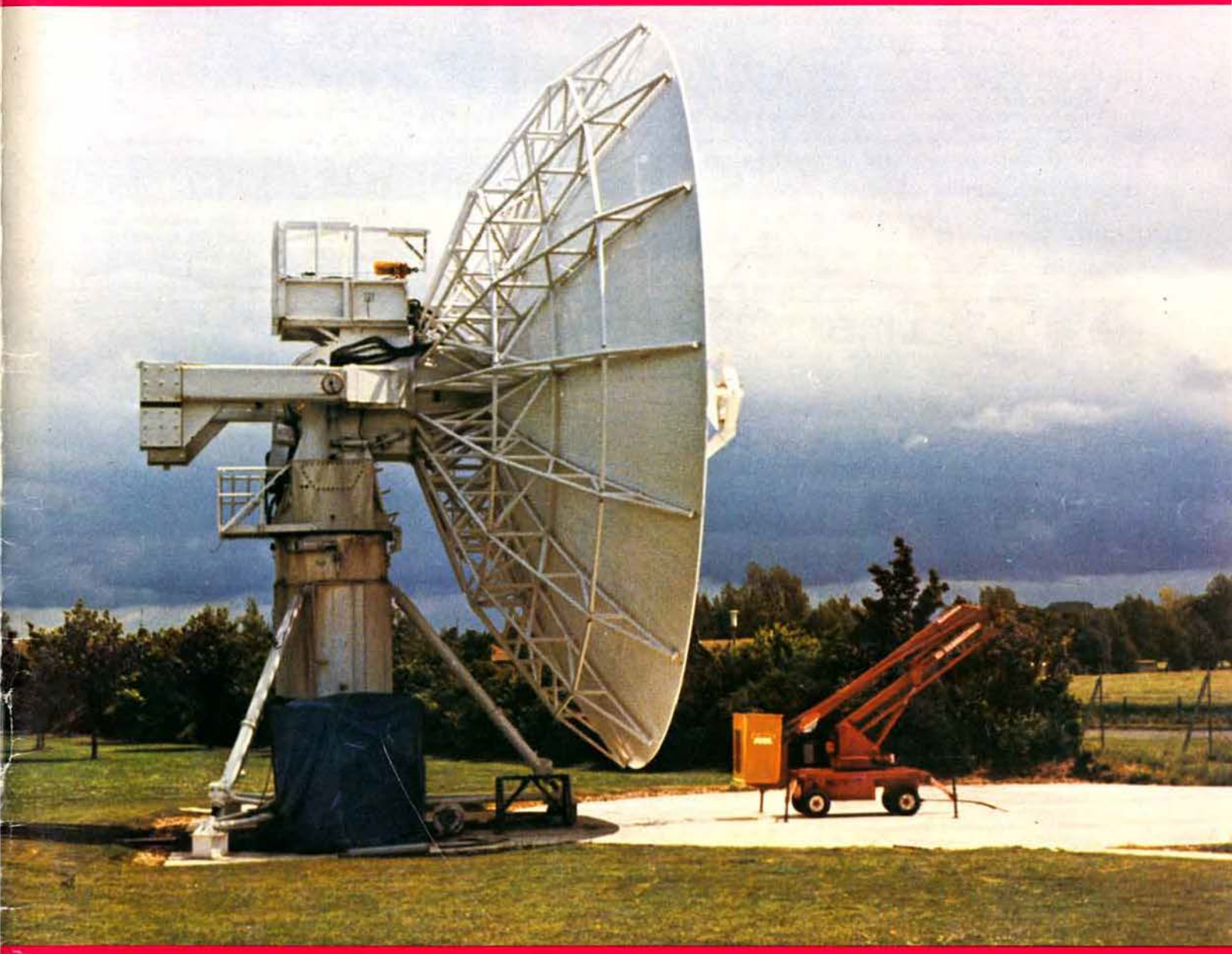
RADio COMmunication

November 1981



Journal of the Radio Society of Great Britain

RSGB

Catronics your one-stop shopping centre for complete equipment from 'Trio' and 'Philips', accessories from 'Jaybeam' and 'Microwave Modules', components, kits and the 'Video Genie' Microcomputer system

Available from Catronics —real value for money in microcomputers

video genie system

Advanced features are:

1. Built-in TV interface, the user's TV set may be used as the display terminal, thus saving money.
2. Main Control Unit contains the CPU plus,
   i) 51 key typewriter keyboard, with 10 key rollover.
   ii) High quality cassette recorder, enables recording and playback of programs, data and the use of pre-recorded tapes.
3. Built-in audio cassette interface for connecting another cassette recorder to serve as cheap and compact storage for large amounts of data on tapes.
4. 16k user RAM included, expandable to 48k.
5. Fully TRS 80 level II software compatible so a huge range of software is already available.
6. Full 12k Microsoft BASIC in ROM.
7. Full expansion capability to Discs and Printer, a small system with big possibilities.
8. Self-contained, all in one attractive case.
9. The system uses the powerful Z80 processor.

Our cash and Carry Price only £355.00 inc VAT

Also available 9" Monitor – built to full professional specification (NOT a converted television) Model CVM600: £130.00.

Full range of supporting programs and accessories available, including Amateur Radio packages.

New RTTY Terminal Unit/Program for Computers

Fabulous new program now available to send and receive RTTY. Complete with Receive Terminal Unit and Transmit AFSK on PCB assy. Suitable for Video Genie and TRS80 computers: CT600 £121.90+90p postage.

PRESTEL IS HERE NOW!

The fabulous 'TANTEL' adaptor is now available from Catronics at only £195.50.This compact unit sits on your desk or chair and will drive virtually any television set, B/W or colour. Send to Catronics for full details.

VIDEO DISPLAY UNIT MODEL CD310 ESPECIALLY DESIGNED FOR THE RTTY ENTHUSIAST

The video display unit is designed to be an all-electronic replacement for a Teleprinter, and therefore does not suffer its disadvantages—bulk, unreliability and noise.

The basic function is to take Murray Code—either from a Terminal Unit (on receive) or from a Keyboard—and produce a complete TV signal. This signal may be fed into a monitor or via the built-in UHF modulator into the aerial of an ordinary domestic TV set. The resulting display is a page of 16 lines of up to 64 characters.

It may also be used (with its keyboard) to send fully encoded Murray Code signals for transmit purposes.

16 lines per page
64 characters per line
Standard TTL compatible input
Standard IV video output
Flashing cursor
Auto-scroll at end of page
Cabinet size 9" × 2½" × 7" approx.

Front panel controls for:
Letter shift
Figure shift
Page reset
Carriage return
Line feed

Built-in mains PSU
Styled to match the Catronics CT100 Terminal Unit
Model CD310 with built-in UHF modulator: £170.00
(Add £5.50 for delivery)

and don't forget the RTTY TERMINAL UNIT CT100 Mk2

Now incorporating a number of modifications, YOU have asked for: including Completely automatic receive/transmit modes.
Protected and buffered input provided for TTY keyboard.
Automatic re-generation of incoming tones.
Special r.f. interference suppression circuit, etc, etc.

Inputs for:
Audio FSK signal in
Data in from VDU (eg CD310)
TTY Keyboard or Tape Reader

Outputs for:
VDU or other TTL compatible equipment
TTY Magnet—single or double current
AFSK to drive Transmitter

Featuring a unique digitally controlled **'Autoprint'** circuit which is a superior replacement for the 'Antispace' and 'Autostart' facilities found on some other terminal units. The terminal will ignore most CW and phone signals but will respond to a correct RTTY signal.

Tuning correctly into an RTTY signal is made simple with a single **'correctly tuned'** LED plus an additional **'Mark frequency'** indicator.

The FSK demodulator circuit utilises a special 'state-of-the-art' system to give excellent performance and stability at low cost. The demodulator is set to decode signals within 75Hz of nominal frequency, ie 1200–1350Hz for space and 1370–1520Hz for mark, when in narrow shift position.

The teleprinter interface unit incorporates electronic 'de-bounce' circuitry to eliminate spurious switching from the Keyboard. The loop supply is protected by a separate fuse and is suitable for driving all single current and double current magnets known to be available.

VAT inclusive prices are as follows: CT101 without Teleprinter interface **£99.60**, CT103 Complete Terminal Unit **£104.90**. All models plus **£5.50** delivery.

APPROVED TRIO DEALER

We are 300 yards from Wallington Railway Station (London Bridge or Victoria). Frequent buses from Croydon and Sutton. Three large car parks within 100 yards. **Credit facilities available on all equipment. Credit cards accepted.** Mail orders normally dealt with on day of receipt. All prices include VAT.

CATRONICS LTD, DEPT 101, COMMUNICATIONS HOUSE
20 WALLINGTON SQUARE, WALLINGTON, SURREY SM6 8RG. Tel: 01-669 6700
Shop/showroom open Monday–Friday: 9.00–5.30, closed for lunch: 12.45–1.45. Saturdays: 9.00–12.45

EXPORT SALES WELCOME — PAY BY CREDIT CARD OR BANKERS CHEQUE

BARCLAYCARD VISA

Access

NOVEMBER 1981

VOLUME 57 No 11

RADio COMmunication

CONTENTS

1014 **Roy Frederick Stevens, MBE, AIAS, FCII, G2BVN**—Obituary

1015 **QTC**

1016 **The G4BWE audio filter** —Stephen Price, G4BWE

1019 **New products** —Vorta portable mast—Thandar TG102 function generator

1020 **A fet dip oscillator for 1·6–215MHz with tone dip feature**—A. L. Bailey, G3WPO

1026 **The effects of preamplifiers on receiver performance, and a review of some currently available 144MHz preamplifiers (Part 1)**—J. N. Gannaway, DPhil, G3YGF

1032 **Technical topics**—Pat Hawker, G3VA

1037 **SWL news**—Bob Treacher, BRS32525

1038 **4-2-70**—John Morris, G4ANB

1041 **A dissertation on the delights of duplex**—Jack Hum, G5UM

1042 **Microwaves**—Charles Suckling, G3WDG

1043 **The month on the air**—John Allaway, G3FKM

1045 **HF propagation study**

1046 **Propagation predictions**
Mobile rallies calendar
Special event station
Looking ahead
Contests calendar

1047 **Contest news**

1049 **Council proceedings**
Obituaries

1050 **Club news**

1053 **Members' ads**

EDITOR
A. W. Hutchinson

Assistant editor
Miss S. M. Walker

Draughtsman
D. E. Cole

Editorial secretary
Miss H. Samuel

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:

Mr C. C. Lindsay,
2 Leyburn Gardens,
Croydon,
Surrey CR0 5NL

Tel 01-686 5839 *(Not RSGB)*

Hours: 0915 to 1715

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

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

26,007 copies per issue average circulation in 1980

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

TRIO *pacesetter in amateur radio*

TS-830S *V.B.T., notch, IF shift, wide dynamic range*

The TS-830S has every conceivable operating feature built-in for 160-10 metres (including the three new bands). It combines a high dynamic range with variable bandwidth tuning (VBT), IF shift, and an IF notch filter, as well as very sharp filters in the 455kHz second IF. Its optional VFO-230 remote digital VFO provides five memories.

TS-830S FEATURES:

- LSB, USB and CW on 160-10 metres, including the new 10, 18, and 24MHz bands. Receives WWV.
- Wide receiver dynamic range. Junction FETs in the balanced mixer, MOSFET RF amplifier at low level, and dual resonator for each band.
- Variable bandwidth tuning (VTB). Varies IF filter passband width.
- Notch filter (high-Q active circuit in 445kHz second IF.
- IF shift (passband tuning).
- Built-in digital display (six digits, fluorescent tubes), analog subdial, and display hold (DH) switch.
- Noise-blanker threshold level control.
- 6146B final with RF negative feedback. Runs 220W PEP (SSB)/180W dc (CW) input on all bands.
- Built-in RF speech processor.
- Narrow/wide filter selection on CW.
- SSB monitor circuit to check transmitted audio quality.
- RIT (receiver incremental tuning) and XIT (transmitter incremental tuning).

OPTIONAL ACCESSORIES:

- SP-230 external speaker with selectable audio filters.
- VFO-230 external digital VFO with 20Hz steps, five memories, digital display.
- AT-230 antenna tuner/SWR and power meter/antenna switch; 160-10 metres, including three new bands.
- YG-455C (500Hz) and YG-455CN (250Hz) CW filters for 455kHz IF.
- YK-88C (500Hz) and YK-88CN (270Hz) CW filters for 8·83MHz IF.

(VFOs for TS-830S, TS-130 Series, and TS-120S are compatible with all three series of transceivers.)

TS830S £694.83 inc VAT
Carriage £4.50.

SP-230 TS-830S VFO-230 AT-230

TS-530S *building on proven success*

The all new TS530S is firmly based on the reputation of the TS520 series and incorporates many of the features of the superb TS830S. Included are the three new bands and, of course, the rig has both digital and analogue frequency readout. Also available for the TS530 is a complete range of matching station accessories, the SP230 speaker, the VFO240 and, of course, the AT230 antenna tuning unit.

NEW

TS530S features:

- Single conversion receiver and transmitter using 8.83MHz IF.
- LSB, USB and CW on 160-10 metres including the new 10, 18 and 24MHz bands.
- Built-in digital display with six digits and also analogue dial.
- IF shift (passband tuning).
- RIT (Receiver Incremental Tuning) and XIT (Transmitter Incremental Tuning).
- Built-in speech processor.
- Narrow and wide filter switching.
- Noise blanker threshold level control.
- Also retained are the rugged reliable 6146B PA valves and the easy to use controls.

Optional Accessories

- SP230 external speaker with selectable audio filters.
- VFO240 external matching VFO.
- AT230 antenna tuner/SWR and power meter/antenna switch, 160 to 10 metres bands.

TS-530S **£534.98**inc VAT
Carriage £4.50

FOR LATEST TRIO PRICES CONTACT YOUR AUTHORISED TRIO DEALER

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

TRIO *pacesetter in amateur radio*

TR-7730 *the new compact 2 metre FM transceiver*

Once again from Trio an absolutely fantastic 2 metre FM Mobile Transceiver. Compact, simple to operate, full 25 watts output – a truly dazzling piece of gear.
Designed by Trio to provide a miniature transceiver, the TR7730 measures 6in wide by 2in high by 8in deep.
In providing both first class performance in transmission and reception Trio engineers have again triumphed.
Switch on your Rig and listen for the outstanding signal from a TR7730.
The five memories, the band and memory scan facility, together with the up/down mike and comprehensive mobile fixing kit make this the rig you have been waiting for.
Remember, sooner or later everyone graduates to Trio equipment.

TR7730 features:

- Compact and lightweight design measuring 147 (5.9) × 51.5 (2.1) × 198 (7.9). Weighing 1.5kg (3.3lb) such a small compact Rig is easily fitted in any small car or for security can be placed in the glove compartment.
- 25 watts output in high power position for good mobile communications – 5 watts in low position.
- Five memories for either Simplex or repeater operation. The fifth memory is capable of non-standard frequency shift.
- Frequency coverage in either 25 or 5kHz steps. Full 2 metre band 144.000 to 145.995.
- Memory scan. Automatically locks on an occupied memory channel and resumes scanning when the signal disappears or when the scan switch is pushed. Scan hold or mike push to talk switch cancels the scan function.
- Band scan. The Rig scans the band in either 25 or 5kHz steps and locks on an occupied channel.
- Both mobile mounting bracket and up/down microphone included with the equipment.

TR7730 **£247.94** inc VAT
Carriage £4.50

NEW

TR-9500 *70cm FM, SSB and CW multimode mobile*

The TR9500 a 70cm multimode mobile giving SSB, FM and CW operation in a compact rig based on the phenomenally successful 2 metre 9000. Combining the convenience of FM with the "DX ability" of SSB on the 70cm band this is the rig all discerning VHF and UHF amateurs have been waiting for. Used alongside your existing 2 metre equipment a new spectrum of contacts becomes available. Repeaters, satellite working, simplex and with the addition of your 2 metre rig Duplex communications are at your fingertips.

Of course the matching accessories, SP120 speaker, BO-9 system base and PS20 power supply, are all available to enable you to build a base station system second to none.

The TR9500 features:

- FM, USB, ESB and CW.
- Similar in size to the TR9000.
- Two digital VFOs.
- Multiple scan facilities for various modes.
- Six memories, five for simplex or repeater shift – and the sixth memory for a non-standard offset.
- Digital frequency display.
- Covers 430 to 440MHz.
- Up/down microphone for manual band scan.
- RIT (Receiver Incremental Tuning) for SSB and CW.
- RF gain control.
- Mobile mounting bracket. Led indicators for on air and busy.

Optional Accessories.

- PS20 fixed station power supply.
- SP120 fixed station external speaker.
- BO9 system base – with power switch, send/receive switch, memory back up power supply and headphone jack.

TR 9500 **£449.88** inc VAT
Carriage £4.50

NEW

APPROVED TRIO DEALER

BIRMINGHAM
Ward Electronics
Soho House,
362-364 Soho Rd.
Birmingham B21 9QL
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

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

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.

EMPORIUM NEWS

Good morning, or if the post was late, good afternoon. Well I hope you read last month's Emporium News – here we go again.

Let us have a look at the Trio pieces of equipment. **Start with the TS830S** – a superb piece of equipment, versatile and just the thing for the HF bands. Variable band width tuning, IF shift and a full range of crystal filters for the first and second IF's. Thus for the committed operator Trio provide a skirt shape to delight. **Also in the range, the TS530S**, replacement for the much admired and trusted 520 range. Digital read-out, speech processor and a full range of goodies. Joking apart, have you looked at the various accessories available for the 830 and 530 range? **Starting with the VFO230:** a fine piece of equipment, not only a digital VFO but having memory facilities as well. For those of you who cannot afford the sophistication and want **a simpler straight-forward VFO, there is the VFO240**. For those of you with more than one antenna, or an antenna which requires a little bit of tuning, **why not add the AT230 antenna tuning unit to your station** – matches the 830 and 530 range exactly. To improve the audio have a look at the SP230 – not only a straight forward speaker but having switchable audio filters as well, plus the advantage that if you have two rigs in your shack there are two switched audio inputs from both rigs so that you can enjoy the audio to the full. For those of you who appreciate sophisticated test equipment, **the SM220 station monitor scope** is a piece of equipment, that only the detailed leaflet can inform you on. Drop us a line or give us a **ring for details**.

Last but not least in the range of accessories is the new KB1 – just the thing for your Christmas list. **A de-luxe ball race knob** for the 830/530 series.

For those of you with the 520 range of equipment – we still have a few **DG5 digital read-outs** here in Matlock priced at £112.01. If you are thinking of this option – and I am sure many of you must be so fond of your 520 as to not part with it – then it would seem an ideal way of getting up-to-date digital read out. We also have a few of the **YG3395C CW filters** available at £37.95.

Looking forward down the range, we have **the R820 amateur band receiver**. Coupled with certain of the short wave broadcast bands this has to be a worthwhile addition to any one's shack. Come and have a look at the one on display in Matlock or talk to Roy on a Saturday – he has one in his shack.

You may have heard of the solid state PA TS180S – it is a difficult piece of equipment to describe – it really has to be seen to be believed. So many facilities and such a versatile piece of equipment, having the addition of instant transmission, no tuning and, of course, it is now **fitted with new bands**. The only way to find out about this rig is to ask for a leaflet, study it at your leisure and then come along and play with the one in our showroom – you will be amazed.

Also in the transistorized PA rigs from Trio are the 130S and V – the S being 200 watts PEP and the V 20 watts.

For those of you wanting to go mobile on the HF bands the 130V would be the rig. For those of you wanting to go mobile with 200 watts then try the 130S. **Small, neat and dashboardable!** these rigs are also highly suitable for your shack. Full range of accessories: **the DFC230 remote controller** with four memories, **the TL120 200 watts PEP linear** and at the give away price of £17.02 **the MB100A mobile mount**. For the full band operator, add to the rigs **the MA5 mobile aerial** system at £88.78 and there you are, mobile on all the bands at the drop of a hat.

For those of you who are power-crazed what about **the TL922 2kW linear**? Perhaps not; it is the only piece of equipment that I know of that dims street lights! How about the TL922, **just ask yourself whether you are man enough for 2kW**.

At the other end of the power spectrum is the **TR2500 hand-held** which was advertised last month: hopefully on show at Donington and I am sure you will all be pleased when you see it. 70cm is still going strong with Trio – **the 8400 on FM** at £334.88, **the 9500 multi-mode** at £449.88. I am sure that you are finding the 2 metre band a little busy with all the new licensees and I have found from my lofty QTH that 70cms is a must. Joking apart, yet again, the 70cm band is great and the contacts to be had are first class.

I hope that people are still enjoying a 'trip around the world tonight' on their R1000's as uncomfortable as it may seem, but we are extremely proud of our general coverage receiver range – **the R1000 by Trio** at £297.85 – **the SRX30D digital readout** at £215.00 and I am afraid I cannot think of words to describe the NRD515 by the **Japan Radio Company**. For those of you who are the proud owners of the NRD515 and possibly the matching memory unit then I am sure you will be delighted to know that JRC are bringing out **a matching transmitter for this rig which will be called the NSD515**. A 200 watts PEP fully transistorized PA – perfectly compatible with the separate receiver, this is indeed a step back which is, in reality, a major step forward. Ask for the special leaflet or ring me, David, (not the David in the showroom) and ask for more details on this rig. **Please note when asking me the price to make sure you have a chair handy**. As I told you last month, come along to Matlock and try them for yourselves. **David, our new man in the showroom**, will be pleased to demonstrate the full range and if you don't like him **there's always Julie!**

A new product is **the ML122 200 watt solid state 3 to 30MHz linear amplifier** 12 volt supply – extremely small (Smaller than your rig) and priced at £115. From AOR, which stands for **Authority on Radio** (their design man in Japan is a genius), we have the full range. **The AR740** which is a 70cm synthesized hand-held transceiver which, from our Showroom in Matlock, will access and hold GB3NM in Nottingham. Ask David to show you the cross on the carpet where you have to stand to achieve this feat. **The AR245 and AR240A** – both hand-held 2 metre transceivers and **the AR22 fully synthesized 141-149MHz receiver**. For the AOR range we have external mike speakers, carrying cases, optional helical antennas and the **25 watt 2 metre linear. Also an RF switched 12 volt powered amplifier** at the give away price of £38.50.

For those of you who are just starting amateur radio and cannot afford one of our reasonably priced transceivers, what about **the SR9** which is just the thing to introduce you to the 2 metre band. Many lads fresh to amateur radio start with this piece of equipment, find out more about the hobby and then move on and from looking at our second-hand showroom shelf it would appear that the majority of them hang on to their SR9s.

We also have in Matlock the 2 metre single side band portable rig from **Mizuho – the SB2X**. This is available at £16[illegible] and covers the following frequencies: 144-144.6, 144.8-145 – thus you will see tha[illegible] the rig covers the sideband section around the calling channel 144.300 and with a flick of the wrist you can zoom to the top of the 144MHz section and check the beacons fo[illegible] example GB3VHF on 144.925.

Also available for this piece of equipment is the **LA2X 2 metre linear** with 10 watts of RF output for 1 watt of drive. Interesting to note this is a linear amplifier and suitable for both SSB and FM. The LA2X is priced at £39.50.

It has just been brought to my attention by Anne that we now have in stock **the UL1000** which is a new concept in receiving station accessories and will help any keen listener to improve the performance of his station, particularly in the difficult conditions existing in the medium wave band. **The UL1000** is a self-contained variable gain tuned pre-amplifier and a particular feature is the use of a high Q loop antenna with directional properties for the 500Hz to 1.6MHz band. This is truly a superb piece of gear and is compatible with our range of general coverage receivers.

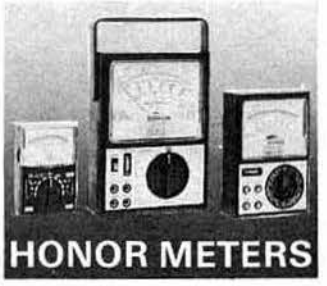
I am pleased to tell you that the **Honor Meter Family** are now good friends of many amateurs and if you require one of them then an urgent telephone call will be required as the demand is heavy. This meter looks like being **another Lowe Electronics' 'standard'**.

Shimizu transceivers are still bringing the flavour of home brew equipment to many shacks and you will be pleased to know that we have the full range of add-on units available.

At long last we have an alternative to the magnetic and gutter mount bases for the Hokoshin range of antennas. For a long time you have been asking us how the 2E and 2NE could be fastened to the bodywork of a car and we have explained the problems of an SO239 base and the mounting on a not perfectly flat surface. Well you will be pleased to know that we now have in stock at the price of £4 **the Hokoshin wing mount** which has SO239's to each end, is fitted to a small hole in the bodywork of your car and can also be angled to take account of the various positions and curves of the metalwork.

Regarding the automatic antenna tuner range from Daiwa, we now have in stock the high powered version and I am sure you will appreciate the advantages of an antenna tuning unit which will automatically, at the push of a button, seek out for you the best matched position for your rig – ideally suited for today's transceivers and extremely well made, the two models, the high and low power, are destined to become firm favourites. **Come along to Matlock and ask David to demonstrate** the one on display.

Alan has just tapped me on the shoulder to remind you about **GPV7 70cm colinear.** You all know of the phenomenally successful GPV5 for 2m – the GPV7 shares all these **fine constructional points** and really has to be **the only 70cms antenna** for your Base Station. Seriously, I am sure that at next year's rallies someone will have a GPV7 mounted on the roof of his car.



Anyway, that's about it for now as Irene (our secretary) is getting tired – so, until next month, gud DX es 73 es FB OM, etc . . .

PROFESSIONAL EQUIPMENT FOR THE AMATEUR

IC–25E

Again ICOM seem to have got everything right with its new 25W FM mobile. It is one of the smallest around and yet is packed with features which make it really handy to use while still maintaining the very high quality expected in ICOM transceivers.

Like its bigger mullimode brother, the IC-25 has TWO VFOs FIVE MEMORIES (which can be used in either simplex or duplex mode) a PRIORITY CHANNEL (which can be any one of the frequencies stored in the memories) full DUPLEX and REVERSE DUPLEX operation and a crystal controlled tone burst. Again the display is brighter and there is an LED Bar-type S-Meter and relative power output meter. The choice of frequency steps is 25kHz and 5kHz. Like the IC-290 multi-scanning functions are available either from the front panel or remotely using the HM-10 scanning microphone.

Again we feel that this beautifully designed and constructed piece of equipment is bound to sell like hot cakes – and again remember that if you buy one directly from Thanet you will get a full two years' warranty and any work will be carried out in our excellently equipped workshop. One of our engineers has been out to ICOM in Japan for a two week course to learn the tricks of the trade.

All this and yet its not much bigger than a car radio!

BUY DIRECT FROM US AND GET TWO YEARS WARRANTY ON ALL EQUIPMENT AND BENEFIT FROM OUR SUPERB TECHNICAL EXPERIENCE AND AFTER-SALES SERVICE.

IC–290E

The IC-290E incorporates all the features you could want in a multi-mode mobile to make it easy to use when driving. A standard 600kHz repeater offset shift is built into its computer's memory but if necessary this can be altered from the front panel for unusual shifts that may be required (such as say 1.6MHz for some transvertors). There are five programmable memories and these can be used in either simplex or duplex mode. Any one of these memories can also be designated as a PRIORITY CHANNEL which can be checked once every five seconds if you wish for that private message you may be expecting. Scanning can be controlled either from the front panel or from the HM10 microphone. There are options to scan the whole band, any selected part of it, or just the memory channels. You do NOT lose the repeater shift when scanning or using either of the VFO's in simplex. Unlike many of its competitors you do have TWO VFO's which can also prove a very useful feature. Further improvements include a brighter frequency readout, an LED bar-type S-Meter and power output meter and the ideal tuning rates of 25kHz per step on FM and 100Hz per step on SSB. Both these rates can be changed to 1kHz steps by use of the TS button on the front panel. For repeater operation both + and – shifts are available and it is possible to listen on the repeater input channel merely by pressing a button. Internal controls allow you to vary scan speed scan delay times etc., Semi break-in CW, and CW sidetone are also available.

Put all these features into an attractive case, add the world wide renowned ICOM quality and performance, and you must see that this is the choice for you. And just as an extra remember, you get a full two years warrenty if you purchase your transceiver direct from THANET or one of our agents listed in this advertisement.

Thanet Electronics

ICOM

143 RECULVER RD., BELTINGE, HERNE BAY, KENT. Tel: 02273 63859

IC–720A

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! 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.

Here are some of the features:-

- Two VFO's with automatic band changing
- General coverage receiver 100 kHz to 30 MHz (with provision to transmit if you have a licence!)
- No PA tuning
- Protection against rotten antennas
- Self cancelling RIT
- Full power capability (even on RTTY) for prolonged periods.
- Automatic control of linear and antenna tuner

IC–730

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, 100Hz and 1kHz steps allows effortless tuning and what's more a memory is provided for one channel per hand. Further convenience circuits are 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 switchtable RF Pre-Amp is a boon on todays crowded bands. Full metering, WWV reception and connections for transverter and linear control almost completes the IC-730's impressive facilities.

IC–2KL

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 30 MHz 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 overridden 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, has a high conductance, several hundred times that of copper and 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–202S (2m)
IC–402 (70cm)

The IC-202S is a very well designed 2m SSB portable. It offers 3W pep output on USB, LSB and CW. Large Battery capacity (HP11 type) or Nicads if you wish. A special VXO circuit to provide smooth tuning and crystal stability needed for SSB operation on 2m. Each of the four 200kHz band positions allows operation anywhere in 2m (Supplied with 144-144.2 and 144.2-144.4) Top of the band Oscar xtals available for cross-pond working. It has a DC socket and SO239 sockets for mobile or base station working barefoot or as a prime mover. Mobile mounting brackets Nicad packs, chargers, cases all available options. You must agree a very versatile well proved rig. The 70cm twin of the 202S has very similar features covering the frequency range of 432-435.2 MHz. Their versatility is well worth an enquiry

IC–24G

The famous IC-240 has been improved given a face lift and renamed the IC-24G. Many thousands of 240s 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 crystal controlled tone call Hi–10W and Lo–1W RF outputs is available along with a 12½ kHz upshift, should the new channel spacing be necessary. The old IC240 proved to be the most reliable rig we have ever sold – the IC24G 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.

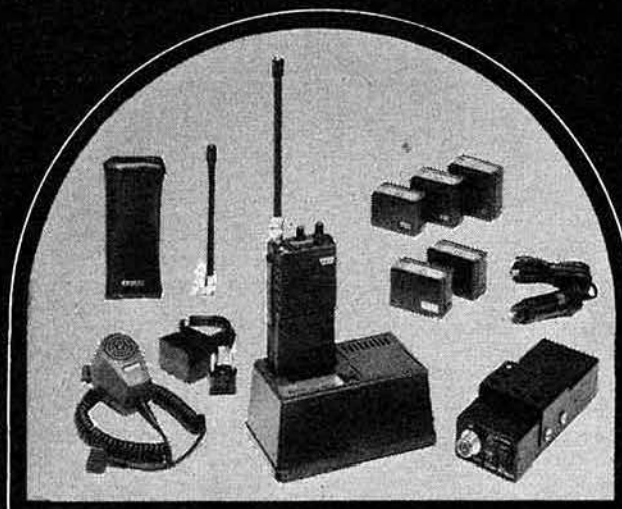
IC–251E
IC–451

ICOM produce a perfect trio in the VHF base station range, ranging from 6 Meters thru 2 Meters to 70 cms. Unfortunately you are not able to benefit from the 6m product in this country, but you CAN own the 215E 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, turning 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

ICOM

BUY DIRECT AND ENJOY THE BENEFITS



IC–2E (2m)
IC–4E (70 cm)

FULLY SYNTHESIZED – covering 144–145.996 in 400 5kHz steps (2E) 430–440 (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
BNC ANTENNA OUTPUT SOCKET – 50 ohms for connecting to another antenna or use the Rubber Duck supplied
SEND BATTERY INDICATOR – Lights during transmit but when battery power falls below 6V it doesn't 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 (2E) + 116MHz (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

IC-ML1	
10 Watt Mobile Booster For IC2E	£49.00
BP5 11 Volt Battery Pack	£30.50
BP4 Empty Battery Case for 6x AA Cells	£ 5.80
BP3 Standard Battery Pack	£17.70
BP2 6 Volt Pack	£22.00
BC30 Base Charger for Above	£39.00
BC25 Mains Charger As Supplied	£ 4.25
DC1 12 Volt Adaptor Pack	£ 8.40
HM9 Speaker/Microphone	£12.00
CP1 Mobile Charging Lead	£ 3.20
LC1 2/3 Cases	£ 3.50 each

Agents (phone first – all evenings and weekends only)

Scotland – Jack GM8 GEC (031 665 2420)
Midlands – Tony G8AVH (021 32 - 2305)
Wales – Tony GW3 FKO (0874 2772 or 0874 3992)
North West – Gordon G3LEQ (0565 4040 ansafone service available)

Announcement of the New IC–AT500 Automatic Antenna Tuner

Icom's Research and Design Team is proud to announce the debut of the new IC-AT500 Automatic Antenna Tuner. This innovative piece of equipment is a marvel of electronic circuit wizardry and is the first of its kind on the market anywhere in the world today.

This compact 6.4 kg antenna tuner provides the following features:

Quick tune up
The newly developed detector circuit detects resistance and reactance of the load, and controls powerful motors to tune the two variable capacitors, thus making the tune up time very short.

Auto band switching
When the IC-720A or IC-730 (with the optional LDA Unit installed) is used, band switching of the tuner can be controlled by the band switch of the IC-720/720A or 730. This tuner has dual accessory sockets, so the auto band switching function can be used with the IC-2KL linear amplifier at the same time.

Pre-set capability
The matching circuit can be used for each band, so you are able to make quick QSY's and have trouble-free operation.

Four antenna connectors
This tuner has four coaxial sockets for antennas, and selects the suitable antenna for each band automatically. When the power of this tuner is turned off, this tuner can be used as an automatic antenna selector.

Two way power source
This tuner can be used with DC 13.8 volts or AC240 volts.

Thanet Electronics

ICOM

143 RECULVER RD.,
BELTINGE,
HERNE BAY, KENT.
Tel: 02273 63859

NEW! WITH BUILT-IN VDU!! £699

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 modem 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 2 V).
DISPLAY OUTPUTS:- RF output and composite video output 1V P-P 75 ohms.
6 memories – 32 chrs each.
Printer interface – Centronic compatable parallel interface buit-in.
OUTPUT FOR OSCILLOSCOPE:- RTTY and ASCII impedance 200K ohm IV 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.

Tono Theta 7000E £599

A great computer
on offer from Thanet

The new THETA Means that every Amateur can enjoy the visual display of CW, RTTY and ASCII in both transmit and receive modes. Just connect the TONO to any TV set via the antenna terminals or to a page printer from the parallel port provided. Bring up your CW speed in receiving or sending by either watching received signals or from recorded cassettes. Connection to the transceiver is via the key, phone and mic sockets.

Some of the Outstanding Features:

COMMUNICATIONS COMPUTER THETA 7000E
UHF and Composite Video Output Printer Interface. Wide range of transmitting and receiving speeds 10CW speeds + 8RTTY.
Built-in demodulator for high performance for 170428 and 820 Hz shift.
Crystal controlled modulator for ASFK Hi or Lo tone.
Convenient ASCII key arrangement. Large capacity display memory. – 2 pages 32 chr x 16 lines split screen to RX and TX if required.
Automatic transmit/receive switch. Anti-noise circuit. Battery backed up memory 7 channels of 64 chrs. Send function. Buffer memory. 53 character type ahead, rub out function. Simultaneous access of the memory – 53 character type ah. LF (line feed cancel function. Cursor control CR/LF 172, 60 or 80 chrs per line) Echo function.
Word wrap around function, Transmit/receive in ASCII or RTTY, CW identification function. Mark and break (space and break) system. Monitor circuit & CW practice functions. Variable CW weights. Cross pattern checking output terminal, log computer output provided. Test message function (Ry and OBF) Receive only version £259

Phone or write for the price list of accessories for this unit

PRICES OF OTHER TONO QUALITY PRODUCTS

These prices may be subject to change, depending upon the state of the £

All inclusive of V.A.T.

Green Display Monitor CRT 120G	£125.00
Dot Matrix Printer HC-900	£449.00
Printer Socket SK7	£ 8.50
Linear Amplifiers -	
UC 70 (430 mHz 55W)	£149.00
2M–50W (2m)	£ 65.00
2M–100W (2m)	£115.00
MR–150W (2m)	£159.00
MR–250W (2m)	£259.00
MR–28LB (26-30 MHz)	£ 65.00
Mast-Head Pre-amps -	
RX 144 (including control)	£ 65.00
RX 430 (and psu box)	£ 70.00

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

Thanet Electronics

ICOM

Contact us for advantageous prices.

What are the benefits of buying direct?

1) Full 2 years warranty on all equipment.
2) Excellent back up and after sales service using fully equipped workshop.
3) ICOM trained technical staff.
4) No charge for speedy delivery service.
5) Avoid disappointments – buy direct from the experts with years of experience.

How to place your order for all advertised products:

- Fill in the attached coupon.
- Phone us during office hours.
- Out of hours leave a message on our ansafone stating clearly your name, address, daytime Tel. No. Access/Barclaycard No.
- Write, enclosing full details of your requirements together with payment, quoting call sign if possible.

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

Name .....
Call Sign .....
Address .....
.....
.....
Daytime Phone No. .....
Please rush me: .....
.....
I enclose cheque/P.O. for .....
..... or debit my Access/Barclaycard
number which is: .....
Signed: .....

Post to: Thanet Electronics Ltd.,
143 Reculver Road,
Herne Bay, Kent.

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 amateur specs; closer tolerances are available. Please send us details of your requirements.

A Low frequency fundamentals in HC13/U or HC6/U
Adj. tol. ±50ppm, Temp. tol. ±100ppm 0 to +70°C

6 to 19·999kHz	£28.12	100 to 159·99kHz	£9.25
20 to 39·999kHz	£17.74	160 to 499·99kHz	£6.19
40 to 79·999kHz	£12.40	500 to 799·99kHz	£7.30
80 to 99·999kHz	£10.60		

B High frequency fundamentals/overtones
Adj. tol. ±20ppm, Temp. tol. ±30ppm 10 to +60°C

800 to 999·9kHz (fund) HC6/U	£9.75
*1·0 to 1·499MHz (fund) HC6/U	£10.35
*1·5 to 2·599MHz (fund) HC6/U	£4.93
*2·6 to 20·99MHz (fund) HC6/U	£4.48
*3·4 to 3·999MHz (fund) HC18 & 25/U	£6.21
*4·0 to 5·999MHz (fund) HC18 & 25/U	£4.93
*6·0 to 20·99MHz (fund) All holders	£4.48
* 21 to 24·99MHz (fund) ,,	£6.73
* 25 to 30MHz (fund) ,,	£8.28
* 21 to 62·99MHz (3 O/T) ,,	£4.48
* 60 to 105MHz (5 O/T) ,,	£5.16
* 105 to 125MHz (5 O/T) HC18 & 25/U	£7.76
125 to 180MHz (O/T) ,,	£7.50
180 to 250MHz (O/T) ,,	£12.49

***Delivery** Normally 5/6 weeks (express available) – all other frequencies 7/8 weeks.

Holders – Low frequencies HC13/U or HC6/U dependent on frequency.

Mid and High frequencies are available in HC6/U, HC18/U or HC25/U unless otherwise shown.

HC17/U (replacement for FT243) and **HC33/U** (wire end HC6/U) available as per HC6/U above at **30p** extra on HC6/U price.

Unless otherwise specified, fundamentals will be supplied to 30pf circuit conditions and overtones to series resonance.

CRYSTALS FOR PROFESSIONAL USE

We can supply crystals to most commercial and MIL specifications, with an express service for that urgent order. Also for commercial use, eg TV or computer crystals, etc, we can supply at very competitive prices. Please send S.A.E. for details or telephone between 4.30–7pm and ask for Mr Norcliffe.

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.

TERMS: CASH WITH ORDER – MAIL ORDER ONLY – S.A.E. WITH ALL ENQUIRIES – PRICES INCLUDE P. & P. (BRITISH ISLES) EXCEPT WHERE STATED – OVERSEAS CHARGED AT COST

TWO METRE CRYSTALS

CRYSTAL FREQUENCY RANGE 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	e	b	e	e	b	e	e	e	e	e
144·480	e	e	e	e	e	e	e	e	e	e	e
144·800	c	e	e	e	e	c	c	c	c	c	e
144·850	e	e	e	e	e	e	e	e	e	e	e
145·000/ROT	a	c	a	c	c	b	b	b	a	a	c
145·025/R1T	a	c	a	e	e	b	e	b	e	e	e
145·055/R2T	a	c	a	e	e	b	e	b	e	e	e
145·975 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
145·125R5T	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/R8T	e	c	a	e	e	b	b	b	a	a	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	b	b	b	a	a	c
145·625/R1R	e	e	e	e	e	e	b	e	a	a	c
145·650/R2R	e	e	e	c	e	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	e	e	a	a	e
145·950/S38	a	e	e	c	e	e	e	e	a	e	e

PRICES: (a) **£1.95**, (b) **£2.32**, (c) **£2.50**, and (e) **£4.48**.

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.

70cm CRYSTALS

Due to the much higher multiplication involved (three times that on 2m) all our stock 70cm crystals are to much higher tolerances than our standard range.

We are stocking the following channels: RB0 (434·60/433·00), RB2 (434·65/433·05), RB4 (434·70/433·10), RB6 (434·75/433·15) SU8 (433·20), RB10 (434·85/433·25), RB11 (434·875/433·275), RB13 (434·925/433·325), RB14 (434·95/433·35), SU18 (433·45), SU20 (433·50) – TX & RX for use with: PYE UHF Westminster (W15U), UHF Cambridge (U10B), Pocketfone (PF1) AND UHF PF70 Range, and STORNO COL/COM 662 all at **£2.32**. For the U450L Base Stn we have the TX crystals for the above channels. The RX crystals for the U450L Base Stn together with TX and RX crystals for any other 70cm channel (eg RB/SU12 (434·90/433·30) RTTY, SU16 (433·40) SU22 (433·55) etc) for most UHF equipments are available at **£4.48** for crystals up to 63MHz, and **£5.16** for 63 to 105MHz to amateur spec or **£5.26** for up to 63MHz and **£6.05** for 63 to 105MHz to the same closer spec as our stock items. Delivery approx 5/6 weeks.

4m CRYSTALS FOR 70·26MHz – HC6/U
TX8·7825MHz and RX6·7466MHz or 29·7800MHz **£2.32**

10·245MHz "ALTERNATIVE" I.F. CRYSTALS – £2.32 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 – HC6/U, HC13/U and HC25/U (Low loss) 16p each. **10p P. & P. per order (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).

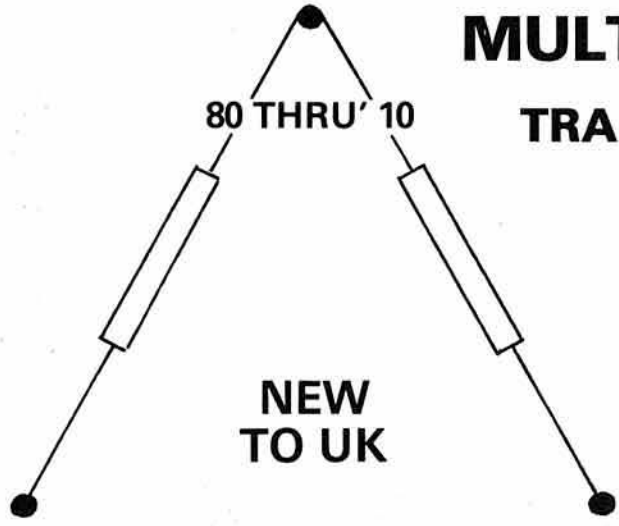
TEST EQUIPMENT FREQUENCY STANDARD CRYSTALS
200kHz and 455MHz in HC6/U **£3.50**
100kHz in HC13/U and 1MHz in HC6/U **£2.95**
5MHz in HC6/U and 10MHz and 10·7MHz in HC6/U and HC25/U **£2.80.**

CRYSTALS FOR MICROPROCESSORS

Please let us know your requirements e.g. 4MHz HC18/U. 1 off, **£2.00**; 100 off, **£1.10**; 1000 off, **99p**; 25,000 off, **50p**.

ANZAC MD-108 DOUBLE BALANCED MIXER

5·500MHz supplied with full details for only **£6.95**.



MULTI-BAND INVERTED "V"

TRAPPED DIPOLE RATED AT 2kW

ONLY 26m LONG

INTRODUCTORY OFFER
£32.00 + VAT
(36.80 inc VAT) P&P £2.00

Sole Distributors

P.M. ELECTRONIC SERVICES & M&B RADIO, LEEDS

WATERS & STANTON ELECTRONICS

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

FDK *Better Quality Lower Prices*

EASY ORDER FORM ON PAGE 997

*BRITAIN'S BEST SELLING 2 METRE FM MOBILE IS NOW EVEN *BETTER VALUE*

£199 inc VAT

MULTI-700EX 25 WATTS

SEND FOR FULL COLOUR BROCHURE

**WHILE OTHER PRICES GO UP, THE 700EX STILL SELLS AT ITS 1980 PRICE*

The Multi 700EX now a firm favourite with amateurs throughout the world—it embodies all the essential features of a completely self-contained FM station. Its punchy 25 watt signal beats all the old 10 watt transceivers hands down. The large digital display gives clear and precise frequency readout, controlled by a "click stop" frequency selector knob that provides steps of 25kHz with an additional 12½kHz selector.

Priority scanning provides for the scanning of pre-programmed channels plus the mains dial channel. Repeater operation is taken care of by means of a 600kHz down shift selector and automatic tone burst switch. For listening on the input frequency of the repeater, instant reverse repeater operation is available at the touch of a button. Local contacts are taken care of by a continuously variable power control that enables power to be reduced right down to 1 watt.

MULTI-750E

2M FM-SSB-CW

£289 inc VAT

An all mode transceiver gives you the chance to work both local contacts on FM and DX contacts on SSB. What better value then, than the Multi 750E 10 watt transceiver covering 144 to 146MHz? This well known product is superbly built with modular board construction and is ideal for both base and mobile operation. If 70cms interests you there is the promise of the matching transverter to be released. This package contains all that you could wish for in an action-packed transceiver, including noise blanker, USB/LSB/CW/FM selector, dual rate tuning, dual VFO control, tone burst, high/low power on all models, RIT and RF gain controls, etc, etc. As for reliability it's unbeatable — ask the man who owns one—but just in case we give you a full 12 months parts and labour Warranty!

Frequency range:	144–146 (or 148) MHz
Frequency steps:	5kHz & 100Hz
Operating modes:	FM/USB/LSB/CW
Supply requirements:	11–15 volts DC (13·8V nominal)
Power consumption:	3 amps on transmit
RF output:	10 Watts or 1 Watt
Sensitivity SSB/CW:	−8dBμat 10dB S/N
FM:	−4dBμ at 20dB N.Q.
Audio output:	More than 1·2 Watts @ 10% THD
Size:	163W × 73H × 260D mm

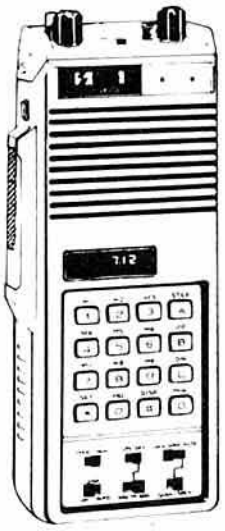
12 MONTHS WARRANTY

FDK (INTERNATIONAL)

NEW 2M FM HIGH POWER HANDHELD

Digital Readout
143–148·995MHz

£179 inc VAT (batteries, charger & aerial inc.)



FEATURES

- ★ Multi scanning. Scan and search of memories and of entire band.
- ★ 10 programmable memories with back-up.
- ★ Selectable power 4 watts or 1 watt.
- ★ Only 6mA drain for optional continuous display.
- ★ Programmable scan steps in multiples of 5kHz.
- ★ Completely integrated keyboard.
- ★ 600kHz repeater shift with auto tone-burst.
- ★ External speaker/mic socket.

DELIVERY BY SECURICOR
Order by post or telephone with confidence – you'll receive your order in 72 hours by Securicor or post (aerials excepted).

'Such nice people'

WATERS & STANTON

FAST AND FRIENDLY

MAIL ORDER – Anywhere in UK HEAVY PARCELS – Securicor
OTHER PARCELS – Parcel Post or British Rail
All goods sent are covered free by our own insurance

All prices include VAT

PRICE LIST – NOVEMBER 1981

Carriage charge in brackets

TRIO PRICE CHANGES – PHONE FOR LATEST INFORMATION

TRIO			
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)
YAESU			
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	Fan 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/4 amp 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/dwn 8pin.p.	13.80	(1.00)
YM36	600 ohm as above (no up/dwn)	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)
FDK VHF/UHF EQUIPMENT			
M700EX	2m FM 25 watt trcvr. 12v DC	199.00	(n.c.)
M750E	2m FM/10W trcvr 12v DC	289.00	(n.c.)
Expander	70cm transverter	219.00	(n.c.)
PS750	230v A.C. power supply	66.00	(2.50)
Palm II	2m FM 6 channel portable	109.00	(n.c.)
Palm IV	70cm FM 6 channel portable	149.00	(n.c.)
TB1	1750Hz tone burst	10.00	(n.c.)
T1200	2m FM synthesised portable	179.00	(n.c.)
TM56B	2m FM monitor 230v/12v DC	89.90	(n.c.)
CC2	Leather case for Palm II/IV	5.75	(.50)
BC2	230v AC battery charger	4.50	(.50)
BB2	"AA" size external battery case	5.00	(.50)
BT2	Ni-cad battery pack	12.00	(.50)
Xtals for Palm II and Palm IV		3.00	(.15)
Xtals for TM56B		2.50	(.15)

MICROWAVE MODULES

STOP PRESS
New Microwave Morse Tutor that speaks to you! **115.00**

MMT28/144	10m linear transverter	99.00	(1.75)
MMT144/28	2m linear transverter	99.00	(1.75)
MMT432/28-S	70cm linear transverter	149.00	(1.75)
MMT432/144-R	70cm linear transverter	184.00	(1.75)
MMT70/28	4m linear transverter	115.00	(1.75)
MMT70/144	4m linear transverter	184.00	(1.75)
MMT1296/144	23cm linear transverter	184.00	(2.25)
MML144/25	2m 25W linear amplifier	59.00	(1.75)
MML144/40	2m 40W linear amplifier	77.00	(1.75)
MML 144/100	2m 100W linear amplifier	129.00	(2.75)
MML432/20	70cm 20W linear amplifier	77.00	(1.75)
MML432/50	70cm 50W linear amplifier	119.00	(2.75)
MML432/100	70cm 100W linear amp	228.65	(2.75)
MM2000	RTTY to TV converter	169.00	(1.75)
MM4000	RTTY Tcvr with keyboard	289.00	
MMC28/144	10m converter	27.90	(.65)
MMC50/28	6m converter	27.90	(.65)
MMC70/28	4m converter	27.90	(.65)
MMC70/28LO	4m converter	29.90	(.65)
MMC144/28	2m converter	27.90	(.65)
MMC144/28LO	2m converter	29.90	(.65)
MMC432/28-S	70cm converter	34.90	(.65)
MMC432/144-S	70cm converter	34.90	(.65)
MMC435/51	70cm ATV converter	34.90	(.65)
MMC435/600	70cm ATV converter	27.90	(.65)
MMC1296/28	23cm converter, 10m output	32.20	(.65)
MMK1296/144	23cm converter, 2m output	59.80	(1.75)
MMDPT	Frequency counter probe	11.50	(.65)
MMA28	10m preamplifier	14.95	(.65)
MMA144V	2m RF switched preamp	34.90	(.65)
MMA1296	23cm preamplifier	29.90	(.65)
MMF144	2m filter	9.90	(.65)
MMF432	70cm filter	9.90	(.65)
MMV1296	70cm 23cm varactor tripler	34.50	(.65)
MMH15/10	15db attenuator, BNC terms	9.90	(.65)

JAYBEAM ANTENNAS (Prices go up in November!)

TB3	HF 3 element Tribander Beam	181.00	(4.50)
VR3	HF Vertical Triband	46.00	(3.00)
4 metre Antennas			
4Y/4M	4 element yagi	22.42	(3.00)
PMH2/4M	2 way phasing harness	13.22	(1.00)
2 metre Antennas			
DC1/WB	Wide band discone (100-470MHz)	41.40	(2.50)
LR1/2M	Omnidirectional vertical	25.87	(2.50)
C5/2M	5dB glass fibre colinear	47.70	(3.50)
5Y/2M	5 element yagi	12.07	(2.00)
8Y/2M	8 element yagi	15.50	(2.50)
10Y/2M	10 element 'long yagi'	33.35	(3.50)
PBM10/2M	10 element Parabeam	39.67	(3.50)
PBM14/2M	14 element Parabeam	48.30	(4.50)
5XY/2M	Crossed 5 element yagi	24.72	(3.00)
8XY/2M	Crossed 8 element yagi	31.00	(3.50)
10XY/2M	Crossed 10 element yagi	40.80	(4.00)
X6/2M/X12/70cm	Dual band crossed yagi	41.40	(4.50)
PMH/2C	2 way phasing harness	8.00	(.75)
Q4/2M	4 element quad yagi	25.87	(2.50)
Q6/2M	6 element quad yagi	33.90	(4.50)
D5/2M	Double 5 slot-fed yagi	21.85	(2.50)
D8/2M	Double 8 slot-fed yagi	29.32	(4.00)
SVMK/2M	Kit for vertical polarisation	8.00	(1.50)
UGP/2M	ground plane	10.90	(1.50)
HO/2M	Mobile 'halo' head only	5.15	(1.50)
HM/2M	Mobile 'halo' with 24" mast	5.75	(1.75)
PMH2/2M	2 way phasing harness	10.90	(1.00)
PMH4/2M	4 way phasing harness	25.30	(1.75)
70cm Antennas			
C8/70cm	8dB glass fibre colinear	54.00	(3.50)
D8/70cm	Double 8 slot-fed yagi	22.40	(2.50)
PBM18/70cm	18 element Parabeam	27.60	(2.50)
MBM48/70cm	48 element Multibeam	31.00	(3.00)
MBM88/70cm	88 element Multibeam	42.55	(4.50)
8XY/70cm	Crossed 8 element yagi	36.80	(3.50)
12XY/70cm	Crossed 12 element yagi	46.00	(4.50)
PMH2/70cm	2 way phasing harness	9.20	(1.00)
PMH4/70cm	4 way phasing harness	19.55	(1.50)
23cm Antennas			
D15/1296	Double 15 slot-fed yagi	36.80	(1.50)
PMH2/23cm	2 way phasing harness	27.60	(1.00)
Matching Transformer			
MT75/50	Impedance transformer 75/50Ω	4.00	(.50)
Chimney Lashing Kit			
DL	Double lashing chimney kit	10.78	(2.00)
Wall Brackets			
W6	6" wall bracket (1¼" masts)	2.65	(1.00)
W21	21" wall stand-off bracket	10.80	(3.00)
W24HD	24" wall stand-off bracket,	15.45	(4.50)
Masts (Aluminium)			
SPM	16' × 1" Portable Mast	16.35	(3.00)
PME	4' extension for double arrays	2.75	(2.00)
A4	4' 6" × 1¼" straight	4.30	(1.50)
A5	5' × 1" straight	2.80	(1.50)
A9	9' × 1¼" straight	8.65	(2.50)
A10	10' × 2" straight	13.55	(2.50)
A12	12' × 2" straight	16.20	(2.50)
A14	14' × 2" straight	18.85	(3.00)
Accessories			
CP1	Cross-over plate 2" × 2"	3.60	(1.50)
JBL59/15	15" jointing sleeve for 2" masts	6.05	(1.50)
JBL29	u/v clamp 1¼" boom to 1" 2" mast	1.75	(.75)
JBL30	u/v clamp 1" boom to 1" 2" mast	1.70	(.75)
JBL53	u/v clamp 1" boom to 1" 2" mast	1.25	(.75)
JBL58	Guy wire clamp: non-rotating	1.60	(.75)
JBL63	u/v clamp 1" 1¼" boom to 1" 2" mast	2.15	(.75)
JBL64	Die-cast clamp 1" boom to 1" mast	1.32	(.75)
JBL65	Die-cast clamp 1" boom to 1" 2" mast	1.35	(.75)
JBL73	HD u/v clamp 1¼" boom to 1" 2" mast	2.25	(1.00)
MBP	Mast base plate for 2" mast	3.90	(1.50)

G-WHIP MOBILE ANTENNA RANGE

Tribander Helical for 10/15/20 metres	25.80	(2.00)
LF40m Coil for above	6.55	(1.00)
LF80m Coil for above	6.55	(1.00)
LF160m Coil for above	6.55	(1.00)
LF telescopic resonator whip	4.25	(1.00)
Base mount single hole fixing + 3m cable	5.75	

AERIAL ROTATORS (complete with control boxes)

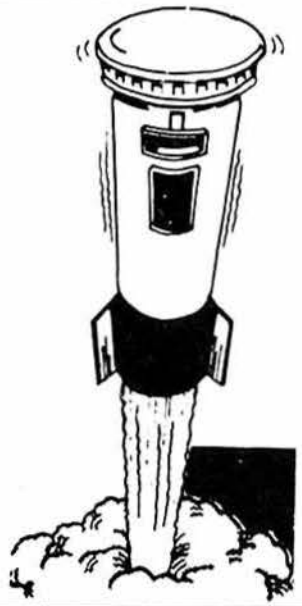
CDE AR40 (5 core cable)	62.00	(1.50)
Channelmaster 9502 (3 core)	54.00	(2.00)

YOUR SOUTHERN TRIO SPECIALIST
DEMONSTRATIONS OF LATEST EQUIPMENT

WHY NOT BRING THE FAMILY . . .
. . . ONLY 4 MILES FROM SOUTHEND-ON-SEA!
(3 miles at high tide)

Sky King SU4000 (6 core)	75.00 (2.50)
KR 400RC (5 core) complete	99.00 (2.00)
CDE alignment bearing	7.75 (1.00)
Channelmaster alignment	11.75 (1.00)
HF ANTENNAS (various manufacturers)	
Mini-Products HQ-1 20/15/10m 2 el	115.00 (2.50)
Mini-Products C4 20/15/10m vert dipole	55.00 (2.00)
Mosley TD3JR 20/15/10m wire dipole	34.50 (1.50)
Mosley "Mini-Beam" 20/15/10m 2 el. 600W	99.00 (2.00)
Mosley "Mini-Beam" 20/15/10m 2 el. 2kW	129.00 (2.00)
Mosley TA32 20/15/10m 2 el.	89.70 (2.00)
Mosley TA33 20/15/10m 3 element	133.40 (2.50)
Mosley Mustang 20/15/10m 3 element 2kW	166.75 (4.00)
Hy-Gain 12AVQ 20/15/10m vertical	43.00 (2.00)
Hy-Gain 14AVQ 40-10m vertical	58.00 (2.00)
Hy-Gain 18AVT/WB 80-10m vertical	89.95 (2.50)
HF5 80-10m vertical 200 watts	48.00 (2.00)
Radial Kit for HF5	28.00 (2.00)
Sagant EL40X 80-40 Balun fed dipole (79')	36.50 (1.50)
Jaybeam TB3 HF 3 element Tribander	181.70 (4.50)
Jaybeam VR3 HF Vertical Triband	46.00 (3.00)
Western DX5V 5-band	89.00 (3.00)
DATONG	
FL1 Automatic audio filter. Int batt.	67.85 (n.c.)
FL2 Multi-mode audio filter	89.70 (n.c.)
PC1 Receiver adapt. 50kHz-30MHz 144MHz o/p	120.75 (n.c.)
ASP Auto RF speech processor	79.35 (n.c.)
VLF Recv. converter. 0-500kHz 28MHz o/p	25.30 (n.c.)
D70 Morse tutor. Self contained	49.00 (n.c.)
D75 RF speech processor (manual control)	56.00 (n.c.)
AD270 Active recv. aerial (indoor model)	37.95 (n.c.)
AD370 Outdoor version of above	51.75 (n.c.)
A/C pwrd. versions AD270 + p.s.u. £42.55 AD370 £56.35	
A/C power supply only	6.90 (n.c.)
DC144/28 2 metre recv. converter	35.65 (n.c.)
ADONIS MICROPHONES	
AM202G Mobile safety mic	20.95 (n.c.)
AM202S Mobile safety mic	20.95 (n.c.)
AM202H Mobile safety mic	29.00 (n.c.)
AM502G Base station compressor mic	39.00 (n.c.)
AM601 Compressor mic.	44.00 (n.c.)
AM802G Base station compressor mic	59.00 (n.c.)
SEM	
2m power amplifier/pre-amplifier 5/30W	57.00 (1.00)
2m power amplifier/pre-amplifier 16/50W	69.50 (1.50)
2m power amplifier/pre-amplifier 16/100W	126.50 (1.50)
2m converter	24.70 (.35)
2m Auto switching pre-amplifier	25.00 (.35)
70cm Auto switching pre-amplifier	30.70 (.35)
2m pre-amplifier	14.95 (.35)
70cm pre-amplifier	19.00 (.35)
2-40MHz pre-amplifier auto switching	18.85 (.35)
2-40MHz pre-amplifier	11.90 (.35)
PA3 miniature 2m pre-amplifier	8.00 (.35)
PA70 miniature 70cm pre-amplifier	11.95 (.35)
Z Match Aerial tun unit 1-8-30MHz 500W	65.00 (1.50)
EZITUNE Aerial tuning aid	30.48 (.75)
IAMBIC Keyer	34.50 (.75)
VHF/UHF MONITORS	
TM56B FM Scanner 4 + 12 channels	89.00 (n.c.)
Sound Air 008 8 channel FM monitor	69.00 (n.c.)
Sound Air M161 16 channel FM monitor	59.00 (n.c.)
MF083 Marine or Amateur + 3 FM broad.	85.00 (n.c.)
BEARCAT 220FB VHF/UHF	258.00 (n.c.)
SX200 VHF/UHF. New stock just arrived!	260.00 (n.c.)
SR9 Tuneable 144-148 or 156-162MHz	46.00 (n.c.)
AR22 2m FM pocket synthesized handheld	89.00 (n.c.)
AR22 flexible antenna	3.00 (n.c.)
MOBILE AERIALS	
ASP201 2m ¼ wave with base	3.50 (1.25)
ASP2009 2 5/8th wave with base	9.25 (2.00)
ASP3009 2m 5/8th wave with base	9.75 (2.00)
ASP462 70cm co-linear with base	8.25 (1.25)
Magnetic base adaptor	8.50 (.75)
ASP677 2m 5/8th wave	14.95 (2.00)
ASP667 70cm co-linear	17.95 (1.25)
ASPM125 28MHz ¼ wave	18.50 (2.00)
Magnetic base adaptor	8.50 (.75)
ASP 'no hole' boot mount adaptor	3.75 (.50)
2NE 2m 7/8th mobile whip	13.00 (2.00)
RG4M Base for above aerial	3.50 (.75)
GSS Heavy duty gutter/boot mount	3.15 (.50)
MB5 Magnetic mount with 5m coax	7.95 (1.00)
10SE 28MHz whip 1-72m long	11.50 (1.25)
15SE 21MHz whip 1-72m long	11.50 (1.25)
20SE 14MHz whip 1-72m long	13.80 (1.25)
WELZ PROFESSIONAL RF PRODUCTS	
SP200 1-8-160MHz 20/200/1kW SWR/PWR	59.00 (n.c.)
SP300 1-8-500MHz 20/200/1kW SWR/PWR	79.00 (n.c.)
SP400 130-500MHz 5/20/150W SWR/PWR	59.00 (n.c.)
SP-15M 1-8-150MHz 2½/20/200W SWR/PWR	29.00 (n.c.)
AC-35M 3-5-30MHz 400W a.t.u. (unbalanced)	49.00 (n.c.)
AC-38M As above with new bands. Oct/Nov delivery	(n.c.)
CH-20A 2 way coax switch. 1kW SO239	15.95 (n.c.)
CH-20N 2 way coax switch. 1kW 'N'	23.95 (n.c.)
CT-03N Dummy load. 3W 1-3GHz 'N'	29.00 (n.c.)
SHORT WAVE LISTENER AERIALS	
3-30MHz Inverted "L"	9.95 (1.00)
3-30MHz Broad band dipole	29.00 (1.00)
Mosley RD5 all-band dipole	40.00 (1.00)
CT 20G ditto 20W 2-5GHz 'N' (gold)	t.b.a. (n.c.)
CT15A ditto 15-50W 450MHz p1259	6.95 (n.c.)
CT15N ditto 15-50W 450MHz p1259	11.75 (n.c.)
CT 150 ditto 150-400W 250MHz p1259	31.00 (n.c.)
CT 300 ditto 300-1kW 250MHz p1259	43.00 (n.c.)
AIR BAND PORTABLE MONITORS (see also VHF/UHF Monitors)	
SHARP HX213 tuneable receiver	13.50 (.75)
INGERSOLL MW/FM/Airband monitor	12.95 (.75)
R517 Tuneable + 3 Xtal controlled chan's	49.50 (.75)
MISC STATION ITEMS	
SEIF 13-8V 4 amp AC power supply	24.95 (2.00)
PS125 6 amp AC power supply	29.00 (2.00)
EK121 Katsumi Electronic Keyer	29.00 (1.00)
EKM12 Matching side tone monitor	10.95 (1.00)
CW2A general purpose morse oscillator	6.95 (.65)
Telegraph CW key (manual)	10.50 (.75)
YW3 Twin SWR/Pwr/Field strength meter	11.95 (.50)
MF210 Self powered 2M FM monitor	12.95 (.50)
FX1 d/l station w/meter 700kHz-250MHz	28.00 (1.00)
DM81 700kHz-250MHz dip meter	51.75 (1.00)
Station log books	1.95 (.50)
12BY7A driver valves	2.75 (.50)
6146B/S2001A P.A. valves	8.70 (.50)
6JS6C P.A. Valves Matched pairs	9.95 (.50)
PL259 plugs	.63 (n.c.)
PL259 reducers	.17 (n.c.)
SO239 chassis sockets	.60 (.10)
PL259 joiners	.85 (.10)
N. Plugs. Silver plated UR67	2.00 (n.c.)
N. Plugs. Silver plated UR43	2.00
4 pin mic plugs	.85 (.10)
3 pin mic plugs	.85 (.10)
6 pin mic plugs (FDK 750)	1.00 (.10)
3 pin chassic socket	.85 (.10)
4 pin chassis socket	.85 (.10)
BNC plugs (bayonet)	.90 (.05)
Pen Cell Ni-cads (HP7 size)	1.20 (.05)
Cigar lighter plugs	.55 (.10)
UR67 cable 50Ω per metre	.69 (.10)
UR43 cable 50Ω per metre	.23 (.05)
5 core rotator cable per metre	.30 (.05)
BL40X baluh 50Ω	11.25 (.35)
3 core rotator cable. Per metre	.22 (.05)
Ferrite rings 1¼" diameter	.35 (.05)
Mosley aerial insulators	.30 (.05)
KX2 SWL aerial tuner 0-5-30MHz	29.90 (1.50)
APM1 Audio Peak and notch filter	33.00 (1.00)
HP3A TVI high pass filter (UHF T.V.)	3.50 (.50)
Drake TV3300 LP Low Pass Filter	18.40 (1.20)
Shure 444D high impedance desk mic	27.50 (1.50)
Shure 201 high impedance hand mic	12.50 (1.00)
Trio HCM10 Digital World Clock	55.20 (1.50)

MAIL ORDER
FASTEST IN THE BUSINESS!



THIS MONTH'S SPECIALS

GLOBAL PS-15 '6 AMP' POWER SUPPLY

£32.95

Here's a new base station power supply ideal for the modern rig or smaller linears. An extremely large transformer ensures safe, quiet operation and the built-in metering monitors both voltage and current drawn. Be warned, there are cheaper supplies about and quite a few blown rigs to testify as to their value for money!

DATONG D70 MORSE TUTOR

£49

This is a completely self-contained morse tutor with internal battery and speaker. It automatically sends random morse characters at speeds from 6-37 words per min. We can personally recommend this item as being excellent value—and it's British!

AZDEN MOBILE SPEAKERS

£8.95 inc VAT

Why pay more elsewhere?

This mobile speaker has been specially made to help copy signals in the vehicle. Specially tailored response ensures clear fatigue-free listening. Give yourself a treat. At this price you can afford to.

SPECIAL OFFER MORSE TRAINING KIT

We've put together a nice little morse training kit comprising the famous HK708 morse key and matching oscillator unit complete with volume control and built-in speaker. If you aspire to a G4 this will help you on the way!

£16.95 (p&p £1)

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

Name.....

Address.....

.....

.....

Please rush me the above. Cheque enclosed for £ .....

Goods required.....

.....

.....

.....

Please charge to credit card No. .....

Radio Shack Ltd for Amateur Radio

R. L. DRAKE PRODUCTS

Model	Description	Inc. VAT	Carr.
TR-7/DR-7	Transceiver/Gen. Cov. Receiver Digital	£1035.00	5.00
PS-7	Power Supply 120/240v for TR-7	207.00	5.00
PS-75	Sideband Duty P.S.U. for TR-7 120/240v	138.00	5.00
RV-7	Remote V.F.O. for TR-7	132.25	2.00
MS-7	Matching Speaker for TR-7 and R-7	29.90	2.00
R-7/DR-7	Digital Receiver 0 30MHz	989.00	5.00
SL-300	CW Filter for TR-7 and R-7 (300Hz)	39.10	0.50
SL-500	CW Filter for TR-7 and R-7 (500Hz)	39.10	0.50
SL-1800	SSD/RTTY Filter for TR-7/R-7 (1800Hz)	39.10	0.50
SL-4000	AM Filter for R-7 Receiver (4000Hz)	39.10	0.50
SL-6000	AM Filter for TR-7 and R-7 (600Hz)	39.10	0.50
AUX-7	Range Prog. board and 1 Receive module	32.20	1.00
RRM-7	Range receive modules for Aux-7 (500kHz)	5.75	0.50
RTM-7	Range tcve. modules for Aux 7 (500kHz)	5.75	0.50
NB-7	Noise Blanker for TR-7	66.24	1.00
NB-7A	Noise Blanker for R-7 Receiver	66.24	1.00
FA-7	Fan for TR-7 and PS-7	20.70	2.00
MMK-7	Mobile mounting kit for TR-7	34.50	2.00
MN-7	ATU/RF Wattmeter. 160 10m (250w)	124.20	5.00
MN-2700	ATU/RF Wattmeter 160 10m (2kw)	207.00	5.00
WH-7	RF Wattmeter/VSWR Bridge (HF)	59.80	2.00
SP-75	Speech Processor	79.35	2.00
CW-75	Electronic Keyer	59.80	2.00
P-75	Phone patch	59.80	2.00
7804	Service Manual for TR-7	18.50	2.00
7805	Service manual for R-7	18.50	2.00
7037	TR-7 Service Kit	37.95	1.00
L-7E	Linear Amp 2kw 10 160m with tubes (2)	897.00	10.00
3-500Z	Tube for L-7E and L-75E	69.00	2.00
L-75E	Linear Amp 1kw 10-160m with tube (1)	598.00	5.00
TV-42LP	Low Pass Filter 100w	10.35	1.00
TV-3300LP	Low Pass Filter 2kw	18.40	1.50
7073	Hand Microphone for TR-7	18.40	1.00
7077	Desk Microphone for TR-7	29.90	2.00
DL-300	Dummy Load 330w	20.70	1.00
DL-1000	Dummy Load 1000w	37.95	2.00
CS-7	Remote control ant. switch 5 way (7 line)	115.00	5.00
B-1000	Balun for MN-7 and MN-2700 4:1	20.70	1.00
Manuals	Spare Operating Manuals	6.00	1.00
Interface	R-7/TR-7 connecting cable	20.70	1.00
AK-75	Multiband Antenna	23.00	2.00
AA-75	Antenna Insulator Kit	2.30	0.50
HS-75	Headset	995.00	1.00

COMMERCIAL SPECIFICATION RECEIVERS AND TRANSCEIVERS

R4245	Commercial Specification Receiver	POA
TR4310	Commercial Specification Transceiver	
RR-3	Marine Specification Receiver	
TRM	Marine Transceiver MF and HF	
MRT55C	VHF 55 Channel	
Cabinet	5" for RR-3, R4245 and TR4310	
MN4438	General coverage tuner	

ENDS OF LINES (Whilst stocks last)

SPR-4	Programmable Receiver	345.00	5.00
DC-PC	DC Power Cord for SPR 4	3.45	1.00
XTAL	Accessory Range Crystals	6.44	0.50
FL-500	500Hz CW Filter for R 4C	39.10	0.50
FL-4000	4000Hz AM Filter for R 4C	39.10	0.50
FL-6000	6000Hz AM Filter for R 4C	39.10	0.50
MS-4	Matching speaker for 4 line	29.90	2.00
AC-4	DSU for TR 4 T 4X Series	50.00	5.00
DC-4	AC/DC PSU for TR 4	84.50	5.00
FF-1	Fixed Frequency Control for TR-4	27.60	1.00
34-PNB	Noise Blanker for TR 4C	69.00	1.00
RV-4C	Remote VFO for TR 4C	92.00	5.00
CW-MOD	500Hz CW Mod for TR 4(C)	52.90	2.00
RCS-4	5 Way Coax Remote Antenna Switch	84.50	2.00
WV-4	VHF Wattmeter 100 1000W 20 200MHz	59.80	2.00
AA-10	2m Linear 1 10 Watts	39.95	1.00
1525-EM	Encoder Microphone	34.50	1.00
PS-3	6Amp 13-6 VDC Power Supply	69.00	5.00
SD-AUTO	SD 240 120 Auto Transformer	19.95	3.00

TRIO EQUIPMENT

MC50	Deluxe dual impedance desk microphone	25.76	1.75
MC35S	First microphone 50k impedance	13.80	1.25
MC30S	First microphone 500ohms impedance	13.80	1.25
LF30A	HF lowpass filter, 1kW rating	17.94	1.25
RD300	1kW oilfilled dummy load	52.21	2.00
TS770E	2m/70cm all mode dual band transceiver. European repeater shifts	784.99	5.00
SP70	External speaker unit for all TS700 series	18.63	1.50
TR9000	2m synthesised multimode mobile/fixed station transceiver	394.91	5.00
PS20	AC power supply for TR9000	49.45	5.00
BO9	Base plinth for TR9000	34.96	5.00
TR7800	2m FM synthesised mobile/fixed station 25W transceiver	284.97	5.00
SP40	Mobile speaker unit for TR7800, TR9000 and TR8400	12.42	1.00
RM76	Microprocessor control unit for TR7600/7625	60.00	1.00
TR2300	2m FM synthesised portable transceiver	166.75	5.00
VB2300	10W amplifier for TR2300	58.00	1.50
MB2	Mobile mount for TR2300 and VB2300	17.71	1.50
RA1	Rubber flexible antenna for TR2300 or TR2200GX	6.90	0.50
PS1200	AC power unit and charger for TR2300/3200/2200 (Non-Trio item)	29.50	1.75
TR2400	2m FM synthesised handheld	198.95	5.00
SMC24	External mic/speaker for 2400	13.80	1.00
ST1	Base stand and quick charger	45.08	1.75
BC5	12V quick charger	18.40	1.00
SC3	Soft carrying case, includes belt hook	11.50	1.00
LH1	Hard leather holster type case	20.00	1.00
PB24	Spare battery pack and charger lead	15.87	1.00
TR8400	70cm FM synthesised mobile transceiver, 430-440MHz	334.84	5.00
PS10	Base station power supply for TR8400	64.86	5.00
PB10	Pack of 10 NiCad batteries for TR2300/3200/2200 series	10.35	1.00
PL1	Spare power charge lead for TR2300/3200/2200 series	1.30	0.25
R1000	Synthesised 200kHz-30MHz receiver. Price includes dc kit fitted	297.35	5.00
SP100	External speaker unit — Matching aerial tuner. See KX2 in Mizuho section	26.91	1.50
HC10	Digital station world time clock	58.88	1.50
HS5	Deluxe headphones for all Trio equipment	21.85	1.00
HS4	Economy headphones	9.00	1.00
TS830S	160-10m transceiver with the new bands. Successor to the TS820	694.83	5.00
VFO230	Digital VFO with memories and digital readout	215.97	5.00
AT230	All band ATU and power meter. Matches TS830S	119.83	5.00
SP230	External speaker unit with switched filters	34.96	2.00
DS2	Optional dc pack for TS830S	43.93	1.50
DFC230	Digital frequency remote controller. Four memories, etc.	185.38	5.00
*NB	The DFC 230 will drive the TS830/130 or TS120 series rigs		
YK88C	500Hz CW filter	29.67	0.75
YK88CN	270Hz CW filter	32.66	0.75
SM220	Station monitor scope	198.03	5.00
BS8	Panoramic display for TS830/180/820 series	44.85	1.00
BS5	Scan board as above for TS520 series	44.85	1.00
R820	The ultimate amateur band receiver	589.95	5.00
TS130S	8 band 200W pep mobile transceiver	525.09	5.00
TS130V	8 band 20W pep mobile transceiver	445.05	5.00
DFC230	Digital frequency remote controller. Four memories, etc.	179.86	5.00
TL120	200W pep linear for TS130V	144.90	5.00
MB100	Mobile mount for TS120/130 series	17.02	2.00
YK88C	500Hz CW filter	29.67	0.75
YK88CN	270Hz CW filter	32.66	0.75
YK88SN	1·8kHz SSB filter	29.21	0.75
VFO120	External VFO	85.10	5.00
SP120	Base station external speaker unit	23.00	1.75
SP40	New mobile speaker unit	12.42	1.00
AT130	100W antenna tuner including new amateur bands	79.12	1.75
PS20	AC power supply for TS120/130V	49.45	5.00
PS30	AC power supply for TS120/130S	88.55	5.00
MA5	New Trio 5 band mobile aerial system. Absolutely complete	88.78	5.00
TL922	160 10 metre 2kW linear 3-500Z tubes included	624.91	5.00

TELEX COMMUNICATIONS INC.

HFC-91	Underchin headphones	6.21	1.00
HMC-2	Underchin headphones	9.20	1.00
HTC-2	Twin Receiver headphones	14.72	1.00
BOOM MICROPHONE HEADSETS			
CB-88	3·2 20 ohms with power microphone	41.40	2.00
CM-1320S	3·2 20 ohms Single Headphone Hi-impedance microphone	36.80	2.00
DUAL MUFF HEADPHONES			
C-610	Dual Receiver magnetic	6.90	2.00
SWL-610	Dual Receiver magnetic	8.28	2.00
C-1210	Dynamic, foam padded	18.86	2.00
C-1320	3·2 20 ohms. Telex's Best	26.22	2.00
MICROPHONES (battery powered)			
PROCOM 1	High Output	11.96	2.00
PROCOM 11	Variable gain	17.95	2.00
CB-73R	Dynamic, noise cancelling	23.92	2.00
CB-73S	as above with 6-wire lead	25.30	2.00

MACROTRONICS

CM-800	HAM Interface for TRS-80	230.00	5.00
TM-800	Deluxe RTTY and morse for TRS-80	362.25	5.00
TM-650	Deluxe RTTY and morse for PET	328.91	5.00
RR-1	RITTY Riter Editor for TM-800	32.95	1.00
ESK	Electra Sketch (Editor and Animations Compiler)	9.90	1.00

VIBROPLEX

Presentation	Super de luxe Semi Automatic Bug Keys	89.70	2.00
Original	De Luxe Semi Automatic Bug Keys	59.80	2.00
Original	Standard Semi Automatic Bug Keys	46.00	2.00
Lightning	De luxe Semi Automatic Bug Keys	59.80	2.00
Lightning	Standard Semi Automatic Bug Keys	46.00	2.00
Champion	Semi Automatic Bug Keys	43.70	2.00
Vibto-Keyer	De luxe Paddle for Electronic Keyer	59.80	2.00
Vibro-Keyer	Standard Paddle for Electronic Keyer	46.00	2.00

ADVANCED ELECTRONIC APPLICATIONS

MM-1	Morsematic Special Keyer	124.20	2.00
MK-1	Keyer	49.45	1.00
ISO-144	2m Antenna	34.50	2.00

TEN-TEC EQUIPMENT

TRANSCEIVERS			
515	Argonaut, 5W, 3·5 30MHz	276.00	5.00
546	Omni-D, Digital, Series C SSB/CW 1·8 30MHz	736.00	5.00
570E	Century/21, 70W, CS, 3·5 29MHz 240 volts	230.00	5.00
580	Delta, 200W, SSB/CW, 1·8 30MHz	469.20	5.00
POWER SUPPLIES			
210/E	115/230 VAC, 13VDC, 1A	27.60	2.00
280	117/230 VAC, 13·5VDC, 18A	92.00	5.00
LINEAR AMPLIFIER			
444	Hercules, 1kW with 115/230 VAC Power Supply	920.00	10.00

ACCESSORIES

206A	Crystal Calibrator	18.86	2.00
208A	Notch/CW Filter for Model 515	29.90	2.00
212	Crystal, for Model 515, 29·0 29·5MHz	3.45	0.50
213	Crystal, for Model 515, 29·5 30·0MHz	3.45	0.50
215P	Microphone, ceramic with plug	18.40	2.00
215PC	Microphone, ceramic with plug and coil cord	21.85	2.00
217	500Hz 8 pole Ladder Filter for Models 545/546	36.80	1.00
218	1·8KHz 8 pole Ladder Filter for Models 545/546	36.80	1.00
219	250Hz 6 pole Ladder Filter for Models 545/546	34.50	1.00
228	Antenna Tuner	59.80	2.00
243	Remote VFO for Models 545/546	103.50	5.00
247	Antenna Tuner	43.70	2.00
273	Crystal, for Model 570, 28·5 29.0	3.45	0.50
276	Crystal Calibrator for Model 570	18.86	1.00
277	Antenna Tuner/SWR Bridge for Model 570	57.50	2.00
282	250Hz 6 pole Ladder Filter for Model 580	35.65	1.00
283	Remote VFO for Model 580	112.70	2.00
285	500Hz 6 pole Ladder Filter for Model 580	32.20	1.00
289	Noise Blanker for Model 580	29.90	1.00
1140	DC Circuit Breaker for Models 545/546 and 580	4.60	1.00
1150	Overvoltage Protector for Models 552/262 Series	9.20	1.00
1170	DC Circuit Breaker for Model 570	6.90	1.00

KEYERS

645	Ultramatic, Dual Paddle	55.20	2.00
670	Single Paddle Keyer	23.00	2.00

ENDS OF LINES (whilst stocks last)

TRANSCEIVERS

544	Triton IV 200W. SSB/CW 3·5 30MHz with digital readout	399.85	5.00
545	Omni-A. Analog. Series B. SSB/CW. 1·8 30MHz	448.85	5.00

POWER SUPPLIES (when bought with Ten-Tec transceiver)

252MO/E	115/230 VAC. 13VDC. 18A for Omni	79.35	5.00
262M/E	230 VAC. 13VDC. 18A. deluxe with VOX (Triton)	85.10	5.00

ACCESSORIES

212	29·0 29·5 Crystal for Models 540/544	3.45	0.50
213	29·5 30MHz Crystal for Models 540/544	3.45	0.50
240	160m Converter for Models 540/544	57.50	2.00
241	Crystal Oscillator for Models 540/544	23.00	1.00
249	Noise Blanker for Models 540/544	18.40	1.00
AC-4	SWR Meter Lower Power	6.90	1.00
KR-5A	Single-paddle keyer, 6 14VDC	25.30	2.00
KR-50	Ultramatic, dual paddle, 117 VAC/6 VDC	57.50	2.00

J BEAM ANTENNAS

4 metre Antennas

4Y/4M	4 element folded dipola yagi with 1¼" boom	22.42
PMH2/4M	2 way phasing harness for two 4m yagis	13.22

2 metre Antennas

DC1/WB	Wide band discone (100 470MHz)	41.40
LR1/2M	Omnidirectional vertical gain colinear	25.88
C5/2M	5dB glass fibre colinear, omni directional	47.72
5Y/2M	5 element golded dipole yagi with 1" boom	12.07
8Y/2M	8 element folded dipole yagi with 1" boom	15.52
10Y/2M	10 element folded dipole 'long yagi' with 1¼" boom and trombone support	33.35
PBM10/2M	10 element Parabeam with 1¼" boom and trombone support boom	39.67
PBM14/2M	14 element Parabeam with 1¼" boom and 45° braces	48.30
5XY/2M	Crossed 5 element yagi with 1¼" boom	24.72
8XY/2M	Crossed 8 element yagi with 1¼" boom	31.05
10XY/2M	Crossed 10 element yagi with 1¼" boom	40.82
X6/2M/X12/70cm	Dual band crossed yagi	41.40
PMH/2C	2 way phasing harness for circular polarisation	8.05
Q4/2M	4 element quad yagi	25.87
Q6/2M	6 element quad yagi	33.92
D5/2M	Double 5 slot-fed yagi with 1" booms	21.85
D8/2M	Double 8 slot-fed yagi with 1" booms	29.32
SVMK/2M	Mounting kit for vertical polarisation for 2 slot-fed yagis	8.05
UGP/2M	Unipole and ground plane	10.92
HO/2M	Mobile 'halo' head only	5.17
HM/2M	Mobile 'halo' with 24" mast	5.75
PMH2/2M	2 way phasing harness for two 2m aerials	10.92
PMH4/2M	4 way phasing harness for four 2m aerials	25.30

70cm Antennas

C8/70cm	8dB glass fibre colinear, omnidirectional	54.05
D8/70cm	Double 8 slot-fed yagi with ¿" booms	22.42
PBM18/70cm	18 element Parabeam yagi with 1¼" boom	27.60
MBM48/70cm	48 element Multibeam yagi with trombone mounting	31.05
MBM88/70cm	88 element Multibeam yagi with trombone mounting	42.55
8XY/70cm	Crossed 8 element yagi complete with phasing harness and 'N' type connector	36.80
12XY/70cm	Crossed 12 element yagi complete with phasing harness and 'N' type connector	46.00
PMH2/70cm	2 way phasing harness for two 70cm yagis	9.20
PMH4/70cm	4 way phasing harness for four 70cm yagis	19.35

23cm Antennas

D15/1296	Double 15 slot-fed yagi with 'N' type connector	36.80
PMH2/23cm	2 way phasing harness for two 23cm antennas	27.60

Mobile Antennas

TAS 2M	5/8 wave glass fibre whip with 4 metres of coaxial cable	15.29
U5	70cm Colinear 5·6dB with 4 metres of coaxial cable	17.25

Carriage on all the above Antennas – £5.00

HY-GAIN ANTENNAS

18HT	6 80m Vertical Tower	258.75
12AVQ	10 20m Trapped Vertical	48.50
14AVQ/WB	10 40m Trapped Vertical	60.37
18AVT/WB	10 80m Trapped Vertical	87.40
18V	10 80m Vertical	31.97
TH6DXX	6 element beam for 10/15/20	235.75
TH3MK3	3 element beam for 10/15/20	180.55
TH3JR	3 element beam for 10/15/20	130.52
TH2MK3	2 element beam for 10/15/20	126.21
HY-QUAD	2 element quad for k0/15/20	194.35
DB 10 15A	10 and 15m beam	132.25
205A	5 element 20m beam	235.75
204BA	4 element 20m beam	178.25
203BA	3 element 20m beam	135.12
155BA	5 element 15m beam	135.12
153BA	3 element 15m beam	72.16
103BA	3 element 10m beam	58.65
105BA	5 element 10m beam	105.80
402BA	2 element 40m beam	181.70
499	Flush body mount	11.84
492	Miniature spring	4.60
LA-1	Lightning arrestor	23.34
LA-2	In Line Lightning arrestor	3.80
BN-86	Ferrite balun	15.52
TELREX	TB5EM 5 element beam for 10/15/20	368.00

CDE ROTATORS

AR-20XL		39.67
AR-22XL		49.45
AR-30		47.15
AR-40		54.62
CD-45		113.85
HAM-4		166.75
BT-1	(Big Talk)	91.42
T2-X	(Tail Twister)	228.85

BENCHER PRODUCTS

BY-1	Keyer Paddle (Black base)	28.75
BY-2	Keyer Paddle (Chrome base)	37.95
BY-3	Keyer Paddle (Gold plated)	92.00
ZA-1A	Balun 3·5 30MHz for dipoles	12.65
ZA-2A	Balun 14 30MHz for beam antennas	13.80

HUSTLER ANTENNAS

AMATEUR ANTENNAS WITH MOUNTS

4-BTV	4-Band Trap Vertical 10 40m	66.70
5-BTV	5-Band Trap Vertical 10 80m	86.25
BBLM-144A	5/8 Wave 2m Magnetic, 17' coax	28.75
BBLT-144A	5/8 Wave 2m Trunk lip and coax	26.45
CGT-144	2m Colinear, Trunk lip and coax	29.90
G6-144B	6db 2m Base Colinear	59.80
G7-144	7db 2m Base Colinear	89.99
HT-144	"Hustleoff" 2m 5/8 wave mobile	19.99
SFM	5/8 Wave 2m Magnetic and coax	22.99
SFS-144	5/8 Wave 2m Speedy Mount	15.99

MONITOR ANTENNAS

DCX	40 700MHz Receiving Discone	13.80
DCL	Discone as above with 50' coax	20.70
UHT-1	140 500MHz Unit Gain and 15' coax	6.50

ACCESSORIES

BM-1	Bumper Mount	11.95
C-29	Stainless Steel Spring	7.95
C-32	Chrome Ball Mount	5.50
HLM	Deluxe Trunk Lip Mount	11.95
MM-1	Universal Single Hole Mount	5.98
MM-3	Universal Single Hole Mount and coax	11.95
QD-1	Quick Disconnect Fitting	9.99
RSS-2	Resonator Impact Spring	4.95
SSM-1	Stainless Heavy Duty Ball and Spring	21.95
SSM-3	Stainless Heavy Duty Spring	10.95

RESONATORS AND MASTS

RM-10	10 metre Resonator	6.95
RM-10S	10 metre High Power Resonator	11.95
RM-15	15 metre Resonator	6.94
RM-15S	15 metre High Power Resonator	11.95
RM-20	20 metre Resonator	9.60
RM-20S	20 metre High Power Resonator	14.49
RM-40	40 metre Resonator	11.50
RM-40S	40 metre High Power Resonator	15.99
RM-80	80 metre Resonator	12.60
RM-80S	80 metre High Power Resonator	24.95

MASTS

MO-1	Mast for Wing Mounting	14.95
MO-2	Mast for Bumper Mounting	14.95
SF-2	2m 5/8 Antenna fits Hustler Mounts	8.50

CARRIAGE EXTRA. PLEASE CHECK FOR DETAILS.

COLLINS EQUIPMENT

KWM-380	Amateur HF Transceiver	1,794.00	10.00

KWM-380 OPTIONS

AC-3801	Noise Blanker	120.75	5.00
AC-3802	Speech Processor		
AC-3803	Control Interface	82.80	2.00
AC-3810	CW Filter. 500Hz	59.80	1.00
AC-3811	CW Filter. 250Hz	59.80	1.00
AC-3812	RTTY Filter. 1·7kHz	59.80	1.00
AC-3813	AM Filter. 6·0kHz	36.80	1.00

KWM-380 ACCESSORIES

AC-2801	Rack Mount	82.80	2.00
AC-2808	Blower Kit	120.75	2.00
AC-2821	DC Standby Power Cable	33.35	2.00
MM-280	Handheld Microphone	23.00	2.00
MM-281	Handheld Noise cancelling mic.	27.60	2.00
SM-280	Desk Top Microphone	47.15	2.00
SM-281	Desk Top Noise cancelling mic.	51.75	2.00
AC-2827	CW Key	17.25	2.00
AC-2828	Microphone Foot Switch	21.85	2.00
AC-2829	Headphones	40.25	2.00
AC-2830	Lightweight Headphones	21.85	2.00

KWM-380 BOOKS

NTN	Owners Manual	4.00	1.00
NTN	Service Manual	20.00	2.00

AMATEUR ELECTRONICS UK

Your number one source for YAESU MUSEN

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-107M Deluxe solid-state HF transceiver

A real thoroughbred from the YAESU stable – a superb receiver section in combination with a rugged, powerful, solid-state PA 240 watt PEP input, 12 memory option, latest bands.

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.

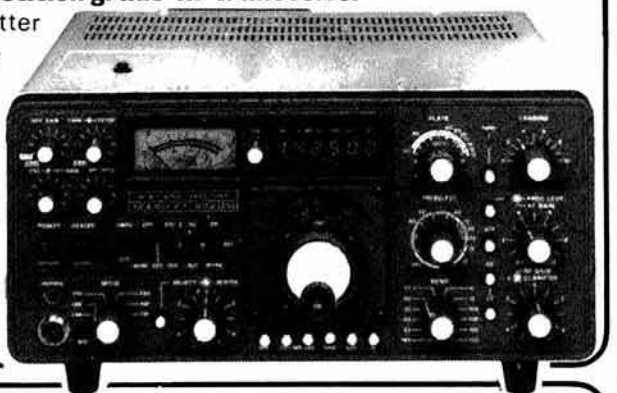
As factory appointed distributors we offer you- widest choice, largest stocks, quickest deal and fast sure service right through-

Access BARCLAYCARD VISA

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

FT-902DM Competition grade HF transceiver

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



For full details of these new and exciting models, send today for the latest YAESU PRICE LIST and LEAFLETS. All you need to do to obtain the latest information about these exciting developments from the world's No. 1 manufacturer of amateur radio equipment is to send 36p in stamps and as an added bonus you will get our credit voucher value £3.60p – a 10 to 1 winning offer.

FRG-7 General coverage receiver

The set with the world-wide reputation. YAESU's famous FRG-7 out-performs many a more expensive set. Rugged and reliable, it features high sensitivity and Wadley loop stability – a delight to use for the established amateur and new SWL alike.

FRG-7700 High performance communications receiver

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

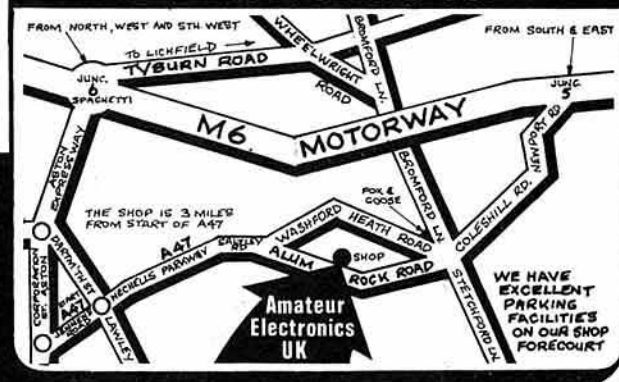
FT-708R and FT-208R
Synthesized UHF/VHF transceivers

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, 300 mW low, 2·5 watts high.

AGENTS

NORTH WEST – THANET ELECTRONICS LTD. GORDON, G3LEQ. KNUTSFORD (0565) 4040.
WALES & WEST – ROSS CLARE, GW3NWS, GWENT (0633) 880 146.
EAST ANGLIA – AMATEUR ELECTRONICS UK – EAST ANGLIA, DR T. THIRST (TIM) G4CTT, NORWICH 06925 865
NORTH EAST – NORTH EAST AMATEUR RADIO, DARLINGTON 0325 55969
SOUTH EAST – AMATEUR ELECTRONICS, UK – KENT KEN McINNES, G3FTE, THANET (0843) 291297

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.

DO YOUR CHRISTMAS 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

HIGH STREET, HANDCROSS, W.SUSSEX. 0444 400786

TRIO 7730

THE LATEST 2m FM 25W RIG

- COMPACT SIZE
- 25 WATTS
- 5 MEMORIES
- MEMORY SCAN
- BAND SCAN

£247 inc VAT & carriage

TRIO

TS 830S	160–10m transceiver 9 bands	£694.00	—
VFO 230	Digital VFO with memories	215.00	(2.00)
AT 230	All band ATU/power meter	119.00	(2.00)
SP 230	External speaker unit	34.96	(1.50)
DFC 230	Dig frequency remote controller	179.00	(1.50)
YK 88C	500Hz CW filter	29.60	(0.50)
YK 88CN	270Hz CW filter	32.66	(0.50)
TS 130S	8 band 200W PEP transceiver	525.00	—
TS 130V	8 band 20W PEP transceiver	445.00	—
VFO 120	External VFO	85.00	(1.50)
TL 120	200W PEP linear for TS 130V	144.00	(1.50)
MB 100	Mobile mount for TS 130/120	17.00	(1.50)
SP 120	Base station external speaker	23.00	(1.50)
AT 130	100W antenna tuner	79.00	(1.50)
PS 20	AC power supply—TS 130V	49.00	(2.50)
PS 30	AC power supply—TS 130S	88.00	(5.00)
MA 5	5 band mobile aerial system	86.00	(5.00)
MC 50	Dual impedance desk microphone	25.76	(1.50)
MC 35S	Fist microphone 50K ohm imp	13.80	(0.75)
MC 30S	Fist microphone 500 ohm imp	13.80	(0.75)
LF 30A	HF low pass filter 1kW	17.90	(0.75)
TR 9000	2m synthesised multimode	371.00	—
BO 9	Base plinth for TR 9000	34.96	(1.50)
TR 7800	2m synthesised FM mobile 25W	284.00	—
TR 7730	2m synthesised FM compact mobile 25W	247.00	—
TR 2300	2m synthesised FM portable	166.00	—
VB 2300	10W amplifier for TR 2300	58.00	(1.50)
MB 2	Mobile mount for TR 2300	17.71	(1.50)
RA 1	Flexible rubber antenna for TR 2300	6.90	(0.50)
TR 2400	2m FM synthesised handheld	198.00	—
SMC 24	External speaker/microphone for 2400	13.80	(1.00)
ST 1	Base stand and quick charger	45.00	(1.50)
BC 5	12V quick charger	18.40	(1.00)
SC 3	Soft carrying case plus belt hook	15.87	(0.50)
PB 24	Spare battery pack and charger lead	15.18	(0.75)
TR 8400	70cm FM synthesised mobile tranceiver	334.00	—
PS 10	Base station power supply for 8400	64.86	(2.00)
TR 9500	70cm synthesised multimode	449.00	—
R 1000	Synthesised 200kHz-30MHz receiver	297.00	—
SP 100	External speaker unit	26.90	(1.50)
HC 10	Digital station world time clock	58.88	(1.50)
HS 5	Deluxe headphones	21.85	(0.75)
HS 4	Economy headphones	10.35	(0.75)
SP 40	Mobile external speaker	12.40	(1.50)

ICOM

IC 730	HF mobile transceiver 8 band	586.00	—
IC 720A	HF transceiver and gen cov receiver	883.00	—
PS 15	Power supply for 720A	99.00	(3.00)
IC 251E	2m multimode base station	499.00	—
IC 25E	2m synthesised compact 25W mobile	259.00	—
IC 290E	2m multimode mobile	366.00	—
IC 2E	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)

YAESU MUSEN

FT 902DM	160–10m 9 band receiver	885.00	—
FC 902	All band ATU	135.00	(1.50)
SP 901	External speaker	31.00	(1.50)
FT 101Z	160–10m 9 band transceiver (FM)	590.00	—
FT 101ZD	160–10m 9 band transceiver (FM) digital ro	665.00	—
DCT 101Z	DC/DC power pack	42.55	(1.50)
FAN 101Z	Cooling fan for 101Z	13.80	(0.75)
FT 707	8 band transceiver 200W PEP	569.00	—
FT 707S	8 band transceiver 20W PEP	485.00	—
FP 707	Matching power supply	125.00	(5.00)
FV 707R(2)	Transverter—2m	198.00	—
FV 707DM	Digital VFO	203.00	—
FC 707	Matching ATU/power meter	85.00	(1.00)
MR 7	Metal rack for FT 707	13.70	(1.00)
MMB 23	Mobile mounting bracket for FT 707	16.10	(1.00)
FRG 7	General coverage receiver	189.00	—
FRG 7700	200kHz–30MHz general coverage receiver	329.00	—
FRG 7700M	As above but with memories	409.00	—
FRT 7700	Antenna tuning unit	37.85	(1.00)
FT 208R	2m FM synthesised handheld	209.00	—
FT 708R	70cm FM synthesised handheld	219.00	—
NC 7	Base trickle charger	26.85	(1.30)
NC 8	Base fast/trickle charger	44.10	(1.50)
NC 9C	Compact trickle charger	8.00	(0.75)
FBA-2	Battery sleeve for use with NC 7/8	3.05	(0.50)
FNB-2	Spare battery pack	17.25	(0.75)
PA-3	12V dc/dc adaptor	13.40	(0.75)
FT 480R	2m synthesised multimode	379.00	—
FT 780R	70cm synthesised multimode (1·6MHz shift)	459.00	—
FP 80	Matching 230V ac power supply	63.00	(1.50)
FT 290R	2m portable synthesised multimode	249.00	—
MMB 11	Mobile mounting bracket	22.25	(1.00)
CSC-1	Soft carrying case	3.45	(0.75)
NC-11C	240V ac trickle charger	8.05	(0.75)
FL 2010	Matching 10W linear	64.40	(1.20)
Nicads	2.2 amp/hr Nicads each	2.50	—
FL 2100Z	160–10m 1200W linear	525.00	(5.00)
FF 501DX	HF low pass filter 1kW	23.00	(0.75)
FSP-1	Mobile external speaker 8 ohm 6W	9.95	(0.75)
YH55	Headphones 8 ohm	10.00	(0.75)
YH 77	Lightweight headphones 8 ohm	10.00	(0.75)
QTR 240	World clock (quartz)	28.00	(0.75)
YM 24A	Speaker/mic 207/208/708	16.85	(0.75)
YD 148	Stand microphone dual imp 4 pin plug	21.10	(1.50)
YM 34	As 148 but 8 pin plug	21.45	(1.50)
YM 38	As 34 but up/down scan buttons	24.90	(1.50)

FDK VHF/UHF

Multi 700EX	2m FM synthesised 25W mobile	199.00	—
Multi 750E	2m multimode mobile	289.00	—
Expander	70cm transverter for M750E	179.00	—

STANDARD PORTABLES

C58 MULTIMODE
£239 inc VAT & carr.

C78 70cm FM
£219 inc VAT & carr.

STANDARD VHF/UHF

C 78	70cm FM portable	219.00	—
CPB 78	10W matching linear	67.50	(1.50)
C 58	2m multimode portable	239.00	—
CPB 58	25W matching linear	79.50	(1.50)
CM 8	Mobile bracket	19.95	(1.00)
CL 8	Soft carrying case	6.95	(0.75)
C 12/230	Charger	7.59	(0.75)

All prices correct at time of going to press

Buy it with Access

BREDHURST ELECTRONICS

HIGH STREET, HANDCROSS, W.SUSSEX Tel: 0444 400786

BARCLAYCARD VISA

DO YOUR CHRISTMAS 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

HIGH STREET, HANDCROSS, W.SUSSEX. 0444 400786

DRAE POWER SUPPLIES

All with over-volts—current limit and thermal protection

4 amp	27.95	(1.50)
6 amp	44.95	(2.00)
12 amp	69.00	(2.00)
24 amp	99.00	(3.00)

DESK MICROPHONES

Shure 444D	Dual impedance	29.95	(1.50)
Shure 526T MkII	Power microphone	39.95	(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 AM202S	Clip-on	20.95	—
Adonis AM202F	Swan neck + up/down buttons	30.00	—
Adonis AM202H	Head band + up/down buttons	30.95	—
Daiwa RM940	Infra red link	45.00	(0.75)

HAND MICROPHONES

TA 600Ω fist mic	4.95	(0.50)
Power mic wide impedance	9.95	(0.75)
Trio MC 30/35 600/5k imp	13.80	(0.75)
Yaesu YE7A/YD846 600/5k imp	5.75	(0.75)
Shure 201 High impedance quality mic	14.50	(0.75)

SWR POWER METERS

UH74
for 70cm
£13.95 (0.50)

MODEL 110
up to 150MHz
£11.50 (0.50)

Model 110	HF/2m calibrated power reading	11.50	(0.50)
SWR 25	HF/2m twin meter	11.50	(0.50)
Welz SP15M	HF/2m 200W	29.00	(0.75)
Welz SP200	HF/2m	59.00	(0.75)
Welz SP300	HF/2m/70	79.00	(0.75)
Welz SP400	2m/70	59.00	(0.75)
Daiwa SW110A	HF/2m	35.00	—
Daiwa CN620A	HF/2m cross pointers	52.80	—
Daiwa CN630	2m/70 cross pointers	71.00	—

DUMMY LOADS

DL 30	PL259 30W max	5.00	(0.50)
DL 60	PL259 60W max	8.80	(0.70)
DL 60	N type 60W max	16.50	(0.70)
DL 150	PL259 150W max	14.95	(0.70)
DL 600	SO239 600W max	29.95	(1.50)
DL 1000	SO239 1000W max	39.95	(1.50)

TEST EQUIPMENT

DRAE VHF wavemeter 130-450MHz	24.95	—
FXI wavemeter 250MHz max	28.00	(0.75)
DM81 Trio dip meter	59.95	(0.75)
MMD 50/500 Microwave Modules frequency counter	69.00	(0.75)

ANTENNA BITS

Hi-Q Balun 1:1 5kW PEP (PL259 fitting)	9.95	(0.75)
T-piece polyprop dipole centre	1.00	(0.20)
Ceramic strain insulators	0.40	(0.10)
Small egg insulators	0.40	(0.10)
Large egg insulators	0.50	(0.10)
75Ω twin feeder—light duty per meter	0.16	(0.02)
300Ω twin feeder—per meter	0.14	(0.02)
URM 67 low loss 50Ω coax per meter	0.60	(0.20)
UR 76 50Ω coax per meter	0.25	(0.05)

Please send total postage indicated. Any excess will be refunded.

DATONG PRODUCTS

PC 1	General coverage converter HF on 2m rig	120.75	—
VLF	Very low frequency converter	25.30	—
FL 1	Frequency agile audio filter	67.85	—
FL 2	Multi-mode audio filter	89.70	—
ASP/B	Auto RF speech clipper (Trio plug)	79.35	—
ASP/A	Auto RF speech clipper (Yaesu plug)	79.35	—
D 75	Manually-controlled RF speech clipper	56.35	—
RFC/M	RF speech clipper module	26.45	—
D 70	Morse tutor	49.45	—
AD 270	Indoor active dipole antenna	37.95	—
AD 370	Outdoor active dipole antenna	51.75	—
MPU 1	Mains power unit	6.90	—

D70
MORSE TUTOR
£49.45 inc VAT & carr.

MICROWAVE MODULES

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	—
MML 144/25	2m 25W linear amp (3W i/p)	59.00	—
MML 144/40	2m 40W linear amp (10W i/p)	77.00	—
MML 144/100S	2m 100W linear amp (10W i/p)	129.00	—
MML 432/20	70cm 20W linear amp (3W i/p)	77.00	—
MML 432/50	70cm 50W linear amp.(10W i/p)	119.00	—
MML 432/100	70cm 100W linear amp (10W i/p)	228.65	—
MM 2000	RTTY to TV converter	169.00	—
MM 4000	RTTY transceiver	269.00	—
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 432/28-S	70cm converter to HF rig	34.90	—
MMC 432/144S	70cm converter to 2m rig	34.90	—
MMC 435/600	70cm ATV converter	27.90	—
MMK 1296/144	23cm converter to 2m rig	59.80	—
MMD 050/500	500MHz digital frequency meter	69.00	—
MMD 600P	600MHz prescaler	23.00	—
MMD P1	Frequency counter probe	11.50	—
MMA 28	10m preamp	14.95	—
MMA 144V	2m RF switched preamp	34.90	—
MMF 144	2m band pass filter	9.90	—
MMF 432	70cm band pass filter	9.90	—
MMS 1	The Morse talker	99.00	—

MORSE EQUIPMENT

MK 704	Squeeze paddle	10.50	(0.50)
HK 707	Up/down key	10.50	(0.50)
HK 704	Deluxe up/down key	14.50	(0.50)
EKM 1A	Practice oscillator	8.75	(0.50)
EK 121	Elbug	29.95	(0.50)
EKM 1A	Matching side monitor	10.95	(0.50)
EK 150	Electronic keyer	74.00	—

ROTATORS

KR 250 Kenpro lightweight 1-1½" mast	44.95	(2.00)
Hirschman RO250 VHF rotor	49.95	(2.00)
9502B Colorotor (med VHF)	49.95	(2.00)
KR 400RC Kenpro (HF) complete with lower clamps	99.95	(2.50)
KR 600RC Kenpro (med HF) complete with lower clamps	139.95	(3.00)

TV INTERFERENCE AIDS

Ferrite rings 1½" 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	17.95	(0.75)
Yaesu low pass filter FF501DX 1kW	22.25	(0.75)
HP4A high pass filter TV down lead	5.95	—

All prices correct at time of going to press

Buy it with Access

BREDHURST ELECTRONICS

HIGH STREET, HANDCROSS, W.SUSSEX Tel: 0444 400786

BARCLAYCARD VISA

AMATEUR RADIO EXCHANGE

As London's number-one amateur radio retailers we always try to be first... for choice... for price... for service... and for refreshment! Now we're the first to bring you news of the new number-one product, the YAESU FT-ONE, the latest HF rig that's going to run away from all the others. With features like these it just has to be a winner all the way.

FT-707

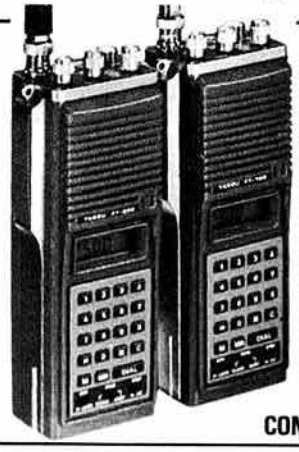
The ultimate in HF mobile transceivers from Yaesu. All the new bands, and all the latest technology.

PHONE FOR PRICE– incl. FREE MIC and ATU. Cash or normal HP only.

FT101 Mk III

The tried and tested Yaesu HF base station, now with audio peak filter and reject notch filter as standard, and choice of AM or FM.

PHONE FOR PRICES incl. FREE cooling fan and mic.



FT-208R/FT-708R

Yaesu's marvellous new hand-held for either 2m or 70cm operation. Its LCD display (with night-lamp feature) is coupled to a 4-bit microprocessor giving 10 memories, up/down scanning in 12·5/25/50kc steps (manual or auto) plus memory scan and scanning between two desired frequencies, priority channel with search-back, keyboard entry allowing split frequency for non-standard repeaters... and lots more.

PHONE FOR PRICES incl. FREE 12V DC to DC CONVERTER and CHARGING UNIT

FT-902DM

Yaesu's top-of-the-range transceiver, and the only HF 100W multimode available to the amateur today. Here are just some of its special features:

★ All bands, top to 10 (including new WARC) ★ Multimode–AM/FM/SSB/CW/FSK (RTTY) ★ Fitted memory unit for instant recall of any frequency ★ RF notch filter–on IF, not AF ★ Built-in Curtis keyer with dot memory ★ Two 6146B PA tubes for greater reliability ★ True frequency counter readout with accurate analogue display

Use the FT-902DM together with the matching FTV-901R transverter for a really superior HF/2m/4m/70cm multimode transceiver. BUY BOTH AND GET A FREE HF-5 ANTENNA AND 2m BEAM. Cash or normal HP only.

TRIO/KENWOOD–LATEST MODEL IMPROVEMENTS

Three best-sellers in the range up-rated with new model designations. The TS-520 and TS-820 become the TS-530S and TS-830S respectively, both with all the new bands, IF shift etc . . . and the TR-7800 becomes the TR-7850, now giving 50W out.

TS-530S £549.00; TS830S £699.00; TR-7850 £289.00

SPECIAL ANNOUNCEMENT

Something new for the long winter evenings . . . The ATV-1 Amateur TV Transmitter

Designed and manufactured to the highest standards specially for us, this complete self-contained video transmitting unit is so simple to operate . . . camera and/or VCR in at one end . . . 70cm antenna out of the other . . . just connect to 13·5V . . . and you are on the air in full colour for just **£77** inc. VAT and p&p.

Team it up with the Microwave Modules MMC 435/600 Converter for a complete fast-scan Amateur TV station, receive and transmit.

FT-480R/FT-780R

Yaesu's very popular 2m format now available for 70cm as well with full 10MHz coverage, FM/SSB/CW, and unbelievable front-end sensitivity. How many other rigs do YOU know with a GaSFeT in the front end? Also, *our* FT-780s are fitted with a 1·6MHz shift, so no need to programme two VFOs.

PHONE FOR PRICES (FT-480R to include free PSU)

LICENCED CREDIT BROKERS ★ Ask for written quotation
INSTANT HP AND 6-MONTHS NO-INTEREST HP TERMS AVAILABLE FOR LICENCED AMATEURS AND BANK/CREDIT CARD HOLDERS

Access BARCLAYCARD VISA

Credit card sales by telephone

STOP PRESS! Some price increases notified by manufacturers, but we will hold advertised figures while stocks last.

All prices include VAT, but p&p/carriage are extra.

AMATEUR RADIO EXCHANGE

• Solid state, all-mode, AM/FM/SSB/CW/RTTY • General coverage receive and transmit 150kHz-30MHz • Synthesised tuning and auto-scanning facility • VFO or keyboard entry • IF shift and width control • Audio Peak Filter • Notch Filter • 3 widths for CW • Built-in Curtis keyer • Built in SWR bridge • Memory facility • Full break-in and variable decay on front panel • 2 FSK widths

FRG-7700 RANGE

Yaesu's latest receiver with FM right across the band now offers all these optional extras ★ Memory facility ★ FRT-7700 Aerial Tuning Unit at only £34.75 ★ Four VHF converters ranging from 50MHz up to 170MHz.

Basic receiver **£299** inc. VAT and **FREE HELISCAN AERIAL**

Converter specifications ★ Please phone for prices

FRV-7700A	118-130MHz	130-140MHz	140-150MHz
FRV-7700B	118-130MHz	140-150MHz	50-60MHz
FRV-7700C	140-150MHz	150-160MHz	160-170MHz
FRV-7700D	118-130MHz	140-150MHz	70-80MHz

YAESU's LATEST . . .
the all-mode portable FT-290R

So many features ★ 10 memories ★ Memory scan ★ 2 VFOs ★ Band scan ★ Clarifier ★ FM/LSB/USB/CW ★ LCD readout ★ Real S-meter ★ Priority channel ★ 2.5W out **£229**

How about teaming it up with a MICROWAVE MODULES 25W amplifier to bring it up to base station specification? The cost . . . just £59

IC-720A

Icom's superb new HF rig with general coverage receive 100kc-30MHz plus transmit facility across its entire range for commercial purposes

OUR PRICE £849

SSTV SCAN CONVERTER

NEW

As exclusive UK distributors for the superb WRAASE ELECTRONICS range, we invite you to come and try these high-quality German products for yourself RIGHT NOW and see why their reputation is so high.

★ Two full-size picture memories (128 × 128 pixels – 16 shades of grey)
★ Receives and transmits ANIMATED PICTURES and HIGH RESOLUTION SSTV (256 pixels per line in 16 seconds giving unbelievable quality)
★ Simple mic input/speaker output connection to your transceiver
★ Easily adaptable for COLOUR SSTV

SC-422A CONVERTER £598

KB-422A KEYBOARD £135

2 NORTHFIELD ROAD, EALING, LONDON W13 9SY Tel: 01-579 5311
Closed Wednesday, but use our 24-hour Ansafone service
So easy for Overseas visitors—Northfields is just seven stops from Heathrow on the Piccadilly Line!

136 GLADSTONE STREET, ST HELENS, MERSEYSIDE. Tel: 0744 53157
Our North West branch run by Mike (G8EWU)
Just around the corner from the Rugby Ground

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 Dealer network. Ably staffed, courteous, Service Department. "B Services" Securicor contract at £3.50!! Biggest stocks of amateur equipment in UK. Twenty-two years of professional experience.

GUARANTEE

Yaesu's *own* warranty does not extend outside Japan. Repairs are the responsibility of the UK dealer selling the set. 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.

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!!

YAESU MUSEN

As UK agents we show some major Yaesu items; VHF multimode hand-portable, general coverage Rxs, multimodes for VHF and UHF FM Tx/Rxs for VHF, UHF and VHF/UHF, HF transceivers (SSB, CW, FSK, AM, FM) and a fistful of VHF and UHF handhelds. NB: 150 Yaesu accessories complement the above —check the last two pages for a sample of our range.

FT1—FOX TANGO ONE—THE WONDER WIRELESS

COVERAGE
RX: 150kHz–30MHz. Continuous general coverage.
TX: 160–10m (9 bands). 1·5–30MHz commercial version.

MODES
All modes; AM, CW, FM, FSK, LSB, USB.
Tx and Rx on opposite sidebands possible.

FREQUENCY SELECTION
No bandswitch. Multiple methods of frequency setting. Main dial: "velvet smooth" 10Hz resolution, 3 speeds;
Set MHz, kHz/R—Normal, kHz/R—fine,
Controls RIT or offset (synthesised clarifier).
Inbuilt Keypad: direct digital entry to 100Hz,
Fast/slow, up/down tuning,
Scanning manual or auto mode.

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 attennuator 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" tune, no loading controls.
Mains and 12VDC. Switch-mode PSU built in.
CW change over delay adjustable through to **full break in.**
Electronic keyer built in. Drive level control.
Front panel adjustable VOX. Signal monitor feature.
RF processor, compression control concentric with mic gain.
Auto mic gain, reduces extraneous off mic noises.

MEMORY
Two memory banks (A + B) each with 10 slots.
Simplex or Semi duplex A, B, RxA/TxB, TxA/RxB.
ANY frequency storable. ANY TX-RX split within coverage.
RIT offset stored together with memory channel.

METERING
Two large moving coil meters (+3 digitals and 12 leds).
R.H. (Rx-Tx): 'S' (1–9, +20, +40, +60dB) and ALC level.
L.H. switched: Ic (20A), Vcc, Discriminator (FM zero), Compression (0–25dB), Forward, Reflected.
Digital readout to 100Hz. Analogue markings for "feel".
Dedicated digital readout of RIT offset to ±9.9kHz.
Digital readout of memory channel number recalled.
LED's: Processor, Noise blanker, Auto mic Gain, Monitor, Peak—Notch filter, Scan, Transceive, TX-RX Clarify, Dial Lock, Tx Disabled.

£1,295 inc. VAT @ 15% & SECURICOR
E&OE

FRG7

* "Industry standard" receiver.
* 0·5–30MHz.
* SSB (LSB/USB), CW, AM.
* Selectivity of ±3kHz at −6dB.
* Wadley-loop triple conversion.
* 10kHz Direct dial readout.
* 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).
* 110–240Vac and 12Vdc.
* Lights; battery economy switch.
* Illuminated edge type "S" meter.
* Optional Battery holder £5.00.

£199 inc. VAT @ 15% & SECURICOR

FRG7700

NEW MATCHING ATU LPF AND SIX VHF CONVERTERS

* Incredible new receiver.
* 0.15–30MHz.
* SSB (LSB/USB), CW, AM, FM.
* 2.7kHz, 6kHz, 12kHz, 15kHz, @ −6dB.
* Up conversion 48MHz first IF.
* 1kHz digital plus analogue display.
* No preselector, auto selected LPF's.
* Advanced noise blanker fitted.
* Antenna 500ohm to 2MHz, 50ohm to 30MHz.
* 20dB pad plus continuous attenuator.
* Constantly variable tone control.
* 110 and 240Vac and 12Vdc option.
* 12 channel memory option.
* Signal meter calibrated in "S" and SIMPO.
* FRG7700M £389. Memory option £83.95.

£329 inc. VAT @ 15% & SECURICOR

SOUTH MIDLANDS COMMUNICATIONS LIMITED

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

FT101ZFM

- ★ 160 10 metres including new allocations.
- ★ Variable IF bandwidth 2·4kHz down to 300Hz.
- ★ 8 pole filters for razor edge selectivity.
- ★ Selectable CW fixed bandwidth CW-W and CW-N*.
- ★ Semi-break in with sidetone for excellent CW.
- ★ Digital plus analogue frequency displays.
- ★ 6146B PA's with 6dB of negative feedback.
- ★ 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, front panel switch.
- ★ AGC: slow-fast-off, front panel switchable.
- ★ Clarifier (RIT) switchable on TX, RX or both.
- ★ Low level transvertor drive output facility.
- ★ Universal power supply 110 234V ac and 12V dc*
- ★ Incredible range of matching accessories.

6 models, Digital/Analogue – AM/FM options.

*Option **£590 inc.** VAT @ 15% & SECURICOR

FT107M

- ★ 160 10 metres (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.*
- ★ Digital Memory Shift gives offset from memory.*
- ★ Up/down scanning control from the 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 switchable from the front panel.
- ★ Attenuator 0 20dB, plus RF gain on front panel.
- ★ RF speech processor fitted – front panel adjustable.
- ★ Digital (100Hz) plus analogue frequency displays.
- ★ Meter Reads; Vcc, Ic, ALC, Compression and SWR.
- ★ Semi-break in with side tone. Vox built in.
- ★ Choice of built-in or separate power supply units.

*Option **£725 inc.** VAT @ 15% & SECURICOR

FT902DM

- ★ 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.
- ★ 6146B's with negative feedback.
- ★ VOX built-in and adjustables.
- ★ Instant write in memory channel.
- ★ Tune up button (10sec, of full power).
- ★ Curtis Keyer – Iambic, single or straight.
- ★ Switchable AGC and RF attenuator.
- ★ Optional 350 or 600Hz CW, 6kHz, AM filters.
- ★ Clarifier (RIT) switchable on TX, RX or both.
- ★ Audio Peak and tunable notch filter.
- ★ 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.

*Option **£885 inc.** VAT @ 15% & SECURICOR

FT707

- ★ 80 10 metres (including 10, 18 and 24MHz bands).
- ★ USB-LSB-CWW-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 3kHz*, 2·4kHz 300Hz, 600 350Hz*.
- ★ AGC: slow-fast switchable from the front panel.
- ★ VOX built-in and adjustable from the front panel.
- ★ Semi-break in with side tone for excellent CW.
- ★ Digital (100Hz) plus analogue frequency display.
- ★ LED Level meter reads: S, PO and ALC.
- ★ Convenient concentric AF/FR gain controls.
- ★ Indicators for: calibrator, fix, int/ext VFO.
- ★ Receiver offset tuning (RIT-clarifier) control.
- ★ Advanced noise-blanker with local loop AGC.
- ★ 25kHz crystal calibrator feature.
- ★ Internal, xtal or external VFO control.

*Option **£569 inc.** VAT @ 15% & SECURICOR

AGENTS

G3ZUL	Brian	Stourbridge	(03843) 5917
GI3KDR	John	Bangor	(0247) 55162
GM8GEC	Jack	Edinburgh	(031665) 2420
GI3WWY	Mervyn	Tandragee	(0762) 840656
GW3TMP	Howarth	Pontybodkin	(035287) 846/324
GW8EBB	Peter	Swansea	(0792) 872525
GJ4ICD	Geoff	Jersey	(0534) 26788
G4EQS	Simon	Redcar	(0642) 480808

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
S.M.C. (Jack Tweedy) LTD
150 Horncastle Road,
Woodhall Spa, Lincolnshire.
Woodhall Spa (0526) 52793
9 5 Tuesday Saturday

1·6MHz shift now available

FT780R

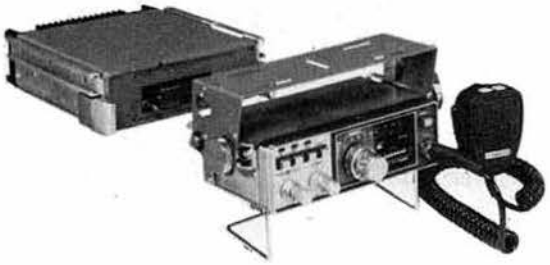
- ★ 430–434MHz (440–445) possible).
- ★ USB-LSB-CW-FM (A3J, A1, F3).
- ★ Input 30W (PEP A3J and A1/F3).
- ★ GaAs Fet RF for incredible sensitivity.
- ★ NMOS four bit micro control.
- ★ Bandwidth 2·2kHz and 14kHz @ −6dB.
- ★ "Dial set" clears unwanted non-integral steps.
- ★ Very bright blue display to 100Hz.
- ★ Display indicates Tx and Rx (inc RIT).
- ★ Manual tone switch on microphone.
- ★ String LED displays for S and PO.
- ★ Digital receiver independent tune (±10kHz).
- ★ Advanced effective noise blanker.
- ★ 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.
- ★ Memory scanning with slot display.
- ★ Up/down tuning from microphone.
- ★ Priority channel on any memory slot.
- ★ Satellite mode allows tuning on Tx.
- ★ Scanning for busy or clear channels.
- ★ Size (case): 10"D, 2.3"H, 6.9"W.
- ★ LED's on air, clear, hi/low, FM mod.
- ★ FP80 mains PSU + SC1 console available.

£449 inc. VAT @ 15% & SECURICOR

CPU2500RS

- ★ Covers 144 to 146 or 148MHz
- ★ 25/3 watt or 10/1 watt models (S)
- ★ CPU controlled digital synthesiser
- ★ 10kHz (+5kHz up) synthesised steps
- ★ Optional 25kHz steps in St version
- ★ 6 digit readout + memory channel number
- ★ Main tuning, by optically coupled encoder
- ★ Up/down tuning/scanning from microphone
- ★ Scanning for empty or occupied channels
- ★ Band scanning up or down the band
- ★ Four normal memory channels
- ★ Further memory for 'odd' split
- ★ Can scan memory channels only
- ★ ±600Hz plus any split (to 4MHz)
- ★ Sub audio tone squelch option
- ★ Manual (EU) and Auto (UK) tone burst
- ★ High or Low (÷10) power switch
- ★ Low noise mosfet RF stage
- ★ LED's for: 'on Air' and 'Busy channel'
- ★ VSWR and reverse polarity protection
- ★ Punch in frequency on keyboard mic (K)
- ★ 0·5A Rx, 2·5A LTx, 6A HTx (25) @ 13·6V DC
- ★ 13·6V DC ± 10%
- ★ Case; 7" W, 2¾" H, 10½" D
- ★ Sensitivity; 0·3μV for 20dB (QS)

£235 inc. VAT @ 15% & SECURICOR



FT720RV

FT720 Control Head

- ★ Four easy write-in memory channels
- ★ Rx Priority channel (auto check)
- ★ Scanning of band/memory for empty/busy
- ★ Up/down tuning/scanning from mic.
- ★ Optically coupled tuning control
- ★ Manual and automatic tone burst
- ★ String LEDs for 'S' and PO7 status LEDs
- ★ 1½W of audio to internal/external speaker
- ★ 3·3 (4·3)" D × 6" W × 2 (2·2)" H

720RV 10W, 2M deck. **720RVH** 25W, 2M 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

720RU 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 between two decks
- ★ Auto change of synthesizer steps/splits

£245 inc. VAT @ 15% & SECURICOR

FT480R

- ★ 144 146MHz (143.5 148.5 MHz possible).
- ★ USB-LSB-CW-FM (A3j, A1, F3).
- ★ 30W PEP A3j, 10/1W out A1 F3.
- ★ Bandpass filter no tune design
- ★ Excellent dynamic range sensitivity.
- ★ Bandwidth 2.4kHz and 14kHz at −6dB.
- ★ Semi break in with side tone.
- ★ Very bright blue 100Hz digital display.
- ★ Display shows Tx and Rx freq (inc RIT).
- ★ String LED display for "S" and PO.
- ★ Digital receiver offset tuning.
- ★ Advanced effective noise blanker.
- ★ 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.
- ★ Memory scanning with slot location 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 FP80 Mains PSU available.

£379 inc. VAT @ 15% & SECURICOR

FT208R

- ★ 144–148MHz (144–148 possible)
- ★ 12·5/25kHz synthesizer steps
- ★ 4 bit CPU synthesizer control
- ★ Keyboard entry of frequencies/splits
- ★ LCD digital display with backlight
- ★ Ten channels of memory
- ★ Memory back up "five-year lifetime"
- ★ Up/down manual tuning
- ★ Manual or auto scan for busy/clear
- ★ Priority channel with "check back"
- ★ Memory scanning feature
- ★ Scan between *any* two frequencies
- ★ Scan with auto pause/restart
- ★ Any split + or − programmable
- ★ Quick change NiCad pack
- ★ 1,750Hz tone burst
- ★ ±600kHz repeater split
- ★ Built in condenser microphone
- ★ 500mW AF to int/ext speaker
- ★ External speaker/mic option
- ★ 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
- ★ Keyboard provides 16 tone DTMF
- ★ 168–(179) H × 60–(70) W × 39–(47) D
- ★ C/w NiCad pack and helical

NC7	**£26.85**	MMB10	**£6.50**
NC8	**£44.10**	FNB2	**£17.25**
NC9C	**£8.05**	PA3	**£13.40**

FT208R
£209 inc.
VAT @ 15%
& POSTAGE

FT708R

- ★ 430–440MHz (440–450 option)
- ★ 25kHz synthesizer steps
- ★ 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
- ★ Any split + or − programmable
- ★ Quick change NiCad pack
- ★ 1,750Hz tone burst
- ★ ±7·6MHz EU split standard
- ★ Built in condenser microphone
- ★ 500mW AF to int/ext speaker
- ★ External speaker/mic available
- ★ 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
- ★ Keyboard offers 16 tone DTMF
- ★ 168(H) × 61(W) × 39(D)mm
- ★ C/w NiCad pack, helical

PA3	**£13.40**	NC9C	**£8.05**
FNB2	**£17.25**	FTS32	**T.B.A.**
FBA2	**£3.05**	FBA3	**£5.00**

FT708R
£219 inc.
VAT @ 15%
& POSTAGE

FT207R

- ★ 144–148MHz (144–148 possible)
- ★ 12·5kHz synthesizer steps
- ★ 4 bit CPU chip for frequency control
- ★ Keyboard entry of frequencies
- ★ Keyboard lockout safety features
- ★ Digital display to hundreds of Hertz
- ★ Display auto shutdown timer
- ★ Four memory channels with switchable back-up
- ★ Memory back-up disable
- ★ Up/down band tuning & memory scan
- ★ Bandscan for busy or clear channels
- ★ ±600kHz split built in
- ★ Any split + or − programmable
- ★ Easy change NiCad packs
- ★ "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 volume
- ★ Tx: 250mA low, 800mA high
- ★ 0·3μV for 20dB quieting
- ★ Double conversion 10·7MHz and 455kHz
- ★ Two tone 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

MMB10	**£6.50**	NBP9	**£17.25**
NC3A	**£46.00**	FBA1	**£3.45**
FLC2	**£21.85**	WMT207	**£5.00**

FT207R
£169 inc.
VAT @ 15% & POST

FT290R

- ★ 144–146MHz (144–148 possible)
- ★ Multimode USB, LSB, FM, CW
- ★ 2·5W PEP, 2·5W RMS/300mW out
- ★ LED's, "ON AIR", "BUSY"
- ★ Moving coil meter for S & PO
- ★ Integral telescopic antenna
- ★ Bandwidth 2·4kHz & 14kHz @ 6dB
- ★ Optically coupled main tuning
- ★ 100Hz backlite LCD Frequency display
- ★ 10 memory channels
- ★ "Five year" memory backup
- ★ FM: 25kHz and 12·5kHz steps
- ★ SSB: 1kHz and 100Hz steps
- ★ Any TX/RX split with dual VFOs
- ★ ±600kHz repeater split, 1,750kHz burst
- ★ Mobile mounting bracket available
- ★ Matching 10W linear Amplifier
- ★ Up/down tuning from microphone
- ★ AF output 1W @ 10% THD
- ★ 58(H) × 150(W) × 195(D) (1·3kg)
- ★ RX, 0·70mA, TX; 800mA (FM max)
- ★ 8 "C" Nicads or Drys Internal
- ★ 8·5 15·2V DC External
- ★ Scan on memory on clarify (±10kHz)!!
- ★ Long battery life with SMC 2·2A/Hr cells

CSC1	**£3.45**	FL2010	**£64.40**
MMB11	**£22.25**	NC1.2C	**£2.30**
NC11C	**£8.05**	SMC2.2C	**£2.70**

FT290R
£249 inc.
VAT @ 15% & POST

★ **NEW BRANCH — SMC (STOKE), 76 HIGH STREET, TALKE PITS, STOKE-ON-TRENT. PHONE (07816) 72644** ★

SOUTH MIDLANDS COMMUNICATIONS LIMITED

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

AGENTS

G3ZUL	Brian	Stourbridge	(03843) 5917
GI3KDR	John	Bangor	(0247) 55162
GM8GEC	Jack	Edinburgh	(031665) 2420
GI3WWY	Mervyn	Tandragee	(0762) 840656
GW3TMP	Howarth	Pontybodkin	(035287) 846/324
GW8EBB	Peter	Swansea	(0792) 872525
GJ4ICD	Geoff	Jersey	(0534) 26788
G4EQS	Simon	Redcar	(0642) 480808

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
S.M.C. (Jack Tweedy) LTD
150 Horncastle Road,
Woodhall Spa, Lincolnshire.
Woodhall Spa (0526) 52793
9 5 Tuesday Saturday

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, ⅝, 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 1-1⅝in 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

As well as 2m antennas featured here, the range covers 4m through 23cms. All models offer good 50ohm matches and bandwidths by incorporating such innovations as the inverse balun. Technical details are quoted in accordance with ICE (ICE138 + 138A) and I.E.E.E. (RV481 RE252 Jan 65) recommendations. (Sae for catalogue.)

The 8XY/2m is basically two 8 element yagis mounted at right angles on a common 9ft boom. It is suitable for horizontal, vertical or circular (with PMH/2c) polarisation. 9·5dB gain in each plane. 47° horizontal beamwidth, 10lb weight, 64lb wind load at 100mph an elegant answer to a single antenna installation.

JAYBEAM 2 METRE

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 omni vert	4·8dB	£47.72	£1.73
LR1/2M	Colinear	4·5dB	£25.87	£1.73
5Y/2M	Yagi 5 ele	7·8dB	£12.07	£1.73
8Y/2M	Yagi, 8 ele	9·5dB	£15.52	£1.73
10Y/2M	Long Yagi, 10 ele	11·4dB	£33.35	£1.73
14Y/2M	Long Yagi, 14 ele	13·0dB	£42.00	£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 ele parabeam	12·4dB	£39.67	£1.73
PBM14/2M	14 ele parabeam	13·7dB	£48.00	£1.73
Q4/2M	Quad, 4 ele	10·0dB	£25.87	£1.73
Q6/2M	Quad, 6 ele	12·0dB	£33.92	£1.73
5XY/2M	Yagi, 5 ele cross	7·8dB	£24.72	£1.73
8XY/2M	Yagi, 8 ele cross	9·5dB	£31.05	£1.73
10XY/2M	Yagi, 10 ele 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	Hrns, 2 way long		£11.92	£1.15
PMH4/2M	Harness, 4 way		£25.00	£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
£90.85

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

KR500
£86.25

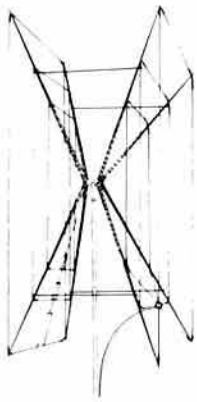
Elevation Rotator (180°).
Up to 50kg of Load.
1¼in-2¼in mast.
1¼in-1¾in boom.

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' × 9½'; TR 9½'; 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)	£11.33	£1.73

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

VERSATOWER

TELESCOPIC & TILTOVER RADIO TOWERS

BEST BUYS LOW COST TOWERS

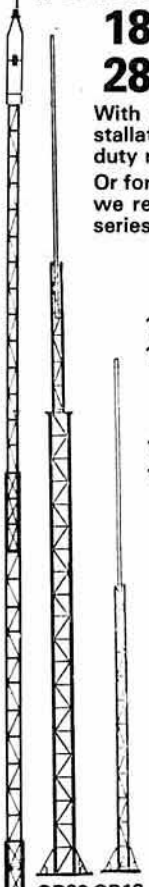
NEW

18FT ONLY £112.70

28FT ONLY £169.90

With tiltover base for ease of installation. These are our latest light duty range.

Or for larger headloads and heights we recommend our post mounted series P60 shown on the far left.



CB28 CB18

STANDARD
Post mounting

13M20P40 40′ £396.75
13M20P60 60′ £485.30

HEAVY DUTY
Post mounting

16M20P60 60′ £671.60
16M20P80 80′ £1012.00

Twelve years of continuous development 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.*

The range encompasses towers between 25 and 120ft in 10, 20 or 40ft sections mounted on ground post, base plate, wall, fixed base or high speed trailer.

SEND NOW FOR SPECIFICATIONS/PRICES

'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.

10M10P30 Post mount	£353.05
10M10W30 Wall mount (LG1013W extra)	£339.25
10M10BP30 Base Plate (HD Bolts extra)	£373.75
10M10FB30 Fixed base (HD Bolts extra)	£327.75

NB: PRICES INCLUDE VAT (AT 15%)
DELIVERY EXTRA (distance dependent)

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: 6¼ × 2¾ × 4¼"

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: 6¼ × 2¾ × 4¼". '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 × 2¾ × 1½"
coupler 3¼ × 2¾ × 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: 6¼ × 2¾ × 4¼"

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 × 2¼ × 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 × 2¾ × 2½". 'On the Air' LED

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

SMC=HS

OMNIDIRECTIONAL VERTICAL HF, VHF, UHF ANTENNAS

HF TRAPPED VERTICAL

The SMCHF5V covers five bands, 10 to 80 metres. Only 15ft 9in high, about 1⅜in diameter and weighing 6½lb but with PEP handling (within the 1·5:1 VSWR bandwidth) of 500W on 10-20m and 200W on 40 and 80m. It is suitable for ground mounting on a good earth stake (with or without radials) or in an elevated position with resonant wire radials or the SMCHF5R trapped radial kit.

The SMCHF5R consists of five solid rods (between 6½ft and 7½ft) sloping downwards at 45° to the antenna. It is the perfect answer to restricted locations. Power; 150W PEP, weight 4lbs.

SMCHF5V £40.25 **SMCHF5R £29.90**
(Carriage on either or both together £1.73)

2 METRE COLINEAR

144MHz, 6·5dB gain and low angle of radiation from two ⅝λ phased sections. Height 3·1 metres. Three 48cm radials project from the bottom chrome-plated brass boss. A good 50ohm match offers better than 1·5:1 VSWR at resonance for 100W PEP plus performance over 4MHz of operational bandwidth. Weatherproof design with a SO239M connector recessed 30cm up the detachable 3·2cm OD support tube. Supplied complete with mounting plate and U bolts for 1¼in mast. Weight 1·5kg.

SMCGP144W (P&P £1.73) **£24.95**

70CMS COLINEAR

432MHz, 6·8dB gain and ultra low angle of radiation from three ⅝λ phased sections to a maximum height of 1·7 metres. Three 17cm radials project from the bottom chrome-plated brass boss. A good 50 ohm match offers better than 1·5:1 VSWR at resonance for 100W PEP plus performance over 10MHz of operational bandwidth. Excellent weatherproof design with a SO239M connector recessed 23cm up the detachable 3·2cm OD support tube. Supplied complete with two extruded mast clamps and U bolts capable of taking masts up to 2⅜in. Weight 1·1kg, Projected area 0·034 square metres.

SMCGP432X (P&P £1.15) **£28.00**

2 METER AND 70CMS COLINEAR

144MHz 2·8dB gain and 432MHz 5·7dB of gain single 50ohm feed. 1·1m high. 100W PEP.

SMC 70N2V (P&P £1.15) **£27.60**

VHF/UHF DISCONES

The SMCGDX1 is a vertically polarized, 3dB gain, 500W PEP, 50ohm, broad-band antenna. It is constructed of eight horizontal rods (each 40cm) radiating from a central boss, thus forming the disc, and eight rods (each 90cm) radiating from the boss but sloping downward at 45° to form the cone. This configuration produces a 1·5:1 VSWR over the range 80 to 480MHz.

The SMCGDX2 is a development of the GDX1 with every other disc rod extended by 72cm and every other cone rod extended by 1·3m. This reduces the lower frequency limit to 50MHz.

The SMCVHFL is a skeleton discone with three off 53in cone and three off 24in disc elements suitable for listening anywhere between 65 and 520MHz.

All models use a SO239M coax connector, (in the GDX versions it is recessed into an extension of the support mast—which doubles as the coaxial feed) and are supplied with mounting hardware to 1¼in mast.

SMCGDX1 (P&P £1.73) **£41.40**
SMCGDX2 (P&P £1.73) **£47.96**
SMCVHFL (P&P £1.73) **£16.85**

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

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

MICROWAVE MODULES LTD

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

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

MMT1296/144

THE ENTIRE RANGE

MML144/100-S

TRANSVERTERS

		Price inc VAT	Post Rate
MMT28/144:	2m down to 10m	£99	B
MMT70/28:	10m up to 4m	£115	B
MMT70/144:	2m down to 4m	£115	B
MMT144/28:	10m up to 2m	£99	B
MMT432/28-S:	10m up to 70cm with satellite shift	£149	B
MMT432/144-R:	2m up to 70cm with repeater shift	£184	B
MMT1296/144:	2m up to 23cm	£184	B

LINEAR AMPLIFIERS

		Price inc VAT	Post Rate
MML28/100-S:	10m 100 watt/switchable preamp	£129.95	C
MML70/40:	4m 40 watt/preamp	£77	B
MML70/100-S:	4m 100 watt/switchable preamp	£129.95	C
MML144/25:	2m 25 watt/preamp	£59	B
MML144/40:	2m 40 watt/preamp	£77	B
MML144/100-S:	2m 100 watt/switchable preamp	£129.95	C
MML432/20:	70cm 20 watt/preamp	£77	B
MML432/50:	70cm 50 watt/preamp	£119	C
MML432/100:	70cm 100 watt	£228.65	D

CONVERTERS

		Price inc VAT	Post Rate
MMC27/MW:	27MHz down to medium wave	£19.95	A
MMC28/144:	10m up to 2m	£27.90	A
MMC50/28:	6m down to 10m	£27.90	A
MMC70/28:	4m down to 10m	£27.90	A
MMC70/28LO:	4m down to 10m/LO output	£29.90	A
MMC144/28:	2m down to 10m	£27.90	A
MMC144/28LO:	2m down to 10m/LO output	£29.90	A
MMC432/28-S:	700m down to 10m	£34.90	A
MMC432/144-S:	70cm down to 2m	£34.90	A
MMC435/51:	70cm ATV down to VHF	£34.90	A
MMC435/600:	70cm ATV up to UHF	£27.90	A
MMC1296/28:	23cm down to 10M	£32.20	A
MMK1296/144:	23cm down to 2m	£59.80	A

MICROPROCESSOR BASED PRODUCTS

		Price inc VAT	Post Rate
MM2000:	RTTY to TV converter	£169	B
MM4000:	RTTY transceiver	£269	B
MM4000KB:	RTTY transceiver + keyboard	£299	D
MMS1:	Speech synthesised morse tutor	£99	B

MMS1

FULL DATA ON EACH OF THE ABOVE PRODUCTS IS AVAILABLE UPON REQUEST

RECEIVE PREAMPLIFIERS

		Price inc VAT	Post Rate
MMA28:	10m low noise preamp	£14.95	A
MMA144V:	2m RF switched preamp	£34.90	A
MMA1296:	23cm low noise preamp	£29.90	A

VARIOUS

		Price inc VAT	Post Rate
MMD050/500:	500MHz frequency counter	£69	A
MMD600P:	600MHz + 10 prescaler	£23	A
MMDP1:	Frequency counter probe	£11.50	A
MMF144:	2m bandpass filter	£9.90	A
MMF432:	70cm bandpass filter	£9.90	A
MMV1296:	70cm to 23cm varactor tripler	£34.50	A
MMS384:	384MHz frequency source	£27.60	A
MMR15/10:	15dB 10 watt attenuator	£9.90	A

MMD050/500

POSTAGE

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

UNITS 'A' = £0.80 UNITS 'C' = £2.75
UNITS 'B' = £2.00 UNITS 'D' = £3.50

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

COUNCIL

President
B. O'Brien, G2AMV

Executive vice-President
J. Anthony, BSc, MIETE, G3KQF

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

Ordinary members
E. J. Allaway, MB, ChB, MRCS, LRCP, G3FKM
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
D. M. Pratt, BTech, CEng, MIEE, MIERE, G3KEP
G. M. C. Stone, CEng, FIEE, FIERE, G3FZL

Zonal members
Zone A. J. Heathershaw, G4CHH (Mrs)
Zone B. J. Anthony, BSc, MIETE, G3KQF
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. G. I. Knight, GM8FFX

REGIONAL REPRESENTATIVES

Region 1—W. R. Parkinson, G3FNM
Region 2—D. S. Smith, G4DAX
Region 3—H. S. Pinchin, G3VPE
Region 4—M. Shardlow, G3SZJ
Region 5—*(To be elected)*
Region 6—F. S. G. Rose, G2DRT
Region 7—P. J. Walker, G8HMG
Region 8—K. A. Crouch, G8KEN
Region 9—W. J. Colclough, G3XC
Region 10—P. A. Jones, GW4HAT
Region 11—B. H. Green, GW2FLZ
Region 12—F. Hall, GM8BZX
Region 13—A. B. Givens, GM3YOR
Region 14—*(To be elected)*
Region 15—J. T. Barnes, GI3USS
Region 16—*(To be elected)*
Region 17—H. G. Cunningham, G8FG
Region 18—W. Ricalton, G4ADD
Region 19—R. J. Broadbent, G3AAJ
Region 20—B. L. Goddard, G4FRG

HONORARY OFFICERS

Audio tape and slide library co-ordinator
D. Simmonds, G3JKB

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

Emergency communications manager
Post vacant

HF manager
E. J. Allaway, G3FKM

Intruder Watch organizer
S. Cook, G5XB

Observation Service organizer
D. M. Pratt, G3KEP

Microwave manager
D. S. Evans, G3RPE

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

Telecommunications liaison officer
Post vacant

Trophies manager
P. A. Miles, G3KDB

VHF manager
K. A. M. Fisher, G3WSN

Video tape and film library co-ordinator
J. Anthony, G3KQF

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

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

ANNUAL SUBSCRIPTION RATES

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

RSGB SUNDAY NEWS BROADCASTS

These broadcasts are made every Sunday morning on hf and vhf, giving almost complete coverage of the British Isles. All stations broadcasting these news bulletins use the callsign GB2RS, and information regarding them is given in the table below.

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	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	GW4KEV	GW8TTM	1100
Clwyd/Merseyside	GW4IEQ	G8NNS	1100

H = horizontal polarization

ROY FREDERICK STEVENS

MBE, AIAS, FCII, G2BVN

Honorary member, RSGB
President, 1966
Member of Council, 1962-80
Telecommunications liaison officer
Member, *Radio Communication* editorial panel
Secretary, IARU Region 1 division

Roy Stevens ("Steve") died on 30 September at the age of 61—at rest from a long, progressively incapacitating illness that he never allowed to interfere with his intense and lifelong dedication to the advancement of amateur radio. And what an impact he has had on the hobby that he pursued so successfully on all bands from 3·5 to 432MHz, as well as in countless national and international committees and councils and working parties!

One theme stands out from the many. His belief in the importance of a strong and united international amateur radio movement to defend, retain and extend the frequencies assigned to amateurs. He never courted easy popularity, but once convinced that an innovation was realistically practicable, and would be to the long-term benefit of amateur radio, he fought tenaciously and single-mindedly for its adoption: a man of action and practicality and sheer hard work. Even from the wheelchair to which his illness finally forced him, he would tackle tasks that would have daunted five fully-fit men.

Steve obtained his (then "AA") call in 1937. He was one of 37 licensed amateurs in the very first draft of RAF Civilian Wireless Reservists ("The Early Birds") to reach France on 5 September 1939 to form the RAF's "Wireless Intelligence Screen" (Y Service). As a leading dxer (well over 300 countries worked) he contributed "Month on the Air" for a time in *Radio Communication*. As chairman of the Society's Technical & Publications Committee for more than 20 years, he wrote innumerable technical and other articles, including the series "IARU Calling" that marked his growing concern with the international and regulatory aspects of amateur radio. This interest culminated in his immensely successful work at the World Administrative Radio Conference 1979 whose results, from January 1982, will stand as a fitting memorial to a quarter-century of work that has brought him so much international respect and honour, including the MBE awarded in recognition of his work for amateur radio in the Queen's Birthday Honours List 1980.

He received many honours and awards from the amateur radio movement, among them: honorary membership of the RSGB, honorary membership of the RAF ARS, the Albert L. McIntosh Memorial Trophy from ARRL (USA), the Golden Needle from the DARC (W Germany), honorary membership of EDR (Denmark), the Order of the Golden Key from NRRL (Norway), honorary membership and medal of SSA (Sweden), honorary membership of VERON (Holland) . . . to name but a few.

By profession a surveyor, he was, in the unrivalled depth of his knowledge and his ability to work closely with the licensing and international regulatory authorities, an "amateur" in the very best sense of the word.

Our gratitude to Audrey, who helped him for so many years, and particularly during the sad yet glorious years of his growing illness.

AT THE MEMORIAL SERVICE for G2BVN, held at the Church of St Edward the Confessor, Romford, on 8 October, attended by members of RSGB Council, past-Presidents, members and staff of the RSGB, representatives of amateur radio societies in North America and Europe, officers of IARU and representatives of other bodies, the President of the RSGB, Basil O'Brien, G2AMV, gave the following address:

"We come here in sadness, but what I have to say to you is in the form of thanksgiving. Thanksgiving for what has been done for us in the amateur radio movement by this quite remarkable man.

"Roy Frederick Stevens—"Steve", as he was affectionately known to many of us—devoted a major portion of life to the protection and improvement of something that many of us hold very close to our hearts—our interest in amateur radio.

"A list of his achievements is so long that it is difficult to single out any individual one. Nevertheless a strong contender for first place in the list must be the International Amateur Radio Union Region 1 Conference in Brighton earlier this year. Steve possessed the great gift of being what can only be described as a brilliant organizer. His success in this field was due to his meticulous attention to detail and the ability to see a very long way ahead.

"During all this period his mind remained clear as always while a most grievous disease gradually denied him the use of his body. In such circumstances his fortitude was outstanding and showed his great strength of character.

"As a pre-war volunteer member of the Royal Air Force, Steve was involved in World War Two in its very early stages. He escaped from France one month after Dunkirk, only to be involved later in a forced landing in the African desert. An accident in which both his legs were broken.

"After the war he returned to his old profession in the fire department of the Century Insurance Company. In this field also he achieved success as a surveyor, and as a lecturer he was able to pass on his considerable knowledge to others. In 1978, after 41 years in his profession—including his war service, he retired from the position of a chief fire surveyor in the Sun Alliance Group.

"It was in his membership of the Radio Society of Great Britain that I knew him. His exceptional memory and wide knowledge of amateur radio, and particularly of its administration, were enormous assets to the Society. Scarcely a day passed without an approach being made to him for his guidance and advice.

"Roy Stevens was the holder of the callsign G2BVN, a callsign which he had held since the 1930s. He served on the RSGB Council for 18 years and was elected President in 1966. He was deeply involved with much of the committee work and especially with the publication of the Society's monthly magazine, *Radio Communication*. Indeed, he was chairman of the Technical & Publications Committee for 20 years. Steve will particularly be remembered for his invaluable work as the Society's Telecommunications Liaison Officer. His close relationship with the Home Office over a very long period has been a great asset to the Society and United Kingdom amateurs as a whole. In recognition of all that he had done for us, the Society in 1979 made him an Honorary Member, the highest honour that the Society can bestow.

"However, it is probably in the international field of amateur radio that Steve was best known. In 1969 he was appointed to the important office of Secretary of Region 1 of the International Amateur Radio Union—a position which he retained until his death. In that office he attended various conferences at home and abroad, culminating in the World Administrative Radio Conference in Geneva in 1979. His participation in that event, when his health was failing, contributed significantly to the successes achieved for radio amateurs.

"Steve has received awards, far too numerous to mention in detail, from amateur radio societies around the world. These recognized his outstanding organizing ability and unceasing efforts for the cause of amateur radio. The greatest acknowledgement of his merit came last year when the Queen saw fit to appoint him a Member of the Order of the British Empire.

"Roy Stevens packed so much into his life and won so much praise worldwide that it is difficult to make sure that nothing has been omitted. If anything has been left out, then those concerned will know about it in their hearts.

"May I end with a quotation from Henry Scott Holland . . .

Death is nothing at all. I have only slipped away into the next room. Call me by my own familiar name. Speak to me in the easy way which we always used. Put no difference in your tone. Wear no forced air of solemnity or sorrow. Laugh as we always laughed at the little jokes together. Please smile. Think of me. Pray for me."

QTC
Amateur radio news

Business hours at RSGB headquarters

In recent years the Society's day-to-day amateur radio and business functions at HQ have become more heavily dependent on the in-house data processor. So much so that it is now necessary to run essential morning and evening save procedures. This will mean that for handling queries from visitors and telephone calls the computer will be available from 10am to 4pm, and business hours will therefore reflect this from 1 November 1981.

Advertising of cb equipment

The Council of the RSGB has decided that citizens band equipment shall not be advertised in *Radio Communication*.

All trade advertisers have been informed of this embargo, which also applies to Members' Ads. Any references to cb equipment which come to notice will be deleted without reference to the advertiser.

FRONT COVER

The 12m dish antenna at the SRC's Rutherford Appleton Laboratory, Chiltern, Oxon, the control and tracking station for the infra-red satellite project due for launching in 1982.

10, 18 and 24MHz bands

The Home Office has now confirmed that:

(1) the 10,100–10,150kHz band will be available to the amateur service on a secondary basis from 1 January 1982. Operation by UK amateurs will be permitted only on a "non-interference" basis.

(2) the 18,068–18,168kHz and 24,890–24,990kHz bands will remain allocated to the fixed and land mobile services until existing assignments have been transferred to new frequencies. More detailed information will be published later.

Stolen equipment

From a car in Burgess Hill, Sussex, on 17 September: Yaesu FT290R transceiver, serial number 16020573; and Microwave Modules 40W linear, serial number 4011801323. Any information to G8TOO, QTHR, or any police station.

From a car at Bournemouth on 8/9 October: Trio TR7500, serial number 930058. Information to G3YNR, QTHR, or Bournemouth police.

COST OF EQUIPMENT

Following numerous letters received from members of the RSGB concerning the cost of equipment, the President of the Society wrote to the secretary of the Amateur Radio Retailers Association. The letter from Basil O'Brien, G2AMV, is reproduced below, as is the reply from Fred Hopewell.

The Secretary
Amateur Radio Retailers Association

28 August 1981

Dear Mr Hopewell

The Society is receiving an increasing amount of correspondence from members regarding what appear to be significant differences between the prices of Japanese equipment purchased in the UK when compared with the purchase price of similar equipment in the USA. Some of these letters have been addressed to the editor of *Radio Communication,* and several have been reproduced in the magazine's feature entitled "Your opinion".

This question of price comparison is raised at almost every meeting of members around the country, and a related question was asked at the Society's last Annual General Meeting.

The Council of the Society is anxious to keep good faith with its members and also, indeed, with its advertisers. In these circumstances, therefore, we are offering space in *Radio Communication* for a letter from ARRA explaining the situation which has arisen and accounting for the different levels of prices in the USA compared with the UK.

We look forward to your reply so that it may appear in an early edition of *Radio Communication.*

Yours sincerely
B. O'Brien, G2AMV
President, RSGB

The President,
Radio Society of Great Britain

14 September 1981

Dear Mr O'Brien,

Thank you for your letter dated 28 August regarding the differences in price between Japanese equipment purchased in the UK and the USA.

I must make it quite clear that the ARRA Rules and Constitution state: "No advice or guidance will be offered relating to Manufacturers' Recommended Prices or Retail Price Maintenance. This is beyond the scope of the association, which declines to engage in this aspect of members' policy in any manner whatsoever." At the same time, one of the objects of the association is to act as liaison between dealers and customers, so, having canvassed the membership, I append a summary of their comments.

1. Lower prices in the USA are the result of:
   - (a) Lower shipping and handling costs.
   - (b) Lower commodity taxes. Import duty in the USA is currently 6 per cent against 12½ per cent in the UK. Also, USA importers pay no VAT; they do pay a small Sales Tax, WHICH IS NOT INCLUDED IN PRICES QUOTED IN MAGAZINES.
   - (c) Larger volume of business. Also, most large Japanese manufacturers of amateur equipment have their own distribution offices in the USA and these are heavily subsidized (if not totally) by the Japanese mother company.
   - (d) Lower business taxation. Not an inconsiderable item, especially if taken in conjunction with the extremely high cost of advertising in the UK (particularly in *Rad Com*!), and it is the importer who pays for this, not the manufacturer.
   - (e) Limited warranty.

Of the above factors, the most important is probably the last. The dealers who quote the lowest prices do so on the understanding that there is no warranty comeback. This, of course, is a dealer's dream, but impossible in this country because of the consumer protection legislation. If it were possible, then undoubtedly UK prices would be much more in line with USA prices. As an example, it is not unusual to allow 15 per cent to cover warranty claims and customer service. The customer may well say: "I do my own repairs, I do not need customer protection". Unfortunately for him, the law says otherwise. A further factor in the case of some importers is that they are compelled to deal through a European subsidiary of the factory, rather than the factory itself. This has the advantage of a central European spares depot, but at an additional cost.

2. Retail Price Maintenance. The general consensus of opinion seems to be that there is a cartel in operation. The FACTS are these:
   - (a) The dealer gets a discount of between 17½ and 22½ per cent as a general rule, depending on settlement terms and quantities etc. For this he has to provide all the protection and service to which the customer is entitled, and the simple fact of life is that if he does this, he cannot AFFORD to allow any discount.
   - (b) It may be argued that the importer, by virtue of additional profit, is able to offer retail customers a discount. True, but this would then place his entire dealer network at a price disadvantage. So, whatever the individual dealer may offer as an inducement, one thing is certain and that is that the importer cannot *ethically* allow any discount.

3. The thought that importers get together and fix prices just will not hold water. If the importers of Brand A, Brand B and Brand C got together to fix high prices, the importers of Brand D will laugh all the way to the bank. If ALL importers get together to fix high prices, some enterprising chap will simply import from Hong Kong or Singapore in quantity and make a killing. The fact that these enterprising chaps are thin on the ground and NOT exactly making a killing is, to say the least, a significant pointer.

4. Amateur radio dealers in this country are well aware of the feeling among the amateur fraternity—they can buy everything else except amateur radio at a discount—which does seem grossly unfair, and the above may help to explain the reasons why. The alternative is to emulate the hi-fi business where a vast mark-up is allowed to permit substantial discounting—surely no radio amateur believes that a 25 per cent discount on hi-fi represents a bargain? Wouldn't the more reasonable and reasoning person agree that there is something to be said for buying his equipment knowing full well that he is most unlikely to get it cheaper elsewhere? Surely it is better to have a sensible pricing structure than to build-in a nebulous mark-up to allow discounting which may be fair to some but unfair to others.

5. Having dwelt at some length on the dealers' point of view, it does not alter the fact that prices in the USA ARE lower than the UK, and undoubtedly some amateurs are looking westwards for their equipment. May I suggest the following?
   - (a) In the case of hf transmitting equipment, first obtain an Import Authority from the Home Office. THIS IS ESSENTIAL!
   - (b) Be certain your rig is suitable for the UK.
   - (c) Shop around the USA dealers for the lowest price.
   - (d) Phone your bank and find out EXACTLY how much your account will be debited, including bank charges.
   - (e) Phone a shipping agent and get a quote for transporting the rig from the USA dealer to the boot of your car. This should include freight, handling, Customs Entry Fees, Duty and VAT.
   - (f) Add it all up and decide whether it is all worth while.
   - (g) Get your findings published in *Rad Com.*

Finally, if the customer has prejudiced the issue and is quite convinced that the UK dealer is making a vast profit at his expense, nothing I can say will shake this view. All I can hope is that some RSGB members will assemble the facts and discover for themselves the true situation.

Yours most sincerely,
Fred Hopewell
Secretary, ARRA

THE G4BWE audio filter

by STEPHEN PRICE, G4BWE*

ONE of the most important components contained within an ssb transceiver or communications receiver is the intermediate frequency filter. Apart from playing a vital role in the generation of ssb for modern transceivers, it is the i.f. filter which dictates the ultimate bandwidth of the receiver. The filter's characteristics will normally be tailored to provide an audio spectrum at the receiver's output extending over the range 300Hz to approximately 3kHz. Such a relatively wide bandwidth is essential to capture the complex harmonic structure of speech waveforms, and any significant reduction in this bandwidth will considerably impair the intelligibility of phone signals. In contrast, morse telegraphy (cw) transmissions contain only a small amount of information/unit time, and for these signals the optimum receive bandwidth is very much narrower.

If the amateur frequency allocations were held subject to a divine plan and so contained only a finite number of strong, highly stable transmissions, each well spaced from its neighbours and devoid of all man-made and atmospheric interference, such considerations of receiver bandwidth would become largely academic. In reality, however, the electromagnetic spectrum is a veritable jungle, densely populated with a myriad of randomly-spaced signals and various kinds of interference. A rational solution to the problem of achieving adequate reception on crowded and noisy amateur bands is to provide some means of tailoring the receiver's bandwidth so that it matches the information rate of the transmission.

For cw reception it is possible to employ a specialized i.f. filter with a bandwidth of only a few hundred hertz, which can be switched into operation when required. Unfortunately, cw filters of this type tend to be rather expensive and are inherently inflexible as their bandwidth and centre frequency cannot be readily altered. A very practical alternative to the cw i.f. filter is an active audio filter. Such filters, when carefully designed, provide a high degree of flexibility, as it is possible to adjust both bandwidth and centre frequency by the manipulation of separate controls. In consequence a host of designs for audio filters have appeared during the last few decades, and many offer considerable advantages. It is interesting to note that an audio filter can be so engineered that it will provide not only a bandpass characteristic but also a bandstop or "notch" function, thus providing a means of eliminating major interference occurring at a specific frequency. This alternative to the technique of merely reducing overall bandwidth is particularly useful in enhancing the quality of ssb reception, as stray heterodynes can be readily eliminated without significantly impairing voice intelligibility.

The graphic equalizer

Turning for a moment to the world of hi-fi and professional sound recording, one finds that an entirely new type of frequency equalizer or, to employ more colloquial terminology, "tone control", has recently emerged. An older type of tone control network, developed by Peter Baxandall, features only two potentiometers labelled BASS and TREBLE. These controls may be adjusted to provide deviation from a flat frequency response so that gain (boost) or, alternatively, attenuation (cut) can be achieved at either the low or high frequency end of the audio spectrum respectively.

The newcomer, known as the "graphic equalizer", is considerably more complex, and consists of a large number of separate filter networks, each with a relatively narrow bandwidth. Slider-type potentiometers are employed to control these networks, so that varying degrees of boost or cut may be obtained at specific points within the audio spectrum. Fig 1 demonstrates both pictorially and diagrammatically how the graphic equalizer operates, and shows the visual, or "graphic" presentation of the response characteristic afforded by the use of slider rather than rotary type controls. The professional graphic equalizer is designed to function over the entire audible spectrum, ie from 30Hz to 20kHz, and each slider control will provide a maximum of around 15dB of either boost or cut at its resonant frequency.

The author decided to build a specialized form of graphic equalizer for communications use with the following differences: (a) the design covers a more limited frequency band of 300Hz to 3kHz, and (b) each slider control offers a much greater range of amplitude control.

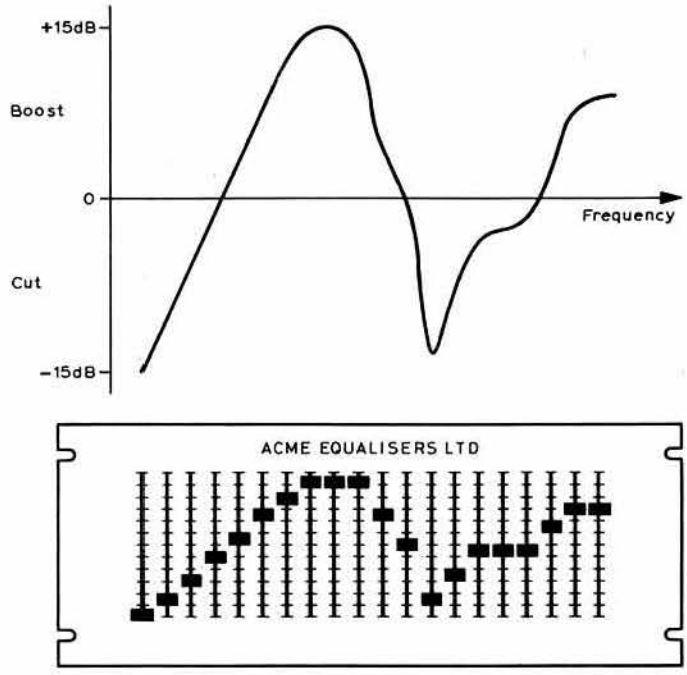


Fig 1. The graphic equalizer

How the filter works

Before examining the complete design in detail it will be useful to study the principle of operation. Fig 2 shows a skeleton circuit diagram of the filter. The series-tuned circuit consisting of L and C exhibits a low impedance at its resonant frequency. If the potentiometer wiper is set at point A, resistor R_I, in conjunction with the tuned circuit, forms a potential divider which will attenuate the signal being presented to the non-inverting input of the operational amplifier. The result of this action is to produce a notch characteristic centred on the resonant frequency of L and C. Conversely, if the wiper is positioned at point B, resistor R_F forms a second potential divider in conjunction with the same tuned circuit. This divider serves to attenuate the negative feedback voltage presented to the inverting input of the op-amp, and thus increases the amplifier's voltage gain considerably. A bandpass or "boost" characteristic, once again centred on the tuned circuit's resonant frequency, has therefore been obtained.

If R_I and R_F are made identical in value and the potentiometer is set at its midpoint, the input attenuation becomes equal to the amplifier's gain, and the gain of the complete circuit is therefore unity. Moving the potentiometer's wiper to either side of centre will enable varying degrees of boost (peak) and cut (notch) to be introduced. As explained earlier, the equalizers employed in recording studios provide only limited amounts of boost and cut. This restriction in control range may be provided by inserting fixed resistors in series with each end of the potentiometer's track. The author's filter dispenses with these resistors and thereby enables the operator to achieve the highest possible ratio in level between wanted and unwanted frequencies.

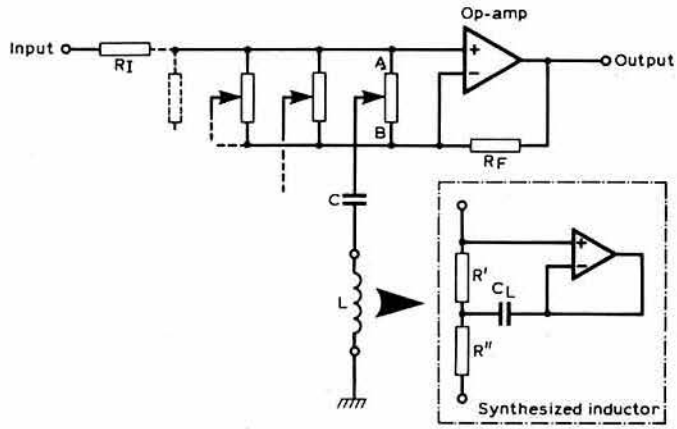


Fig 2. Skeleton circuit showing the filter's principle of operation

*64 Northover Road, Westbury-on-Trym, Bristol BS9 3LH.

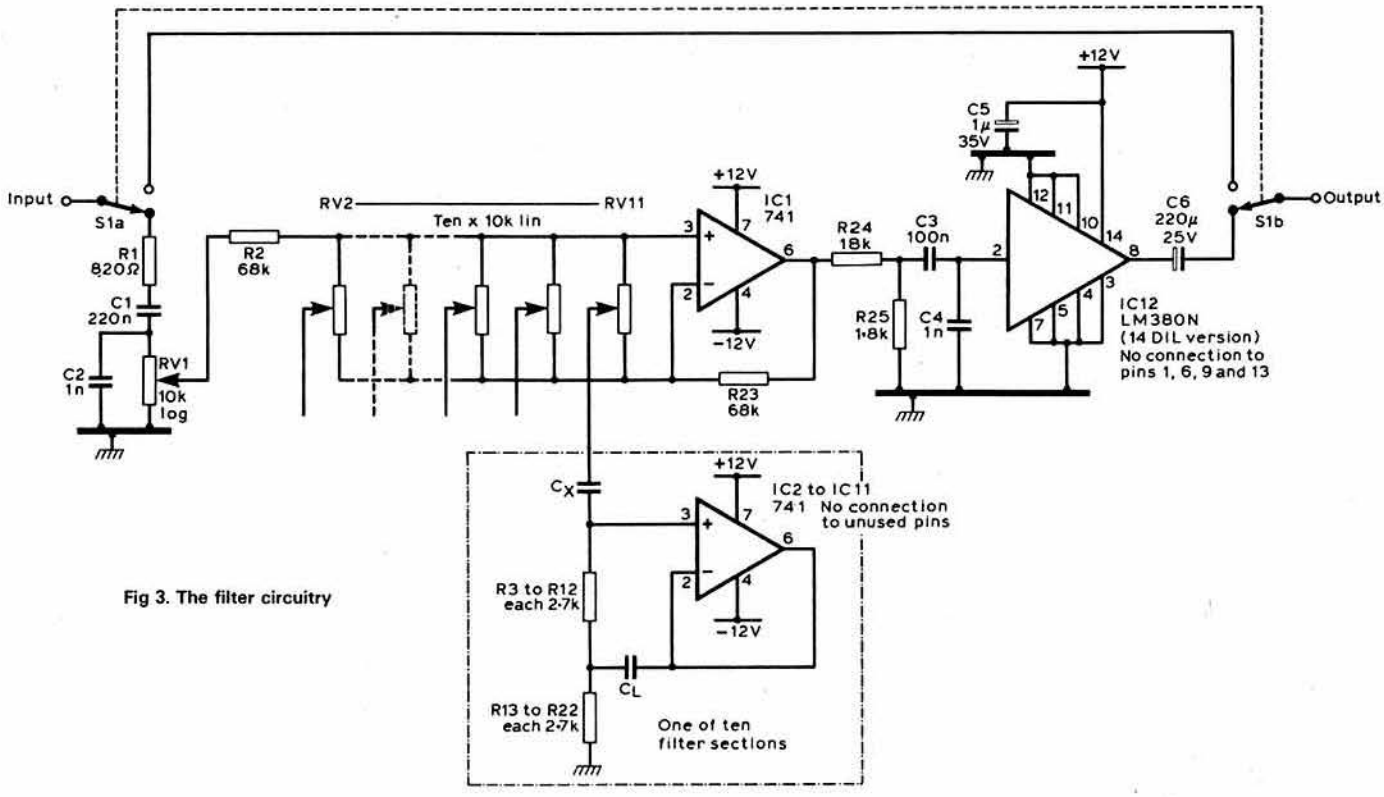


Fig 3. The filter circuitry

Rather than employing discrete inductors, which are bulky, expensive and susceptible to hum pick-up, the inductance required for each tuned circuit is synthesized by a simple gyrator consisting of an inexpensive op-amp, two fixed resistors and a capacitor (see box, Fig 2). For those interested, the value of synthesized inductance in Henries is given by the following formula:

$$L = C_L \times R' \times R''$$

Many previous audio filter designs, particularly those presented in the more theoretically-based textbooks and articles, have suffered from the disadvantage of requiring accurate component values, thus necessitating the use of close tolerance capacitors which are expensive and difficult to obtain. The design and operational parameters of the author's filter have been framed to allow the use of standard five per cent tolerance resistors and five or ten per cent tolerance non-electrolytic capacitors. The final design utilizes 10 filter sections, with centre frequencies extending over the range 440 to 2,720Hz. The first five sections each feature a bandwidth of 200Hz and thereby cover the segment 350 to 1,360Hz. The next three sections are of 250Hz (−6dB) bandwidth, and the ninth and tenth sections have bandwidths of 300 and 400Hz respectively. It is of course possible to design a filter with sections of 200Hz bandwidth only, but 13 separate filter networks are required to cover the range 350 to 2,920Hz; three more than the number employed in the present design. Furthermore, as the centre frequency of a filter of given bandwidth is increased, the effect of component tolerances becomes proportionately greater. For example, a filter of 200Hz bandwidth resonant at 2,820Hz would demand fixed component tolerances of around 2·5 per cent or, alternatively, the incorporation of variable elements in order to set the centre frequency accurately.

The practical design

Fig 3 shows the audio filter circuitry. The input signal obtained from the rig's external loudspeaker socket is fed via the by-pass switch (S1a), through R1 and the coupling capacitor C1, to the gain control, RV1. C2 removes any high frequency energy and acts as an rf filter.

Reference to Fig 2 and associated text will explain the function of R2, R23, RV2 to RV11 and op-amp IC1. For the sake of clarity, only one of the 10 filter sections is shown. Each section is identical in circuitry, the only variation being in the values of capacitors C_X and C_L. Table 1 gives these values plus other relevant data. The output from pin 6 of IC1 is fed via the potential divider comprising R24 and R25 to coupling capacitor C3, and hence to the input pin of IC12. IC12 is a monolithic audio power amplifier type LM38ON, and inclusion of this final stage enables the filter to drive a loudspeaker or low impedance headphones. C6 is the output coupling capacitor and S1b completes the by-pass circuitry. Decoupling capacitor C5 is critical in that it serves to prevent oscillation of IC12. C5 should therefore be positioned close to IC12 and must be a low-inductance type, eg tantalum bead. C4 decouples the input of IC12 at high frequencies.

The mains power supply circuitry is shown in Fig 4 and requires little explanation. As there are a large number of op-amps in the filter, 11 in total,

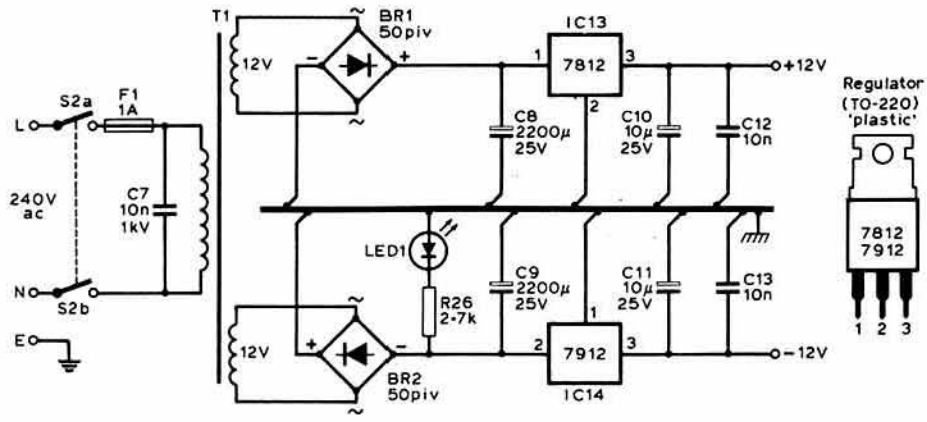


Fig 4. Mains psu for the filter

the author opted for a two-rail supply. Small 1A ic regulators are employed, and readers should note the variation in pin-out between the positive output (7812) and negative output (7912) devices. LED 1, which is fed via current limiting resistor R26, provides on/off indication. The mains transformer is a small general purpose type with 250mA (minimum) secondaries, as manufactured by Douglas, Repanco etc.

Construction and testing

As the filter is an audio project the exact layout of components becomes largely a matter of choice, but hum loops should be avoided by the use of single-point earthing. It is also a good idea to employ miniature audio coaxial cable for the signal leads. The prototype has been constructed on Veroboard, and the 10 slider potentiometers are bolted directly to the filter's case. Readers who demand a more professional standard of construction may wish to consider the production of a pcb, and if this technique is adopted it should be possible to mount the slider potentiometers on the circuit board itself, thus cutting down on the number of flying leads. A metal case is recommended, mainly as a precaution against the effects of transmitter radiation. The most tricky part of the filter's construction is undoubtedly the cutting of the 10 slots for the slider controls. However, a small twist drill, a supply of junior hacksaw blades and a miniature file should make light work of the job.

Two sockets are provided on the back panel for input and output. These may be either jack, phono or DIN according to preference. The only other panel-mounted components are S1 (by-pass), S2 (on/off), RV1 (gain) and LED1.

Op-amps IC1 to IC11 may be mounted in sockets, provided these are of proven quality (eg Texas low profile). The LM380N must be soldered into place, as this is a power device and heat is conducted away from the chip via pins 3, 4, 5, 10, 11 and 12. The Vero strips to which these pins are soldered should therefore be left uncut for a length of approximately 1·5in on either side of the LM380N and liberally tinned with solder. If a pcb is employed, an area of unetched copper should be left as a heatsink.

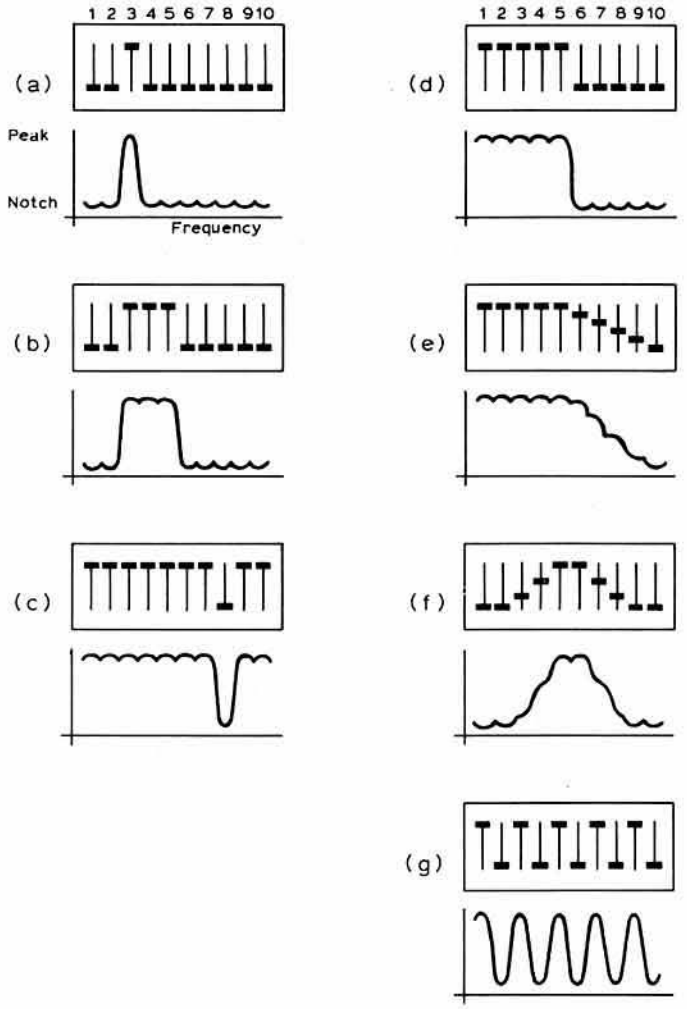


Fig 5. Some response curves obtainable. (a) A narrow bandwidth cw filter, centre frequency 860Hz. (b) Wide-bandwidth cw filter, centre frequency 1kHz. (c) A 2kHz notch. (d) Steep-slope low-pass filter, turnover frequency 1,400Hz. (e) Gentle-slope low-pass filter. (f) Low-Q band-pass response centred on 1,400Hz. (g) Comb filter, see text

Table 1. Values of C_X and C_L plus other relevant data

Section	C_X	C_L	Centre Frequency (Hz)	Bandwidth (Hz)	Q	Synthesized Inductance (H)
1	18nF	1μF	440	200	3·7	7·3
2	8·2nF	1μF	650	200	5·5	7·3
3	4·7nF	1μF	860	200	7·3	7·3
4	3·3nF	1μF	1030	200	8·7	7·3
5	2·2nF	1μF	1260	200	10·7	7·3
6	1·8nF	820nF	1530	250	10·7	6
7	1·3nF*	820nF	1800	250	12·6	6
8	1nF	820nF	2060	250	14·3	6
9	940pF**	680nF	2330	300	13·4	5
10	1nF	470nF	2720	400	10·8	3·4

*1·2nF + 100pF in parallel **470pF + 470pF in parallel

Suitable 10 per cent tolerance capacitors for CL (see Table 1) are Mullard C280 polyester (352 series). It may not be possible to obtain the 820nF value, however, but use of 470nF in parallel with 330nF provides an acceptable substitute. The C280 series capacitors are not suitable for C_X, as below 330nF their stated tolerance is increased to 20 per cent. Siemens polystyrene type B31310 of five per cent tolerance, or the ceramic plate capacitors sold by Marshalls, may be used for C_X. A strict analysis of the design will show that the use of 5 or 10 per cent tolerance capacitors for C_L and C_X does not guarantee a particularly high accuracy in the setting of centre frequencies for the filter sections that operate above 1kHz. No problems have been encountered in practice, however, and in any case it is a simple matter to trim individual values by the addition of padding capacitors should any of the sections fail to operate as intended.

The completed filter may be tested with the aid of an audio frequency generator and ac millivoltmeter or, alternatively, by the following procedure:

The filter's input is coupled to the receiver's external loudspeaker socket, and a loudspeaker is connected to the filters output. The receiver is adjusted to provide a broad spectrum of random noise, ie a fairly constant "hiss" or "roar" which can be obtained by tuning the receiver to a clear frequency or by simply unplugging its antenna and turning all the gain controls, including af, to maximum. The by-pass switch (S1) is set to bring the filter into operation, and with every one of the 10 sliders in the notch position and RV1 at mid-travel a low output level should result.

The first slider (section 1, 440Hz) is now advanced to the peak position, and if all is working properly the filter will deliver a significantly higher noise level. This noise will possess a distinct tonality or "pitch". The first slider is now returned to the notch position and the second slider advanced to peak. Once again, a distinct noise output is obtained but the "pitch" will appear noticeably higher due to the upward shift in resonant frequency. This process is repeated so that all 10 sections are sequentially "peaked" and, provided the noise pitch continues to rise in the expected manner, the filter may be considered ready for use.

Fig 5 presents a few examples of the response curves obtainable, and serves to illustrate the filter's versatility. The comb response, example g, is of little practical value, but if the receiver's calibrator tone is swept through the range 300Hz to 3kHz five distinct peaks accompanied by alternate notches should be clearly heard. This exercise provides an amusing demonstration of the filter's capabilities.

When using the filter to provide a narrow passband for cw reception, as in Fig 5 example (a), it should be remembered that not all present-day cw transmissions are free from chirp. Chirpy cw signals will sweep in and out of a narrow passband, thus making copy virtually impossible. The only solution to this problem will be to widen the passband as shown in example (b).

Refinements

Modern ssb receivers and transceivers are characterized by having an audio response curve which rolls-off fairly rapidly below 300Hz. There are two main reasons for this. First, the i.f. response of a transceiver will be tailored to provide maximum carrier rejection on transmit, and it is this passband shaping that results in a restricted lf response on receive. Second, the use of physically small "communications" loudspeakers, invariably housed in vented enclosures, produces considerable attenuation of the lower audio frequencies. In most cases, therefore, the 10-section design featuring a first filter resonance of 440Hz will prove adequate. However, readers who possess a receiver system which features extended lf response may wish to incorporate an additional section with a centre frequency of 230Hz. The values of C_L and C_X for this section are 1μF and 68nF respectively.

Components list

R1	820Ω	C1	220nF
R2, 23	68kΩ	C2, 4	1nF
R3-22, 26	2·7kΩ	C3	100nF
R24	18kΩ	C5	1μF tant elect 35V
R25	1·8kΩ	C6	220μF elect 25V
All 0·25W 5%		C7	10nF 1kV
RV1	10kΩ log	C8, 9	2,200μF elect 25V
RV2-11	10kΩ linear slider	C10, 11	10μF elect 25V
LED1	TIL209 (red)	C12, 13	10nF
BR1, 2	50 piV silicon bridge rectifiers	C_L, C_X	see Table 1 and text
S1, 3	DPDT toggle	IC1-IC11	741
S2	DPST mains	IC12	LM380N 14 dil
F1	1A anti-surge	IC13	7812 regulator
T1	240V primary, 0-12V, 0-12V secondaries 250mA	IC14	7912 regulator

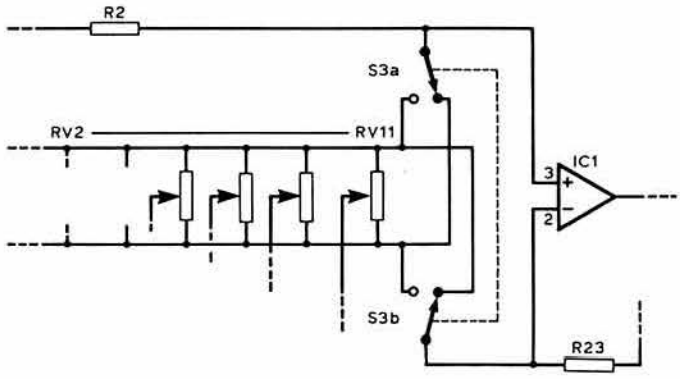


Fig 6. Circuit modifications to incorporate S3

A valid criticism of the basic design is that the need to manipulate 10 entirely separate slider potentiometers can, at times, make operation of the filter a rather tiresome process. The problem is largely overcome by the addition of a single switch (see Fig 6 for circuit modifications) that enables the amplitude response to be inverted. S3, if incorporated, may therefore be employed to instantly convert a given bandpass response into a band-stop (notch) characteristic. Furthermore, a low-pass response may be transformed, by simply flicking S3, into a complementary high-pass response. In order to avoid confusion, S3 must be clearly labelled NORMAL and INVERT.

Finally, constructors may wish to add a second output socket specifically for headphones. If modern low impedance headphones are to be used, a fixed resistor of around 150Ω should be wired in series with this socket to attenuate the filter's output, thereby reducing the effect of background noise generated primarily by IC1. While considering the noise generated by IC1, constructors may note that it is worthwhile selecting the lowest-noise 741 from those purchased and to use it as IC1. The remaining ics, to be used in the gyrators, will not contribute significant noise.

Conclusion

Whether used in conjunction with a simple direct-conversion receiver or a highly-sophisticated multimode transceiver, the filter described will more often than not provide a valuable improvement in the readability of weak cw signals. It will also enable the operator to remove annoying heterodynes and other "hash" from telephony transmissions.

As the process of separating wanted from unwanted information is also a major function of the human brain, the filter can be said to be working in harmony with the operator's sensory and "processing" systems. In future, however, automation will play an ever-increasing role in information processing. The morse decoder, whether built around committed logic or microprocessor based, is a perfect example of what technology holds in store. It must be remembered, however, that these machines, still in their infancy, are almost totally incapable of isolating the wanted signal from other transmissions and interference. Not surprisingly, the use of an audio filter ahead of such decoders will often make a critical difference and so enable the system to function correctly, rather than outputting gibberish.

Bibliography

[1] "Simple active filters for equalizers", D. W. Protheroe, BSc, *Wireless World* September 1980, pp 77-8.

[2] "Audio filters as an aid to reception—with special reference to the Datong frequency agile audio filter Model FL1", D. A. Tong, BSc, PhD, G4GMQ, *Rad Com* February 1978, pp 114-8. □

NEW PRODUCTS

Vorta portable mast

The Vorta Topmast is suitable for vehicle, wall or guyed mounting, can be erected by one person, and can be transported inside most vehicles. Price range upwards from £31.06 for a type 4-3.

Model	Mast length Metres	Feet	Necessary sections	Diameter sections	Weight (kg)
4-3	4	13·12	3×1·33m	28-32-36	1·700
6-3	6	18·91	3×2m	28-32-36	1·450
8-4	8	26·25	4×2m	32-36-40-44	4·000
12-6	12	39·37	6×2m	32-36-40-44-48-5-2	6·500
5-3	5	16·40	3+2m	32-36	2·010
6-4	6	19·69	4×1·5m	28-32-36-40	2·850
6-3R	6	19·69	3×2m	36-40-44	3·000
6-2	6	19·69	2×3m	36-40	2·800

Top sections supplied with sealing cap. All specifications are as accurate as possible.

Further information from Vorta Systems (UK), 297-299 High Street, Cheltenham, Gloucestershire GL50 3HS. Tel 0242 511511.

Thandar TG102 function generator

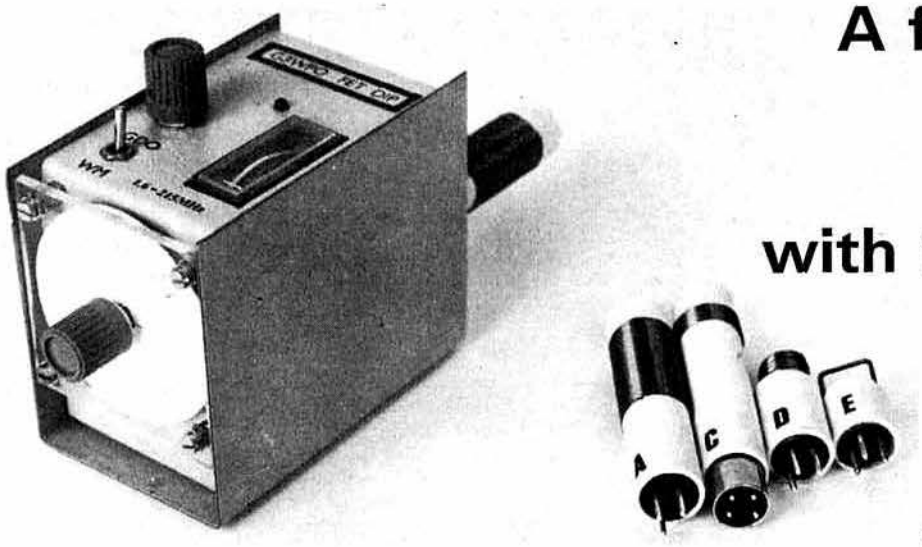
The TG102 function generator is the latest product complementing the Thandar range of test instruments. It is mains operated and has a frequency range of <0·2Hz to 2MHz producing sine, square and triangle waveforms plus dc from a variable amplitude 50Ω output. TTL output is also provided. External sweep facility is available enabling >1,000:1 frequency change within a selected range. The TG102 is housed in the proven Thandar case which combines ruggedness and portability.

The Thandar TG102 function generator

The TG102 is designed and manufactured in England complete with mains lead and one-year warranty and costs £145 plus VAT. Further information from Sinclair Electronics Ltd, London Road, St Ives, Huntingdon, Cambs. Tel (0480) 64646.

A fet dip oscillator for 1·6–215MHz with tone dip feature

by A.L. BAILEY, G3WPO*



The assembled unit with coils

Introduction

The dip oscillator is an essential piece of test equipment for any radio amateur involved in rf-orientated construction, and will help to meet the requirements of the amateur licence concerning measuring equipment. The instrument to be described covers 1·6 to 215MHz in five ranges, and in addition to the standard meter indication of energy absorption, also features an audio oscillator whose frequency is lowered during resonance. This assists in locating the dip when rapidly tuning across the instrument's coverage. All of the rf circuitry is accommodated on one pcb, thus making the design reproducible.

Over 30 of these have been built as a Worthing & District Amateur Radio Club project.

Circuit description

The rf oscillator is based on a fet Kalitron oscillator, identical to that used by G3HBW for his vhf/uhf gdo, but with component modifications for operation at hf. A large number of different oscillators were tried for this application, and this circuit offers the most consistent output and wide range, without resort to tapped coils, feedback arrangements or similar complications.

The tuning capacitor is always the problem area In a dip oscillator design, and it is currently very difficult to find a suitable off-the-shelf component, as those who have tried to construct some existing designs will have found. Also, the construction of the rf circuitry directly around the capacitor terminals is not conducive to uniformity between constructors. A capacitor was required which could easily be attached to a pcb, and, without too much hope of success, a plastic-type variable capacitor (polyvaricon) of the type invariably seen in Japanese transistor radios was tried—the likely problem area being the loss of Q inherent in the capacitor's construction. To the author's surprise the circuit did function, and with a few rearrangements to the pcb layout, and improvement of the stator earthing arrangements, the existing design was arrived at.

The overall circuit Q is lower than would be achieved with an air dielectric capacitor, but the dip obtained is adequate, and in conjunction with the audio oscillator, easy to find when tuning. The balanced configuration of the oscillator is retained on the pcb, athough a little offset by the tuning capacitor's internal construction.

The two rf chokes (L2,3) exhibit no strong self-resonances within the scale coverage, aided by damping with R4,5. It is possible to extend the vhf

*9 Alberta Walk, Worthing, West Sussex BN13 2SG.

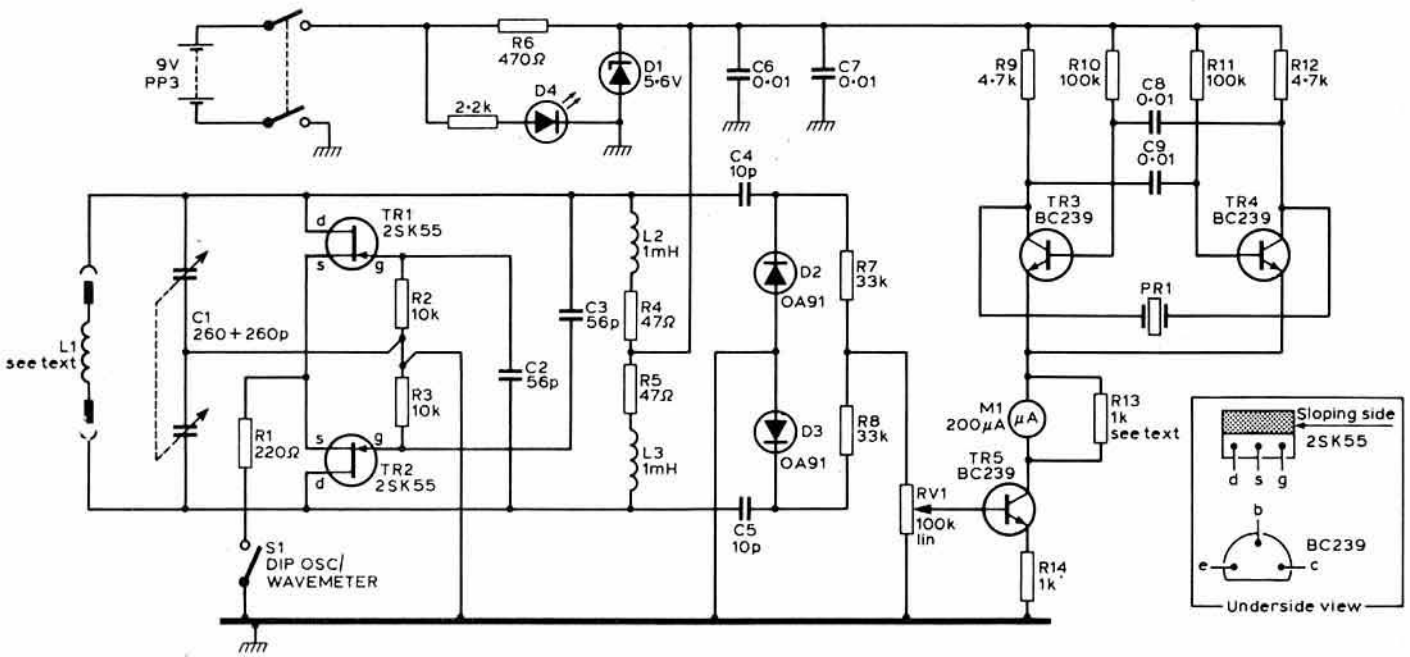


Fig 1. Circuit diagram

coverage by lowering the value of L2,3 and the coupling capacitors, but the oscillator will refuse to function on the lowest band, and the LC ratio at vhf is too high for sustained oscillation across all of the tuning capacitor's swing. However, as the oscillator was primarily intended to be for hf use, with the two common vhf bands covered, the existing circuit was thought to be adequate.

Removal of power to the rf oscillator only, allows use as a wavemeter, in which case resonance is indicated by the meter reading, and by the audio oscillator commencing oscillation—the pitch being highest at resonance. The instrument is powered by a 9V PP3 battery, stabilized at 5·6V by D1, allowing battery usage down to about 6V. Current consumption is around 7mA.

RF from the oscillator is rectified by D2,3; both being point-contact germanium diodes (OA91) dc isolated by C4,5. RV1 functions as a sensitivity control for the meter driver TR5. The output from the oscillator is reasonably constant over each band, dropping gradually as the frequency is increased, until the highest band is reached—when the output drops noticeably—but is easily recovered by the sensitivity control.

Audio output is by a simple multivibrator (TR3,4) with a piezo-ceramic resonator connected between the two collectors. These resonators are small, inexpensive and provide a good level of sound for very little drive. The total current flowing through the circuit, and thus the frequency of audio oscillation, is controlled by TR5 and varies with the rectified voltage to RV1. The multivibrator will commence oscillation at about mid-scale reading of M1, with a gentle oscillation at about full-scale reading. R13 can be added to intensify the audio output but the sensitivity will be decreased as the value of R13 increases.

Coil formers

Several types of coil former construction were tried, including battery plugs, speaker plugs and more complicated arrangements. The final choice was three-pin DIN plugs (only two pins are actually used), with the former itself made from plastic electrical conduit tubing which can be Araldited to the plug; the shroud and plastic surround not being used. The plugs should be of the silverplated type. The conduit specified is widely available from electrical stockists, and is not expensive—a damaged length sufficient to make the formers could probably be scrounged from a contractor.

The lower range coils are wound directly on to the formers, but the two high ranges are air wound, with the former used as a protective handling shroud over the lower ends of the coils.

Construction

The pcb (Figs 2,3) accommodates the rf circuitry and all remaining components, except for the external controls, meter and ceramic resonator which are mounted directly on the chassis. It is important that the pcb is copied exactly if the instrument's coverage is to be the same as the original and will allow the precalibrated dial to be used. Photographic reproduction is best, otherwise careful drawing by hand using a fine pcb marking pen will suffice. Alternatively, a ready-screened, drilled glass-fibre pcb is available, together with all other components, including metalwork and the coil formers.

Construction is best started with the pcb itself, as the instrument's general operation can be checked after assembly and then built into the case. All leads of components mounted on the pcb must be kept as short as possible around the rf oscillator section, with not more than 3mm of the fet (TR1,2) leads above the pcb surface. All components except for the tuning capacitor mount on the non-track side of the pcb.

1. Insert and solder the connection pins. Those marked "X" being inserted from the foil side, and the four marked "Y" from the non-foil side so that the polyvaricon stator lead earthing straps can be soldered to them. Push all of the pins hard home with a suitable tool before soldering.

2. Insert and solder all fixed resistors, mounting horizontally or vertically as indicated by Fig 4. Vertical resistors should be inserted with the body-end resting against the pcb upper surface in the same positions as indicated.

3. Insert and solder the fixed capacitors, keeping the leads as short as possible for C2,3,4,5. Mylar capacitors are green.

4. Insert and solder D2,3, taking care when bending the leads so as not to break the glass encapsulation.

5. Insert and solder D1 (mounted vertically).

6. Insert and solder L2,3.

7. Insert and solder TR1,2,3,4,5 with TR1,2 leads 3mm above the pcb surface.

8. Solder in the two links, using insulated wire.

9. Insert the polyvaricon capacitor from the foil side of the pcb with the five leads through the appropriate holes (spindle first). Ensure it is flat

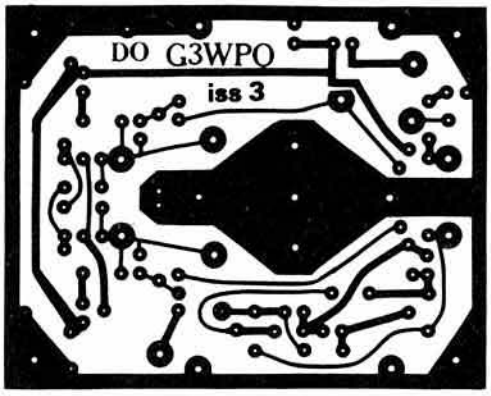


Fig 2. PCB

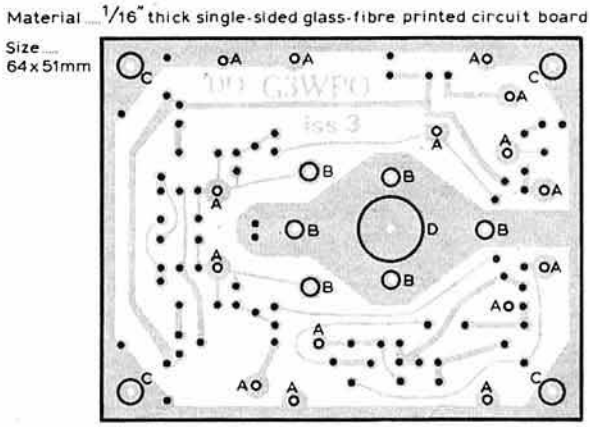


Fig 3. PCB drilling details

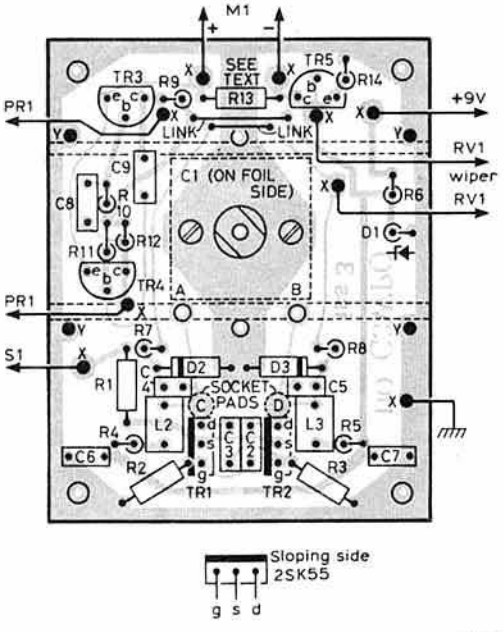


Fig 4. Component layout

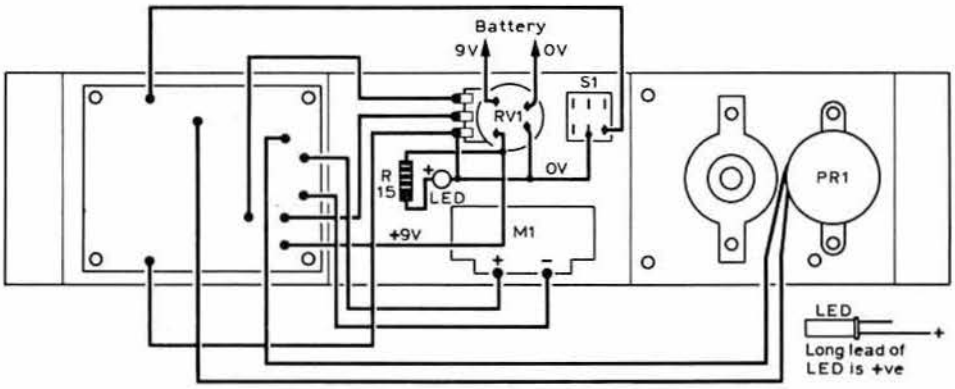


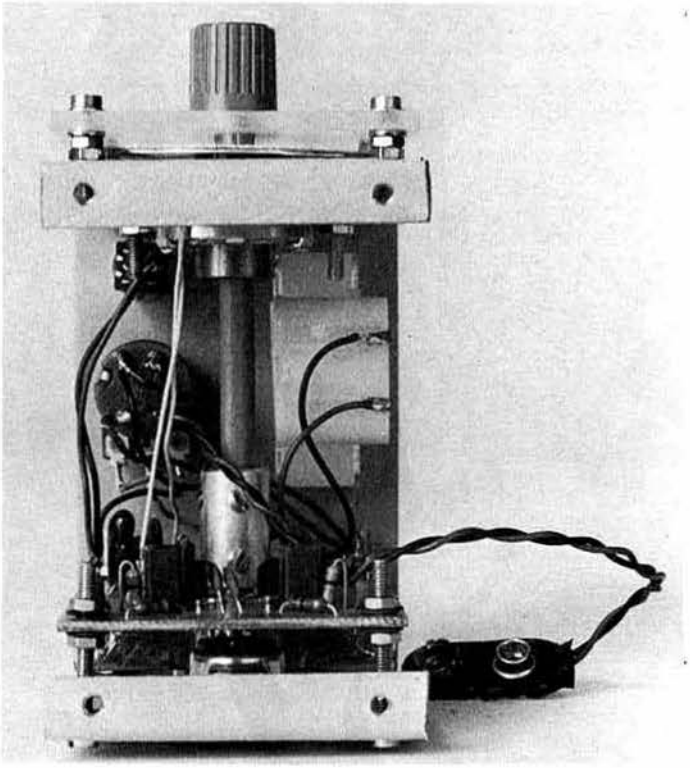
Fig 5. Wiring diagram

against the pcb, and solder the two rotor leads (A and B) to the pcb, taking care not to melt the capacitor body.

10. Prepare the two stator earthing straps from single-sided pcb material, and tin with a hot iron across the copper surface. Both straps mount with the tinned surface against the inside of the connection pins (relative to the polyvaricon) and with the strap between the stator lead and the polyvaricon body. Solder the straps to the pins first, with the lower edge of the strap just clear of the pcb to avoid shorts. Then solder the straps to the stator leads, and finally the stator leads to the pcb proper. Cut off the excess leads close to the pcb on the component side.

On the top of the polyvaricon are four short leads which are connected to the four internal trimmers. These should be cut off close to the plastic body, and the trimmers set to minimum capacitance (vanes open) with a small screwdriver. Also, if the kit of components is used, two small screws are supplied to attach the polyvaricon to the pcb via the mounting holes on the pcb. Carefully tighten these up. UNDER NO CIRCUMSTANCES use any other screws, such as the two 8BA ones for the piezo-ceramic resonator mounting which are too long and will damage the vanes of the polyvaricon beyond repair.

11. DOUBLE CHECK the pcb for solder bridges and component positioning.



Underside view

Checking operation

In order to check the operation, coil C is required and should be made as described under "Coil construction".

First, clip off half the length of each of the DIN socket connections, and entirely remove the lug (if any) protruding from the surrounding metal cover. Solder temporarily to pads C and D on the foil side of the pcb.

Temporarily connect the meter (Fig 5), sensitivity control, switch, piezo sounder and battery. If possible check that the current consumption is around 7mA and that the voltage at D1 is approximately 5·6V. With no coil inserted, the rf section will self-oscillate at around 20MHz, but this does not affect the operation once the coil is inserted. Insert the coil, set the sensitivity control to read about seven-eighths fsd on the meter; the audio oscillator should then be oscillating. If the audio oscillator does not function, either there is a fault in that part of the circuit, or the rf oscillator is not working (in which case the meter will not read). The multivibrator and meter drive circuit can be checked by temporarily connecting a 10kΩ resistor between +V and the non-earthy side of the sensitivity control. The audio output should commence at around mid-scale reading and increase in pitch as the sensitivity is increased. Check also that the oscillator functions over the total tuning capacitor range and that the audio/meter readings vary smoothly.

To check the dip, either construct coil A, which has a self-resonance around 40MHz, or use another inductor/capacitor combination whose frequency is within coil C's range.

Once all is working, the wavemeter function can be checked if required, although there is very little chance of this not functioning if the previous checks have been satisfactory. In use as a wavemeter, the supply to the oscillator is removed, and the detected rf will drive the meter/audio with a peak in both as resonance is reached. Turn the sensitivity control fully clockwise for this and then adjust as required.

Components list

R1	220Ω	**D1**	5·6V 400mW Zener diode
R2,3	10kΩ	**D2,3**	OA91
R4,5	47Ω	**D4**	3mm red dome LED
R6	470Ω	**TR1,2**	2SK55
R7,8	33kΩ	**TR3,4,5**	BC237/8/9
R9,12	4·7kΩ	**M1**	200μA type 909
R10,11	100kΩ	**PR1**	Piezo resonator Toko type PB2720
R13,14	1kΩ		
R15	2·2kΩ		

All resistors are 0·25W 5% carbon film.

RV1	100kΩ linear Alps potentiometer with on/off switch
C1	2 × 266pF polyvaricon Toko type 2A2QST7
C2,3	56pF ceramic plaquette
C4,5	10pF ceramic plaquette
C6,7	0·01μF ceramic disc
C8,9	0·01μF mylar
L2,3	1mH choke Toko type 7BA
Slow motion drive	Jackson epicyclic 6:1
S1	SPCO miniature toggle switch
Spindle coupler	RS type 509–793
Wire	Insulated 1·25, ·56 and ·25mm dia (enamelled copper)

18 and 22swg aluminium sheet, 2/3mm perspex sheet, 6 and 8BA nuts and bolts. PP3 battery connector. Two knobs. PP3 battery.

Toko and Alps components, and the meter, are obtainable from Ambit International, as is a complete set of components, together with drilled screened pcb, coil formers and the metalwork. Please enclose an sae with all enquiries.

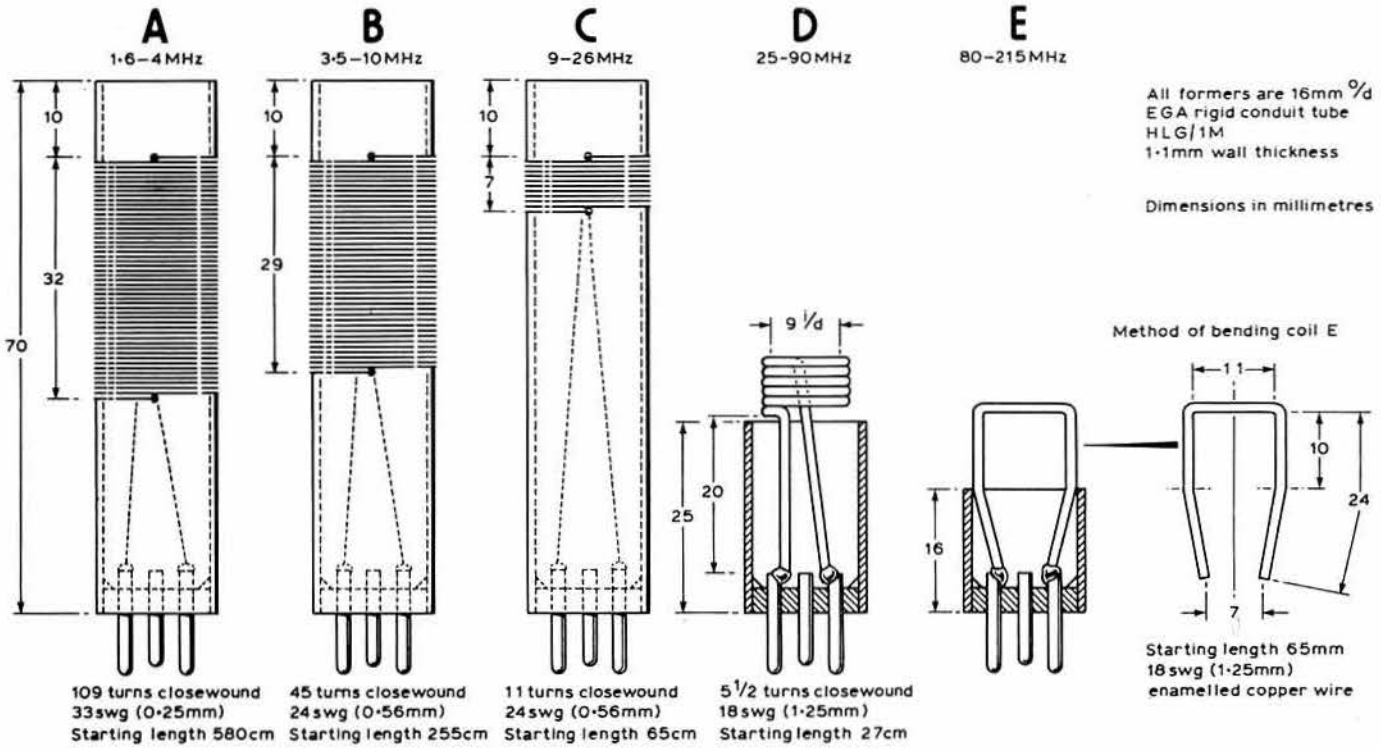


Fig 6. Coil construction

Coil construction

Again, it is important that the constructional details are followed if the precalibrated scale is to be used. Referring to Fig 6, cut the coil formers to the lengths indicated and drill two holes in each of the long formers in the positions indicated, using a 1mm (or near) diameter drill. Take the length of wire indicated, feed through the lower hole from the outside of the former, and out through the bottom, leaving 20mm protruding from the former. Close-wind the number of turns stated towards the other hole, then feed through the hole and out of the bottom of the former again. Secure the windings in place with a tiny drop of cyanoacrylate or Araldite at each hole and around the last turn at each end of the winding. Reduce the two ends of the wire to 10mm in length and strip 3mm of insulation off each. Tin and solder to the DIN plug connections. Prepare and smear a good layer of Araldite (rapid if available) around the lower inside edge of the former to about 3–5mm depth and carefully insert the plug, pushing the wire back into the former. Make sure the plug is at right angles to the former all the way round, and leave to set hard.

The two upper range coils are air wound. Coil D should be wound round a 0·375in diameter drill or other suitable former, the lower lead bent at right-angles to the main winding, and the upper lead bent into the centre of the winding and cut off at the centre. Strip a few millimetres of insulation from the upper lead and solder a straight piece of wire of the same gauge to this running down from the centre of the coil. Cut the two leads to 20mm in length, measuring from the lower side of the bottom turn. Solder to the plug connections, with the lower ends of the wires resting against the plastic of the plug former. Prepare the shroud, slide over the coil from the plug end, and Araldite into place.

Coil E is made as shown in the drawing, and the shroud fitted in a similar manner to coil D, with the wire ends again resting against the plastic of the plug former. Some form of protection should be offered to the coils when not in use.

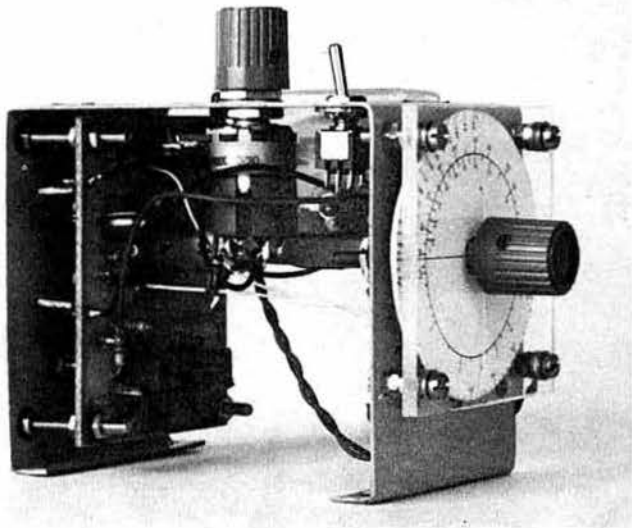
The case

The design of the case is somewhat dictated by the physical construction of the polyvaricon, and requires that the tuning scale be at the rear end of the instrument if a reasonably-sized scale is to be used. This is a slight disadvantage over a conventional design but one soon becomes adjusted to it after practice.

A slow-motion drive is provided to which the tuning scale is affixed, with the drive coupled to the capacitor by a short 0·25in spindle and aluminium coupling. The piezo resonator is fixed to the rear panel, with the controls, meter and an indicating on/off l.e.d. to the top panel.

A simple two-part case construction is utilized, and, bearing in mind that many people have difficulties in bending covers to fit neatly (the author is no exception), the cover is made first, and the main chassis cut to fit it; all measurements are made from a centre line, thus guaranteeing a good fit. The prototype was made from vinyl-coated steel plate, which happened to be to hand, and is very durable, but 18swg aluminium sheet is perfectly suitable, and the drawings accommodate either. The bending is easily accomplished with a vice and two pieces of 1–2in section steel angle iron, or by any other method used by the constructor.

Start by cutting, marking and drilling the cover, then clamp the centre panel exactly on the bending line and bend at 90°. Turn round and repeat with the other side. Make sure the two sides are parallel, and measure the inside dimension accurately. Now mark out the main chassis panel, using the dimension just obtained for the short side. Accurately mark a centre line down the panel length, and mark the rest of the panel out. Centre punch and pilot drill all holes, then enlarge to the correct sizes. The meter cut-out should be filed until the meter is a good fit.



Left front-angle view

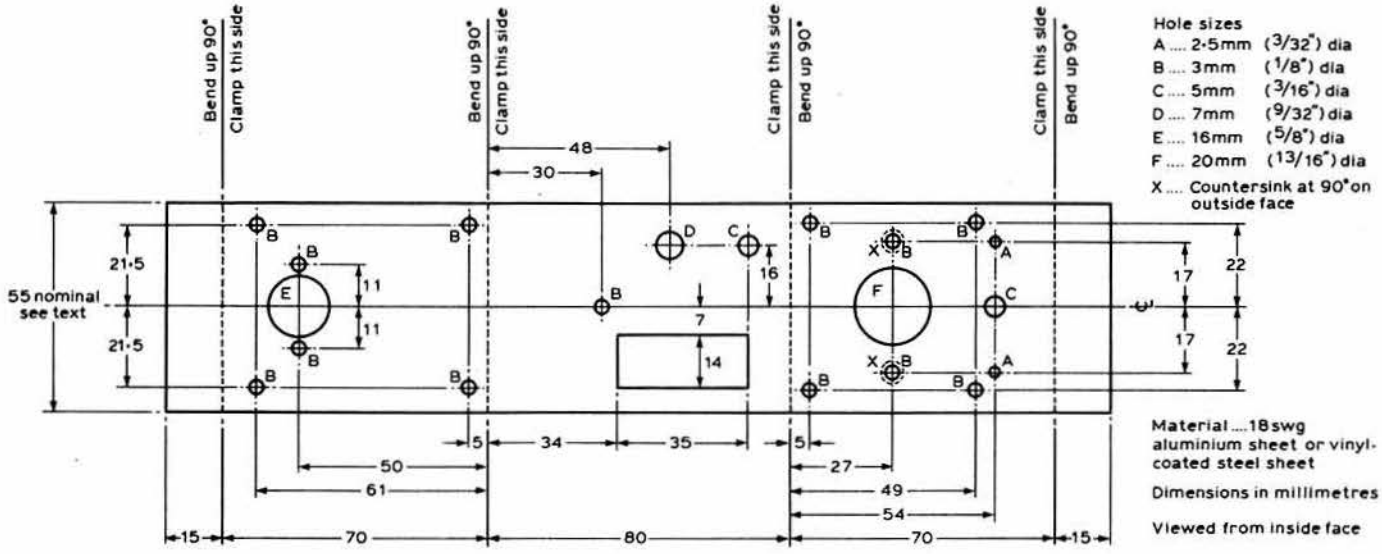


Fig 7. Chassis plan

Now bend the chassis, in the same manner as the cover, first clamping the centre panel bending lines in turn for the first two bends, followed by clamping the back and front panels to bend the two end flanges. It will probably be necessary to file the edges of the flanges on the outside to ensure that the chassis fits neatly into the cover at the bends. Position the front of the chassis 2mm in from the front of the cover and mark the centre of the four fixing holes for self-tapping screws on to the two flanges, and punch and drill these.

If aluminium has been used, clean up with wire wool or liquid scouring cream. The chassis and cover can be primed and spray painted as desired, or simply covered with Contact or Fablon type materials which have the advantage of being easily replaced, as the cover will tend to be chipped during use on the bench.

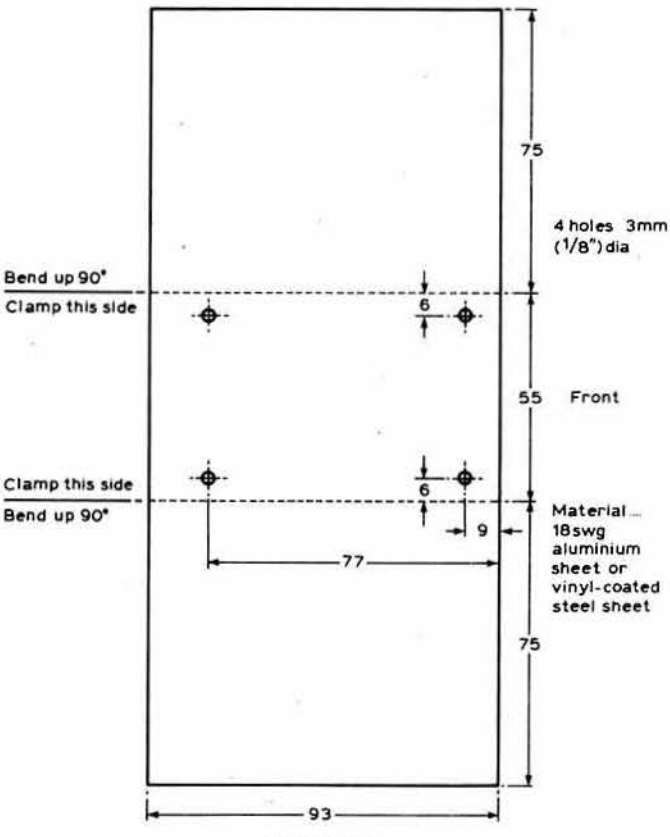


Fig 8. Cover

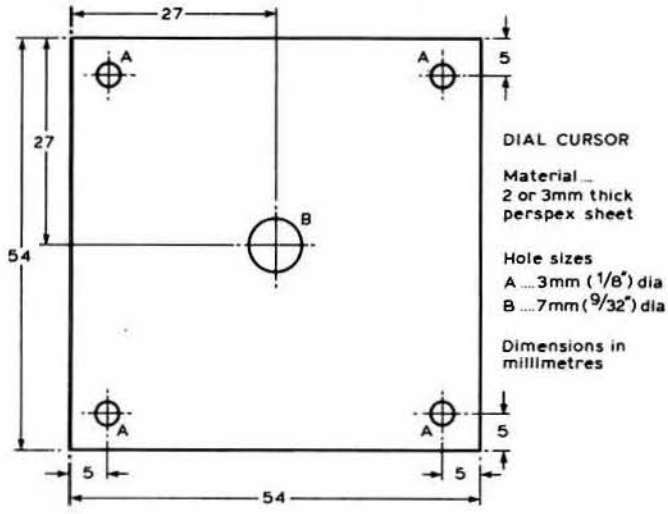
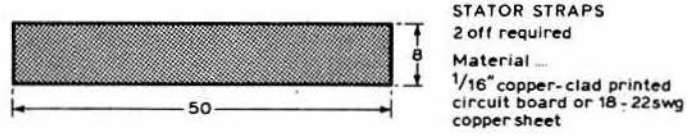


Fig 9. Dial cursor



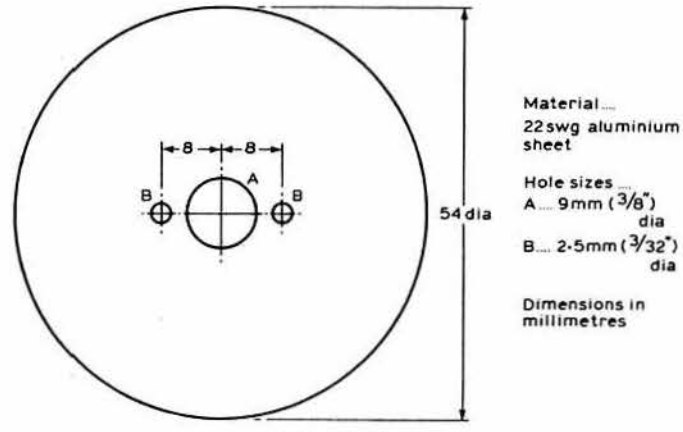
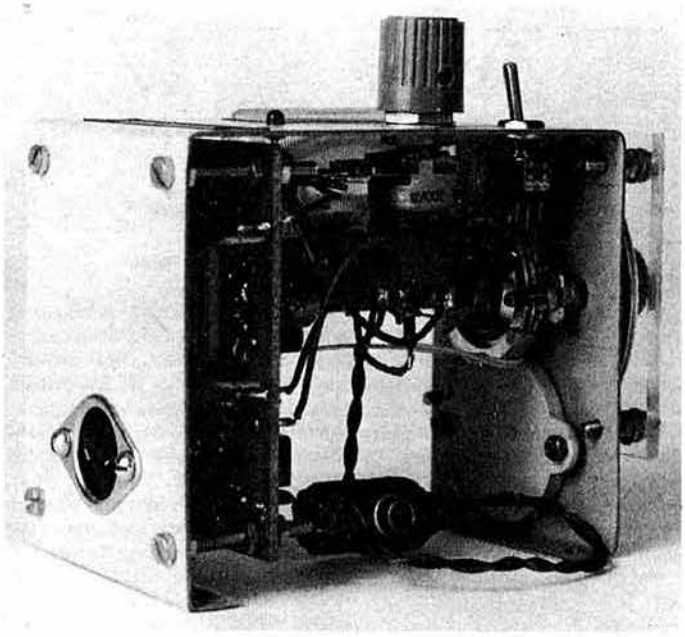


Fig 10. Dial plate



Right rear-angle view

Assembly of instrument

It is suggested that the following order of assembly is followed:

1. Bolt the DIN socket into place on the front panel (with leads clipped as previously indicated).

2. Fix the 4×25mm 6BA bolts on to the front panel with a lockwasher and nut each, and screw one nut on to each. Mount the pcb on to the bolts and slowly screw down each nut until the DIN socket leads are just touching the two connection pads on the rear of the pcb. Check that the pcb is parallel with the front panel on all sides, solder the socket leads to the pads by inserting a soldering iron carefully through the gap, and finally fix the pcb into place using additional lockwashers and nuts.

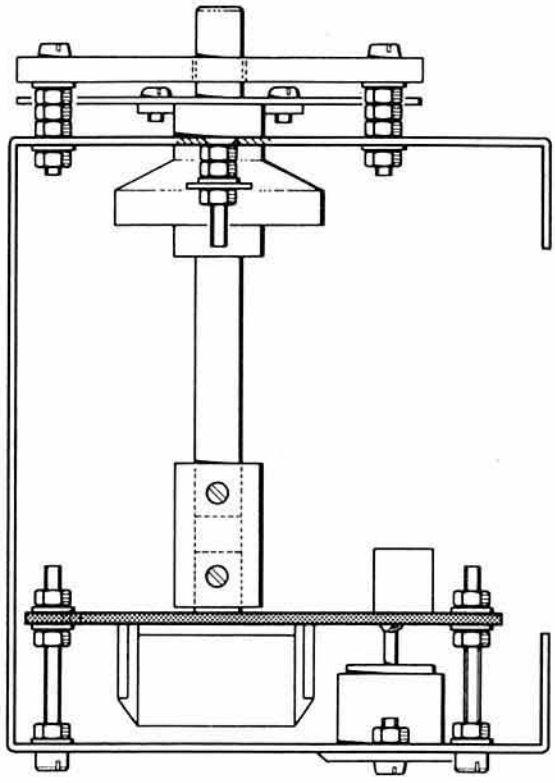
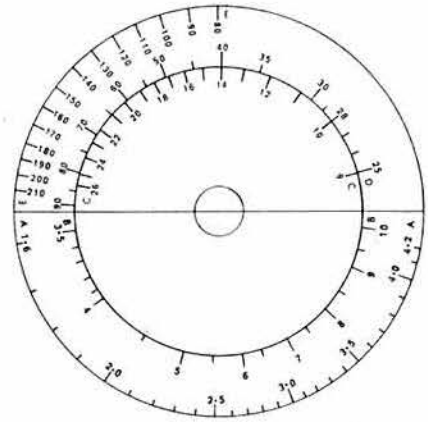


Fig 11. Mechanical detail of case and drive

The precalibrated dial



3. Reduce the potentiometer spindle to 10mm in length and mount with tags facing the front panel.

4. Fix toggle switch into place.

5. Mount meter into position with the tags facing the outside edge of the chassis, using a couple of small spots of Araldite or cyanoacrylate adhesive on the face of the meter side flanges.

6. Mount the piezo resonator using 8BA nuts and bolts (countersunk) with an extra nut and a plain washer between each flange and chassis to prevent the flange breaking when tightened.

7. Insert two 12mm 6BA countersunk bolts through the slow-motion drive mounting holes, with a shakeproof washer and two 6BA nuts on the inside of each. Reduce the shaft of the slow-motion drive to 15mm in length and mount into place with nuts and washers.

8. Cut the extension spindle to length (38mm), using any suitable material (a spindle from a potentiometer could be used), place the coupler on the polyvaricon and insert the extension spindle into the coupler and slow-motion drive. It may be necessary to slightly flex out the chassis ends to achieve this. Tighten up and make sure the two chassis end plates are parallel.

9. Prepare the dial and the perspex cursor. Perspex can be cut with an ordinary hacksaw, but be careful not to saw in jerky motions. When drilling, start with a small drill and slowly work up to the correct diameter, using a fast drill speed and moderate pressure. The cursor can be polished with metal polish if required. Scribe a fine line through the centre for a pointer.

10. If using the precalibrated dial, carefully cut out the scale from the page and glue to the aluminium dial plate, the exact orientation with respect to the fixing holes being unimportant at this stage. Fix the dial into place with two screws on the slow-motion drive. (If a drive with flange is unobtainable, the scale can be fixed to the front face of the drive with adhesive, after cleaning off the lubricating grease which will be on the face.)

11. Fix the cursor into place with 6BA nuts and bolts as indicated in the drawing, with the pointer line upright. Do not overtighten the bolts.

12. The internal wiring can now be completed, following Fig 5. The only point to note is that the wires should avoid the tuning capacitor shaft. The leads on the battery connector are a little short to allow easy removal of the cover with the battery in place, and can usefully be extended by about 30mm (either extend the wires and insulate, or remake the connector with new leads after slitting the plastic cover open).

13. The battery should be fixed in place on the bottom cover (using double-sided adhesive tape, or a small aluminium clip if preferred) approximately in the centre, long side facing the open end of the cover, avoiding the slow-motion drive and tuning capacitor shaft.

14. The only remaining work is to orientate the dial to a known calibration marker. This can be done by first finding the gdo signal on a receiver—preferably towards the higher end of the ranges. Then release the grub screws holding the shaft to the slow-motion drive, and while holding the shaft turn the dial until the desired calibration point lines up with the cursor. Retighten the grub screws.

REVERSE SIDE
OF
PRECALIBRATED
DIAL

The frequency coverage should be verified at the extreme ends of each range, using a frequency counter coupled to the coil, or a general coverage receiver. As long as the coverage is correct at each end the remainder of the scale should be correct. Note that coil E does not oscillate over the full swing of the tuning capacitor, but the non-oscillating section is overlapped by coil D. In the event of an unacceptable discrepancy, check that the coils have been wound correctly. In the unlikely event that there is an unacceptable calibration error, a new scale will have to be made and calibrated by hand.

Use of the instrument

The most accurate frequency indication will be with the coil coupled to the circuit under test; maximum coupling being obtained if the axis of the oscillator coil is at right angles to the direction of current flow. The distance between the two coils should be adjusted for the minimum dip detectable with certainty for the greatest accuracy. Overcoupling will produce a spectacular dip but an inaccurate one.

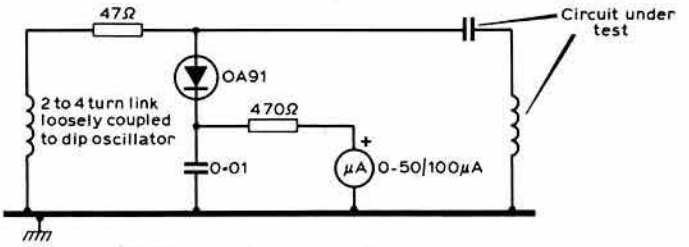


Fig 12. Measuring resonant frequency of a toroid

With power to the dip oscillator removed by S1, a sensitive wavemeter is obtained which will indicate the frequency of a transmitter or oscillator. It can also show the presence of harmonics with a transmitter. Other uses are for the measurement of inductance and capacitance (see [2] for details) and resonant frequency of antennas, since these are also tuned circuits.

The instrument will also double as a rudimentary signal generator, with the advantage that the rf output is modulated at the frequency of the audio oscillator, enabling easy location on a receiver.

One type of inductor/capacitance combination which cannot readily be dipped with an instrument such as this is that using a toroid core. One method of carrying out such a measurement is to use the dip oscillator as a signal generator, loosely coupled to a detecting circuit, via a 2–4-turn link coil. Fig 12 shows the circuit, and resonance is indicated by the meter. Knowing the value of the capacitance, the inductance of the toroid winding can also be calculated if desired, allowing for circuit strays.

References and further reading

[1] "A vhf dip oscillator", A.L. Mynett, G3HBW. *Rad Com* September 1970.
[2] "The 'squeak box' or tone dip oscillator", P.W. Sollom, G3BGL. *Rad Com* March 1974.
[3] "Gate dip meter that really dips", W3WLX. *Ham Radio*, June 1977.
[4] *Test Equipment for the Radio Amateur* (2nd edn). RSGB, pp3.9–3.19. □

The effects of preamplifiers on receiver performance, and a review of some currently available 144MHz preamplifiers

by J. N. GANNAWAY, DPhil, G3YGF*

PART 1

Introduction

At first sight the use of a low-noise preamplifier would appear to be a straightforward way of improving the performance of a poor receiver, but in reality it is not so simple. While a preamplifier can improve some aspects of the performance of a poor receiver it inevitably degrades others. If used with understanding, these adverse effects can be minimized and a worthwhile improvement obtained, but when used without this understanding, the performance of even a good receiver can be unnecessarily degraded. In this two-part article, the overall objective is to describe how a preamplifier can be used to best advantage.

The first part is intended to provide an adequate technical background to the design and use of preamplifiers. It is concerned with the characteristics of a receiver that are likely to be affected by the use of a preamplifier, and the aspects of the preamplifier's performance that will be relevant when it is used as part of an overall receiving system. Although the discussion concentrates on 144MHz, the basic principles described are equally valid at other frequencies.

The second part of the article consists of a technical review of a number of 144MHz preamplifiers which are currently available in the UK, either as kits or ready assembled and tested. In both cases the noise figure obtained will depend on the method used to align the input matching circuitry, and results of using several methods are compared. It is hoped that the article will provide both the understanding required to use a preamplifier to best effect, and also the means to assess the suitability of those currently available.

Technical background

Many receivers have a poor performance which is due to basic design faults such as excessive gain before the mixer and filter, or the use of inefficient circuitry such as low gain or high-noise-figure transistors and mixers. Ideally the solution would be to rebuild the first stage or stages using improved techniques and the devices that are currently used in preamplifiers, and then the overall performance could be improved without any compromises. However, this is often not considered practical, and the use of a separate low-noise preamplifier becomes an attractive alternative.

The advantages of a preamplifier can be summarized as follows:

(a) The receiver sensitivity can be improved, as the overall noise figure of the receiver/preamplifier combination can be made close to that of the preamplifier itself, given sufficient gain in the preamplifier.

(b) If the preamplifier has a narrow passband, it can improve the receiver's performance by attenuating out-of-band signals and reducing any overloading effects that they may cause in the receiver. It can also improve the rejection of spurious responses such as the image, or i.f. breakthrough.

(c) A preamplifier mounted at the antenna can effectively eliminate the effects of feeder losses on the noise figure.

(d) All these benefits can be obtained with little or no modification to the receiver.

*Dept of Engineering Science, Parks Road, Oxford

Unfortunately there is a very real price to be paid for these advantages. The sensitivity is only improved if the preamplifier has significant gain. This extra gain decreases the capacity of the receiver to tolerate strong signals, and so the receiver/preamplifier combination will show overload effects on signals that would not have caused any problems on the bare receiver. The optimum performance is obtained by making a compromise between the overall noise figure and the strong signal performance that is required in the light of conditions on 144MHz, and choosing the preamplifier gain accordingly.

Main receiver characteristics

There are many important characteristics of a receiver, but only those relevant to the use of preamplifiers will be considered.

Receiver sensitivity

This is usually determined by the noise generated in the first few stages of the receiver. It is normally specified by giving the equivalent value of the noise power at the receiver input. This can be done in a variety of ways, and four of the more commonly used ones are shown in Fig 1 for comparison.

Noise power in 2·5kHz bandwidth: RMS Voltage across a 50Ω load	dB relative to 1mW (dBm)	Noise figure (dB)	Noise temperature (degrees Absolute, K)
220nV	−120dBm	20dB	29000K
70nV	−130dBm	10dB	2900K
22nV	−140dBm	3dB	290K
7nV	−150dBm	0·41dB	29K
2·2nV	−160dBm	0·04dB	2·9K

Fig 1. Diagram comparing various methods of expressing receiver sensitivities

The number of microvolts across a 50Ω resistor or the number of decibels relative to one milliwatt (dBm) specify the absolute value of this noise power, and both depend on the receiver i.f. bandwidth used; a value of 2·5kHz is assumed for comparison purposes. A noise figure in decibels relates this noise power to the thermal noise level at room temperature (290K), and a noise temperature in degrees absolute (K) expresses the noise power as a temperature at which the thermal noise power would have the same value; both of these methods are independent of the receiver bandwidth. The equations relating them all are given in the appendix. It is convenient here to express noise figures in terms of decibels relative to 1mW, as well as the more familiar noise figure and temperature, as this method is also used to describe other signal levels which will need to be compared with the noise level.

As this noise level limits the weakest signals that can be heard, it is often referred to as the noise floor. The weakest readable signal is taken as one which is equal to this noise level, ie a signal-to-noise ratio of 0dB. For the example chosen, a noise figure of 8dB, this corresponds to a level of −133dBm in a 2·5kHz bandwidth.

All the conclusions on receiver and preamplifier performance are equally applicable to modes other than ssb and cw, but many of the other modes have non-linear detectors (eg, limiting in the case of fm) and, since this introduces unnecessary complications, examples have only been given for the case of ssb.

Strong signal performance

This is more difficult to characterize, particularly when the receiver has to handle a wide range of signal levels at various frequencies. The receiver's deficiencies can become apparent in many ways, but the main ones of interest are the third-order intermodulation products which are caused by two strong signals mixing together to produce spurious signals, eg $2f_1 - f_2$. Examples of this effect are seen when two closely-spaced in-band signals, such as those present in a single speech transmission, produce spurious signals near the transmission that make it appear wider than it actually is: eg if $f_1 = 144{\cdot}250$MHz, $f_2 = 144{\cdot}251$MHz, then $2f_1 - f2 = 144{\cdot}249$MHz and $2f_2 - f_1 = 144{\cdot}252$MHz. The main cause of non-linearity is usually the mixer stage, though the rf stages or the crystal filter can also contribute to the problem.

The effect of varying the level of two equally-strong signals present at a receiver or amplifier input is shown in Fig 2. As the levels of the two input signals are increased, the level of the spurious products increases at three times that rate. At some point the input signal and the equivalent level of the spurious signals at the input would be equal; the level of either of these

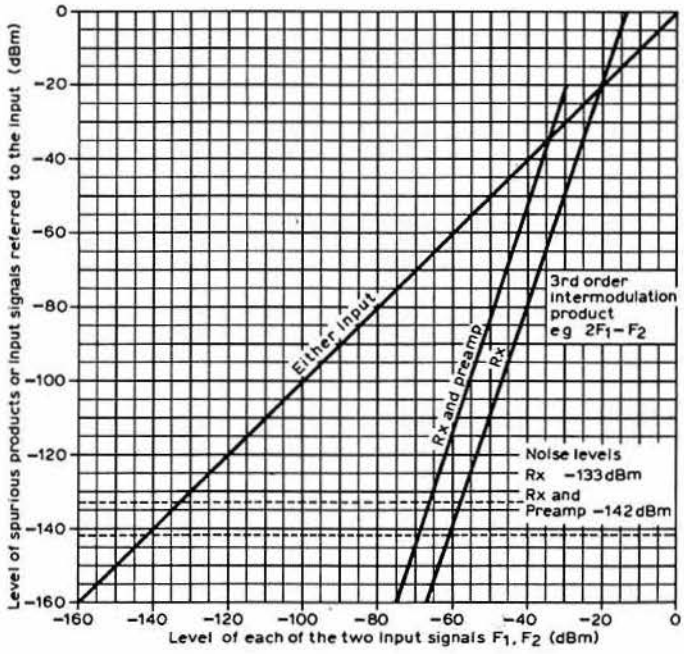


Fig 2. Graph showing how the strength of spurious third-order intermodulation products varies with input signal levels

signals at the input is then called the third-order intercept point, and is expressed in decibels to milliwatt. In the case of an amplifier it can be referred to either the input or the output, the values differing by the gain of the amplifier.

For amateur vhf receivers it is typically in the region −35 to −5dBm, though some receivers can be considerably worse. This level is only a mathematical concept, and will probably be quite a way above the actual signals that the equipment will handle; it is useful for predicting the level of spurious signals as the input signal level is varied.

Its value can be found by increasing the level of two equal in-band signals, say 100kHz apart, until the spurious product is just detectable, ie equal to the receiver noise level. The value of the intercept can then be calculated from the input signal (S) and receiver noise level (N), using the relation given.

$$\text{Third order intercept} = 0{\cdot}5\,(3 \times S - N) \quad \text{(all levels in dBm)}.$$

The prediction is only approximate, however, as the value of the intercept changes at much higher signal levels, ie near the 1dB compression point, and higher-order intermodulation products also become important —particularly when the system, such as a receiver, contains many non-linear components.

Spurious-free dynamic range (sfdr)

The spurious-free dynamic range can be expressed as the region between the noise floor and the strongest signal which produces intermodulation products that are just detectable, ie equal to the noise floor. Within this range a true picture of the signal will be seen as the receiver is tuned across it. Signals stronger than this upper limit will appear broader than they really are, and may generate other spurious products that could obliterate weak signals. Typical vhf receivers might have a spurious-free dynamic range of around 60–90dB in a 2·5kHz bandwidth.

The input level required to generate audible spurii in such receivers is surprisingly small, around 2nW for the example chosen, corresponding to −57dBm, or 300μV across 50Ω. It is easy to see why in some cases receiver overloading can be the cause of reports of a wide signal. If a receiver front-end has a fairly high third-order intercept point, eg an sfdr of 80–90dB, then other defects in the receiver can become apparent. For example, a local oscillator with bad noise sidebands can also have the effect of making the transmission appear wider by an effect known as reciprocal mixing, or the stop-band attenuation across the crystal filter may not be adequate.

1dB compression point

Another measurement that is used to describe amplifier and receiver performance is the 1dB gain compression point. This is the input signal for which the gain is reduced by 1dB from the small signal value, and is usually only a few decibels below the level that produces maximum possible output. Above this level the envelope of this signal will become

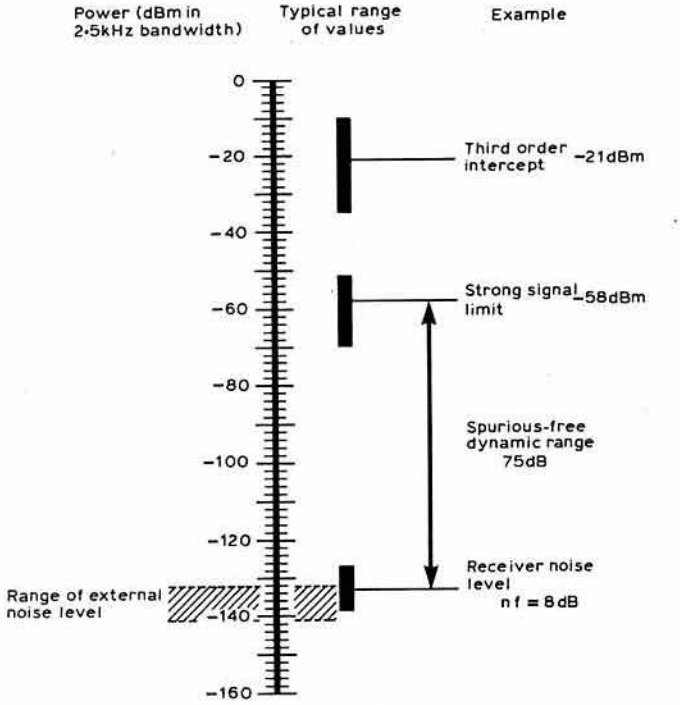


Fig 3. Diagram showing the signal levels present at a receiver input

clipped and badly distorted. This level corresponds to an output of about 0dBm from the preamplifiers tested, and with that level at their input most receivers will be very badly overloaded indeed.

Summary of receiver performance

The relative magnitudes of all the aforementioned signal levels are shown in Fig 3 for a typical receiver having a noise figure of 8dB and a third-order intercept of −21dBm. This sets the noise floor at −133dBm. The signal level that will generate spurii equal to the noise level can be found from Fig 2 to be −58dBm, so the spurious-free dynamic range in 2·5kHz is 75dB.

The overall performance can thus be described by giving the noise figure and either the third-order intercept, or sfdr and bandwidth. The third-order intercept is perhaps a more general method, but the sfdr is preferred, as a dynamic range in decibels is more directly meaningful. The bandwidth must be stated, however, as the value obtained depends on it, eg it will be 14dB (2,500/100) better in a 100Hz bandwidth, such as might be used for cw, since the noise power present is proportional to the bandwidth.

It is possible to estimate the strongest signals that the receiver might have to cope with. The signal from a 1W transmitter 1 mile away over a line-of-sight path using dipole antennas would be −45dBm; for a 100W transmitter it would be −25dBm, and if 10-element beams were used, pointing at each other, it could be −5dBm.

It is apparent by referring to Fig 3 that problems due to strong signal effects will be common in most receivers even if a preamplifier is not used. There is obviously much room for improvement in this aspect of receiver design, and it represents quite a severe challenge to the designer. Receivers are not alone in having these shortcomings, however, and similar effects will also occur in transmitters.

External noise sources

So far the receiver has only been considered as an isolated piece of equipment. When it is connected to an antenna it will be presented not only with a range of signals, but also some external noise sources. The three main sources of noise are:

(1) Manmade electrical interference. This is usually only intermittent, and so will not be considered, but in some circumstances it could be a serious limitation if it were continuous, such as noise sidebands from the many transmitters in urban areas.

(2) Thermal noise from the earth. This is a fairly constant source of noise which is radiated by the earth as it is at a temperature of 290K above absolute zero, corresponding to a noise figure of 3dB.

(3) Sky noise [1]. This is noise from the hot bodies and radio sources in space. It varies with frequency and direction in space, but with typical beamwidths used at 144MHz the equivalent temperature varies between about 200K and 1,200K, corresponding to noise figures of 2–7dB.

An antenna pointing horizontally will usually see noise contributions from the earth and from various parts of the sky as the antenna beam is scanned across the sky by the rotation of the earth. The resulting overall noise level at 144MHz corresponds to a noise figure varying between 3 and 8dB. This noise level is always present in any receiving system, and will limit the sensitivity however low the receiver noise figure may be.

Some of these external noise sources are fairly constant in amplitude, and can be useful for checking the performance of sensitive receiving systems with high-gain antennas by observing variations of the received noise level on the S-meter as the beam is rotated. The strongest source of noise is the galactic centre, which is visible as the Milky Way, and, since few antenna systems have any elevation capability, it can be found most easily as it rises and sets across the horizon. It should also be possible to see an increase of about 1dB when the antenna is pointed at the sun [4].

The effect of the background and receiver noise levels on the overall signal to noise ratio is shown in Fig 4. At lower frequencies the background noise level is very high [1], so higher noise figures are quite acceptable; at higher frequencies the background noise level is much lower, so it is worthwhile using much lower noise figure receivers.

It will be seen that there is very little to be gained by using a noise figure that is much below the background noise level. On 144MHz this sets the minimum overall noise figure required at about 2dB, as then for the short periods when the antenna is pointing at the quietest parts of the sky the signal-to-noise ratio would only be 2dB worse than that obtained if a perfect, noiseless receiver were used. For most of the time when the background noise level is higher, the difference will be much less, and so virtually inaudible.

It would obviously be preferable to have the lowest noise figure possible, but the sacrifice of the strong-signal performance will probably be a more important consideration.

Preamplifiers may also be used after mixers in uhf or microwave converters, and here the lowest possible noise figure will be desirable, as the external noise levels are much lower at these frequencies. However, the distribution of gain throughout the system must still be carefully chosen.

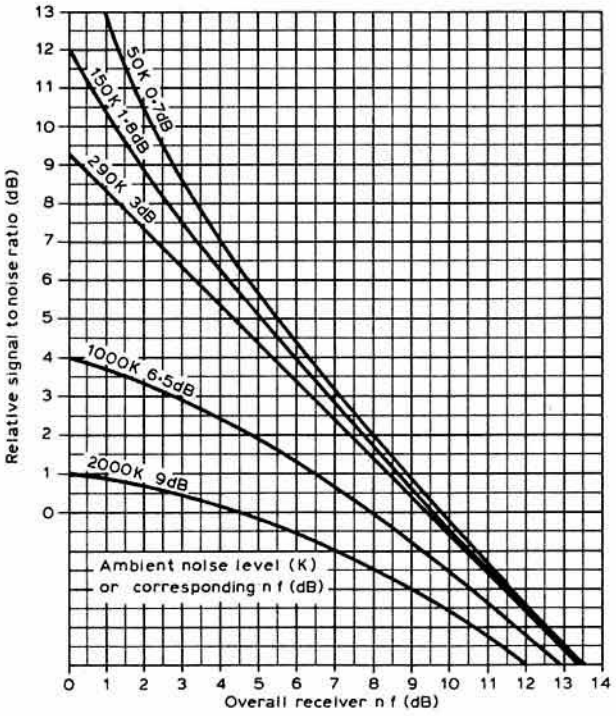


Fig 4. Graph showing how the signal to noise ratio varies with receiver noise figure and background noise level due to galactic and thermal noise

Effects of using a preamplifier

The overall noise figure obtained when a preamplifier is used with a receiver depends on several things: the receiver noise figure, the preamplifier noise figure and gain, and the loss in any cables used to connect them. Fig 5 shows the gain required to give an overall noise figure of 2dB for various combinations of receiver and preamplifier noise figures. The expressions used to plot these graphs are given in the appendix. The gain required is typically 10–15dB, but a frequent mistake is to use too much gain, as there is a tendency to expect a large increase in the receiver noise output when the preamplifier is connected.

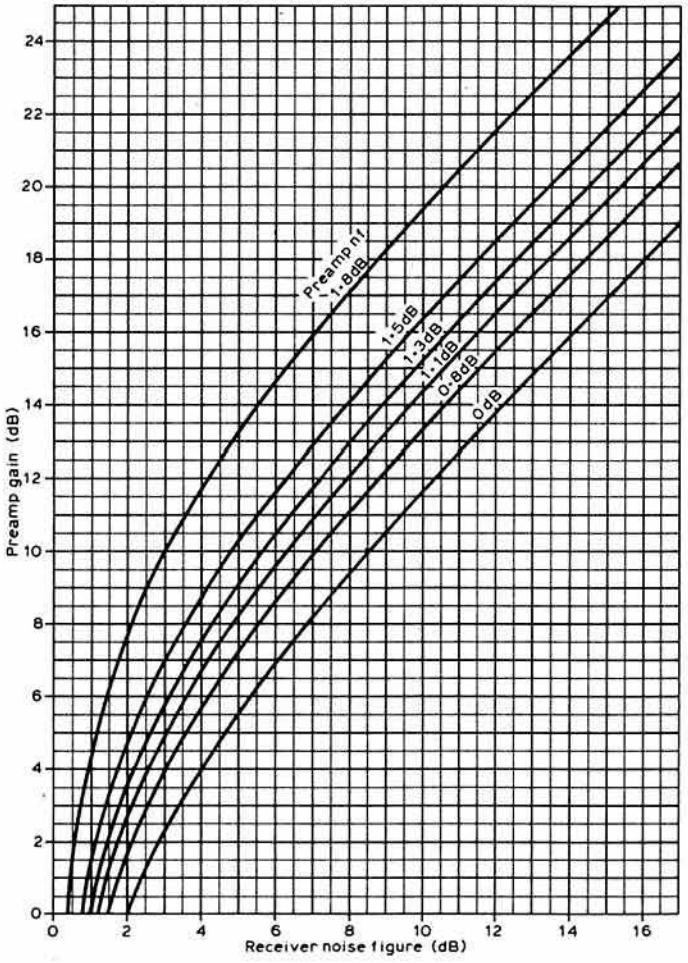


Fig 5. Graph showing the gain needed from a preamplifier to obtain an overall receiver noise figure of 2dB as a function of preamplifier and receiver noise figures

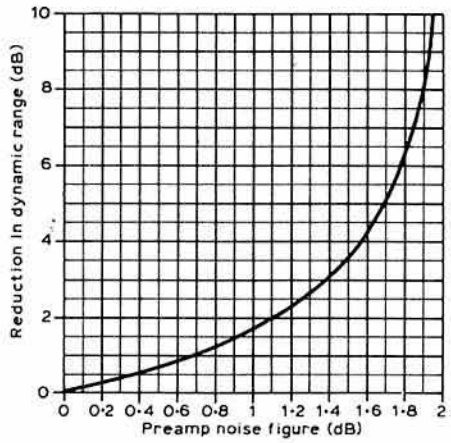


Fig 6. Graph showing the reduction in dynamic range that occurs when a preamplifier is used as in Fig 5 to obtain an overall noise figure of 2dB

The corresponding reduction in dynamic range is shown in Fig 6, which assumes that all the spurious products are generated in the receiver rather than the preamplifier. This would certainly be the case with most of the preamplifiers tested, as their third-order intercept points are much higher than those of the receivers with which they would be used. The degradation need only be quite small, 3–5dB, but the more serious effect is that since the levels of all the in-band signals have been increased by the gain of the preamplifier, the strongest signal that the system can now handle is reduced by almost the gain of the preamplifier, ie 10–15dB.

Two widely-spaced out-of-band signals can also mix to produce spurious in-band products, and in this case the addition of a selective preamplifier can help reduce the problem by decreasing the level of the out-of-band signals that reach the receiver.

The amount by which the dynamic range is degraded depends on the ratio of the overall noise figure achieved to the noise figure of the preamplifier alone. This explains why still lower noise figure preamplifiers are being developed, although at first sight the high external noise levels would not seem to make this worthwhile. It allows some of the device's noise figure to be sacrificed so that, by using a lower gain, a better strong-signal performance can be obtained.

Example

Fig 7 shows the effect on the receiver performance when a preamplifier with a noise figure of 1·4dB is used according to the criteria just described. There are two main effects:

(1) The overall receiver noise figure is reduced from 8dB to 2dB, improving the sensitivity by 9dB, from −133dBm to −142dBm.

(2) All signals at the receiver input are increased by the gain of the preamplifier, 13dB, so the strong signal performance is degraded as follows:

The noise level at the input of the receiver is now 4dB higher, so the signal level at the receiver input which generates spurii equal to the noise level will also be slightly higher, by about 1dB. Together, these effects reduce the upper limit of the dynamic range by 13 − 1 = 12dB, and so the third-order intercept is also reduced, from −21dBm to −34dBm.

Thus the overall effect is to reduce the dynamic range by 12 − 9 = 3dB, as shown in Fig 6. The galactic background noise level is now slightly higher than the overall receiver noise level, and so, depending on its actual level, will reduce the overall sensitivity and dynamic range by a further 3–9dB.

This may not seem a very serious decrease in the dynamic range, but because the upper limit has been reduced by 12dB—almost the gain of the preamplifier—signals which previously produced barely detectable spurii

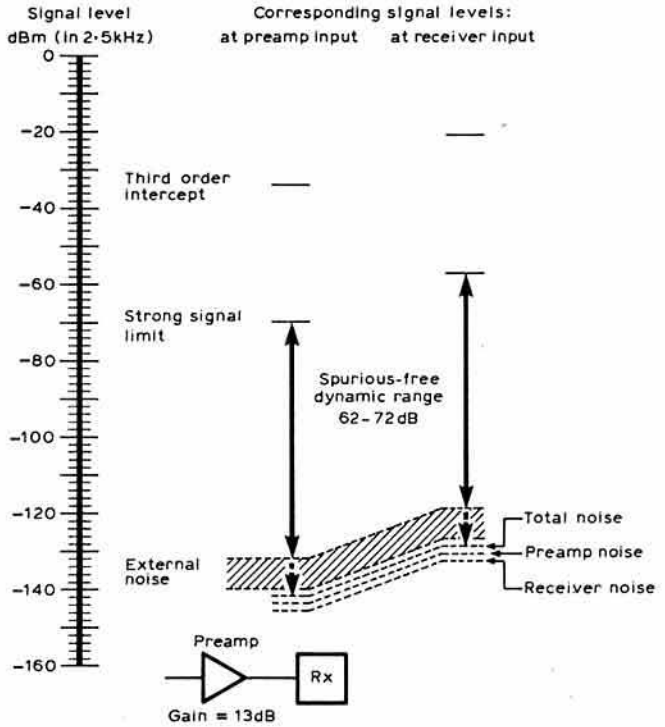


Fig 7. Diagram showing the effects of a preamplifier on the signal levels at a receiver input

will now generate them 34dB above the noise level. This is quite a high price to pay for an increase in sensitivity of from 0 to 6dB depending on the background noise level.

Although most devices with a noise figure below about 1·8dB could give an overall noise figure of 2dB, the worse the noise figure of the device the higher is the gain that is needed to achieve this noise figure and so the worse the strong-signal performance. A device with the lowest possible noise figure is thus still desirable, provided that it has a reasonable strong-signal performance. An overall noise figure of 2dB has been chosen as an example of a reasonable compromise in a typical 144MHz system, since the receiver's sensitivity will be wasted if the weak signals are drowned by receiver spurii or splatter from other strong signals.

For modes where weak-signal performance is paramount, eg moonbounce, a lower overall noise figure may be needed, where the last decibel or two is more important than the sacrifice in strong signal performance; but bear in mind that these last decibels are almost inaudible, and will only be there when looking at the quietest parts of the sky.

Effect of cable losses

When the preamplifier is installed in a system, long lengths of feeder will usually be needed to connect the antenna to the receiver, and this cable may have a loss of several decibels. This loss will worsen the noise figure of the system, but its effect will be far greater if it is placed between the antenna and the preamplifier than between the preamplifier and the receiver, as in Fig 8. In the first case the loss adds to the overall noise figure; in the second case, it adds only to the receiver noise figure, so that, by referring to Fig 5 to recalculate the overall noise figure or gain required using the new receiver noise figure, it will be seen to have a much smaller effect on the overall noise figure. This can be compensated for anyway by increasing the preamplifier gain slightly. So if the feeder loss is significant, say more than 1dB, it is worth considering putting the preamplifier at the masthead, although it does involve the complications of mounting the preamplifier and changeover relay in a waterproof box.

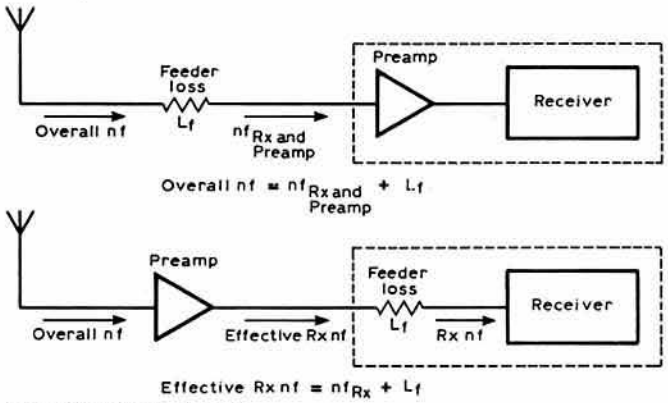


Fig 8. The effect of feeder losses on the overall noise figure obtained (all values in decibels)

On the subject of controlling the switching of this relay, although rf switched preamplifiers may be suitable for use with a.m. or fm, where a carrier is always present, provided that there is sufficient power to switch them after the feeder losses have been taken into account, direct control of the changeover relay is preferable for other modes. This could be done by powering both the preamplifier and the relay from a dc supply sent up the coaxial cable and controlled from the ptt line of the transceiver. The relay would rest in the transmit position, with the preamplifier out of circuit. In some rigs, the IC202 for example, this control voltage can be derived from a dc voltage that appears on the antenna socket on the receiver, thus needing no modification to the equipment. In others, the ptt voltage could be sensed by putting an in-line adapter in the microphone lead.

Low-noise preamplifier design considerations

Some of the techniques used in low-noise preamplifier design may not be familiar to those used to working with higher level amplifiers. The most important part of the circuit is the input matching network, which has to perform the correct impedance transformation between the 50Ω input and the input of the device with a very low loss, as any losses in this circuit will increase the noise figure just as if they were a lossy feeder in front of the preamplifier.

For maximum gain this matching network must transform the input impedance of the device down to 50Ω, so that it presents a matched load to the line (swr = 1:1). However, to obtain the best noise figure, the device impedance must be transformed to some other specific impedance which will not in general be 50Ω, so the preamplifier will then present a mismatch to the line. This impedance will usually be different for each type of device, and the swr will become worse the lower the noise figure of the device. For 1 to 1·5dB noise figure devices, this swr is typically 2·5 to 10:1.

In order to set the input matching for best noise figure, two independent adjustments are necessary to adjust the resistive and reactive parts of the impedance presented to the device, rather like the tuning and loading controls on a transmitter. A ready-built and boxed preamplifier should be supplied optimized for a 50Ω source impedance, so if the antenna and feeder do not present this impedance, a poorer noise figure will result. Few antenna systems will have an swr much better than 1·5:1 unless the antenna has been individually adjusted on test equipment, and an swr of this order can degrade the noise figure by about 0·5dB. The lower noise figure devices are more sensitive in this respect, and the actual noise figure obtained under working conditions will usually be somewhat worse than the optimum. More information on this subject can be found in [1].

All the ready-built preamplifiers tested are intended to work with a 50Ω antenna system. For those with 75Ω systems, several options are available:

(a) Build a λ/4 matching transformer or atu to transform the 75Ω antenna system to 50Ω at the preamplifier input.

(b) If the preamplifier has two input matching adjustments, ie tuning and loading, as in the Wood & Douglas models, these can be set for a 75Ω source impedance, and a similar performance will be obtained.

(c) Do nothing, and accept a poorer noise figure corresponding to the 1·5 to 1 swr between the two systems.

Aligning preamplifiers

Ready-made preamplifiers should have been aligned for best noise figure by the manufacturer, but the kits and unboxed ones will need to be optimized by the owner, and some form of noise figure indicating device is needed for this. Either a commercial automatic noise figure meter or a simpler homebuilt version such as that described by G4COM [2] would be suitable. Both operate by connecting a noise source to the input of the preamplifier and observing the change in receiver noise output as the noise source is switched on and off at a rate of several tens of hertz. It is possible, but far more difficult, to do the alignment by ear using a weak signal from a generator, and even harder to do on an off-air signal such as a beacon, as it is usually fading, and changes of 1dB or less have to be observed. If it is not possible to adjust the antenna impedance to 50Ω, it may be worthwhile optimizing the input matching when the preamplifier is installed in the system.

In this case, either the noise from a noise source, or a very weak signal, must be injected into the preamplifier when it is installed in the complete system without disturbing the matching of the rest of the system.

The easiest way of doing this is to run the noise or signal source into a small antenna—a dipole or small beam—which is near the main antenna but far enough away to prevent it from detuning it; a distance of several wavelengths would be suitable. This method will need a slightly more powerful noise or signal source than usual, as the coupling between the source and the antenna is fairly weak. The noise or signal source can then be used as described earlier for optimizing purposes.

Choosing the gain required

The gain needed should be chosen from Fig 5, taking into account the receiver noise figure and feeder losses. A suitable attenuator can be built from the data in the appendix and used between the preamplifier and receiver to reduce the overall gain to the desired value. However, if the receiver noise figure is not known, the gain can still be set approximately by varying it until the noise output from the receiver increases by the amount shown in Fig 9 when a 50Ω load on the input of the receiver is replaced by the preamplifier with a 50Ω load on its input.

This method is valid for receivers which have linear detectors, ie product detectors, and assumes that the agc is not acting, so that the receiver is linear—ie the audio output is proportional to the rf input. For a.m. and fm receivers it is not so straightforward, but if they have accurately

calibrated S-meters that give a reading on the receiver noise the approximate changes can be observed on them.

Conclusion

A preamplifier can make a useful improvement to a receiver's sensitivity, but on 144MHz the external noise level limits the improvement that is possible. While a selective preamplifier can prevent some out-of-band signals from reaching the receiver, the degradation of the in-band strong-signal response is likely to be greater than the improvement in sensitivity. It is therefore worthwhile being able to switch it out of circuit if it is not needed.

The final part of this article will present the results of reviewing a number of preamplifiers that are currently available for 144MHz.

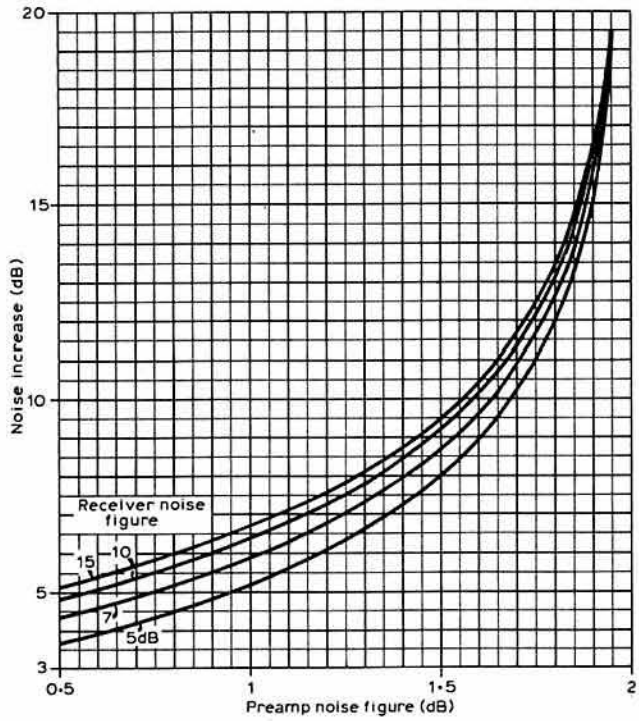


Fig 9. Graph showing the increase in noise output required from the receiver to give an overall noise figure of 2dB when a dummy load on the receiver is replaced by the preamplifier with a dummy load on its input

Appendix 1

(1) Relations between noise figure, nf (dB), noise temperature, T (degrees absolute, K) and noise power, P (dBm and μV).

$$nf(dB) = 10 \log \left(1 + \frac{T}{290}\right)$$

$$P(dBM) = 30 + 10 \log (kTB)$$

$$P\mu V = \frac{V^2}{50}$$

$k = 1{\cdot}38 \times 10^{-23}$, B = bandwidth (Hz)

(2) Effect of sky temperature (T_{sky}) and overall receiver noise temperature (T_{prx}) on the overall s:n (dB).

$$s{:}n = 10 \log \left(\frac{\text{P signal (Watts)}}{(T_{sky} + T_{prx})\ kB}\right)$$

T_{prx} = noise temperature of preamplifier and receiver combination.

(3) Gain (dB) needed from a preamplifier to achieve a given overall receiver temperature (T_{prx}).

$$G = 10 \log \left(\frac{\frac{T_{rx}}{T_{prx}}}{\left(1 - \frac{T_{pre}}{T_{prx}}\right)}\right)$$

T_{pre} = Preamplifier noise temperature. T_{rx} = receiver noise temperature.

(4) Reduction in dynamic range (dB) by using a preamplifier, assuming all spurii are generated in the receiver.

$$R = 6{\cdot}6 \log \left(1 - \frac{T_{pre}}{T_{prx}}\right)$$

(5) Noise increase (dB) when a preamplifier is connected to a receiver with 50Ω loads on the receiver or preamplifier inputs.

$$I = 10 \log \left(\frac{T_{rx}\left(1 + \frac{290}{T_{prx}}\right)}{(T_{rx} + 290)\left(1 - \frac{T_{pre}}{T_{prx}}\right)}\right)$$

Appendix 2

Suitable attenuators [3] for use with the preamplifiers can be built to the design shown in Fig 10. The expressions for the resistor values for any attenuation are given below for both the T and pi type attenuators and some values are given in the table.

$$\text{Attenuation (dB)} = 20 \log \left(\frac{50 + R1}{50 - R1}\right) \quad \text{when} \quad R2 = \frac{2{,}500 - R1^2}{2R1} \quad \text{"T" type}$$

$$\text{Attenuation (dB)} = 20 \log \left(\frac{R1 + 50}{R1 - 50}\right) \quad \text{when} \quad R2 = \frac{5{,}000R1}{R1^2 - 2{,}500} \quad \text{"}\pi\text{" type}$$

Carbon film or other non-inductive types of resistors should be suitable. In some cases the nearest preferred value will have to be taken.

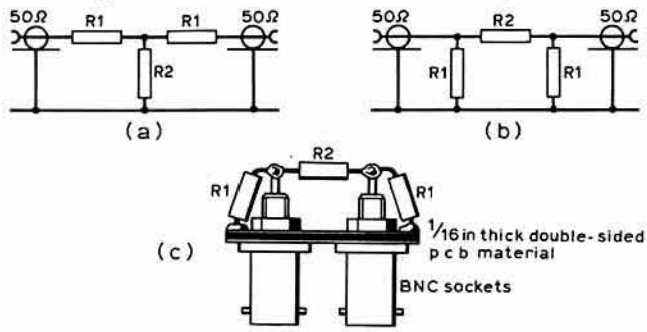


Fig 10. Circuits of (a) "T" and (b) "π" type attenuators. (c) Construction of "π" type attenuator

Design data for 50Ω "T" and "π" type attenuators

dB	"T" TYPE R1	"T" TYPE R2	"π" TYPE R1	"π" TYPE R2
1	2·9	433	870	5·8
2	5·7	215	436	11·6
3	8·6	142	292	17·6
4	11·3	105	221	23·9
5	14·0	82	178	30·4
6	16·6	67	150	37·4
7	19·1	56	131	44·8
8	21·5	47·3	116	53
9	23·8	40·6	105	62
10	26·0	35·1	96	71
12	30·0	26·8	84	93
14	33·4	20·8	75	120
16	36·3	16·3	69	154
18	38·8	12·8	64	196
20	40·9	10·0	61	248
25	44·7	5·6	56	443
30	46·9	3·2	53	790

References

[1] "A gasfet preamplifier for 432MHz with a 0·5dB noise figure", J. Gannaway, G3YGF, and C. Suckling, G3WDG. *Rad Com* December 1980, p1270–5.

[2] "An alignment aid for vhf receivers", J. R. Compton, G4COM, *Rad Com* January 1976, p36. Also "Microwaves", *Rad Com:* October 1979, p934; March 1980, p270.

[3] "Microwaves". *Rad Com* March 1979.

[4] "Microwaves". *Rad Com* July 1979.

TO BE CONTINUED

TECHNICAL TOPICS

Pat Hawker, G3VA

G. K. CHESTERTON believed that a man looking at a hippopotamus may be tempted to regard a hippopotamus as an enormous mistake. Sometimes I think if he had been born a little later he might have written similarly of the swr meter. Mark Twain warned that although soap and education are not as sudden as a massacre they may be more deadly in the long run: perhaps he was thinking of that oversimplified cramming to get newcomers through the RAE! But you cannot teach anybody anything they do not want to learn.

If we are honest we must admit that as amateurs most of us absorb only what we wish to believe. No matter how many articles tell us that for antenna systems reflected power does *not* mean lost power, and that (at least at hf) an swr of up to about 2·5:1—and sometimes considerably more—may give virtually as much radiated power as a perfect 1:1 match, there are still a lot of people who fret and fume if the pointer goes much beyond 1·1:1. One cannot say too often that a high swr results only in an additional loss that depends on the actual line loss, and that *if the line itself had no loss you could have an infinitely high swr and still lose no power;* provided the transmitter delivers power into the feeder.

On vhf and uhf, where line losses tend to be much greater than at hf, there *is* need to worry about a high swr. And, of course, when your latest all-solid-state transmitter automatically reduces power (or blows its top) when looking into a 2:1 or more swr, then (even on hf) you need either to get the swr down below that figure or fit some form of matching unit; not to increase radiation but to satisfy those touchy rf power transistors.

The latest attempt to convince us of all this is by Stan Gibilisco, W1GV/4, in *Ham Radio* (August 1981, pp33–7) although the facts have been set out for years in the better handbooks. *Ham Radio* believes this exposé will put this long-standing controversy to rest once and for all. I suspect it will be disappointed. The concept of power being reflected back along the transmission line and then back into the transmitter (without being reflected back again to the antenna) is firmly ingrained. Some things, it is said, are believed because people feel they must be true and in such cases an immense weight of evidence is necessary to dispel this belief. Despite the extremely low losses of open-wire resonant feeders with very high swr, the myth of a massive power loss arising from a failure accurately to match the feeder to the antenna element is likely to persist for a long time; possibly until amateurs throw away those swr meters and go back to using neon bulbs and pilot lamps!

Tunable cw/notch filters

Circuit details of relatively simple tunable selective and notch audio filters of variable bandwidth have been published by R. A. Worsley in *Electronic Engineering* (November 1980, pp19–20). As a cw filter (Fig 1) this can be tuned to frequencies between about 20Hz and 1kHz by adjustment of the dual-pot (RV2). The positive feedback control (RV1) can be advanced until the circuit oscillates, normally being set just below the threshold of oscillation for maximum selectivity (which may be too sharp for normal speed cw). IC1 provides a buffer stage with low impedance output.

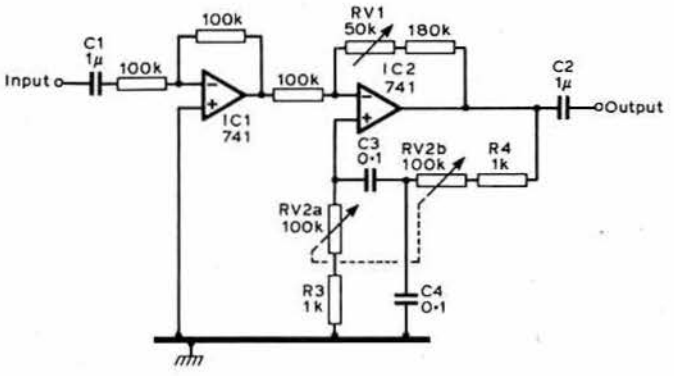


Fig 1. Tunable cw filter (20Hz to 1kHz) with adjustable selectivity. Frequency is varied by the ganged pot RV2. RV1 controls positive feedback and should be set below the threshold of oscillation to provide required degree of selectivity. All pots are linear types. The filter was not originally designed as a cw filter and ringing characteristics are not known. All pots are linear. *(Electronic Engineering)*

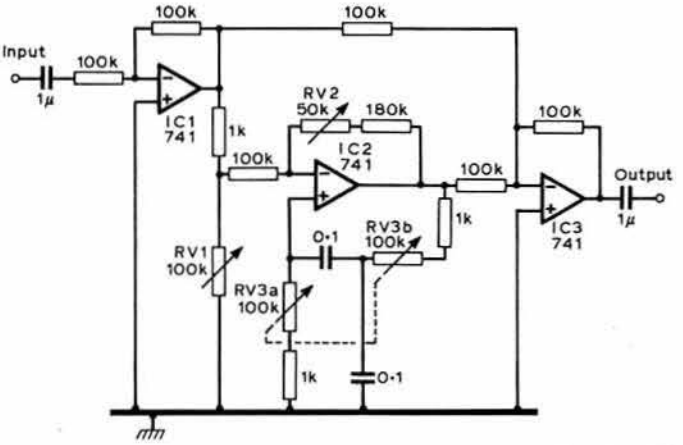


Fig 2. Tunable notch filter based on similar network to the cw filter, but with addition of attenuation control (RV1) which could also be incorporated in the cw filter. *(Electronic Engineering)*

IC2 is an inverting amplifier with a frequency selective positive feedback loop (RV2, R3, R4, C3, C4). With the values shown, the filter should tune from about 20Hz to 1kHz, but values for other frequency ranges can be calculated from $f = 0{\cdot}5\pi CR$ where $C = C3 = C4$ and $R = RV2a + R3 = RV2B + R4$. With the original filter set to 400Hz, the 3dB points could be set to 400Hz ± 3Hz. Gain of the circuit is high and a gain control may be found necessary, as shown, for the notch filter.

Fig 2 shows the tunable notch filter with an additional signal attenuator RV1 connected between the buffer and the filter. IC3 sums the output of the tuned stage to the original buffered signal so that at the filter frequency the signals cancel and there will be virtually zero output, while other frequencies are preserved. When set to 400Hz there should be negligible effect on signals except in the range 395–405Hz. R. A. Worsley warns that some "fiddling" with the controls may prove necessary to get the best out of these filters, and one presumes that the frequency loop components should be reasonably accurately matched for optimum results.

"No-polarity" nicad charging

One of the hazards of charging small nicad batteries is that the polarity is not always shown clearly on the battery. Unfortunately, charging a nicad the wrong way round can damage or destroy the cell.

In *Electronic Design* (17 September 1981) Hanan Boasson descibes a polarity-sensing unit for use with an existing nicad charger that automatically determines the correct charging polarity, regardless of which way round the battery is connected: Fig 3.

The remaining potential in the discharged battery forward biases either of two pairs of transistors (a pnp pair TR1, TR2 or an npn pair TR3, TR4) ensuring that the charging current flows in the correct direction. Representative values of R2–R5 for a 3V charger would be 2,200Ω. Note that the battery discharges through these resistors when there is no charging voltage (blocking diodes in the transistor collector circuits can prevent this). The safe-current limiting resistor R1 may not be necessary if the charger is already current-limited. For single cells, the transistors should be germanium types to reduce base-to-emitter voltage drop.

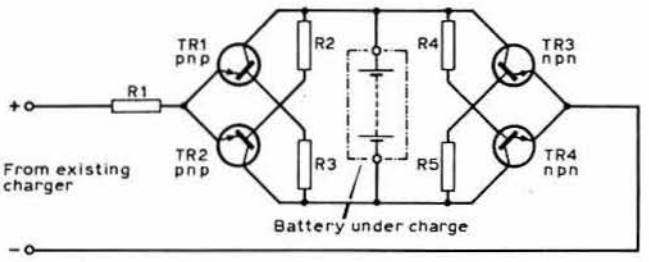


Fig 3. How to ensure that a nicad battery is always charged with the correct polarity. Residual battery potential determines charging polarity by switching on either the npn or pnp transistors. Will not work with completely discharged cells. *(Electronic Design)*

Groundplanes

There is probably no such thing as a "simple" antenna. Indeed if one glances through the pages of, for example, *IEEE Trans Ant & Prop* (the prime source of information on what professional antenna research engineers and mathematicians are up to) one might be excused for thinking that only Senior Wranglers have any chance of understanding what happens when a piece of wire is fastened to the branch of a convenient tree or you hook up a tranny to the bed springs!

Perhaps, in spite of the various discussions recently in *TT* on vertical antennas, you still think of a groundplane antenna (gpa) or monopole as a basically simple and easily understood antenna. If so it is worth considering some comments that have come from Fred Brown, W6HPH/G5AWI, and John Wilson, G8KIS. W6HPH writes:

"I was intrigued by the dissertation on the groundplane antenna in July *TT*. Theoretical analysis of the gpa is perhaps as useful for illustrating certain antenna theorems as for understanding the groundplane itself. For instance, it can be shown that the gpa exhibits 3dB *gain* over a dipole. It is also possible to prove that the gpa in free space has 3dB *less gain* than a dipole. Both proofs are valid and do not contradict each other!

"It is quite easy to show that a $\lambda/4$ monopole over a perfectly conducting earth has 3dB of gain over a dipole in free space. This is simply a consequence of the fact that the monopole is radiating into a hemisphere rather than into a sphere; its three-dimensional directive pattern is identical to a dipole except sliced in half. Hence it is radiating into half the angular volume, and therefore exhibits 3dB of directive gain.

"What is not so well known is that at 0° elevation angle a gpa in free space is 3dB *worse* than a dipole in free space. At first this might seem to contradict the above paragraph, which could lead one to believe that an elevated gpa is 3dB better than a $\lambda/2$ dipole at the same height.

"The principle of symmetry permits us to insert a thin conducting sheet into the H-plane of any symmetric antenna without affecting the electromagnetic fields. This is shown in Fig 4 (a) for a $\lambda/4$ dipole.

"In Fig 4(b) the voltage generator has been split into two generators of half voltage so that connections can be made to the conducting plane. This, of course, makes it possible to split the antenna into two identical monopoles, each completely shielded from the other, and so one monopole can be considered by itself.

"Current into the monopole will remain exactly as it was for the dipole, but since the voltage generator is now $E/2$, we have the well-known result that the impedance of the monopole is exactly one-half that of the equivalent dipole. Although this analysis has assumed an infinite conducting plane, it also obviously holds true for a finite but large groundplane since the edge of any large plane will be too far from the feedpoint to affect impedance. It also has been shown experimentally to be valid for a groundplane of only $\lambda/4$ radius, as well as the more common configuration of four $\lambda/4$ radials.

"The field strength, e, at a distant point on the horizontal plane is found by integrating the current Id1 over the length of the monopole. There are other factors involving distance and phase in the integral, but they need not concern us here. The important point is that if we carry out the same integration over the original $\lambda/2$ dipole, it will produce twice the field strength, $2e$, since the integration is over twice as much length. This might lead us to expect that a monopole would be 6dB worse than a dipole since e is 6dB below $2e$. But remember the dipole was fed from a generator voltage of E, whereas the monopole had a voltage of $E/2$. So twice as much power (3dB more) was going into the dipole since current is the same in both cases. Thus if equal *powers* are fed into the two antennas, the monopole will be 3dB worse in producing distant field strength. Hence its gain is -3dBd at zero elevation angle.

"The E-plane pattern of the gpa vs the dipole is shown in Fig 5. Note that regardless of the size of the conducting plane the gpa is always 3dB worse than the $\lambda/2$ dipole at zero elevation angle. Of course, this is virtually the only angle of interest in vhf propagation. At sufficiently high elevation angles, the gpa can actually show a gain over a $\lambda/2$ dipole, a result consistent with the analysis of my second paragraph. A larger conducting plane will bring down the elevation angle where maximum gain occurs; but at 0° the dipole will *always* be 3dB better than the groundplane, no matter how large a conducting plane is used.

"In view of these facts it is surprising that groundplanes are so widely used for vhf omnidirectional coverage. Not only do they throw away 3dB, both receiving and transmitting, they exhibit a difficult feed impedance of about 35Ω. Both feed impedance and gain can be improved by drooping the radials down to 60° or more below horizontal. This simple expedient will raise the feed impedance to the standard 50Ω and increase the gain to almost that of a dipole."

John Wilson, G8KIS, who is a member of the Science Unit at BBC Bush House, draws attention to a detailed letter from M.S. Smith and Gaelle de

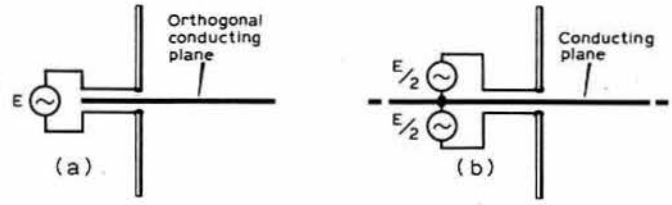


Fig 4. (a) Dipole element into which a thin conducting sheet has been inserted. (b) Showing how a voltage generator can be split into two so that connection can be made to the conducting plate (groundplane) to form two identical and separate monopoles each having a feedpoint impedance half that of a dipole

Prunelé, of University College London, published in *Electronics Letters* (3 September, 1981, Vol 17, No 18, pp 653–6). This shows that the size and nature of the "groundplane" of a monopole antenna also has a considerable effect on the amount of cross-polarized radiation, ie the extent of the horizontally-polarized component radiated from or received on this "vertically-polarized" antenna. G8KIS points out that this letter has practical consequences on the debate regarding polarization that is currently being conducted in both broadcasting and amateur mobile circles.

The writers point out in their introduction that "a monopole antenna equal or less than $\lambda/4$ long, on a groundplane whose dimensions are large compared to the operating wavelength, has an image due to induced currents in the groundplane, and the radiation pattern is principally vertically polarized. For groundplanes with dimensions of about one or two wavelengths (typical dimensions with a 144MHz antenna mounted on the roof of a car—*G3VA) the induced currents do not form a complete image* and this has several effects: (a) the vertically-polarized pattern is modified; (b) the input impedance is modified; and (c) *some horizontally-polarized radiation can occur, depending on the shape of the finite groundplane.*" It is also suggested that non-central monopoles, as commonly used on car roofs and boots (particularly for vhf/fm broadcast reception) and often with rectangular groundplanes tend to have a cross-polarized element independent of monopole length but which varies with the size of the groundplane in terms of the size/wavelength ratio.

G8KIS points out that such findings have a significant bearing on the question of using mixed polarization (circular or slant) for broadcasting and mobile operation. He also feels that this effect may explain why a 144MHz or 432MHz handy-talkie often works just as well (or better) when held horizontally while working a vertically-polarized distant station. He wonders whether amateur repeaters ought to be equipped with antennas providing mixed polarization as an experiment.

Antenna radiation patterns

Many of the antennas used by radio amateurs are (and have to be) located in far from ideal sites. It is extremely difficult to assess accurately the extent to which a particular site is likely to affect results. It is worth remembering that one of the most common problems is that nearby structures tend to blur and fill in the nulls that look so impressive in the theoretical radiation patterns, and which one hopes will reduce interference from short-skip signals.

Recently, for example, in discussing the ZL-Special and HB9CV unidirectional driven arrays (*TT* October) I mentioned the good back-to-front ratio associated with the cardioid radiation patterns. It is, however,

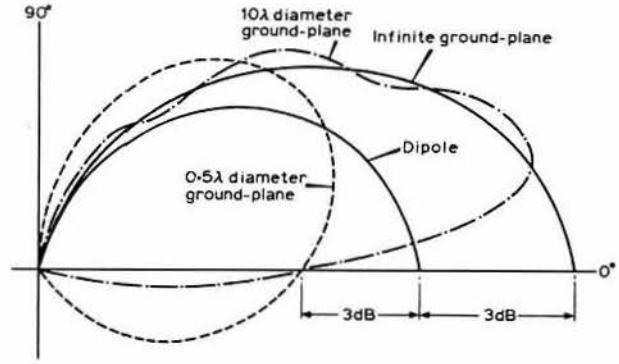


Fig 5. Free space radiation patterns of $\lambda/4$ monopoles over perfectly conducting groundplanes of various diameters. The infinite groundplane shows a 3dB gain over a dipole at 0° elevation angle, but any finite groundplane will exhibit a 3dB loss

worth noting that *Ham Radio* (October 1980) reported a professional investigation into the ZL-Special indicating that it can yield a power gain of about 4dB (reference dipole) and a front-to-back ratio of about 36dB with a deep null off the back of the beam. However, it then added: "the deep null directly off the back, shown in theory, is usually unobtainable because of reflection from nearby metallic objects or buildings". Any conductive object (including trees) in the plane of polarization of a transmitting antenna tends to pick up and re-radiate energy and so forms an extra (usually unwanted) element in the array.

This point is brought out in *IBA Technical Review No 14* in a section discussing the four-mast directional mf antenna with vertical polarization at Saffron Green, near Barnet, North London, where the primary object is to obtain deep rejection nulls in specific directions in order to prevent co-channel interference with other stations using the same channels (the antenna radiates simultaneously on two frequencies). Despite a long and intensive search, it was necessary to accept that any site in the London area was likely to be less than ideal—with the following results:

"At London, the site was adjacent to two lines of electricity pylons to the north and east, the pylons being of various heights between 27m and 32m and about 500m distant at their closest approach. The situation was complicated by the presence of a 24m steel tower at a distance of 700m in front of the antenna in the main lobe.

"The effect of these structures is to form a complex antenna of 32 radiating elements, tending to provide radiation patterns in which the broad nulls are broken by as many as a dozen small lobes, though in practice the antenna achieves the desired nulls in the critical directions."

The pylons and towers were a good deal shorter than the four radiating elements (each 71m high) and the closest was 0·5km distant (at the frequencies concerned this represents about 2λ or more). By comparison, most amateur antennas are positively hemmed in by metal gutters, fences, roof spaces containing water pipes etc, etc. It is no wonder that antennas so often have radiation patterns that differ from those in the handbooks!

Antenna matching for amateur bands

In the September *TT* under the heading "antenna matching", attention was drawn to the concept of a "two-stage" philosophy for wide-range antenna matching units as described at the recent radio receivers conference by Dr M.J. Underhill, G3LHZ, of Philips Research Laboratories. Unfortunately a small but very important error crept into the circuit diagram of the "final matching unit" (Fig 4, page 819) covering 1·5 to 30MHz. The value of the variable capacitor Cp should have been 2,200pF (≪ 40pF minimum capacitance) and *not* 220pF as shown—quite a difference! The smaller value would of course greatly reduce the matching flexibility of the unit, particularly at the lower frequencies.

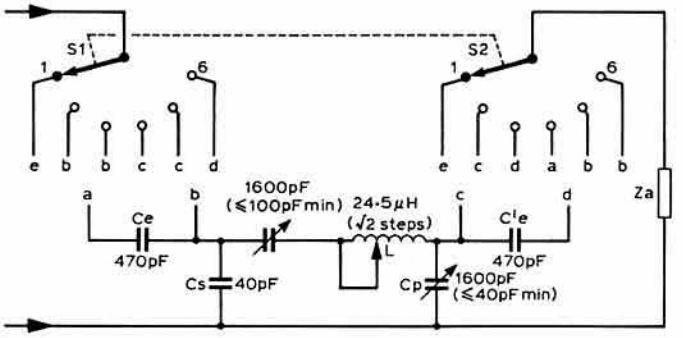


Fig 6. The modified component values for G3LHZ's "final matching unit" suitable between 1·8 to 30MHz. The network configurations are given in Fig 5 of September *TT*. (See text for a correction to the values given in September for the unit covering 1·5 to 30MHz)

However, G3LHZ points out that the original component specifications can be usefully modified for amateur applications in all bands from 1·8 to 30MHz, since it is the range 1·5 to 1·8MHz that imposes the greatest demands for large values. For amateur use Cl = Cp = 1,600pF, Ce = Cé = 470pF, and the maximum value of the tapped or variable inductor can be reduced to 24·5μH. These values are shown in Fig 6 and reference should be made to Fig 5 in the September *TT* for the matching configurations which, of course, remain the same as for the commercial unit.

In practice, as G3LHZ points out, for Cp or Cl a three- (or four-) gang receiving-type air-spaced capacitor is suitable. The capacitor Cl should be mounted so that its capacitance to ground is not excessive, although Cs can be reduced to compensate for this, which is rather convenient! Three- and four-gang 500pF or 550pF variable capacitors are becoming components easier to find in a junk box than to obtain at reasonable cost from suppliers, but they are still around.

Coaxial cables—neglected factors?

It was not until well into the 'thirties that coaxial cables at reasonable cost became available to radio amateurs. For the low-impedance untuned transmission lines for dipoles etc, it was common practice to use good quality twisted electric-light flex. Poor quality flex could result in dramatic losses at 28MHz or above, although high-grade flex was not uncommonly used for some of the early 40–45MHz television receiving antennas in the 1936–8 era.

For many years we have taken the use of coaxial cables pretty much for granted, using rule-of-thumb ideas about attenuation: thicker cables result in less loss; "foam" dielectric is better at vhf/uhf than solid dielectric; at uhf even the best thin cables result in heavy losses at 100ft or more, etc. There is, however, much more to coaxial cables than meets the eye, as Charles Brainard, WA1ZRS, and Ken Smith emphasize in an out-of-the-common article "Coaxial cable—the neglected link" (*QST* April 1981, pp28–31). The article is timely in that cable manufacturers have been forced by the high price of copper to introduce cables having less effective braid shielding.

The authors provide an analysis that highlights the importance of the shielding used in different types of cable, showing that energy is lost due to radiation if the cable is "leaky". Indeed there are special "leaky" cables intended to form continuous antennas to provide controlled radiation for some forms of short-range communications systems. But most of us seek cables that provide the minimum of radiation, or, in other words, that provide maximum "isolation" and shielding.

Down-line attenuation of cables is governed by: (a) the type and material of the centre conductor; (b) the velocity of propagation and type of material of the centre dielectric; *and* (c) the type of material of the outer conductor.

It is worth noting, for instance, that, other things being equal, a solid-centre conductor (nowadays seldom found in consumer-type cables) results in less loss than a multi-strand tinned copper centre conductor, since both stranding and tinning increase attenuation, although tinning simplifies soldering. Similarly, the outer braid shielding of cables of a given size may vary significantly; for example, the percentage of bare copper varies from about 40 per cent to almost 100 per cent. Whereas an RG-59/U cable with 40 per cent bare copper shield may have a loss per 100ft of 5·55dB at 150MHz, a similar cable with 98 per cent bare copper may have substantially less attenuation, around 3·2dB. The article, in fact, provides a powerful argument against using low-grade cables of uncertain construction.

The authors also point out that braided-shield cables are, to varying degrees, affected by their environment (ie rather in the same way as 300Ω balanced line has to be kept away from metal guttering etc). The common practice of mounting a coaxial cable directly to the leg of an antenna support tower can (if the braid shielding is only average) drastically alter the losses in the cable, due to a change in the attenuation characteristics: this change in characteristics can be in excess of a factor of 10. Degradation of this type increases with frequency (isolation characteristics of a cable at 14MHz are roughly 10 times better than at 144MHz).

Placing relatively leaky cables in any conducting environment causes adverse results: apart from attachment to tower legs, this can apply also to cables buried in the ground.

Another point that one seldom sees emphasized is that cable characteristics provided by manufacturers naturally refer to brand-new cables, used with good connectors. Losses can increase greatly if the cables absorb moisture etc, as mentioned below.

Weatherproofing cable junctions

The vital importance of preventing moisture from gaining ingress into coaxial cables and then being drawn along the cable by capillary action has been stressed a number of times in *TT*. In this connection, Gerald Stancey, G3MCK, has found a useful modification to the "toothpaste-cap" method of weatherproofing the ends of a feeder cable. He writes:

"The toothpaste cap is drilled to take the inner conductor and the braid pigtail as shown in Fig 7. Drill the holes as small as possible. Thread the leads through the holes. Smear the end of the coaxial cable where the braid pigtail leaves it with sealant, and fill the toothpaste cap with the sealant. Then pull the cable up through the top of the cap as far as it will go; that is to say, to the position shown in Fig 7. Leave the assembly in a dry place until the sealant is thoroughly set."

Earlier this year, G3MCK made up two test assemblies using two

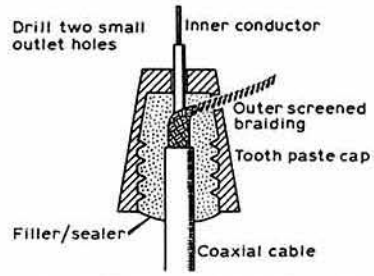


Fig 7. G3MCK's improved method of waterproofing the ends of coaxial cable with reversed toothpaste cap

different sealants: (1) Bostik No 6 weatherproof sealant; and (2) Evostik Colourseal (colourized silicone rubber bathroom sealant). The two assemblies were then hung up on an exposed line in his garden from January to August (ie about seven months). Both were then dissected with no trace of moisture or corrosion found in either case (though the Evostik smelt strongly of vinegar when it was being applied).

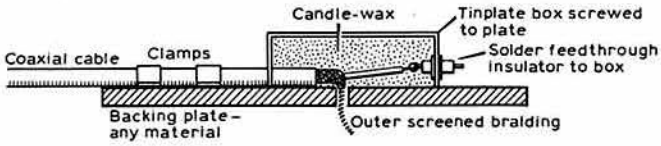


Fig 8. G3MCK's proposed method of securely waterproofing cable where weight is no problem. The cable is clamped to a backing plate on which is mounted a tinplate box which is subsequently filled with molten candle wax. Connections are made to the braid and inner conductor via strain-relief anchor points on the backing plate. It is essential to avoid cracking the wax due to cable movement after it has set

These tests have convinced G3MCK that either sealant is satisfactory, and so is the method. The advantage of using the cap this way round is that it really forces the sealant round the cable when it is pulled into the cap. Where weight is not a problem, G3MCK believes that an effective technique would be to use a backing plate, as shown in Fig 8, although he has not tried this idea yet.

Tips and topics

The circuit of an interesting-looking arrangement for a hybrid transistor/valve grounded-grid amplifier was spotted recently in the journal *Radio,* credited to UA4RO. The text explanation in Cyrillic Russian script defeats me: Fig 9.

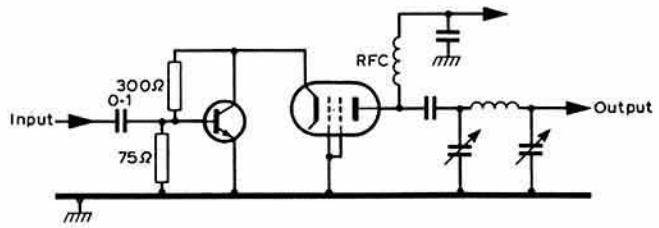


Fig 9. UA4RO's grounded-grid hybrid amplifier

Mike Lee, G3VYF, notes the problem of replacing dial and pilot lamps in much modern equipment where only long-fingered concert pianists have any chance of fitting new bulbs unaided. When recently he needed to replace two bulbs in an FT101E he recalled an old dodge. By stripping a section of outer cover from coaxial cable (UR67 in his case) and inserting the glass bulb into one end, the bayonet or screw end of the lamp can be manipulated into its holder, using the "tool" as a flexible extension rod. Once the bulb has been correctly located the coaxial cover is simply pulled off the glass bulb.

Joel Anderson, N1JA, in *QST (Hinks & Kinks* August 1981, p37) points out that direct-conversion receivers often suffer from mains hum stemming initially from the power supply unit but which remains resistant to additional ripple reduction since it involves an rf mixing process. It can, however, often be overcome by the simple expedient of bypassing the power rectifier diodes with suitable 0·01μF capacitors.

Al Kaufman, W1JVQ, advises that when a strong wind blows, rotary beam antennas should be left pointed in the direction that will produce least wind resistance; he suggests pointing the element *ends* in the direction of the wind as this reduces element movement and vibration, and minimizes possible wind damage.

The classic vertically-polarized "bobtail" array (see *ART* etc) is normally voltage fed. Alan Kaul, W6RCL, in *73 Magazine* (July 1981 pp 92–3) has been trying an inverted bobtail (Fig 10) with low-impedance feed and seems well satisfied with the results.

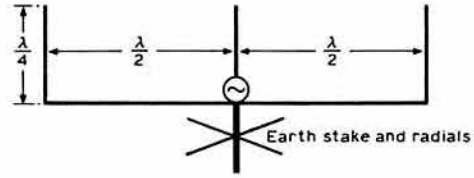


Fig 10. "Inverted bobtail" array used by W6RCL with low-impedance (coaxial cable) feed. Dimensions for 21MHz would be 11ft 6in λ/4, 23ft λ/2; for 28MHz, 8ft 4in λ/4, 16ft 8in λ/2. *(73 Magazine)*

To the saga of coaxial connectors (*TT* July p630), Brian Walters, GW3YSP, adds the following comments: "You mention that N-series connectors can be used on 70Ω cables, but it is worth noting that N-type connectors are available in *both* 50Ω and 75Ω impedances. The major difference is that the centre pin is very much thinner for 75Ω than for 50Ω. This means smaller holes in the middle of the ptfe insulators, the body of the plug remaining the same. A point worth remembering is that some professional test gear (eg the Marconi rf power meter for 75Ω impedance) uses the 75Ω N-type sockets, so that care must be taken to use the correct plugs. A 50Ω plug can cause irreparable damage to the centre socket by splitting it into four fingers." Additionally, GW3YSP mentions that for bnc plugs he believes that Greenpar make a conversion kit to allow 75Ω termination; this comprises centre pin, ptfe insulators etc. And for difficulty in "making off" plugs he awards the prize to the 2-pin bnc connectors comprising one pin and one socket in a bnc-sized body!

Where coaxial cable is split in order to form a termination for connection to antenna elements etc, J. C. Peerless, G3JPJ, finds that plastic covers intended for standard crocodile clips (available from RS Components as Part No 423-368) can be used effectively to prevent ingress of water into the body of the cable; he always fills the clip cover with MS4 silicone grease before installing it on the cable termination.

Nostalgia corner

"It's a wonderful hobby — radio. I can't recommend it too highly. A normal lad can build himself a receiver for as little as $10—and a transmitter for only $25. If he uses the right frequencies he can cover a good part of the world with such a rig". A 1956 quote from the late John L. Reinartz, K6BJ etc, one of the great pioneers of "short waves" in the 'twenties.

John Clarke, FC6FPH/G8KA, now resident in Corsica, recalls that the pre-war British "experimental" licences imposed on the young the insult that they were officially issued only to their fathers, who often did not know a dit from a dah! One had to supply birth certificates, character references etc for both father and son. In his case, along with other pupils at Charterhouse, he had to do a year with an "artificial aerial" licence, keeping a careful record of experimental work; this was then sent with the application for the "full" licence. But, with a 6L6G (Raytheon) crystal oscillator, 350V psu and some 6K7 valves in a simple receiver, schoolboys of the 'thirties could be pocket-money hf operators. (I had "my" 2BUH licence soon after my 14th birthday but had to wait two years before I could apply, on behalf of my father, for the "full" G3VA ticket).

G8KA has noted the recent concern about the effects of a nuclear electromagnetic pulse on solid-state equipment and wonders if we ought to run a competition for valved "survival" rigs which he feels might come in useful if only to find out if anybody else has survived; possible perhaps in Corsica but I doubt if London amateurs will bother to enter! Some recent communication with the Ministry of Defence has convinced me that they would need a four-month rather than a four-minute warning!

Ionospheric basics

During the past few decades a lot has been learnt about both the ionosphere and the equally remarkable magnetosphere, partly as a result of observations made in Antarctica, which provides a natural platform from which to observe magnetospheric processes. A very useful update on present ideas can be found in an article by Dr John Dudeney in *New Scientist* (17 September 1981 pp714–7) which not only describes the new

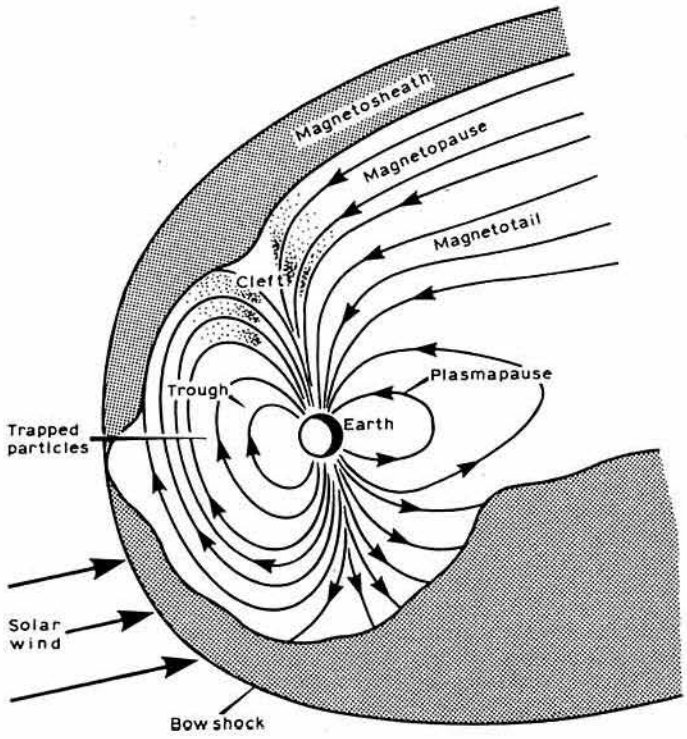


Fig 11. The earth's magnetosphere, showing formation of the bow wave and the long tail. *(New Scientist)*

advanced ionospheric sounder that has been installed at Halley but also reviews the basic processes whereby the solar wind leads to auroras, ring currents and magnetic storms.

The author shows that two factors crucial in creating the magnetosphere are the solar wind and the associated interplanetary magnetic field. The solar wind is a gusty though continuous stream of electrically-charged sub-atomic particles (mostly protons and electrons) flowing outwards from the sun. When these particles reach the earth's magnetic field they begin a complex mixture of processes that are, as Dr Dudeney puts it, "not yet fully understood". But on the side of the earth in sunlight, a shock front (bow shock) is created, compressing the geomagnetic field; whereas on the other side of the earth, in darkness, the magnetic field is drawn into a vast tail: Fig 11.

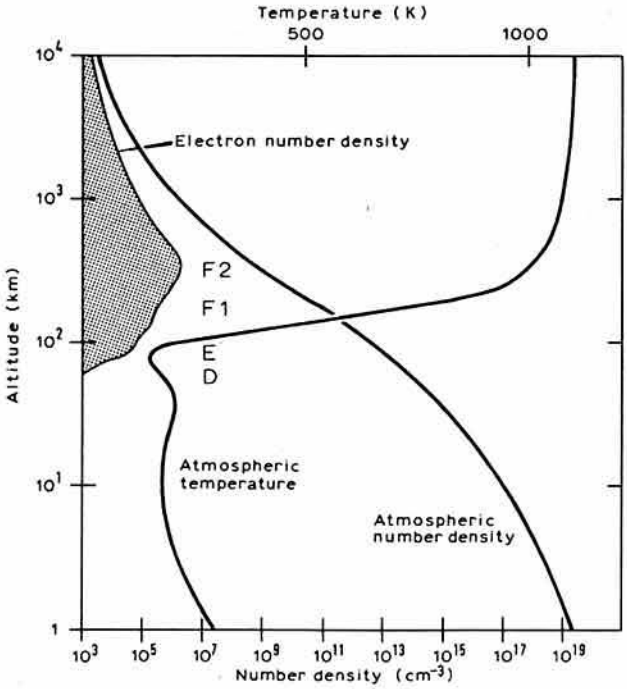


Fig 12. The ionosphere. UV light from the sun ionizes atoms and molecules in the upper atmosphere, resulting in free electrons and ions. Electron number density peaks in the F2 layer. *(New Scientist)*

Although the ionosphere may be considered as the lower boundary of the magnetopause, in many respects it exists independently. Ultraviolet light from the sun strips electrons from atmospheric constituents, giving rise to mixtures of free electrons and ions (ie plasma). Most ions originate from atomic oxygen in the F-region, while in the E and D regions there are also molecular ions of oxygen, nitric oxide and complex hydrates.

The ionospheric plasma is a "dynamic entity" diffusing and acquiring momentum. In the D and E regions the ionosphere forms only a small portion of the atmosphere but, farther away from the earth, what remains of the atmosphere is composed predominantly of low energy ("thermal") protons. Figs 11 an 12 are from the *New Scientist* article, which also discusses the F-region midnight trough that was mentioned in the June *TT* (p534).

Mobile ssb or fm?

In the August *TT*, in connection with the radio receivers conference at Leeds, mention was made of the work over the past five years on an ssb system for the commercial mobile radio service. This work, partly sponsored by the Wolfson Foundation, is aimed primarily at radio spectrum conservation. SSB would permit the use of 5kHz channelling rather than the current 12·5kHz channelling on vhf and 25kHz on uhf in the private mobile radio service, using fm or a.m..

For commercial applications it is necessary to make certain that the system would have sufficient frequency stability to ensure that no tuning of the receiver would be necessary, and for this reason various techniques such as a pilot carrier or pilot audio tones have been used successfully. However, before any new system comes into operational use it is also, of course, important that careful assessment be made of how, in practice, ssb compares with the a.m. and fm systems.

At Leeds, details were given of an elaborate initial Home Office subjective evaluation by users of ssb versus fm (12·5kHz and 25kHz channelling). This involved over 3,000 two-way contacts in which the users had no idea which system they were actually using, with identical-looking equipments switched round from time to time, and the contacts assessed similarly on a grading scale.

For those who tend to think of ssb as a mode capable of providing much better results than fm, particularly over longer distances, the results may come as something of a shock, although it should be emphasised that the tests were with *mobile* stations which present considerably greater multi-path and doppler-shift problems with ssb than with fm.

The general conclusions of these (and other tests carried out by Pye Telecommunications) are that: (a) At frequencies below 200MHz the 5kHz ssb gives performance slightly superior to either 12·5kHz-channelling fm or 12·5kHz a.m., but slightly *inferior* to 25kHz fm. (b) Above 200MHz, 5kHz-ssb can be used, but requires an extremely good agc system to maintain good speech quality if the vehicle is travelling at more than 30km/h. (c) With present technology it would be possible to use ssb for hand-portable as well as for vehicle-mounted equipment.

However, the Home Office trials (at about 160MHz) clearly showed that the advantages of 25kHz fm were *greatest* for the longer distances (over 15 km) where the field strength was less than about 3μV/m. In this area 74 per cent of the ssb contacts were rated excellent/good compared with 66 per cent of the 12·5kHz fm, but the 25kHz fm achieved a 91 per cent score. Only at close range (0-3km, field strength over 100μV/m) did the ssb equipment (99 per cent) score better than 25kHz fm (97 per cent). The 25kHz fm consistently outperformed 12·5kHz fm at all ranges, although between 3 and 15km, 12·5kHz fm marginally outperformed ssb.

It should be stressed that ssb offers the important advantage of the narrow 5kHz channels, though the Home Office trials have still to determine how close transmitters using the same channel can be located; the "capture effect" of 25kHz fm would suggest that it would be possible to re-use such channels without excessive co-channel interference much more often than for ssb stations, just as for broadcasting wideband fm (maximum deviation 75kHz and channel spacing ideally more than 200kHz) can show appreciable frequency conservation compared with double-sideband a.m. (unfortunately quite a lot of this advantage is lost with pilot-tone stereo).

These trials thus indicate that for amateur mobile operation there is a lot to be said for continuing to use fm with the existing channels, at least until the number of stations increases to such an extent as to make it essential to increase the number of channels without taking up more spectrum space.

SWL NEWS

Bob Treacher, BRS32525*

QSL cards

Your scribe's piece on QSL cards (September 1981) prompted a welcome response from FC6FPH—the disguise worn these days by G8KA. John remarked that he is one of those who answers all cards received from listeners, because, as he puts it, he can just faintly remember his swl days! He also comments that if a listener station simply wants "wallpaper", he should send his QSLs via the bureau—but he must be patient for the return card (something your scribe is always repeating in this page). However, the intelligent listener who realizes that he only wants one card confirmed from each country will be much better advised sending his cards direct. John says it is vital to enclose an addressed envelope and one irc to stations within Europe, and two or three ircs depending on the location of the station outside Europe. (Post offices have an airmail guide to overseas postage rates from which it can be determined whether two or three ircs are required.) Also sound advice, which should get you that desired card quickly.

John remarks that FC is not great dx, but of those who are licensed most are to be found on 144MHz (oh, for a lift to FC from southeast England!). He is the only English licensee resident on the island, and knows only too well that the cost of sending your card is put up by using ircs, but suggests it is a good start if listeners get all Europe confirmed. Lastly, John puts forward a very useful idea. As the *DX Callbook* is now expensive, he suggests making friends with an operator who gets a new callbook, say, every two years. This will lessen your chances of the address being out of date and thus the likelihood of your card being returned.

Also on the subject of QSL cards, G3ESO was inspired by your scribe's comments and has sent his QSL, which shows Stonehenge on a crisp winter morning. He took the photograph some years ago, but on his return to amateur radio decided to use it as his QSL. It is certainly unusual, and to discover more it is suggested that readers listen for G3ESO and drop him a card direct. G3ESO's card helps to illustrate the point your scribe was making about well-turned-out cards.

Newcomers

Quite a batch this time. Roger Pols, BRS31440, who last contributed to this journal in 1967 as A4182, has been very inactive since 1971, but now his two children are growing up he has treated them to an FRG7700! This will replace a rather well-used Lafayette HA63. He has a small garden so antennas are not quite what he would like but a groundplane for 14MHz, which he also uses on 1·8–7MHz through an atu, an inverted-V for 21MHz and a $\lambda/2$ dipole for 28MHz perform adequately. His list of goodies is quite extensive, but A4XIZ, CE3AIO, JA4GQS, OA3PDX, ZP5PX and 8P6OR stood out on 7MHz ssb during September. Roger lives close to G3LDI who recently held open house to a bunch of young would-be swls so that they could have a brief insight into the delights of amateur radio.

Archie Magrath, RS48064, is another newcomer to the hobby, and has a very good take-off near the North Sea at Ramsgate. He is currently studying for the RAE, which he intends to sit in December.

RS47473 is Giles Maddex, who has his brother, G8UZG, to thank for his BC348 receiver. Giles has a 100m long wire, but has trouble keeping it in place as he has another brother who uses the garden for motorbike scrambling and who has been known to become entangled with the antenna, as well as causing interference from the ignition.

Harry Cutter, BRS43882, uses a 9R59DS with a 210ft long wire, a homebrew atu and a homebrew notch filter. He lives near Royston, Hertfordshire, and has been interested in radio for some time. He likes to listen to the Navy nets, being an ex-radio mechanic in the RN, and has several awards, including the Royal Wedding Award. However, he considers the best one to be the Gozo Award, and he was the first G listener to claim it. He comments on one of a number of QSL cards he has received recently; from K0GAE/AM who was the captain of a USAF Boeing 747 flying above the Mediterranean.

*79 Granby Road, Eltham, London SE9 1EH

1981 countries table

Station	28	21	14	7	3·5	1·8	Total	Mode
RS42604	199	207	202	158	117	29	912	ssb
BRS14585	197	206	211	149	123	19	905	ssb/cw
BRS25429	186	207	209	112	105	32	850	ssb
BRS8841	157	198	224	116	96	6	797	ssb/cw
BRS48909	167	215	221	92	64	18	777	ssb
A8808	172	166	164	106	96	34	738	ssb/cw
BRS44703	133	155	169	105	93	11	666	ssb
BRS1066	136	163	161	83	64	38	645	ssb/cw
BRS35509	82	126	143	57	39	2	449	ssb
ARS42503	92	125	146	28	32	0	422	ssb
RS46228	37	111	106	128	28	2	412	ssb/cw
BRS44266	116	74	125	43	34	8	400	ssb
BRS41992	56	74	131	65	50	16	392	ssb
BRS18529	48	60	111	69	71	20	379	ssb
BRS31440	89	117	85	47	21	3	362	ssb
RS44218	81	85	111	26	21	5	329	ssb/cw
BRS40705	95	85	92	31	24	1	327	ssb
BRS46708	71	40	85	40	57	0	293	ssb
A9191	58	60	75	27	29	3	252	ssb/cw
ARS41349	44	73	51	25	34	2	229	ssb

DX swl

Good to have another contributor to this paragraph; Michael Saxton, ORS48081, who wrote from Detmold, West Germany. He has been a listener for some time but has only recently joined the Society. He uses an FRG7700 plus FRT7700 atu and FRV7700 for 144MHz, and he intends to have QSL cards printed to send to the dx he hears.

HF news

Derek Casson, BRS41992, wrote after a short absence, having added a few more new ones on 3·5MHz; the 28MHz band also showed signs of life during September, being open to VK and ZL late in the evening. He now has 207 countries heard and 60 confirmed. He is one of several reporters to mention the OE2VEL Pacific trip. It had been heard from KH8 and ZK2 and was also scheduled to visit A35, T2 and T32. Several mention hearing signals on both 28 and 7MHz for worthy additions to their all-time scores.

Graham Powell, RS46228, reports 9J2TJ, UK1PGO, 9G1JX, 5T5AY and 3B8AE/3B9 on 7MHz. He also mentions TA1MA and 4U1ITU on 3·5MHz. Graham now has 188 countries heard.

Brad Bradbury, BRS1066, had a good month for 1·8MHz QSL returns, with W8LRL, LZ1KDP and LA9PX obliging. He also received a card from ZM7ZR on 14MHz. Brad now has 228/266 confirmed.

Brian Wainwright, BRS44703, has installed a Datong active antenna with a home-made rotator and switch panel. He is pleased with the improved reception this addition makes. Brian reports FR0FLO/J on 28MHz, and JT0WA, D68AM, FK8DR and 5V7HZ on 21MHz.

Paul Crankshaw, BRS48909, also mentions FR0FLO/J on 28 and 14MHz for a new country, and he also heard FR0FLO signing FH0FLO from Mayotte on 21MHz. 28MHz activity provided A6XJC, A22ZM, HM1PW and 9Q5FL. On 14MHz Paul wonders how many VP8 licences there are. He reports six: AGX, AJL, AJM, QI, QP and ZR.

G3ZAY reports that he is the QSL manager for VP8ANT (G3CWI in disguise), who will be active from South Georgia in November, and Antarctica after that. All swl reports will be answered, and the QSL address is simply PO Box 146, Cambridge.

Mike Price, ARS45940, mainly listens on 14MHz during early morning hours. This has provided some good dx in the shape of A9XZ (QSL via PO Box No 26855, Bahrain), CE0AE, P29BS and T30DB. He also asks whether stations in nets always QSL. It is extremely difficult to offer an answer to this; so much depends on the individual station's QSLing habits, but with so many nets in existence now and with so many designed simply for "country chasers", your scribe considers that there must be better than a 50-50 chance of getting a card.

Robert Small, BRS8841, did not have too much to report as he had been /A in France and Monaco. However, he caught up with S9VCT (Principe and Sao Tome) Robert also comments on the improved 28MHz conditions, mentioning AH2L, P29NRL, VK9NS, VK9YC, VK9NYG and JA2KLT/3B9, all logged within one hour on 19 September.

Mark Mullins reports country number 287, in the shape of 7Q7LW.

VHF news

The highlights this time were the good tropo conditions which, very conveniently, coincided with the RSGB 144MHz Contest on 5–6 September. Several reporters mention good dx, the best of which was OK1KHI/P, HK29b; DK0SF, FL33b; DK9ZQ/P, EL69f; DF3DJ/A, EL31f; DK0GR/P, EK21j; LX0DX, DJ01g and F1FCV/P, DH06e. Many other DLs were active from the not so rare DJ, DK and DL squares. Some

(Continued on page 1040)

4 - 2 - 70

John Morris, G4ANB*

144MHz tropo dx record broken

At 2240gmt on 4 September 1981 Richard Baker, GD8EXI (XO77h), completed an ssb contact on 144MHz with EA8XS (SO73d) in the Canary Islands. The distance between the two stations is approximately 3,025km, which is thought to be a new IARU Region 1 dx record for 144MHz tropo. The contact was also the first ever recorded between the Isle of Man and the Canaries on 144MHz.

At 2221gmt on 4 September GD8EXI worked GW8JLY, who mentioned that an EI station had worked the Canary Islands. GD8EXI then turned his 14-element Parabeam towards the Canaries, a thing he had rarely done before, as "until now there has been no land that way". A weak, Spanish-speaking station was heard, and at 2240gmt GD8EXI called in and completed his contact with EA8XS. The two stations then moved up to 432MHz and tried to establish contact on that band, using 144MHz for talkback. This attempt failed, as did several others during the next 2h. Although EA8XS heard GD8EXI at S2, the signal in the reverse direction was only occasionally just detectable, and so the uhf contact was not completed.

EA8XS was copyable by GD8EXI on 144MHz for a total of 2h, and at one point his signals peaked at S9. The propagation was apparently by marine ducting over the sea path between the Isle of Man and the Canaries. GD8EXI also heard EA8XS working G5KW on the Isles of Scilly and making at least a partial QSO with GD3YEO. GD8EXI was using 400W p.e.p., and EA8XS 2kW.

Congratulations to both stations on this excellent 144MHz contact; and on the 432MHz one-way, which surely points the way for the future.

Late news. As we close this contribution, a report has just been received from ON5FF that EA8XS had worked TF6IG in Iceland on 144MHz on 9 August. No further details of this contact are known, but the distance must have been over the 4,000km mark, considerably exceeding that between GD8EXI and EA8XS. This in no way reduces the achievement of GD8EXI in working EA8XS, although it now seems that his contact took the UK rather than the IARU Region 1 144MHz tropo dx record. Further details of the EA8XS–TF6IG QSO will be given when they become available.

GB3WS closed down by RSGB

GB3WS (RB6, Sudbury, Suffolk) has been closed down and the RSGB, which holds all UK repeater licences, has revoked permission for its operation. GB3WS originally operated from a church in Sudbury, but in 1979 its mast was damaged and so the repeater had to be taken off the air. Earlier this year reports were received that GB3WS had been heard operating from a new location, although no site clearance form nor warning that the unit was ready to come back into service had been received by RSGB HQ. Accordingly, the GB3WS contact man was asked to clarify the situation and supply the appropriate documentation.

The ensuing correspondence failed to produce the legally-required paperwork, and more often than not no response at all to letters from RSGB HQ was forthcoming. In early September blank site clearance forms were sent by normal mail and recorded delivery, with the ultimatum that if one of these was not completed and returned within seven days permission to operate GB3WS would be withdrawn. This condition was not fulfilled, leaving RSGB HQ no option but to close GB3WS down and inform the Home Office and the contact man, again by recorded delivery, of this decision.

The vast majority of repeater groups are meticulous about keeping RSGB HQ informed of their activities, and the partnership between the actual construction and operation of repeaters by these groups and the central co-ordination provided by the Society usually works very well. In the final analysis, however, it is the RSGB which holds responsibility for all repeaters and is accountable to the Home Office for their operation. When, as in this case, differences occur and a repeater is not being run in the correct manner the Society can and must close it down.

The closure of GB3WS will no doubt raise in some minds the question of whether action should be taken over the illegal operation which takes place on some urban vhf repeaters. There is a very important difference. GB3WS was in effect an illegal repeater, as it was not being run according to the terms of its licence. Those units which suffer from the misguided antics of a few unfortunate souls are in themselves quite legal, but are being used in an illegal manner. The situation may be likened to that of a road builder, who may be blamed for building a road in the wrong place, but cannot really be held responsible if he builds a perfectly good road which is then used by people who commit road traffic offences. In the latter case, closing the road is not an acceptable solution.

The fact that GB3WS was originally licensed indicates a need for a uhf repeater service in that part of the country. Should any other group in or around west Suffolk wish to take over the GB3WS licence they are asked to contact the general manager at RSGB HQ.

Contest and tropo report

The IARU Region 1 144MHz Contest on 5–6 September coincided with an anticyclone over Europe which brought excellent tropo conditions on all bands from 144MHz upwards. Some European stations in the contest were heard making around 1,400 contacts during the 24h, and a few UK entrants approached the magic 1,000 QSO mark. G4BPO/P, in Suffolk, had the extremely frustrating experience of having both the main and stand-by generators fail, putting them off the air for 90min and leaving them just short of target with 985 contacts completed. The double breakdown was particularly ironic as the G4BPO group had never before suffered even a single generator failure.

On 144MHz the propagation generally favoured UK stations in the east and southeast, who were able to make contacts into Poland, Czechoslovakia, Austria and East Germany, including stations as far away as KI locator square. Although the conditions were better than average for most of the 24h, there were noticeable peaks at about 0200 and 0600gmt on the Sunday morning. GJ4ICD worked 19 countries during the contest, the best dx being OK1AIB/P (HK29b). G8LFB (ZL30f) who, like many others, was not actually entering the contest but came on to see what was about and give a few points away, found plenty of well-sited, high-power dx stations only too eager to work him. The best were OK3RMW/P (KJ62g) at 0607gmt, and OK1KHI/P (HK29b) at 0643gmt. The distance between G8LFB and OK3RMW/P was approximately 1,455km, and G8LFB was running just 25W to a 16-element Yagi for the contact.

Further west the propagation was less spectacular but still good. From a fairly modest contest site in south Oxfordshire the best for G4ANB (ZL34j) were DL6XZ/A (GJ65d) at 0635gmt and DJ9HO (GJ12d) at 1046gmt, with many less-distant German stations being worked through the night. G4DGU in north Devon found the conditions were good enough to be able to work stations in the east of the UK off the backs of their beams. Propagation on the north–south path was also good.

On 432MHz the opening produced some good tv dx. G4IMO in Essex and G8PTH in Kent both exchanged P5 pictures with ON5VW and ON4ABC during the morning of 6 September. During the evening conditions were slightly poorer, but F2XO in Boulogne sent colour pictures of his shack and grandson in SECAM, positive modulation, to G4IMO, who had a camera trained on the receiver and was recording the proceedings. Afterwards G4IMO transmitted the pictures back to F2XO in PAL colour!

Aurora

There were a few short auroral openings in 144MHz towards the end of August. G4IGZ (Nelson, Lancs) found an event in full swing when he turned the rig on at 1450gmt on 23 August. GM, GI and OZ stations were worked on ssb, but the 4CX350F in the linear was expensively blown up trying to work SM6EAN on cw. The activity faded at about 1600gmt. In the evening of the same day, at 2224gmt, GM3JFG (XR30b) worked LA7KK (FU62j) by aurora.

On 24 August GM3JFG made several medium-dx contacts between 1614 and 1649gmt, including LA2PT (FT13b). Another opening from 1556 to 1715gmt on 29 August brought contacts with LA, OZ, SM and DL. Among the best were DL1JF (FO62d) and SM6CMU (GR50b).

On 18 September G3COJ (ZL37a) found a short auroral opening from 2248 to 2246gmt and worked GM4ILS (YR24e) and GM4IAO (YR47h). Another opening on 26 September brought contacts with GM4ILS, GM4IAO, GM4COK (YP04b) and GM4IPK (YP05h) between 1754 and 1828gmt. Despite waiting up until 2330gmt, G3COJ heard no second phase.

*24 Collett Way, Grove, Wantage, Oxon OX12 0NT.

Sporadic-E

As an excellent summer for 144MHz sporadic-E draws rapidly to a close, several correspondents have been taking a respite and looking back through their log books. G4DSC (Ripon, N Yorks) was lucky enough to catch most of the 144MHz *Es* openings during the 1981 season, and altogether worked 16 countries by this mode. Luck by itself is never enough, and much of G4DSC's success can be attributed to careful observation and preparation. Shift working also helped. G4DSC has kindly provided several pages of notes and hints on *Es* prediction and operation, some very familiar, others quite novel. If these were reproduced now they would probably be forgotten by the time the 1982 season rolls round, so they will be saved until the spring. Do any other readers have any special *Es* operating techniques they would like to share with others?

G4DSC found a short 144MHz *Es* opening at 1515–1522gmt on 16 August and worked HG5AIR (JH47g), OK3KNM (JI15e) and OK3KCM/P (JI69g). Later the same day, at about 2000gmt, GJ4ICD worked into the YU6 area of Yugoslavia, and also heard several Greek stations.

GI4KSO (WO40d) has challenged the claim by GI8YDZ (*not GI8YBZ as reported in September's* 4-2-70; *apologies to GI8YDZ and G8YBZ)* for the *Es* dx record from GI. On 28 June 1979 GI4KSO, then using his old callsign of GI8JPG, worked IT9TDN (HY68b) by sporadic-E, a distance of approximately 2,420km. Can any other Northern Ireland reader better this? The GI8JPG–IT9TDN contact may also have been the first complete GI–IT9 QSO on 144MHz. Since taking up his Class A licence, GI4KSO has made the following contacts—some or all of which may also be 144MHz "firsts" from GI: OY5NS (WW77f) by ms on 3 January 1981; EA6FB (AY07j) and ZB2BL (XW64g) by *Es* on 10 July 1981; and CT1WW (WB63b) by ms on 11 August 1981. On the same subject, GJ4ICD has claimed a 144MHz GJ–EA9 "first" for working EA9HG on 30 July 1981.

50MHz

G3WBQ, in Surrey, has noticed an encouragingly early start to the autumn te season, with several ZS3 and ZS6 beacons audible from 1600 to 1900gmt on 14–16 September. This compares with the first reception of ZS3/ZS6 signals on 5 October in 1979, and on 9 October in 1980. ZD8TC has reported to G3WBQ that there is now a beacon in Nairobi on 50·105MHz. At present the equipment is quite modest, with only a dipole antenna, but the JA operator of the station is apparently planning to improve the set-up.

ZD8TC also mentioned that he can hear the PY2AA beacon between 50·059 and 50·062MHz, and not on the slightly lower frequency usually listed. The variation is caused by poor temperature stability of the beacon oscillator, so ZD8TC can check on the weather in Brazil by this means!

G4BPY heard the ZB2VHF 50MHz beacon by sporadic-E on most days during August, and the 70·120MHz beacon was also audible on several occasions. On 16 and 20 August G4BPY heard the 5B4CY 50MHz unit during the early evening. This beacon has now been fitted with a new solid state transmitter, and has been moved from the old frequency of 50·498MHz to the slightly different one of 50·501MHz. G4BPY is up to 22 countries worked by 28–50MHz crossband, with 20 confirmed, and is hoping to reach the quarter century by the end of the year.

50MHz was open again between 1619 and 1645gmt on 20 September, and G3COJ heard ZS6DN, ZS6BMS (alias G3HBW) and ZS6PW. After they faded out ZB2VHF came through on 50MHz, and later on 70MHz. G3UUT was believed to have worked ZS6LN by crossband.

Repeater news

Two new uhf repeaters were due to come on the air during September; GB3GR (RB11, Grantham, Lincs) and GB3SM (RB13, Leek, Staffs). A site change is pending for GB3YL (RB14, Lowestoft, Suffolk).

On vhf, GB3YJ (R7, Leamington Spa) was due to come into service on 26 September, but GB3NA is temporarily off the air.

Following a special one-off proposal, the Home Office has granted permission for GB3WH (R4, Abingdon) to move to a new site near Swindon and change channel to R2, and has issued a licence for a new vhf repeater, GB3VA, which will operate on R4 from Brill, Bucks. Exactly when the changes take place will depend on progress with the hardware for the two units. Before GB3VA can be brought on the air, a lightning conductor must be fitted to the church in which it will be located, but it is hoped that the repeater will be operational by the end of the year.

Those living on the south coast of England and some other coastal areas will be aware of the problems caused by the Syledis radiolocation system. This operates on a frequency between 432 and 433MHz and radiates pulses over a bandwidth of 6MHz. It is there quite legally, as radiolocation shares the 432MHz band with amateurs, but amateur activity tends to be more disrupted by Syledis than vice-versa. The GB3IW repeater (RB4, Isle of Wight) has been seriously affected during recent months, with a Syledis unit actually having been co-sited with the repeater, making it completely unusable. It is for this reason that GB3IW has been somewhat up and down in operation recently, through no fault of the repeater group. The vhf manager, G3WSN, and the Telecommunications Liaison Committee are currently examining the whole Syledis problem. Several approaches are being investigated, and it is hoped that a satisfactory solution will be found soon.

Awards

It has been a busy month for the vhf awards manager, with two FMD Supremes having been claimed and new heights in the 4-2-70 squares series reached on 70MHz.

Starting with the Four Metres and Down awards, Sue Firth, G8SFI, of York, earned a small but significant place in history by submitting a claim for the 144MHz Senior, No 166. Earlier this year G8SFI took the 432MHz Senior and 1·3GHz Standard awards, so this latest claim automatically brought her Supreme award No. 35. G8SFI thus becomes the first yl operator to hold the FMD Supreme—others please follow!

Derek Poulter, G3WHK, of Surrey, has taken 432MHz Senior No 75 and 1·3GHz Standard No 28. Added to his 144MHz Senior, earned back in 1978, these automatically brought him FMD Supreme award No 36, the fourth to be claimed this year.

Walt Davidson, GW3NYY, of Swansea, is another person who believes in saving postage by sending several award claims at once. Almost eight years ago G3NYY took the 144MHz FMD Standard for operations from London. Starting all over again from Swansea he has taken 144MHz Standard No 585 within 16 months of operating. At the same time GW3NYY claimed the 432MHz Standard (No 163), 144MHz Senior (165) and a Microwave Squares award, all for portable operation.

In the 4-2-70 Squares series, GW3NYY appears again, having taken the basic 144MHz 10 countries and 40 squares award, No 60, this time for operation from the home QTH. Still on 144MHz, G8VR has taken a sticker for 18+80, and actually provided confirmations from 24 countries in his claim. Up on 432MHz, G3XDY has taken a 10+40 sticker.

The most spectacular Squares awards reported this month, however, were for 70MHz operation. G3IKR, the first claimant of any 70MHz Squares award, has now graduated to the 8+30 category for operations from Wolverhampton. Gordon Pheasant, G4BPY, skipped the lower echelons of the 70MHz Squares series and went straight to the 10 countries and 35 squares level, the first-ever claim in that category. The 10 stations worked for the "countries" part of the award were as follows: EI2DJ on 4 April 1981; G3FDW on 2 August 1981; GD2HDZ on 20 April 1980; GI3RXV on 19 December 1980; GJ3YHU/A on 14 June 1981; GM3UKV/P on 30 July 1981; GU3HFN on 13 August 1981; GW3MHW on 9 June 1980; ZB2BL on 1 June 1980; and the QSO that made the claim possible, 5B4AZ on 7 June 1981.

My suggestion in September's *4-2-70* that the Squares awards could be extended again, possibly on an open-ended basis, produced a small but favourable response, but more suggestions would be most welcome. For example, how about dropping the countries requirements from the Squares awards and introducing a new, separate "VHF Countries Award"? Please send in your comments and ideas, which will all be forwarded to the VHF Committee.

Home Office rules—no "K"

Many rigs are fitted with pip-tone units, which transmit a short "bleep" each time the press-to-talk button is released. These are particularly popular, and useful, for contest and dx operating on ssb. As cw users will testify, an audio tone is rather more penetrating than a voice saying "over", and a pipe-tone gives a distinctive indication of the end of a transmission to the QSO partner. A few stations may also be heard using "K" tones, a "dah-di-dah" at the end of each over rather than a simple "T". The licensing position on end of transmission markers is as follows:

The Home Office has agreed that pip-tones may be used at the end of transmissions on frequencies greater than 144MHz. The tone is only to be used where there is poor copy due to weak or fading signals, in order to remove any ambiguity that the transmission has ended. The tone frequency should be 800 to 1,000Hz, and the recommended duration is 250±100ms. Note that while a Class A licensee could use the letter "K" rather than "T", a Class B licensee may only use a "T" by this agreement. Pip-tones are intended for use on ssb only.

In other words, the use of pip-tones on frequencies above 144MHz is a

concession granted by the Home Office in addition to the normal licensing conditions. They should not be used on 70MHz, nor on fm, where the presence or absence of a carrier serves to indicate whether the transmission has ended.

Leaving aside questions of legality and whether feeding a keyed audio tone into a less-than-perfect ssb transmitter produces true cw, the use of "K" tones, even by Class A licensees, does not seem to offer any operational advantage. At 12 wpm a morse "T" is 300ms long. At the same speed a "K" takes 900ms, three times as long. A minimum contact needs at least two transmissions so that the use of a "K" rather than a "T" can add over 1s to the time taken to complete a contact. Multiply this by several hundred contacts and add in all of the unanswered "CQ" calls and it is fairly easy to reach a total of 20–30min out of a 24h contest spent doing nothing except waiting for the "K"!

The "kiss" principle ("keep it simple, stupid") expounded by G3VA often applies to operational practice as well as technical matters. Although the generating hardware may not be so interesting to design and build, "T" tones are at least as effective as "K" tones for marking the end of transmissions. As they take less time on the air, "T" tones are therefore preferable from a practical point of view, as well as being permitted by the Home Office.

Reporting bad signals

Every contest brings reports of bad signals. It would be surprising if hundreds of rigs around the country could be uprooted and taken over rough ground to hill tops without one or two of them being knocked slightly out of kilter. A problem encountered by many operators, especially newcomers to vhf, is how to report a faulty transmission tactfully.

Bad signals on ssb come in two varieties; those where the audio is distorted in some way, reducing intelligibility; and those which spread over a wide bandwidth, commonly called "splattering". Audio distortion is quite easy to report; just a short call describing the symptoms is all that is needed. If the report is ignored the only sufferer will be the offending station itself, as the distortion will cause contacts to be lost. In most cases, however, a warning of faulty audio will be, if not exactly welcomed, at least gratefully received and acknowledged.

Reporting an apparently wide signal is a bit more tricky, as the signal from a nearby contest station can be very strong. (I recall on one occasion sitting at the bottom of a hill with a high power contest station at the top of the hill, about 1km away. The transmission from the contest station caused a visible movement of the needle of the meter on my swr bridge.) The problem could thus be caused either by a faulty or mis-tuned transmitter, or by strong signal effects within the receiver of the person making the report. Without access to specialist test gear the two effects are very difficult to distinguish. The dilemma is whether to make a report, and risk receiving uncomplimentary comments on one's receiver; or to keep quiet, perhaps allowing a station to continue transmitting a wide signal, albeit unwittingly.

One way of distinguishing between receiver overload and transmitter spread is to reduce the signal level, either by moving the beam or by fitting an attenuator between the antenna and the receiver. If the main signal level drops by 10dB and the splatter by 30dB, the problem almost certainly lies within the receiver. However, if a reduction in the strength of the main signal gives only the same drop in the splatter level, there is good evidence of a faulty transmission, which should be reported to the originating station.

If it is not clear whether the deficiency lies in the transmitter or receiver, then *make the report,* but also mention any uncertainty. A competent contest operator should accept the report and be able to evaluate it in the context of any other reports which have been received. If the transmission turns out to be clean then no harm will have been done, but if a mis-tuned transmitter *is* radiating a wide signal it is only by receiving reports that an operator can be made aware of the problem—and possibly avoid disqualification from the contest.

The same principles apply to non-contest operation. If a station appears to be putting out a faulty signal he should be informed, not as a complaint but as a courtesy, and hopefully the report will be received in the same spirit.

10 and 30 years ago

Browsing through the vhf columns of past issues of *Rad Com,* and its previous incarnation, *RSGB Bulletin,* is a fascinating—and occasionally enlightening—occupation. The following items seem particularly apposite this month:

"Two outstanding feats have recently been performed on the V.H.F's: firstly the European 2m. DX record was broken when G5YV (Leeds) contacted F8MG (Arcachon, Gironde), and secondly, G3DIV/A (Eastbourne, Sx.)—who only last month made the first 70cm. QSO with France—added two more countries to his bag on that band by exchanging signals with PA0PN and ON4UV."—G2UJ in *Around the V.H.F's,* November 1951.

The G5YV–F8MG distance was 635 miles, and the contacts made by G3DIV/A were G–PA and G–ON "firsts" on 432MHz.

The second item is rather more recent:

". . . the RSGB recently convened a meeting at which the VHF Committee and a group of members interested in the technical and operational possibilities of vhf repeaters embarked on an intensive session of exploratory work on the subject. There may have to be others. In due time it may be possible for Council to submit to the licensing authority a convincing case for permitting the installation and use of a repeater or repeater system in this country."—G5UM in *Four Metres and Down* November 1971.

Was that *really* only a decade ago?

Scatter

Gunter Hoch, DL6WU, is looking for sked partners on 432MHz to verify the validity of G3YGF's troposcatter predictions (*Rad Com* August 1981, p713). DL6WU's station has eme capability, with 250kW erp, and he would like to contact similarly-equipped stations about 1,000km away from EJ locator square. Interested operators should write to DL6WU at: Gersprenzweg 24, 6100 Darmstadt-Eberstadt, West Germany.

During an expedition to Andorra, G4IGZ bought a local map to work out his QTH locator, and having done so was somewhat disconcerted suddenly to find himself apparently relocated to the middle of the Mediterranean. Close examination of the map revealed that it specified longitude in degrees east of Madrid.

GJ4ICD has reported that the 432·830MHz Paris beacon, FX1UHF (BI21b), is back on the air and is audible nearly every day in GJ.

The report of the discovery by Brighton & DRS of a smoke device in their VHF NFD tent prompted G3LQI, the hf contests organizer for nearby Worthing & DARC, to suggest that "the smoke bomb was 'planted' by the organizers of that club's activities in order to cover up their own poor results in VHF NFD!" A bit of friendly local rivalry certainly adds spice to a contest.

GJ3RAX and GJ4JWA are both reported to be operational on 432MHz fast-scan tv from Jersey, each station running 100W.

G6CIY recently completed his first QSO through GB3CH. Nothing unusual in that, perhaps, except that G6CIY was originally licensed before the war as G8PH and has just become relicensed.

The production of children seems to be endemic among members of the VHF Committee. Latest to succumb was the chairman, G3VEH, and congratulations to him and yf on the arrival of a son, Oliver.

Please remember that the *4-2-70* "late news" deadlines are only for "stop press" reports. For inclusion in a given month all other news and views should arrive by the first date specified. All items for January 1982 to reach G4ANB by 14 November (late news by 24 November) and for February by 12 December (late news by 28 December) please. □

SWL NEWS

(Continued from page 1037)

stations in G-land worked into Y2, HB9, OE and SP, but these dx stations were not audible at those reporters' QTHs. The same good conditions allowed stations on 432MHz to work into SM and LA.

DX conditions on the vhf bands will now tend to be less favourable, but it is well worth keeping an eye on the weather map in the event of a high pressure anticyclone system giving some chance of temperature inversion in November, and remember that autumnal mists also give rise to some unusual conditions on vhf.

QSL cards reported include G8TRW/P, XJ05h; DC6ZF, EK65e; DC9NI/A, FK69j; SM6GFS, GR11j; OK1IDK/P, GJ28h, OZ9QV (ms), GP22f; and YU2RGO (ms), HF20c.

Here and there

Leonard Salaman, RS46145, attended the Harrow Show where the NW London Raynet Group set up a station alongside the Harrow Radio Club station. A good time was apparently had by all. Leonard passed on details of the Signals Gnatter Net each evening on 3,740kHz at 1830.

Copy for the January 1982 issue should reach your scribe by 17 November. □

A dissertation on the delights of duplex

by JACK HUM, G5UM*

PERSONS permitted to hear an amateur radiotelephony transmission for the first time in their lives react in one of three ways, so far as the author's observations go. If they wish to be excessively polite they will say something like "What a long and interesting broadcast!" (being unused to amateur parlance they tend not to say "transmission"). Or, more candidly, the first-time listener may be provoked into saying "Doesn't he run on rather! How can the man at the other end remember all he has said?". Thirdly, and more candidly still, the reaction may be expressed in a terse phrase "Long-winded old gas-bag!"

If amateurs are honest with themselves they must admit that there is some substance in such external opinions upon the way in which they conduct their affairs over the air. No layman needs to tell them that many a telephony "over" is far too long, and that in spite of the strictures published by the amateur radio press over the last three decades about monologues-on-the-air little improvement is noticeable.

Way back in the early days of amateur communication, the operation of changing from transmit to receive and vice versa was not the flip of a switch act which it is today. One tended to use one's transmit time to full advantage once an often-recalcitrant rig had been persuaded to radiate. Thenceforth the habit of long overs became a norm that was perpetuated: newly-licensed people heard them, thought they were the accepted manner of conducting contacts, and copied them.

Much later, voice-operated equipment helped to speed up overs to the extent that amateur electronic communication began to take on some of the characteristics of the face-to-face conversation which is the normal human being's speech pattern. However, vox does not confer the capability of instant, uninterrupted response typical of a landline conversation. There is a rather different medium which does: it is called duplex. Operators who have tried it react with delighted enthusiasm, expressed in such terms as "This is better than television—I feel I can almost *see* you!" and "This is a real conversation stimulant—I thought we might run out of things to say when we went duplex, but it's quite the reverse".

Others who have not essayed the delights of duplex express themselves in more cautious terms. Doubts are expressed as to whether or not duplex is permitted by the terms of the licence, and technical problems that might make the mode difficult or impossible to use are foreseen. Such misgivings are readily allayed when an operator, upon being persuaded to re-read the terms of the licence, discovers that there is absolutely nothing in it to forbid or even to restrict duplex operation. As for the imagined technical problems, these turn out to reduce themselves to the more obvious precautions of avoiding desensitization of the home receiver by home transmitter, and of arranging, when crossband duplex is envisaged, not to select a frequency in, say, the 432MHz band which might be dropped upon by the third harmonic from a talkthrough emission in the 144MHz band.

Which brings us by easy stages to the question "In-band or crossband?".

In-band . . .

For in-band duplex operation, duplicate equipment and antennas are needed. Operator A will transmit at one end of a band and receive Operator B's signals near the opposite end of the band. This postulates practising duplex in the vhf and uhf spectrum where adequate separation of transmitted frequencies is possible—and, by the same token, of received frequencies also. Even then, care must be exercised not to set up either of the frequencies in an unsuitable part of the band. If fm is to be used—and in the vhf context it nearly always will be—it should not encroach upon a non-fm area of either the 144 or 432MHz bands, nor quite obviously upon a repeater area. Which areas to avoid are clearly delineated in the published band plans [1]. Something else no practitioner of duplex will wish to do is to use any of the popular "S" or "SU" channels, in constant use most of the day. Such constraints still leave the would-be duplex operators with a large amount of frequency spectrum on 144 and 432MHz in which to practise the art at no discomfort whatever to other users.

The possibility of desensitization (eliminated by adequate separation of frequencies) is less of a disadvantage of in-band duplex than the need to possess duplicated equipment. The operator who prefers to buy rather than to build may be daunted at the prospect of laying out £200 for a second transceiver that offers no more than his existing equipment does, except to give him duplex facilities. Instead, he may prefer to invest in a transceiver for another band, thus furnishing him with simplex facilities there when he needs them. In other words, a considerable case may be made for operating duplex on a crossband rather than an in-band basis.

27 Ingarsby Lane, Houghton-on-the-Hill, Leicester LE7 9JJ.

A selection of do's and don'ts of duplex

1. Adhere to Clause 7 of the licence and keep a listening watch on the frequency of emission at intervals of at least 15min and preferably as frequently as 5min.
2. When an open microphone is used in the transmission path, wear headphones to avoid the possibility of retransmission of the received signal.
3. Transmit callsigns and exact frequencies in use every 15min and preferably every 5min.
4. If your callsign is not in the callbook announce your location often.
5. Never invite a Class B operator to crossband into an area for which he is not licensed (for safety keep above 144MHz).
6. Select duplex frequencies in quiet parts of the bands in use: never settle on popular S-channels; but . . .
7. Strictly observe Footnote 4 in the schedule to the licence.
8. Use commonsense and impeccable operating procedure at all times; you never know who may be listening.

. . . Crossband

Greater flexibility of operation comes as soon as crossband duplex is considered. "De-sense" problems disappear (so long as the operator avoids the obvious pitfall of transmitting on, say, 144·6MHz and expecting to receive his partner on 433·8MHz!). There is a wealth of uncluttered frequencies (channels, if you like) in both the 144 and 432MHz bands where (again within the requirements of the vhf/uhf bandplan) duplex links may be set up to the great pleasure of the participants, to the curiosity of the casual listener, and at no inconvenience to any other user.

Crossband duplex imposes on both participants the duty to announce frequently who they are talking to and on what frequency. Another obligation is to lift carriers at frequent intervals (say every 5min) to ensure that nobody is being inconvenienced who might wish to use the frequency.

Social obligations

The foregoing paragraph contains a hint about the social obligations arising from the use of duplex (and all other modes, for that matter, because a social obligation arises with every radio transmission ever made, including even a brief 20s contest exchange, particularly if this should occur from a high-power sender on a prime site).

Recognising, then, his social and licence obligations, the user of duplex takes care that no ambiguity at all shall accompany his operating practices; that, for example, a Class B licensee shall never talk to an operator on a band denied to him (eg, 70MHz or 1·8MHz) [2], and that positive identification of himself and his operating frequency shall be made very often.

"I can hear myself coming back": this is the magic moment signifying that duplex contact has been successfully achieved. But other listeners, too, can hear that "coming back" through the receiving station's loudspeaker. To suggest using headphones is an obvious alternative, but most participants may prefer to use a speaker for two important reasons: first, it allows the QSO-partner to gain some idea of what his own transmission sounds like, and second, it effectively sustains the ambience of face-to-face human conversation that only duplex operation gives.

Nevertheless it is important that after the partner has had the opportunity to hear himself coming back the home loudspeaker output should be reduced. The Home Office is not enamoured of this so-called "open microphone" technique: for this reason alone, apart from social considerations, it should be practised with the greatest care and responsibility.

In other words, to play safe, use headphones; but recognizing that your QSO-partner will wish to hear what his own transmission sounds like, invite him to give you a counting check (1 to 10) to hear his own voice via your own microphone for technical reasons only, *without* his callsign. Then resume the headphones.

What of the swl? To him duplex requires only a receiver and an antenna. Interesting and more sophisticated avenues are open to him, however, if he wishes to hear both sides of a crossband contact; eg, by using switchable converters into the main station receiver to do so.

Could greater use of the duplex mode—while strictly observing the social obligations outlined above and the terms of the licence—gradually replace the old-fashioned longeurs which have dogged amateur radio speech communication for 60 years? There are many operators who, having tasted its delights, hope so.

References

[1] RSGB vhf/uhf band plans. *Rad Com* January 1981, page 50.
[2] *Rad Com* January 1981, page 30.

MICROWAVES

Charles Suckling, G3WDG*

1·3GHz fm repeaters licensed

Ten repeaters are now licensed for the 1·3GHz band: GB3AA, Alveston, Avon (RM0); GB3BH, Watford, Herts (RM0); GB3BW, Brentwood, Essex (RM6); GB3CP, Crawley, West Sussex (RM3); GB3LN, Greenwich, London, (RM15); GB3MC, Horwich, Lancs, (RM0); GB3PS, Barkway, Herts, (RM3); GB3RU, Reading, Berks, (RM9); GB3MM, Bloxwich, W Midlands (RM6); and GB3WX, Brighton, Sussex (RM9).

The specifications for these units are as follows:

(a) Input/output spacing is 6MHz.

(b) Channel spacing is 25kHz, although 75kHz will be used initially.

(c) The repeater transmitter will operate continuously (with F1 identification) when the repeater is not being accessed.

(d) The talkthrough mode of the repeater will be initiated on receipt of a carrier plus 1,750Hz access tone. When in talkthrough, the F1 identification will be replaced by F2.

(e) Some repeaters will transmit an inaudible tone (at 100Hz) when in talkthrough mode. This will enable mobile stations to use tone-operated squelch if desired.

(f) AFC will be employed in the repeater receiver.

(g) Repeater output frequencies are: RM0, 1,297·00MHz; RM3, 1,297·075MHz; RM6, 1,297·15MHz; RM9, 1,297·225MHz; and RM15, 1,297·375MHz. All inputs are 6MHz low, eg RM0, 1,291·00MHz; RM3, 1,291·075 etc.

(h) Antenna polarization will be horizontal.

As can be seen, these repeaters will differ in two important ways from lower-frequency units. The first difference is the radiation of a continuous carrier by the repeater when not being used in talkthrough mode. The main reason for this is so that mobile stations can determine when they have a workable path to the repeater, without constantly needing to test for access by transmitting. Since mobile propagation losses on 1·3GHz are more variable than on lower frequencies, this should be a very valuable feature. The availability of a continuous signal will also allow the repeaters to be used as an aid to setting up equipment, as well as for tropospheric propagation monitoring.

The second difference to lower-frequency repeaters is the use of horizontal polarization instead of vertical. It seems to be somewhat easier to construct higher-gain omnidirectional antennas with horizontal polarization. The Alford slot antenna (see *Microwaves* August 1981) is a good example. A vertically-polarized antenna of comparable gain would be considerably more difficult to make. On 1·3GHz, propagation losses are higher than on the lower bands, and experience with mobile propagation has shown that every last decibel of performance will be necessary for fm mobile to be successful. Thus the attraction of vertical, ie that very simple low-gain antennas (such as the $\lambda/4$ whip) can be used, does not apply on the microwave bands. The use of horizontal polarization also means that stations already active on 1·3GHz need not erect different antennas for repeater working.

UK to Holland on 2·3, 3·4 and 10GHz

During a lift on 7 September, G4BYV (Norfolk) worked PA2HJS (CK) on 3·4GHz over a 388km path. Signal reports of 539 were exchanged. The transmitter used by G4BYV on 3·4GHz consisted of a 10W source at 384MHz tripled to 1,152MHz and tripled again to 3,456MHz. On receive, an interdigital mixer with an HP2565 diode was used. The antenna was a 4ft dish with a dual-band feed (2·3/3·4GHz) designed by DC3QS, fed through 100ft of FHJ-4 heliax cable. On 2·3GHz, G4BYV worked PA0EZ, PA2DOL, PE0AGO, PA0HEJ and PA0FRE, all at 59! G8ADC worked two PA stations on 2·3GHz from his Luton QTH. G3LQR is reported to have worked Holland on 10GHz.

G4BYV notes that he has already constructed a second local oscillator chain for 2,320MHz, so that split-frequency contacts can be made with DL stations, who are no longer permitted to operate below 2,320MHz.

*46 Windsor Close, Towcester, Northants.

Beacon news

G8AGN reports that the GB3MLE 10GHz beacon is now operational from Emley Moor, on 10,400MHz. It is located at 900ft asl and should be audible over a wide area. A sectoral horn antenna beaming 173° true and fed from a 40mW Gunn oscillator is used. Reception reports would be most welcome, and should be sent to G8AGN, QTHR.

Rain-scatter tests on 10GHz

During the stormy weather in September a number of stations were involved in some very interesting experiments with rain-scatter propagation. G4KNZ at his home QTH near Slough was copied 40dB above noise by G3YGF in Oxford over a non-optical path, using only 1mW of narrow-band. G4KNZ also copied G3JVL. These paths are not workable under normal conditions! Similarly, G3FYX (near Bristol) copied signals from G4MBS (near Alton).

It is worth noting that all stations were operating from home, and that this was probably the first case of rain-scatter being exploited by so many stations at once. The success of these tests is most encouraging, since it means that many fixed station–fixed station paths can be worked on 10GHz without needing high-power equipment, and it will be very interesting to see what new paths can be covered on 10GHz during the winter bad weather (when one does not feel like going portable!).

A feature of rain-scatter propagation is that very often, particularly over shorter paths, the scattering centre is well above the horizon at one or both stations. Thus it is not necessary to possess a good location in order to be successful with this mode of propagation; in contrast to line-of-sight or tropospheric scatter.

Regular skeds

Do you have a regular sked on any of the microwave bands? The writer would be pleased to publish details of any regular skeds so that others can look out for them. To start the ball rolling, here are details of two regular skeds:

Frequency	Time	Stations	
1,296·205MHz	11pm daily	G3WDG(ZM65d)	G3JVL(ZK16f)
10,368·150MHz	10pm daily	G3YGF(ZL14d)	G3JVL(ZK16f)

Microwave award holders

The number of microwave award holders continues to grow steadily, and it is interesting to review the list from time to time. The writer is very grateful to G5UM, the vhf/uhf awards manager, who compiled the following lists.

"Four Metres and Down" 1·3GHz Award
No 1 G3MCS 1967; No 2 G4BEL 1973; No 3 G3WDG/P also 1973; No 4 G3OBD/P; No 5 G3DAH, No 6 G3JVL, all 1974; No 7 G3NHE 1975; No 8 G3KAC 1975; No 9 G3JXN, No 10 G3EHM, No 11 G4BYV and No 12 G8GDZ/P all 1976; No 13 G3XDY/P 1977; No 14 G8GP 1978; No 15 G3HCW 1978; No 16 G3DY, No 17 G3TDG and No 18 G6XM all 1979; No 19 G3SPJ, No 20 G8BHH, No 21 G3COJ, No 22 G8IFT, No 23 G8FMK and No 24 G3TQF all 1980; No 25 G8SFI, No 26 G3XDY and No 27 G8GXE all 1981.

"Four Metres and Down" 1·3GHz Senior Award
No 1 G4BEL 1976; No 2 G3DAH 1979; No 3 G8GP 1980; No 4 G3TDG 1980; No 5 G3OSS 1981.

"Four Metres and Down" 1·3GHz Receiving Award
No 1 BRS34348 1978.

"Four Metres and Down" Microwave Award (for first contact over 600km on 1·3GHz)
No 1 G4BYV; No 2 GM8BJF; No 3 G3DAH; No 4 GD2HDZ; No 5 G3KMS; No 6 G3ZEZ; No 7 G3LRP; No 8 G3PQY/P; No 9 G8GP; No 10 G4BEL; No 11 G8IFT; No 12 G8LEF; No 13 G8BFX; No 14 G4ASR; No 15 G3XDY; No 16 G3XDY/P; No 17 G8MWR; No 18 G8LHT; No 19 G8GNE; No 20 G8LZM; No 21 G3HCW; No 22 G8ART; No 23 G8FIS; No 24 G8SFI; No 25 G3TDG; No 26 G3TQF; No 27 G3PBV; No 28 G8GXE No 29 G3OSS; No 30 G8GRT; No 31 GM8MBP.

Microwave Squares Award, 1·3GHz band
Five squares category: No 1 G8MWR, No 2 G4FRE, No 3 G3SPJ, No 4 G4FAW, No 5 G8FMG, No 6 KA1GT, No 7 G8GXE, No 8 G8FMK, No 9 G8KAX, No 10 G8ABP, No 11 G3TQF, No 12 G3PBV, No 13 G4FSG, No 14 G4FSG/P, No 15 GW3NYY/P, No 16 G8LZM. Ten squares category: No 1 G8LEF, No 2 G3XDY, No 3 G3SPJ, No 4 G8IFT, No 5 G8GXE. Fifteen squares category: No 1 G3XDY/P, No 2 G3XDY, No 3 G8LEF, No 4 G8ART, No 5 G3TDG, No 6 G3OSS. Twenty squares category: No 1 G8BFX, No 2 G3XDY. Twenty-five squares category: No 1 G4BEL, No 2 G3XDY. Thirty squares category: No 1 G4BEL, No 2 G8BFX.

"Four Metres and Down" Microwave Award (for first contact over 500km on 2·3GHz)
No 1 G3LQR, No 2 G4BYV, No 3 G8PQF.

Microwave Squares Awards, 2·3GHz band
No 1 G4BYV (five squares), No 1 G4BYV (10 squares).

"Four Metres and Down" Microwave Award (for first contact over 150km on 10GHz)
No 1 GW3RPE/P (1971), No 2 G3ZGO/P, No 3 G8APP/P, No 4 G3ZKR/P, No 5 G3WDG/P, No 6 G3BNL/P, No 7 GW3EEZ/P, No 8 G8CVS/P, No 9 G8AZU/P, No 10 GW8CKT/P, No 11 G3KSU/P, No 12 GC3WJG/P, No 13 GM3DXJ/P, No 14 G3OXX/P, No 15 GM8BKE/P, No 16 GW4BRS/P, No 17 G3VPF/P, No 18 GM8HEY/P, No 19 GW4ALN/P, No 20 G3JHM/P, No 21 GW8FJG/P, No 22 G8BDJ/P, No 23 F0AKD/P, No 24 G2RY/P, No 25 G4DDK/P, No 26 G8ANZ/P, No 27 GW8DUP/P, No 28 GW8EHK/P, No 29 G8AXE/P, No 30 G8ARO/P, No 31 G8BCO/P, No 32 G3FYX/P, No 33 G8GKV/P, No 34 G3NKL/P, No 35 GM3OUR/P, No 36 G8PMT, No 37 G4HUP/P, No 38 G3UKV/P, No 39 G3ZME/P, No 40 G4DBM/P, No 41 GW3YGF/P, No 42 G3JVL, No 43 BRS40670, No 44 F6DLA/P, No 45 G3FNQ/P, No 46 G8CIU/P, No 47 G3YJH/P, No 48 G2DSP/P, No 49 G4ETU/P, No 50 GW3NVK/P, No 51 EI2VDF/P, No 52 G8SHF/P, No 53 G8ADP, No 54 G3MTG/P.

Microwave Squares Award, 10GHz band: Five squares category: No 1 G8GKV/P (1978), No 2 G8BDJ/P; No 3 G3KSU/P, No 4 G3JHM/P, No 5 G8PMT, No 6 G4CNV/P, No 7 GW3YGF/P, No 8 G3ZME/P, No 9 F5DLA/P, No 10 BRS40670, No 11 F0AKD/P, No 12 G3YJH/P, No 13 G2DSP/P, No 14 G4ETU/P. □

THE MONTH ON THE AIR

John Allaway, G3FKM*

LETTERS continue to arrive in reply to the comments by G3YDX in September *MOTA*. Their content ranges from the majority (which support the viewpoint put forward) to others who feel that the present situation is perhaps not as serious as is suggested. Typical of the latter is the following by Henry Lewis, G3GIQ:

"As an active dx'er and a participant in list operations, both as caller and controller, I would welcome the opportunity to reply to G3YDX through the columns of *MOTA*.

"Attempting to turn the clock back on events is not possible, even for radio amateurs. Lists and nets were not invented for their own sake, they appeared in response to a genuine need resulting from a vastly increased amateur population, much improved and easily available equipment, and a new degree of frantic international competitiveness. None of these factors is likely to disappear.

"Any observer familiar with ssb operation can recall occasions when a fruitless pile-up has been converted to an orderly stream of QSOs by the intervention of an effective net control operator. This works particularly to the benefit of the less-competitive station, who would never aspire to 'break' the pile-up. The concept of a helping hand seems to this writer to be more akin to the spirit of amateur radio than the more usual exclusion of the weak by the strong.

"I strongly refute the implication that, in general, list contacts are not honest but manufactured, and contend that it is highly presumptuous to assert that only QSOs made by other means are worthwhile. I should, however, like to add that I have also observed doubtful list operations. These are relatively rare and reflect only on the controller and participants, and do not devalue the concept.

"In reply to your question, Ron, you received no action from the ARRL because, as far as most of us are concerned, you are indeed a voice in the wilderness. May I be permitted to modify someone else's famous comment: 'If you don't like the heat it may be prudent to leave the kitchen'."

ARRL Bulletin No 93, dated 12 September, contained good news for all those who use 7MHz. At a meeting of the ARRL Board of Directors on 10 and 11 September it was decided not to petition for the 7,075–7,100kHz part of the 7MHz band to be released for telephony use by Extra Class licence holders. All non-USA users of this band will be delighted that this decision has been taken.

G4LFG reports the receipt of QSL cards for low-power contacts, mostly on 28MHz and made out to operator "Jim". Information would be appreciated by Mr Michael Davis, G4LFG, QTHR.

Overseas news

G3MCS has received a letter from UK0AMM which says that the station will be active on 1·8 and 3·5MHz every weekend from 1 October this year, and that information is given out on 14,220kHz at 1300 every Friday and Saturday. There is a possibility that rtty will be in use from UK0AMM early next year, and, in addition, special equipment for eme work on 144MHz and 430MHz is available—this runs about 1kW input to an antenna with 25dB of gain. The hf station uses six-element Yagi beams on 14, 21 and 28MHz, with four-element verticals on 3·5 and 7MHz. A four-element and a three-element vertical are under construction for 1·8 and 3·5MHz, as well as a six-element horizontal beam for 7MHz, six-element Yagi beams for 21 and 14MHz, and a 24-element vertical "for all bands". The most active of the club's operators are Leo, UA0ADR; Serg, UA0ACE; Bob, UA0AAK; Yuri, UA0AAA; Paul, UA0103-267; as well as the letter writer, Victor, UA0103-235.

Publicity Release No 81-02 from the IARU Region 3 Association lists a number of items concerning the Solomon Is Radio Society. The Controller of Posts and Telecommunications, Honiara, has approved the following: From 1 January 1982, amateurs in the Solomon Is may use the band 10·10 to 10·15MHz on a non-interference basis. In addition, the bands 18,068 to 18,168kHz and 24,890 to 24,990kHz will be made available to Solomon Is amateurs on an exclusive basis once ITU transfer procedures are completed. However, the Controller promised to investigate the release of the two higher bands earlier, but on a non-interference basis. The SIRS application for H4 amateurs to use the band 7·1 to 7·3MHz was ultimately successful, and now amateurs in two countries in Region 3 may use the top 200kHz of 7MHz—Solomon Is and New Zealand. Australian amateurs are permitted to operate 7·0 to 7·15MHz, and the WIA is currently negotiating with the Australian administration to increase the upper limit to 7·3MHz. The SIRS has also received an undertaking that "mode band plans" will not be enforced by Government legislation. The SIRS is a relatively new member of IARU Region 3 Association; the members are very active and have a society club station, H44SI.

China

Philip Weaver, VS6CT, president of HARTS, has kindly forwarded a copy of a press release issued following recent events in China. It is dated 12 September 1981, and reads: "The Boeing Employees ARS delegation arrived in the PRC on 4 September 1981 and departed on 12 September. We were the first official international amateur radio delegation to visit China in more than 32 years. Our host was the Chinese Institute of Electronics, a branch of the Fourth Ministry of Machine Building. The delegation members consisted of C. P. West (W7EA), H. Oman (K7HO), R. W. Hudson (K7LAY), and W. P. Showers (KC7CF), all being Boeing employees from Seattle with a total of more than 110 years of Boeing service. Our other sponsor was the Western Washington DX Club. Contributors to our expedition included the R. L. Drake Co, who supplied two complete TR7 stations; Telex Hygain who supplied two tape dipoles, and ARRL who supplied a copy of the film *Wide World of Amateur Radio* and a few books.

"Our delegation prepared and presented a four-hour slide presentation covering amateur radio in the USA. This presentation was made in each of the cities that we visited. Although we did not expect to operate we were permitted to set up a demonstration station in Beijing and communicate with our home city, Seattle. This historic event occurred at about 10pm Beijing time on 6 September. Our contact in Seattle, representing our two clubs, was W7PHO, and our callsign in Beijing, also representing our two clubs, was K7LAY. We are very sorry that we could not talk to more stations. The Chinese advised us that our transmissions were the first authorized amateur radio communication demonstration in more than 32 years, truly a historic event. This contact signifies the increasing friendship between our two nations.

"A second historic event occurred on 9 September. With the assistance of our delegation, the Chinese in Beijing installed a TR7 station, and the Chinese in Shanghai also installed a TR7 station. Successful communications were established between Beijing and Shanghai by Chinese operators for the first time in more than 32 years. The operator in Beijing was Chen Ren-Mo and the operator in Shanghai was Hsu Y. C. Mr Hsu was licensed many years ago as XU8CH and C1CH. Although propagation was not good between Beijing and Shanghai, communications were established about 1045pm on 9 September—the station in Beijing used the callsign C1E, and the one in Shanghai used the callsign K7LAY. Both stations were heard in many countries with strong signals. The Drake equipment performed excellently despite much rough handling during transportation.

"The Chinese asked us to tell the world that their top government leaders are solidly behind amateur radio, and before long China expects to establish many friends throughout the world through the medium of amateur radio.

"Our delegation was overwhelmed by the reception we received in China, and very honoured to be the first official amateur radio delegation to China and to demonstrate amateur radio. In China we met many old-timers, and our meetings with them were precious events in all our lives.

"We are very appreciative to our hosts in China, the China Institute of Electronics, and to the China National Radio Sport Commission and the Shanghai Institute of Electronics."

DX news

The *ARRL Bulletin* referred to earlier also gave notice that after a date to be established by the ARRL Awards Committee, credits for single-mode DXCC will not be granted for crossmode contacts. It also confirmed that the band plan to 1·8MHz described by K1ZZ in August *QST* was to be accepted—this retains the "dx window" between 1,825 and 1,830kHz, and adds an additional area where USA amateurs should not transmit between 1,850 and 1,855kHz. The whole segment 1,800–1,900kHz was released in full to USA amateurs on 21 May this year.

* 10 Knightlow Road, Birmingham B17 8QB

ZK1CB is active from Rarotonga in the S Cook Is. He has Icom IC730 and IC701 transceivers with a TH6DXX, CL36 and vertical antennas. Victor also holds the callsigns 5W1DJ and KA7HRK/KH8, and he advises direct QSLing as cards going via the bureaux take up to a year to reach him. There now seems to be some doubt about the location of ZK1DG who was originally believed to be in the N Cook Is.

Although KH3AB should have left Johnston Is his place will have been taken by AH3AA, who promises to be very active.

T30DB is on Tarawa and expects to remain there for about two years. He has an FT101ZD with a vertical antenna but should have a linear amplifier and tri-band beam soon. T30AC and T30AE have also been worked from the UK—the former on 14MHz ssb and the latter on 21MHz ssb. It is believed that QSL cards from T3AF (who operated in November 1980) are not being accepted for DXCC credit as they do not indicate in which part of Kiribati the station was located.

F2CL has been issued with the call FB8WG, and was due to leave Reunion Is on 5 September for Crozet Is with the relief crew for the island's weather station. He may not be able to get on the air until November. It seems that there is a TR4 transceiver already on the island but its condition is unknown—however, F2CL is taking his own HW101 transceiver, and the TXDX group in Dallas has provided him with a modified SB102 vfo unit which will enable split-frequency operation to take place.

D68AM is active once more and keeps a schedule with K0VVV on Tuesdays and Thursdays at 1930 on 21,285kHz.

EA1QF, QSL manager for C31MF, EC1AD, EC1BW, EC9AA, 3C1AB, 3C1CE, 3C1JP and 3C1MM, may now be reached at the address in "QTH Corner".

A reminder that the CANADX net should have resumed its Sunday meetings at 1600 on 14,173kHz by the time this is being read. The net is for dx information exchange.

VK9YC is often to be heard on 28MHz ssb around 1100. He also operates on 14MHz and has been worked on 7MHz cw.

Belize, formerly VP1, became independent on 21 September. The new prefix is V3A, and old calls seem to be using their previous suffix letters following the V3A. Contacts made on 21 September are being QSLd with special cards supplied by the Belize Government.

ZL3AFH/A has been off the air due to equipment failure but should be on again by now. ZL2HE, dx editor of *Break In* (the NZART monthly magazine) reports that ZL4PO/C, Lester (formerly ZL3PO/C) will be active from Chatham Is for three years commencing this month. His equipment consists of a TS820 with V-beam antennas, and Lester is in charge of Post Office operations on the island. ZL3PA/C is still active, and ZL4OY is said to be likely to come on the air from Campbell Is this month.

Expeditions

At the time of writing, it was being rumoured that a group of Spanish amateurs (EA2FZ, EA2JG and EA8AK were mentioned) hoped to visit Albania sometime this autumn and to operate with a ZA call. The latest estimated date was early December, but obtaining permission from the Albanian authorities is a very large stumbling block and it will be somewhat surprising if the operation takes place.

David Schoen, N2KK, will be in N Yemen for six weeks commencing mid-November. He will be working for the N Yemen Government and is hoping to be able to take some radio equipment with him and operate.

Information received by *QRZ DX* from VU2BBJ indicates that there may be an expedition to the Laccadive Is during November or December. There seems to be considerable doubt about the recent VU7AN operation by VU2JPN and VU2WTR (both of whom are Japanese nationals working in India). It is believed that proper permission was not obtained—the islands are dangerous to visit as they are the home of raiders who attack shipping in the area.

Karl Renz, K4YT, left the USA at the beginning of October for Mauritius. From there he expected to go to Malagasy, Tanzania, Malawi, Kenya, Rwanda, Burundi and Somalia. He hopes to be able to operate from stations in these countries, but has some equipment with him which can be used if this arrangement is not practicable. He should be in each country about one week, but is often delayed and should still be active when this is read. All QSLs should be sent via W2TK.

Iris and Lloyd Colvin, W6QL and W6KG, set forth once again on 1 October on an expedition which they expect to continue for at least six months. They have applied for operating permission in "several very rare countries", but in any case their itinerary calls for month-long stays in 8P6, 9Y4, FY, PZ, 8R1 and PJ2. As before they will divide their time equally between cw and ssb, and their normal frequencies will be 28,025, 28,550, 21,025, 21,285, 14,025, 14,225, 7,025, 7,185, 3,525 and 3,800kHz. This time special efforts will be made to use 3·5 and 7MHz. The Colvins have the largest collection of QSLs filed alphabetically in the world, and they are still collecting—all cards should be sent via the YASME Foundation (See "QTH Corner").

In a letter which arrived just before *MOTA* went to press, Jim Smith, VK9NS, wrote from W Samoa where his wife, Kirsty, and he were taking a holiday and operating as 5W1DK and 5W1DG respectively. He said that their visit to Tokelau had gone well and that propagation into Europe had been very good. No linear had been used but Jim found that his groundplane and beam had worked extremely well—the transceiver being an Icom 701. The cost of reaching ZM7 from Apia was high—some US$9,000. The expedition to Heard Is is still awaiting confirmation from the charter boat, but Kirsty has now received permission to accompany the party and be the sixth operator. Another possibility exists but this would involve Kirsty and Jim only.

Awards

Quarter Century Award

Issued by the British Amateur Radio Teleprinter Group for proof of two-way contact with, or reception of, at least 25 countries. Endorsements are available for each extra 25 countries. Submissions should consist of the QSL cards or photocopies which have been witnessed and signed by two other licensed amateurs. Claims may also be sent as a list of QSLs (with full QSO details) certified by two recognized radio club officials or a national radio society. Any BARTG contest log may also be used if the claim is sent in with the log entry. Send £0.50, US$3 or 15 ircs to Ted Double, G8CDW, 89 Linden Gardens, Enfield, Middlesex, EN1 4DX. Additional stickers cost 20p or two ircs (plus 50p or five ircs if QSLs are submitted).

Australian Ladies Amateur Radio Association Award

For contacts with five members in at least four Australian states since 30 June 1975. Send log extract certified as correct by two other licensed amateurs, plus seven ircs, to ALARA Awards Custodian, Mavis Stafford, VK3KS, 16 Byron St, Box Hill South, Vic, 3128, Australia. Band/mode endorsements are available. Contacts made during official ALARA nets do not count. These rules will apply for applications made after 1 January 1982.

Worked All DU

For confirmed contact with all nine call areas in the Phillipine Is (DU1-DU9). Single or five band or mode endorsements are available.

Worked All Asean Award

For contacts with operators in the Association of Southeast Asian Nations—five with DU, and one each with Malaysia, Indonesia, Thailand and Singapore, since 1 January 1970. Endorsements as in the WADU. For either award send certified list of contacts signed by two club officers plus US$4 (ircs will not be accepted) to E. F. Zambrano, PO Box AC-166, Quezon City 3001, Phillipines.

Certificado Permanente del Radio Club Villa Carlos Paz

For contact with 23 Argentinian stations, the first letters of whose sufffix letters (ie the province indicator) spell "Radio Club Villa Carlos Paz" plus club station LU4HAW, or three members of the club. Send certified log data (signed by two licensed amateurs) and US$5 or 10 ircs to Award Manager, RC Villa Carlos Paz, Casilla de Correo 104, 5152 Villa Carlos Paz, Cordoba, Argentina.

Contests

September *CQ* contained results of the **1980 CQ WW DX Contest (Phone).** UK scores were as follows:

		SINGLE-OPERATOR			
Callsign	Band	Points	Callsign	Band	Points
G3FXB	All	3,770,819	**GD4HOX**	28MHz	7,222
GM3BCL	All	667,224	**G3NFY**	21MHz	264,513
G3VAO	All	298,158	G3ZHL	21MHz	54,796
G3MWZ	All	54,900	**GJ5DPW**	21MHz	52,195
GJ5DPU	All	50,544	**G3VPW**	14MHz	659,492
GJ5DPV	All	9,576	**GJ5DPX**	14MHz	59,012
G3MXJ	28MHz	1,182,880	**G3TKR**	3·5MHz	8,404
G3SNN	28MHz	423,472	**GM5AXY**	3·5MHz	5,400
G3TXF	28MHz	31,570			

G3FXB was world eighth in the all-band section, and **G3MXJ** world sixth on 28MHz. In the **QRP section G4BUE** was top world entry with 493,844 points from 905 QSOs—the other UK entrants were G3FTQ who was 11th with 99,495 points, and G3WFL who was 18th with 48,811 points. GM3RFR (39,697) was 20th of the 61 entries.

QTH CORNER

CR9AN	Box 468, Macao
EA1QF	PO Box 351, Longrono, Spain
GW3IRK	A Whitehill, TMDE/FEI, ACRC-A, APO 09178
OE1ETA/KH6	via OE2DYL (see ZK2TA)
OE1ETA/KH8	
OE2VEL/KH6	
T30AE	PO Box 276, Bikenibeu, Kiribati
V3ASC	PO Box 461, Belize, Belize
V3AWS	PO Box 306, Belize, Belize
VK0JP	via VK2KKK, Box 50, Grose Vale, NSW 2753, Australia
YASME	YASME Foundation, PO Box 2025, Castro Valley, Calif. 94546. USA.
ZK2EL	via ex OE2DYL, D. Konrad, Bessaralierstr. 39, 5020 Salzburg, Austria.
ZK2TA	
ZL2HE	Arthur Law, P.B., Mangatoro, Dannevirke, New Zealand.
3V8VT	Dr V. Thompson, Box 32487, Phoenix, Az, 85064, USA.
5H3TM	Box 429, Mbeya, Tanzania.
5T5AY	via W4LZZ, J. Bernier, 121 Alonquin Tce, Indian Harbour Beach, Fla, 32937, USA
5V7WI	via DK9KD, D. Loeffler, Postf 620260, D 5000 Koeln 60, FR of Germany.
5W1DD	via OE2DYL (see ZK2EL)
5W1DG	J. Smith, Box 103, Norfolk Is, 2899, Australia
5W1DK	Kirsti Smith, Box 90, Norfolk Is, 2899, Australia.

MULTI-OPERATOR SINGLE-TRANSMITTER

GW6GW	8,641,050 points	**GW4BRS**	1,536,080 points
G6UW	4,188,716 points	G3KMI	755,730 points
G3HTA	3,077,212 points	G4CVZ	589,893 points
G8JC	2,278,516 points	**GD5DPA**	182,410 points
G6CW	1,583,301 points		

Congratulations to **GW6GW** who came world fourth.

All Austria Contest
1900 21 November until 0600 22 November.
1·8MHz cw only. Exchange RST and serial number (from 001)—these must be confirmed by the receiving station repeating the whole code. Each QSO counts one point, and the multiplier is two for each OE Bundesland (OE1-OE9) and one for each other prefix worked. OE stations are allowed to use 1,823–1,838kHz, 1,854–1,873kHz and 1,897–1,900kHz. Send logs before 15 December to OVSV, "AOEC 1981", Postfach 999, A-1014 Wien, Austria.

The Czechoslovakian Contest
0000 to 2400 8 November.
1·8 to 28MHz phone and cw. A station may be worked only once on each band. Exchange RS/T plus ITU zone (UK is 27). Each contact counts one point but three if with OK. Score is total QSO points multiplied by sum of ITU zones worked on each band. Use separate log for each band and include summary sheet with usual declaration that rules have been obeyed, and post before 31 December to CRC, PO Box 69, 11327 Prague 1, Czechoslovakia. Applications may be made for the "100 OK" and "S6S" awards if a request is submitted with a log.

European DX Contest (RTTY)
0000 14 to 2400 15 November.
Rules similar to other sections of the WAE DX Contest. However, it is permitted to work other stations in one's own continent in this part (but not with one's own country). QSOs with same continent count one multiplier on each band (including 3·5 and 7MHz) and QTCs are not allowed with own country. Deadline for logs is 15 December.

IPA Contest
7 and 8 November—0000–0300, 0700–1000 and 1400–1800 each day.
Non-members of the International Police Association RC send RS/T and serial QSO number, members prefix with "IPA" before the code. Activity will centre around 3,575, 7,025, 14,075, 21,075 and 28,075kHz (cw) and 3,650, 3,775–3,800, 7,075, 14,295, 21,295 and 28,650kHz (ssb). QSOs on 3·5 and 7MHz count two points, but eight if "dx". All count four points on 14, 21 and 28MHz. Multiplier is IPA countries plus IPA USA states worked on each band added together. Logs should be posted before 31 December to IPARC, WA8VDC, T. D. Jenkins, 3327 Cloverdale W.B., Monree, Mich, 48161, USA.

Navy Radio Operators Contest
1200 14 November to 1600 15 November.
All bands cw only. Organized by Italian Navy Old Rythmers Club. Copy of rules from G3FKM (sae please).

Around the bands

The G8KG summary of the past month's conditions reads as follows: "The period of sustained high solar activity which began in August continued well into September. The 2,800MHz solar flux was above 200sfu for 39 consecutive days (12 August to 19 September) with peaks of 270 on 28 August and 260 on 6 September. It is interesting to note that in October/November 1979 there were 44 consecutive days above 200sfu, but the average level during the recent period was somewhat higher than at that time.

"The monthly mean flux for September looks like being close to 220sfu, which means that the average level of flux during the past 12 months has been higher than in any other 12-month period in the present cycle—ie the smoothed curve continues to be very flat-topped.

"By the end of September the daily flux values had again risen above 200sfu, but the indications were that the spell of very high activity had ended. For stations in the northern hemisphere it would, of course, have been better if this spell had come a month or two later so that it coincided with the seasonal improvement in dx conditions. Nevertheless it produced some excellent days on the higher bands, with 28MHz well open to all continents by the middle of the month."

Smithy concluded his letter by saying that we are approaching the point where activity sometimes takes a sudden dive before recovering later in the cycle. The following are thanked for supplying logs from which the next section has been compiled: G2s DHV, HKU, G5JL, G8KG, G3s GVV, HCT, IMW, KSH, LOL, GM3LYY, GM3PPE, G4s AXD, DSE, EHQ, JVG, LRS and RSs 1066 and 25429. Callsigns listed in italics were cw.

HF propagation study

Band Predictions for November 1981

UTC	28MHz	21MHz	14MHz	7MHz	3·5MHz
	000001111122	000001111122	000001111122	000001111122	000001111122
	024680246802	024680246802	024680246802	024680246802	024680246802
EUROPE					
Moscow	....8‡‡95...	...1999992..	...78778982.	986432235898	‡‡42....25‡‡
Malta	....79876...	....999995..	11.687789972	998532236899	‡‡42....3‡‡‡
Gibraltar	....27655...	....899995..	88778971	998853225799	‡‡‡52...25‡‡
Iceland	.....4775...	....189993..	....7888992.	886353346788	‡‡‡52...34‡‡
ASIA					
Osaka	....83.....	...2971.....	2..575433314	....1..13672	.....34.
Hong Kong	...2‡‡83....	...4888831..	2...55568742	13685	352
Bangkok	...4‡‡‡‡6...	...3688993..	3...15568954	1.....13686	354
Singapore	...588886...	...4688993..	2...15568964	1.....13685	352
New Delhi	...5‡‡‡8....	...558895...	422..4568645	62.....13688	3.....355
Teheran	...6‡‡‡‡6...	...8678994..	645412568976	862....13678	53.....345
Colombo	...6‡‡‡‡7...	...4478995..	52...2568976	5.....13688	2.....355
Bahrain	...6‡‡9951..	...75689961.	7542.1468987	861....13678	53.....34‡
Cyprus	...3‡‡‡971..	...88899961.	543755678985	8852..124788	‡‡2.....4‡‡
Aden	...6‡‡‡‡83..	1..645789842	8652..268998	861.....3677	53.....345
OCEANIA					
Suva (S)	.....3773...	....478983..	..117556861.	...21..131..	.....
Suva (L)	1...4431.353	22.287754864	..266435761.	....11...21..	.....
Wellington (S)	....47753...	.....888882..	...47556861.	....1..131..	.....
Wellington (L)	....22....12	221.76421554	..246435662.	....1...21..	.....
Sydney (S)	...388885...	...6988992..	...265568831	....1..1351.	.....2..
Sydney (L)	....21.....1	1.1.7631.244	...175455851	....1...23..	.....
Perth	...688764...	...5688895..	2...15568974	13662	.....33.
Honolulu	.....2..	....1...271.	143.6331761.	..452..131..	...2.....
AFRICA					
Seychelles	...6667632..	2..444788842	863...368999	73.....3678	5.....345
Mauritius	...57888841.	21.444789963	862...268999	61.....3688	3.....455
Nairobi	...58889762.	32.644589985	9842...58999	861.....3677	53.....354
Salisbury	...356788741	53.644479997	9942...37999	861.....2688	53.....355
Capetown	1..167888863	64.554468998	9943...15899	862.....478	53.....55
Lagos	1...‡‡‡‡‡863	75.475468998	99673..15899	7772.....588	455.....25‡
Ascension Is	1...88778533	651.85446888	99865...1699	7784.....168	555.....35
Dakar	....8‡‡8‡962	541.97547998	998562..2799	77851....268	5452.....45
Las Palmas	....6‡99972.	99889972	675286557899	888631..1588	‡‡‡3.....25‡
S AMERICA					
South Shetland	46777652	441.88766777	787574311246	23431.....1	.....
Falkland Is	47788862	432.88654577	8985752...37	57751.....1	2442.....
Rio de Janeiro	28766641	332.77444686	998473...168	87751.....5	5452.....2
Buenos Aires	47777751	322.88643476	9983751...37	67751.....2	4452.....
Lima	.....‡‡‡85.	111.14854465	7882654...16	57851.....1	2452.....
Bogata	.....‡‡‡85.	1.1..4854464	7782154...27	77752.....2	4442.....
N AMERICA					
Barbados	.....7‡‡‡85.	1.1..8844585	8782453...58	77752.....5	4442.....2
Jamaica	.....‡‡‡84.	..1..3864574	77814541...37	77752.....2	4442.....
Bermuda	.....4‡‡‡84.	..1..8866784	777155411268	77752.....4	4442.....2
New York	.....8‡‡83.	4887772	777145542367	67652.....3	4432.....
Mexico	.....‡‡83.	486452	677152451..5	37752.....	.452.....
Montreal	.....18‡‡83.	5888872	777145554467	67652.....13	3432.....
Denver	.....4871.	88751	676151265235	37752.....	.442.....
Los Angeles	.....861.	38741	576.52.65213	16752.....	.342.....
Vancouver	.....24..	.....783.	575.52.57554	25652..11...	.242.....
Fairbanks	.....	....11.1351.	563.65457864	23552..13321	..22.....

1·8MHz. 2100 *EA8AK, UL7CAD, 4U1ITU.*
3·5MHz. 0600 EA8YV, F0HS/FC, *FP8AA, HC1MD/5,* NA6T, PY3TE, W0ZV (Col), YV4CB, ZL4KF. **1800** *VS6CT.* **2000** *HZ1AB.* **2200** UK9CAE, VK6HD. **2300** *CX8DT,* RK0A, UL7GAA.
7MHz. 0500 *OY3H, W6·W7, HB9ASF/ZB2, ZF2BN.* **0600** FO8FO, FP8AA, HH2SD, T30BI, *V3AUR,* VE7s, VK9NS, *XT2AW,* ZK2EL. **0800** *KH6IJ* **1700** FR7CE. **1800** FR0FLO, VK5BW, ZL1AZV, 3B8AE/3B9, 8Q7AZ. **1900** FR0FLO/J, JA5BJC, ZS6BUT. **2000** *G3KTR/5N9,* **2100** *CN0IV.* **2200** *LU8DQ,* TR8DX, UK0A, VP2VFW. **2300** *UA1PAM,* 7X2LS.
14MHz. 0000 VP9HM/P. **0400** HI8KW, **0500** DF9FM/ST3. **0600** AH8A, KA2MI, KL7MF, YJ8RG. **0900** SP2BHZ/JW, **1700** F0AHY/FC. **1800** A22AK. **1900** C21NI,

T30AB, IV3OSH/5R8. **2000** T30BI, VP8ZR, 3D2ET. **2100** KV4AA. **2200** FY7BO, JA, 9V1UQ.

21MHz. 0800 VK, ZL, 5W1DG. **1200** XT2AE. **1400** A9XBD, HM1SX, VK9YC. **1500** KB7RV (Nev), KL7FG, P29NRL, 9M2HC. **1700** KH6BOG, VK, OE5JTL/YK, ZS, 9Q5L. **1800** S79CC, VK0AM, 7Q7LW. **2000** A71AD, T30AT, VP8s AGI, QP, ZD8TC, 9X5PP. **2100** S83H, 7Q7LW.

28MHz. 0800 KP4KK/DU2, JA, *ZC4YC*. **0900** *OD5LX*, **1000** H44PT. **1100** AP2HB, FR0FLO/J, J3AH. **1400** UK1PGO, VK8OB, VS6CT. **1500** *HS1AMM*, TL8JM, VK4, VK6XB, W6-W7 and VE7 (until 1900), VP5RAC, 9Q5L. **1600** 5N8BRC. **1700** A22AA, HK0EHM, VK0AM, VU. **1800** C5ACK, *VP8AGY, YB0BRT*, 5H3TM, 7P8BJ. **1900** CE0AA. **2000** *CE0AA, G3MUV/CE0, FR7BP/J*, S79WHW, 3B8AE/3B9. 2100 J73CB, VK2, ZL3ME.

Thanks to all who contributed to this month's column, and to the authors of the following for items extracted:- **DX'press** *(PA0TO)*, **CQ Magazine** *(W1WY)*, **DX NL** *(DL3RK)*, **Lynx DX Bulletin** *(EA1QF/EA2JG)*, the **DX Bulletin** *(K1TN)*, the **Long Island DX Bulletin** *(W4UL/W2IYX)*, **DX News Sheet** *(Geoff Watts)*, the **Ex-G Radio Club Bulletin** *(W3HQO)*, and **Long Skip** *(VE3EUP)*.

Please send all items for **January** issue **to reach G3FKM** no later than 27 November. □

Propagation predictions

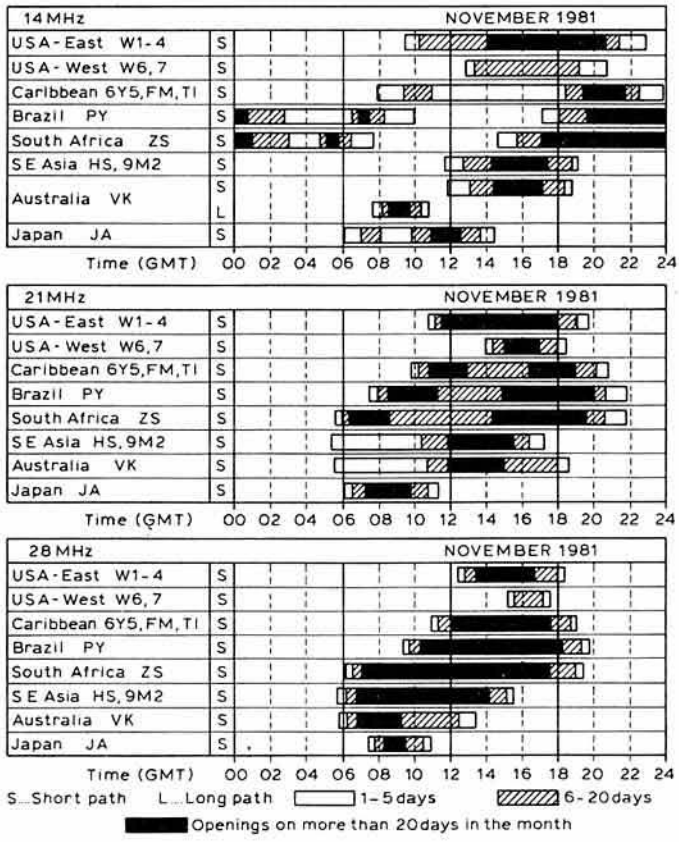
Propagation conditions will remain at their maximum on the **28** and **21MHz** bands, but this autumnal maximum will be slightly lessened, as we are in the declining arc of the sunspot cycle. This decline will be mostly steady, but sudden changes may occur from one month to another. Such a sudden fall in sunspot activity cannot be accurately forecast, so this uncertainty has to be taken into account in these predictions. Accepting that sunspot activity will slowly but steadily fall in the coming months, traffic with all continents will be possible on **28MHz**; western North America will only be heard on favourable days with above average mufs. Due to seasonal conditions **28MHz** will close during the winter season between 1800 and 1900gmt.

All continents will be heard on **21MHz**. DX via the indirect path will be possible on this band as well as on **14MHz** under favourable conditions. Towards the end of the month **21MHz** will close about 2000gmt.

On **14MHz** dx will be possible during the afternoon and until about midnight. During the latter half of the night practically the only traffic possible will be with South America and Africa.

There will be no noticeable changes from last month on **7** and **3·5MHz**; the latter will be interrupted by the dead zone during the early morning.

The provisional mean sunspot number for August 1981 from the Sunspot Index Data Centre was 158·2. The maximum daily number was 233 on 30 August with a minimum of 102 on 6 August. The predicted smoothed numbers for December 1981, January and February 1982 are 120, 118 and 116 respectively.



Mobile rallies calendar

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

13 December—Leeds & DARS Christmas Rally, The Pudsey Civic Centre, Pudsey, near Leeds. Convenient access M1, M62, M621 and rail station 1min walk away. Ample car parking, licensed bar, excellent catering facilities. Talk-in on S22 and SU8. The rally will cater for all electronic and radio hobbies. Further information from G4FIM, G4IMF or G6CNP, or tel 0532 794507.

23 May 1982—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.**

Special event station

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

GB2VER, 1-30 November
The station celebrates the 21st Anniversary of the Verulam ARC of St Albans. It will operate on the hf bands and 144MHz ssb. All QSLs will be acknowledged. Details from G4JKS, tel St Albans 59381.

Looking ahead

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

6 November—RSGB lecture at the IEE, London. "F-layer propagation above 30MHz during sunspot maximum of Cycle 21", by F. M. Smith, G8KG.
6-8 November—WACRAL annual conference weekend, Cliff College, Calver, nr Sheffield. Details from sec G3AGX, QTHR. Non-members welcome.
5 December—RSGB AGM, IEE, Savoy Place, London.

1982
9 January—RSGB Presidential Installation, Derby.
20 March—RSGB VHF Convention, Sandown Park.

Contests calendar

7-8 November	IPA *(Rules in November MOTA)*
***8 November**	144MHz (CW) *(Rules in August issue)*
8 November	Czechoslovakian *(Rules in November MOTA)*
14-15 November	Esperanto (ILERA) *(Rules from G4MR, QTHR)*
14-15 November	Second 1·8MHz *(Rules in October issue)*
14-15 November	European DX (RTTY) *(Rules in November MOTA)*
14-15 November	Navy radio operators *(Rules in November MOTA)*
15-16 November	European DX (RTTY) *(Rules in July issue)*
21 November	Verulam ARC transmitting and receiving *(Rules in November issue)*
21-22 November	All Austrian *(Rules in November MOTA)*
29 November	Verulam ARC transmitting and receiving *(Rules in November issue)*
November/ December	BATC Cumulative *(Rules in July issue)*
6 December	144MHz Fixed *(Rules in October issue)*
23-24 January 1982	White Rose SWL *(Rules in October issue)*
6-7 February 1982	7MHz (Phone) *(Rules in August issue)*
27-28 February 1982	7MHz (CW) *(Rules in August issue)*
13-14 March 1982	Commonwealth *(Rules in November issue)*
20 March 1982	AGCW—DF uhf/vhf cw (432MHz) *(Rules in June issue)*

*IARU co-ordinated date

Verulam ARC Transmitting & Receiving Contest 1981 rules

Section 1. 1·8MHz 2000-2400gmt, Saturday 21 November
Section 2. 144MHz 0900-1300gmt, Sunday 29 November
The rules of the contest are the same as published on page 1055 of the November 1979 *Radio Communication*, with the following exception:
Post separate logs for each section of the contest to F. Claytonsmith, G3JKS, 115 Marshalswick Lane, St Albans AL1 4UU. Entries must be postmarked not later than 20 December 1981.
Copies of the rules may be obtained from G3JKS.

CONTEST NEWS

RSGB HF Contests Championship 1981-2 rules

1. RSGB hf contest general rules do not apply.
2. No entries for the championship are required.
3. The championship will be decided on the basis of RSGB hf single-operator contests held between 1 October 1981 and 31 July 1982.
4. Points will be awarded to the leading 10 UK stations in the results published in *Radio Communication,* as follows:

Contest	Position									
	1	2	3	4	5	6	7	8	9	10
21/28MHz Telephony	80	70	60	50	40	30	20	15	10	5
21MHz CW	80	70	60	50	40	30	20	15	10	5
2nd 1·8MHz	40	35	30	25	20	15	10	5	0	0
1st 1·8MHz	40	35	30	25	20	15	10	5	0	0
7MHz CW	70	60	50	40	30	25	20	15	10	5
7MHz Phone	70	60	50	40	30	25	20	15	10	5
Commonwealth	100	90	80	70	60	50	40	30	20	10
Low power	30	25	20	15	10	5	0	0	0	0
R Round-up	60	50	40	35	30	25	20	15	10	5
Summer 1·8MHz	40	35	30	25	20	15	10	5	0	0

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

The Commonwealth Contest 1982 rules

TRANSMITTING SECTION

1. The general rules for RSGB hf contests, to be published in the January 1982 issue of *Radio Communication,* will apply.
2. When. From 1200gmt on Saturday 13 March 1982 to 1200gmt on Sunday 14 March 1982.
3. Eligible entrants. Members of the RSGB resident in the UK, and radio amateurs licensed to operate within the British Commonwealth or British Mandated Territories.
4. Contacts. CW (A1) only in the 3·5, 7, 14, 21 and 28MHz bands. Contacts may be made with any station using a British Commonwealth callsign, except those within the entrant's own call area. UK stations may not work each other for points. In accordance with IARU recommendations, contestants are requested to operate within the lower 30kHz of each band, except when contacting novice stations which operate above 21,100kHz and 28,100kHz.

The Commonwealth Contest is a single-operator, single-transmitter event. Evidence of simultaneous operation on more than one frequency may result in disqualification.
5. Scoring. Each completed contact will score five points. In addition, a bonus of 20 points may be claimed for the first, second and third contacts with each Commonwealth call area (as listed in the accompanying table) on each band. All British Isles prefixes (G, GB, GD, GI, GJ, GM, GU and GW) count as one call area.
6. Logs. Separate logs are required for each band. Each band log should be separately totalled and should include, at the end, a check list of call areas worked on the band. Logs must include gmt, callsign of station worked, RST/serial number sent, RST/serial number received and points claimed. Separate band totals should be added together and total claimed score entered on the cover sheet. It is important that logs are carefully checked for duplicate contacts. Unmarked duplicate contacts for which points have been claimed will be heavily penalized and logs containing in excess of five will be disqualified.
7. Entries. Entries may be single- or multi-band. Single-band entries should show contacts on one band only; details of contacts made on other bands should be enclosed separately for checking purposes. Multi-band entries will not be eligible for single-band awards.

Each entry will consist of the separate band logs together with a cover sheet, summary and declaration that the rules and spirit of the contest were observed.

Entries should be addressed to D. J. Andrews, G3MXJ, 18 Downsview Crescent, Uckfield, East Sussex TN22 1UB, England. Adjudication of this contest will commence on Monday 17 May 1982. Any entry received after this date may be excluded from the contest. Overseas stations are therefore advised to forward their logs by airmail.
8. Awards. To the winner, the BERU Senior Rose Bowl; to the runner-up, the BERU Junior Rose Bowl; and to the leading UK station, the Col Thomas Rose Bowl Certificates of merit will be awarded to: (a) first, second and third placings in home and overseas multi-band sections; (b) the leading home and overseas single-band entries on each band; (c) the leading station in each overseas call area.

RECEIVING SECTION

1. When. Times and dates as for the transmitting section.
2. Eligible entrants. Members of the RSGB resident in the UK, and all swls resident in the British Commonwealth or British Mandated Territories. Only the entrant may operate his receiving station for the duration of the contest. Holders of transmitting licences are not eligible to take part.
3. Scoring. To count for points a station outside the entrant's own call area must be heard in a contest contact. CQ or test calls will not count for points. A station may be logged only once on each band for the purposes of scoring. When both stations in a contact are heard they should be logged separately and points claimed for both entries provided that the stations are outside the entrant's own call area.

Each completed log entry will score five points. In addition, a bonus of 20 points may be claimed for the first, second and third stations heard in each Commonwealth call area on each band. All British Isles prefixes count as one call area.
4. Logs. A separate log is required for each band. Logs should show the date/time gmt, callsign of station heard, RST/serial number sent by the station heard, callsign of station being worked, and points claimed. A check list showing the call areas claimed on each band must be included.
5. Entries. Each entry will consist of the log sheets, check list and a signed declaration that the receiving station was operated in accordance with the rules and spirit of the contest and that the entrant does not hold an amateur transmitting licence. Entries should be addressed and sent as in rule 7 of the transmitting section.
6. Awards. The BERU Receiving Rose Bowl to the winner. Certificates of merit to the leading entrant in each continent.

COMMONWEALTH CALL AREAS

The following call areas are recognized for the purpose of scoring in the 1982 Commonwealth Contest:

A2	Botswana	VR6	
A3	Tonga Is	VS5	
A5	Bhutan	VS6	
C2	Nauru	VX9	Sable Is
C5	Gambia	VY1	Yukon
C6	Bahamas	VY0	St Paul Is
G/GB/GD/GI/GJ/GM/GU/GW		VU	India
H4	Solomon Is	VU	Laccadive Is
J3	Grenada	VU	Andaman & Nicobar Is
J6	St Lucia	YJ	
J7	Dominica	ZB2	
J8	St Vincent	ZC4/5B4	
P2	Papua New Guinea	ZD7	
S2	Bangladesh	ZD8	
S7	Seychelles	ZD9	
T2	Tuvalu	ZE	
T3	Kiribati	ZF	
VE1		ZK1	Cook Is
VE2		ZK1	Manihiki
VE3		ZK2	Nuie
VE4		ZL1	
VE5		ZL2	
VE6		ZL3	
VE7		ZL4	
VE8		ZL	Auckland & Campbell Is
VK1		ZL	Chatham Is
VK2		ZL	Kermadec Is
VK2	Lord Howe Is	ZM7	
VK3		3B6/3B7	Agalega & St Brandon
VK4		3B8	Mauritius
VK4	Willis Is	3B9	Rodriguez Is
VK5		3D2	Fiji
VK6		3D6	Swaziland
VK7		4S7	
VK8		5H3	
VK9	Christmas Is	5N2	
VK9	Cocos Is	5W	Samoa
VK9	Norfolk Is	5X5	
VK0	Heard Is	5Z4	
VK0	Macquarie Is	6Y5	
VK0/VP8*	Antarctic	7P8	
VO		7Q7	
VP1		8P	
VP2A	Antigua, Barbuda	8R	
VP2E	Anguilla	9G1	
VP2K	St Kitts, Nevis	9H.	Maltese Is
VP2M	Montserrat	9J2	
VP2V	British Virgin Is	9L1	
VP5	Turks & Caicos	9M2	W Malaysia
VP8	Falkland Is	9M6/9M8	E Malaysia
VP8	S Georgia	9V1	
VP8	S Orkney Is	9Y4	
VP8	S Sandwich Is		
VP8	S Shetland Is		
VP9			
VQ9	Chagos		
VR1	British Phoenix Is		

*All calls operated from Commonwealth controlled areas of the Antarctic (VK0, VP8, ZL5 etc) count as one call area.

3·5MHz Field Day 1981 results

In summer the 3·5MHz band during daylight, and particularly during the current part of the sunspot cycle, is perhaps not the best setting for a nationwide low power contest. So maybe the smaller number of portable stations active this year, resulting in the lowest entry for some time, is not too surprising. Most entrants commented on the reduced activity and thus welcomed the proposal that 7MHz should be included in future. G4DJX suggested that the morning session should be devoted to 3·5MHz and the afternoon to 7MHz. G3XTJ (of G3RTE/P) feels more activity would be created if the event coincided with VHF NFD. The HF Contests Committee will carefully consider all your views and suggestions before the rules for the 1982 field day are published.

G3VER/P, operated from Royston HFD by G3JKS and G4DJX, the leader in the 15W section, used a TS120V with a dipole at 34ft. The winners in the 5W section, G4DDX/P, located at Weston HFD, used a TenTec Argonaut and a dipole 25ft high. GW3SB/P, with his HW8 and 66ft of wire was the runner up.

Subject to Council approval, the Houston-Fergus Trophy will be awarded to G3VER/P and certificates of merit will be sent to G3SEN/P, G3RTE/P, G4DDX/P, GW3SB/P, and G3KKQ/P.

G3NKS

15W SECTION

Posn	Callsign	QSOs	Points	Posn	Callsign	QSOs	Points
1	G3VER/P	74	535	7	G3IFF/P	37	325
2	G3SEN/P	60	475	8	G4ELZ/P	33	290
3	G3RTE/P	62	460	9	G3YRC/P	23	240
4	G3ORY/R	52	430	10	G4HPS/P	24	185
5	G4CZB/P	51	420	11	GM4FDT/P	6	75
6	G4CDD/P	44	380				

5W SECTION

Posn	Callsign	QSOs	Points
1	G4DDX/P	40	345
2	GW3SB/P	12	150
3	G3KKQ/P	12	130

Check logs acknowledged with thanks from G3MCK, G3RPB/P, G3ZDW, G4IEH/P.

Summer 1·8MHz Contest 1981 results

Many contestants commented on the favourable conditions for dx during the contest. Five continents were worked with several stations working a number of dx QSOs.

The winner of the UK section and also the leading first-time entrant was G4ANT, operated by G3CWI, with a score of 711 points from 150 contacts. In second place was G3RPB, who had 695 points from 136 QSOs and in third place was GM3ZSP, with 143 contacts.

In the overseas section 30 logs were received from 12 countries. The winner by a clear margin was OZ1W with 446 points from 74 contacts.

The HF Contests Committee is pleased to note the number of first-time entrants, but is disappointed with only one entry in the senior citizen category.

G3WPF

UK SECTION

Posn	Callsign	Points	Posn	Callsign	Points
**1	G4ANT	711	**17	G4KGG	371
2	G3RPB	695	18	G3VRY	358
3	GM3ZSP	680	*19	G4AYM/P	340
*4	G5RS	652	***20	G3TR	329
5	G3PDL	636	21	G3BGM	320
6	G3XTJ	633	22	G3ZJK	316
7	G3IGW	626	23	G4BUO	307
8	G6UW	617	**24	G4KKZ	304
9	G4FNL/P	591	25	G4CQF	260
10	G3SJJ	567	26	GI2FHN	244
**11	G4AFU/A	536	27	G4ECI	241
12	G3RWL	533	28	G3KKQ	237
13	G4DJX	529	**29	G3ZRZ	233
14	G3JKS	520	30	G8QZ	145
*15	G4DDL	504	31	G4EBK	136
16	G3YMC	439			

OVERSEAS SECTION

Posn	Callsign	Points	Posn	Callsign	Points
1	OZ1W	446	16	OL1BAO	148
2	OK1DFF	324	17	OL1AZM	145
3	PA0LOU	300	18	DL8QS	137
4	LB1GB	298	19	SP3GVX	133
**5	DJ5BV	277	20	UP2BIM	126
6	OL4BBP	271	21	DL1SN	99
7	OK2BWM	227		OL5AYF	99
8	DJ3XD	224	**23	ZD8TC	96
**9	UR2RCU	214	24	OL2BCC	86
10	OL5AXU	209		YU7SF	86
11	YU7JDE	191	26	OL5BCV	81
**12	UA2FCW	179	27	OZ1LO	75
13	UT5AB	174	**28	UA2FEA	48
14	OK3CQR	165		YU7ORQ	48
	OL8CKB	165	30	SP5KMB	40

Check logs from G3SNX, GB4RN, LA9HW, OK1KUA, OK1MZO, OL5AWJ and UP2-038-672.

* Multi-operator ** First-time entrant *** Senior citizen

DF Qualifying Event Salisbury results

Twenty-four entries were under "starter's orders" at Salisbury Racecourse for this year's df qualifying event. The weather was sunny and warm, and with signals good, the field was soon evenly spread — about half on course towards the west — and half heading eastwards.

G2FIX/P, the "A" station, was at the far end of Grovely Woods and after the onslaught of the first few—was perhaps not too well hidden! G3FKF/P the "B" station, was on the disused Salisbury-Bournemouth railway track near Downton (and we do not believe the unfortunate car which was stuck had really driven through the tunnel!).

The tea was again arranged by Lorna (xyl of G8ODM) and helpers, at the Activity Centre.

Thanks to G4LDR and G3YWT who operated the "out stations" and Sir Evan Nepean, G5YN, who managed the event.

Posn	Name	Club	Time of arrival TX "A"	TX "B"
1	M. Hawkins	Chelmsford	1501	1413
2	R. Parsons	Burton-on-Trent	1416	1503
3	D. Newman	Slade	1434	1515
	W. North	Mid-Thames	1515	1423
5	I. Butson	Colchester	1436	1526
6	E. Mollart	Mid-Thames	1437	1528
7	B. Bristow	Mid-Thames	1441	1532
8	A. Simmons	Mid-Thames	1441	1534
9	P. Lisle	Mid-Thames	1452	1538
10	C. Merry	Dartford Heath	1539.5	1451
11	M. Easterbrook	Dartford Heath	1438	1540
12	A. Butcher	Chelmsford	1540·5	1450
13	W. Pechey	Mid-Thames	1541	1442
14	D. Holland	South Manchester	1443	1543
15	R. Shepherd	Mid-Thames	1501·5	1555
16	R. Vickers	Slade	1556	1427
17	P. Yeates	Salisbury	1558	1501
18	C. Plummer	Mid-Thames	1558·5	1446
19	G. Whenham	Coventry	1606	1427
20	P. Woolett	Dartford Heath	1614·5	1452
21	C. Wells	Mid-Thames	1566	1617
22	T. Gage	Mid-Thames	1622	1449
23	R. Goodearl	Mid-Thames	1629	1553
24	S. Holly	Salisbury	1445	—

D. Newman and E. Mollart qualify for the National Final.

DF Qualifying Event South Manchester results

Twenty teams, a record for South Manchester, assembled at the start, a lay-by near the Manchester Ship Canal. The weather was fine. Signals were received from both transmitters at good strength, however most competitors chose transmitter "B" as their first station.

The "A" station, G3FVA/P, operated by Dave Holland and Colin McKenzie, was located 0·25 miles from the start, with 1·5km of antenna wire, some going past the start. The site was a disused rubbish tip, very overgown and nettle-infested. Nothing was heard by the transmitter crew until 1510 but it was not until 1526 that a competitor arrived, this being Bill North, quickly followed by several others. Some had been misled by a suitably "doctored" signal strength at the start!

The "B" station, G3UHF/P, operated by Dave Bolton and John Murphy, was situated some nine miles away near Lymn Dam. Again "lots of wire" was the order of the day, however, some antennas went through extremely unsavoury swamps etc. The transmitter crew heard several gratifying crashes as competitors fell into a deep hole hidden by vegetation. First to arrive was Bob Vickers at 1419, but a further 20min elapsed before further competitors appeared. Some, it is believed, spent most of the afternoon there!

After the contest, 45 weary people enjoyed the excellent buffet prepared by Mary Holland, ably assisted by Helen and Joanne. The results were then announced, Bill North winning the event and the South Manchester DF Trophy for the fourth consecutive year!

Posn	Name	Club	Time of arrival TX "A"	TX "B"
1	W.J. North	Mid-Thames	1526·5	1442
2	R. Parsons	Burton-on-Trent	1527·5	1441·5
3	D.E. Newman	Slade	1529	1441
4	C. Wells	Mid-Thames	1530	1441
5	B.J. Mahoney	Ariel/Hereford	1531	1441·5
6	R. Shepherd	Mid-Thames	1532	1448
7	T.C. Gage	Mid-Thames	1534	1451
8	W. Petchey	Mid-Thames	1535	1440
9	R. Vickers	Slade	1545	1419·5
10	A. Butcher	Chelmsford	1620	1440·5
11	G. Whenham	Coventry	1625	1550·5
12	J.E. Drakeley	Slade	1625·5	1550
13	D. Yorke	South Manchester	1626	1516
14	C. Merry	Dartford	1627	1514
15	J. McBurney	South Manchester	1628	1522
16	P. Woollett	Dartford	1531·5	1628
17	P.M. Williams	Slade	1629·5	1450
18	J. Warburton	South Manchester	—	1551
19	T. Gleeson	South Manchester	—	1552
20	M. Ellis	South Manchester	—	—

C. Wells and R. Shepherd qualify for the National Final.

DF Qualifying Event Oxford results

The hoped-for good start of the Oxford DF Qualifying Round was tempered by the failure of the "A" station transmitter an hour before the start, and the appearance of 10 additional competitors and their teams on spec, and, as they had not booked in time had to forego the excellent tea that was once again well organized by Jean Mollart and her band of helpers. However, it was a record turn-out of 28 teams, and but for several regulars on holiday could have been more.

It was the organizers' intention to keep the competitors hunting for as long as possible and the two transmitters were located some 32 miles apart, far from usable roads, well-hidden and with "funny" antennas. Both transmitters put acceptable signals into the start and the teams left to locate station "A" in the NE corner of map 164 or station "B" in the opposite SW corner. The built-in difficulties did not prevent the eventual winner from taking a chance and appearing quite close to station "A", his first transmitter, in time for the second transmission, locating G4AZN/P at 1408, which is a very creditable time indeed. This transmitter was deviously hidden in a continuous line of dense bushes on top of a disused railway cutting with over a mile of very fine wire distributed so as to create curious off-putting radiation patterns.

Station "B", G3UJO/P, was also by a disused railway but in a very marshy wood, and managed to keep the first competitor to find his second transmitter in some trouble until 1550 by means of unexpected radiation lobes and the natural habitat.

In spite of the planned difficulties and those of the competitors own making, 15 teams found both transmitters by 1630 and only two failed to find either transmitter which once again emphasizes the very high standard that this sport has now reached.

Posn	Name	Club	Time of arrival TX "A"	TX "B"
1	R. Brocks	Chelmsford	1408	1550
2	C. Wells	Mid-Thames	1446	1552
3	D. Newman	Slade	1425	1556
4	P. Lisle	Mid-Thames	1445·5	1600
5	C. Plummer	Mid-Thames	1441	1604
6	R. Shepherd	Mid-Thames	1441·5	1605
7	B. Bristow	Mid-Thames	1437	1606
8	I. Butson	Colchester	1442	1606·5
9	T. Gage	Mid-Thames	1444	1609
10	D. Holland	South Manchester	1437·5	1611
11	R. Parsons	Burton-on-Trent	1619	1459
12	P. Yeates	Salisbury	1425·5	1623
13	W. North	Mid-Thames	1444·5	1624
14	G. Whenham	Coventry	1627	1504
15	E. Mollart	Mid-Thames	1628	1504·5
16	P. Tyler	Mid-Thames	1440	—
17	R. Goodearl	Mid-Thames	1445	—
18	B. Mahoney	Aeriel/Hereford	—	1512·5
19	C. Merry	Dartford Heath	—	1526
20	J. Drakeley	Slade	—	1535
21	M. Easterbrook	Dartford Heath	1536	—
22	G. Foster	Stratford-on-Avon	—	1537
23	R. Smith	South Manchester	—	1538
24	D. Yorke	South Manchester	—	1551
25	P. Woolett	Dartford Heath	1555	—
26	G. Harris	Oxford	—	1556·5
27	A. Butcher	Chelmsford	—	—
	M. Sheridan	Stratford-on-Avon	—	—

R. Brocks and P. Lisle qualify for the National Final.

COUNCIL PROCEEDINGS

A brief report of the Council meeting held on 20 August 1981

Present: Mr B. O'Brien (President, in the chair), Dr E. J. Allaway, Messrs J. Anthony, R. G. Barrett, J. Bazley, R. Bellerby, P. F. D. Cornish, Dr D. S. Evans, Mr L. N. G. Hawkyard, Mrs J. Heathershaw, Messrs G. R. Jessop, G. I. Knight, I. Kyle, W. J. McClintock, D. M. Pratt, G. M. C. Stone (members of Council), D. A. Evans (general manager/secretary), Mrs H. M. Allin (minutes secretary).

Apologies for absence were received from Mr K. Fisher, G3WSN, and Mr A. W. Hutchinson (editor).

Financial report

The hon treasurer discussed at length the figures which were set out in the balance sheet and draft management accounts dated 30 June 1981.

The President congratulated Mr Cornish on the well-presented accounts. Mr Cornish expressed thanks to all the HQ staff involved.

General manager's report

The general manager reported on:

(i) Arrangements for elections to the 1982 Council;

(ii) The possibility of purchasing a small stand for use at rallies and exhibitions by regional representatives;

(iii) The new "Headline News Service" which was a 3min news tape available on 01-837 4118;

(iv) Expansion of the computer system;

(v) Increased workloads on staff arising from increased business—eg (a) every 30 seconds a sales item passed through the Society's front door, (b) in a typical day over 200,000 separate pieces of information were looked-up on the computer, and (c) correspondence levels were still high;

(vi) Intruder Watch work was now running on the computer each month—some band scans had been produced by the Society on the new bands and the reports were being sent to the Home Office;

(vii) Membership figures and new subscription rates; and that approximately 1,500 members had joined the Amateur Radio Insurance Scheme.

Review of committee business

Education

Mr Anthony was asked if the committee could produce statistical information on current RAE results. Mr Pratt reported that a *Rad Com* article, giving information on the RAE, was proposed.

Finance & Staff

The President read a letter he had drafted to Mr Hopewell of the Amateur Radio Retailers Association, which had been approved by the committee, regarding the differing prices of Japanese equipment in the UK and USA. Council agreed that this letter be sent.

Mr Cornish confirmed that the committee had approved the sum of £100 for the proof-typing of scripts of the *RAE Manual* for the blind.

HF

A recommendation for the award of the ROTAB trophy was proposed by Mr Hawkyard, seconded by Mr Bazley, and agreed by Council.

HF Contests

The minutes of a meeting of the committee were accepted without comment.

IARU

The minutes of a meeting of the committee were accepted without comment.

Interference

Mr Jessop reported that he had been asked to prepare a data section for the new *Interference Manual*, and was awaiting further details of the committee's requirements.

Membership & Representation

Nominations for representatives to fill vacancies in the regions had now been received. The election procedure for Regions 5, 7 and 13 was agreed.

Microwave

Dr Evans confirmed that a document on 1·3GHz band planning was to be circulated shortly.

Rally & Exhibition

Mr Hawkyard reported on the 1981 Woburn Rally.

Raynet

A long and detailed debate took place on the subject of Raynet—it's organization, aims and future. Consideration was given to a paper submitted by Mrs Heathershaw, setting out an opinion of Raynet.

After considerable discussion, the following was agreed:

(a) The Society would continue to support Raynet as it had done in the past.

(b) Raynet controllers should preferably be members of the Society, and it was hoped to make some future ruling on this.

(c) Members of Raynet do not necessarily have to be members of the RSGB. Some system of contributions to the Society was discussed for future consideration.

(d) The President, the executive vice-President and the general manager would, if possible, attend meetings of the Raynet Committee.

(e) HQ would, in the fullness of time, take over the routine record-keeping of Raynet, subject to the availability of staff following an investigation into the work involved.

(f) No emergency communications manager would be appointed at this stage.

(g) Towards the end of 1981 the committee would seek the election of 12 "Raynet Representatives", being one representative from each defence zone (the three zones in Scotland to form one Raynet area), to act in a corresponding role on the committee and to attend a meeting early in 1982.

(h) To invite G3XC and G4FLQ to become members of the Raynet Committee; a third member to be chosen after consideration.

The views of the committee on an independent survey carried out by Mr Bellerby were noted.

Technical & Publications

A brief discussion took place on the committee's involvement with the RAE.

Council approved the awards made by the committee for the year ended 30 June 1981.

Telecommunications Liaison

A report from the telecommunications liaison officer mentioned the likelihood of 18 and 24MHz being made available for amateur use on a secondary basis from 1 January 1982.

VHF

Mr Stone reported that Sandown Park had requested a change of date for the VHF Convention to 20 March 1982. This was agreed.

Mr Cornish enquired as to the latest position regarding Syledis. The general manager replied that this part of the spectrum was under the control of the military, and little could be done to ease the situation. Four years of talks between the Society and Home Office had resulted in temporary improvements only, but negotiations were continuing.

VHF Contests

Council approved the committee's recommendation to co-opt Mrs P. Suckling, G4KGC.

Membership & representation

Council noted and approved:

(i) Reduced subscriptions in respect of two members;

(ii) Waived subscription in respect of one member;

(iii) Affiliation of Barnsley & DARC; Borden ARC, Sittingbourne, Kent; Gordano ARG, Portishead, Avon; IBM ARC (London); McMichael ARS, Slough; Radio Amateur Technical Engineering Club, Cheshire; and Skegness & DARS.

(iv) Appointment of Messrs C. Corderoy, GI4CZW, and A. Courtney, G8XIP, as area representatives for Co Fermanagh and Exeter respectively.

Vice-President

Council agreed that Mr D. Baptiste be made a vice-President of the Society.

Forward Planning Group

Mr O'Brien thanked G3RPE for his excellent work on the production of the group's report, and remarked that there was still work to be undertaken by the group, which would continue in existence and produce a further report early in 1982.

World Radio Amateurs Day

Council voted in favour of IARU's recommendation that 18 April be celebrated annually as WRAD, in order to call attention to the contributions of amateur radio and to commemorate the founding of IARU.

CB

Mrs Heathershaw reported on complaints regarding advertisements which included cb equipment.

Mr Knight said he had received a number of complaints of amateur retailers supplying cb equipment.

OBITUARIES

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

Mr B. A. Austin, G8OAO

Mr Austin died on 29 August aged 67. He had been a member of the Yeovil ARC for many years, and helped with their outdoor events. He served with Army Signals during the last war but had only recently taken up amateur radio.

Mr G. R. Phillips, G3FYE

Ray Phillips died on 6 September, aged 56. He was a member of the RSGB for many years, and obtained his licence in 1949. He was instrumental in re-forming the Stockport RS in 1951 and apart from brief periods as chairman and treasurer, held the secretary's post for 30 years until his death.

He helped many aspiring amateurs to obtain their licences through formal RAE classes and personal tuition. A keen interest in helping blind and disabled people involved him in the local "talking book service", and he was also area representative for RAIBC.

He was an accomplished cw operator with an immaculate straight-key fist. A stalwart of NFD and AFS, he also enjoyed local nets, and had been an active member of Raynet.

Mr P. J. Reynolds, G3PQR

Philip Reynolds died in August 1981. He had devoted much of his time to the application of solid-state techniques to uhf and shf communication. His experimental work with G3ZEZ, G3LQR and many other stations in East Anglia and on the Continent helped to establish amateur communications on these higher frequencies. He was an active member of the Colchester RA.

Mr A. Roberts, G3GKQ

Arnold Roberts died on 24 August, aged 52. He was very active on top band, cw and a.m.. He was an ex-RAF wireless operator and had a fine "fist". Amateur radio sustained him during many years of ill-health.

Mr A. Tillyard, G2IJ

Arthur Tillyard died on 14 August. An enthusiastic and active member of the RNARS and Horndean Radio Club, his main activity in recent years was concentrated on the vhf bands, but before then he was very active on top band. Many local amateurs remember him for the help he gave them as novices. He was active on the air until a very short time before his death.

Also:

Mr G. Arthur, GJ4JVP;

Mr C. W. P. Chamberlain, G3TWP, on 28 July;

Mr R. Eslor, G3KIX;

Mr L. Hodson-Hirst, GW8FHW; and

Mr A. A. Hordern, GJ2AAO.

CLUB NEWS

The following is the latest information received by RRs from RSGB affiliated societies, clubs and groups in time for inclusion in this issue. Basic unchanged information on other affiliated organizations will be published in the January 1982 issue.

RSGB affiliated organizations are requested to report all programmes and news items to their regional representatives regularly. Information for inclusion in the **January 1982** issue should reach them by **12 November** and for the **February 1982** issue by **10 December.**

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.

Ainsdale (AARC)—10, 24 November. Ainsdale Scout HQ. Details from sec Norman Horrocks, G2CUZ, tel 0704 77604.

Barnoldswick (Rolls-Royce ARC)—4 November (AGM with bar and supper available), 8pm. Rolls-Royce Sports & Social Club, Barnoldswick. Sec Leslie Logan, G4ILG, tel Barnoldswick 812288.

Blackburn (East Lancs ARC)—3 November (Home-made construction night), 1 December (AGM), 7.30pm. Shadsworth Leisure Centre, Blackburn. Pro Norman Jenkin, G4CGT, tel 0254 75037.

Blackpool (B & Fylde ARS)—3 November. Further information from Jim Newland, G5ND, tel 0253 64508.

Bolton (B&DARS)—4 November ("Rig testing", by Chris Moulding, G4HYG), 18 November ("Computers", by Alban Pearce, G8NVW). Informal meetings 11, 25 November, 2 December (AGM), 8pm. Horwich Leisure Centre, Horwich, Nr Bolton. Sec Alan Hartley, G8PRH, tel Bolton 46023.

Bury (BRS)—10 November ("Radio astronomy at Jodrell Bank", by Reg Lascelles, G3AKX), 7.30pm. Mosses Community Centre, Cecil St, Bury. Informal meetings on 3, 17, 24 November. Publicity sec Peter Butterworth, tel 061-798 0970.

Leyland (LHARG)—9 November (AGM and bring and buy sale), 7.30pm. The Library, Lancaster Gate, Leyland. 1 December (Dinner to be held at 8pm, Hartwood Hall Hotel, Chorley). Sec Arthur Jolly, G4JCO.

Liverpool (L&DARS)—The club is now running an RAE class for members only. If you would like to join the L&DARS and participate, meetings are 3, 10, 17, 24 November, 8pm. Conservative Rooms, Church Road, Wavertree. Sec R. Simmons, G3PNS.

Manchester (South Manchester RC)—6 November ("Computer abuse", by Michael Wood). 13 November (Annual dinner at the Bowdon Hotel, Altrincham), 20 November ("Pip tone generator", by John Heath, G8IRB), 27 November (Technical forum), 4 December ("23cm fm equipment", by Trevor Hopkins, G8TYY), 8pm. Sale Moor Community Centre, Norris Road, Sale. Informal meetings each Monday, 8pm. Sec David Holland, G3WFT, tel 061-973 1837.

St Helens (StH&DARC)—5 November (Programme to be finalized), 12 November (Talk on the sun probe by Jim Leviston, G3NFB), 19 November ("Rig surgery", with Jim Rigby, G8XLI), 26 November (Surprise guest speaker), 7.45pm. Conservative Club, Boundary Road, St Helens. Morse practice prior to each meeting. Sec Mark Edwards, G4LHL, tel St Helens 31846.

Warrington (UK FM Group Western)—5 November, 8pm. Grappenhall Community Centre, Bellhouse Lane, Warrington. Sec Gordon Adams, G3LEQ, tel 0565 4040.

Wirral (WARS)—4 November (Chairman's night), 18 November ("A practical demonstration of his latest computer", by Frank Smith, G3YGL), 7.45pm. Sports Centre, Grange Road West, Birkenhead. Sec Garry O'Keefe-Wilson, G4MIA, tel 051-677 1531.

Wirral (W&DARC)—11 November (ARRL film—The World of Amateur Radio), 25 November (Social evening and certificate presentation by the President of RSGB), 4, 18 November, informal meetings, 8pm. Sports Concourse Centre, West Kirby. Sec Ian Brooks, G8PMW, tel 051-639 5666.

REGION 2—RR D. S. Smith, G4DAX, Red Roof, Goathland, Whitby, North Yorks YO22 5AN. Tel 094-786 333.

Barnsley (UK FM Group Northern)—6 December, 7.30pm. The Royal Hotel, Church Street, Barnsley. Sec G8PLJ. On 12 September the UK FM Group Northern hosted a Repeater Working Group open meeting. The agenda covered such subjects as RWG history, licensing, rationalization, and a fairly detailed rundown on the proposed ssb repeater. Past and future licensing were discussed, and the RWG listened attentively to the opinions of the northern groups present. Was your group represented?

Denby Dale (DD&DARS)—Second and fourth Wednesdays in each month, 7.30pm. Pie Hall, Denby Dale. Denby Dale Rally, 20 June 1982, same location as this year's successful do. Mark it in your diaries. Sec J. Cleg, G3FQH.

Halifax (H&DARS)—First and third Thursdays in each month (with cw class for those interested). 1 December ("Datong electronics", by David Tong). The Claremont Liberal Club, Dale Street North, Claremont, Halifax. Sec G4LEC, tel 0422 33080. Note the new venue, brought on by the rapidly increasing membership of this newly-reformed club. A full 1982 calendar is being prepared.

Harrogate Repeater Group (HRG)—Building of GB3HG, the proposed 144MHz repeater for North Yorks, continues apace, and the group is looking to an early 1982 switch-on. Info from chairman G4ATZ.

Hornsea (HARS)—Wednesdays, 11 November ("Computers", by Andrew Blake), 18 November ("Operating abroad", by G8UPS), 8pm. The Mill, Mill House, Attic Road, Hornsea. Sec Mrs J. Heathershaw, G4CHH.

Leeds (White Rose RS)—8pm. Moortown Rugby Football Club, Moss Valley, Alwoodly, Leeds 17. Club net 8pm Thursdays on 3·775MHz. Sec G8UYZ, tel 586406. The popular White Rose Net on Thursday nights has changed frequency, with 21·350 as an alternative. The Christmas do on 12 December promises to be quite an event. Details from G3KWT.

Pontefract (P&DARS)—Thursdays, 12 November ("Wehrmacht wireless of World War Two", by G3ESP), 26 November ("Noise bridge", by G4AAQ), 10 December (Social evening), 8pm. Carlton Community Centre, Pontefract. Details from G4ISV, tel Pontefract 72784. The G4FPO/G4KMW morse class can chalk up yet another success, and the power wiring for the club radio room has been completed.

Wakefield (W&DARS)—17 November (Slide show), 1 December (Club project, G3WWF), 15 December (Christmas social evening at Holmfield House), 29 December (On the air/natter night), 8pm. Holmfield House, Denby Dale Road, Wakefield. Sec G4BLT, tel Wakefield 255515.

Wakefield (West Yorkshire Police RS)—In addition to G8WYP the club now have G3WYP (by special arrangement with the Home Offfice and previous holder). The club's gear is now operated during club meetings on the second Tuesday in each month, with a very attractive QSL card. Meetings restricted to police or ancillary staff. Details from Police Academy, Westfield Road, Wakefield, W Yorks.

York (YARS)—Fridays except the third in each month, 7.30pm. United Services Club, Micklegate, York. Sec Keith Cass, G3WVO. Having got their York RAE class under way the club is pleased to report about 25 new students (is cb losing its appeal?). The club continues to welcome visitors, being in a tourist town, the last to date being G5MXM.

John Feeley, G8VFK, (l) being presented with a portable cassette recorder, donated by Lowe Electronics, by Tom Beaumont of LAR, during the Leeds & D ARS "Hamfest". G8VFK runs a cassette news service for blind and disabled amateurs. *Photo:* **G3YEE**

Pat Hawker, G3VA, (r), with Ray Bannerman, G8YSJ, and Trevor Beamond, G3VLF, after he had given a lecture on technical topics to Derby & D ARS. *Photo:* **G3SZJ**

While it is always a pleasure to meet members, and resolving membership problems is always easier on a face-to-face basis, don't forget that my phone number heads this column to be used, and a 5min cheap rate call may save an expensive call to HQ. I would also like to remind programme secs that I am available to spread the RSGB word at club meetings. *RR2.*

REGION 3—RR H.S. Pinchin, G3VPE, 61 Cole Bank Road, Hall Green, Birmingham B28 8EZ. Tel 021-777 1320.

Birmingham (Midland ARS)—17 November (Surplus sale), 8pm. 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 December (Christmas party and home constuctors' contest), 8pm. Hampstead House, Fairfax Road, West Heath, 7104.

Birmingham (University of Aston ARS)—Informal meetings Mondays and Fridays during term, 1pm. Sumpner Common Room. RAE and morse classes available. Chairman G4GJL. Sec G8ZEZ, c/o Electrical Engineering Department.

Bromsgrove (B&DARC)—13 November (Talk on recording techniques), 24 November (Informal at Parkgate Inn), 8pm. Avoncroft Art Centre, Bromsgrove. Club net Wednesdays, 144·850MHz, 8pm. Sec G4HFP, tel Stourport (02993) 3818.

Hereford (HARS)—6 November (Grand junk and equipment sale), 20 November (Constructional contest), 4 December (See newsheet), 8pm. Civil Defence HQ, Gaol Street, Hereford. Sec G4CNY, tel Hereford (0432) 3237.

Kidderminster (K&DARC)—10 November (Informal evening), 24 November ("Receiver design and specifications", by Roger Dixon, G4BVY), 8pm. Aggborough Community Centre, Hoo Road, Kidderminster. Sec G4ILQ, tel Kidderminster (0562) 4930.

Malvern Hills (MHRAC)—10 November (Morse class and RSGB tape/slide lecture on Oscar 7), 7.30pm. The Red Lion Inn, St Ann's Road, Great Malvern. Sec G4BVY, 9 Wyche Road, Malvern, tel Malvern (06845) 62900.

Redditch (RRC)—12 November ("Experience of a radio amateur as a prisoner of war in the far east", by Tom Douglas, G3BA), 26 November (Informal meeting), 8pm. WRVS Centre, Ludlow Road, Redditch. Sec G3EVT, tel Alcester (0789) 762041.

Shrewsbury (Salop ARS)—12 November (Calibration evening with D. Goddard, G3UQH), 19 November (Natter night), 26 November (Members' films and slides), 3 December, 8pm. Albert Hotel, Smithfield Road, Shrewsbury. Sec G3VWH, tel Shrewsbury (0743) 51833.

Solihull (SARS)—17 November (RSGB discussion evening with past Presidents John Allaway, G3FKM, and John Bazley, G3HCT), 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.

Stourbridge (SARS)—16 November (Surplus sale), 7.45pm. Library, Longlands School, Brook Street, Stourbridge. Sec G8JTL, tel Lye (038482) 4019.

Stratford-upon-Avon (S-u-A&DARC)—The first of a new series of meetings was held on 6 October. Meetings will now be held regularly on the second and fourth Mondays in each month, 7.30pm. Bearley radio station. Talk-in on S22. Acting sec G8OVC, tel Stratford (0789) 750584.

Sutton Coldfield (SCRS)—9 November (Natter night), 23 November (AGM and construction contest judging), 7.30pm. Central Library, Sutton Coldfield. Club net

Mondays, except on meeting nights, 145·2MHz, 8pm. Sec G8TUR, tel 021-353 2061.
Walsall (WARC)—11 November (RSGB film and slide evening), 25 November (Night on the air), 8pm. Forest Comprehensive School, Bloxwich. Club net Fridays 3·70MHz ssb, 9pm. Sec G4GKC, tel Walsall (0922) 39457.
Warwick (Mid-Warwickshire ARS)—16 November ("Top band df", by Geoff Foster, G8UKT), 7 December (Open meeting), 8pm. 61 Elmscote Road, Warwick. Club net Mondays on non-meeting days, 145·350MHz, 8pm. Sec G8RZR, tel Warwick (0926) 496453.
Wolverhampton (WARS)—9 November (Natter night), 16 November ("Radio operation in Sweden", by Gordon Meddings, G4DGM), 23 November (Committee meeting—members welcome to listen), 30 November (Natter night), 8pm. Wolverhampton Chamber of Commerce & Indusry, 93 Tettenhall Road, Wolvrhampton WV3 9PE. Sec G8EDG, tel Wolverhampton (0902) 763617.
Worcester (W&DARC)—7 December ("CW operating", by Ray Dobdinson, G3RGD), 8pm. "Old Pheasant", New Street, Worcester, Sec G8TZE, tel Tewkesbury (0684) 293890.

REGION 4—RR M. Shardlow, G3SZJ, 19 Portreath Drive, Darley Abbey, Derby DE3 2BJ. Tel Derby (0332) 556875

Derby (D&DARS)—4 November (Bring and buy), 11 November (Natter night), 18 November (Technical topics forum), 25 November (Visit by John Birkett of Lincoln), Historic Section meet third Friday in each month, 7.30pm. 119 Green Lane, Derby. Sec Jenny Shardlow, G4EYM, tel Derby 556875.
Derby (NHARG)—6 November (AGM), 13 November ("Opto-electronics", by Dr R. Lewin), 20 November ("Elements of logic with cmos and ttl", by K. Clamp), 27 November (Film show), 7.45pm. Room 7, Nunsfield House, Boulton Lane, Alvaston, Derby. Sec Ian Cage, G4CTZ.
Hinckley (HARES)—4 November ("Psychology", by G3XWD), 18 November (AGM), 7.30pm. Room H10/11, John Cleveland College, Butt Lane, Hinckley. Sec Norman Geary, G8STX, tel Hinckley 632778.
Ibstock (IARS)—10 November ("RTTY", by G8RBY), 24 November (Visit, tba) 7.30pm. Hastings Arms, Ibstock. Sec Steve Haywood, G8UZQ, tel Ibstock 62158.
Matlock (Derwent Valley ARS)—2 November (AGM), Chatsworth House, Matlock Training College, Chesterfield Road, Matlock. Sec G8GIY.
Nottingham (ARCON)—5 November (Forum), 12 November (Talk), 19 November (Activity night), 26 November (Talk, tba), 18 November (Raynet meeting) 7.30pm. Sherwood Community Association, Woodthorpe House, Mansfield Road, Nottingham. Sec Mike Shaw, G4EKW.
Scunthorpe (SARC)—3 November (Natter night), 10 November (AGM), 17 November ("Slow scan", by G3CCH), 24 November ("Crossword", by G8TIY), 7.30pm. Grange Farm Hobbies Centre, Franklin Crescent, Scunthorpe. Sec Joe Sheardown, G8TIY, tel Scunthorpe 732438.
Spalding (S&DARC)—6 November (RAE talk by G4OO), 7.30pm. Maple Room, White Hart Hotel, Market Place, Spalding. Information from G4OO, tel Risegate (077586) 382.
Wigston (WRC)—Fridays, 20 November (Visit to Radio Leicester), 7.30pm. United Reform Church, Wigston, Leicester. Sec Tim Riggott, G4MFU, tel Leicester 712570.

REGION 6—RR F. S. G. Rose, G2DRT, 84 Cock Lane, High Wycombe, Bucks HP13 7EA. Tel Penn (049481) 4240.

Aylesbury Vale (AVRS)—3 November (Illustrated lecture on natural phenomena by G3KLT), 1 December (Inter-club quiz with Leighton and Linslade clubs), 8pm. Elmhurst Youth Centre, Fairfax Crescent. Details from sec G8BQH, tel 0296 64783.
High Wycombe (Chiltern ARC)—25 November (Junk sale), 30 December (Natter night), 27 January (AGM). John Hawkins Canteen, Victoria Street. Details from sec Peter Stears, tel High Wycombe 24095.
Maidenhead (M&DARS)—3 December (Constructional contest), 15 December (Christmas social). Sec John Patrick, G3TWG, tel Bourne End (06285) 25275.
Newport Pagnell (Milton Keynes &DRS)—9 November (HF propagation—Part 2). Lovall Hall, Silver Street, Newport Pagnell. Details from D. O. White, G3ZPA, tel Milton Keynes 501310.
Reading (RARC)—10 November (Constructional contest/Inter-club quiz), 24 November (Junk sale), 8 December (AGM), 22 December (Club Christmas dinner). Details from sec Chris Young, G4CCC.
Vale of the White Horse (VWHARS)—3 November (Two films about satellite communications, "Space talk", and "Voices in orbit", from British Telecom), 1 December (Social evenings at the White Hart), informal pub meetings on other Tuesdays, same place. Details from G4FLX, tel Wallingford 37482, or G3SEK, tel Didcot 812584.

REGION 7—RR P. J. Walker, G8HMG, 12 Brownlow Road, Redhill, Surrey RH1 6AW.

Crystal Palace (CP&DRC)—21 November ("The GB2RS propagation forecasts", by Charlie Newton, G2FKZ), 19 December (Film show and Christmas party), 8pm. Emmanuel Church Hall, Barry Road, London SE22. Sec G3FZL, tel 01-699 6940.

REGION 8—RR K. A. Crouch, G8KEN, 14 Victoria Road, Capel-le-Ferne, Folkestone, Kent CT18 7LR. Tel 0303 55241.

Brighton (BRC)—Second Wednesday in each month, 4 November ("Shack safety", by G8VEH), 18 November (AGM night), 7.45pm. 47 Cromwell Road, Hove.
Canterbury (East Kent RS)—5 November (ATV talk by G8GHH), 7.30pm due to meeting place problems. Contact G8PFE, or listen GB3KS.
Chichester (C&DARC)—16 November. Contact G8FCX, tel Littlehampton 5082.
Crawley (CARC)—4 November ("SSTV", by G3HSK), 11 November (Informal meeting by G8YCY), 18 November (Committee meeting), 25 November ("VHF communications", by G3FZL). Further details from David Hill, G4IQM, tel Crawley 882641.
Dover (South East Kent YMCA RC)—4 November (Natter night), 11 November (Safety in the shack), 18 November (Oscar film), 25 November (G3OUF, RSGB General Manager), 2 December (Natter night), 7.30 for 8pm. YMCA Centre, Leybourne Road, More details from G8KEN, QTHR.
Hastings (HERC)—18 November (BBC sound engineering), 7.30pm. Social evenings Fridays, 7.30pm. 479 Bexhill Road, St Leonards. Computer group meets Mondays, 7.30pm as above. Wednesday meetings at West Hill Community Centre, Croft Road, West Hill, Hastings. More details from George North, G2LL, tel Cooden 4645.
Kent Repeater Group—New treasurer, G3VJF. Subs of £5 to be sent to him. Details from G3MDO.
Maidstone (MYMCAARS)—Fridays, 13 November ("Amateur satellites", by G3AAJ, secretary Amsat UK), 27 November ("The radio amateurs' role in emergency communications", by Harry Binks, Senior County Emergency Planning Officer), 8pm. Beginners classes held first and third Fridays in each month. New idea is morse and general questions on Tuesday evenings, 8pm. All at "Y" Sports Centre, Melrose Close, Cripple Street, Loose. Contact Graham Edy, G4AXD.
Medway (MARTS)—13 November (RAF film evening), 20 November (Junk sale), 7.30pm. No 1 Hall, St Luke Church, King Williams Road, Gillingham. Details from G4EVY, tel Medway 76463.
Tunbridge Wells (West Kent ARS)—13 November ("Colour tv", by Pat Tiernay), 27 November ("BBC Radiophonic Workshop", by Dick Mills), 7.30 for 8pm. Adult Education Centre, Monson Road, Tunbridge Wells. Following Tuesdays, 8pm, informal get-together at Old Drill Hall, Victoria Road, Tunbridge Wells. Contact G4DYF, tel Sevenoaks 56708.

Will all clubs note that G3OUF, RSGB general manager, will be at the Dover Radio Club on 25 November to answer questions about the RSGB. If you wish to attend please ring RR8, G8KEN, to make arrangements for catering etc. Call in for talk-in on GB3KS or S20.

REGION 9—RR W. J. Colclough, G3XC, High View, Indian Queens, St Columb, Cornwall TR9 6LL. Tel 0726 860485.

Barnstaple (North Devon ARC)—The RR would like to thank members of NDARC for the welcome extended to him on his visit. A considerable amount of discussion took place on the subject of interference to domestic equipment such as hi-fi etc caused by cb operators—the debate will continue. Details from G4CG, tel Barnstaple 3683.
Camborne (Cornish RAC)—At the request of the Newfoundland Radio Club CRAC have again been asked to put on a station for the Marconi Eightieth Anniversary of the letter "S" on 29 October. A special contact with Newfoundland is to be arranged from the QTH of G3ZPW of Lands End. 5 November (Surplus equipment sale). The Clubroom, Pool, Camborne.
Exeter (EARS)—Members and visitors are reminded that a club net takes place each Tuesday on S23 at 7.30pm. 2, 16, 23, 30 November. The Scout Hut, Emmanuel Road, Exeter.
Newquay (N&DARS)—4, 18 November. The new QTH of sec Bob Lawrence, G4LDA, is 36 Molsworth Street, Wadebridge.
Saltash (S&DARC)—Many members took part in the recent Raynet exercise "Coastal", among them that stalwart of the club Colin Squires, G3XCS. Sec Eddie Hayden, G4LZU, Treetops, Three Corners, Chilsworthy, Gunnislake, Cornwall, tel 0822 832838.
Treverbyn (English China Clays RC)—The club has recently formed a computer section which meets on alternate Mondays—for talk-in listen on S22. The callsign G6ECC has just been issued to the club and was used to great effect during the recent Raynet exercise, the club facilities being transformed and used as the East Cornwall Raynet HQ. Yet another xyl has passed the RAE. Sylvia Geary can now be heard as G8PWD, which was her son's call before he became G4JZA. Brother Jonathan is now G6CVR. Alternate Mondays, 7pm. Club net on meeting nights on S22. Secs address as Newquay &DARS.

REGION 10—RR P. A. Jones, GW4HAT, 68 Pastoral Way, Tycoch, Swansea SA2 9LY.

Bridgend (B&DARC)—11 November, 7.30pm. NCB Social Club, Tondu, Bridgend, Club call GW4LNP. Club net each Wednesday, 7pm on S13. Further details from Peter Lynn, GW8WCI.
Haverfordwest (H&DARC)—RR10 wishes to contact the current chairman and/or secretary asap.
Loughor (LAR&EC)—Tuesdays fortnightly, 7.30pm, at new venue of Loughor Scouts Hall located at the top of Heol Caetynewydd, accessible from Pengry Road, Loughor. Further details from Tim Griffin-Thomas, GW8TYS, tel Gorseinon 893392.
Newport (NARS)—Mondays, 7pm. Brynglas House, Brynglas Road, Newport. Club call GW4EZW. Detailed programme not to hand at press time but films and lectures are being organized. CW classes each week. Further details from Barry Green, GW4HYZ.

Basil O'Brien, G2AMV, RSGB President, visiting special station GB2IYD, operated by Exeter ARS from St Loyes College for Training the Disabled for Industry and Commerce, in Exeter, to commemorate the International Year of Disabled People. L to r, standing: G4HAZ (background); Major Morgan Harry, deputy appeals organizer; Col Parsons, principal of St Loyes College; Basil O'Brien, G2AMV; and Bill Western, chairman of Exeter ARS. Seated: G6XA and G8YOA. ***Photo: Express & Echo***

GB4BBS being operated from the Bridgend Blind School by Dave, GW8YAB, with Sam, GW3ITQ, seated; and Brian, GW3YSP, standing, and some boys of the school. ***Photo: Western Mail & South Wales Echo***

Port Talbot (BSCARS)—Thursdays, 7.30pm. BSC Sports & Social Club, Margam. 4 December (Annual Christmas social will be held in the above premises, 7.30pm. Bar extension, raffles etc. Tickets priced £6 from Brian Thomas GW4KYT, 18 Rosemary Court, Morriston, Swansea, tel 794213). Club details from Reg Bray, GW4ESV.
Swansea (SARS)—Revised meetings now first and third Thursdays in each month at earlier time of 7.30pm. 19 November ("Vintage radio" by Dr Viv Phillips). Lecture Room 'N', Applied Sciences Block, Swansea University College. Club net each Sunday 1100gmt, 28·530MHz ± QRM. Net controller Cen, GW4BIQ. Further details from Roger Williams, GW4HSH, tel 404422.
West Wales Repeater Group (GB3WW)—Subscriptions are now due and all users of this repeater are urged to join the group. A new control unit using a National Semiconductors 6502 microprocessor has recently been installed and views from users are welcomed. Further details from S. L. Bleaney, GW3VPL, tel Briton Ferry 812361.

REGION 13—RR A. B. Givens, GM3YOR, 41 Veronica Crescent, Kirkaldy, Fife KY1 2LH. Tel 0592 200333.

Glenrothes (G&DARC)—Wednesdays, 7.30pm. 15 November ("Video", by GM4DTH), 7.30pm. Clubroom, Provosts Land, Leslie, Fife. RAE and morse classes at Balwearie High School, Kirkaldy. Details from GM3YBQ, tel Kirkaldy 65789. Club details from GM4AQO, tel Kirkaldy 66287.

REGION 16—RR *To be elected*
Chelmsford (CARS)— 3 November ("ICs and radio communication", by G3RZP), 7.30pm. Marconi College, Arbour Lane. Club has recently purchased a morse tutor which is available for loan to members. Details from Andrew Mead, G4KQE, tel Silver End 83094.
Colchester (CRA)—12 November ("Contests and contest operating", by members of the club who have tried it), 26 November ("How to qualify for a private pilot's licence", by Jack Kay, G3CO), 7.30pm. Colchester Institute, Sheepen Road. Details from Frank Howe, G3FIJ, tel Colchester 70189. Club is also holding a top band df hunt on 6 November, 7.30pm, Fordham Heath, ngr 945 264. OS Map 168 will be required. Details from Ian Butson, G4HKC, tel Colchester 860724.
Haverhill (H&DRS)—6 November (Foxhunt), 20 November (RSGB tape/slide lecture on dx station working), 27 November (Calibration evening), 7.30pm. Steeple Bumpstead Road. Details from Dave Hickford, G6BPS, tel Haverhill 61207.
Norwich (Norfolk ARC)—11 November (Special general meeting), 25 November (Subject to be arranged), 7.45pm. Crome Community Centre, Telegraph Lane East. Details from Paul Gunther, G8XBT, tel Norwich 610247.

REGION 17—RR H. G. Cunningham, G8FG, 235 Station Road, West Moors, Wimborne, Dorset BH22 0HZ. Tel Ferndown (0202) 876018.

Basingstoke (BARC)—18 November (Constructors competition and equipment auction). The club will be celebrating its 20th birthday with a formal dinner in December, monitor GB2RS for final details.
Bournemouth (BRS)—The Bournemouth Radio Society now meets in Room 9, Kinson Community Centre on the first and third Friday of every month. Contact G3VPC, tel 0202 699217, to arrange talk-in.
Fareham (F&DARC) Wednesdays, 7.30pm. Room 12, Porchester Community Centre, 4 November ("80m rx project", by G4IJP), 11 November (Natter night), 18 November (GB3PH and how it works), 25 November ("Historic radio", by G6NZ). Sec G4ITG, tel 0329 234904.
Farnborough (F&DRS)—Second and fourth Wednesday in each month, 7.30pm. Railway Enthusiasts Club, Access Road, off Hawley Lane. 11 November (Surplus equipment sale), 25 November (AGM). Sec G4BJQ, tel Farnborough (0252) 43036.
Weymouth (SDRS)—First Tuesday in each month, 7.30pm. Civilian Canteen, Army Bridging Camp, Wyke Regis. 3 November (The ever popular quiz). Sec G3ZGP, tel Weymouth (0305) 812893.

REGION 19—RR R. J. C. Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ. Tel 01-989 6741.

Cheshunt (CDRC)—4 November (Natter night/cw practice), 11 November ("Two metre dx and meteor scatter", by Paul, G4IJE), 18 November ("The G3DNQ goodies show", by Don, G3DNQ), 25 November (Junk sale), 8pm. The Church Room, Church Lane, Wormsley, Herts. Enquiries to Jim Sleight, tel Ware 4316.
Chiswick (ABCARC)—17 November ("The station of GU4GYT", by G3GEH (postponed from June meeting)). The Committee Room, Chiswick Town Hall, High Road, Chiswick W4. Sec W.G. Dyer, G3GEH, tel 01-992 3779.
Edgware (EDRS)—12 November (Video tape show "The secret listeners and satellite comms"), 26 November (Repeaters/microwave beacons, by SW Herts UHF Repeater Group). Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. Sec G4HMD, tel 01-952 6462.
Grafton (GRS)—13 November ("Seeing in the dark", by Peter Wallis of the Hamstead Scientific Society), 27 November ("Doppler radio direction finding", by Ron Touw, G4IIQ), 8pm. The room behind the Five Bells pub, East End Road, near East Finchley tube station.
Harrow (RSH)—6 November (Informal and practical), 13 November ("Basics-Part 3: simple semiconductor circuit theory"), 20 November (Informal), 27 November (Demo on a vcr), 8pm. Roxeth Room, Harrow Arts Centre, High Road, Harrow Weald, Middlesex. Publicity officer Peter Marcham, G3YXZ. Sec Chris Friel, G4AUF, tel 01-868 5002.
London (Imperial College ARS)—Information from G4MIK, tel 01-589 5111, ext 1301, daytime.
London (Post Office HQARG)—4 November (Visit to a tv studio). Weekly net on Wednesdays, 8pm, local 3·750 for PO and BT folk. Sec G3TIS, tel 01-836 1222, ext 2602. Further info from J. A. Clarke, Room 521, Electra House, Victoria Embankment, London WC2. Only open to Post Office members.
St Albans (Verulam ARC)—24 November ("Why not do it yourself", by G3UFB). Main meetings held in the Charles Morris Memorial Hall, Tyttenhanger Green, nr St Albans, 7.30pm. Informal meetings on the second Tuesday in each month at RAFA HQ, Victoria Street, St Albans. Sec G4JKS.
Southgate (SRC)—12 November (G6QM Construction Trophy, slide show of club events), 8pm. St Thomas Church Hall, Prince George Avenue, Oakwood N14. Sec V. Austin, G4MCD, tel 01-360 5832.
Stevenage (SDARC)—15 November ("Talk on ICL Ltd", by Dave Musson), 19 November (Films), 8pm. The Staff Canteen, British Aerospace, Gunnels Wood Road, Stevenage, Herts. Sec S. Clarke, G8LXY, or G8MCV, tel Stevenage 64624.
South West Herts UHF Group—The group's 1·3GHz beacon/repeater GB3BH has been licensed by the Home Office and cleared by the RSGB. Work has started on this interesting project which will be sited at Bushey Heath in Hertfordshire. The 10GHz beacon GB3SWH has been rebuilt by G3BNL and is being air-tested prior to being put back into the beacon service. GB3HR is the group's 433MHz repeater at Bushey Heath which continues to give excellent service. Experiments are being carried out to improve coverage into the Harrow area. The group would like to ask regular users to contribute to the running of these projects. Please send donation to the treasurer, Brian Greenaway, G3THQ. Further details of the group's projects from sec Trevor Groves, G4KUJ, ex G8BBE.
Wanstead (ELGRSGB)—15 November (Visit by David Evans, G3OUF, RSGB General Manager, who will answer all questions. RR19 will also be there to see fair play), 3pm. Wanstead House, The Green, Wanstead, London E11, 200 yards from Wanstead underground station. All welcome to this meeting. Sec Rod Holmes, G3GPQ, 36 Hillside Gardens, Walthamstow, E17. Chairman G3AMF, tel 01-989 9224.
Watford (WRC)—8.15pm. The Small Hall, Christ Church, St Albans Road, Watford. All are welcome to this new club. Info from G8CHW, 15 Whippendell Road, Watford.

Some members of Glenrothes & D ARC at "Scotam 81", l to r: GM4IPS, GM4LYQ, GM8ZTV, GM3ZSP, GM8ZDQ, GM3OLK. ***Photo:*** **GM3ZSP**

REGION 20—RR B.L. Goddard, G4FRG, 2 Greenfield Park, Portishead, Bristol BS20 8NQ.

Bristol (BARC)—Tuesdays, 7.30pm. The University Settlement, Barton Hill, Bristol 5. 3 November (Computer club meeting). Further information from Trevor, G8GFZ.

Bristol (BRSGBG)—30 November (Constructors competition) details from Chris, G8GLQ, tel Bristol (0272) 621253. 7.30pm. Queens Building, Bristol University.

Bristol (North Bristol ARC)—Fridays, 7.30pm. C/o Self Help Enterprise, Braemar Crescent, Northville, Bristol. Secretary reports that membership is at full capacity but information on weekly club activities is available from Ted Bidmead, G4EUV, tel Bristol (0272) 691685.

Cheltenham (CARA)—Regular meetings first Thursday and third Friday in each month. 5 November (Talk and slides on "Installation of a two-way radio link in Zaire", by John Corbett, G3TWS), 20 November (Natter night). Secretary wishes to remind members of the AGM which will be held on 3 December. Further information from Grant, G4ILI, tel Cheltenham (0242) 43891.

Gloucester (GARS)—Thursdays, 7.30pm. Chequers Bridge Centre, Painswick Road, Gloucester. 5 November ("Vertical antennas", by L.O. Rogers, G2HX). Further information from Pat, G3MA.

North Avon Repeater Group. Secretary reports that the 70cm repeater GB3BS in Bristol has had a new micro-processor control installed with improved performance and that the 23cm repeater GB3AA is now licensed. The group are hoping to hear from anyone interested in 23cm. Sec is G8NNU.

Yeovil (Y&DARC)—Thursdays, 7.30pm. Building 101, Houndstone Camp, Yeovil. 5 November ("SIDs", by G3MYM), 12 November ("Microwaves", video tape), 19 November ("Can we work VK on a millewatt?" by G3MYM)., 26 November (Natter night and committee meeting). On 4 October the Yeovil Club celebrated the 35th anniversary of its founding. The club had its first meeting on 4 October 1946 and has been in continuous operation since then. The present membership is 73 and of these, three are founder members. They are life president, G3BEC, secretary, G3NOF, and treasurer, BRS10663. Information on the club's activities can be obtained from Don McLean, G3NOF, tel Yeovil (0935) 24956.

If your club is not included above please request your secretary to send me details by the date given at the beginning of "Club News". *RR20.*

The wedding of Michael Ball, G8LZK, and Susan Richards took place at King's Lynn, Norfolk, on 25 July. Back row (l to r): Brian, G8VCO; Dave, G3ZCA; Pete, G8FCU; Bill, G8HDK; and Graham, G8LUV. Front row (l to r): Ann, G8MAY, xyl of G3ZCA; Mike, G8LZK; Susan, (RAE pending); Alan, G8BHG, bride's father; and Ann, G4EYL, xyl of G8LUV. *Photo*: G4KHF

RADIO AMATEUR OLD TIMERS ASSOCIATION

President: W. K. Alford, TXK/G2DX
Vice-president: F. J. H. Charman, BEM, G6CJ
Hon secretary/treasurer: Miss May Gadsden, 19 Drummond House, Long Lane, London N2.
RAOTA net: Thursdays 11am, 3,740kHz Controller: G3DSI

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 27MHz 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.

No guarantee of inclusion in a specific issue can be given, other than the first possible issue after receipt.

Closing dates in 1981 for issues in brackets, are **19 November** (January 1982), **17 December** (February 1982).

Post to: MEMBERS' ADS, RSGB, 88 BROOMFIELD ROAD, CHELMSFORD, ESSEX CM1 1SS
Do not post to RSGB HQ or Advertising representative

FOR SALE

Shack clearance: Yaesu FT480R, 2m tx/rx, one month old, £200; Yaesu FT290 2m tx/rx, £110; regretfully Yaesu FT101ZD, two months old, £390. RS45440. Tel Linda, Bedford 870827, after 6pm.

Disco equipment: twin decks, 100W amp, two 120W loudspkrs, dancing lights, rope lights, strobe, echo unit, mics, stands, approx 600 singles, £600 ono. Will split, can deliver. Codar CR70 rx and preamp, £30. G8ZVH. Tel 0623 810944.

RCA 16mm sound film projector model 1600, Tandberg reel tape recorder with 12-position language lab facilities, cash offer or exchange hf tx or other gear. Headsets with boom mic, £5. AR88LF, £20. G3DVF, QTHR. Tel Alnwick 602487, evenings.

KW2000A, mains psu, Shure mic, good cond, £150. Kyokotu Digital 2 2m synthesized scanning tx/rx, mobile mount, mic, £150. G3SDO, QTHR. Tel Preston (Dorset) 833379, daytime, Upwey 3491, evenings.

KW Atlanta QRO rig, 500W, p.e.p. with spare valves incl 7360, vgc, cw, ssb, a.m., £250 ono. G4INM, QTHR. Tel 0245 59194, anytime.

Heath IM16 v/meter, £25. 230V 10A mains regulator, £30. Emoto 1100MXX, unused, £150. Weircliffe tape eraser, £30. 30ft three section lattice mast, £30. Tel Wellingborough 663517, evenings.

Datong AD270, active antenna, brand new, in orig packing, mains power unit, £35 comp. Steven Muster, 38 Hickling Road, Ilford, Essex IG1 2HY.

HP412A vtvm, good cond, V,I,R, 200mΩ input resistance, manual, £45. Airmec 314A ac/dc V,I,R, electronic 12V or mains 500MHz, £38. Stabilized 5V (adj) 4A overload protected Belix SP452, £12. Two new 1mA mirror scale tropicalized Turner meters, 11 × 14cm, £9 each. Clearout, all new: Push-in 24V indicators, 10p; BFY50 10p; min pcb relays, 24V-26·5V, 2pco, 90p; miniature enclosed plug-in relays, 24V 4pco, 90p; non-elect 4·7μF 100V, 30p; 100nF 250V, 4p; pcb terminal strips, 15p. CWO plus postage. Tel 0243 780583.

IC240 2m mobile, diode programmable, all accessories, mobile mount, manual, manufacturers' packing, good general cond, £110. G8CCI, QTHR. Tel Oxford (0865) 880229, evenings/weekends.

Storno 2m xtals for simplex channels S19-23, R2, R5, suit 11MHz rx, 12MHz tx, all 14 xtals for £15. Post free. Tel Bailey, 0642 54791, between 9am and 4.30pm.

HBR Electronics rtty DM170, TD224 vdu, KB29 with keyboard, Catronics CT100 rtty terminal unit, W0LMB sstv keyboard, TW 2m transverter, Garex Electronics psu, offers invited. Thurlow, G3WW, QTHR. Tel March (0354) 740255.

Heath continuing education courses, dc electronics, ac electronics, transistors, electronic circuits. Trainer and oscilloscope, offers over £100. Buyer collects. Jim Coggins. Tel 01-727 2141, evenings.

IC251E, £400. FT101E, £400. Comp Heathkit station, £200. Buyer collects rx, tx, SB300, SB400, spare valves, spkr. H.G. Harvey, 7 Garden Cottage Flats, The Ridgeway, Saundersfoot, Dyfed.

400W 144MHz linear amp, pair 4CX250B, properly constructed case, psu in separate box, incl all metering and protection circuits, spare valves, £100 ono. 1kW dummy load/power meter to suit, £30. G4KNZ NOT QTHR. Tel Maidenhead (0628) 27105.

NAG 144XL amplifier, 250W output, nine months old, reason for sale going hf, £340 ono. G8TIN, QTHR. Tel Banbury (0295) 721 123.

TR2400 2m handheld, 12 months, unmarked cond, comp with manual, manufacturers packing, all supplied accessories, soft case, shoulder strap, belt hook incl, £150. Spkr/mic, £10 if required. G8CCI, QTHR. Tel Oxford (0865) 880229, evenings/weekends.
KDK 2025E 2m tx/rx, 25W fm band scan etc, 12 months old, incl slide mount, £160 or exchange for 2m multimode. JVC stereo radio cassette recorder, exc cond, £85. G8WSK. Tel Mike, Cosham 377607.
FDK Multi Palmsizer 2, 2m handheld phase-lock loop tx/rx, 145–6, comp with nicads, charger, helical whip, xtal toneburst, extension spkr/mic, £90 ono. G4BRX, QTHR. Tel Bishops Cleeve 5321.
Ex-WD a.m. rx type R1155A with mains power pack, good cond, sensible offers please. G6CHM. Tel Wombourne (0902) 893167.
Hustler vertical antenna 5BTV, 80–10m, high power mount, ground post, £40. SSM Z-Match atu, 80–10m, high power, £30. Prefer buyer collects. G4GIN, QTHR.
FT207R handheld with NC2 mains charger/psu, only used occasionally for monitoring or demonstrations, comp, £150. G3BA. Tel 021-353 1893, anytime.
Shack clearance: KW2000E ac psu, T44 mic, £200. FT7 mobile tx/rx, G-whip bumper mount antenna, £175. Standard C8600 12 channel 10W 2m fm tx/rx with toneburst, 5/8 boot mount antenna, £75. G4BAL, QTHR. Tel 01-302 4062, anytime.
Need unusual, hard-to-find vacuum tubes? Send me your needs with an addressed-only envelope. Have 1920 to present. Hundreds surplus to my needs. *Wanted:* I need British military. Tony Grogan, WA4MRR, 5 Rollingwood Drive, Taylors, SC 29687, USA.
207R, comp packing, ls mic, power supply, charger, mint. *Wanted:* HF tx/rx, fm, ssb, cw, or tower, self-supporting, over 50ft. G4MJN. Tel 0536 85637.
Complete hf station: Immac TS520S with 500Hz i.f. filter, SP520 matching spkr, AT200 (illuminated) atu, MC35S mic, £400. Carriage extra. GM3HBT, QTHR. Tel Larkhall 883306, after 6pm or weekends.
TS520, good cond, orig packing, manual, £275. FT7 tx/rx, 80–10m ssb/cw mic, manual, comp with ac psu FP4, £225. G4EYA. Tel 01-777 9908.
Microwave Modules transverters MMT1296/144, £130. MMT432/28, £65. MMT144/28, £50. Converters MMC435/600, £23. MMC1296/28, 1,268MHz, lo output, £25. MMA144V preamp, £25. Pye U50A 4CX250B 70cm amp, £55, buyer collects. Rest plus carriage. G4FRE, QTHR.
TR7500, £165. MM2000 rtty converter, £120. KW VFO4B. £25. G3RKZ, QTHR. Tel Derby 515212.
Creed 7B teleprinter, £5. 500W 240V isolation transformer, £10. 5A circuit breaker, two-pole diecast, £2. Steel equipment desks, solid, good looking, £10. G3SIP, QTHR. Tel 06582 7086.
Swan 700 tx/rx, mic, mains psu, £425. Buyer collects. G4DFE, QTHR. Tel Lye 5061.
AR240, comp with nicads, charger, homebrew helical, orig whip, external psu socket fitted, exc unmarked cond, in orig packing, £120 ono. G8OOV, QTHR. Tel Padstow (0841) 532527.
KW E-Zee Match, £25. KW103 swr/pwr meter, £15. One 6146, unused, £2. Pair 6146Bs, used, £4. Pair QQVO640A, used, £2 each. G3JXG NOT QTHR. Tel 0742 875036.
FT101B cw filter, orig packing, leads, mic, manual, etc, low mileage, £330. Buyer collect or share Securicor charge. G4FPM. Tel Worthing (West Sussex) 63962.
Yaesu FT501/FP501, exc cond, manual, packing, signal readout, 500W p.i.p. £275 ono. Free Shure 201 mic to purchaser of FT501. G4IIA NOT QTHR. Tel Mike, 056-881 326 (Herefordshire).
Drake C Line T4XC, AC4 psu, R4C 1,500Hz and 250Hz filters, 160–10m coverage, both exc cond internally and externally, will operate new bands with appropriate xtals, incl all connecting leads, manuals, £700. KW1000 1,200W linear, good cond, manual, £180. Trio TR7200G 2m fm tx/rx, five repeater, four simplex, incl mobile mount, manual, £90. Reason for sale going abroad. G3TKN. Tel 07014 65101.
Lots of "junk", vgc, fan oven, exch for cctv camera and monitor, or c portable, or any Robot sstv gear. *Wanted:* 400 pcb and cost. Bill Ball, G8XCF. Tel for info on "junk" 0253 404459, after 7pm and before 9pm.
Trio 2300 with nicads, charger, immac, £120. Western rotary dipole, DX31, unused, £35. HF5 five-band vertical, exc performer, £20. FDK Multi 750E, multimode, 1–10W, immac, £200. GW4FLZ, QTHR.
Yaesu FT7 hf bands tx/rx, performs superbly and is in exc cond, £240. G4GAH, QTHR. Tel Wallingford (0491) 37188.
Vintage radio McMichael portable, MS367 1920/30, trf, perfect wkg order, mains power pack to drive it, £30. Boyce, 54 Grand Avenue, Lancing, Sussex. Tel Lancing 5204.
Yaesu FT480R, £280. KW77 rx, £80. KW202 rx, £125. **Hammarlund SP600 rx,** £125. IC2E spkr mic, two cases, ac quick charger, high power battery, will split, Ferguson 14in colour remote control tv, £175. G3RCQ. Tel Hornchurch 55733, evenings.
Eddystone 730/4, new cond, ex-Ministry, professionally checked, £115 ono. US Navy frequency meter LM14, similar BC221, plus modulation, new cond, psu, charts, manual, £25 ono. 813 (RCA), unused, offers? G3NJP, QTHR. Tel Cranbrook (0580) 714482.
FT202R, handheld, with nicads, external mic spkr, S20–22, R0, R4, R5, £70. Liner 2 with PA3 preamp, mic, mobile bracket, £65. G4EQC, QTHR. Tel Burntwood (Staffs) 3030.
FRG7700 with memory, used little, mint cond, orig packing, manual, £295. G3WMO NOT QTHR. Tel 0604 740425.
Atari video computer with four cartridges (exchange for 10W/100W linear with preamp), Akai GXC40D stereo deck, LSR vhf Omni-match, KSR keyboard with manual, lots of "junk". Bill Ball, G8XCF. Tel Blackpool 404459 after 7pm and before 9.30pm daily.
Lafayette HA700 gen cov rx, 150kHz–30MHz, wkg but requires some attention, £25. Heath SB301 rx, 10–80m, all filters fitted, £55. G4LTK. Tel Coventry 661264, after 6pm.
FL2100Z linear, latest model, new WARC bands, new, unused, £100 under list, £285. G2KF, QTHR. Tel 072-681 2337.
Trio TS130V, approx four months old, mic, £375 ovno. 29 Heighams, Harlow, Essex. Tel Harlow 417791.
FT227R fitted 25/5kHz stepper and scanner, good cond, boxed, £155. Multi U11 70cm, fitted 12 channels, boxed, £125 ono. G8YHF. Tel Broadstone (0202) 698015, evenings and weekends.
Trio TR2300, fitted reverse repeater, nicads, charger, case, etc, orig packing, good clean rig, £120. G6AJV. Tel Lyme Regis 3654.
Inpet old rom Plessey, 8–32k memory, expansior board, comp with rtty, morse prog, circuit board, £160 G3XGZ NOT QTHR. Tel Wantage 65511, daytime, Wantage 4004, evenings.
Atlas 210X hf tx/rx, 100W output, ac power supply, deluxe mobile bracket, Atlas mobile antenna matching transformer, G-whip tribander helical with 80 and 40m coils, two whips, £325. G3KLF. Tel Fareham 236906, weekends and evenings only please.
Complete hf station: exc cond, Yaesu FT7 mobile/base station, 80–10m, mic, IC3PE psu, £250. MFJ 901, atu, £35. AEC swr bridge, £7.50. KW trapped dipole, 80–10m ant, £20. Would exchange for Olympus photo equipment. G4DFS, QTHR. Tel 0226 790043.
13·8V psus half price: 12A ex-ICL voltage variable, £38; 5A Murphy, £20. ITC 9in tv monitor, new, £100. Heath HM2102 swr/pwr, 144MHz, £12. MM202G mobile safety mic, £15. All include carriage or less 10 per cent if collected. G8ESK, QTHR. Tel Bradford 45611.
Datong D70 morse tutor, £35. Mullard high-speed valve tester, offers. Futaba M series tx/rx, four servos, £85 ono. Part-built Gruman Traveller, 1/6 scale, £18. New Enya 40 engine, £25. SM Enya 25 engine, new crank, £10. G4MID. Tel Ted, Mildenhall (0638) 715178, 9am–5pm.
Eddystone 750, fitted product detector, £50. Datong UC1, £75. G3OZT, QTHR. Tel 0703 843198.
IC202 in good cond, comp with orig accessories, £105. Carriage extra. Stephen Prior, G8KQB NOT QTHR. Tel 040924 548 during office hours or 8–10pm.
Eddystone Bugkey, £5. Self-supporting vertical 40–10m, 2,000W p.e.p. rating, offers? Mains pu for Codar AT5, £5. Matching mod/psu for LG300, £15. Maintenance manuals, £5 each. KW2000A, SCR522, 6S auto tx, Siemens T100R tp, BC609A 3610A. Stone, G3JFC, QTHR. Tel Crayford 522489.
Datong asp, £55. Daiwa CN630, £55. Burns TC101 wavemeter, £40. 9502A rotator and alignment bearing, £45. Tonna 21-el 70cm, £20. 9-el 2m, £10. All as new, some in orig packing, no offers. G8RCG, QTHR. Tel Mike, 061-494 0434.
Telegraph morse key dated 1898, double current type, brass with bevelled glass dome, in wkg order. Telegraph terminal unit and galvameter, same vintage, the three items, £60. Tel Shoreham-by-Sea (07917) 5499.
Storno Viscount mobile 2m fm tx/rx, incl auto toneburst generator, mosfet preamp, antenna, manuals, £30 ono. Nascom-1 microcomputer with Nas-sys monitor, in Kenilworth case, psu, keyboard, modulator, etc, still under guarantee, manuals, £140 ovno. G6CCR, QTHR. Tel Steve, Banbury 710708.
QTH Sussex Coast: 350ft long garden, 450ft asl, block built shack, 22ft long, 100ft from house which is detached two bed bungalow full central heating, double glazed, separate concrete garage, £35,000. G4ERA, QTHR. Tel Pett 2350.
Trio TS120V, plus mic, immac cond, orig packing, never used mobile, £280. G4KLI NOT QTHR. Tel Macclesfield (0625) 29748.
TS280FM 80ch 50W 2m fm tx/rx, not used mobile, orig packing, £175. Homebrew transverter, 28–144MHz 50W with psu, looks tatty but effective, £50. *Practical Wireless,* 1935–9, selection of five copies, £1.50, post free. G3UFW, QTHR. Tel Romsey 515884.
Icom IC720 with matching spkr, almost new, in perfect cond, 2h total on-air time, with or without new Heathkit 20A supply, accept sensible offer. Drake 2NT tx with TenTec vfo, exc, £95. G5DDC. Tel 01-486 4137.
G3PLX vdu rtty unit, with scroll cursor xtal baud speeds (45·5 and 50) and tones, psu keyboard, video monitor, terminal unit, £160. Roberts, G8FDJ. Tel Sheffield 333847.
Trio 2200GX fitted R0, R3, R7, S20–22, helical rubber whip, new nicads, good cond, in orig packing, £55. G4LDF. Tel 01-428 3266 (N W London).
HW100 HP23A two-speed drive 6HS6 rf amp, spare 6146 valves, manuals, £150. Creed 7B, £8. Creed 7TR, £6. **Siggen 390G/4, £10. DX tv eqp** TV125, tuner, MH311 ant, offers. G3JKN, QTHR. Tel Denham (0895) 832229.
Liner 2 mic, mobile mounting bracket, mint, Belcom matching power supply, Belcom matching external vfo, all connecting leads, £120 or will part exchange what have you? G6AUW. Tel Weymouth 786930.
Yaesu FT224 2m tx/rx, fitted S17, S19–23, R0, R3–8, exc cond, suitable for both mobile and base station, £120 ono. G8YGD. Tel 0252 29842.
Icom IC251E, as new cond, used only few hours, must **sell, QTH ng for vhf, £395. GW4ACO, QTHR. Tel** 0492 55240.
Metal detector, Fieldmaster 3, vgc, £20 or part exchange for any vhf tx/rx hand portable. M. Rogers, 662 Maidstone Road, Wigmore, Kent ME8 0LH.
Trio TR7600 tx/rx, with RM76 remote controller, 10W 2m fm, £150 ono. G4GGS, QTHR. Tel 061-789 5293, after 6pm.
FTDX401, vgc, used as rx for two years, £260. Cambridge AM10D modified fm, 6ch, new output valves, £30. IC240, Nov 1980, used little, R0-9, S20-24 fitted, £140, G8OBK, QTHR. Tel 061-439 2020.
IC202S, extra xtals fitted for 144·80 to 145·00 and 145·80 to 146·00, comp with box, instructions, etc, £110. G4CXJ, QTHR. Tel 0993 2573.
Tower: 8 × 8in narrow section, square lattice extendable tower, 20–28ft, £55 ono. Vertical 28ft rgf/ss marine hf whip antenna, cw large mounting base, £30 ono. G4KVX, QTHR. Tel Beaconsfield (04946) 6933.
DX302 gen cov rx, 100kHz–30MHz, digital readout, morse practice feature built in, £150. Port, BRS47111. Tel 01-309 1615.
Sony stereo cassette system model TC124CS, portable equipment, player/recorder, two spkrs, stereo mic, all contained in zipped carrying case, powered by internal batteries, mains or car supply, used little, £70 ono. Pearson, Denehurst, Rosslyn Avenue, Preesall, Blackpool. Tel 811162.
HW101 tx/rx/psu, cw filter, manual, professionally made, £220 ono. 2m 5-el quad, 10ft mast, chimney lashing, AR40 antenna rotator, £55 ono, exchange for mobile tx/rx/telescope. G4JVD. Tel Harrogate 61545.
3RPI crt, new, £6.50. Ex-equip, £3. Brass pounder morse key, £5. Heathkit HG10 vfo, £4. TT21 valve, £1. Six new 807 valves, £2. 1,850kHz xtal B7G, £1. Twenty 6·2V; 3A mes bulbs, £1 boxed. Carriage extra. G3LTU NOT QTHR. Tel Cleethorpes 66412.
Heathkit SB301 rx with 2m converter, SBA3004, SB401TX xtal mic, Cambridge speech compressor, SB600 spkr, all cables, manuals, quantity spare valves, £230. Buyer to collect. G3EVT, QTHR. Tel 0789 762041.
FT200/FP200, covers 10m 28–29·5MHz, good cond, SEM hf auto preamp, many spare valves included, £200. G4BOF, QTHR nr Leominster, Herefordshire. Tel 056-881 658.
Trio R1000 rx, exc cond, orig packing, manual, £235. Joystick System 'A' tuner and antenna, £30. Together, £260. Sanwa five-channel radio control nicad system, three servos, charger, £80. All prices ono. Buyer pays carriage. Tel Loveden (0400) 72704.
IC240, good cond, used little, manual, mobile mount, mic, power lead, etc, £140. Buyer collects. G8UUK NOT QTHR. Tel Croydon 01-686 3636.
Trio 2300, nicads, charger, £130. Trio 7010 ssb 2m with mobile mount, £100. G8MJH, QTHR. Tel 01-529 0351, after 6pm.
SSTV Spacemark monitor, all parts, ics, components, etc, checked and replaced as necessary, £75 ono. Homemade monitor part Spacemark circuits, works ok, £50 ono. Buyers to inspect and collect. R. J. Newey, G8AJI, QTHR. Tel 021-544 6171.
Collins 30L1 linear, plate power input 1,000W service manual, still the best, hardly ever used, £375. G3UFZ, QTHR. Tel Bishops Stortford (0279) 723088.
Sinclair ZX81 microcomputer, manual, psu, leads, tape of six 1k ram games, wkg fb, only £50. Bearcat 220FB vhf/uhf scanning rx, handbook, bracket, leads, £225 ono. Both items demonstrated. GM3XWJ. Tel 041-942 6606.
12AVQ, £20. Flexiwhip, comp with base, 80, 40, 20, 15m coils, £20. Lucas split charging relay, £5. Hansen

swr bridge, £6. All carriage extra. G3RB, QTHR. Tel Whitley Bay 530504.

Keyer ETM2B, £20. 18AVT/WB five-band vertical ant, repaired 80m coil, hence only £20. Audio filter, 2·5kHz–80Hz, £8. Hamgear PMIX calibrator, £5. G3VOK, QTHR. Tel 0582 23729, day, 0582 52934, evening.

Western DX5V five-band vertical, new, buyer collect, £20. G5KC, QTHR.

KW2000A with ac psu, spkr, two spare 6146B valves, manual, perfect wkg order, £80. AR88D with spare valves, fm adaptor, manual, good cond, buyer collects, £35. B. Sykes, G2HCG, 52 Marine Drive East, New Milton, Hants. Tel New Milton 617090.

Pye PF1 Pocketfones, three pairs, xtalled on RB10, RB14, SU8, nicads, circuits, new cond, £30 pair or £80 the lot. Four tx and three rx boards for spares, £5 the lot. GM3SZP, QTHR. Tel 041-776 6650.

813 valves with bases, have five available, £7.50 each. 813 valve bases, ceramic, new, £1.50 each. DC psu for Heathkit SB101 series, needs new 30A circuit breaker, £25 or offers. G3YCP, QTHR Somerset.

Tower 32ft lattice, Heathkit, buyer arranges transport, **£70. Eddystone EC10 Mk1, mains and battery packs, £48. Carriage extra. G3JIE, QTHR. Tel 0603 714686.**

Pye Westminster W25FM boot mount, 10 channel, incl S20, R0, R3–7, £90 ono. KP202 helical, leather case, charger, £60 ono. AR88LF, £50. G8EZM NOT QTHR. Tel Orpington (0689) 30334.

Icom IC202E rig committed suicide off bedroom windowsill, damaged case, pc board cracked (not broken) in several places, wkg ok before hari-kari, ideal for reworking or repair, offers? G8HOU, QTHR. Tel Syd, 01-561 1522, anytime after 6pm.

Yaesu FT707 100W tx/rx, as new, four months old, £475. FP707 matching power supply, spkr, mint, £80. FC707 matching atu, incl dummy load, £60. Demo available. G4MCK. Tel Stevenage 68564.

FLDX400, FRDX400, £300. TR2300, comp, £140. Pye AM10B, £20 or offers. G3SHQ NOT QTHR. Tel Twyford (Hants) 713003.

Muirhead D890B decade osc, 1Hz–111·1kHz, Lissajous scope comparator, £50 ono. 10·7GHz **doppler radar exp unit, works well, £30 ono.** *Wanted:* Cowl gill motor. G3KPW. Tel 0474 62051, evenings.

Yaesu Sigmasizer 10W 2m fm mobile tx/rx, 80 channel, fitted with rf preamp, time out indicator, £100. G8BMG, QTHR. Tel Stoke-on-Trent (0782) 513559.

KW2000B ac supply, KW E-Zee Match, KW match, KW dummy load, KW lp filter, Shure 201 mic, all used little, £230. G4BQS, QTHR. Tel Selsted 216.

KW2000B ac psu, Shure mic, handbook with circuit diagrams incl, new 6146Bs fitted recently, good wkg order, only one previous owner, £170 ono. G4IXS, QTHR. Tel Crewe 780546.

Dentron MLA2500 hf linear, £500. Yaesu FT221R, £295. Both as new. Buyer collects. G2ACK, QTHR. Tel 0342 21221.

TS770E, as new, £595. MM2000, £105. MMT70/145, £65. Video Genie with cw and QRA cassettes, £245. TenTec Century 21 tx/rx, £150. G3TUX. Tel Chris, Haslemere (0428) 3229.

Drake TR7, DR7, NB7, £850. G4HPI, QTHR. Tel 0604 864284.

23cm: Two 4ft dish antennas by C & S, precision metal spinners, originally 20dB gain at 1,430MHz swr 1·1, £25 each, buyer collects. Quantity TT22 pa valves, new, boxed, £6 each. G3CRO, QTHR. Tel 01-886 3279, evenings.

Atlas 210X console, spare matched pa driver, 20dB preamp inbuilt, £335. Swan 350 psu, 400W spare valves, £140. 9R59DS gc rx, £45. Prefer buyers collect. G4DGY, QTHR. Tel Southampton (04215) 66048.

KW2000, ac psu, mic, handbook, buyer to collect, £100. G3JKA NOT QTHR. Tel Byfleet (09323) 46742.

TS700G, exc cond, £280. FRG7 digital, fitted ssb filter, fm discriminator, exc cond, £130. 144/432MMT mint cond, £100. All ono. G3JXK, 16 Pinney Close, Taunton, Somerset. Tel Taunton 52499, evenings or weekends.

TS830S, fitted YK88C cw filter, VFO230, SP230, MC35S mic, all absolutely as new, £750, no offers please. G4AEL, QTHR. Tel Bristol 793211.

Icom 260E, nine months old, in perfect cond, Phihong 5A power supply unit, gutter mount antenna, the lot, £295. G2GC, QTHR. Tel Wakefield 250103.

A perfect TR7010 2m ssb tx, with 5-el Yagi, quick sale at £105. Valves: 829 and base, QQVO310, 807, ceramic base, offers around £7.50 the lot. *Wanted:* 12 or 6V lead-acid cells for portable work. G8SGG, QTHR. Tel Guildford (0483) 61057.

Nascom 2, 32k with graphics, toolkit, Naspen ZEAP psu, professional case, full documentation, £425 ono. Might exchange for mobile hf tx/rx. Paul Davies, G4GYB, 18 Market Place, East Finchley, London N2 8BB. Tel 01-883 2182, home, 01-889 9361, work.

Drake SPR4 solid-state rx, 24 bands, incl amateur, aeronautical, marine, broadcast, a.m., ssb, cw filters, exc cond. £200. KW2000B tx/rx, ac psu, vgc wkg regularly top to ten, carriage extra, £200. GM3TBV, QTHR. Tel Blairgowrie 2520.

FT101, 10–160m, spare valves, cw filter, manual, mic, all leads, 444 mic, FV101B, SSM Europa B, all leads, all items immac, unmodified, as new, £350 ono. Sullivan Wheatstone bridge, offers? Can arrange delivery London area. G4CSB, QTHR. Tel 802 3378, evenings.

Yaesu FRDX400 rx, mint cond, 2m fm calibration units, i.f. scope, op handbook, packing, £120 ono. G3KPW, QTHR. Tel 0474 62051, evenings.

R219 with power supply, MA7917 exciter, vhf and uhf military xtal tx/rx, 88 set, PO type 316 jacks, sockets, patching cords. Thomas. Tel Swansea (0792) 74671, evenings.

KW2000B, Shure 201 mic, ac psu, spkr, handbook, Decca overhaul certificates, £200. Buyer collects or pays carriage. Teletext decoder, Tifax XM11 by Texas, psu, remote hand control, interface board info etc. £60 ono. Tel Clacton (0255) 814320.

TR2300 2m fm transportable reverse repeater, nicads, charger, helical, case, etc, perfect, £150. MML144/25 linear, preamp, as new, £45. Sief PS134 13·5V 4A regulated, £18. Buyer collects. G4CQK, QTHR. Tel Walton-on-Thames 27199, anytime.

FRG7, boxed, as new, manual, no mods, £140. G8WRD. Tel Reading (0734) 693766.

Trio BS5 scan board panoramic display for TS520 series, new, £20. Burns wavemeter TC101, new, £20.

PF1 Pocketfones tx, rx, RB14, nicads, service manual, £20 for pair. Postage extra. J. W. Henderson, GM4HKW, 1 Rossiebank Crescent, Westmuir, Kirriemuir, Angus.

FRG7, fitted cw filter, mint cond, boxed, as purchased, incl manual, £130. Buyer inspects and collects. Tel Wakefield 270525.

FT101Z, immac cond, orig packing, comp with fan, mic, cw filter, manual, no mods, £395. G3RQ, QTHR. Tel 0272 43288.

Trio TR2300, as new, used very little, comp with nicads, charger, soft case, strap, manual, orig packing, £135 ono. G3PU, QTHR. Tel 0305 786484.

Pye PF2FMH vhf fm single-unit handportable, internal ls/mic, leather case, xtalled, R6, S20, spare nicads, £59. PF2UH, uhf version of above, toneburst, xtalled RB4, £59. Charger for above, £2. 9MHz xtals for 2m, £1.20 each. G3WUN. Tel Rochdale 57353.

FDK Multi 700EX 2m fm synth, as new, never used mobile, all assys new Dec 1980, buyer to collect or pay towards carriage, £150. Callers by appointment. G3VSJ, QTHR. Tel Hoddesdon (099-24) 68052, after 5.30pm and weekends.

Standard 8800 2m/fm mobile, over 10W output, orig packing, four months old, only used as base station, £170 ono. G6AHN. Tel Steve, 01-954 2311, ext 123.

Trio TS120V mic, cw filter, TL120 linear, £410. FRG7, mint cond, no mods, battery holder, £140. G4MCL. Tel Dave, 061-796 5153, after 6pm.

Teletype ASR33, comp with punch, reader, pedestal, fully overhauled, exchange for bw monitor, scope or offers. G4EMB, QTHR. Tel 9621-816459.

Drake R4C serial 23324, comp with six additional xtals, incl 29/30MHz, unmodified, exc cond, £280 ono. G8FKR. Tel Cambridge (0223) 842223.

FDK Multi 700E, £150 ono. Reg Stocker, G4LKC, Katkins, Oaklands Avenue, Wistow, Huntingdon. Tel Ramsey (0487) 822539.

New IC211E, Heathkit SB104 kit, spkr, almost new IC701, psu, IC245E, old but immac FT400, spkr, spare pas, other valves, all must go to any reasonable offers to clear shack for QSY. P.F. Barry, G3RJS. Tel 01-878 5442.

IC202S, used little, nicads, built-in charger, 12V, four **xtals, £120. G3UVY, QTHR. Tel Ripon 3387**

Trio JR310 amateur bands rx, 80–10m usb, lsb, a.m. £75 ono. G4HKR, QTHR. Tel 0532 871566.

Eddystone 730/4 with circuits, £130. Hamgear preselector, 1·8–30MHz, £8. BC221 frequency meter, calibration charts, £20. Transistor dip oscillator, £38, BC456B 28MHz a.m./ssb rx, circuit, £12. All ono. Can possibly arrange delivery. G8OWY, QTHR. Tel 061-370 2521.

Muirhead Decade oscillator, 1Hz–111kHz, built-in oscilloscope for frequency checking, vgc, circuit, instructions, £65. G3VWE, QTHR. Tel 0272 656783.

Xtals min HC18/U, 10·5MHz, 12·5MHz, 20MHz, £1 each, or 60p each for six and above. M. Small, 1 Wingate Road, Heaton Chapel, Stockport SK4 2RJ.

Daiwa CL22 atu 1·8–30MHz for use with gen cov rx, £15. Gordon Weaver, 60 Crispin Road, Winchcombe, Glos. Tel 0242-603682.

KW Vanguard, spare 6L6 valves, immac, £40. CR100, good, most valves new, £35. G2DAF Mk1 rx, looks professional, £55. All plus carriage but would recommend personal collection. G3WDN. QTHR.

W1191 wavemeter with charts, free to interested collector who can arrange transport. G3UUT, QTHR. Tel Cambridge (0223) 843546, evenings.

IC2E, exc cond, incl nicads, charger, helical, earphone, etc, still under guarantee from Thanet, £125. Reason for sale, going hf. *Wanted:* FT401(B), or similar rig. Tel Sittingbourne (Kent) (0795) 73401.

Trio TR7200G 2m mobile, λ 5/8 sticky whip, £90. KW Vespa 2 tx, £80. FDK Palm 4 70cm handheld tx/rx, £120. Icom IC240 2m mobile, £120. G3XUS, QTHR. Tel Newhaven (07912) 4465, evenings.

Icom IC201 2m ssb fm cw tx/rx, good cond, incl mic, 12/240V, £240 ono. G4HHI, QTHR. Tel 0325 52739.

G2DAF tx, exc cond, £40. 70cm 8-over-8, used little, £12. G4CMU. Tel Burgh Heath 54497.

CR100 communications rx, 60kHz–30MHz, booklet, circuit, spare set of valves, good cond, £30. Codar rf preselector PR30, 1·5–30MHz, £10. G4GRN, QTHR. Tel 0992 31698, after 6pm please.

Atlas 180 160–20m, 12V mobile, cw/ssb, 200W p.e.p., £210. Kenwood LF30A low pass filter, Z=50Ω, max 1kW p.e.p. unused, FF501 Yaesu lpf, unused, £12.50 each. AEC SWR50 meter, £5. IC201 2m all mode tx/rx, £225. G4DXC, QTHR. Tel 0274 563289.

Modular Electronics 432/28 transverter, £50. G2DAF Mk2 tx, Kokusai filter, 898 dial, £35. ZVC board, XF9B filter, built, £45. MM 432/28 satellite converter, £14. GWM 144 tx/rx boards, cased, control box, £50. BGY22/23 pa, £15. 437BGY, £12. GW8DUP, QTHR. Tel Swansea 72632.

FT/FP200 with 28MHz xtals, phones, mic, key, Osker SWR200, RF1239, Mustang 3-el beam, 14AVQ vertical, 40/80 dipole, Ham-M heavy duty rotator, CDR antenna rotor, cable, best offer secures complete station. G3EAX, QTHR. Tel Worthing 47097, evenings.

QTH Shirley, Solihull, W Midlands, four bedrooms, freehold semi-detached, 150ft garden, planning permission 10m and 2m antennas, £34,500. G3PLP, QTHR. Tel 021-744 3187.

Going temp QRT: Icom IC211E, Yaesu FT101Z, six bands, both exc cond, used infrequently, no sensible offer refused. G4IWA NOT QTHR. Tel John, Atherstone (08277) 3670.

New radio valves: 6CH6; 6SN7; 12AT7; 12AX7; EK2; VP13C; PZ30; TH29; 6BW6; and others, reduced prices. Service sheets, some vintage, for disposal. Mains transformer, 350-0-350, 80mA, good cond. 39 Amberley Drive. Tel Bognor (0243) 824735.

Dymar portable tx/rx, three channel, body worn, rig comp with three separate nicad battery packs, circuit diagrams, ready for conversion on to 2m fm, £25. RS47347. Tel Birmingham (021) 360 9307.

FT75 ac/dc psus, DX33 tribander, WE Alumast 30ft, Emoto 102 rotator. G3ZSR. QTHR. Tel Steve, 0469 60739.

FT290R, absolutely mint, nicads, case, 21 months guarantee, superb rig but returning to hf, £225. AR88LF, good order, manual, £35. Nelson Jones stereo tuner Integrex kit, *WW* design, smart metal work and case, good order, £25 ono. G3WJJ. Tel Reading 692888.

FT202R, 2m fm handheld, six channels, S20–22, R1, R3, R6, xtals for R4, helical, nicads, carrying case, new cond, £75. G4AFW, QTHR. Tel Aldeburgh 2464.

Trio JR500 rx with top band handbook. A Robinson. Tel 01-363 3363.

HF cw/a.m. station, 80–10m, comprising Lafayette Starflite 90W tx, Heath vfo, Trio JR102 rx gen cov with ham bandspread, £60. AM10D Cambridge, wkg R6, S20–22, £60. Jaybeam 2m 4-el beam, £1. G3TWN, **QTHR. Tel 051-334 5643.**

Shack clearance: all new bits and pieces; capacitors; resistors — many powers and values; slow motion drives; flywheels, variable capacitors; variable resistors, eg 2%-stereos, 200Ω carbons, tapped log/alogs (for loudness); ifts coils; xtal etching chemicals, everything must go. G3VZF. Tel Radlett 5723.

Trio TS120S, as new, to spec, operators and extra service manual, inspection and collection welcome or Securicor extra, £310. Lattice steel tower, 38ft, in two sections, with counter balance, purchaser collects, £35. G3GYE, Westmoors, Trezelah Gulval, Penzance. Tel 2486, evenings.

Trio R1000, exc cond, handbook, orig packing, £220. Datong AD270 active antenna, power unit, new, £30. QM70 144MHz converter, 28MHz i.f., £12. Could deliver between Bradford and Shrewsbury, otherwise buyer pays carriage. G8PPR, QTHR. Tel Bradford (0274) 674396.

TR2200G tx/rx, fitted S20–22, R0, RR0, R3, R7, auto toneburst, charger, case, orig packing, comp with power supply/charger, £80 ono. G6ASC. Tel Birmingham 021-705 1253.

TS510, PS510 manual, spare valves, mic, all ready to go, buyer to inspect and collect, £200 ono. G2CLN, QTHR. Tel Bromsgrove (Worcs) (26) 73578.

Trio 2400 with base stand, £150. In orig boxes, Datong morse tutor, £35. G8DZD, QTHR. Tel 021-354 1899.

TR7500, 1W or 10W synthesized 80ch F7 tx/rx, manual, mobile mount, vgc, orig packing, £150. G3NPJ. Tel 051-648 6389.

Trio 220G, fully xtalled with S14–16, S19–23, R2–3,

R6, R6 input, comp with nicads, helical, charger, mains, psu, £85 ono. G4ARO, QTHR. Tel 02934 6036.

Tonna 144MHz 16-el Yagi, new, boxed, £25. 12AVQ, new, boxed, £35. Jaybeam 144MHz, 6-el quad, used one month loft, £20. Europa B, 28/144MHz, new, never used, £70. 1¾/1⅝in aluminium elements, (6 × 12ft) for 2-el 14MHz beam, £10. Bud 20 × 20mm fd variable wide spaced, £1. RCA plate transformer, 900800, 1890/945V, 40kVA, £12. Foster ditto, 230/250V, 12V .42A, £2. Ferranti ditto, potted tapped 230V input tapped 6·3V output, 11·4A, £2. Ball races collar for three guys for 1in mast, new, £1. Going VE3, G3AIZ, QTHR. Tel Chelmsford (0245) 71790.

FRG7D, new cond, used little, £140. Bodigian, RS9271. Tel 09274 25074, evenings, Northwood, Middx (084421) 3555, day.

Grundig Satellit 2100, all bands to 30MHz, bfo, mains adaptors, case as new, £140 ono. Ferrograph series six reel-to-reel, vgc, £40 ono. some books. SAE for list, Buyer collects or pays postage. Tel Maidstone (0622) 61327.

Icom 255E, latest model, up/down scan mic, £165. Icom 211E with icrme remote controller/scanner, £375. Datong FL2 audio filter, £60. Daiwa latest infra-red mic system, £30. *Practical Wireless* and *Shortwave Mags*, 1967–78, free if collected. G4IOF, QTHR. Tel 01-486 8286.

Five mono 19in video monitors, 10MHz bandwidth, solid-state, faulty, £10, wkg, £20. Four Epsylon video cameras, solid-state with lens, 12V dc, or mains, faulty, £15. Circuit diagram and info on all items. G8UCL, QTHR. Tel Nick 021-472 6689.

Clearance: Taylor C&R bridge model 110C, £10. Taylor valve voltmeter model 170A, works but needs attention, £10. Taylor multimeter model 70A, £5. All ono. G3OML, QTHR. Tel 01-540 2713.

Datong FL2 multimode audio filter, mains psu, £75. Drake MN2700 antenna matching network with rf power and vswr meter, 2kW rating, £185. Both items as new. Tel 045-36 3994, after 6pm.

FT75 mains and mobile power packs, FV50C, £95. RX EC10 Mk2, £68. Codar AT5 MK2, £25. Europa transverter, £60. G3JMY, QTHR. Tel Sheffield (0742) 664370.

Sony ICF700W rx, 0·53–29·8MHz, a.m. wide, a.m. narrow, usb lsb/cw, fm band 2, S-meter, digital readout, £210 ono. Sony ICF2001 0·15–30·0MHz in 1kHz synthesized steps, AM155B, fm band 2, £130 ono. Tel Pete, Southend (0702) 558194.

Icom IC245 multimode, 144–148MHz, 10W fm, ssb, cw incl mobile mount, packing, handbook, £200. Codar AT5 tx, a.m., cw, mains power supply, £18. SEM top band converter, £8, G4ECI, QTHR. Tel 061-439 3831.

Circa 1940–50 galvos, bridges, precision potentiometers standards, by Cambridge. Tinsley, Watson, Sullivan etc. Free list. Many other items cheap. G4KDV. Tel 0943 463083.

Trio 2200GX, 2m tx/rx, portable/mobile, ideal first rig, vgc, no mods, xtalled S20–22, S16, R0, RR0, R5, nicads, charger, case, strap, helical, manual, £100 or offers. G8MRQ NOT QTHR. Tel Nottingham (0602) 280252.

FT200/FP200, fan, etc, £230. Palm 2, six channels, hardly used, £80. Liner 2, with preamp, £80. FL1, £40. G4IFB, QTHR.

Trio 7200G 2m 10W fm tx/rx, seven simplex, six repeater channels fitted, mobile mount, manual, unmarked, good cond, £95. Mobile 2m $\lambda/4$ and 5 $\lambda/8$ antennas, £5 each. All carriage extra. G3KZU, QTHR. Tel Oxford (0865) 63000, evenings.

Mizuho SB2M 2m ssb/cw tx/rx, incl nicads, £70. G4EVW, QTHR. Tel 08893 2821.

KW Vanguard 160–10, £30. Codar AT5, £25. Labgear topbander, £25. Hallicrafters SX28, £30. Creed 7ERP, cover, unfinished BARTG tu, all components, £27. 6F33 valves, new, incl port, £2. *Wanted:* KW2000 series tx/rx. G4JOW NOT QTHR. Tel Westonzoyland 740.

Clearing shack: Realistic DX302 gen cov rx, used for 1h only, £90. ADC sound shaper Mk2 stereo frequency equalizer, £75. Leak 2000 tuner amplifier, £25. RS44786. Tel Norman, 021-772 2131.

FT101E, exc cond, £410. G3XXJ, QTHR. Tel 021-351 2370, evenings.

Sentinel top band converter, brand new, i.f. out 14·000–14·200, £15. G3YBD, QTHR. Tel 061-998 5648.

1·5kVA 240V 50Hz petrol generator, £175. EC10, exc cond, £50. Jaybeam 70cm 46-el multibeam, £10. Eico 425 scope with probes (similar to Heathkit 10–18U but 110V ac), £5. P. Hart, G3SJX, QTHR. Tel 01-656 9054.

Muirhead K449 weather chart recorder, auto/manual to WMO standards, operates direct from radio rx, comp with paper, handbooks, £525. Buyer must inspect/collect. Morris. Tel Bolton 52384.

Trio 2300 portable, c/w nicads, charger, £140. Yaesu FT2FB mobile, poor cond, £65. Trio TS820, c/w digital display, cw filter, external vfo, £650. G3XTZ, QTHR. Tel 01-890 2535, office.

LCDS microprocessor development system by National Semiconductor (see Farnell catalogue) comp with all optional boards, orig cost £900, will sell for £300 or exchange for radio, video electronic equipment. GW8KNG. Tel 0222 617245.

Microwave Modules, 10m to 2m transverter, MMT28/144, as new, £70. CS decoder board (Elektor), built and tested with all info, £35. Yaesu YM7A hand mic, 500Ω, to suit FT101ZD etc, £5. G4HOJ, QTHR Wiltshire. Tel 0793 771153.

FL400 FRSDX400, both boxed, as new, handbooks, recently serviced professionally, owner sad to part with this first class combination, imminent move necessitates sale, first offer over £200 secures. Will deliver radius 50 miles, G2BIM. Tel 03955-4359 (Devon).

Trio 2300, comp incl set of nicads, all new, perfect, in orig packing, £125. G3WPI, QTHR. Tel 0703 734513.

BC221 frequency set, power pack, charts, £18. FWE wide range sig gen, 15Hz–1MHz, sine square wave, pair of new unused matched 6KD6 valves, £7. *Wanted:* hf linear and Century 21. G4IZG, QTHR. Tel 0903 41109.

SSM Europa 2m transverter with preamp cw interconnecting leads for FT101, £40. GM3XOG, QTHR. Tel Troon 313235.

KW107 Supermatch atu, incorporates swr/pwr meter, dummy load, as new, £79. Realistic DX160 rx, mint, 150kHz–30MHz, ssb/a.m./cw amateur, international bands etc, £69 ono. Prefer buyer collects. All queries answered. G4GIG, QTHR.

Large value electrolytics capacitors: typical values 22,000μF, 40,000μF, 58,000μF (30V) etc. SAE for list. Mike Thompson, GM4JEJ, 1 Osborne Terrace, Arbroath, Angus.

MM4000 rtty tx with RCA keyboard, as new, £210 Prefer buyer inspects and collects. G3CQK, QTHR. Te Walton-on-Thames 27199.

FL110 Yaesu 200W solid-state linear, 10–160m, 13·6v dc input, as new, any reasonable offer considered. G3FJA, QTHR. Tel Ruislip 39235.

Heath MM1U multimeter, £10. Heath HM2102 swr/power 2m, £12. MMW 144/70cm transverter, £100. Stolle rotator for spares, £5. Polar elecs swr bridge, up to 500MHz, £50. Various antennas, 144 and 432MHz. G8ESK, QTHR. Tel 0274 45611.

FT480R multimode 2m tx, immac, all packing etc, four months old, £310 ono. Matching scanning desk mic YM38, £20. Part-built hf linear with two brand new TY2-125 triodes, filament transformer, 1,500V 1A transformer etc, £60 ono. G4GZS, QTHR. Tel Rugby 815506.

Creed 7E, Creed 54, two Olivetti TE300 printers, ST5 terminal unit, S6S tape reader, case of rolls, plenty of spares, £65 the lot. G8WRV, 35 East Street, St Neots, Cambs.

Exchange: FDK750E multimode tx/rx, 40W MML, preamp, both nearly new, in exc cond, for hf tx/rx, anything considered, or sell rig, £260. MML, £60. G6AVN. Tel Halifax (0422) 58856.

2m fm Pye Bantam equipt, three channels, batteries, charger, £45. 2m a.m. 10W valve tx, £9. 2m 1W Snowflake a.m. tx, £6. 4CX250B valves, £2. Taylor Hobson Varotal 8–40in F8 zoom tv camera lens, £50. G8CQE, QTHR. Tel 01-656 5285.

WANTED

LM1595 or equivalent ic for ARRL speech processor. Any info re availability appreciated. O. English, G4HST, Oldchurch Hospital, Romford, Essex RM7 0BE.

VFO 30G for Trio YP10. Prefer wkg. G4LSL NOT QTHR. Tel 0748 833559.

Antenna noise bridge. Audio peak notch filter for ssb. Valves 6HS6, 6BN8, 6CB6, 6CL6, 6EA8, 6GW8, 6AU6, 12AT7, 12AU7. Small mic transformer, low to high impedence. G3RDK, QTHR. Tel 01-856 7478.

Accessories for TR9000. SP120 external spkr. BO9 base. PS20 power supply. G6CHM. Tel Wombourne (0902) 893167.

For the Wireless Museum: pre-war Gamages catalogue, old radio books, magazines, catalogues, QSL cards, callbooks. Collection arranged. Details please to hon curator G3KPO, QTHR. Tel Ryde 62513.

Drake 2C, must be good cond. G3ORH, QTHR. Tel Maidstone 44021, after 6pm.

G2DAF Mk2 rx, wkg or part-finished, must have all main components. Details to G4DUF, QTHR. Tel 042879 2104.

Service manual or any info on Airmec modulation meter type 409. Please write 189 Blacker Lane, Netherton, Wakefield, W Yorks. Tel Bob, 0924 277794.

DX34 or similar, must be in good cond. *For sale:* CR100, good cond, heavy, so buyer collects. GW3KYT, QTHR. Tel 0492 55156.

Morse key, brass on wooden base. Spanswick, 17 Harlands Close, Haywards Heath, West Sussex. Tel 0444 51346.

Trio TX599 tx to partner existing JR599CS rx. Minor repairs no objection. Collection anywhere UK arranged by buyer. Maddocks, G8ZON. Tel 0705 29129.

Copy of *Transmission and Propagation Vol 5* by Glazier and Lamont (HMSO). Eddystone 770R manual to buy or copy. G8NDL. Tel 01-555 8898.

Suitcase tx/rxs. British: Mk XV, Paraset, type 3 Mk2 (The B2 set), type A Mk1, type A, Mk2*, type A Mk3 (The B2 Minor), rx type 53 Mk1, tx type 51/1, Mk119, Mk122, Mk128 (wooden cased), Mk217. Polish: type BP3 (the T3) and type AP4. American: SST/R1, SST/R5, ANPRC5, GRC109, AR11, RS6, RS8, Delco 5300 and TRC77. Any spare parts, incomplete or damaged sets, orig manuals or associated literature welcomed. Taylor, G3UCT, QTHR. Tel Fleet (02514) 6998.

40ft antenna tower, strong, suitable for TA33 and rotator, preferably lightweight metal in good cond. G3SKZ NOT QTHR. Tel 0435-873570.

B2 suitcase radio or any other wartime suitcase/spy type radio. Any cond or incomplete welcome. G8VDZ, QTHR. Tel 01-949 2317.

Any TW equipment. Circuits, gen, sales literature on Withers gear. FT243 xtals for 600kHz, 6,027kHz, 7,800kHz. Peter Turner, G4IIL, QTHR. Tel Brighton 607737, evenings.

Radio Communication **February 1977.** *Radio Communication* with G3HBW 2m converter or copy thereof. P. Ebsworth, G8CKB, Forland, 5395-Steinsland, Norway.

Sommerkamp FL200B circuit diagram; loan, photocopy or purchase. Postage and expenses refunded. G3XKY, QTHR. Tel 01-348 3314.

HF linear amplifier, triode type grounded grid, suitable for Drake TR4 cw. Roy Horley, G4KME, Willowbrook, 50 Hillswood Drive, Endon, Stoke-on-Trent. Tel 0782 503444.

AR88D urgently required, good cond throughout, very fair cash paid for exc model with manual, no doubtful or badly marked rx please. Will collect southern England. G8BU, QTHR. Tel Fordingbridge (0425) 53883, evenings.

Wide-spaced 1kW transmitting types: variable capacitor, 350pF, and split-stator or dual section variable capacitor, 250pF each section. G4DET, QTHR. Tel Leicester (0533) 764684.

Line output transformer for Bush CTV25 with Mk3 time base, solid-state rectifiers. G2ACK, QTHR. Tel 0342 21221.

Texas ic SN7600 1ND for repair. Heath GR9900 tv. GM4HBM, QTHR. Tel 67 25104, evenings.

Impecunious schoolboy swl requires hf rx. Must be in wkg cond, limited funds available. GM4HHY, 55 Belwood Road, Milton Bridge, Penicuik, Midlothian. Tel 0968-73783.

Urgently needed: Manual, circuit and any information for Cossor 1052 oscilloscope, borrow or buy, all expenses reimbursed. G3AFC, QTHR. Tel Pat 04747 2691.

R216 rx vhf, CV253/ALR tuning unit, AM913/TRC 100–225MHz, AM914/TRC 225–400MHz tuning units. Bentley, 27 De Vere Gardens, Ilford, Essex. Tel 01-554 6631.

Pocketfone 70 PF2AMB plastic case required to repair set broken in accident. Cockermouth Mountain Rescue Team, G3LBX, Rectory Lorton Road, Cockermouth CA13 9DU.

Hallicrafter SX100 rx, in good wkg order. Cameron, Coombe Cottage, Pitchcombe, Stroud, Glos.

Rejected for uhf? 4CX250/4X150 holders for hf use. Ferrite rings marked FX1587, FX1588. American callbooks up to 1960, *Radio Communication* 1969–78. G3IMW, QTHR. Tel 01-340 0789.

Morse tutor, Datong D70. R. Newstead, 12 Rye Close, North Walsham, Norfolk NR28 9EY.

FR200 in first class order. Can collect up to 40 miles, G3EZH. Tel 061-330 1182 business hours. Mon-Sat, except Tuesdays.

New 4CX350A, 4CX350FG, 4CX250B or R, ITT or Eimac, new 2C39A, ptfe rod, sheet, good quality dspcb, Jackson Bros slow motion drives, magnetic devices 1,296MHz relays 12V, 5pF + 5pF min caps, 3CX1000 with base, 3CX1500 with base, Eimac SK620A bases, hf Bird elements, new 4CX2250K, pa transistor for 1,296MHz 10W plus. All letters answered. GJ4ICD, Lemnos, Longueville Road, St Saviour, Jersey CI. Tel 0534 26788.

70cm all mode tx. RTTY/cw to interface with 32k PET computer. Mactronics M650 or similar. 70cm linear amp. Brass cw key, older type preferred. 2m atu, similar AT145 Packer model. *For sale:* 32k Commodore PET with 4040 dual disk drive, must sell, incl cassette, plus carriage or to be collected. Both mint cond, selection of disk programmes, the latter to buyer's requirements, £850. Printer 2023 also available, together with spare disk drive, jumper board, many extras. G4IZW, QTHR.

Western

CALL Western FOR YOUR YAESU AND TRIO REQUIREMENTS

A selection from the range . . .

HF EQUIPMENT	FT-101Z	Analogue dial	from	£539
	FT-101ZD	Digital (Basic, AM, FM versions available)	from	£599
	FT-707	Solid state transceiver		£549
	FP-707	PSU/speaker		£119
	FC-707	Antenna tuner		£82
	FL-2100Z	Linear amplifier		£399
V/UHF EQUIPMENT	FT-227RB	2m FM Mobile		£229
	FT-290R	2m all-mode Portable		£235
	FT-480R	2m all-mode Mobile		£360
	FT-720RV	2m FM Mobile		£239
	FT-720RU	70cm FM Mobile		£264
RECEIVERS	FRG-7	General Coverage Receiver		£189
	FRG-7700	General Coverage, Digital		£315

HF EQUIPMENT	TS-130S	Solid state transceiver	£525
	TS-530S	HF base transceiver	£539
	TS-830S	Deluxe HF transceiver	£699
	TS-820S	★ SPECIAL OFFER ★	£559
V/UHF EQUIPMENT	TR-2300	2m FM Portable	£164.95
	TR-2400	2m FM Hand Held	£198.50
	VB-2300	10W Amp. for TR-2300	£45
	TR-8400	70cm FM Mobile	£299
	TR-7625	★ SPECIAL OFFER ★	£239
	TR-9500	70cm all-mode mobile	£459
RECEIVER	R-1000	General coverage, digital	£295

FT-ONE NOW! THE ONE THAT HAS IT ALL!

NEW

FEATURES

- ★ Wide Dynamic Range Front End
- ★ Frequency Control by Keyboard, Up-Down Switches or Dial
- ★ IF Width, Shift and Audio Peak or Notch Filtering
- ★ 10 VFO System for Comprehensive Frequency Control
- ★ Full CW Break-in
- ★ General Coverage Receive
- ★ Built-in PSU

BRIEF SPECIFICATIONS

Frequency Coverage	RX: 150kHz–29·9999MHz TX: 1·8MHz–29·9999MHz (No TX outside Amateur Bands)
Modes	LSB, USB, CW, FSK, FM, AM
Size	370(W) × 157(H) × 350(D) mm
Weight	17kg
Power Requirements	100–234V AC; 13·5V DC

CALL US NOW FOR PRICES

NEW

A FULL RANGE OF ANTENNA ROTORS FROM Western

THE "BUDGET" FAMILY
(24V motors)

WE-1145 — LIGHT DUTY
(similar to SU-2000 with circuit improvements)

Direction indicator	Control knob
Rotation time	60 seconds
Antenna weight (max)	50kg
Mast size	28–44mm
Wind load area (max)	0·25sq.m.
Cable required	5-way
PRICE	**£34.95**

FU-400 — MEDIUM DUTY

Direction indicator	Meter (NESW)
Rotation torque	550kg.cm.
Braking torque (stationary)	1,500kg.cm.
Rotation time	50 seconds
Antenna weight (max)	200kg
Mast size	38–50mm
Wind load area (max)	0·5sq.m. (basic 0·8sq.m. (with stay bearing)
Cable required	6-way
Lower mast clamp included	
PRICE	**£64.95**

"EMOTO" — THE "PROFESSIONAL" FAMILY
(All Emotos take 32–62mm mast — motor volts 50–0–50V isolated)

EMOTO 103SAX — MEDIUM DUTY

Direction indicator	360° circular dial
Rotation torque	450kg.cm.
Braking torque (stationary)	1,500kg.cm.
Rotation time	55 seconds
Antenna weight (max)	150kg
Wind load area (max)	0·5sq.m.
Cable required	6-way
PRICE	**£86.25**

EMOTO 502SAX — HEAVY DUTY

Direction indicator	360° circular dial
Rotation torque	600kg.cm.
Braking torque	4,000kg.cm.
Rotation time	66 seconds
Antenna weight (max)	400kg
Wind load area (max)	1·5sq.m.
Cable required	6-way
PRICE	**£125.35**

EMOTO 1102MXX/1103MXX — EXTRA-HEAVY DUTY

Direction indicator	Meter (NESW)
Rotation torque	800kg.cm. (1102); 1,000kg.cm. (1103)
Braking torque	1,000kg.cm.
Rotation time	80sec (1102); 110sec (1100)
Antenna weight (max)	400kg
Wind load area (max)	2·5sq.m.
Cable required	7-way
PRICES	**1102MXX £189.75** **1103MXX £194.35**

EMOTO ACCESSORIES

1211	— Mast bracket for 103SAX	£10.93
1213	— Mast bracket for 502SAX	£14.38
1215	— Mast bracket for 1102/1103	£22.43
MB-300	— Rotary guy bearing	£13.80

ALSO Western MASTS, TOWERS, ANTENNAS . . .
SEE PREVIOUS ADS. FOR WESTOWER, ALUMAST, ULTIMAST
NO PRICE CHANGES ON THESE BRITISH-MADE PRODUCTS!

SEND SAE FOR FURTHER DETAILS OF ITEMS OF INTEREST

ACCESS—VISA CARDS ACCEPTED—HP ARRANGED (WRITTEN QUOTATIONS ON REQUEST)
ALL LISTED PRICES INCLUDE VAT AT 15% AND CARRIAGE

Western Electronics (UK) Ltd
FAIRFIELD ESTATE, LOUTH, LINCS LN11 0JH
Tel: Louth (0507) 604955 Telex: 56121 WEST G

OPEN HOURS: 09.00–12.00; 13.00–17.00 Mon/Fri; SATURDAYS 0900–12.00

NORTHERN IRELAND
Mike Matthews, GI8MNQ
Newtownards (0247) 815859

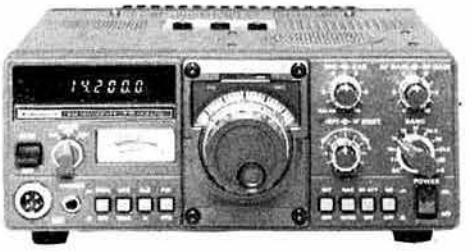
STEPHENS-JAMES LIMITED

TRIO R-1000

TR-9000

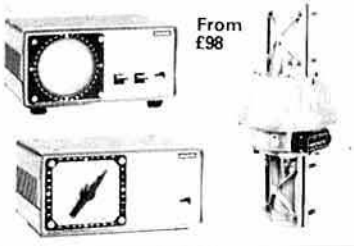
TRIO TS-830S

TRIO TS-130S



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	TR2400	£198.95	TR9000	£394.91
	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	PS10	£64.86

DAIWA Full range of reliable antenna rotators



From £98

DAIWA ANTENNA TUNER

CN1001A 200 watt £129.95
CN2002 2kW £190.00

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: **£948.75** 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.

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 1210/1 10A 13-5V £65.00
Model 156S 4-15V 6A Twin Meter £40.00
Model 1210S 4-20V 10A Twin Meter £88.00
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 £41.00
FX1 Station Wavemeter £29.00
Wellz SP200 swr/power £49.95
HP4A High Pass Filter £6.00
50 watt Dummy Load 50ohm £7.25
Drae VHF Wavemeter £25.00
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
Sky Ace aircraft band hand held receiver £49.00
SRX30D Digital Receiver £195.00
Arganaut 515 Transceiver £276.00

R512 Aircraft Band Scanning Receiver £138.00
Digital Flight Scan Airband Receiver £215.00
SR9 2m FM Receiver £46.00
FDK 700EX Transceiver £199.00
FDK 750E Transceiver £289.00
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

FULL RANGE OF BEAMS AVAILABLE

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 £96.76
Hustler 5 band vertical £86.00
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 £190.00
Multi 750 Transceiver £290.00

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

MAIL ORDER

FROM

AMCOMM

by two way FREEPOST

MORSE KEYS

HK 707	Straight Up/Down keyer	£11.44
BK 100	Semi-automatic mechanical bug	£17.88
MK 702	Up/Down keyer on marble base	£22.43
MK 702	Manipulator	£22.43
MK 704	Squeeze paddle	£14.38
MK 705	Squeeze paddle on marble base	£22.43
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 ouput with 9dB preamp	£209.88
2M3-150P	144MHz 3W input/150W output with 9dB preamp	£209.88

G. WHIP Mobile Antennas

Tribander 10-20 Slide	£25.88
L.F. Coil 40/80/160 MTS	£6.56
L.F. Whip Telescopic	£4.26
Multimobile 10-20 Auto	£30.48
M/Mobile Coil 40/80/160	£6.56
M/Mobile Whip Telescopic	£4.26
Flexiwhip 10M Mast	£18.11
F/Whip Coils 40/80/160	£6.56
Base Standard	£5.75
Base Heavy Duty	£6.33
Extenarod	£12.08

SHURE MICS

201	Hand ceramic omnidirectional high impedance	£14.49
202	Hand ceramic noise reducing high impedance	£15.18
401A	Hand controlled magnetic high impedance	£16.56
401B	Hand controlled mag. low impedance (200 ohms)	£16.56
444	Desk adjustable height controlled magnetic	£32.43
526T	Desk controlled response transistor preamp	£39.33

DUMMY LOADS

DL20	30W DC 150MHz with PL259 connector	£6.33
T-80	80W DC 500MHz with SO239 connector	£22.94
T-150	150W DC 500MHz with SO239 connector	£32.78

STILL HELPING WHERE IT HURTS!

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

Many Other Items Available on Similar Terms—Call for Details

Product	List Price	Deposit	12 Payments
Yaesu FT 1	£1295.00	£600.00	£57.91
Yaesu FT 902DM	£885.00	£399.00	£40.55
Yaesu FRG 7700/S	£329.00	£139.00	£15.89
Yaesu FRG 7700/M	£409.00	£180.00	£19.01
Yaesu FT 101ZD/FM	£665.00	£300.00	£30.41
Yaesu FT 101ZD/AM	£650.00	£275.00	£31.29
Yaesu FT 101Z/FM	£590.00	£250.00	£28.27
Yaesu FT 101Z/AM	£575.00	£225.00	£29.15
Yaesu FL 2100Z	£425.00	£185.00	£20.08
Yaesu FT 480R	£379.00	£185.00	£16.18
Yaesu FT 707	£569.00	£230.00	£28.27
Yaesu FT 290	£249.00	£120.00	£10.82
Standard C78	£219.00	£99.00	£10.04
Standard C58	£247.00	£107.00	£11.69
Icom 730	£574.00	£250.00	£27.00
Icom 720A	£883.00	£400.00	£40.26
Icom 290	£366.00	£166.00	£16.67

Microwave Modules

MMT 432/28	£149.00
MMR 432/144R	£184.00
MMT 28/144	£99.00
MMT 144/28	£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

Unadilla/Reyco

Antenna Traps –

Precision moulded coil forms stainless hardware Aluminium tube irridit finish Coated aluminium wire. Fully waterproofed.

Available 7/14/21 Mhz £12.99

W2AU Balun

3.5/30 Mhz 2.5Kw with Lightning Arrestor – Suitable Vees, Yagis, Doublets, Quads etc..

£12.99

Standard

C8800 2m Tcvr £252.00

C7800 70cms Tcvr £275.00

Dentron

GLA 1000 Linear Amp 10/80 1Kw £295.00

MLA 2500 Linear Amp 10/160 2Kw £699.00

MT 3000 3Kw Tuner/SWR/Dummy Load £275.00

SWAN CUBIC

Astro 103	POA
PSU	POA
1500Z linear	POA
ST1A ATU	POA
ST2A ATU	POA
ST3ATU	POA

Rotators

KR 400 RC	£90.85
AR 40	£59.00
KR 9502A	£50.00
Skyking SU400	£92.00
Skyking 250	£39.50
Emoto 502CXX	£139.75

All items VAT and carriage paid

ICOM IC 730

All bands 10-80m including 30m, 17m and 12m. 100w RF out and 40w AM. Twin VFO, digital readout, 3 speed tuning down to 10Hz. Dial lock, RIT, N.B. and switchable preamp.

SEE HP LIST ABOVE

SWR/RF Power Meters

SWR 25 3.5/170Mhz	£12.94
LEADER LPM 885 – HF 1Kw	£58.00
HANSON 3.5/150Mhz 200w	£28.75
REECE UHF 74 144/432	£16.28
HANSON FS 500H 1.8/60Mhz 2Kw	£67.85
OSKAR SWR 200 3.30Mhz 2Kw	£40.00

FDK Mult 700EX £199.00	Send 30p for our bumper bundle	No Quibble Guarantee Same Day
FDK Mult 750E £299.00	literature	Despatch All Items Advertised

Choose your AMTECH here

Amtech 100 Mobile Match	£16.95
Amtech 200 Random Wire ATY 10-160m	£29.95
Amtech 300 Random and Coax Fed ATU	£43.95
Amtech CW 250 The most outstanding CW filter available	£24.90
Amtech Channelguard A plug in device to eliminate those unwanted stations Decoder	£15.25
Sender	£7.25
Amtech FM7 FM Demodulator for FRG 7	£11.90

Antennas - Wide range in stock including Jaybeam - Hygain - Cushcraft - ASP Telecon Hokushin etc...

Bantex ⅝ whip complete antenna **£8.99**

Bantex ¼ whip complete antenna **£3.50**

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

9.00 – 5.30 Sunday by Appointment

All items over £100 available on easy terms at List Price.

NO POSTAGE REQUIRED

AMCOMM SERVICES
FREEPOST
HARROW
MIDDX
HA2 0BR

Please send me _____

at _____ enclosed cheque/P.O. for

_____ or charge my VISA/ACCESS

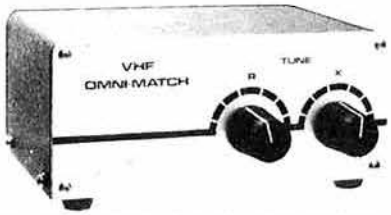
Nr _____

Name _____

Address _____

_____ Post Code _____

GET OMNI-MATCH-ABILITY



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**
(See Air Test report in P.W. July 81)

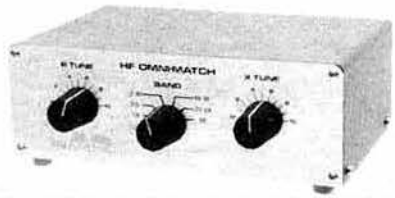
READY NOW!

LINEAR OMNI-MATCH 3·5–30MHz. Improves transceiver to linear amplifier matching. Increases drive for full output while easing load on transceiver. Broadband. Switched impedances. Handles 300W **£19.95**

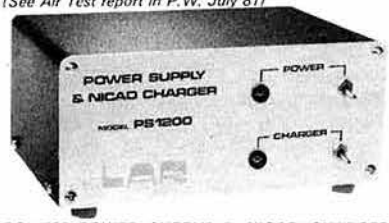
ANTENNA TRAPS Pair of 7MHz weatherproof traps. 500W. Pair of lightweight end insulators. Full instructions for 5-band trap dipole 80–10 metres. Boxed set **£12.50**

TRAPS FOR THE NEW BANDS

MOBILE OMNI-MATCH 1·8–30MHz. 12-ratio impedance transformer matches lower impedance of mobile whips. Broadband, no tuning. Reduces SWR. Increases workable bandwidth. Handles 300W **£19.95**



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**



PS 1200 POWER SUPPLY & NICAD CHARGER Charge and operate at the same time. Suits Trio and Icom portables **£29.50**

1kW FEEDER SWITCH A top quality switch with a generous power margin. Up to the minute styling **£16.95**

SWL OMNI-MATCH New design optimised for receiving 200kHz–30MHz. Improves any antenna/receiver combination .....**£23.95** (add £2 for S0239)

LAR MODULES LIMITED

60 GREEN ROAD
LEEDS LS6 4JP

Telephone
0532 782224

24 HOUR ANSAFONE

Order by post or phone your Access/Barclaycard number
All prices inc. of VAT
Add £1.75 for p&p.

OMNI-MATCH TIP No. 5
Which end of the band is your beam tuned for?
What is the SWR at the other end?
With an Omni-match it matters not—you get 1:1 SWR throughout.
P.S. Works wonders with a Mini-beam.

SAE for leaflets or send 50p for new Antenna Catalogue. 70 pages packed with information and know-how.

TRADE ENQUIRIES INVITED

THE ATU PEOPLE — Hazel & Tom G4DVZ — Geoff G3FCW — Margaret G4GYL — Bill G4DCY — Andrew G6DNG

VHF WAVEMETER

135-450MHz. Designed to meet Home Office requirements for 2 Metre operation.
£24.95 (inc VAT and carr.)

13·8V POWER SUPPLIES

FULLY PROTECTED BRITISH MADE POWER SUPPLIES

4 Amp **£27.95** + £1.00 carr.
6 Amp **£44.95** + £2.00 carr.
12 Amp **£69.00** + £2.00 carr.
24 Amp **£99.00** + £3.00 carr.

NEW!

POWER SUPPLY MODULES

Ready-built and tested regulator PCB's, 12 Amp continuous output, 18 Amp surge, fully protected output.

Requires a transformer, rectifier, output transistors and heatsinks to complete a 12 Amp power supply.

£18.00 inc. VAT (carr. £1.50)

TRANSFORMERS

NEW!

16·5V 24A **£25.00** (carr. £2.50)
17·0V 12A **£15.00** (carr. £2.00)

Access Cards Accepted All Prices Include VAT Manufactured in UK

DAVTREND LIMITED

89 Kimbolton Road, Portsmouth, Hants. Ports (0705) 816237

G2BAR HAM BAND AERIALS

DX RADIO COMMUNICATION AT ITS BEST.
2 METRE—4 METRE HF BAND YAGI'S SCORING GREAT SUCCESS.
FOR DETAILS HOW TO PUT YOUR DX SIGNAL WHERE YOU WANT IT!
SEND 30p STAMPS FOR LEAFLETS AND NEW PRICE LISTS.

UPPINGTON TELE-RADIO (BRISTOL) LTD
12-14 Pennywell Road, Bristol BS5 0TJ Telephone 0272 557732

VALVES VALVES VALVES

The following valves in matched pairs 6JS6/C, 6KD6, 6JB6/A, 6LQ6, 6HF5, 6146A, 6146B. **YES** the 6JS6/C is Japanese and works in the FT101. Most amateur radio valves including difficult to obtain types **EX STOCK**. Quotations without obligation. If we don't stock your type we may be able to import for you, PLEASE ENQUIRE. REMEMBER over 200 types **EX STOCK**. Sae for list. 'Phone for assistance re types suitable for your equipment. USA and Jap manufacture of popular types available.

DON'T DELAY 'PHONE TODAY 0204 54165, G4AZM
Wilson, 20 Croft Gate, Harwood, Bolton BL2 3JJ

TRIO

LAR

AUTHORISED ICOM DEALER

...the sign of fine communications

AUTHORISED DISTRIBUTOR FOR TRIO & ICOM EQUIPMENT IN YORKSHIRE AND THE NORTH EAST.

Buy from the communications specialists every time . . . you will get good service from professionals who know your hobby well. For example:

TRIO TS803S The ultimate H.F. Transceiver, with new bands fitted.
PRICE
£726.57

TS130S
200W pep mobile transceiver, with new bands fitted.
PRICE
£547.40

ICOM IC251E All Mode Base Station 2m Transceiver with Scanning facility. **PRICE**
£495.00

ICOM IC-24G
The best and most reliable mobile transceiver.
SPECIAL PRICE
£169.00

HERE ARE A SELECTION OF TOP BUYS!

TRIO EQUIPMENT

NEW!	Trio 9000 multi-code 2m transceiver	£371.91
R1000	200kHz to 30 MHz PLL Receiver with digital readout	£305.90
VF0230	Digital VFO with memories and digital readout	£220.80
AT230	All band ATU and power meter. Matches TS830S	£121.21
SP230	External speaker unit with switched filters	£37.72
YK88C	500Hz CW Filter	£29.67
YK88CN	270 Hz CW Filter	£32.66
TL922	HF linear amplifier 160-10m/2kW P.E.P.	£595.70
TS130V	HF 20W pep mobile transeiver	£450.80
SP40	New mobile speaker unit	£12.42
PS20	AC power supply for TS130V	£48.30
MB100	Mobile mounting bracket for 130V	£17.25
PS30	AC PSU for TS120S, TS130S & TS180S	£85.10
TS770E	2m 70cm all mode dual bander	£785.91
TR7800	2m synthesised mobile FM 25 Watt	£276.00
TR2300	2m FM portable transeiver	£166.75
VB2300	10W booster	£55.43
MB2	Mobile mount	£17.71
TR2300	Spare power lead	£1.30
LAR PS1200	Power supply unit and ni-cad charger for TR2200GX/TR2300/TR3200 and ICOM portables. You can charge and operate at the same time.	£29.50
SRX30D	0.2 to 30 MHz SWL Receiver with digital readout	£195.00
HS5	Communications headphones, tailored response	£21.85
HS4	Communications headphones, tailored response	£10.35
LAR	1kW P.E.P. 3-way antenna switch	£16.95
LAR	Antenna traps for multi-band dipole	£12.50

VHF AMATEUR RECEIVERS

SX200N	Programmable Scanner 26-514MHz	£264.00

HF MOBILE ANTENNAS

'G' whip tribander helical 20/15/10		£25.87
'G' whip multimobile 20/15/10		£30.47

NEW HF VERTICAL ANTENNA

HF5	80 10m vertical	£48.50
HF5R	Optional radial kit for roof mounting	£28.00

ICOM PRODUCTS

IC255E	25 watt FM 2m mobile with memory and scanner	£255.00
IC2E	2m FM hand portable	£169.00
NEW!	IC290E 2M all mode mobile	£359.00

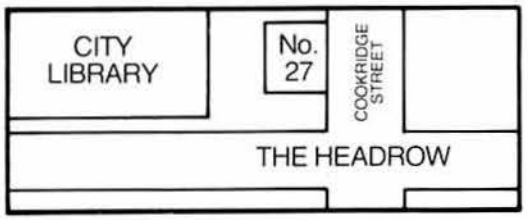
NOTE: (i) All prices include VAT
(ii) Securicor delivery arranged if required.

LAR

Leeds Amateur Radio
27 Cookridge Street, Leeds LS2 3AG
Tel: (0532) 452657 (Shop)
Mail Order/Service Department:
60 Green Road, Meanwood, Leeds LS6 4JP
Tel: (0532) 782224

HOW TO BUY!

By post – or 'phone your Barclaycard, Access or LAR Creditcard number. Alternatively, call in for a chat. The shop is just 10 minutes from Leeds City Station and there's easy parking if you travel by car.
*Instant HP for licensed Amateurs *Extended Credit Terms Available.
A QUOTATION ON ALL CREDIT ITEMS IS AVAILABLE.
*Open 9.15 – 6.00 pm, Saturday 9.15 – 5.30 pm.



FROM THE SHOP – We're close to the station and car parks. Do call in and see Uncle Tom's cabin!

POST NOW!

Send 50p for Catalogue and Price List.

I enclose cheque for £_____ Plus 50p for Brochure*
*delete if not applicable.

to purchase _____

Name _____

Address _____

_____ RC28

Post to: Leeds Amateur Radio, 60 Green Road, Meanwood, Leeds LS6 4JP.

TO BARCLAYCARD/ACCESS/LAR
I authorise you to debit my Barclaycard/Access/LAR Budget Account with the amount of £_____

My No. is | | | | | | | | | | | | | | | | |

Signature _____

TRIO DISTRIBUTOR. LAR are area distributors for CUSHCRAFT Antenna Specialists, ICOM Microwave Modules.

WOOD & DOUGLAS

A NEW construction season is with us again. Check through our many kits and modules for your soldering iron's evening entertainment. Prices on the "NYA" items should now be available, ring for details.

PROJECT	CODE	ASSEMB'D £	KIT £
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	NYA	NYA
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
Combined Power Amp/Pre-Amp (30W)	70PA/FM30	NYA	NYA
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	NYA	NYA
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
4M EQUIPMENT			
FM Transmitter (1·5W)	4FM2T	NYA	NYA
FM Receiver	4FM2R	NYA	NYA

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

SMC (Leeds)

South Midlands Communications Limited

★ IT'S HERE ★

commodore COMPUTER

VIC-20

COLOUR, SOUND, PET BASIC WITH MEMORY EXPANSION UP TO 32K. SAE FOR DETAILS

★ **INTRODUCTORY PRICE £189.95 inc VAT** ★

G3PSM **G8SMC** **G6EVQ**

BARCLAYCARD—HIRE PURCHASE—PART EXCHANGE—ACCESS A PLEASURE

257 OTLEY ROAD, LEEDS, YORKSHIRE LS16 5LQ
Telephone: Leeds (0532) 782326
Monday to Saturday open 9-5.30pm

J. BIRKETT

25 The Strait, Lincoln LN2 1JF Telephone 20767

COMMUNICATION SERIES OF IC's untested. With data, RF, IF, VOGAD, AGC, AF AMP, DOUBLE BALANCED MODULATOR, MIXER, All IC's **27p** each.
TRW UHF POWER TRANSISTOR 1,200MHz, 2 watt, 12 volt type PT 4642 @ **£2.50.**
CERAMIC TRIMMERS 2·5 to 6pf, 3 to 10pf, 4·7 to 20pf, 7 to 35pf, 10 to 40pf, 10 to 60pf. All @ **15p** each.
FILM TRIMMERS 4pf, 10pf, 20pf, 60pf. All @ **15p** each.
100 PIV 20 amp BRIDGES @ £1.30.
EMCAP SUB-MINIATURE DISCS ·01uf 100VW @ **5p** each.
TANTALUM BEAD CAPACITORS ·1uf 35VW, ·33uf 35VW, 2·2uf 35VW, 4·7uf 16VW, 417uf 35VW, 6·8uf 35VW, 10uf 10VW, all @ **10p** each. 15uf 25VW @ **15p**, 22uf 25VW @ **25p**, 33uf 10VW @ **25p**, 47uf 10VW @ **30p** 100uf 20VW @ **40p**, 330uf 3VW @ **20p**, 470uf 6VW @ **20p.**
PCB SUB-MINIATURE LOW PROFILE 12 VOLT S+P CO RELAY suitable for Tx-Rx switching @ **60p.**
ERIE SOLDER-IN FILTERCONS TYPE 1203-050 Min. insertion loss 45dB. From 200MHz to 10GHz, 1,500pf @ **50p.**
MULLARD SUB-MINIATURE 1,000pf 63VW DISCS @ 25p doz.
BURNDEPT HAND HELD FM TRANSMITTER PC BOARD for 70cm, less crystal, with connections @ **£5.50.**
CRYSTAL FILTERS 10·7MHz BW ±7·5kHz @ **£5** each.
DUAL GATE MOS FET LIKE 40673 @ 33p each.
WIRE ENDED PIN AERIAL SWITCHING DIODES, pass 1 Amp RMS @ **40p** each.
ITT PMT-2R CAPACITORS ·1uf 400VW, 6 for **15p.**
ERG WIRE WOUND RESISTORS 2·5 Watt 4·7 Ohm, 3 for **18p.**
14 PIN DIL 741 OP-AMPS @ 4 for **50p.**
PC MOUNTING HEAT SINKS TO66 Type @ **15p**, TO3 Type @ **20p.**
2 POLE 3 WAY LEVER MINIATURE TOGGLE SWITCH @ 60p each.
SPECIAL MIKE INSERTS SUB-MINIATURE ELECTRET @ £1.50, KNOWLES MAGNETIC 300 Ohm @ **50p**, MAGNETIC 1,000 Ohm @ **50p.**
CMOS CD 4022 OCTAL COUNTER-DIVIDER @ 40p.
CAMBION RF CHOKE 15UH 260mA @ **15p** each.
CAMBION UHF RF CHOKE 0·1UH 1,100mA @ **15p** each.

600MHz 8 DIGIT FREQUENCY COUNTER
Model UK 522 complete with leaflet.

UK 522 Price £108

LOW NOISE VHF FET 400MHz TYPE J304 @ 30p.
RCA CA3081 MULTI TRANSISTOR IC @ 20p.
PLESSEY OP-TO ISOLATOR OPX-003 @ 20p.
P CHANNEL FET 2N 5461 @ 3 for 60p.
TOKO YSNS 30450 2MH COIL @ 20p.

Please add 30p for post and packing. Orders over £3 post free

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 1981 CATALOGUE FREE ON REQUEST (SAE PLEASE)

NEW!! SOMMERKAMP'S LATEST 2 METRE MOBILE FEATURING 15·5kHz SPACING, 50W. NO PICTURE YET, SO WHY NOT SEND FOR DETAILS? £239.00 inc VAT

NEW!! SOMMERKAMP'S TS788 DXCC AM+FM+CW+USB+LSB. 10 METRE MOBILE WITH BUILT-IN LINEAR & DIGITAL FREQUENCY DISPLAY — REMOTE CONTROL MIC. £359.00 inc VAT

YAESU & SOMMERKAMP

FT101ZD Series

now stocking in all these varieties:

FT277ZD	9 band digital MkIII + AM	£671
FT101Z	9 band MkIII + FM	£500
FT101ZD	9 band MkIII + FM	£665
FT277ZD	9 band MkIII + FM	£753

FT307DMS

FT307DMS Sommerkamp with int. PSU & DMS unit Mic £951

SOMMERKAMP FT902DM FITTED CW FILTER & FM FILTER, KEYER, MEMORY, ETC. £935.00

FRG7700

FRG7700	Yaesu	£329.00
FRG7700	Sommerkamp with memory	£409.00
FRT7700	Tuner	£37.85
FFS	Filter	£9.95
FRV7700A	Converter	£68.75
FRV7700B	Converter	£75.50
FRV7700C	Converter	£69.00
FRV7700D	Converter	£66.30

DISCOUNT PRICE!! FT725RU

SOMMERKAMP 70cm MOBILE STILL AVAILABLE 10 WATTS ON 70 FOR **£199.00!!**

DISCOUNT PRICE!! SOMMERKAMP FT207R(C)

MICROPROCESSOR-CONTROLLED 2m FM HAND-HELD SCANNER, MEMORY, KEYBOARD ENTRY. TONE PAD + NC9C CHARGER+CASE+HELICAL 7M 24 SPEAKER MIC £16.67 **£159.00!!**

SAME DAY DESPATCH BY SECURICOR OR DATAPOST OF ANY EX STOCK ITEMS—INSTANT ACCEPTANCE OF YOUR TELEPHONED ORDER BACKED BY ACCESS OR BARCLAYCARD!

2 Metre Handhelds

IC2E	Icom	£169
FT202	Yaesu	£109
TR2300	Kenwood	£175
TR2400	Kenwood	£195
AR245	5W.AOR	£165
C800	Standard	£59
FT208	Yaesu	£209

2 Metre Base Stn

IC251E	Icom	£495

70cm Handhelds

FT708R	Yaesu	£219
FT404R	Yaesu	£199
IC4E	Icom	£209
FT708R	Sommerkamp	£219

HF Base Access

Actually in stock at the time of going to press:

YK901	Yaesu	£115
YR901	Yaesu	£424
FC902	Sommerkamp	£126
YO901P	Yaesu	£302
SP901	Yaesu	£29
FF501	Yaesu	£22
FP707	Yaesu	£109
FC707	Yaesu	£80
FTV707	Yaesu	£82

2 Metre Mobiles

C8800	Standard	£235
C58	Portable	£239
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
TR8400	Kenwood	£275
FT780R	Sommerkamp	£449
FT725RU	Sommerkamp	£199

HF Base Stn

IC720A	Icom	£899
PS20	—	£125
TS830S	Kenwood	POA
FT902DM	Yaesu	£885
FT902DM	Sommerkamp	£935
FT107	Yaesu	£799
FL2100Z	Yaesu	£425
FL7B	Sommerkamp	£439
YC7B	Sommerkamp	£77
FT707	Yaesu	£569
FT767DX	Sommerkamp	£619

Antennas: We have 2m and 70cm mobiles and base station HF verticals and beams, mini-beams, rotators, cable and we can supply towers too . . . Please ask.

ICOM — FULL RANGE OF ACCESSORIES FOR IC2 NORMALLY EX STOCK. Key, swr meters, plugs, sockets, all normally ex stock.

Microphones: Always a microphone with our rigs (FREE of course) and we have Shure, Yaesu, Leson, Turner, Noise cancel, Dual Impedance, Compressor, Amplifier, Desk, etc. Please ask.

MICROWAVE MODULES NORMALLY STOCKED. G WHIPS EX STOCK.

NEWS FLASH!!

SOMMERKAMP'S NEW LUXURY HF TRANSCEIVER, KNOWN AS FT-ONE, AVAILABLE BY TIME OF PUBLICATION.

ALSO!! SOMMERKAMP MULTIMODE BASE STATION FOR 2m & 70cm, KNOWN AS FT275RD, AVAILABLE NOV/DEC 1981.

OUR 1981 LIST & SHORT FORM CATALOGUE FREE OF CHARGE—SAE APPRECIATED.

INTEREST-FREE CREDIT TO LICENSED AMATEURS — DETAILS PLEASE ASK ! !

G4JDT
HARVEY

EAST LONDON HAM STORE

G8NKV
DAVE

H. LEXTON LIMITED

191 FRANCIS ROAD LEYTON E.10
TEL 01-558 0854 TELEX 8953609 LEXTON G

RADIO & ELECTRONIC ENGINEERS — ENGINEERS ALWAYS AVAILABLE ON THE PREMISES

MAIN (UK) SERVICE CONTRACTOR TO HITACHI SALES (UK) LTD

EXCLUSIVE TO US IN THE UK. 1kW input 600W ssb 350FM 2MTR LINEAR!!

FM/SSB D70C 70cms, 10W in, 200W out FM	£475.00	FM/SSB D200C 600W pep 350 FM	£475.00
FM/SSB D200S 1kW pep 600 FM	£600.00	FM/SSB D200 350W pep 160 FM	£300.00

ICOM PORTABLES

IC2E FM 2m £169.00
IC202 SSB £169.00
IC402 70cm £242.00

All accessories available—see below

ICOM MULTIMODES

IC251 2m	£495.00
IC451 70cm	£599.00
IC260 2m	£299.00
IC290 2m	£379.00

ICOM FM MOBILES

IC24G	£165.00
IC255	£255.00
IC25E	£259.00

ICOM 720A G/C

IC720A 200W	£849.00
PS15 Power Supply	£95.00
PS20 P/S with speaker	£125.00
IC730 See panel, below left	

ICOM® WE ARE PROUD TO ANNOUNCE THAT WE ARE AUTHORISED DEALERS

ICOM

HF TRANSCEIVERS

IC730 200W	£586.00
IC2KL 500W linear	£839.00
IC2KLPS Power supply	£211.00

ICOM ACCESSORIES

BP5 IIV Pack	£30.50
BP4 Empty case for 6XAA	£5.80
BP3 STO Pack	£15.50
BP2 6V Pack	£22.00
BC3 Base Charger	£39.00
DC1 12V adaptor	£8.40
WM9 Mic speaker	£12.00
CP1 Mobile Charging load	£3.20
LC1/2/3 cases	£3.50

★

TRIO/KENWOOD

TS830S HF Transceiver	£700.00
TS130S HF Transceiver	£530.00
TR8400 UHF mobile	£320.00
TR9500 UHF Multimode	£470.00
TR7800 VHF mobile	£268.00
TR7840 HP FM 2m	POA
TR7730 2m FM	TBA
TR9000	£370.00

Many Trio/Kenwood accessories available

YAESU/SOMMERKAMP

FT902DM WARC	POA
FT101ZD FM/AM	POA
FT707	£569.00
FP707 Power Supply	£125.00
FC707 ATU	£85.00
FU707DM VFO	£203.00
FT480R 2m Multimode	POA
FT290 2m Portable multi-mode	£249.00
FT207R 2m	£170.00
FT767DX Sommerkamp	POA
FT227ZD Sommerkamp all options	£753.00
FT101ZD Yaesu FM	£665.00

All Accessories available, including FV902, FC902, YP901P, YK901 POA

FT707 + FP707 PSU

£659.00

MICROWAVE MODULES

MMA 144V 2m Preamp	£34.90
MML 144/25 RF AMP	£59.00
MML 144/40	£77.00
MML 144/100S New with Preamp	£129.95
MMT 432/144 2-70 Transverter	£184.00
MMT 28/144 10m Transverter	£99.00

MM 4000 RTTY SEE IT WORKING AT OUR SHOP £269.00

Full range stocked

STANDARD

C8800 2m Mobile	£250.00
C7800 70cm Mobile	£270.00
C78 70cm Portable	£219.00
C58 2m	£245.00

NEW STANDARD 2m PORTABLE NOW IN STOCK

CMB8 Mobile mount	£17.95
CPB78 Power amp	£65.00
CL8 Carry case	£6.95

ROTATORS ETC

DIAWA

DR7600X	£135.00
DR7600R	£144.00
DR7500R	£105.00

KENPRO

KR250	£44.00
KR400	£90.00
HAM IV	£189.00
CHANNEL MASTER 9502	£50.00
CN620 1·8-150MHz Pwr/swr	£52.00
CN2002 2·5 kW PEP auto ATU	£190.00

ALL CARRIAGE FREE

SWAN/CUBIC

102BX 235W + PS5	£800.00
103BX WARC 235W	£1,000.00
PS6 Power Supply	£145.00
150MX Digital	£561.00
15002 Linear	£406.00
ST2A ATU	TBA
ST3A ATU	TBA
HF Mobile ant	£80.00

CUSHCRAFT AMATEUR ANTENNA

HF, A3 20/15/10 3 ele beam 8bD **£165.00**
ATV3 20.15.10 Trapped vertical **£38.30**
ATV5 10.15.20.40.80 Trapped vertical **£83.69**
214B 14 ele boomer 05·2dB **£55.77**
ARX 2 Ringo Ranger 6dB vertical **£27.86**
CS100 Speaker **£12.50**
A144·44 ele Yagi **£18.25**
A144·77 ele Yagi **£22.82**
A144·11 11 ele Yagi **£28.94**
ARX2B Ringo MkII **£32.29**
ARB2K Conversion kit RINGO MkI to Ringo MkII **£14.18**

FULL RANGE IN STOCK. SAE CATALOGUE

144 + 10T + Yagi
144 + 20T + Yagi } OSCAR

For vertical and horizontal Oscar specials

SPECIAL KB105 10-80m trapped vertical **£77.95**

BEAM ANTENNAS NOW IN STOCK

RECEIVERS ALL ON SPECIAL OFFER—POA

R1000	Kenwood
FRG7700	Yaesu
FRG7700	Memory
IC2001L	Sony
SEARCH II	2 metre

ALL POA ARE ON SPECIAL OFFER. PHONE HOT LINE 01-556 1415

ALL ACCESSORIES AVAILABLE—PLUGS SKTS CO-AX 2MTR COLINEAR £31.50, 70CM COLINEAR £31.50

Access

PRICES INCLUDE VAT AT THE PRESENT RAGE OF 15%

OPEN MON–FRIDAY 9:00–5:30. SATURDAY 10:00–3:00. INSTANT HP FACILITY AVAILABLE

EASY ACCESS M2–M11–M1 NORTH CIRCULAR ROAD–EASY PARKING

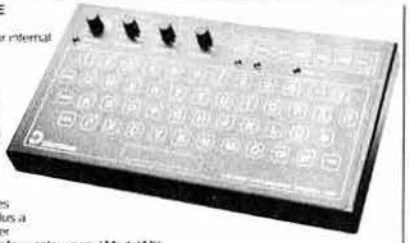
BARCLAYCARD VISA

DATONG PRODUCTS

DESIGNED BY ENTHUSIASTS FOR ENTHUSIASTS!

KEYBOARD MORSE SENDER – THE ULTIMATE KEYBOARD – CHECK THESE FEATURES

- CONVENIENCE: no need for a power cable: four internal pen cells last for 300 hours **and** give continuous memory back up.
- EXCLUSIVE COLOUR CODED KEYBOARD DESIGN: Separate key switches beneath a tough polycarbonate membrane combine excellent 'feel' with a splash proof wipe-clean surface.
- LAVISH MEMORY: four 64-character memories with auto-repeat and programmable 'pause' function, for all the routine sending.
- BUFFER MEMORY: ensures perfect sending despite less than perfect typing.
- COMPREHENSIVE CHARACTER SET: includes punctuation, procedure signals, accented letters. Plus a 'merge' key for making any non-standard character.
- BEAUTY AND STYLE: only one inch thin and with four colour panel Model MK looks every bit the thoroughbred it is. Model MK is supplied with output leads and spare connectors but without batteries (four HP7 pen cells).



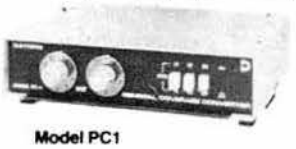
Model MK

MODEL ASP – THE "INTELLIGENT" RF CLIPPER

Model ASP modifies your speech signal direct from the microphone and makes it more effective at modulating your transmitter. The effect is as if the transmitter peak power were to increase by between two and three times. "Intelligent" means that unlike other speech processors, Model ASP automatically senses your voice level and reacts accordingly to always maintain the degree of true r.f. clipping selected (in decibels) by the panel push-buttons. Special circuitry does this without the undesirable side effects of simple a.g.c. devices. Adding a Datong r.f. clipper to a normal SSB transmitter has a similar effect to adding a linear amplifier but without the high cost and risk of TVI.

G8's – ARE YOU MISSING OUT?

Unless you can monitor the other bands you are missing a lot. If you have a 2 metre all-mode receiving set up, just add Model PC1 in series with its antenna and you have a superb general coverage receiver. What better way to listen in to all the non-VHF amateur bands, not to mention everything else from 60 kHz to 30 MHz? For sheer value for money there is no better way to get high performance general coverage reception. After all what a waste it is if your expensive 2 metre all-mode rig covers one band only?



Model PC1

ATTENTION VHF SCANNER OWNERS!

Did you know that Model PC1 will extend the coverage of your SX 200 type scanner to include all the long, medium and short wave bands as well? This is an excellent way to listen to your favourite short wave broadcast stations without the extra expense of a complete new receiver.

MINIATURE RECEIVING ANTENNAS

If you don't have enough space to put up traditional receiving antennas, our active antennas are the answer. They need no tuning yet have constant sensitivity from 200 kHz to well over 30 MHz.
Results are quite comparable to full size conventional antennas but the space saving is enormous. The indoor version (AD270) is 3 metres long and the outdoor version (AD370) is 2 metres long.
A TV-type feeder cable of any reasonable length can be used yet because the antennas are balanced dipoles any interference picked up by the feeder is rejected. Because of their wide frequency coverage Datong Active Antennas are ideal accessories for modern general coverage communications receivers.

Model AD270

Model AD370

Model DC144/28

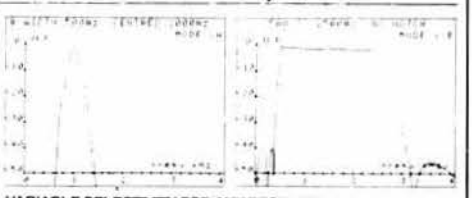
YET ANOTHER 2 METRE CONVERTER?

Yes but not **just** another. Model DC144/28 is designed to overcome the overload and spurious signal problems experienced by conventional converters. It uses a Schottky diode balanced mixer with about 7dbm of local oscillator drive. This, coupled with a 3SK88 r.f. amplifier, gives an excellent combination of low noise figure and strong signal handling capability. Its input and output gain controls also help you get the best out of your main receiver without flattening it with excessive gain.
Model DC144/28 is available either as a complete cased unit (die cast box, SO239 connectors) or as a ready built and tested PCB module.

MODEL D70: THE GO-ANYWHERE MORSE CODE TRAINER

For building up your morse code reception speed there is no better method than the Datong "Morse Tutor".
You learn the code with the characters at normal speed but with an extra delay between each one. As you improve you reduce the "DELAY" control until, with it fully reduced, you find you are reading code at the chosen speed and with correct spacing.
An important feature is that the unit is completely portable. This allows you to practise wherever and whenever you find it most convenient. The all-CMOS design gives about 60 hours of practice from a low cost PP3.

Model D70



VARIABLE SELECTIVITY FOR ANY RECEIVER

Have a look at these curves (and the others in our data sheet) and you will see why a U.S. reviewer commented that the FL2 is "incredible – it's like having a tunable crystal filter."*
With Model FL2 connected in series with your speaker you can wipe out off-tune "monkey chatter", unwanted tones and sundry "burbles" from SSB, while for CW the ultra-steep skirts allow you to use wider bandwidths for a given rejection of off-tune signals. This makes tuning easier and reduces listening fatigue.
Model FL2 costs little more than a single special accessory filter yet it offers better performance, extreme versatility, and can be used with any receiver.
*R. S. Dicks, 73 Magazine, July 1981 p 119.

Model FL2

NEW PRODUCTS PREVIEW

Model DF1
Direction finder attachment for FM, VHF receivers/transceivers, gives directional readout on circle of LED's. Connects to loudspeaker and antenna jacks.

Model RFA
R.F. switched broadband preamplifier. Boosts gain and noise figure of receivers from 30 to 200 MHz.

Products not shown in this advertisement
Model Datest 1 Transistor Tester
Model Datest 2 Transistor Tester
RF Speech Processor Model D75
Model RFC/MRF Speech Processor PCB Module
Model MPU Mains Power Unit
Accessory Leads
Model VLF
Model FL1

DATONG ELECTRONICS LIMITED

INGENIEURBÜRO ULRICH HANSEN

VHF & UHF PREAMPLIFIERS: A range from Ulrich Hansen of West Germany
A range of high quality in-line preamplifiers for 2 metres or 70 cms, featuring ultra-low noise figures and state-of-the-art design. The range includes R.F. switching capability from 60 watts P.E.P. to 500 watts P.E.P. and choice of silicon low noise devices or the latest gallium arsenide MESFETs for the best possible noise figure. Indoor or mast mounted options are also included. Full details free on request. These units represent a cost-effective way of improving your DX receiving capability.

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

FL1	59.00 (67.85)	VLF	22.00 (25.30)	AD270	33.00 (37.95)	MPU	6.00 (6.90)
FL2	78.00 (89.70)	D70	43.00 (49.45)	AD370	45.00 (51.75)	DC144/28	31.00 (35.65)
PC1	105.00 (120.75)	D75	49.00 (56.35)	AD270 + MPU	37.00 (42.55)	DC144/28 Module	25.00 (28.75)
ASP	69.00 (79.35)	RFC/M	23.00 (26.45)	AD370 + MPU	49.00 (56.35)	Keyboard Morse Sender	140.00 (161.00)

DATONG ELECTRONICS LIMITED
Spence Mills, Mill Lane, Bramley, Leeds LS13 3HE, England. Tel: (0532) 552461

Lee Electronics Ltd

THE VERSATILE FM/USB/LSB/CW

STANDARD C58!

The C58 is the ultimate 2 metre transportable offering a superb performance on FM/USB/LSB & CW unequalled in any transceiver to date.
The C58's small size makes it truly a portable and when used with the CM8 mounting cradle it has all the features, and more, of a mobile multi-mode transceiver.

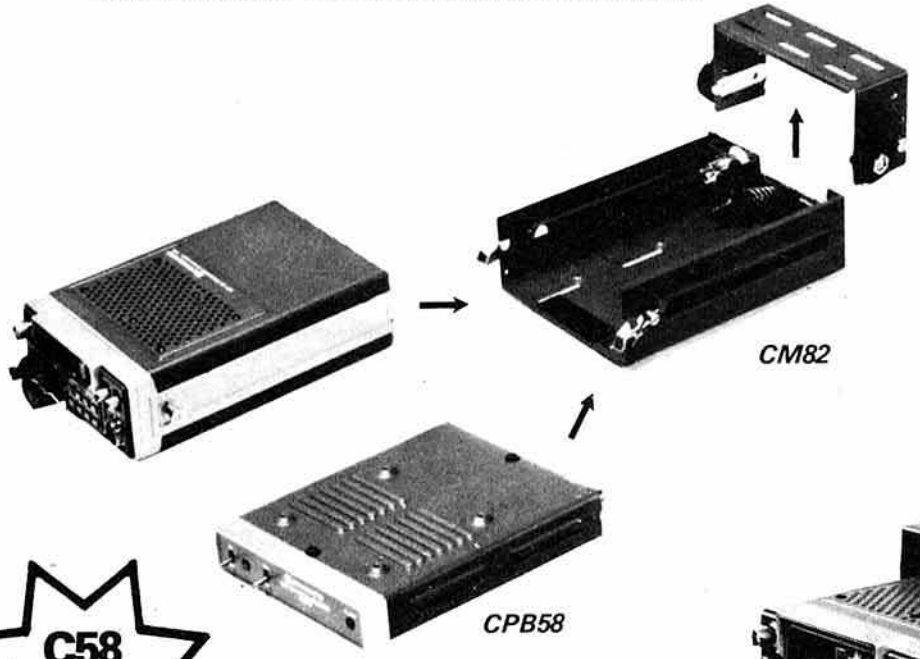
UNIQUE L.C.D.
The lcd display has been purpose-made for Standard and it not only displays the frequency down to 100Hz but also supplies scanning and memory details. The main advantage with the lcd display is the low power consumption which is a must for portable equipment. For night use the display can be illuminated.

MEMORY/SCANNER
The C58 has five memories that can be user-programmed from the front panel controls; these memories not only retain the frequency but also the mode at the time of programming. When the memories are scanned the scanner will look only at those channels that have been entered in the correct mode; ie: if out of five channels three have been entered in the FM mode and two in the SSB mode, then on scan with the mode switch in the FM position the three FM channels will be scanned (this is displayed on the lcd). When the mode switch is in the SSB position only the two SSB channels will be scanned. This type of intelligent scanning can be found only in the Standard range at the present time.

IN ITS PORTABLE FORM

FULL TECHNICAL SPECIFICATION AVAILABLE ON REQUEST

WITH ITS MOBILE OPTIONS



C58 £239.00 INC VAT

CL8 CARRY CASE	£6.95
CM8 MOBILE MOUNT	£19.95
C230 240V CHARGER	£7.95
NC8 SET OF Ni-CADS	£11.00
CPB58 25W LINEAR	£79.50

IN ITS MOBILE CRADLE

LEE ELECTRONICS LTD
400 EDGWARE ROAD, LONDON W2
Tel: 01-723 5521. Telex: 298765

HF & PART EXCHANGES WELCOME
SAE FOR FULL DETAILS

Access BARCLAYCARD VISA

MAIL ORDER

Photo Acoustics Ltd

MICRO COMMUNICATIONS DIVISION

BUDGET ACCOUNT

WE ARE AUTHORISED DEALERS FOR:—

APPROVED TRIO DEALER

YAESU

AUTHORISED ICOM DEALER

FDK

TR-7730

FT-707

IC-251

MULTI-750E

H.F. Transceivers

Trio TS830S	£694.83 (4.50)
Trio TS530S	£534.98 (4.50)
Trio TS130S	£525.09 (4.50)
Trio TS130V	£445.05 (4.50)
Yaesu FT1 (New)	£1295.00 (4.50)
Yaesu FT902DM	£885.00 (4.50)
Yaesu FT101ZD	£665.00 (4.50)
Yaesu FT707	£569.00 (4.50)

2 Metre & 70 cms

Trio TS770E	£784.99 (4.50)
Trio TR9000	£374.90 (4.50)
Trio TR7730	£247.94 (4.50)
Trio TR2300	£166.75 (4.50)
Trio TR8400	£334.88 (4.50)
Trio TR9500	£449.88 (4.50)

2 Metre & 70 cms

Icom IC251E	£499.00 (4.50)
Icom IC290E	£366.00 (4.50)
Icom IC25E	£259.00 (4.50)
Icom IC2E	£169.00 (4.50)
Yaesu FT290R	£249.00 (4.50)
Yaesu FT708R	£219.00 (2.50)
Yaesu FT208R	£209.00 (4.50)
Yaesu FT480R	£359.00 (4.50)
Yaesu FT780R	£449.00 (4.50)
FDK M700EX	£189.00 (4.50)
FDK M750E	£289.00 (4.50)
Azden PCS3000	£219.00 (4.50)
Standard C58	£239.00 (4.50)
Standard C78	£219.00 (4.50)

RECEIVERS

Trio R1000	£279.85 (4.50)
Lowe SRX 30D	£195.00 (4.50)
Yaesu FRG7700	£329.00 (4.50)
Yaesu FRG7700M	£409.00 (4.50)
SX200N	£264.50 (4.50)
R517 Airband Receiver	£49.45 (1.00)

AERIALS
J. BEAM
CUSHCRAFT
AVANTI
HOXIN
HOKUSHIN
G-WHIP

ACCESSORIES

5 amp PSU Bermec	£14.75 (1.25)
10 amp PSU PP1310	£49.50 (4.50)
20 amp PSU Yaesu	£125.00 (4.50)
FX1 Wavemeters	£28.00 (1.25)
DM801 G.D.O.	£51.78 (1.25)
SP15M SWR & Power Meter	£29.99 (2.50)
SP300 1·8–500MHz	£79.99 (2.50)
SP400 130–500MHz	£59.99 (2.50)
CNA 1001 Auto ATU	£129.95 (2.50)
SW110A SWR/Power	£31.33 (1.25)
CN620A Twin Pointer SWR	£52.81 (2.50)
LAR VHF Omni Match	£34.90 (2.50)
LAR HF Omni Match	£69.25 (2.50)

FULL RANGE OF MICROWAVE MODULES

Access

24 HOUR ANSWERPHONE — CREDITCHARGE — PART EXCHANGE

58 HIGH STREET, NEWPORT PAGNELL, BUCKS.

TEL: 0908 610625

BARCLAYCARD VISA

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
HF 12 POCKET SIZE 12 channel xtal controlled 4MHz bandwidth in range 130–175MHz. With nicad and charger **£57.95**. Xtals extra, see below. Helical aerial **£4.40**.
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 32 (145·80) incl, at **£2.46** (+**20p** post). Over 40 popular marine channels at **£2.85** (+**20p** post). Sae list.
CRYSTALS FOR 28·5MHz. 3rd overtone suit most Jap/USA 10m rigs. 28·5MHz Tx and 28·045MHz Rx HC18U **£4.60 per pair**.
RESISTOR KITS new extended range at old prices 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-fit design for AM Cambridge, replaces squelch board with minimum of other modifications **£5.95**. Transistor Vanguard (AM25T) version (modified squelch) **£6.60**
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.

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

LOSING DX?

ANTENNA FAULT? Poor reports? Check it FAST with an Antenna Noise Bridge, MEASURE resonance 1–150MHz and radiation resistance 2–1,000 ohms, accurate ANSWERS directly, also use it for rf coil resistance etc, MORE DX, £15.70.

TIME WRONG? MSF Clock is ALWAYS CORRECT—never gains or loses, SELF SETTING at switch-on, 8 digits show Date, Hours, Minutes and Seconds, larger digit Hours and Minutes for easy QUICK-GLANCE time, IDEAL for SKEDS, parallel BCD output, receives Rugby 60kHz atomic time signals, built-in antenna, 1,000km range, TIME RIGHT, £62.80.

RARE DX UNDER QRM? DIG it OUT with a Tunable Audio Notch Filter, between your receiver and speaker, BOOST your DX/QRM ratio, 40dB notch, hear WEAK DX, £13.80.

LINEAR OKAY? Check it with a Two Tone Oscillator, £12.90.

MISSING DX? Make them HEAR YOU with a Speech Compressor, between your microphone and transmitter, BOOST your POWER up to four times, 60dB agc, SOUND BIG, £12.80.

60kHz RUGBY RECEIVER, as in MSF Clock, serial data and audio outputs, built-in antenna, £17.90.

LONG WAVE DX? Exciting 100–600kHz Converter to 3·5–4MHz, built-in antenna tuner, extend your coverage, £15.90.

Each fun-to-build kit includes all parts, printed circuit, case, postage etc, instructions, money back assurance so GET yours NOW.

CAMBRIDGE KITS

45 (RY) Old School Lane, Milton, Cambridge

2m 12V Power Amplifier assembled and tested. Board size 180 × 30mm. 25W minimum out with 150mW drive. Aerial filter included 70dB attenuation **£20.**
Single Channel (HC25U socket, multiplication × 12) driver board with audio processor suitable for above P.A. Board size 180 × 60mm **£25.**
2m 12V 6-channel 1W Transmitter (3W version also available). Aerial filter and audio processor included. Board size 140 × 82mm **£30.**
Semiconductors as per January advertisement still available.

Mail order only. £3 min, p&p 40p. 15% VAT to be added to total

HELLER ELECTRONICS LTD 49 Blossom Waye, Hounslow, Middx TW5 9HB

NASCOM, TUSCAN, TANGERINE, VIDEO GENIE
Microcomputers, plus a wide range of books
S.A.E. for details ★ See us at most MOBILES

MICRO-PRINT LTD
59 Church Street, Stoke-on-Trent ST4 1DQ. Tel: 0782 48348

CITIZENS BAND RADIO

NOTICE TO ADVERTISERS

The Council of the Radio Society of Great Britain has decided that "Radio Communication" shall not carry advertising connected in any way with citizens band radio.

Would you therefore please ensure that advertising copy submitted in future complies with this embargo, especially when using advertising copy which has previously been submitted to other publications which apply no such restriction.

NORTHERN COMMUNICATIONS

FDK

AZDEN • CUSHCRAFT • YAESU • FDK • STANDARD • JAYBEAM • LUNAR • ASP • SWAN-CUBIC • G-WHIP • MM • CDE • SEM

YAESU

AND NOW FOR SOMETHING REALLY NEW!

2m or marine
—12Vdc
15 × 19 × 4cm
mobile bracket
& int. speaker

A VHF monitor receiver with **VFO** plus **12 optional scanning** channels for **£46.00** inc VAT, carriage free. **Crystals £2.25 per channel inc VAT.**

SWAN "POWER HOUSE" SPECIAL OFFER

A unique opportunity to obtain this **100 watt CW/SSB Output** 80–10 metre transceiver. Superb and simple operation, built in VOX, calibrator NB.RIT, Solid State P.A. at a one off price.
Normal price £422.00 plus matching 20amp mains supply, £135.00.
SPECIAL OFFER: A complete HF Mobile station with **100MX** top quality **Shure microphone** + **G Whip** 3 band mobile antenna for ..... **£389.00!**
OR, Swan 100MX + 20 amp supply ..... **£499.00!**
Also in stock, the Swan Cubic Astro 150 and New 103

ROTATOR BARGAINS

In addition to being noted as a leading supplier of antennas, masts and fixings we are able to supply more than 20 different styles of antenna rotators, by leading manufacturers. From our extensive range we have selected just two, for special attention, this month.
RO-250. This successor to the Stolle 2050, now available from Hirschmann. A "through" style rotator, ideal for VHF beams or azi/elevation and polarisation applications. 25kg load with easy 3 core type cable control system..
RO-250. Complete with control box, inc VAT and delivery **£45.00**
SI-100. Optional alignment bearing for increased load bearing by 10kg inc VAT and delivery **£12.00**

NEW SU4000 by Skyking. A medium/heavy duty 200kg load rotator, in Melamine coated, reinforced diecast alloy housing. Stationary braking torque 1,500kg/cm 6 core control. Designed to be durable, quiet and weatherproof. Supplied complete with insulated, safe ABS plastic control unit with meter style display. A very nice unit!
SU4000 complete with control box, inc VAT and delivery **£85.00**

WIDEBAND ANTENNA

The new "NORCONE DISC 512" is a wideband, unity gain antenna, specially developed for coverage of 66MHz to 512MHz. An ideal partner for the BEARCAT SX200N and other scanning monitor receivers. It may also be used for transmission. Full coverage of 70, 144, 432MHz Amateur bands, Aircraft, Marine and Public Services ..... (a) **£25.95**

SX200N SPECIAL OFFER

Latest model SX200N scanning receiver + Norcone 512, inc. VAT and delivery **£285.00**

ZL-12 COMPACT YAGI

13db gain, compact 2 metre Yagi. 10' 6" boom, lightweight, rugged design. Hundreds of this award winning antenna already in use. Send for details. **£28.75** p.p. £1.75

ZL-8 SUPER COMPACT YAGI

9db gain, super compact 2 metre Yagi. 6' 0" boom, lightweight, rugged design. Ideal for limited spaces and portable operation. Send for details. **£17.95** p.p. £1.75

Buy it with Access

299-303 CLAREMOUNT ROAD, Box 3, HALIFAX HX3 6AW, WEST YORKSHIRE
VISIT OUR SHOWROOM *Tuesday to Saturday inclusive 9.45am–5.30pm.*
Telephone: (0422) 40792—24-hour answering service

BARCLAYCARD VISA

cushcraft NORTHERN COMMUNICATIONS

The Antenna

A 144-4	4 element 10db Yagi 145MHz	(a)	£18.25
A 144-7	7 element 10·5db Yagi 145MHz	(a)	£22.85
A 144-11	11 element 11db Yagi 145MHz	(b)	£28.95
A 144-10T	5 elements crossed, with phasing, for sat wkg. 10·5dbd linear gain	(b)	£39.17
A 144-20T	10 elements crossed, with phasing, for sat wkg. 12·2dbd linear gain	(b)	£55.44
A 147-20T	10 elements vertical, 10 elements horizontal, with separate Gammamatch feeds, optimised for FM vertical, SSB horizontal 12·2dbd	(b)	£49.95
DX120	12 phased, horizontal, colinear elements 14dbd	(b)	£53.15
ARX2B	Ringo Ranger Mk 2. New Model 5·5dbd (7dbi) 2m colinear	(a)	£32.00
ARX2K	Ringo Ranger conversion kit to Mk 2 spec.	(a)	£14.20
ARX450	UHF Ringo Ranger	(a)	£29.68
214B	Junior Boomer 14 element 15·2db 144MHz	(c)	£55.77
A3219	The Boomer 19 element 16·2db 144MHz	(c)	£67.74
LAC 1	Blitz Bug lightning arrestor P2/So	.50p	£3.85
LAC 2	Blitz Bug lightening arrestor So/So	.50p	£3.85
AV3	3 band vertical 10–15–20 metres	(b)	£38.32
AV5	5 band vertical 10 to 80 metres	(b)	£83.69
AR10	10 metre band Ranger Vertical 3db gain	(a)	£24.00
R3	3 band high performance vertical 10–15–20 metres, motorised half wave, with control box	(c)	£T.B.A.
A10 3CD	3 element Yagi 8dbd Rugged Monobander	(c)	£55.38
A15 3CD	3 element Yagi 8dbd Rugged Monobander	(c)	£79.20
A20 3CD	3 element Yagi 8dbd Rugged Monobander	(d)	£139.75
A3	3 element Yagi 8dbd Super NEW Tribander	(d)	£165.75

The Company

Send for full details of the products of your choice.
Prices include VAT, UK mainland carriage, as shown:
(a) £3.00 (b) £3.45 (c) £4.30 (d) £8.00.

ACCESS
BARCLAYCARD

299-303 CLAREMOUNT ROAD, Box 1, HALIFAX HX3 6AW, WEST YORKSHIRE
Tuesday to Saturday inclusive 9.45am–5.30pm. **Telephone: (0422) 40792—24-hour answering service**

MOSLEY

WE ARE THE ANTENNA PEOPLE

Mustang	3 elements, 10, 15 and 20 metres	£174.00
TA-33 Jr.	High Power model incl. Balun 3 elements, 10, 15 and 20 metres	£158.00
TA-33 Jr.	3 elements, 10, 15 and 20 metres	£140.00
TA32 Jr.	2 elements, 10, 15 and 20 metres	£93.00
TA31 Jr.	Rotary dipole, 10, 15 and 20 metres	£55.00
ELAN	3 elements, 10 and 15 metres	£100.00
TD-2	Trap Dipole 40 and 80 metres	£45.00
TD-3 Jr.	Trap Dipole 10, 15 and 20 metres	£35.00
TCD-2	Trap Dipole 40 and 80 metres compressed	£55.00
V-3 Jr.	Trap Vertical 10, 15 and 20 metres	£40.00
Atlas	Trap Vertical, 10, 15, 20 and 40 metres	£65.00
SWL-7	Dipole 11, 13, 16, 19, 25, 31 and 49 metres	£40.00
RD-5	Dipole 10, 15, 20, 40 and 80 metres	£40.00
Orbit	Vertical 11, 13, 16, 19, 25, 31 and 49 metres	£55.00

Administrative Address only (All antennas available ex works, carriage and VAT extra)

MOSLEY ELECTRONICS LIMITED

196 Norwich Road, New Costessey, Norwich NR5 0EX

Send for HANDBOOK containing full range of Antennas and technical information, 28 pages **£1.00.** *Refundable upon purchase of Antennas.*

PACKER COMMUNICATIONS

Newly licenced? Remember you MUST have a wavemeter. WM2 for 2m covers 130–300MHz **£22.45**

Improve that match! Get the most from your rig with our AT-145 2m Antenna tuning unit. Hundreds now in use all over the country **£19.95**

Yaesu Musen dealers for Lakeland. Buy or hire a FT-208R or FT-290 from us

See you at Leicester and Donington. We will refund the cost of entry to customers buying over £25 goods on production of entry ticket at our stand.

Unit 4, Old Station, Coniston, Cumbria LA21 8HQ
Office (09664) 678 Home (0229 89) 448

Buy it with Access

YAESU

BARCLAYCARD VISA

Amateur Radio Shop 0484-20774

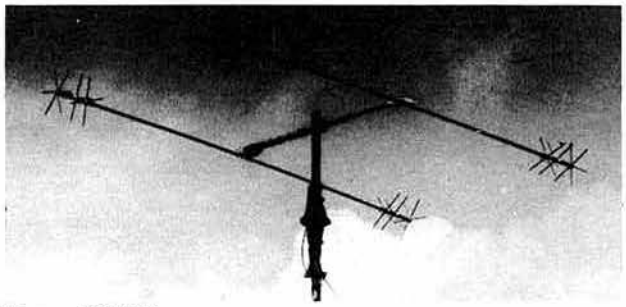
4 Cross Church Street Huddersfield West Yorkshire

NOW IN OUR 21st YEAR—ESTABLISHED 1960

ANNOUNCEMENT
NOW AVAILABLE—THE G4MH MINI-BEAM KIT
COILS, SPOKES, DOWELS, PLATES
ONLY **£55.00** incl. VAT P/P £1.50—SAE DETAILS

G4MH MINI BEAM

Price: £77.50 + £2.50 p&p in UK
PACKAGE: beam, rotator, 15m coax UR43, 15m 5 core—**£150.00**
Designed and manufactured in the UK



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

SAE for details. Coax UR43, UR67 and 5 core available

IN STOCK— Yaesu - Trio - Bearcat - S.E.M. - J-Beam - G-Whips — SN200N
FACILITIES— Instant Hp - Creditcharge - Barclaycard - Access
SECONDHAND— Always large stocks, ever-changing - SAE for lists - We buy secondhand gear, cash
YAESU— FT7B - FT107 - FT901DM - FT101Z - FT101ZD - FT707 - FT480 - FRG7 — FRG7700
NEW!— 2 metre 5/8 wave mobile antenna, 3·5dB with mag mount - only **£12** complete (Whip incl balun, mag mount, PL259 fitted)
FULL RANGE— SWR inds - coax - keys - books - etc
ALSO ON DISPLAY— MICROPROCESSORS - Apple - Sharp - Video Genie - ITT 2020 - Super Board - Sorcerer
PX WELCOME— We have Hi-Fi - Ham Radio - Computers - What have you?

OVERSEAS AGENTS REQUIRED FOR THE MINI BEAM

OVER 2000 sq.ft. SHOWROOM AREA Our Staff: Jim G4MH, Ray G8IOF, Chris G8PUT, Norman G3WAH
Open Monday–Saturday 9.00am to 5.30pm, late night Thursday till 8.00pm

Auto Marine

Your Official Yaesu Dealer in Greater Manchester for the North West.

Distributor of Jaybeam Antennas. Main Cushcraft Dealer. Agent for TAL, LAR, Microwave Modules, Western, Revco, Mosley, Drae, Shure.

We carry a full range of station equipment including SWR and Power Meters, Connectors, Co-Axial Cables and Switches, Rotators, Power Supplies and a Full Stock of RSGB Books and Maps.

Our prices are competitive. Just send SAE for our catalogue and price list. Special package deal for new licensees setting up station.

Credit Card and Hire Purchase facilities with written quote on request. Telephone answering machine after hours. Open Tuesday to Saturday. Monday by appointment.

YAESU
Western
MOSLEY
DRAE

Access — Buy it with Access
BARCLAYCARD VISA

AUTO MARINE DEVELOPMENT COMPANY
60 ORLANDO STREET, BOLTON
Phone (0204) 21059

TONNA (F9FT)

YOUR NUMBER ONE CHOICE FOR 6m, 2m, 70 AND 23cm ANTENNAS

TONNA

NEW from TONNA—as well as the **144MHz 13 element Portable** and the **1296MHz 23 element antennas**—the **50MHz 5 element antenna**—price £31.74 (a)—send for full details.

	length (M)	weight (kg)	
144MHz			
4 element	1·37	0·5	**£14.20** (a)
9 element fixed	3·30	1·9	**£16.56** (a)
9 element portable	3·30	1·7	**£18.44** (a)
9 element crossed	3·50	2·0	**£28.75** (a)
13 element portable*	4·50	2·5	**£29.75** (a)
16 element fixed	6·40	4·4	**£31.74** (a)
435MHz			
19 element	3·20	1·1	**£19.00** (a)
19 element crossed	3·30	1·8	**£30.14** (a)
21 element	4·60	2·6	**£26.43** (a)
21 element ATV	4·60	2·6	**£26.43** (a)
1296MHz			
23 element*	1·64	0·9	**£28.75** (b)
4 × 23 element antennas—power splitter—stacking frame			**£161.46** (a)
135MHz Satellite			
9 element crossed	3·50	1·8	**£35.67** (a)

*Denotes 50Ω only. All others 50Ω or 75Ω impedance.
High quality Phasing Harness available.

Telescopic Portable Masts
18ft **£16.76** (a) 25ft. **£24.94** (a)

AVANTI 'ON GLASS' MOBILE ANTENNAS A real alternative—receives and transmits through glass—no holes to drill—no magnet to scratch paint—no clamps—takes only minutes to install, without tools—no ground plane required—all electrical connections inside car—complete with 15ft cable and connector. 2m 3dB. **£16.42** (c) 70cm 3dB **£16.42** (c) 70cm 5dB **£17.79** (c).

ANDREW HELIAX LDF4-50 COAXIAL CABLE. Attenuation per 100ft. 144MHz—0·8dB. 435MHz—1·6dB. 1296MHz—2·9dB. **£2.60 per metre** (a).
'N' Type connectors for Heliax LDF4-50 male or female **£9.00.**

MICROWAVE MODULES — LUNAR — ROTATORS — UR67 and UR43 COAXIAL CABLE ETC.

PLEASE ADD CARRIAGE AS SHOWN (a) £3.50. (b) £1.60. (c) £1.40 MAINLAND ONLY.

FOR FULL DETAILS OF OUR RANGE SEND 30p FOR OUR CATALOGUE.
CWO—ACCESS—VISA—just telephone your card number. All prices include VAT. Callers welcome, but by appointment only please.

RANDAM ELECTRONICS,
12 Conduit Road, Abingdon, Oxon OX14 1DB. Tel: Abingdon (0235) 23080 (24 hours).

SOUTH WEST COMMUNICATIONS

★ SUPERB QUALITY, BRITISH-MADE POWER SUPPLY

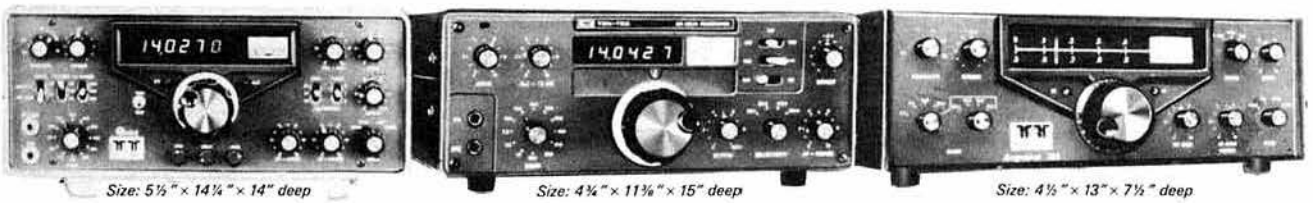
★ **SHURE POWER 2·5/4 Amp** ★ **SHURE POWER 7 Amp**
★ Thermal shutdown protection against overload and short circuit.
★ Regulation better than 1%
★ 13·8V 2·5 Amp **£15.95** ★ 13·8V 7 Amp **£26.95** Post and packing allow £2
★ REPAIRS AND SERVICING TO H.F. AND VHF AMATEUR EQUIPMENT ★

SOUTH WEST COMMUNICATIONS
2a CHAPEL STREET, HOLSWORTHY, DEVON. Tel: HOLSWORTHY 253504

ENTER THE NEW WORLD of KW + TEN-TEC

Introducing a New Concept in HF communications

A NEW SERIES WITH NEW FEATURES, NEW PERFORMANCE, AND ALL 9 HF BANDS.



Size: 5½" × 14¼" × 14" deep | Size: 4¾" × 11⅜" × 15" deep | Size: 4½" × 13" × 7½" deep

KW + TEN — TEC OMNI-C*

- with comprehensive facilities • superb SSB with 8 pole filter • all 6 present HF bands (+ all 3 new bands 10,18 + 24.5 MHz) covering 10-160 meters
- 2 speed CW break — in facility • new "hang" AGC for smoother operation
- 200 watts max input power.

KW + TEN — TEC DELTA*

- HF transceiver 10 — 160 meters, 9 bands including new bands
- 200 watts max input power
- compact yet easily serviceable
- superb mobile transceiver, nominal 13v D.C. input.

KW + TEN — TEC ARGONAUT*

- the best in QRP is now better than ever
- total solid state full band coverage 10-80 meters
- 5 watts input • improved receiver sensitivity
- full CW break-in
- WWV receive at 10 and 15 MHz.

Come to KW for all your other amateur radio requirements KW service and guarantee — KW maintains the tradition of service the company is renowned for. Output transistors unconditionally guaranteed for 12 months. The KW — TEN — TEC units offered above are introduced as a prelude to fully UK assembled equipment.

*(*A full range of accessories is available for KW+TEN—TEC equipment)*

other KW units available.
KW 107 Supermatch KW trap dipole
KW E-Z match KW traps
KW Balun KW antenna switch

KW COMMUNICATIONS LTD
Vanguard Works, Jenkins Dale, Chatham ME4 5RT
Tel: 0634-815173 Telex: 965834 KW COMM G

GWM RADIO LTD

All prices include VAT and post

STORNO hand held CQP562 FM 420/470MHz. Complete and recently out of service, with used battery, **£35. POCKETFONES PF1.** Tx and Rx with circuits and information, **£21.25.** Good used batteries, **£5.50** pair. AC chargers for 12 of each, **£17. ITT STARPHONES SF1 UHF** with used battery, **£35. CAMBRIDGE LB** dash with mike or HB Boot, no attachments, either **£15.** Pye control boxes, **£3.** AC chargers for Starphone 14 LMU 8a for 12 batteries, **£15.** Bantam AM or FM batteries, **£6** either. Bantam AC chargers, **£15. PF2UB,** no attachments, with used battery, **£35.** Used batteries not tested or guaranteed except PF1 and Bantam. **RECEIVERS, ALL OVERHAULED AND IN GOOD ORDER** and **ALL CARRIAGE EXTRA. R209/2/B NATO.** 115/220 AC, 12/24 DC complete with input plug. 1·0 to 20·0MHz in four bands, AM/CW/FM. Speaker. Water resistant case and in excellent condition, **£45. EDDYSTONE 730,** 480kHz to 30MHz, **£135** or clean and complete straight from Ministry, **£70.** Also **770R** and **770U, £150** either. **MARCONI KESTREL 3 MARINE** 200kHz to 4·5MHz, 12/15V DC solid state, with circuit, **£35. MARCONI ATALANTA,** 15kHz to 28MHz, AC supply fitted, **£115** or clean and complete as from ship with 115V DC supply, **£75. THERMOGRAPHS** by F. Darton & Co, 8 day clockwork. Excellent condition, **£40. JENNINGS** Vacuum variable capacitors, 2-31.5pf, **£6.**

40-42 Portland Road, Worthing, BN11 1QN. Tel: 0903 34897

IQD INTERFACE QUARTZ DEVICES LTD

29 Market Street, Crewkerne, Somerset, TA18 7JU
Tel: (0460) 74433 Telex: 46283 inface.g.

FREQUENCY STANDARD, MARKER & CONVERTER CRYSTALS
5·0, 10·0, 10·7 & 38·66667MHz 18U **£2.70;** 1·0MHz 6U or 33U **£2.95;** 100·0kHz 13U or 34U, 116·0MHz 18U **£3.00;** 455·0kHz 6U **£3.50;** 200·0kHz 6U **£3.70;** 1·0MHz hi-stab 6U **£4.25;** 10·0MHz hi-stab 36U **£6.00**

CRYSTAL FILTERS
Super selective 250Hz 8-pole CW filters for FT-101, FR-101, FT-301, TS-520, TS-820, FT-901 & FT-101Z **£18.69** each, and (9MHz types with appropriate carrier crystals):

9MHz SSB	6 pole, BW 2·5kHz at −6dB and 5kHz at −60dB	£20.50
9MHz SSB	8 pole, BW 2·4kHz at −6dB and 4·3kHz at −60dB	£24.00
9MHz CW	5 pole, BW 500Hz at −6dB and 2·2kHz at −60dB	£22.50
9MHz FM	8 pole, BW 12kHz at −6dB and 21·6kHz at −60dB	£24.00
10·7MHz FM	8 pole, BW 7·5kHz at −3dB and 17·5kHz at −70dB	£24.00
10·7MHz FM	8 pole, BW 15kHz at −3dB and 35kHz at −70dB	£24.00
21·4MHz FM	8 pole, BW 15kHz at −3dB and 50kHz at −80dB	£25.20

455kHz CFU series ceramic filters, various bandwidths in stock **£1.50**

TBG-2 crystal tone-burst generator **£8.00**

PLEASE ADD 15% VAT. POST FREE

A. J. H. ELECTRONICS

The Gables, 20 Barby Lane, Hillmorton, Rugby, Warwickshire, CV22 5QJ

Terms of Business: Cash with order. Mail order only, or Callers by appointment. Official orders accepted on a strict monthly basis. Handling Charge 50p. Minimum order **£2.00.**
Tel RUGBY daytime 76473, evening 71066. S.A.E. with enquiries.
Prices now include VAT. FULL MONEY-BACK GUARANTEE ON ALL ITEMS

VHF RF POWER TRANSISTORS:

Type	Gain (db)	Output	Volts	Freq. MHz	Price
2N6083	5·7	30W	12	175	**£6.50**
PT4555	8	25W	12	150	**£4.00**
SD1212-6	8·2	3min	12	175	**£2.50**
PT4556	7	40W	12	80	**£4.50**
PT4236A	10	1W min	12	175	**£0.75**
PT4236B	10	11W	12	88	**£3.00**
PT4236C	6	35W	12	88	**£4.50**
2N5070	13	25W (pep)	24	30	**£5.00**
BFW16A	10	1W	12	175	**£0.75**
2N3866	10	1W	28	175	**£0.75**

2SC2028 **£1.90,** 2SC2078 **£2.90.**
2SC1306 **£2.75,** 2SC1307 **£3.25.**

TA7205P 6 watt audio IC 12V, ex-new equipment and tested, **£1.50.**
TDA1010 9 watt audio IC @ 14V single in line type, **£1.50** each.
MDA800 8 amp 50 volt bridge rectifier OK for 12 volt PSU, **70p** each.
LOW PROFILE RELAY, 12 volt 2 pole change over OK for 50 watts, RF @ 145MHz, new only **£2.25.**
FETS/MOSFETS:
3SK88 super low noise 1·1db NF @ 150MHz, 26db gain, ONLY **£1.40** each.
3SK51 (40673) **70p.** 3SK60 (sim. 3N204) **80p.** BFR84 18db 3db nf @ 200MHz **75p.** E5565 (2N3919) **30p.** TIS88A **40p.** BF256 **38p.** 2N4381 "P" chan **40p.**

BIPOLAR VHF/UHF RF AMPS:
BF166 **25p,** BF180 **30p,** BFY90 **95p,** BF152 **15p,** BF576 (pnp 1,200MHz ft) **20p,** 2N4957 (pnp UHF RF amp. 3½db nf @ 1GHz) **30p,** ST2110 (2N918 BSX20) **15p.**
VHF/UHF SWITCHING DIODES BA243 (VHF) **20p.** BA244 (UHF) **25p.**
VHF/UHF VARICAP DIODES ITT210 **20p,** BB105 set of 4 **60p,** BB141 **25p,** TIL209B LEDS ⅛in dia. "red" only **10p,** 10 for **75p.**
PL259 plugs 50p, reducers for UR43/UR76 **15p.**
SO239 sockets 50p, PL258 couplers **60p.**
BNC 50 ohm flange sockets **70p.**
CO-AXIAL disc ceramics 100pf 100 volt OK UHF/SHF decoupling-pkt, 20 for **25p.**
10·7MHz CRYSTAL FILTER ±3·5kHz @ 3db, 910 ohm. ITTO24DE/923L **£7.00.**
10·7MHz CRYSTAL FILTER ±7½kHz @ 3db, 910 ohm. LQU/445/901B ex-equipment **£6.00.**
10.7MHz CRYSTAL FILTER SSB type BF4133 (LSB only available), 200 ohm imp. small size 38 × 18 × 15mm. new **£4.00** each.
21·4MHz CRYSTAL FILTER ±7½kHz @ 3db imp, approx. 2k ohm, new **£5.00.**
STORNO CQM39 low band 68-88MHz Radiotelephones boot mounting valve/transistor type with control equipment, a bit dirty but clean internally, a cheap way to get started on four meters, untested, no gen. ONLY **£15.00** (buyer to collect by arrangement).

Coming shortly two 2 meter linear amps 60 and 80 watt output in kit form or ready built — watch this space or ring for details.

G2DYM ANTI-INTERFERENCE ANTI-TVI TRAP DIPOLES TRANSMITTING & S.W.L. MODELS

DATA SHEETS LARGE SAE. AERIAL GUIDE 50p

Callers welcome Tel: 03986 215

G2DYM, UPLOWMAN, TIVERTON, DEVON

INDEX TO ADVERTISERS

Aero & General Supplies 1058
Aircom of Abergavenny 1074
AJH Electronics 1077
Allweld Engineering 1070
Amateur Electronics UK Ltd 1000/1
Amateur Radio Exchange 1004/5
Amateur Radio Shop 1076
Ambit International . . . . . 1069 & 1072
Amcomm Services . . . . . 1061 & 1080
Arrow Electronics Ltd 1065
Auto Marine Development Co 1076

Bedford Audiocomm 1070
J. Birkett 1064
BNOS Electronics 1058
Bredhurst Electronics 1002/3

Cambridge Kits 1073
Catronics Ltd . . . . . Cover II & 1066
Compstock Electronics Ltd 1078
CQ Centre 1066
CR Supply Co 1074

Dales Keycode Ltd 1058
Datong Electronics 1069
Davtrend Limited 1062

Eurover Electronics Ltd 1074

Fortop Ltd 1070

Garex Electronics 1073
Gemini Communications 1068
GPW Electronics 1078
GWM Radio Ltd 1077
G2DYM Aerials 1077

Heller Electronics 1073
D. P. Hobbs Ltd 1079
Holdings Ltd 1068
Homebru Electronics 1058

Interface Quartz Devices Ltd 1077

Jaycee Electronics 1058

KW Communications Ltd 1077

LAR Modules Ltd 1062
Leeds Amateur Radio 1063
Lee Electronics 1071
H. Lexton Ltd 1067
London Communications (Equipment) Ltd 1080
Lowe Electronics Ltd 986/9

Micro-Print Ltd 1073
Microwave Modules 1012
Modular Electronics Ltd 1080
Mosley Electronics Ltd 1075
Multitone Electronics PLC 1079
Mutek . . . . . 1068 & 1072

Northern Communications 1075
Northern Mobile Rally 1058

Packer Communications 1075
Photo Acoustics Ltd 1073
Piper Communications 1080
PM Electronics Services 994

QuartsLab Marketing Ltd 1066

Radio Shack 998/9
Radiovision 1060
Randam Electronics 1076

SMC (Leeds) Ltd 1064
Sota Communications Systems Ltd . . 1070
South Midlands Communications Ltd 1006/11 & 1072
South West Communications 1076
Spacemark Ltd 1068
Stephens-James Ltd 1059

Telecom 1078
Thanet Electronics 990/3
TMP Electronics Supplies 1079

Uppington Tele Radio Ltd 1062

Ward Electronics 1074
Waters & Stanton Electronics 995/7 & Cover III
Western Electronics (UK) Ltd 1057
W. H. Westlake 1058
C. Wilson 1062
Wood & Douglas 1064

Yaesu Musen Co Ltd . . . . . Cover IV

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: **C. C. LINDSAY (cheques payable to RSGB), 2 Leyburn Gardens, Croydon CR0 5NL. Tel: 01-686 5839.**

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, Britannia Stores, Leeswood, Nr Mold, Clwyd CH7 4RU.
AERIAL WIRE 14swg hard drawn copper, 70' coils £5.50 140' £8.90 incl postage. TMP ELECTRONICS, Britannia Stores, Leeswood, Nr Mold, Clwyd CH7 4RU.
CRYSTALS MADE TO ORDER within six weeks, 4-105MHz, wire or pins, £3.90 each inclusive. 70cm and 2m FM crystals from stock, £2.95. SAE list. Hartley Crystals, Green Lane, Milford, Godalming, Surrey GU8 5BG.
QSL CARDS Quality printing on coloured gloss cards, at competitive prices. SAE for samples. S. M. Tatham, "Woodside", Orchard Way, Fontwell, Arundel, West Sussex.
D.I.Y. QSL CARDS, just add your own callsign, etc., also SWL design. 50 for £2.00, 100 for £3.15 inc p/p send s.a.e. for samples. UHF high-pass TVI filter £2.40 inc. p/p. Lam Electronics (RC), 47 Golden Miller Road, Cheltenham, Glos. (Tel: 0242 43891, 24-hr).
CALLSIGN JUMPERS. Ideal Present. Smart V-neck jumpers embroidered with your callsign/message. colours, black, navy, grey, bottle, chocolate, red, white. Chest 28"-44", £7.90 including P&P. 'Mountain Tops', 26 Chapel Street, Enderby, Leics.
QSL & LISTENER CARDS Quality printing on coloured gloss cards, at competitive prices. SAE for samples S. M. TATHAM "Woodside", Orchard Way, Fontwell, Arundel, West Sussex.
EVER BEEN MISTAKEN FOR A CB-ER? Set the record straight with our two-colour plastic car window stickers, worded 'NO, IT'S NOT CB – IT'S AMATEUR RADIO!' Price 60p (+15p p&p) from G3TDL, 21 Denton Drive, Brighton BN1 8LR.
STATION LOGBOOKS £2.25 (callsign printed on front cover). Mobile Minilogs: 80p. Callsign Window Stickers: £1.50. Callsign badges: £1.75. QSL Cards s.a.e. samples. Beauprint (G3OYI), Meltham Road, Honley, Huddersfield.
QSL CARDS Quality printing on gloss or tinted cards. SAE for samples. Express Printing Services, 28 Payne Avenue, Hove, Sussex.
TRAP DIPOLES, CUSTOM BUILT, ANTI-TVI MODELS, Tx-ing, SWL-ing, 24' to 108'. Send s.a.e. for lists. – G2DYM, Uplowman, Tiverton, Devon. (Tel: 03986 215).
QUALITY PERSONAL CALLSIGN TIES. Callsign – offwhite 3mm symbols on navy, wine or green background. Minimum order is two ties on same background – £9.70 the pair incl 5/6 weeks delivery – CWO to Garrison Radio, Catterick Garrison, N. Yorks DL9 3JD. Tel: 0748 833311.
PROTECT YOUR RIG with an overvoltage crowbar module. Connects across 12V supply. Fully built, includes 25 Amp thyristor. Only £4.75 inc. post and VAT. Fremark Electronics, Strattons Walk, Melksham, Wilts.
KW2000 FOR SALE. Good working order, recent service. Complete with AC PSU, Shure mic, handbook. £110 ono. Please Telephone G4CQM on Hindhead 6802.
ANTENNA INSTALLATION SERVICE, Central Scotland, UHF, VHF, HF, 24 hr answering facility. U-Aerials Ltd, Galston, Ayrshire. Tel: 0563 820265.
PERSONALISED QSL CARDS 1,000 £11, 5,000 £38, (SAE for samples). Q/Cards, 89 Derwent Street, Blackhill, Consett, DH8 8LT.
SWR PROBLEMS? The VHF ANTENNA-TUNE, designed for two metres, will sort them out: £28.95 inc postage. MISSING DX? SWL's should be using the ANTENNA TUNE/SELECT: £27.65 inc postage. STURDY galvanised steel masts: £50 per 10' section, delivery extra. full details (SAE, please) from PJ Communications, 159a High Street, Maldon, Essex CM9 7BS.

WANTED

GOOD SECONDHAND EQUIPMENT ALWAYS WANTED. Come to Amateur Radio Exchange for the best deal. 2 Northfield Road, Ealing, London W13. Tel: 01-579 5311.
QSL'S (AMATEUR AND COMMERCIAL) WANTED most urgently for small research project, envelopes etc, used postally pre- and post-war from Iceland, Jan Mayen, Faroes, Spitzbergen, Bear Island, Scandinavia and Greenland. Replies to Box 186, RSGB, 2 Leyburn Gdns, Croydon, CR0 5NL.
PHOTOCOPIES OF COMPONENT AND CIRCUIT DIAGRAMS for cathode ray oscilloscope Taylor model 31A in exchange for IRC's or ZE stamps. Please send to: Brian Legg, ZE1GC, 9 Wingate Road, Highlands, Salisbury, Zimbabwe.
RETAIL AGENCIES. Radio retailers with full service facilities, invite amateur radio wholesalers/importers to contact us with a view to an agency commitment. Box 187, RSGB, 2 Leyburn Gardens, Croydon CR0 5NL.

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

MISCELLANEOUS

PATENTS and TRADE MARKS – Booklet on request, King's Patent Agency Ltd (B. T. King, Reg Pat Agent) – 146A Queen Victoria Street, London EC4. Tel: 01-248 6161. Telex: 883805. Established 1886.
ZX8I-I6K – AMATEUR RADIO PROGRAMME. 500 listings with recall by prefix, country, CQ and ITU; £5.50. G4KNV, 57 Osbaldwick Village, York YO1 3NP.
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.
DATONG MORSE TUTOR £5.75 for one month (including travelling time). Keep it longer if you like. All customers send £20 deposit to GM6CFT at Pointsea Research, 25 Westgate, North Berwick, East Lothian.
OSCILLOSCOPE repair and calibration. Quick service, competitive rates, W.I.R. Electronics, 01-367 6816.

HOLIDAY ACCOMMODATION

BOURNEMOUTH 'Dolbadarn' Private Hotel, 8 Grand Avenue, Southbourne BH6 3SU. Booking now for Christmas; from evening dinner December 24, £20 per day, full board. Minimum 3 days. No VAT. Residential licence, bedroom radio, call and tea making facilities. 0202 424826, E. W. & J. M. Batten (G3BKN).
SUSSEX, NEAR WORTHING/BRIGHTON, bed and breakfast, 18th century flint cottage, car space. G8SUU, QTHR. Tel: Lancing 3102.
OPERATE MARITIME MOBILE THIS WINTER. Luxury skippered sloop "Moody Mistress" based English Harbour, Antigua, offers Winter Holidays with a difference. Latest ICOM 720A and standby ATLAS 215X rigs plus good food and drink, Windsurfing, Scuba Diving and guaranteed sunshine. Charter Agents: Montague Marine Management, 43a North Hill, Plymouth. Tel: (0752) 665187.

SITUATIONS VACANT

MUTEK LIMITED REQUIRES A TEST TECHNICIAN/PROTOTYPE WIREMAN to complement its existing team. The person appointed will have a keen interest in rf engineering and be able to demonstrate their enthusiasm and skills perhaps formally or perhaps in terms of their hobby. In either case a considerable degee of self-reliance is required as is the ability to grow with an expanding company. Bradworthy is situated in the far north-west of Devon some 60km west of Exeter. It is a friendly rural community of around 800 people with a strong sense of identity. Local authority housing may be available to a suitable applicant. If this opportunity interests you please telephone Chris Bartram on (0409 24) 548 for an initial discussion.

Our expansion opens new engineering opportunities in mobile radio

We need engineers capable of maintaining V.H.F. and U.H.F. mobile radio-telephone equipment. During Autumn '81 we are moving to brand new, purpose-built premises near Regent's Park and we need additional talent to strengthen our team and add to our expansion. Formal qualifications not necessary, but ability, intelligence, and enthusiasm are! Call Mike Rawlings or Bill Clarke on 01-328 5344 now.

London Communications
(Equipment) Ltd
30 Boundary Road, St. Johns Wood, London NW8 Tel: 01-328 5344

MODULAR ELECTRONICS 95 High St, Selsey, W. Sussex PO20 0QL. Selsey (024361) 2916
S.S.M. RF Power Transistors, Specialist RF components. Low noise Devices. 2N3866 **£1.01**. 2N4427 **£1.17**. 2N3553 **£1.29**. 2N5913 **£1.77**. 2N6080 **£5.19**. 2N6081 **£8.22**. 2N6082 **£9.49**. 2N6084 **£13.90**. 2N5590 **£6.96**. 2N5591 **£8.63**. 2N5944 **£7.47**. 2N5945 **£9.49**. 2N5946 **£12.02**. 2N5914 **£4.60**. SD1127 **£2.66**. SD1143 **£7.60**. SD1416 **£26.56**. SD1019 **£20.24**. SD1135 **£5.72**. SD1136 **£8.55**. SD1088 **£20.24**. SD1089 **£27.83**. SD1434 **£29.10**. SD1477 **£28.75**. SD Devices cover 4 to 100w out. Ex Equip RF. 2N5070 **£2.88**. 2N5645 **£4.50**. Low noise Small Signal BFR90 **£2.82**. BFR91 **£3.45**. BFR34a **£2.25**. TP491 **£3.68**. 40673 **92p**. 3N204 **£1.75**. BF900 **£1.30**. BFY90 **£1.15**. BFT66 **£2.59**. SD201 **£2.45**. SD306 **£2.60**. 2N918 **60p**. 2N5179 **82p**. BF115 **50p**. BF180 **50p**. ST2110 = 2N2369/BSX20 **30p**. ZS276 1.5a 600v **12p**. 400v 2.5aBr **50p**. H.P. Diodes 5082 2800 **£1.10**. 2835 **98p**. 3010 **98p**. Ant Relays 12v **£10.70**. PTFE Sheet 30cm Sq **£2.30**. Xtl Filt 10.7MHz 25kHz **£8.05**. Trimmers. Tetfer 10pf **44p**. PTFE Film 9pf or 18pf **34p**. 25pf **15p**. BNC Plug **70p**. BNC S/H sock **69p**. 4h Sock **63p**. 600MHz 10 i.c. MC12013p **£11.50**. BF900 preamp (144) **£8.05**. BFR34a pre/a (432) **£8.62**. Ferrites FX1115 **6p**. FX1898 **13p**. FX2049 **12p**. Heatsink 6M1 6" **£2.20**. TBA120 I.F. I/C **82p**. Modules. RF Amp with C/O. CPM15-2 1·5w = 15w **£27.03**. CPM25 3·3w = 20w **£28.46**. Send for details. RF amps 50 in/out no C/O. PM2-10 0·4w = 10w **£18.50**. PM2-15 1·5w = 15w **£19.60**. PM2-25 3w = 20w **£21.00**. RF Amps 50 in/out no C/O. PM70-10 1·7w = 10w (432) **£21.50**. PM70-4 0·4w = 4w **£19.60**.
All prices inc. VAT at 15%. Add 50p Post. **Closed November 9 to 23.**

MASTHEAD PREAMPS **2 — 70 — 23** GaAs FET Preamps
NEW! NEW! NEW!

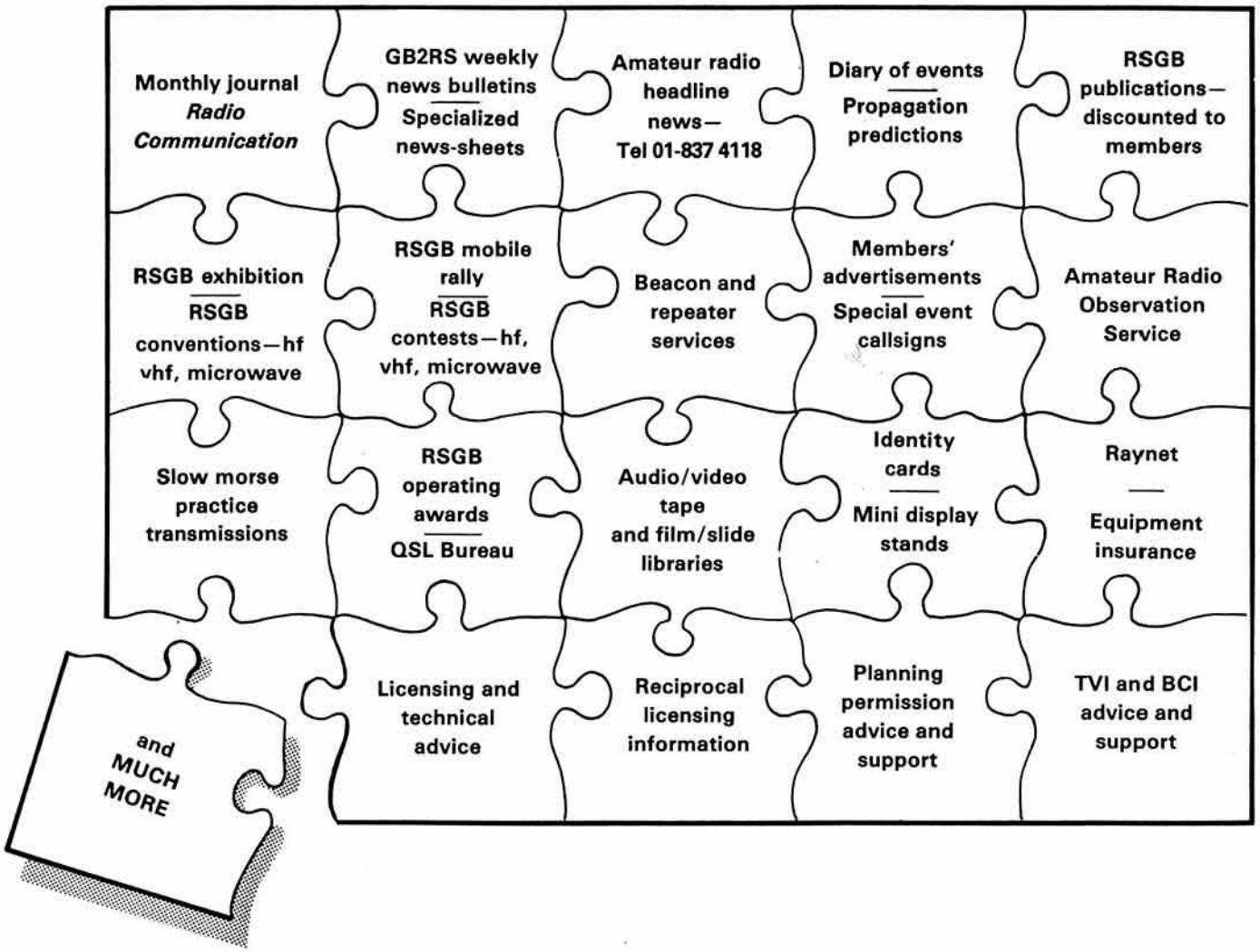
- The high performance 23cm transverter system is now being re-designed to take advantage of recent advances in technology resulting in lower noise L.O. & RX mixer etc.
- 144-432MHz transverter. An advanced design available soon. Superb single board Kit. NF<2·5dB.
- The full range of RF products from SSB Electronics (W. Germany) is available, further details in CAT. 30p.

PIPER COMMUNICATIONS
4 Severn Road, Chilton, Didcot, Oxon OX11 0PW
Telephone: 0235 834328. Evening calls welcome B4 9pm.

Radio Society of Great Britain

REPORT & ACCOUNTS
and
THE YEAR IN REVIEW

for the year ended 30 June 1981



Radio Society of Great Britain

(COMPANY LIMITED BY GUARANTEE)

35 DOUGHTY STREET, LONDON WC1N 2AE

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

COUNCIL

President
B. O'Brien, G2AMV

Executive vice-President
J. Anthony, BSc, MIETE, G3KQF

Immediate past-President
P. Balestrini, TEng(CEI), MITE, MIAM, G3BPT‡

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

Telecommunications liaison officer
R. F. Stevens, MBE, G2BVN**

Members

E. J. Allaway, MB, ChB, MRCS, LRCP, G3FKM
D. J. Andrews, G3MXJ*
R. G. Barrett, GW8HEZ
R. Bellerby, MA, BSc, FBIS, G3ZYE
T. P. Douglas, MBE, AMIEE, G3BA†
D. S. Evans, PhD, BSc, FIM, G3RPE
K. A. M. Fisher, TEng(CEI), MIPRE, G3WSN
L. Hawkyard, G5HD
J. Heathershaw (Mrs), G4CHH
G. R. Jessop, G6JP
G. I. Knight, GM8FFX
W. F. McGonigle, GI3GXP*
D. M. Pratt, BTech, CEng, MIEE, MIERE, G3KEP
G. M. C. Stone, CEng, FIEE, FIERE, G3FZL

*Resigned on 31 March 1981
†Retired on 31 December 1980
‡Died on 30 April 1981
**Died on 30 September 1981

Secretary & general manager: D. A. Evans, G3OUF

Auditors: Edward Moore & Sons, chartered accountants

Bankers: Barclays Bank Ltd

ANNUAL GENERAL MEETING

NOTICE IS HEREBY GIVEN THAT THE FIFTY-FIFTH ANNUAL GENERAL MEETING of the Society will take place at the Institution of Electrical Engineers, Savoy Place, London WC2, at 2pm on Saturday 5 December 1981 for the transaction of the undermentioned business:

1. To receive and, if approved, confirm the minutes of the fifty-fourth annual general meeting circulated with the November 1981 issue of *Radio Communication*.

2. To receive and consider the accounts for the year ended 30 June 1981, and the reports of the Council and the auditors thereon.

3. To announce the names of members to serve on the Council for the year 1982. In the event of any successful candidate(s) being of the age of 70 or over it will be necessary for their appointment(s) to be confirmed by the meeting.

4. To resolve that Messrs Edward Moore & Sons be reappointed auditors of the Society for the ensuing year, and that their remuneration be fixed by Council.

5. To transact any other business which may be properly transacted at an annual general meeting.

Any member entitled to attend and vote at the above meeting may appoint a proxy to attend. A proxy need not be a member of the Society. Members attending the meeting should bring their current membership cards.

By order of the Council
D. A. EVANS
Secretary

1 November 1981

Notes
(a) Forms for the appointment of proxies may be obtained from the secretary upon request.
(b) The instrument appointing a proxy shall be deposited at the office of the Society not less than 48 hours before the time appointed for holding the meeting.

Financial report of Council to members of the Radio Society of Great Britain

Council has pleasure to present the audited accounts of the Society and its subsidiary for the year ended 30 June 1981 which are set out on pages *iv* to *viii*. These show that before taxation the Society had a surplus of £31,163 over its expenditure for the year. The provision for Corporation Tax of £6,517 on investment and other income is offset by a reversal of tax provisions amounting to £18,237 which were made in previous years for deferred tax. These provisions were mainly in connection with stock relief for which new rules were effective from November 1980. As a result the final sum added to the Society's funds for the year amounted to £42,883.

The growth of the Society and its income and expenditure over the past three years is illustrated by the following summary:

Year ended 30 June	1979 £	1980 £	1981 £
Income			
Subscriptions	167,642	210,258	264,084
Book sales—less cost of printing and despatch	58,938	73,185	92,622
Other income	5,537	8,340	17,703
Expenditure			
Headquarters—administration and finance	133,156	170,780	231,929
Membership services:			
Radio Communication	132,453	168,405	258,348
Less: Advertising	88,529	121,396	193,801
	43,924	47,009	64,547
All other services including Cost of Council and committee meetings	34,260	36,310	46,770
Surplus—before taxation	20,777	37,684	31,163

During the years covered by the above table, membership increased by 38 per cent (from 21,197 to 29,337) and inflation, as measured by the Retail Price Index, amounted to 50 per cent.

Subscription income

Subscriptions were increased at 1 October 1980, and the credit to the accounts for this year reflect both that increase and a 12 per cent increase in membership during the year. This income is shown after deduction of VAT, which amounted to approximately £15,600.

Advertising revenue

The Society continued to enjoy a high level of support from established and new advertisers. Income under this heading reflects both increases in rates—which are still below those of competing journals—and an increase in the volume of advertising space taken.

Sales of publications

These continued to increase, and included export sales of £36,072 (1980: £36,492). As in previous years the contribution made by sales of publications accounts for a great part of the overall surplus.

Other income

Throughout the year surplus cash funds have been placed on deposit account and have helped to increase other income by £9,363 to £17,703. High interest rates were obtainable during much of the year, but the expectation is that income from this source for 1981–2 may not be so great.

Once again virtually all headings of expenditure show an increase during the year. Particularly large increases were suffered for rates, lighting and heating where the authorities concerned imposed unavoidable additional cost during the period. Staff costs rose, due to increase in numbers at headquarters and increases in salary scales during the year.

The increase in expenditure on telephone, postage and printing reflect a greater level of activity plus the additional charges imposed by the postal and telephone services.

Membership services

We have once again to report a significant increase in the gross cost of production of *Radio Communication*. The print order increased in line with membership, but there were also substantial increases in the various elements of cost of production and distribution. As already mentioned, advertising rates were increased, but the ultimate effect as far as the Society was concerned was an increase in the net cost (after deduction of advertising revenue) of £17,000, making a total for the year of £64,547.

The costs of other direct membership services did not increase unduly during the year, but there was a large increase again attributable to imposed charges in the costs of committee, regional and Council meetings for which members travel over great distances to attend. During the year the Society was host to the IARU Region 1 Conference held at Brighton in April, and the cost of the Society's participation is reflected in the total of £8,897 shown for the cost of international meetings and conferences. Overall the cost to the Society of the Brighton conference was approximately £8,000, part of which was met by a provision made in the accounts for the year to 30 June 1980. The balance represents the cost of overseas conferences attended by the President and members of Council.

The Society continues to enjoy a strong cash flow, and the consolidated balance sheet at 30 June 1981 shows an increase in net current assets of £35,856. Capital expenditure during the year was £22,301, most of which was incurred on upgrading the data processing installation. In this connection Council at its meeting in July 1981 authorized expenditure of a further £10,000 for a high-speed printer.

Financing of the widely-spread activities of the Society is a constant concern of Council, which has approved a further increase in subscription rates effective from 1 October 1981. It is estimated that the increases made—which approximate to the national average level of inflation of 16 per cent since October 1980—will enable the Society to continue and improve the level of service to amateur radio for the coming year.

RADIO SOCIETY OF GREAT BRITAIN

AND ITS WHOLLY-OWNED SUBSIDIARY COMPANY

CONSOLIDATED INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 30 JUNE 1981

	Notes	1981 £	1981 £	1980 £	1980 £
INCOME					
Subscriptions	(1)		264,084		*210,258*
Advertising	(1)		193,801		*121,396*
Book sales			230,845		*177,617*
Other income	(5)		17,703		*8,340*
Total income			£706,433		*£517,611*
EXPENDITURE					
Book sales					
Cost of printing		101,635		*77,517*	
Costs of editing and despatch staff		36,588	138,223	*26,915*	*104,432*
Headquarters					
Rates, lighting, heating and cleaning		12,182		*9,271*	
Repairs and maintenance		1,710	13,892	*2,342*	*11,613*
Administration					
Staff costs		104,427		*77,337*	
Pension		750		*300*	
Telephone, postage, printing and stationery		61,511		*40,072*	
Insurance		1,507		*1,199*	
Repairs and maintenance of equipment		486		*668*	
Equipment hire		21,322		*14,732*	
Depreciation of equipment (including loss on disposals)	(1)	17,133		*13,098*	
Audit fees		6,550		*5,630*	
Legal and professional fees		1,461		*2,863*	
General expenses		1,103	216,250	*2,047*	*157,946*
Finance					
Bank charges		762		*435*	
Surplus on redemption of Sinking Fund Policy		—		*(392)*	
Bad debts		1,025	1,787	*1,178*	*1,221*
Membership services					
Radio Communication	(6)	258,348		*168,405*	
Certificates, awards, trophies, etc		4,499		*2,558*	
QSL Bureau		8,857		*7,278*	
Beacons, repeaters, satellites and Intruder Watch		2,517		*3,613*	
IARU Region 1 contribution and levy		4,261		*5,325*	
Rallies, exhibitions and publicity	(7)	(3,136)		*(3,319)*	
Cost of committee, regional and Council meetings		20,875		*16,133*	
Cost of international meetings and conferences		8,897	305,118	*4,722*	*204,715*
Total expenditure			£675,270		*£479,927*
SURPLUS FOR THE YEAR BEFORE TAXATION					
[of which £31,053 *(1980: £33,351)* arises in the Society]			31,163		*37,684*
Less Provision for taxation thereon at 40% *(1980: 40%)*	(8)				
Corporation Tax on investment income		(6,517)		*(3,100)*	
Deferred tax		18,237	11,720	*(10,500)*	*(13,600)*
SURPLUS FOR THE YEAR AFTER TAXATION			£42,883		*£24,084*

RADIO SOCIETY OF GREAT BRITAIN

AND ITS WHOLLY-OWNED SUBSIDIARY COMPANY

BALANCE SHEETS AT 30 JUNE 1981

	Notes	1981 The Society £	1981 The Society and subsidiary £	*1980 The Society £*	*1980 The Society and subsidiary £*
FIXED ASSETS					
Freehold property at cost	(1)	—	41,675	—	*41,675*
Furniture, equipment and computer programming	(1)(2)	50,725	50,725	*45,557*	*45,557*
Investment in and loan to subsidiary	(3)	42,786	—	*42,788*	—
		93,511	92,400	*88,345*	*87,232*
INVESTMENT					
Quoted at cost [Market value £19,213 *(1980: £18,307)*]		19,503	19,503	*19,503*	*19,503*
NET CURRENT ASSETS					
Stocks at lower of cost and net realizable value		92,321	92,321	*84,758*	*84,758*
Debtors and payments in advance		76,094	76,094	*52,132*	*52,132*
Bank balances and cash in hand		141,619	143,927	*64,171*	*66,479*
		310,034	312,342	*201,061*	*203,369*
Less					
Creditors and accrued charges		(92,337)	(93,878)	*(62,865)*	*(64,387)*
Corporation Tax payable		(8,393)	(8,437)	*(4,025)*	*(4,125)*
		209,304	210,027	*134,171*	*134,857*
NET ASSETS		£322,318	£321,930	*£242,019*	*£241,592*
FINANCED BY					
ACCUMULATED FUND. Balance at 1 July 1980		106,125	105,939	*82,274*	*81,855*
Surplus for the year ended 30 June 1981		42,844	42,883	*23,851*	*24,084*
		148,969	148,822	*106,125*	*105,939*
Less					
Preliminary expenses of subsidiary		—	(241)	—	*(241)*
		148,969	148,581	*106,125*	*105,698*
LEGACY FUND	(4)	6,665	6,665	*6,187*	*6,187*
SUBSCRIPTIONS IN ADVANCE	(1)	163,421	163,421	*108,207*	*108,207*
DEFERRED TAXATION	(1) (8)	3,263	3,263	*21,500*	*21,500*
		£322,318	£321,930	*£242,019*	*£241,592*

(The notes on page vi form part of these accounts)

B. O'BRIEN, *President*

P. F. D. CORNISH, FCA, *Honorary treasurer*

NOTES ON THE ACCOUNTS

1. Accounting policies:
   (a) Subscriptions—cash received in respect of subscriptions for the year has been apportioned on a time basis from the actual dates subscriptions were receivable, after deduction of VAT. Life subscriptions are credited to Income and Expenditure Account over a period of 10 years.
   (b) Advertising income is the gross amount receivable for advertisements in *Radio Communication*.
   (c) Depreciation—no depreciation has been provided on the freehold property. The Council is of the opinion that the present market value of the Society's freehold property (which is held in the subsidiary company) is in excess of £100,000, and that any depreciation required in respect of the building element would be insignificant. Other fixed assets are written off using the straight-line method over their estimated useful lives at the following rates:
      Furniture — 10 per cent per annum
      Equipment — 20–25 per cent per annum
      Computer — 20 per cent per annum
   (d) Deferred taxation has been provided at 40 per cent using the liability method in respect of timing differences which are not expected to continue for the foreseeable future.

2. Furniture, equipment, and computer programming

	1981 £	*1980 £*
Cost 1 July 1980	73,219	*34,179*
Additions during year	22,301	*43,202*
Disposals during year at cost	—	*(4,162)*
Cost 30 June 1981	95,520	*73,219*
Accumulated depreciation	(44,795)	*(27,662)*
Book value as shown in balance sheet	£50,725	*£45,557*

3. The share capital of the subsidiary, Lambda Investment Company Limited (registered in England), is £100 in shares of £1 each and all the shares are held by the Society or its nominees.

4. The Legacy Fund was established in the year ended 30 June 1976. Legacies and donations amounting to £478 *(1980: £17)* received in the year have been credited direct to this account.

5. Other income includes bank interest of £14,469 *(1980: £5,684)* and quoted investment income of £1,664 *(1980: £1,664)*.

6. *Radio Communication* expenses comprise the whole of the costs of printing and distribution, advertising commission, and the cost of editorial staff and the Chelmsford office.

7. Rallies, exhibitions and publicity expenses comprise:

	1981 £	*1980 £*
Society publicity and advertising	9,359	*3,595*
Surplus on the Society's own events less the cost of participation in other rallies and exhibitions	(12,495)	*(6,914)*
	£(3,136)	*£(3,319)*

Book sales totalling £24,537 gross *(1980: £26,563)* made at rallies and exhibitions have been accounted for under income from book sales.

8. The Society is liable to pay Corporation Tax on its investment and trading income. Owing to the effects of capital allowances, tax on trading income has been deferred; the total provision for deferred tax is as follows:

	1981 £	*1980 £*
Corporation Tax deferred by reason of stock relief	—	*17,300*
Excess of taxation allowances on fixed assets over depreciation charged	5,072	*4,800*
Less: Losses carried forward	(1,809)	*(600)*
	£3,263	*£21,500*

As a result of the provisions of the Finance Act 1981, tax deferred by reason of stock relief can now be clawed back only upon discontinuance of trading; accordingly the amount of £17,300, being the accumulated provision at 30 June 1980, is surplus to requirements and has been credited to the profit and loss account.

9. A contract for capital equipment costing £10,000 *(1980: Nil)* was outstanding at the year end.

10. The Society administers certain prize and memorial funds, totalling £501 *(1980: £690)* which are not included in the accounts.

CONSOLIDATED STATEMENT OF SOURCE AND APPLICATION OF FUNDS FOR THE YEAR ENDED 30 JUNE 1981

	1981	*1980*
SOURCE OF FUNDS	£	*£*
Surplus for the year before taxation	31,163	*37,684*
Donations, legacies and interest	478	*17*
Adjustment for items not involving the movement of funds:		
Depreciation (including loss on disposals)	17,133	*13,098*
Tax suffered by deduction	(500)	*(500)*
Surplus on surrender of Sinking Fund Policy	—	*(392)*
Total generated from operations	48,274	*49,907*
OTHER SOURCE		
Proceeds of surrender of Sinking Fund Policy	—	*5,395*
	48,274	*55,302*
APPLICATION OF FUNDS		
Purchase of fixed assets, less proceeds of sale	(22,301)	*(41,493)*
Corporation Tax paid	(1,705)	*(840)*
	£24,268	*£12,969*
INCREASE IN WORKING CAPITAL		
Stocks	7,563	*27,478*
Debtors	23,962	*18,746*
Creditors and subscriptions in advance	(84,705)	*(48,655)*
	(53,180)	*(2,431)*
Movement in net liquid funds		
Cash balances	77,448	*15,400*
	£24,268	*£12,969*

REPORT OF THE AUDITORS TO THE MEMBERS OF THE RADIO SOCIETY OF GREAT BRITAIN

We have audited the accounts set out on pages *iv* to *vii* in accordance with approved auditing standards.

In our opinion the accounts, which have been prepared under the historical cost convention, give a true and fair view of the state of affairs of the Company and its subsidiary at 30 June 1981 and of their surplus of income and of their source and application of funds for the year ended on that date and comply with the Companies Acts 1948 to 1980.

4 Chiswell Street, London EC1Y 4XB.
1 October 1981

EDWARD MOORE & SONS
Chartered Accountants

LAMBDA INVESTMENT COMPANY LIMITED

REPORT OF THE DIRECTORS

The directors have pleasure in submitting their report for the year ended 30 June 1981. The company is a wholly-owned subsidiary of the Radio Society of Great Britain (a company incorporated in England) and was formed to acquire the freehold property, 35 Doughty Street, London WC1, which is the headquarters of the Society. The directors are of the opinion that the market value of the property is in excess of £100,000.

The directors are Messrs L. E. Newnham (chairman), R. F. Stevens, G. R. Jessop and P. F. D. Cornish. The first two named hold one share each as nominees of the Society. Mr P. F. D. Cornish retires by rotation at the Annual General Meeting and, being eligible, offers himself for re-election. A resolution re-appointing Messrs Edward Moore & Sons as auditors will be proposed at the Annual General Meeting.

By order of the Board
D. A. Evans
Secretary

BALANCE SHEET AT 30 JUNE 1981
and
REVENUE ACCOUNT FOR THE YEAR ENDED ON THAT DATE

	1981			1980		
	£	£	£	£	£	£
ASSETS						
Freehold property at cost			41,675			*41,675*
Preliminary expenses			241			*241*
Bank balance			2,308			*2,308*
			44,224			*44,224*
LIABILITIES						
Sundry creditors		1,541			*1,522*	
Corporation Tax payable		44	(1,585)		*100*	*(1,622)*
NET ASSETS			£42,639			*£42,602*
FINANCED BY:						
Authorized and Issued Capital						
100 shares of £1 each fully paid			100			*100*
Revenue Account						
Rent receivable in the year to 30 June 1981		250			*250*	
Surplus on redemption of Sinking Fund Policy		—			*392*	
Less:						
Audit fee	100			*80*		
Sundry expenses	40			*229*		
		(140)			*(309)*	
		110			*333*	
Less:						
Provision for Corporation Tax thereon at 40%		(71)			*(100)*	
		39			*233*	
Balance at 1 July 1980		(186)	(147)		*(419)*	*(186)*
Loan from the Radio Society of Great Britain			42,686			*42,688*
			£42,639			*£42,602*

L. E. Newnham
P. F. D. Cornish, FCA
Directors

REPORT OF THE AUDITORS TO THE MEMBERS OF LAMBDA INVESTMENT COMPANY LIMITED

We have audited the accounts set out above in accordance with approved auditing standards.

In our opinion, the accounts which have been prepared under the historical cost convention give on that basis a true and fair view of the state of the Company's affairs at 30 June 1981 and of the result for the year ended on that date and comply with the Companies Acts 1948 to 1980.

4 Chiswell Street, London EC1Y 4XB
1 October 1981

EDWARD MOORE & SONS
Chartered Accountants

THE YEAR IN REVIEW

Some of the activities of the Society in the year ended 30 June 1981

GENERAL MANAGER'S REPORT

MAIN POINTS

The Society has again made considerable progress during the year under review. The turnover increased by 37 per cent to £0·7 million, which by any standards represents a major increase in activity. Membership has increased from 26,028 to 29,337, which represents an increase of 12·7 per cent, the highest in the Society's history. Book sales increased by almost 50 per cent. This growth, which has been achieved despite the present economic situation, has enabled services to members to be improved and extended at a time when the general trend is toward contraction. The major items of interest during the year have been the extension of the data processing facilities to cope with the above growth, the impact of citizens band radio on amateur radio, the Region 1 IARU Conference which the Society hosted, and the establishment of a forward planning group to examine future trends in amateur radio and to recommend the necessary changes in the structure of the Society.

SOCIETY ADMINISTRATION

The increased turnover noted above represents a substantial increase in the workload on headquarters staff. At all times the staff are heavily loaded, and normal absence due to holidays and sickness can cause problems. Unfortunately this last year has seen a higher than average turnover of staff with, for example, two experienced senior staff leaving within a fortnight, and significant absences due to sickness of key personnel.

Nevertheless, the staff has accepted the additional load, which has included the training of new staff. Thus, for example, 5,370 new members were enrolled into the Society, which process alone represents a major task. The increase in book sales meant in practical terms that one book was sold every minute of each working day throughout the year—a problem in logistics if nothing else. By improved planning the normal Christmas rush was anticipated, so that orders even as late as 23 December were dispatched on Christmas Eve.

Further demands on staff arose from the planned increase of their attendance at exhibitions and rallies to provide specialist services and information. Extra demands were created by the IARU Region 1 Conference in Brighton, and the major changes in organization of the annual exhibition caused by the fire at Alexandra Palace.

A most important function of headquarters is to make available information. This year has seen the introduction of a standard publicity pack which includes posters, literature, and advice to help those who are putting on a display for the public. Newsletters which cater for special interests are potentially most valuable; this year has seen the introducion of a microwave newsletter which complements the *DX News-sheet* for hf enthusiasts. As part of the process of making information more rapidly available, a news headline service was instituted in the year—a three-minute summary of major news, which is updated twice weekly, is available on 01-837 4118—this service is already proving popular, with several hundred calls per week, and it is intended to supplement the existing GB2RS and "Oracle" news services.

A somewhat unusual feature of headquarters administration is the high degree to which it is required to interact with volunteer effort. In most cases this relationship is most productive. The scale of the interaction can be judged by the numbers involved in committee and representative work—over 400. One of the consequences is that it is now necessary to employ a fulltime member of staff to deal with this area of activity. Much of the volunteer work has become established over the years. A new development this year has involved the Intruder Watch. Headquarters has now taken over the data processing of the information generated by the Intruder Watch observers, which has allowed the Intruder Watch co-ordinator to concentrate on analysis rather than routine and time-consuming paperwork. This is a good example of a most productive staff/volunteer relationship.

Yet again the increase in headquarters workload has been coped with by only a slight increase in staff. This is a reflection of the value of the introduction of the IBM34 computer in the previous financial year, and the capacity of the staff to exploit its potential. Indeed, it has been found necessary to further extend the system; the number of work-station vdus has been increased from six to 10, the core of the central processing unit from 96 to 138kBytes, the disk storage from 27 to 64MBytes and, more recently, to install a much faster system printer. There seems to be little doubt that the present success of the Society, and in particular its capacity to cope with the rapid growth of its activities, is largely due to its forward thinking in applying advanced data processing techniques. As one example of the benefits of the system, the rapid analysis of cash flow enables the Society to invest surplus funds on a weekly basis, the interest from which makes a useful contribution to the Society's funds.

Forward planning

The effective application of techniques such as described above demands an increasingly professional approach to the Society's administration. With the Society's turnover likely to exceed £1 million per annum within a few years, the administration must continue to grow and develop in the manner of similar associations and organizations. In recognizing these changing conditions, Council established during the year the Forward Planning Group, the terms of reference of which are: "That the whole future of amateur radio worldwide and in the UK be examined with a view to determining whether the Society is providing the necessary support in services to its members, and, if not, what changes and revisions in the structure and scope of its organization, premises and equipment are required."

The group has presented its first report to Council; it will continue its work and will report again in the new year. In order to obtain the basic data for planning, a new membership survey has been designed, from which it is expected that valuable information on present activity levels and future trends will be obtained. Survey forms have already started to be circulated with the subscription reminders. The more forms completed and returned by members, the more precise the conclusion that can be drawn.

Membership statistics

As reported above, membership increased during the year from 26,028 to 29,337, with 5,730 new members enrolled, and a breakdown of the membership is given in the appendix. The introduction of data processing facilities in 1975 for the first time enabled highly reliable membership statistics to be maintained. With the passage of time it is beginning to be possible to discern longer term trends. Thus there are indications that not only are the numbers of new members of the Society increasing year by year, but the rate of increase is also growing. At the same time the indications are that the overall rate of loss of members is remaining at a constant proportion of membership, which trend augers well for the future if it continues. More detailed analysis of these statistics is part of the current programme of the Forward Planning Group.

Illegal operation in amateur bands

It is perhaps not surprising that as interest in amateur radio has grown, so too has the level of illegal activity in amateur bands. This has taken various forms, from simple pirate activity to repeater jamming and, more recently, to the intrusion of cb operation into the 28MHz band as part of the widespread illegal cb operation. The scale of the latter operation is, of course, very much larger than ever experienced before.

The Society has devoted much effort in attempting to deal with these problems, although without a great deal of success. As has been pointed out on a number of occasions, the major barrier to action by the authorities has been the limitations of the Wireless Telegraphy Act, which has made successful prosecution of offenders most difficult; the current size of this cb problem, which dwarfs the amateur radio problems, is an indication of the ineffectiveness of the Act. It is to be hoped that as part of the introduction of cb, the Home Office will ensure that the Act is amended to enable them to cope with illegal cb operation in general, and with illegal operation of all sorts on the amateur bands in particular.

A most important factor influencing the continued well-being of amateur radio is the status of amateur radio itself. It is to be regretted that a relatively small proportion of amateurs have operated illegally within the amateur bands and have used cb equipment. This has inevitably hindered the Society's efforts to solve the problem of illegal activity generally. The future strength of the amateur movement vis-a-vis cb will continue to depend on maintaining the high status of amateur radio; in this, *every member* has a vital role in continually putting forward the best aspects of amateur radio in his/her contacts with the authorities and the general public, and by

pointing out the fundamental differences between amateur radio and cb. To help in the latter effort, the Society has circulated the media with an information sheet. Additional copies of this sheet are available from RSGB headquarters for use by members.

Brighton conference

One of the more important events of the year was, of course, the IARU Region 1 Triennial Conference held in Brighton at the end of April. Altogether about 150 delegates representing 38 of the 51 member societies met to discuss current problems. A detailed report of the conference was given in the July 1981 issue of *Radio Communication*.

Besides being obviously heavily involved as host for the largest-ever Region 1 conference, the scale of RSGB participation can be judged from the fact that the Society contributed over a quarter of all the papers submitted. Bearing in mind that each paper has to be conceived, researched, discussed, checked and double-checked before submission via the RSGB IARU Committee, this clearly represents a significant effort by the various RSGB committees involved.

The work of the conference obviously did not end in Brighton. Out of the conference came a number of recommendations and proposals for action that are currently being followed up in committee, and new Society commitments have been taken on to add to our already very heavy involvement in international aspects of amateur radio. One of the (possibly underestimated) bonuses of meetings such as that at Brighton is the wide interaction beyond the formal business of the conference; we were particularly fortunate in being able to spend some time with such welcome visitors as Harry Dannals, W2HD (president of the American Radio Relay League) and N. Fujioka, JM1UXU (representing JARL), and also international Officers of the IARU; Noel Eaton, VE3CJ (IARU president), Dick Baldwin, W1RU (IARU secretary), Pedro Seidenanan, YV5BPG (secretary IARU Region 2), and David Rankin, 9V1RH (secretary IARU Region 3). Interaction between these visitors and all the delegates to such major events can only be to the benefit of amateur radio worldwide.

Radio Communication

The Society's monthly journal *Radio Communication* continues to be the main link between the Society and its members.

Since its first issue as the *T &R Bulletin* in July 1925, its dimensions had remained virtually unchanged, but as a result of the tremendous increase in the number of pages in each issue over the past few years it was decided to increase the page size and at the same time adopt a modern format. The new style, introduced with the January 1981 issue, represented a considerable effort of production during the pre-Christmas period, and the editorial staff are to be congratulated on their efforts.

The new size resulted in a 40 per cent increase in print area per page and, with no increase in the size of print used, the content also increased by that amount. It had been expected that an 88-page issue—equivalent to 123 pages of the former size—would equate with the average size of issue in the last six months of 1980. In the event, both advertising and editorial content increased beyond expectation, so that in the first half of 1981 five 96-page issues and one 104-page issue were produced—no mean achievement without any increase in editorial staff.

Over the year under review the total equivalent number of pages at the old size, including editorial content of the June 1980 issue carried forward to the July issue, was 1,610—compared with 1,202 pages in the 11 issues of 1979-80.

Amateur Radio Insurance Scheme

For some time the Society has been involved in establishing an insurance scheme designed specifically to meet the needs of its members. Hitherto the schemes available were either not very suitable or unduly expensive. The new scheme has already proved popular and represents yet another service to members.

SOCIETY NATIONAL AND INTERNATIONAL AFFAIRS

The Society is now represented at most major exhibitions and other amateur radio events around the UK. Since these activities take place mainly at weekends, these duties are shared between Council members, including the President, and headquarters staff. The summer of 1980 saw the beginning of a programme whereby staff attended many weekend events in order to extend Society representation: this, while being somewhat time-consuming, provided headquarters and Council members with a good deal of insight into members' basic interests and concerns. In this way the Society has a real presence in most part of the UK; thus, during the last six months of 1980, Council and staff members attended numerous events in England, the Region 15 meeting in Northern Ireland, and the now popular conventions in Scotland and Wales. In addition, the Society's 1980 President was able to represent the Society overseas in The Netherlands, West Germany and Italy.

The Society's 46th President, Peter Balestrini, G3BPT, completed his term of office at the end of 1980 and on 1 January 1981 Basil O'Brien, G2AMV, became the Society's 47th President. The Presidential Installation on 10 January 1981 took place in Chester, following the first Council meeting of 1981 held earlier on the same day.

There was a total of four vacancies for the 1981 Council. The three vacancies for ordinary members of Council were filled by the election of Mr K. Fisher, G3WSN, and the re-election of Dr E. J. Allaway, G3FKM, and Mr J. Bazley, G3HCT. Mr P. F. D. Cornish, G3COR, accepted Council's invitation to continue as the Society's honorary treasurer. The fourth vacancy on Council, in Zone A, was filled by Mrs J. Heathershaw, G4CHH, who became the first lady Council member in the Society's long history.

At the first Council meeting of 1981, Mr J. Anthony, G3KQF, was elected executive vice-President for the year. In addition to the annual appointment of Society officers and committees, Mr G. Jessop, G6JP, was appointed "IYDP co-ordinator" during the 1981 International Year for Disabled People.

Council wishes to record its thanks to Mr T. Douglas, G3BA, who retired from Council at the end of 1980; also to Mr D. Andrews, G3MXJ, and Mr W. McGonigle, GI3QXP, who resigned from Council early in 1981 for business and health reasons, respectively. To fill the vacancies which occurred, Council co-opted Mr I. Kyle, GI8AYZ, for Zone F, and Mr W. McClintock, G3VPK, for Zone C, for the remainder of 1981.

As members will already know, Peter Balestrini, G3BPT, the Society's immediate past-President, died on 30 April while attending the IARU Region 1 Conference. His experience, especially in his role as emergency communications manager, has been greatly missed, as have his contributions to many other areas of the Society's activities.

In the year under review, Council met seven times; this included a special meeting in June to discuss in detail citizens band radio. Details of the work of Council and the highlights of the work of its committees have been recorded in *Radio Communication* under "Council proceedings". The policy of arranging some Council meetings at the weekends to reduce conflict with members' work has continued.

During the first six months of 1981 the Society's President, along with other Council members and staff, made many visits to events and clubs around the UK. The President and the general manager were guests of the American Radio Relay League at their National Convention in March 1981. In addition, the President represented the Society in Belgium in May. At home, among the clubs visited by the President or general manager during the year, were: Southdown Amateur Radio Society, Dunstable Downs Radio Club, Stockport Radio Society, Reading Amateur Radio Club, St Dunstan's Amateur Radio Club, West Sussex Raynet Group, Derby Radio Society, Wirral Amateur Radio Society, Thornton Cleveleys and District Amateur Radio Club, Bristol and District Amateur Radio Society, UKFM Group (Western), and the Scarborough and District Amateur Radio Society. Regional meetings were held in Liskeard, Cornwall, in April, and at Denby Dale, Yorkshire, in June, both of which were attended by the President and/or the general manager. The Membership & Representation Committee continued its policy of holding special meetings around the country, which this year included meetings in Cambridge and Hereford, to provide further opportunities for discussions with members.

Each year the Society receives many hundreds of visitors from all over the world. The Brighton IARU Conference provided an ideal opportunity to meet officers from many other societies, but few found time from the busy conference schedule to visit RSGB headquarters. However, during the year the now perennial visit to headquarters of Noel Eaton, VE3CJ, was most welcome. It is also our continuing pleasure to be able to discuss matters relating to management techniques with Dick Baldwin, general manager of ARRL.

A rather special event took place in May 1981. For another first in the Society's history, a meeting was arranged to which past-Presidents of the Society were invited. Many were able to attend this most productive meeting, and it is hoped that this event will take place again in 1982.

In conclusion the Society has continued to expand its national representation and has continued to play a major role in international amateur radio affairs as one of the leading amateur radio organizations in the world.

VOLUNTEER EFFORT WITHIN THE SOCIETY

As noted earlier, one fulltime member of staff is required simply to administer the organization necessary to make effective use of all the volunteer effort put into the Society. The work of this staff member includes

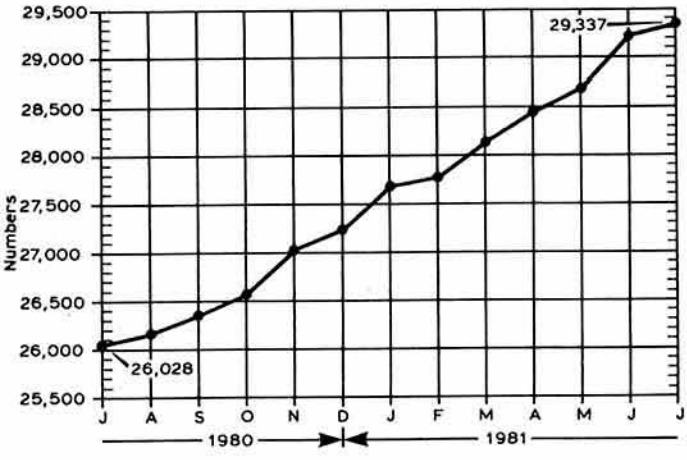
the organizing of the 100 or more Council and committee meetings held each year, the minutes of these meetings and the reports of working parties, together with the routine room and hotel bookings, expenses and travel arrangements. The size of this volunteer effort, which is so essential for the well-being of amateur radio itself, represents some surprising statistics. At this time there are:

11	Honorary officers
12	Intruder Watchers
14	BREMA/CCIR/BSI/IERE liaison members
16	Planning panel members
18	Council members
20	Regional representatives
20	AROS listeners
31	Beacon keepers
43	QSL Bureau sub-managers
39	Slow-morse transmitters
80	Newsreaders and reserves
100+	Area representatives
133	Repeater keepers
162	Raynet controllers
175	Committee members

Perhaps these numbers speak for themselves.

APPENDIX
MEMBERSHIP STATISTICS

Membership graph



New members by month

Month	1980-1	1979-80	1978-9	1977-8
July	291	213	214	188
August	295	307	311	150
September	679	210	249	195
October	288	400	379	254
November	581	455	483	336
December	280	328	140	187
January	483	539	510	396
February	529	320	301	302
March	320	316	415	250
April	491	439	226	280
May	437	342	339	322
June	696	346	366	227
TOTAL	**5,370**			

Members by UK region

Region	%	Region	%	Region	%	Region	%
1	10·6	6	4·8	11	1·2	16	6·6
2	6·8	7	6·5	12	1·5	17	6·7
3	8·9	8	7·5	13	1·6	18	2·4
4	6·7	9	3·0	14	2·4	19	9·4
5	3·9	10	3·2	15	2·3	20	4·7

UK main categories

Category	1980-1 (%)	1979-80 (%)	1978-9 (%)	1977-8 (%)
Ordinary corporate	85·3	85·3	84·6	84·5
Life	0·7	0·8	0·8	1·0
Reduced/OAP	2·9	3·4	3·8	4·0
Waived	1·0	1·2	1·0	1·0
Family	1·2	1·1	0·9	0·7
Channel Islands	0·3	0·4	0·4	0·4
Student/Associate	5·1	5·0	5·7	5·6
Honorary	<0·1	<0·1	<0·1	<0·1
Complimentary (non-members)	0·3	0·4	0·3	0·3
Libraries (*Radio Communication* subscribers)	0·4	0·4	0·4	0·4
Clubs	1·7	1·9	2·0	2·0

SWLs comprise 24·9 per cent of the UK membership

Note. For the first time, the membership statistics include some clubs and family members not previously listed, as they do not receive *Radio Communication*.

Overseas main categories

Category	%
Surface mail	65·9
Air mail	5·0
Libraries (*Rad Com* subscribers)	1·8
Complimentary (non-members)	9·5
Clubs	0·5
Agencies	17·3

Main countries for overseas circulation

Country	%
USA	14·9
Australia	8·1
Netherlands	7·0
Germany	5·0
Belgium	4·8
New Zealand	4·5
Finland	4·3
Canada	4·2

There were 2,722 overseas members in 162 countries at the end of the 1980-1 financial year.

COMMITTEE REPORTS

Education

Committee: GW3VBP, G3KQF, G3HB, G6NZ, G8MW, G3KEP, G2WS, G8NUC and G2CVV.

Five formal meetings of this committee were held during the year; four in London and one near Cardiff. By invitation, some members of the committee presented a lecture on amateur radio to international students of the Atlantic College near Cardiff, and were joined the next day by the remainder of the committee for a formal meeting.

The programme of lectures at the Science Museum was presented once more during Easter week. The audience at each of these lectures provided an interesting and stimulating discussion following each talk.

It was not possible to arrange a meeting of RAE instructors at this year's Alexandra Palace exhibition due to the pressure on space, although members of the committee were available on the RSGB stand. However, a meeting was organized at the Leicester exhibition in October, and an officer from the City & Guilds of London Institute attended this meeting. RAE centres were again organized in Derby and London for the December and May examinations and were fully booked.

A heavy programme was dealt with during the committee meetings, including preparation of the new edition of the *RAE Manual*; advice on setting up RAE tutorial classes; and various problems associated with the RAE, including suggested improvements.

Two new members joined the committee in January, and along with the other members made a valuable contribution to our work.

J. Anthony, G3KQF, chairman

Finance & Staff

Committee: G3FKM, G3KQF, G3HCT, G3COR, G3RPE, G2AMV and G2BVN.

The year ended 30 June 1981 saw further improvement in HQ staffing and the extension of the data processor to cover more accountancy records. The committee authorized the extension of the IBM34 system by increasing its store capacity and adding further terminals. The future needs of the Society were discussed, and a suggestion to form a forward planning group, chaired by the President, was accepted by Council. This will report in the near future.

The failure of the first Phase 3 satellite launch resulted in a large financial loss to AMSAT, and the committee's recommendation that a substantial donation should be made to the AMSAT-DL Construction Group to assist with the building of a second satellite was carried out.

There has been a demand for a comprehensive, specially tailored, equipment insurance policy for many years, and althogh the problem has been under consideration for a long time no previous quotation has been as favourable as the new Amateur Radio Insurance Scheme negotiated

during the year. Thanks are due to Mr R. F. Stevens, G2BVN, and the general manager for their work on this project.

One improvement which is envisaged for the future is the introduction of a common subscription renewal date, and talks were held with other organizations who have already made such a change.

The Society is very conscious that there is much equipment and literature of great historical interest distributed around the country, and it is keen to see that it is not lost. The hon treasurer has been investigating the possibility of appointing a Society archivist, and has had talks with individuals professionally involved in similar projects.

The committee wishes to express its sincere thanks to the general manager and all his staff, at Doughty Street and at Chelmsford, for their work for the Society throughout the year.

John Allaway, G3FKM, chairman

HF

Committee: G3FKM, G3HCT, G4FTJ, G4CNY, G3AAE, G4BUO and G3PSM.

The committee held five meetings during the year and considered a wide range of hf matters.

For the IARU Region 1 Conference, papers were prepared and agreed by members of the committee; while other papers, prepared outside the committee but concerning hf matters, were reviewed. Particular attention was given to the usage of the new 10·1MHz band, and it was satisfying to note that the committee's recommendations were accepted by the Region 1 Conference.

Consideration was given to the possible revision of the UK Amateur Licence, and also to the possibility of a Novice licence. The intrusion of the cb operation into the cw portion of the 28MHz band was deliberated, and encouragement was given through *Rad Com* for the greater use by licensed operators of this section of the amateur allocation.

Members of the committee produced two papers on the likely future trends in the hf bands, and these were submitted for the information of the President's Forward Planning Group.

Due to the restricted accommodation at the 1981 RSGB exhibition at Alexandra Palace it was not possible to arrange hf lectures, neither was there space for the usual hf stand. However, questionnaires concerning an hf convention were prepared and circulated. From the considerable number of questionnaires completed and returned it is evident that there is great interest in such an event. The committee is currently seeking an appropriate venue, and planning for an hf convention during 1982.

The committee was honoured that its secretary, G3FKM, was elected chairman of the Region 1 HF Working Group during the IARU Conference.

J. D. Kay, G3AAE, chairman

HF contests

Committee: G3FKM, G3MXJ, G3HCT*, G2KKQ, G3RJV*, G6LX, RS20249, G4BUO, G3KDB, RS10977, G4BEL, G3NKS and G3WPF.

The committee participated in the IARU Region 1 Conference held in April. Various papers concerning contest operations were discussed in committee to establish the Society's view, and three members of the committee were among the RSGB delegation at Brighton. Topics discussed included contest policy for the new bands, IARU Region 1 SSB Field Day rules and publicity, common log and summary sheets for international contests, contest free band segments and contest championships.

The committee became increasingly disturbed during the year by the declining standard of operating evident on the amateur bands, and this was reflected in the quality of contest logs received. Increased penalties for unmarked duplicate contacts in logs were announced.

Overseas publicity remains a problem, not only in getting the relevant information circulated in good time, but ensuring that it reaches the right person. Regular news-sheets are sent to a computerized mailing list, giving details of rules and results of RSGB international contests.

The Affiliated Societies Contest remains one of the most popular events held during the year, and the committee continues to encourage club and team activity in this and other contests. A multi-operator section has been introduced in the 21/28MHz Telephony Contest. The committee is aware of the clash of field day dates with other contests, but with the acceptance of common dates throughout Europe for these events, and the shortage of suitable weekends during the summer months, it is unlikely that there will be a satisfactory resolution to this problem in the near future.

The committee would like to express its thanks to two corresponding members, Eric Mollart, BRS10977, for his organization of the Society's df events, and to the Rev G. Dobbs, G3RJV, for his help and advice on QRP matters.

D. J. Andrews, G3MXJ, chairman

IARU

Committee: G3FKM, G3MXJ, G3HCT, G3ZYE*, G3RPE, G3WSN, G5CO, G3GVV and G2BVN.

The work of the committee for the period 1980–1 can be divided into three phases:

1. Preparation for the Region 1 Conference.
2. Activity at the conference.
3. Post-conference work.

For many months prior to the conference, the committee was concerned with the task of studying papers prepared by other RSGB committees, and by other national societies. The task was heavier than on previous occasions, with approximately 180 papers to be considered; each member of the delegation was allocated papers, for which he was responsible.

The conference delegation of the RSGB consisted of G3FKM, G3MXJ, G3HCT, G3RPE, G3WSN, G3GVV (leader of delegation), and G3VEH, plus the President and secretary. In addition, representatives included G3AAJ, G2UK (AMSAT-UK), G3PLX (BARTG), G3DME (International Beacon Project), G3PSM (IARU Monitoring Service) and G3BPT (Raynet). Both within and without the conference rooms the opinions of the RSGB were sought on many occasions, a tribute to the esteem in which our Society is held. The conference was overshadowed by the death of Peter Balestrini, G3BPT.

The committee has now started considering the implementation of conference recommendations.

R. J. Hughes, G3GVV, chairman

Interference

Committee: G3KQF, G4BYA, G4CMU, G2FLB, GM4ELV*, G8MCQ, G3HCQ, G3HLF, G4DXA, GU3YIZ*, G8HTA, G3BLE, G2YS and G3VTT.

A great amount of work has been done in the past year on the preparation of the new edition of the *Interference Manual*. This work, together with work on a tape/slide lecture, made it necessary to increase the size of the committee. A request for volunteers published in *Rad Com* produced a very satisfying response, and as a result the required increase was duly made.

The number of requests for assistance from members was roughly the same as in previous years, and no particular difficulties were encountered.

Lectures at club meetings were given at Tamworth by Mr Anthony; Echelford by Mr Swinnerton; Maidstone by Mr Turner; and Medway by Mr Jobson.

A booklet containing reprints of the "Interference" articles in the May 1975 issue of *Rad Com* was produced and is now available.

A proposal that tvi groups should be formed has been considered, and interested clubs are asked to contact the chairman.

P. F. Jobson, G3HLF, chairman

Membership & Representation

Committee: G3FKM, G3KQF, GW8HEZ, G3HCT, G3RPE, G5HD, G4CHH, GM8FFX, G2AMV, G3VPE and G4DAX.

The composition of this committee, with all elected zonal members of Council being members, is designed to allow the views of all members to be heard. This year, to further expand on this philosophy, Council's agreement was obtained to allow two RRs to join the committee and for these to be changed on a yearly basis. This experiment has added a new dimension to the deliberations of the committee with consequent benefits to the general membership.

Seven meetings were held during the year, and continuing the policy of meeting Society representatives and members, two of these meetings have been held away from London; one in Cambridge and one in Hereford. The debate and interchange of views at these provincial meetings, and the evening session which followed each meeting, has proved most stimulating and useful.

In addition to routine work, the committee arranged for this year's RR and AR elections, drew up a typical constitution for the establishment of clubs, considered club insurance problems, arranged new types of members' supplies, investigated new designs of certificates (other than contest certificates) and reformed the "Club News" feature in *Rad Com*.

The GB2RS ad hoc committee, which operates as part of the M&R committee, has now finished its immediate deliberations, implemented its recommendations and compiled a report, which has appeared in *Rad Com*. This group has not been disbanded but is held in suspense pending further work.

An RR's Conference has been scheduled, and this will no doubt provide material for an even heavier agenda at forthcoming meetings.

J. Anthony, G3KQF, chairman

Microwave

Committee: G8AGN, G4KNZ, G3PFR, G3RPE, G3YGF, G8IXI, G4CNV*, G4KUJ*, G3JHM*, G4ALN*, G3VEH*, G4FSG, G3HWR, G3JIX*, G3WDG, G4KGC and G3JVL.

This year saw an increase in the committee's administrative work, in addition to its involvement with technical matters and meeting organization. A large amount of time was spent writing and discussing its contributions to the Brighton IARU Conference, and subsequently in producing new draft band plans for 1·3 and 2·3GHz as contributions to a new working party set up at the conference. increased liaison with the Repeater Working Group resulted in a specification being agreed for the new 1·3GHz fm repeaters, 10 of which are now licensed. Discussions are under way on the planning of 1·3GHz tv operation with representatives of BATC and RWG. The committee also spent considerable time discussing its contribution to the Forward Planning Group. The committee has taken an increasing interest in microwave beacon planning and monitoring of current beacon status.

The technical side of the committee's work has covered a number of areas during the year. The need for a transceiver design for 5·7GHz was identified, and a redesigned version of the now well-established G3JVL 10GHz transverter was developed with excellent results. the technical requirements for 1·3GHz fm and possible tv repeaters have been discussed, and work has been done on the key areas of horizontally-polarized omni-directional antennas and diplexing filters. Designs for both have been produced and tested. Mobile propagation experiments have been made on 1·3GHz with the dual purpose of investigating the likely success of the 1·3GHz fm repeaters and gathering data for extrapolation to the proposed 900MHz cb allocation. A paper on the latter subject was submitted to the Home Office.

Work on a high stability local oscillator source was completed and has been written up as a committee paper for *Rad Com*.

The committee has continued its long-standing interest in conventions and round table meetings. A lecture stream was contributed to the VHF Convention, and a number of round table meetings were held at all three regular venues, Martlesham Heath, Sheffield and Winchester. The committee was also invited to submit papers to the IERE-sponsored Radio Receivers Conference, and two papers were presented, on 10GHz ssb equipment and 1·3GHz gas fet amplifiers.

C. W. Suckling, G3WDG, chairman

Propagation Studies

Committee: G3HTF, DJ5DT*, G3BYW, G3RPE*, G3LTP, G3NAQ*, G3USF*, G3GVV, G2FKZ, G3LZZ*, G4AQI, G3FZL and G3DME.

The year has seen evidence of a growing awareness of the extent and capabilities of amateur radio in propagation research. With the assistance of Serge Canivenc, F8SH, the IARU sporadic-E co-ordinator, the committee prepared and presented an invited paper to an audience of about 50 leading experts in the field of sporadic-E research at a symposium held on 24 February at the Appleton Laboratory. A paper demonstrating the use of amateur networks in tropospheric studies was presented by the committee to the IEE International Conference on Antennas and Propagation, held at York University in April, which was also attended (in his professional capacity) by DJ5DT, one of our corresponding members. A joint British Telecom/RSGB study of two occasions of anomalous propagation associated with weather fronts formed a contribution to an URSI meeting held in August in Washington. British Telecom has indicated that it would be interested in further co-operative analyses of a similar nature.

From May 1981 G4AQI has provided the monthly "HF Propagation Study" table for *Rad Com* in a more convenient form for use on the amateur bands. The new table shows directly the probability of communication between he UK and any of about 50 selected locations around the world. For those who have need of predictions outside the amateur bands, hpf/luf figures are still available direct from G4AQI, QTHR, against a supply of saes.

In order that the most may be made of current professional interest in amateur network studies of sporadic-E, Serge Canivenc, F8SH, has agreed to join the committee as a corresponding member, and already has supplied detailed analyses of specific events and a large volume containing his collected information for the 1980 "season". In return we hope to send him relevant material which might not otherwise come to his attention and act as a collecting centre for UK observations.

The committee's activities in auroral propagation studies, the International Beacon Project, lectures, exhibitions and CCIR work continue. Both CCIR Study Groups 5 and 6 have indicated that they would welcome further contributions from the amateur service, particularly those involving large networks (as have been used for our Es and tropo studies)—which represent a line of research impossible to duplicate professionally on such a scale—and long-term analyses of the signal strength of individual stations, especially those using amateur beacons in the uhf and shf bands.

R. G. Flavell, G3LTP, chairman

Rally & Exhibition

Committee: G5HD, G3TDR, G4HHB, G3VPK, G3MVV, G3SZJ and G3IIR.

Two new members joined the committee during the year; Ron Kingstone, G4HHB, and Martin Shardlow, G3SZJ; and their contribution to the Committee's work has been very much appreciated.

In close co-operation with HQ staff, the members have endeavoured to attend all major events and functions in various parts of the country. The modular stand construction adopted at this year's Alexandra Palace Exhibition proved to be very successful, although the main intention was to accommodate as many exhibitors as possible into the much smaller hall, following the disastrous fire of July 1980. Planning is already taking place for the 1982 exhibition in the new Alexandra Pavilion.

The basic structure of an RSGB stand at an event has become much wider than in the past, not only selling publications but preparing identity cards, subscriptions, information about committees, advice to new members and other specialist advice from staff.

The untimely death of Peter Balestrini meant a great loss to the committee and, of course, to the Society and us all.

Norman Miller, G3MVV, chairman

Raynet

Committee: G8CAC, G4AVV, G3XC, G4FRG, G4CHH, G6JP, GW2HPG*, G8MBB, G3IIR, Ron Barrett, Mrs Taff Crane and Mrs Jane Balestrini.

During the year the Raynet membership has continued to grow, perhaps not quite as fast as in the previous year, although there are now some 150 groups comprising, in all, over 3,500 members. Activity is somewhat less in the north and Scotland than in other areas, and there is still room for recruitment.

Most groups have carried out exercises and, as might be expected, the frequencies used were mainly in the 144–146MHz band although there has been some activity on 432 and 70MHz and even the hf bands. In some areas experimentation in the use of rtty for fixed point-to-point working has taken place.

The user services are taking advantage of the concessions made to Raynet groups by the Home Office in 1980 in that the services of Raynet could be used at charity functions, provided that permission was obtained in advance; since the beginning of 1981 over 50 permits have been issued by the RSGB, acting on the authority of the Home Office. In a similar manner some 25 permits have been issued for the use of manned talkthrough.

The committee, through the IARU Committee, was responsible for calling the attention of the IARU Region 1 Conference to the need for co-ordination in regard to emergency communication networks. A working party was set up at the conference under the chairmanship of Peter Balestrini, G3BPT, the RSGB emergency communications manager, and as a result the conference agreed that the RSGB/Raynet would act as convenor for countries in Region 1 interested in the development of emergency networks. As members will already know, a shadow was cast on the proceedings by the sudden death of Peter towards the end of the conference.

Much of the committee's time during 1981 has been spent on trying to plan a viable method of representation on the 1982 Committee. Two schemes have been discussed but both have been abandoned due to cost, but a third, and more economical, scheme is under discussion at the moment.

During the year the new A4-size, loose-leaf, *Raynet Manual* has been published, and so far has been in good demand. The long-awaited Raynet lapel badges with black lettering on a gilt background have also become available.

Eric W. Yeomanson, G3IIR, chairman

Technical & Publications

Committee: G4FTJ, G3OQD, G3RPE, G3YGF, G4CDY, G3SJX, G3VA, G3TDR, G3FRB*, A. W. Hutchinson, GI3VCI*, G4IQQ, G3HWR and G2BVN*.

The committee met at approximately six-weekly intervals throughout the usually lasted from 6.15pm until about 9.30pm, which makes a late evening for those who have far to travel. it is an indication of the efforts which volunteers are prepared to put into amateur radio on behalf of others.

The main business of the committee is, of course, concerned with maintaining and improving the standards of the Society's publications. A large part of each meeting is therefore concerned with arranging the refereeing of articles submitted to *Rad Com* and dealing with technical points raised by them. Another most important task is the up-dating of existing books and the production of new books: here the main work is in planning each book and in finding writers who are both well-qualified in their field and with the ability and experience to produce a high-quality product. The latter task does not seem to get any easier as time goes by! When time permits, the committee is becoming increasingly involved with broader technical matters as the complexity of the hobby grows.

During the year, new editions of *Amateur Radio Techniques, A Guide to Amateur Radio*, in both paperback and hardback editions, and the *RSGB Amateur Radio Call Book*, have been produced. Sales of the *RAE Manual* continued at a remarkably high rate, reflecting the enormous interest at present in amateur radio.

In course of preparation are new editions of the *Amateur Radio Operating Manual*—which will incorporate decisions made at WARC 79 and the IARU Region 1 Conference—and the *Teleprinter Manual* which is expected to be published in 1982. A new book to look forward to is *HF Antennas for all Locations* by Les Moxon, G6XN, which should be available early in 1982. In addition to the latter book, there are three other new books in the course of preparation. Clearly it has been a busy year for the committee, in particular for its editorial staff members, and all those at HQ responsible for the success of what amounts to quite a large publishing operation.

D. S. Evans, G3RPE, chairman

Telecommunications Liaison

Committee: G3FKM, G3HCT, G5XB, G3RPE, G3WSN, G5CO, G3GVV, G3KEP, G4BSO*, G2BVN, G3PSM and G2CVV.

The January meeting recorded the committee's appreciation to Roy, G2BVN, who during the past 14 years had not only chaired the committee but also acted on behalf of the Society as telecommunications liaison officer. Roy agreed to continue as TLO, thereby enabling us to have available a wealth of experience and knowledge in connection with licensing matters both in the UK and worldwide.

During the year under review the committee has approached the Home Office for permission to use 10, 18 and 24MHz on a secondary basis with effect from 1 January 1982. At the time of writing this report, satisfactory progress has been made.

The Class A licence has been considered in detail, and our draft proposals for simplifying the format have been submitted to the Home Office for comment.

The committee has continued to negotiate for a form of Novice licence, and some progress has been made in this area.

The Amateur Radio Observation Service, under the guidance of David Pratt, G3KEP, has again during the past 12 months given valuable assistance to the Society and its members.

Council approved the welcome return of Stan Cook, G5XB, to once again guide the Intruder Watch operation.

The committee is grateful to Bob Price, G4BSO, and his panel for the specialist advice that has been given on planning difficulties, and in particular the production of a booklet outlining to members the correct method of applying for planning permission to erect antennas.

J. Bazley, G3HCT

VHF

Committee: G3ZNU, G3COJ, G4AVV*, G3XDV, G3DAH*, G3BA, G5KW*, G3WSN, G5UM*, G3RWL*, G3VEH, G4ANB, G3VZV*, G3FZL, G4BEL, G3SEK and G3IIR*.

This last year has proven a busy and successful one, particularly with respect to the organization of the VHF Convention held for the first time at Sandown Park Racecourse. The same venue will be used next year, when, hopefully, the minor problems encountered this year will be smoothed over and a larger trade display area will be arranged.

At the end of 1980 Mr T. P. Douglas, G3BA, retired from the vhf manager's post after a most valuable term of office, but he agreed to be retained as an ordinary member of the committee. His successor, Mr K. Fisher, G3WSN, took office at a time when the IARU Region 1 Conference preparations were approaching their most hectic time. Mr Douglas ensured a smooth transfer during this transition period, and the committee is indebted to him for the excellent work he conducted while in office.

An interestingly-varied selection of vhf and uhf papers were submitted for the conference, and the committee expresses gratitude to all authors for their co-operation. Many useful conclusions were drawn from all papers during a week of deliberations; however, a satisfactory QTH Locator system has still to be agreed and will be discussed at the next vhf managers' meeting.

The committee is enthusiastically pursuing many varied vhf and uhf aspects of amateur radio, particularly with the aid of the corresponding members. Areas of interest include 50MHz activities; beacon establishment, operational and listing; repeater matters through the Repeater Working Group; band planning and propagation observations—to mention but a few, much of which is excellently reported by the *4-2-70* columnist, Dr J. Morris, G4ANB.

One change of corresponding member has taken place due to the resignation of Mr M. Crampton, G8DLX, after being promoted to chairman of BATC. The new representative of BATC is Mr G. Shirville, G3VZV, a well-known and established amateur television enthusiast.

The committee is most grateful for the efforts of the vhf manager, particularly with respect to his presentations at the IARU Region 1 Conference, and to the vhf/uhf awards manager, Mr Jack Hum, G5UM.

The Repeater Working Group has continued to advise the committee on all repeater matters, and has carried out much routine work in conjunction with HQ staff. Work has included checking the technical specification of new proposals, monitoring operational units, and generally assisting in the administration and co-ordination of the UK repeater system.

In order to keep in close touch with repeater groups, a newsletter—*Repeater report*—was produced from time to time, and open meetings were held in Warrington, Nottingham and Reading. Technical advice has been given to a number of groups.

During the year, 14 vhf repeaters were licensed, the majority of which are now operational. A number of additional units are in the planning stage. Both before and after the IARU Conference, there was considerable discussion about 12·5kHz channel spacing on the 144MHz band, but it is not likely that this will be introduced for some time.

With an increased interest in uhf, 16 new 432MHz repeaters were licensed, and another 10 are ready for the Home Office. With the latest batch of applications comes the introduction of a new repeater channel, RB15. The UK has the world's largest narrow-spaced (1·6MHz input to output) uhf repeater system, and a number of countries have sought and been given technical advice.

The most important development of the year was the submission to the Home Office of proposals for 10 repeaters on 1·3GHz. These units are now licensed, and are a new departure in that, when not in talkthrough, they will operate as horizontally-polarized beacons to assist propagation research.

C. J. Morcom, G3VEH, chairman

VHF Contests

Committee: G3MXJ*, G3KKQ*, G5HD, G8ACJ, G3VPK, G3LCH, G3XDY, G2HIF, G3FZL, G3WDG*, G4KGC and G4BEL.

The committee met 10 times during the review period and arranged some 25 contests and adjudicated nearly 1,200 logs.

The new year saw some changes in the general rules once again, the main being the increase in the number of sections available in some contests. This appears to have been successful, as the entries from the single-operator stations has increased. A major change was also made in the rules of the 1981 VHF NFD—we await the outcome and it is hoped that it will have encouraged the smaller and less well equipped clubs to enter, now that they can possibly do so on an equal level with others.

The newly-introduced 1,296MHz cumulative contest produced a good level of activity on the band, but conditions did nothing to encourage entries; however, most contestants enjoyed the event and asked for it to be repeated. The other new contest was the meteor scatter event—this one, however, was a different story, very few entries being received although activity was reasonably good—it was decided to give the event another try.

With the increase in microwave contests in the calendar it was proposed that G3WDG should stand down as a corresponding member and his place be filled by his wife, G4KGC, as a full committee member; this has now been implemented.

The committee would like to thank all the entrants over the last year in the contests that the committee has organized, and looks forward to support in the years to come.

R. J. Taylor, G4BEL, chairman

* *Corresponding member*

REPORTS FROM THE . . .

. . . Amateur Radio Observation Service organizer

The AROS completed its fourth year of operation in September. There are currently 20 observers throughout the UK who send details of deviations from the licence conditions for fowarding to British licensed amateurs by the honorary organizer. The service does not cover unlicensed operation and is only concerned in reporting to licensed amateurs those matters which could either endanger the reputation of the amateur service, or cause amateur licences being suspended or revoked if monitored by the authorities.

The number of reports sent out continues to be quite small, which helps to confirm the high standard of operating by UK amateurs. The honorary organizer would like to take the opportunity of thanking all AROS observers for their valuable work.

D. M. Pratt, G3KEP

. . . Audio, tape and slide library co-ordinator

The library continues to be well supported by many affiliated societies and clubs. Wintertime sees the maximum loans, many to the more remote areas of the country, due, it is supposed, to the difficulties in travelling for guest speakers etc.

During the year 61 loans were made and, without exception, it was possible to supply all requests for selections. This is due to a programme of record keeping which has allowed analysis of popular lectures. These have been duplicated, several three and four times, which allows more than one club to have a lecture at the same time.

The current stock is 45 separate lectures. Unfortunately some 50 per cent of these are over 25 years old and the material is somewhat outdated in many cases. Efforts are being made to obtain more up-to-date material, but these have not met with much success thus far.

D. E. Simmonds, G3JKB

. . . HF manager

April 1981 being the occasion of the triennial IARU Region 1 Conference, the Society found itself involved in discussion on the use of the three new hf bands allocated to the amateur service by WARC, as well as the position likely to apply on 1·8MHz as a result of its changing status. At the time of writing this report it seemed that the Society's excellent relationship with the Home Office was likely to produce a situation where 10, 18 and 24MHz would all become available for UK use on 1 January, 1982—18 and 24MHz temporarily loaned to us on a secondary basis. Band planning has already been discussed.

News from the ARRL's petition to the FCC for the extension of the USA phone sub-bands on 7 and 14MHz was received with dismay. A letter conveying these sentiments was written to the president of ARRL by the late Peter Balestrini, G3BPT, RSGB 1980 President. The position in mid-1981 appeared to be that privileges for phone use by Extra Class licensees down to 14,150kHz and for Advanced Class down to 14,175kHz were being sought. The 7MHz proposals appeared to be in abeyance. The Society is registering its protest with the FCC.

The spread of illegal cb signals into the low end of 28MHz has been causing great concern. It is against the terms of the amateur radio licence to speak to these stations over the air, and their presence is largely due to the lack of activity by the legitimate users of that part of the band. Some answer seems to lie in the greatly increased use of 28MHz for short-distance communication at times when there is no long-distance propagation.

John Allaway, G3FKM

. . . Intruder Watch organizer

As foreshadowed in the 1980 report, a restructuring of Intruder Watch operations involving the Society's central data processor was undertaken at the beginning of the year, and the work of reporting intrusions in the exclusive amateur bands was resumed in June. A few minor problems have been experienced, and these are expected to be resolved when watchers achieve a greater degree of uniformity in logging. The new system, in which watchers will eventually report directly into the data processor, is based on exploratory work carried out in August 1980 and on the recommendations of a small working party set up to assess the results. The enforced "low gear" period of 1980–1 was not wasted, and several I-Watchers, as well as other members, reported persistent serious intrusions for notification to the UK administration.

Intruder Watch had the full co-operation of the Home Office monitoring service, and, in one case, the radio interference inspectors of British Telecom, who succeeded in tracing and eliminating a particularly offensive intrusion. At the beginning of the year, Intruder Watch was asked to carry out an occupancy check of the projected 18 and 24MHz amateur bands. This was scheduled for three one-month periods, in mid-winter, mid-summer and the spring equinox. The results of the survey were prepared in tabular form supplemented by charts with time and frequency co-ordinates showing the daily distribution of activity.

Following a recommendation by the Intruder Watch working party, the co-ordinator began in July to submit information on Intruder Watch activities to G3FKM for publication in *The Month on the Air*.

Intruder Watch is a small group composed of some 15 to 18 members, many of whom possess specialized knowledge or who have equipment for accurate frequency measurement and demodulation and display by vdu or hard copy. Knowledge of morse code is no longer an essential qualification. At a time when intruding transmissions are on the increase more members are needed.

S. Cook, G5XB

. . . Microwave manager

By his terms of reference the microwave manager is required to be heavily involved with international aspects of microwaves. As a consequence, therefore, this year has been particularly busy, since it included the triennial IARU Region 1 Conference in Brighton. As was the case in the previous conference in Hungary, and the intermediate meetings in Amsterdam and Maidenhead, a separate microwave stream dealt with matters above 1GHz.

RSGB contributed a dozen or so papers concerned with microwaves. These reflected the wide range of activities that go to make up amateur radio; an update of current UK practice on 10GHz (for which RSGB has special responsibility) and on 24GHz; the experimental side represented by the 1·3GHz repeater system, which has already been adopted by the Danes; the administrative side represented by designation of the new bands and vhf/microwave dividing lines; the setting of standards such as polarization standards for eme and terrestial operation; and a number of papers looking ahead to what could be expected from our five new terrestial microwave allocations and nine space allocations.

The majority of these papers had been introduced to other delegates at the previous Maidenhead conference. It is perhaps a consequence of the earlier preparation and exposure to discussion, both formal and informal, which resulted in all our papers being accepted as worthwhile contributions at Brighton.

Two major actions arising from the conference form part of our current programme. It was decided to set up a working party to produce a draft 1·3GHz band plan under the chairmanship of PA0QC, the chairman of the VHF Working Group. This party includes representatives from DARC, EDR, RSGB, USKA and VERON. The RSGB contribution is well in hand. Some replanning of the 2·3GHz allocation is urgently required as a result of Germany, and possibly others, losing 2,300–2,320MHz. Work on this replanning has also started.

Work of this nature requires much skill and effort if a high standard is to be maintained. We are fortunate that sufficient people are prepared to give their time to the Microwave Committee to make it possible.

The development of the amateur bands so far has relied heavily on individuals and groups identifying the need for particular items and techniques, and being prepared to do something about it—there are few black boxes on microwaves. The development of the millimetric bands is likely to be even more dependent on the type of inspired effort that we have seen on the lower microwave bands . . . and an even bigger challenge.

D. S. Evans, G3RPE

. . . QSL Bureau manager

The QSL Bureau continues to be one of the most popular services offered to members of the Society, and during the year under review some 1,200,000 cards passed through its hands. This is only marginally greater than the previous year, and it seems that the large number of cards being received from new amateurs is balanced out by a reduction in enthusiasm by some of their more experienced fellows.

A certain amount of inconvenience continues to be caused by non-standard cards, and also the failure to sort cards alphabetically by prefix. Strangely enough these often originate from clubs and the organizers of special event stations, who really should be expected to "know the drill".

It is also fair to report that two complaints were received from members concerning delays in the delivery of cards, but the subsequent enquiries disclosed nothing to suggest that QSL Bureau personnel were in any way to blame.

Finally, thanks are due to our team of sub-managers, our card-sorting friends, with particular reference to Jim Russell, G3OKQ, and finally to Mrs Allen for her forbearance and "after-hours" work put in on members' behalf. Without all their assistance we would be in sore straits indeed.

E. G. Allen, G3DRN

. . . Slow Morse Practice Transmissions organizer

There are still about 100 transmissions each week, with the 144MHz band now carrying most of the practice sessions. This probably means that listeners away from urban areas have little chance of regular practice due to the restricted coverage at vhf. This emphasizes the need for many more operators to volunteer for the service if it is to achieve a nationwide availability. Many operators would welcome an extension to the existing concession which would permit them to send random letter groups.

With the emphasis on vhf transmissions, it is obvious that immediate reports can be obtained from Class B operators after the end of each session, but most operators would also appreciate reports from listeners.

M. A. C. MacBrayne, G3KGU

. . . Telecommunications liaison officer

During the year under review there has been activity covering all parts of the radio spectrum. With the implementation of the decisions of WARC 79 which will commence on 1 January 1982, this has been the subject of continuing negotiation with the the administration. It is hoped that the long delay imposed by the ITU transfer procedures may be partly overcome by the release of 18 and 24MHz allocations on a secondary basis until the bands become available for exclusive amateur use.

The negotiations concerning a limited number of restricted permits for operation on 50MHz progressed satisfactorily, if slowly, until the intervention of outside interference. Negotiations continue hopefully to a satisfactory conclusion.

There has been a continual activity in connection with the operation of Syledis in the 432MHz band. Unfortunately the requirements of the primary user of this part of the spectrum appear to inhibit a relatively simple solution.

It is anticipated that the new amateur satellite allocations and new microwave bands will become available in accordance with the WARC decisions.

After the submission of a draft novice licence there has been little progress, as the administration feels that this development must be linked to the impending computerization of the amateur licensing system. A considerable amount of time has been spent in the preparation of a new draft amateur licence which it was hoped would be effective on 1 January 1982. For reasons mentioned later it appears that this date may not now be possible.

Society activity in connection with cb appears elsewhere in the annual report.

In addition to the major items mentioned above, there is continued liaison on a day-to-day basis concerning matters of detail. In common with other government departments, the Home Office has suffered staff cuts, and this position has been aggravated by the government policy of staff rotation between departments. Together this has meant that due to no fault of its own the Radio Regulatory department have not been able to provide the type of response previously experienced.

This opportunity is taken to express our thanks for co-operation given in difficult circumstances.

R. F. Stevens, G2BVN

. . . VHF manager

The last year has undoubtedly been dominated by the Region 1 Conference, at which numerous matters were very well aired. Band planning was high on the list. While it is felt it is unwise to continually amend or change the band plans, there were inevitably many changes which have become necessary since the previously agreed plans were produced.

There will always be conflicting interests on an international scale, but RSGB policy has always been well received, and it is pleasing to see the co-operation that has been built up within Region 1 for the continued co-existence of the many specialist and differing modes of communication found on our bands today. It is only through the co-operation of all operators with regard to the band plans that all interests can successfully continue.

One major change to the 144MHz band plan particularly affecting the UK situation with regard to Raynet, is the formation of the exclusive beacon band. The 432MHz band plan has evolved following the Region 1 questionnaire, and it became evident that the UK, with our system of repeaters, has been able to co-exist without any significant problems with other users such as atv. This has certainly not been so in other countries. The future development of atv is to be promoted on 1·3GHz to assist these problems, but 432MHz operations—where so much work has already been done—will undoubtedly continue as well.

The future use of 50MHz and improving activity on 70MHz have again been areas of promotion throughout the year. The operation of the 50MHz beacon GB3SIX has continued. Much has been learnt about propagation by the many stations who have participated in crossband work. A considerable volume of work continues to be handled and processed by the Repeater Working Group. Liaison continues in many areas concerning vhf matters and, whatever an operator's interest, it is hoped that in some way he/she is being considered. The VHF Convention at Sandown Park was a great success. The UK activity continues to advance, evolving new techniques and methods, and the future looks very promising particularly at vhf.

K. A. M. Fisher, G3WSN

. . . VHF awards manager

An analysis of the vhf/uhf awards issued during the 12 months ended 31 July 1981 shows the following:

"Four Metres and Down" Certificates: 70MHz Standard Transmitting, 2; 70MHz Senior Transmitting, 1; 70MHz Standard Receiving, 1. The totals in these three classes are 139, 46 and 6 respectively. On the 144MHz band, where the activity is considerably higher, the figures are:

144MHz Standard Transmitting, 33; total issued, 583.
144MHz Senior Transmitting, 12; total issued, 164.
144MHz Standard Receiving, 4; total issued, 8.
144MHz Senior Receiving, 0; total issued, 3.
432MHz Standard Transmitting, 10; total issued, 162.
432MHz Senior Transmitting, 8; total issued, 74.
432MHz Receiving, 1; total issued, 7.
1,296MHz Standard Transmitting, 5; total issued, 27.
1,296MHz Senior Transmitting, 3; total issued, 5.
1,296MHz Receiving, 0; total issued, 1.

Supreme Award (for achieving three Senior Awards or two Senior Awards plus one 1,296MHz Standard Award), 2; total issued, 34. "Four Metres and Down" Microwave Awards are obtainable for first contacts achieved over specified distances on the six microwave bands. During 1980–1 four such certificates were issued, three for 1·3GHz, one for 2·3GHz and five for the 10GHz band.

"Four-Two-Seventy" Squares Awards: 70MHz: one basic certificate was issued during the year and one sticker for an existing certificate.

144MHz: 37 basic certificates issued for 10 countries and 40 squares verified. Stickers for the higher categories were issued in response to 29 applications. During the year the square categories were extended to embrace 20 countries and 150 squares; already one member has reached this level, and suggestions are being made that it is not onerous enough!

432MHz: eight basic certificates issued during 1980–1: total now 11, for six countries and 30 squares. Stickers for higher categories were issued in respect of six applications.

Microwave Squares Awards: 1·3GHz: Nine microwave certificates were issued for the basic five squares confirmed, and 10 stickers supplied for existing microwave certificates.

2·3GHz: one sticker issued in respect of a basic award previously issued.

10GHz: four certificates issued in respect of contacts with five locator squares. To date 14 awards have been issued in this category, of which one was for fixed site operation from home and one for receiving.

In addition to the above 200-plus proficiency awards, the vhf/uhf awards manager processed all the vhf and uhf contest results upon receipt of *pro formae* from the VHF Contests Committee. Requests from members to endorse applications for overseas vhf/uhf awards are frequently received and duly actioned.

Jack Hum, G5UM

. . . Video tape and film library co-ordinator

The period from July 1980 to June 1981 has seen an increase in the use of the library. There are nine 16mm film titles which were borrowed on 126 occasions, and the six video tape titles went out 107 times. Most video tapes are now available on Philips N1500 and VHS standards, and several are available on U-Matic and V2000 standards. It is hoped to make these tapes available on Betamax standard late in 1981.

Three new 16mm films are being added to the library from July 1981, and if these are as popular as the last new addition they will soon by booked up for 1982.

Some problems have arisen due to borrowers not returning films or tapes promptly, and it must be emphasized that delay in returning titles may mean disappointment for the next borrower.

The quality of some tape copies is not quite 100 per cent due to poor master tapes, but they are all of acceptable quality and the situation is gradually being improved.

J. Anthony, G3KQF

WATERS & STANTON ELECTRONICS

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

OUR NAME MEANS A GOOD DEAL

AZDEN COMPUTER CONTROLLED FM TRANSCEIVERS

£219

PCS 3000
2M FM 25 WATTS
S.A.E. for colour leaflet

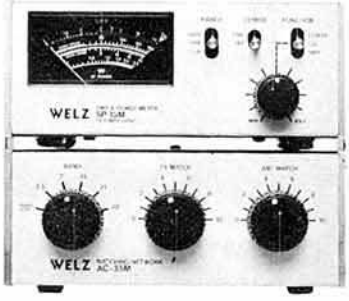
TRIED 10M FM?
PCS 2800
28-30MHz 10W

£179

SPECIAL OFFER
FULL SIZE 10M VERTICALS
COMPLETE WITH RADIALS
£17.95

SEE PAGE 997 FOR EASY MAIL ORDER SLIP

WELZ — **LABORATORY STYLE EQUIPMENT AT AMATEUR PRICES!** — **WELZ**



SP15M POWER METER **£29.95**
Here's a real economy in line power meter ideal for the HF/VHF operator. Maximum handling is 200 watts and forward/reflected power is directly read in 3 ranges:- 0-2·5, 0-20W and 0-200W. Sensitivity is constant throughout the range 1·8-150MHz.

AC 38m 3·5-29MHz ATU **£59.00**
This is a must for solid state rig owners. Designed for coax feed, this ATU covers 8 bands 3·5 to 30MHz with a straight through position. Rated at 400 watts it will match anything between 10 and 500 ohms.

2 WAY SWITCH DC-450MHz
Now at last we've found a true coaxial switched rated at DC-450MHz at 1kW. Unlike other units the coaxial cavity is perfectly preserved with a small gold plated changeover finger. The insertion loss is an amazing 0·1dB and the isolation an equally amazing 70dB. Made by one of Japan's laboratory equipment manufacturers, this unit is the perfect answer to coax switching at VHF/UHF.
Model CH-20A £15.95 (SO239 sockets)
Model CH-20N £27.95 ("N" sockets)

DUMMY LOADS DC-1300MHz!

(High power figures refer to intermittent use)

CT-15A
15/50 watts
DC-450MHz
£6.95

CT-15N
as above but
fitted 'N' sockets
£11.95

CT-03N
3/5 watts
DC-1300MHz
£24.95

CT-300
300/1kW
DC-250MHz
£43.00

MODELS
SP200 1·8 160MHz 20W-200W-1kW **£59.95** (n.c.)
SP300 1·8 500MHz 20W-200W-1kW **£79.95** (n.c.)
*SP400 130 500MHz 5W- 20W-150W **£59.95** (n.c.)
*Note: VHF model has 'N' sockets

PROFESSIONAL QUALITY SWR/POWER METERS NOW LEARN THE TRUTH!

Welz VSWR/POWER meters are high quality instruments approaching laboratory accuracy. They are capable of providing extremely accurate measurements of both power and voltage standing wave ratio. Features include high sensitivity (2·5W full scale 1·8-500MHz), and completely flat response.

HP4A TVI FILTER £5.95
We are pleased to announce the introduction of the new GLOBAL HP4A TV filter. Even more effective than earlier models, its double action filters both inner and outer coax conductors. Ideal for both VHF and HF operators, it is now so effective it should solve most cases of interference caused by RF down the TV aerial lead. Keep one handy!

THE DEVELOPMENT OF THE DECADE—

FT-ONE

THE GENERAL COVERAGE MULTIMODE HF TRANSCEIVER—FOX TANGO ONE

DESIGNED BY

YAESU MUSEN

DISTRIBUTED BY

SOUTH MIDLANDS COMMUNICATIONS LTD
OSBORNE ROAD, TOTTON, SOUTHAMPTON

AMATEUR ELECTRONICS UK
508–514 ALUM ROCK ROAD, 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