RADio COMmunication

October 1981

HF NATIONAL FIELD DAY 1981 — results in this issue

Torbay ARS HF NFD contestants on location in South Devon

Grimsby ARS "B" station G3YMF/P. L to r: Fred Watts; Ron, G8XHZ; Ian, G8XNY; and George, G4EBK. *Photo:* G4KAL.

Members of the Shirehampton ARC on their contest site. *Photo:* G3YHV

Journal of the Radio Society of Great Britain

CATRONICS FOR TRIO

VISIT OUR STAND AT THE LEICESTER EXHIBITION OCT 23–25

NEW TS830S

WITH NEW BANDS

TS830S Brief Specification

Frequency Range:	9 bands, 160m–10m
Modes:	CW, USB, LSB
Final Power Input:	220 watts PEP (SSB)
	180 watts DC (CW)
RX Sensitivity:	0·25μV at 10dB S/N
Catronics' Price:	£726

TS130S

WITH NEW BANDS

TS130S Brief Specification

Frequency Range:	8 bands, 80m–10m
Modes:	CW, USB, LSB
Final Power Input:	~200 watts PEP (SSB)
	~160 watts DC (CW)
RX Sensitivity:	0·25μV at 10dB S/N
Catronics' Price:	£547

25W PEP version also available TS130V at £450

TR2400

2M SYNTHESIZED PORTABLE

TR2400 Brief Specification

Frequency Range:	144–146MHz
Mode:	FM
RF Output Power:	1·5 watts min.
Sensitivity:	1·0μV for 30dB S/N
Display:	LCD
Memories:	10 built in
Scanning:	Auto in 5kHz steps
Catronics' Price:	£198

TS770

ALL MODE 2M + 70CM

TS770 Brief Specification

Frequency Range:	144–146MHz
	430–440MHz
Mode:	SSB (USB, LSB), CW, FM
RF Output Power:	10 watts. Only for FM:
	10W (Hi)/Approx. 1W (LOW)
Sensitivity	SSB/CW 0·5μV for 10dB (S + N)/N
	FM 1μV for 30dB (S + N)/N
20dB quieting (FM):	Less than 0·4μV
Catronics' Price	£785

NEW TS530S

BUILDING ON SUCCESS

TS530S Brief Specification

Frequency range:	9 bands, 160m–10m
Modes:	CW, USB, LSB
Final Power Input:	220 watts PEP (SSB)
	180 watts DC (CW)
Receive Sensitivity:	0·25μV at 10dB s/N
Catronics' Price:	£561

TR9000

2M COMPACT ALL MODE

TR9000 Brief Specification

Frequency Range:	144–146MHz
Modes:	USB, LSB, FM, CW
RF Output Power:	10 watts
Sensitivity:	SSB/CW 0·25μV for 10dB S/N
	FM 0·25μV for 12dB SINAD
Frequency Control:	Digital, phase locked VCO
Memories:	5 built in
Scanning:	Auto—25/12·5kHz/100Hz
Catronics' Price:	£371

TR7800

2M FM SYNTHESISED

TR7800 Brief Specification

Frequency Range:	144–145·995MHz
RF Output power:	H1 25W, LO 5W (adjustable)
RX sensitivity:	0·2μV for 12dB SINAD
Autoscan:	5kHz or 25kHz
Memories:	15 inc 1 × priority
Repeater shift:	+/−600kHz & Reverse
Frequency display:	4 digit LED & Mem. No.
Catronics' Price:	£276

NEW TR8400

70cm FM SYNTHESISED MOBILE

TR8400 Brief Specification

Frequency Range:	430–439·975MHz
Channel Spacing:	25kHz
RF Output Power:	10W (HI) or 1W (LO)
RX Sensitivity:	0·4μV for 12dB SINAD
Memories:	5 (scanning)
Repeater shift:	±1·6kHz
Catronics' Price:	£329

R1000

COMMUNICATIONS RECEIVER

R1000 Brief Specification

Frequency Range:	200kHz–30MHz
Modes:	AM, USB, LSB, CW
Sensitivity	<2MHz: 5μV
	>2MHz: 0·5μV
	for 10dB S + N/N on SSB
Digital Readout:	to 1kHz
Clock:	Quartz controlled
Catronics' Price:	£305

We always have a good selection of used equipment in stock—ask for current list.

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 sale facilities available on all equipment. Credit cards accepted.** Mail orders normally dealt with on day of receipt. All prices include VAT.

CATRONICS LTD, DEPT 100, 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

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OCTOBER 1981

VOLUME 57 No 10

RADio COMmunication

CONTENTS

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

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

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

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26,007 copies per issue average circulation in 1980

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

Thanet Electronics

IC-2E

The Largest Selling Amateur Transceiver in the World!

CHECK THE FEATURES
FULLY SYNTHESIZED — covering 144-145.995 in 400 5kHz steps.
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.
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 IC 2E	£49.00
BP5 11 Volt Battery Pack	£30.50
BP4 Empty Battery Case For 6 x AA Cells	£5.80
BP3 Standard Battery Pack	£17.70
BP2 6 Volt Pack	£22.00
BC30 Base Charger For Above	£37.00
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
LC 1/2/3 Cases	£3.50 each

IC-251E

IC-451

Icom produce a perfect trio in the VHF base station range ranging from 50 Meters thru 2 Metres to 70 Cms. Unfortunately you are not able to benefit from the 5M product in this country, but you CAN own the 215E for your 2 Metre station and the 451E for 70cms.
Both are really well designed and engineered multi-mode tranceivers capable of being operated from either the mains or a 12 volt supply. Both contain such exciting features as scan facilities, automatic selection of the correct repeater shift for the band concerned, full normal and reverse repeater operation, tuning rate selection according to the mode in use, VOX on SSB, continuous power adjustment capability on FM and 3 memory channels. Of course they are both fitted with a crystal controlled tone burst and have twin VFOs as have most of ICOMs fully synthesized transceivers. These two transceivers have now become really popular throughout the world — so why not pop a note on our ansafone for more details?

Thanet for ICOM

See the final page of our advertisement regarding prices.

ICOM

the amateur's professional friends

These excellent new products from Icom are now available, and it really looks as if they are going to prove winners as they seem to have everything right!

IC-290E

AVAILABLE NOW!

The IC-290E incorporates all the features you could want in a multimode 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 VFOs in simplex. Unlike many of its competitors you do have TWO VFOs 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 that you get a full two years' warranty if you purchase your transceiver direct from THANET or one of our agents listed in this advertisement.

IC-25E

AVAILABLE NOW!

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 multimode 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".

What about other new products? — well you may well ask but we won't be giving too much away just yet. But how about a 70cm version of the IC-2E and a fully automatic antenna tuner to start off with?

Buy direct from us and get two years warranty on all equipment and benefit from our superb technical experience and after-sales service

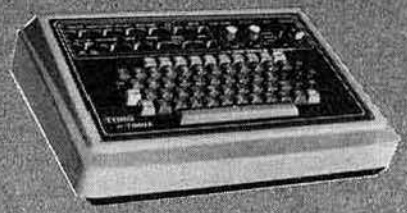
Thanet for ICOM

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

See the final page of our advertisement regarding prices.

Thanet Electronics

Tono Theta 7000E
A great computer on offer from Thanet



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 tranceiver) CW, RTTY, and ASCII — Built in 5" green display monitor. It will handle the alphabet, numerals, symbols and special codes on CW. On RTTY — 5 unit baudot (CITT 2). On ASCII the standard 7 unit code.
Speeds:— CW — 3 wpm to 50 wpm with automatic follow up. 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 at 600 ohms (usable from 8 to 1000 ohms) 30 mv. to 2 v. TTL input RTTY and ASCII, and can be used for RS232C interface. At frequency of 800 Hz ONCW with an active PLL filter.
Display output:— RF output and composite video output 1V P-P 75 ohms.
Printer interface:— Centronics compatable parallel interface built-in.
Output for oscilloscope:— RTTY and ASCII impedance 200K ohm 1V P-P.
Number of characters display:— 512 characters x 2 pages — total 1024.
Power source:— 13.8 VDC.
Complete with full size keyboard.

RECEIVE ONLY VERSION CWR 680 — £169 inc.

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 receiver sent or from recorded cassettes. Connection to the transceiver is via the key, phone and mic sockets.
Some of the Outstanding Features
COMMUNICATIONS COMPUTER THETA 0.7000E
UHF and Composite Video Output. Printer interface. Wide range of transmitting and receiving speeds 1CW speeds+ 8RTTY. Built-in demodulator for high performance for 170.425 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 mode or RTTY. CW identification function. Mark and break (space and break) system. Monitor circuit & CW practice function. Variable CW weights. Cross pattern checking output terminal. log computer output provided. Test message function (Ry and OBF). Phone or write for the price list of accessories for this unit.

Prices of other Tono quality products

All inclusive of VAT.

Green Display Monitor CRT 120G	£119.00
Dot Matrix Printer HC-900	£425.00
Printer Socket SK7	£8.50
Linear Amplifiers:—	
UC 70	£139.00
2M-50W (2m)	£65.00
2M-100W (2m)	£115.00
MR-150W (2m)	£159.00
MR-250W (2m)	£249.00
MR-28LB (26-30 mhz)	£65.00
Mast-Head Pre-Amps:—	
RX 144 (including control)	£60.00
RX 430 (and psu box)	£65.00

THE PRICES MAY BE SUBJECT TO CHANGE, DEPENDING UPON THE STATE OF THE £.

Tel: 02273 63859

PROFESSIONAL EQUIPMENT FOR THE AMATEUR

ICOM

IC-720A

IC-2KL

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. How many of its competitors have two VFOs as standard, or a memory which can be recalled, even when on a different band to the one in use, and result in instant retuning AND BANDCHANGING of the transceiver? How many include a really excellent general coverage receiver covering all the way from 100kHz to 30MHz (with provision to transmit there also if you have the correct licence)? How many need no tuning or loading whatsoever and take great care of your PA, should you have a rotten antenna, by cutting the power back to the a safe level? How many have an automatic RIT which cancels itself when then main tuning dial is moved? How many will run full power out for long periods without getting hot enough to boil an egg? How many have band data output to automatically change bands on a solid state linear AND an automatic antenna tuner unit, when you are able to add these to your station?
Well you will have to do quite a bit of hunting through the pages of this magazine to find anything to approach the IC-720-A. It may be just a little more expensive than some of the others — but when you remember just how good it is, and of course the excellent reputation for keeping their secondhand value you will see why your choice will have to be an IC-720A!

To compliment the excellent IC720A HF Transceiver, ICOM have produced the IC2KL linear amplifier. It is of a similar size and matches the IC720A perfectly. It produces 500W output on SSB, CW, AM and RTTY, needing 80—100W of drive. As with the IC720A, 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 IC720A, 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 IC720A, but can be added to the IC701 and the IC720. The IC2KL 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 use of this system enables a very compact design, for which ICOM is the leader.
This advanced design includes protection circuits against Mismatching, Overheating, Overcurrent, Overdriving, Over Output Power, and the PA units unbalancing. Its spurious emissions are more than 60 dB below peak power output and third order distortion more than 30 dB below each tone of a two tone test, could a valve linear ever be as good as this?
The IC2KL has a matching power supply the IC2KLPS delivering 40vDC at 25A continuous for 10 minutes maximum.

Thanet for ICOM

AGENTS (PHONE FIRST — All evenings and weekends only, except Barnsley and Burnley)

Scotland	Jack GM8GEC (031-665-2420)	Midlands	Tony G8AVH 021-329 2305 or 0674 3992
Wales	Tony GW3FKO (0874 2772)	North West	Gordon G3LEQ (Knutsford (0565) 4040)
Burnley	(0282 38481)		

See the final page of our advertisement regarding prices.

TWO YEARS WARRANTY ON ALL EQUIPMENT

IC-730

ICOM's answer to your HF mobile problems — the IC730. 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 band. Further convenience circuits are provided such as Noise Blanker, Vox, CW Monitor, APC and SWR Detector to name a few. Provided the IC730 is kept connected to its supply its CPU will remember your instructions — even when turned off! Built in fan keeps the finals cool and remember there is no tuning up to be done. A built-in Speech Processor boosts talk power on transmit and a switchable RF Pre-Amp is a boon on todays crowded bands. Full metering, WWV reception and connections for transverter and linear control almost completes the IC730's impressive facilities. Use this rig as a high class mobile or with a suitable 13v psu as your main base station. Give us a ring and ask for a full spec to be sent to you.

IC-202S

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 200k Hz 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 ans SO239 sockets for mobile or base station working, barefoot or a s 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 having very similar features, covering the frequency range of 432-435.2 MHz. Their versatility is well worth an enquiry.

We apologise for not quoting prices this month, this is because at the time of writing this ad. the £ seems to be going down a hole and we don't know what it's going to do. Please contact us for up to the minute prices.

IC-24G

The famous IC240 has been proved, given a face lift, and renamed the IC24G. 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 IC24G 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 output 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.

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

Thanet Electronics

ICOM

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

THIS YEAR AT CASTLE DONINGTON

HOME OF THE DONINGTON MOTOR MUSEUM

THURSDAY 29th OCTOBER
FRIDAY 30th OCTOBER
SATURDAY 31st OCTOBER

ADMISSION TO THE SHOW £1
(includes entry to the Museum)

Certain dealers will be refunding admission cost on sales over £30

FREE CAR PARK

WELCOME TO DONINGTON

In 1971, following two or three years with no national amateur radio shows, a group of concerned dealers got their heads together and formed an association with the sole aim of putting on a really representative amateur radio exhibition in the Midlands. The result was the formation of the ARRA and the first National Amateur Radio Exhibition at the Granby Halls in Leicester. Everyone now knows that the show went from strength to strength over the years, but in our tenth year it is obvious from comments received from visitors to the show that serious drawbacks arose as the attendance figures increased.
We are delighted to tell you that the show has been moved this year to a superb new site at Castle Donington. All the problems of Leicester have been overcome by the move, and you will no doubt see the wisdom and necessity for leaving Granby Halls behind us.

HOW TO GET THERE

Access to Donington Park is easy. Simply leave the M1 motorway at exit 24 (East Midlands Airport) and follow the signs to Donington Park. You need only travel about a mile and a half along quiet country roads; quite a contrast to fighting with Leicester city centre traffic.

PARKING

You remember the parking in Leicester – at Donington Park there are 2 acres of free parking right at the exhibition hall entrance. Say no more!

FACILITIES

When you pass through the plate glass doors, cross the carpeted entrance hall and enter the well lit, clean, warm halls at Donington, you will be amazed at the facilities.

FOR YOU

At Donington, all the main dealers and importers will be putting on an even bigger and better display of all the best for the Radio Amateur and Enthusiast.

The only complaint is likely to be from wives and girl-friends who may miss the stands selling dolls, balloons and souvenirs. The ARRA felt that these stands were not in keeping with Amateur Radio and, accordingly, have not allocated them space.

PLUS

Add to all this the fact that since the new exhibition is taking place at the home of the Donington Motor Museum, and the entrance charge also includes entry to the Museum, you have full and free access to one of the finest collections of historic motoring in the country.

APPEARING AT THE SHOW

Absonglen
Amateur Electronics
Amateur Radio Shop
Amsat-UK
Arrow Electronics
B. Bamber Electronics
BATC
Bredhurst Electronics
J. Birkett
C. B. Electronics
CP Developments
Datong Electronics
Electro Supplies
Eley Electronics
R. J. Finch
F. R. Gallca
Grove House Electronics
Isherwoods Electronics
International Short Wave League
Jaybeam
John's Radio
JPS
LAR Modules
Lowe Electronics
MB Radio
Micro Print
Minffordds
Modular Electronics
Newton Engraving
Packer Communications
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SMC Jack Tweedy Limited
Stephens James Limited
Strumech Limited
Taurus Electrical Services
A. H. Thacker & Sons Ltd.
Thanet Electronics
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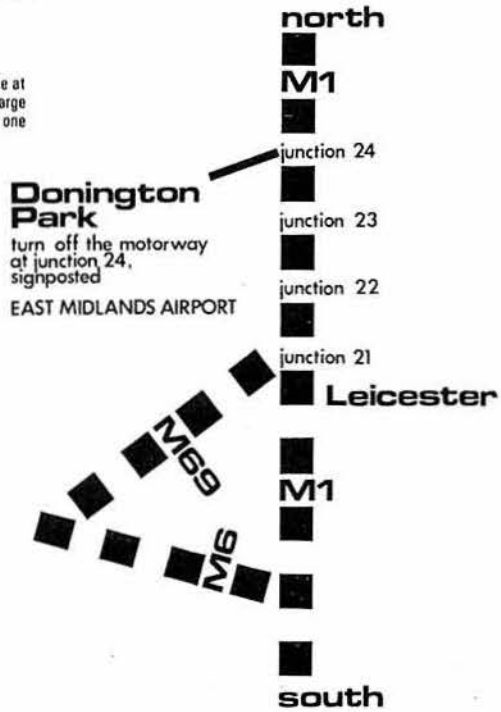
Waters & Stanton
Western Electronics
Wilson Valves



the Nunsfield House A.R.G. will provide
talk in on S22 & SU8

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 pass-band 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 £726.00 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 **£561.00** 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 **£238.00** 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 **£472.00** 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
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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.

TRIO

pacesetter in amateur radio

PB25 battery unit

MS1 mobile stand

ST2 base stand

NEW TR2500
NEW TR2500
NEW TR2500

ring for details

TRIO

pacesetter in amateur radio

Trio 8400 the new way to 70cm FM mobile, a fully synthesized 430 440MHz 10 watt output, mobile transceiver with memories, 2 separate VFO's all in a truly amazing compact package. Complete with up/down frequency shift microphone and car mounting bracket the TR8400 is the way to go. 70cm is on the move.

TR-8400 *70cm FM mobile*

£329 inc VAT. Securicor carrriage £4.50

TR-9000 The exciting TR-9000 2-metre all-mode transceiver combining the convenience of FM with long distance SSB and CW in a very compact, very affordable package. Because of its compactness the TR-9000 is ideal for mobile installation, add on its fixed station accessories and it becomes the obvious choice for your shack.

TR-9000 *2 Metre Multimode*

£372 inc VAT. Carriage by Securcior £4.50

TR-7800 Trio's remarkable TR-7800 2-metre FM mobile transceiver provides all the features you could desire for maximum operating enjoyment. Frequency selection is easier than ever, and the rig incorporates new memory development for repeater shift, priority, and scan. The TR-7800 by Trio, the only FM mobile.

TR-7800 *The Ultimate 2 Metre Mobile FM rig*

£275 inc VAT. Carriage by Securicor £4.50

LOWE ELECTRONICS Access LOWE ELECTRONICS Access LOWE ELECTRONICS Access

EMPORIUM NEWS

A page of bits and pieces – small and not so small, inexpensive and good value for money. Let's have a look at receivers: the SR9, priced at £46.00, which includes VAT. The rig does not include crystals which are available at £2.50 per channel and we have a comprehensive stock of channels available. The great thing about the SR9 is the price and the fact that it gets you onto the 2 metre listening scene quickly. You don't even have to buy crystals to start with; use the VFO position and tune the band from 144 to 146 to find out where the locals are before buying those crystals. 12 volt supply and an absolute winner.

What about the AR22, so small that it will fit in your vest pocket. What a strange term, my vest hasn't got a pocket – anyway it is very small and has to be seen to be believed. Having a frequency range of 141 to 149·995 and stepping in 5kHz steps, you will appreciate that there will be little in the amateur FM BAND that will escape your attention. The AR22 comes complete with nicads, earphone and wire antenna. An optional helical is available.

For you deep sea sailors a marine version of both the SR9 and AR22 exists. Ring us for details.

I don't know whether you have noticed it but **how about the MFO83** – a marine scanning receiver with FM BROADCAST facilities. Eight crystal controlled FM marine band channels from 156 to 162MHz, crystals available for the majority of the frequencies at £2.80 each plus 3-channel FM presets. You can set each preset position to stations within the 88 to 108 MHz range.

For the general coverage receiver fiend we have three to choose from, each giving remarkable value for money. **Starting at the SRX30D**, priced at £215.00 including VAT which is a digital readout receiver covering 200kHz to 30MHz. Just the rig for the chap starting listening to the big wide wonderful world.

Next in our range, **the Trio R1000** which you will find described in previous adverts and priced at £305.90, including VAT.

Finally, **the absolutely finest receiver we have seen for many years**, the NRD515. Words escape me! Come to Matlock and have a twiddle. Available for the NRD 515 are matching speaker and a 24-channel memory unit. For the man who has everything, the NSD515 matching transmitter should be available with a matching power supply by the time you read this. Be one of the few on the HF BANDS who can also use the same rig to listen to anyone of 24 preset stations, ranging from the "light" programme to Radio Korea broadcasting from Seoul on 7550 or 9870kHz.

To go with your shortwave receiver, we have the full range of Mizuho accessories: **the KX2 aerial tuner unit** at £29.90 – the AX1 aerial switching system at £27.03 and, finally, the APM1 audio peak and notch filter at £33.00. **Try our HF5 HF vertical** or, if you have room and the trees, a dipole using our egg insulators (small 30p each, large 45p each) and, of course, 50 ohm coax (UR43) at 30p per metre.

If you have visited Matlock you will have seen on the receiver display **an interesting device with a directive loop aerial.** The Lowe UL1000. This is now available and is priced at £39.50 including VAT. The UL1000 is a self-contained variable gain, tuned preamplifier suitable for use with various aerial systems. A particular feature of the UL1000 is the use of a high Q loop aerial for the 500kHz to 1·6MHz band.

Latest in our list of goodies is the AR740AA – **a 70cm hand-held FM transceiver** giving the full 10MHz coverage complete with repeater shift and integral tone burst. Running 3 watts or 300 milliwatts and priced at £195.

The AR740A represents an economical way of moving onto 70cm. Of course the AOR range still incorporates the AR240A and the AR245 – both 2 metre hand-helds. Regarding reliability, just ask anyone who owns one.

Still available, **and proving a great success,** is the Shimizu SS105S, the transceiver which brings back the flavour of home brew equipment. You remember spending hours drawing up circuit diagrams for highly sophisticated pieces of gear – the endless hunt for components, the time spent with the soldering iron, the holes in your trousers – the wife on her knees pulling solder from the lounge carpet. The modifying of a biscuit tin to provide a home for the assorted boards. Was your success rate better than the average? Look under your shack table. Have you tried to recoup your losses by making a sale? Hard work now all in the past, the Shimizu, a kit partially built. Twelve hours' work and a nice piece of gear for you to admire. Almost 100 per cent rate of success and a saleable item if poverty and the workhouse approach. **Enjoy the flavour of home brew equipment.** An 80 to 10 metres rig with outstanding performance on SSB, CW and with the addition boards, FM. The SS105S is available at £275.00, the noise blanker £11.50, the FM RX unit £25.00, the FM TX kit £14.00, the RX marker £15.00 and the 500Hz CW filter £23.50. Total that up, build it yourself and talk about it on the air.

Ask for our leaflet on frequency counters. On the reverse of the leaflet are our **standard range of power supplies**: the PP1305 4A at £15.00, the PP137 7A at £32.00 and the PP1310 10A at £49.50. These are firmly established as the standard power supply for your shack.

For those of you brave enough to drill a hole in the car, the Revco base and 5/8 or 1/4 wave whips are worth looking at: the Revco base £4.00, the 5/8 whip complete £5.50 and the 1/4 wave £1.50. Also in the Revco range is the well constructed magnetic base priced at £17.35.

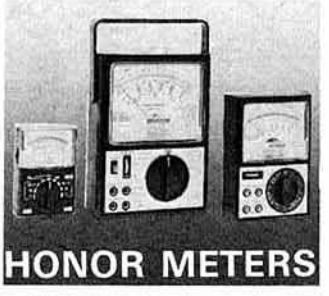
Daiwa produce a complete range of accessories, both for mobile and fixed station use. You are all familiar with the cross needle meter. The CN620A 1·8 to 150MHz at £52.81, the CN630 140 to 480MHz at £75.00 and the CN650 1·2 to 2·56GHz at £95.00.

Consider the simple SW110A – not a cross pointer but a standard single meter. Accurate and a snip at £29.90, including VAT.

For those of you who feast on gadgets, the Daiwa automatic antennae tuner is for you, 2 models: the CNA 1001A at £156.00 and the higher priced high power model at £228.00. I am sure you have not yet seen the latest addition to the Daiwa range, the CN520 cross needle meter 1·8 to 60MHz 200W/1kW at £32.50 and the CN540 50 to 150MHz 20/200W at £35.00. Both new meters ideal for car mobile operation or added facilities for your shack. Ring for details. **Of course the rotators are still going round in circles** and the infra red mike is still priced at £45.00. We now have the Daiwa external modules: the RF670 mike compressor at £38.80, the RX110 144MHz pre-amp at £26.20, the RX770 27 to 29MHz pre-amp at £24.75 and, finally, the AF306 audio filter at £31.50.

Meet the Honor family of test equipment – three models to choose from: the KRT100 with 11 ranges at £5.75, the KRT200 with 18 ranges at £10.50 and the superb KRT500 with 43 ranges at £19.50, all including VAT. Ring us and ask for details.

Finally, **take a look at the new additions to the Trio range**. The TR7730 for 2 metre mobile and the TR9500 for multi-mode operation on 70 centimetres. Both have been in my shack and the TR7730 is in my car. 25 watts, five memories and it has to be the smallest rig you have seen. Look on the opposite page at the new TR2500 hand held, ring us for details.



Please ring us for details of the items mentioned or write for a full catalogue (please include 70p in stamps to cover postage). Better still **come and see us at Matlock.**

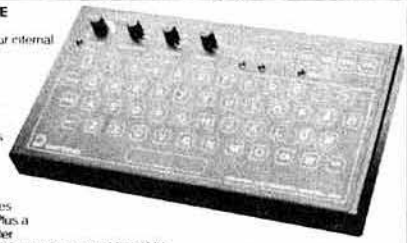
DATONG PRODUCTS

DESIGNED BY ENTHUSIASTS FOR ENTHUSIASTS!

SEE US IN HALL 3 AT THE A.R.R.A. EXHIBITION, DONINGTON PARK, 29th–31st OCTOBER

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)



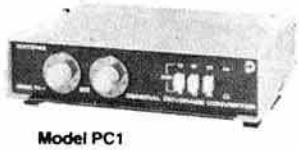
Model MK

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.

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 S0239 connectors) or as a ready built and tested PCB module.

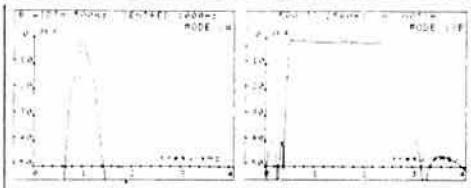
MODEL D70: THE GO-ANYWHERE MORSE CODE TRAINER

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

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

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

WATERS & STANTON ELECTRONICS

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

FDK *Better Quality Lower Prices*

EASY ORDER FORM ON PAGE 887

*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

£289 inc VAT

2M FM-SSB-CW

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.

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	99.00(2.50)
Mini-Products C4 20/15/10m vert dipole	49.50(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	90.00(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	167.90(4.50)
Jaybeam VR3 HF Vertical Triband	42.50(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.)
AM802G Base station compressor mic	59.00(n.c.)
SEM	
2m power amplifier/pre-amplifier 5/30W	50.00(1.00)
2m power amplifier/pre-amplifier 16/50W	66.70(1.50)
2m power amplifier/pre-amplifier 16/100W	126.50(1.50)
2m converter	23.00(.35)
AM601 Compressor mic.	44.00 (n.c.)
2m Auto switching pre-amplifier	21.73(.35)
70cm Auto switching pre-amplifier	24.73(.35)
2m pre-amplifier	14.95(.35)
70cm pre-amplifier	17.73(.35)
2-40MHz pre-amplifier auto switching	18.66(.35)
2-40MHz pre-amplifier	11.73(.35)
PA3 miniature 2m pre-amplifier	8.00(.35)
PA70 miniature 70cm pre-amplifier	10.00(.35)
Z Match Aerial tun unit 1·8-30MHz 500W	47.15(1.50)
EZITUNE Aerial tuning aid	30.48(.75)
IAMBIC Keyer	34.50(.75)
VHF/UHF MONITORS	
TM56B FM Scanner 4 + 12 channels	79.00(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!	240.00(n.c.)
SR9 Tuneable 144-148 or 156-162MHz	46.00(n.c.)
AR22 2m FM pocket synthesized handheld	83.00(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	13.95 (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)
AIR BAND PORTABLE MONITORS (see also VHF/UHF Monitors)	
SHARP FX213 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(n.c.)
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 balun 50Ω	11.25(.35)
3 core rotator cable. Per metre	.22(.05)
Ferrite rings 1⅛" 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

£31.95

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!

AZDEN DESK MIC

The new Azden DX-354 desk mic is purpose made for ham radio by one of Japan's foremost audio engineering companies. With its heavy die-cast metal casing, built-in variable compressor and 500-50k ohm o/p, it matches any transceiver. Our ridiculously low price makes it a must.

£29.00

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.

AZDEN MOBILE BOOM MIC

Azden's new rugged boom safety mic gives you real freedom under mobile conditions. The black anti-dazzle gooseneck boom (16") plus gear change amplifier and T/R box with remote LED indicator panel, makes it remarkable value. Smartly boxed with full instructions.

£25.95

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, Warren House, Main Road, Hockley, Essex. (E.C. Wed. 1.00 pm)

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

Goods required .....
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Please charge to credit card No. .....

AMATEUR RADIO EXCHANGE

October again, and that means Leicester Exhibition time. This year—for rather complicated, "political" reasons—there will be two shows in the month, the official A.R.R.A. one, and the independent one in the Granby Halls on 23rd, 24th and 25th October where we shall be exhibiting. For 1982 we hope that this rift in the industry will be healed and that ALL retailers will have the opportunity of showing together under one roof at the same time. Because only in that way can you, the radio enthusiast, really choose your equipment

FT-707

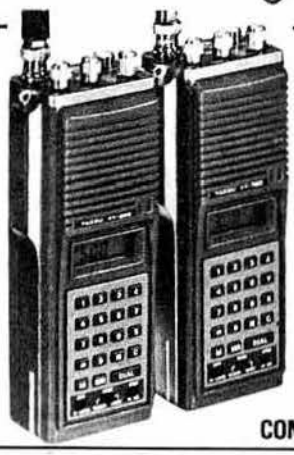
The ultimate in HF mobile transceivers from Yaesu. All the new bands, and all the latest technology.

PHONE FOR PRICE—incl. FREE ATU

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.

PHONE FOR PRICES

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

- **SST-1/SST-2** New low-priced ATUs capable of handling 200W from top to 10, from only **£19.00**
- Our popular **HELISCAN** aerial – ideal for the SWL who wants a simple-to-erect indoor antenna for good HF-band reception – now reduced to only **£9.95** (p & p £1).
- **WOOD & DOUGLAS** Full range of kits and modules always in stock.

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

Because of currency fluctuations etc., some prices are unknown as we go to press, and others may vary by publication date. Please phone for latest information.

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

AMATEUR RADIO EXCHANGE

properly, with all the makes, all the models, side by side . . . to try for yourself and decide which suits you best. But then, that's the choice we've always tried to give you at Ealing . . . at rallies up and down the country . . . and now at our new branch in St Helens too . . . the best range, and the best deal!

Brenda (G8SXY) and Bernie (G4AOG) look forward to welcoming you to their Stand at the Granby Halls.

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

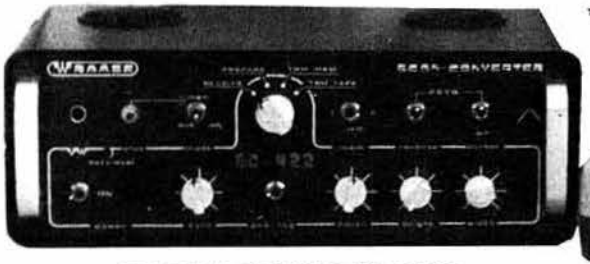
OUR PRICE £849

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!

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Our North West branch run by Mike (G8EWU)
Just around the corner from the Rugby Ground

Bredhurst electronics

BREDHURST NEWS

July 1981

Page 1

TRIO

		£	carriage
TS 830S	160 10m transceiver 9 bands	726.00	–
VFO 230	Digital VFO with memories	220.00	(2.00)
AT 230	All band ATU power meter	121.00	(2.00)
SP 230	External speaker unit	37.70	(1.50)
DFC 230	Dig. frequency remote controller	185.00	(1.50)
YK 88C	500 Hz CW filter	29.67	(0.50)
YK 88CN	270 Hz CW filter	32.66	(0.50)
TS 130S	8 band 200 W pep	547.00	–
TS 130V	8 band 20 W pep	450.00	–
VFO 120	External VFO	92.46	(1.50)
TL 120	200 W pep linear for TS 130V	139.00	(1.50)
MB 100	Mobile mount for TS 120/130	17.25	(1.50)
SP 120	Base station external speaker	26.91	(1.50)
AT 130	100 W antenna tuner	81.00	(1.50)
PS 20	A.C. power supply TS 120V/130V	48.30	(2.50)
PS 30	A.C. power supply TS 120S/130S	85.00	(5.00)
MA5	5 band mobile aerial system	86.00	(5.00)
MC 50	dual impedance desk microphone	25.76	(1.50)
MC 35S	Fist microphone 50K impedance	13.80	(0.75)
MC 30S	Fist microphone 500 ohm impedance	13.80	(0.75)
LF 30A	H. F. low pass filter 1 kW	19.30	(1.00)
TS 770E	2m/70cm all mode transceiver	785.00	–
SP 70	External speaker unit	18.63	(1.50)
TR 9000	2m synthesised multimode	371.00	–
BO 9	Base plinth for TR 9000	36.11	(1.50)
TR 7800	2m F.M. synthesised mobile 2.5W	276.00	–
TR 2300	2m F.M. synthesised portable	166.00	–
VB 2300	1 OW amplifier for TR 2300	55.43	(1.00)
MB 2	Mobile mount for TS 2300/VB 2300	17.71	(1.00)
TR 2400	2m F.M. synthesised handheld	198.00	–
ST 1	Base stand and quick charger	43.70	(1.50)
BC 5	12v quick charger	17.25	(1.00)
SC 3	Soft carrying case	11.50	(0.75)
PB 24	Spare battery pack/charger lead	15.18	(1.00)
SMC 24	Ext Speaker-Mic	13.80	(0.75)
R 1000	Gen coverage receiver	305.00	–
SP 100	External speaker unit	26.91	(1.50)
HS 4	Economy headphones	10.35	(0.75)
HS 5	Deluxe headphones	21.85	(0.75)
HC 10	Digital station world time clock	59.34	(1.50)

FDK VHF/UHF EQUIPMENT

Multi 700EX	2m F.M. synthesised mobile 2.5W	189.00	–
Multi 750E	2m synthesised multimode - mobile	289.00	–
Expander	70 cm transverter for M 750E	169.00	–

STANDARD VHF/UHF

C78	70cm FM transportable	219.95	–
CPB 78	10W Linear Amp	67.50	(1.50)
C58	2m multimode transportable	247.50	–
CPB 58E	25W Linear Amp	79.50	(1.50)
CM8	Mobile bracket	19.95	(1.00)
CL8	Soft Case	6.95	(0.75)
–	Charger	7.59	(0.75)

MORSE EQUIPMENT

HK 707	Up/Down Key	10.50	(0.50)
MK 704	Squeeze paddle	10.50	(0.50)
EK 121	Elbug	29.95	(0.50)
EKM 12	Matching side tone monitor	10.95	(0.50)
EK 150	Electronic keyer	74.00	–

POWER SUPPLIES – Overvolts current limit protection

4 Amp	Continuous 4 amp 12v P.S.U.	27.95	(1.50)
6 Amp	Continuous 6 amp 12v P.S.U.	44.95	(2.00)
12 Amp	Continuous 12 amp 12v P.S.U.	69.00	(2.50)
24 Amp	Continuous 24 amp 12v P.S.U.	99.00	(5.00)

SWR – POWER METERS

SWR 25	Twin Meter	11.50	(0.50)
SW 110A	Daiwa (1.8 – 150 MHz)	35.00	(0.75)
SP 200	Welz (1.8 – 150 MHz)	59.95	(0.75)
SP 400	Welz (130 – 500 MHz)	59.95	(0.75)
CN 620A	Daiwa (1.8 – 150 MHz) cross-pointers	52.80	–
SP 300	Welz (1.8 – 500 MHz)	79.95	–
CN 630	Daiwa (140 – 500 MHz) cross-pointers	71.00	–

MICROPHONES

MM 202S	Adonis clip on safety mic	20.95	(0.50)
MM 202HD	Adonis head band safety mic + Up/Down	29.00	(0.50)
MM 202FU	Adonis swan kneck safety mic – 1 O/P	30.00	(0.50)
AM 502	Adonis compressor mic – 1 O/P	39.00	(0.75)
AM 802	Adonis compressor mic 30/P s	£59.00	(0.75)
RM 940	Daiwa infra red link safety mic	45.00	(0.50)

YAESU

FT 101Z	160-10m 9 band transceiver (FM)	£529.00	–
FT 101ZD	160-10m 9 band transceiver (FM)	£599.00	–
DCT 101Z	12 v d.c. adaptor	34.50	(1.00)
FV 101Z	remote VFO for FT 101Z/ZD	121.90	(1.00)
FT 107M	160 – 10m 9 band transceiver	690.00	–
FV 107	remote VFO for FT 107M	92.00	(1.00)
FC 107	160 – 10m atu aerial switch p/meter	102.00	(1.00)
FP 107E	230v a.c. power supply for FT 107	106.00	(2.00)
FP 107	power supply for internal fitting	97.75	(2.00)
FTV 107(2)	transverter main frame with 2 metres	207.00	–
430 V107V901	70cm transverter card	175.00	–
SP 107P	external speaker in cabinet	57.50	(1.50)
SP 107	external speaker in cabinet	27.60	(1.50)
DMST 107	12 channel memory for FT 107	£88.00	(1.00)
CW	CW filter for FT 107	23.00	(0.50)
AM	AM filter for FT 107	23.00	(0.50)
YM 34	desk mic for FT 707/107 dual imp.	18.80	(1.50)
YM 35	500 ohm up/down mic FT 707/107	12.65	(0.75)
YM 36	500 ohm noise canceling FT 707/107	11.90	(0.75)
YM 37	500 ohm manual mic FT 707/107	6.15	(0.75)
FT 707S	80-10m 8 band transceiver – low pwr	454.00	–
FT 707	80 – 10m 8 band transceiver – high pwr	529.00	–
FP 707	230v a.c. to 12v d.c. psu for FT 707	109.00	(2.00)
FC 707	80 – 10m a.t.u. for FT 707	80.00	(1.00)
FV 707DM	Ext. digital V.F.O. for FT 707	186.00	(1.00)
MR 7	Metal rack for FT 707	14.95	(1.00)
MMB 2	Mobile mounting bracket for FT 707	16.10	(1.00)
FL 2100Z	160 – 10m 1200 watt linear	385.00	(5.00)
YH 55	8 ohm headphones	9.95	(0.50)
FF 501	Low pass filter 1 kW	22.25	(0.75)
QTR 24D	World clock (quartz)	25.70	(0.75)
FP 12	230v a.c. 12 amp D.C. power supply	78.00	(2.00)
FP 4	230v a.c. 4 amp D.C. power supply	41.00	(1.50)
FSP 1	Mobile speaker 8 ohm 6 watt	9.60	(0.75)
FRG 7	0.5 – 30 MHz communication receiver	189.00	–
FRG 7700	Latest gen cov receiver from Yaesu	309.00	–
FRG 7700M	as above but with memories	389.00	–
FT 208R	2M F.M. handheld	190.00	–
FT 290R	2M multimode transportable	229.00	–
FRT 7700	Antenna tuning unit	34.75	(1.00)
FT 480R	2M synthesised multimode	359.00	–
FP 80	Matching 230v a.c. power supply	59.00	(1.50)

ICOM

IC 2E	2M F.M. synthesised handheld	169.00	–
IC L1/2/3	Soft cases	3.50	(0.50)
IC HM 9	Speaker – microphone	12.00	(0.75)
IC BC 30	230v a.c. base charger and hod	37.00	(1.50)
IC BC 25	230v a.c. charger	4.25	(0.75)
IC CP 1	Car charging head	3.20	(0.50)
IC BP 2	6v Nicad pack for IC 2E	22.00	(1.00)
IC BP 3	9v Nicad pack for IC 2E	17.70	(1.00)
IC BP 4	Empty battery case for IC 2E	5.80	(0.75)
IC BP 5	11.5v Nicad pack for IC 2E	30.50	(1.50)
IC ML 1	10W mobile booster for IC 2E	49.00	(1.00)
IC 255E	2M F.M. sythesised mobile (25w)	255.00	–
IC 260E	2M sythesised multimode (10w)	339.00	–
IC 251E	2M multimode base station	495.00	–
IC 202S	2M SSB portable	189.00	–
IC 720A	H.F. Transceiver, gen. cov. receiver	873.00	–
IC 730	H.F. Transceiver	599.00	–
IC PS 15	20 amp power supply for IC 720	95.00	(2.50)
IC HM 10	Scanning Mic for IC 255/260	20.00	(0.75)

STATION ACCESSORIES

H1 Q	1:1 balun PL259 fitting	9.95	(0.75)
T piece	Polyprop dipole centre	1.00	(0.20)
–	Ceramic strain insulator 60mm	0.40	–
75 ohm	Light duty twin feeder (per mtr)	0.20	(0.02)
300 ohm	Ribbon (per mtr)	0.14	(0.02)
DM 801	Trio grid dip meter	51.75	(0.75)
FX 1	250 MHz wave meter	28.00	(0.75)
DRAE	130 – 450 MHz wave meter	24.95	–
HP 4A	High pass filter – TV down lead	5.95	–
TVI 30	Low pass filter – 30 MHz cut-off	5.95	(0.50)
–	Ferrite rings – top quality 1½" dia (per pair)	0.80	(0.20)
DL 20	30W Dummy Load (150 MHz)	5.00	(0.30)
DL 60	60W Dummy Load (500 MHz)	8.80	(0.50)
T 100	100W Dummy Load (500 MHz)	24.00	(0.50)
T 200	200W Dummy Load (500 MHz)	35.00	(0.50)
10 CORE	Rotator cable (per meter)	0.28	(0.20)
URM 67	Low loss 50 ohm coax	0.60	(0.20)
UR 76	50 ohm coax	0.25	(0.05)
SA 450	2 way 500 MHz coax switch	10.00	(0.50)
TA 55M	SO 239 connector magnetic mount	6.95	(0.75)

All prices correct at time of going to press.

To order any of the above items simply write, enclosing a cheque, or phone your credit card number to: Bredhurst Electronics, High St, Handcross, W. Sussex. Tel. 0444 400786

Lee Electronics Ltd

LEE

London's Leading Stockists Of:

STANDARD • YAESU • ICOM • MICROWAVE MODULES • LUNAR • SST • SHURE • HI-MOUND • CDE • TELECOMM ANTENNAE • J-BEAM • KATSUMI • ETC.

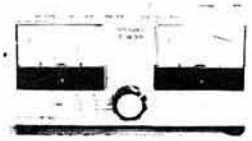
LEE

OSKER BLOCK RANGE

SWR200B swr/power meter covering 3-200MHz, 50/75 Ohm power range 3-30MHz, 20/200/2kW, VHF 2/20/200W **£49.00** inc VAT. P&P £1.00.

SWR300 swr/power meter 3-30MHz (2m and 70cm with adaptors) power range 20/200/2kW with SPC-2B 20/200W at 2m with SPC07A 2/20W at 70cm. Respective prices **£45.94, £17.49, £21.79** inc VAT. P&P £1.00.

SWRVVV meter body only, covers 144/432MHz with adaptors SPC-2B and SPC07A, **£19.95** inc VAT. P&P £1.00. Adaptors as SWR300.



T-435: VHF/UHF swr and power meter with 2/20/120 watt with N type connecters power measurement. **£34.44** inc. VAT. P&P 75p.

SWR25: This ever-popular twin SWR and power meter covers 3·5–150MHz at **£12.08** inc VAT. P&P 75p.

UH74 SWR & power meter switchable HF, 2m & 432MHz with remote head at **£16.38** inc VAT. P&P 75p.

DL30 Dummy load 25W DC-150 MHz **£6.61** inc VAT. P&P 50p.
TS80 100W Dummy load DC-150 MHz **£20.12** inc VAT. P&P £1.00.
T150 250W Dummy load DC-500 MHz **£28.50** inc VAT. P&P £1.00.
T200 200W Dummy load DC-500 MHz **£31.62** inc VAT. P&P £1.50.

POWER SUPPLIES

PX402

PM103 4·5/6/7·5/9/12V dc 500mA fully stabilised **£13.50** inc. VAT. P&P £1.00
PX402 13·8V dc 3A cont. 4A max. fully stabilised power supply with overload protection **£19.95** inc. VAT. P&P £2.00.
PH5000 13·8V dc 5A continuous 7A max. Fully stabilised **£19.95** nc. VAT. P&P £2.00.

HELICAL ANTENNAS

2m with BNC plug	£4.50
2m with P1259 plug	£4.50
2m with IC215/Standard/Trio screw	£4.25
2m with AR240 screw	£4.25

ALL PRICES INCLUDE VAT. P&P 25p

COAX SWITCHES

★ NEW SA-450 ★

High quality coax switch housed in a diecast box with SO239s

Frequency	3·5–500MHz
Weight	450gms
Max power	2·5kW
Impedance	50ohm

CT-1 Coax toggle, 3 SO239s **£6.85** inc. VAT. P&P 25p.

CT-2 Coax toggle, 2 SO239s, 1 PL259 **£6.85** inc. VAT. P&P 25p.

TS-120 Coax slide switch, 3 SO239s **£6.75** inc. VAT. P&P 25p.

ART3000C

This rotator delivers the highest performance that can be expected of the standard size rotator. The unit has disc brakes to ensure excellent stopping and handles maximum load of 250kg/550lbs. **£91.94** inc VAT.

HI-MOUND KEYERS

KH707	Straight Up/Down keyer	£10.06
BK100	Semi auto/mechanical bug	£17.88
HK702	Up/Down keyer on marble base	£22.43
MK702	Manipulator	£22.43
MK704	Squeeze paddle	£10.63
MK705	Squeeze paddle on marble base	£22.43

ALL PRICES INC. VAT. P&P 50p

ADONIS MICS

AM802 Desk mic	£59.95
AM502 Desk mic	£29.95
202S Boom mic	£20.98
202HD Headset	£28.17
202FX Swan neck	£30.48

ALL PRICES INCLUDE VAT
P&P 50p.

MK-1024

A semi- or fully-automatic squeeze keyer producing dots and dashes in the precise ratio required for perfect code. The speed is adjustable from 0-60wpm. Power inputs 110/240V AC or 9–14V DC. **£65** plus VAT. P&P £1.

EK-150

As EK-150 but with four memories each capable of storing 256 bits making a total of 1,024 bits. This can be recalled separately or in sequence for one long message. **£117.50** plus VAT. P&P £1.

KB105

80–40–20–15–10m

WITH TRAPPED RADIALS

THE UNIT IS MADE FROM THE FINEST QUALITY ALLOY FOR STRENGTH

OVERALL HEIGHT 20 FEET

COMPLETE WITH NYLON GUYS

ONLY £77.75 inc VAT

Lee Electronics Ltd

THE VERSATILE FM/USB/LSB/CW

STANDARD C58!

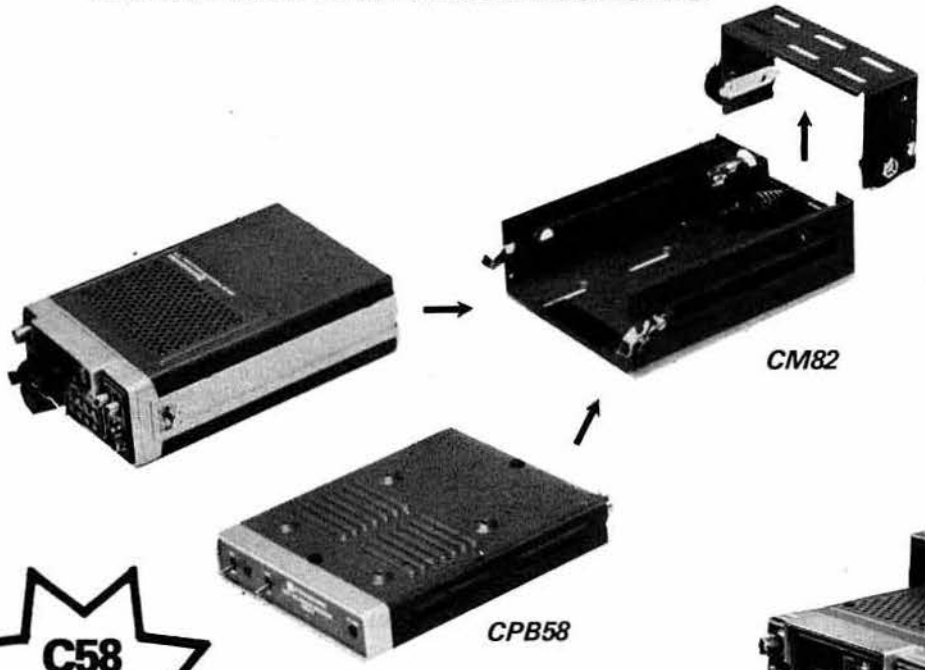
The C58 is the ultimate 2 metre transportable offering a superb performance on FM/USB/LSB & CW unequalled in any transceiver to date.
The C58's small size makes it truly a portable and when used with the CM8 mounting cradle it has all the features, and more, of a mobile multi-mode transceiver.

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



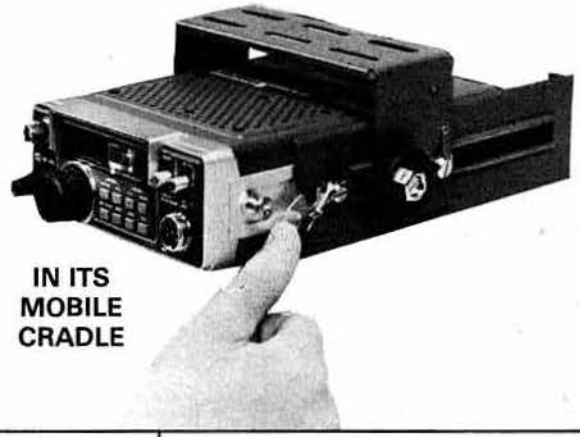
CM82

CPB58

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

AMATEUR ELECTRONICS UK

Your number one source for YAESU MUSEN

G3FIK

YAESU

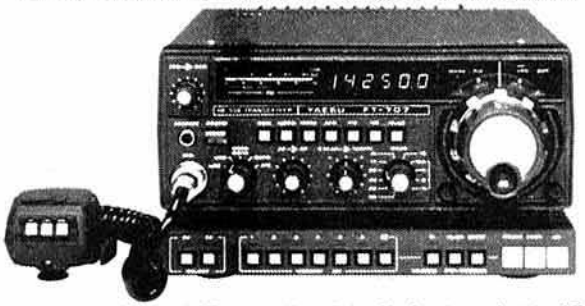
FT-101ZD Mk III

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.

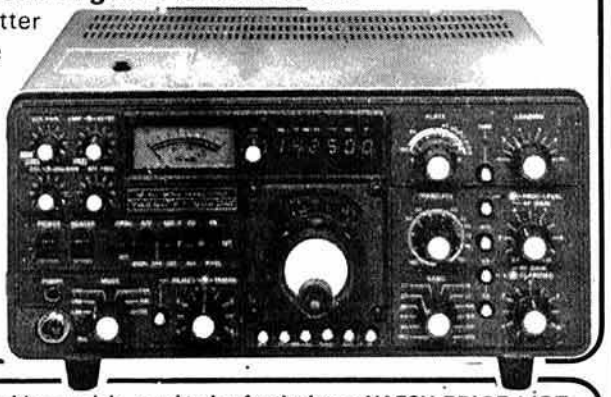
As factory appointed distributors we offer you- widest choice, largest stocks, quickest deal and fast sure service right through-

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 & 430MHz.

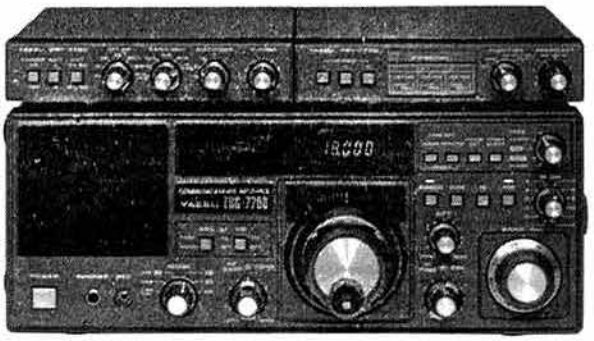


For full details of these new and exciting models, send today for the latest YAESU PRICE LIST and LEAFLETS. All you need to do to obtain the latest information about these exciting developments from the world's No. 1 manufacturer of amateur radio equipment is to send 36p in stamps and as an added bonus 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.

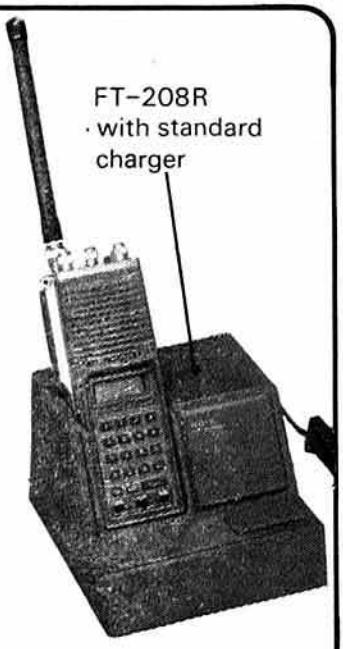
FT-708R and FT-208R
Synthesized UHF/VHF transceivers

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.

FT-708R

FT-708R with NC8 standard/quick charger/DC PSU

FT-208R



FT-208R with standard charger

AGENTS

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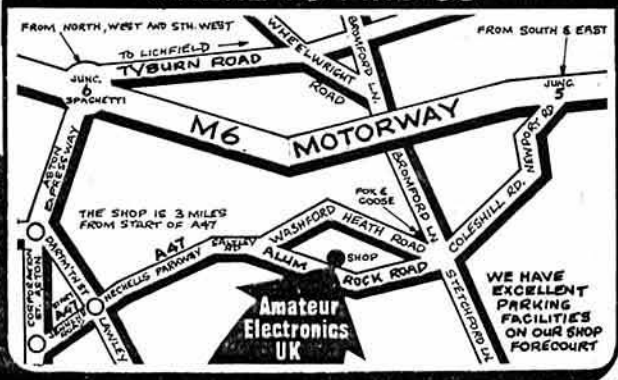
NORTH EAST – NORTH EAST AMATEUR RADIO, DARLINGTON 0325 55969
SOUTH EAST – AMATEUR ELECTRONICS, UK – KENT KEN McINNES, G3FTE, THANET (0843) 291297

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.

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, four 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 smattering of our range of accessories.

RU-12-04-06

4 AMPS+
4lbs, 7" × 5" × 3"
£15 inc.
(P&P £1.50)

RS-12-08-10

8 AMPS+
8lbs, 8¾" × 5¼" × 4¼"
£30 inc.
(P+P £1.50)

SS-12-25-35

25 AMPS
26½lbs, 12" × 8½" × 6¾"
£99 inc.
(P+P £2.00)

POWER UNITS

RU-12-04-06
4 Amp Continuous, 6 Amps Peak. Economic solution 10W mobile to home station.

RS-12-08-10
8 Amp Continuous, 10/11 Amps Peak. Foldback current limited.

SS-12-25-35
25 Amp Continuous 35 Amps Peak. Full foldback current limited.

All 240V, 50Hz units

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.

£309 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

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GI3KDR	John	Bangor	(0247) 55162
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GI3WWY	Mervyn	Tandragee	(0762) 840656
GW3TMP	Howarth	Pontybodkin	(035287) 846/324
GW8EBB	Peter	Swansea	(0792) 872525
GJICD	Geoff	Jersey	(0534) 26788
G4EQS	Simon	Redcar	(0642) 480808

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S.M.C. (Jack Tweedy) LTD
Jack Tweedy, G3ZY
150 Horncastle Road,
Woodhall Spa, Lincolnshire.
Woodhall Spa (0526) 52793
9 5 Tuesday Saturday

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	**£24.55**	MMB10	**£5.75**
NC8	**£41.40**	FNB2	**£16.10**
NC9C	**£7.65**	FL2010	**£59.75**

FT208R
£195 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	**£12.25**	NC9C	**£7.76**
FNB2	**£16.10**	FTS32	**T.B.A.**
FBA2	**£2.70**	FL7010	**T.B.A.**

FT708R
£199 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

NC3	**£39.50**	NBP9	**£16.85**
NC3A	**£42.55**	FBA1	**£2.70**
FLC2	**£20.70**	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	**£59.75**
MMB11	**£20.70**	NC1.2C	**£2.30**
NC11C	**£7.65**	SMC2.2C	**£2.70**

FT290R
£299 inc.
VAT @ 15% & POST

SAE FOR 16 PAGE ANTENNA AND MAST STOCK/PRICE LIST

SOUTH MIDLANDS COMMUNICATIONS LIMITED

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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

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Colin Thomas, G3PSM
257 Otley Road,
Leeds 16, Yorkshire.
Leeds (0532) 782326
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NEW

CHESTERFIELD
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Chesterfield (0246) 453340
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S.M.C. (Jack Tweedy) LTD
Jack Tweedy, G3ZY
150 Horncastle Road,
Woodhall Spa, Lincolnshire.
Woodhall Spa (0526) 52793
9 5 Tuesday Saturday

FT101ZDFM

- ★ 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.

4 models, Digital/Analogue—AM/FM.

FT101ZAM	£515.00 inc	SP901	£28.75 inc
FT101ZFM	£529.00 inc	FV101Z	£121.90 inc
FT101ZDAM	£585.00 inc	FV101DM	£225.00 inc
FT101ZDFM	£599.00 inc	FV901DM	£223.45 inc
FL2100Z	£385.25 inc	WMT101Z	£12.00

*Option **£599 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.

FT107M	£690.00 inc	FC107	£102.35 inc
FT107MDMS	£775.00 inc	FP107	£97.75 inc
FV107	£92.00 inc	FP107E	£106.95 inc
FTV107	£110.40 inc	Filter (crystal)	£23.00 inc
SP107	£27.60 inc	WMT107	£12.00

*Option **£690 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—lambic, 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.

FT902DM	£799.00 inc	YR901	£369.00 inc
FT902DE	£713.00 inc	YVM1	£142.60 inc
FT902D	£724.50 inc	YK901	£115.00 inc
YO901P	£302.45 inc	FTV901 (2)	£263.35 inc
FC902	£126.50 inc	WMT901	£12.00

*Option **£799 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.

FT707	£529.00 inc	*FTV707	£82.00 inc.
FT707S	£455.00 inc	70TV	£80.50 inc
FP707	£109.25 inc	144TV	£101.20 inc
FC707	£80.50 inc	430TV	£175.95 inc
FV707DM	£186.30 inc	WMT707	£10.00

*Option **£529 inc.** VAT @ 15% & SECURICOR

1·6MHz shift now available

FT780R

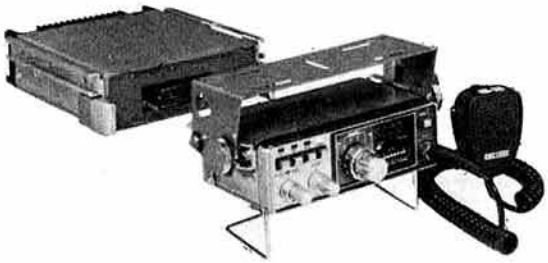
- ★ 430-434MHz (440-445) possible).
- ★ USB-LSB-CW-FM (A3J, A1, F3).
- ★ Input 30W (PEP A3J and A1/F3).
- ★ GaAs Fet RF for incredible sensitivity.
- ★ NMOS four bit micro control.
- ★ Bandwidth 2·2kHz and 14kHz @ −6dB.
- ★ "Dial set" clears unwanted non-integral steps.
- ★ Very bright blue display to 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.

£409 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.

£359 inc. VAT @ 15% & SECURICOR

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 1-1¾in masting and, like all the hardware, is Iridite treated to mil specs.

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

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

J-BEAM

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	£4.54	£0.63
HM/2M	Halo, 24in mast	-3·0dB	£5.41	£0.75
UGP/2M	Ground plane	0·0dB	£10.12	£1.73
C5/2M	Colinear omni vert	4·8dB	£44.28	£1.73
LR1/2M	Colinear	4·5dB	£24.15	£1.73
5Y/2M	Yagi 5 ele	7·8dB	£11.27	£1.73
8Y/2M	Yagi, 8 ele	9·5dB	£14.49	£1.73
10Y/2M	Long Yagi, 10 ele	11·4dB	£31.05	£1.73
14Y/2M	Long Yagi, 14 ele	13·0dB	£36.00	£1.73
D5/2M	Yagi, 5 over 5 slot	10·6dB	£20.13	£1.73
D8/2M	Yagi, 8 over 8 slot	12·3dB	£27.14	£1.73
PBM10/2M	10 ele parabeam	12·4dB	£36.80	£1.73
PBM14/2M	14 ele parabeam	13·7dB	£44.85	£1.73
Q4/2M	Quad, 4 ele	10·0dB	£23.69	£1.73
Q6/2M	Quad, 6 ele	12·0dB	£31.40	£1.73
5XY/2M	Yagi, 5 ele cross	7·8dB	£22.27	£1.73
8XY/2M	Yagi, 8 ele cross	9·5dB	£28.41	£1.73
10XY/2M	Yagi, 10 ele cross	11·3dB	£37.72	£1.73
PMH2/C	Harness, Cir. Polar		£7.48	£0.52
PMH2/2M	Harness, 2 way		£9.89	£0.86
PMH2/2ML	Hrns, 2 way long		£11.04	£1.15
PMH4/2M	Harness, 4 way		£23.12	£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

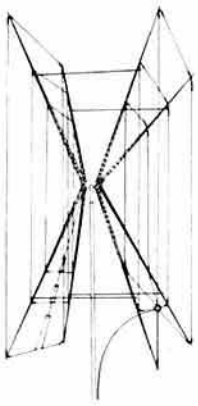
Elevation Rotator (180°).
Up to 50kg of Load.
1¼in-2¼in mast.
1¼in-1¾in boom.

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

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

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.

CB28 CB18

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
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 × 3¾"
Time Const: PEP follow 4 second

FS710 £78.20

FS500 £60.95 — PEAK READING LEVEL RESPONSE

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

FS600 £44.85 — PEAK READING LEVEL RESPONSE

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

FS300 £40.25 — LEVEL RESPONSE, LARGE METER

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

FS7 £35.65 — VHF/UHF WATTMETER & BRIDGE

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

FS711 £32.20 — REMOTE INDICATOR TYPE

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

FS5E £32.20 — INDEPENDENT TWIN METER

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

FS300M £31.05 — LEVEL RESPONSE, POWER & SWR

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

SWR3S £23.00 — WIDE RANGE POWER & SWR

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

SWR50B £23 — TWIN METER, RELATIVE POWER

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

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

SMC=HS

OMNIDIRECTIONAL VERTICAL HF, VHF, UHF ANTENNAS

HF TRAPPED VERTICAL

The SMCHF5V covers five bands, 10 to 80 metres. Only 15ft 9in high, about 1¾in 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

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WHAT?

The NEW Leicester Amateur Radio Exhibition. That's what.

WHERE?

The Granby Halls, "as usual," but with improved facilities including new catering arrangements, easier car parking and quicker admission. That's where.

WHEN?

Friday, Saturday, Sunday, 23, 24, 25 October 1981, 10am-6pm Fri/Sat, 10am-5pm Sun. That's when.

WHO?

At this independent show you will find some of the best-known retailers in the country. You will also find many specialist traders not previously invited to participate at Leicester. This way you'll have a real chance of finding the rig you want – at a keen price too – and also some of those awkward bits and pieces you're always looking for and can never track down. That's who you'll see there.

ADMISSION: £1
Refundable by certain exhibitors against purchases over £30.

BRING-AND-BUY/TALK-IN on 2m and 70cm.
Both organised by the Leicester Radio Society.

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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, GW8AAA
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

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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

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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

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

QTC
Amateur radio news

Amateur radio software sought
The RSGB is preparing a new book entitled *Amateur Radio Software* and would be interested to hear of any suitable BASIC or assembler programs. Note that distance calculation, QTH locator conversion or bearing calculation programs are not required. Please write to John Morris, G4ANB, 24 Collett Way, Grove, Wantage, Oxon OX12 0NT, giving a brief description of the program and its function. Give also the name of the programming language used and the machine on which the program was written. It is *not* necessary to send bulky printouts or cassettes until these are requested.

Radio Communication Easibinders
Easibinders for the new size *Radio Communication* are now in stock at RSGB HQ. See the mail order price list on p976 for details of price etc.

RSGB HQ to close during exhibitions
During the period of the Leicester and Castle Donington exhibitions RSGB HQ will be closed, as staff will be involved with these events. The dates of closure will be from Friday 23 to Friday 30 October inclusive.

The Amateur Radio Insurance Scheme
This membership service is clearly a great success, with over 1,300 policies issued since the launch of the insurance scheme in March. As a result of many continued requests to join the scheme a combined leaflet application is inserted in this issue.

Amateur Radio Insurance Services draw your attention to a few points: (a) Cornhill Insurance have agreed to a special free cover offer to 1 December 1981 for new applications—see insert for details; (b) theft of equipment from cars is increasing rapidly—to protect the scheme as a whole Cornhill have had to bring in an excess of 20 per cent, limited to a maximum of £75, of the value of the claim. This excess *only* applies to thefts from vehicles and not to mobile/portable equipment in any other circumstances; (c) the premium rates have been adjusted—see insert—they are now even more attractive for the higher sums insured; and (d) the extension of cover to Europe is now automatic—there is no need to advise ARIS before travelling. These changes will apply to new policies issued from 1 October 1981 and existing policies from their next annual renewal date.

Regional representatives
Council has approved the appointment of Mr P. J. Walker, G8HMG, as representative for Region 7, and Mr A. B. Givens, GM3YOR, as representative for Region 13.

Regions 5, 14 and 16
Late valid nominations for more than one candidate for the vacant posts in these regions have been received, and a ballot is therefore necessary. The candidates are:

Region 5	Region 14	Region 16
S. Platt, G6AZI	V. Kusin, GM4HCO	D. Cutts, G4FAW
G. Peck, G8CXK	R. James, GM4CXM	T. D. Howe, G3PLF
J. S. Allen, G3DOT		

Not later than 23 October, members residing in the regions concerned may vote for one candidate in the form prescribed below. Completed ballot forms, which must reach RSGB HQ by the above date, should be enclosed in a sealed envelope marked "Region – election".

FORM OF BALLOT PAPER

I, ...

being a fully-paid-up corporate member of the RSGB residing in Region .....

wish to record my vote in favour of

Mr.....

as representative for Region .....

Signed ..... Callsign or BRS No .....

Address.....

.....

RSGB PRESIDENT 1982

The RSGB Council has unanimously elected Mr Jack Anthony, BSc, MIETE, G3KQF, to be 1982 President of the Society.

Mr Anthony has been a member of the Society since 1956, and member of Council for Zone B since January 1977. He is this year's executive vice-President, and currently chairman of the Education and Membership & Representation committees, and a member of the Finance & Staff and Interference committees.

Society awards
Council has approved the following awards recommended by the Technical & Publications Committee for the year ended 30 June 1981:

The **Norman Keith Adams Prize**, for the most original article contributed to *Radio Communication*, to **S. J. Price, G4BWE**, for his article "The G4BWE speech processor" (October 1980).

The **Courtenay Price Trophy**, for outstanding technical development in the field of amateur radio, to **D. G. Smith, G3UUR**, described in *Technical Topics* (*Rad Com*, December 1980).

The **Ostermeyer Trophy**, for the most meritorious description of a piece of home-constructed radio or electronic equipment published in *Radio Communication*, to **A. L. Bailey, G3WPO**, for his article "The RX80 Mk2" (January 1981 and subsequent issues).

The **Wortly Talbot Trophy**, for outstanding experimental work in the field of amateur radio, to **J. N. Gannaway, G3YGF**, and **C. W. Suckling, G3WDG**, for the development of low-noise gasfet preamplifiers for use in moonbounce.

QSL Bureau
GM4 series. Mr J. Sey, GM8MJ, is no longer sub-manager for this series, and until a successor is appointed all envelopes for collection of cards for GM4 callsigns should be sent to GM6MD.

Raynet controllers net
A Raynet group controllers net is held on the first Sunday in each month, commencing at 8.30am, on 3,790kHz (±). The net controller is Brian Goddard, G4FRG, group controller for Avon and Somerset.

Radio Amateur Old Timers Association
The change of constitution has been welcomed very favourably by amateurs interested in reception and constructional work, and membership has increased accordingly. An attractive QSL card has been issued, and is already much sought after. Only a fixed number has been printed for G2OT's first issue, and there is no doubt these will become collectors' items as the collection craze grows.

It is hoped to commence a later ssb net and a cw and a.m. net to supplement the present 11am ssb net on 3,740kHz on Thursday mornings. This is already getting overloaded and makes no provision for members who are working at this time.

Unfortunately a sheet of the list of life members has been mislaid, and it would be appreciated if life members would contact Miss May Gadsden as early as possible so that the list could be corrected and their membership recorded.

BATC president
Mr Roger F. Appleton, chief engineer for London Weekend Television, has been installed as president of the British Amateur Television Club. He takes over from Mr R. C. Hills, G3HRH, who has been a great asset to the club during the last three years, and to whom the club extends its grateful thanks.

VERON "Day for the amateur"
VERON, the Netherlands national amateur radio society, is again organizing a "Day for the amateur" and "Amrato" exhibition to be held this year on 31 October at the RAI-Congresscentre in Amsterdam. Throughout the day, in addition to the regular events such as the nomination of the "amateur of the year", the do-it-yourself contest and the lectures, there will be a number of special amateur radio items.

For further information contact: J. Hordijk, PA0AJE, Francklaan 5, 4837 CR BREDA, Netherlands. Tel 076-653390.

RSGB LECTURE

Institution of Electrical Engineers

Savoy Place, London WC2

6pm, Friday 6 November 1981

"F-layer propagation above 30MHz during sunspot Cycle 21"

by F. M. Smith, G8KG

Buffet tea: 5.30pm

4U1ITU operation

Following a recent meeting of the International Amateur Radio Club, the following statement was issued:

"The general policy of the club, as established upon its foundation in 1961, remains that any licensed radio amateur is authorized to operate our club station according to the type of national licence held. At its meeting on 12 May 1981 the club modified the operating conditions of the club as follows:

"Potential operators shall be invited to subscribe to one of the three membership categories that are:

Annual member	Sw Fr30;
Life member	Sw Fr150;
Ambassador life member	Sw Fr500.

These membership categories shall entitle any member to operate the club station as requested. Should any of these membership categories not be convenient to prospective operators, an operating charge of Sw Fr10 shall be requested for casual operation, and an operating charge of Sw Fr30 shall be requested for contest operation whether from an individual or a group of contest operators. This charge is destined to compensate the club for normal wear and tear and maintenance of station equipment.

"It is to be understood that any operation of the club station implies that operators QSL 100 per cent for all QSOs (unless the distant station specifically requests that no QSL is needed). This rule also applies to contest operation, with the additional provision that QSL cards will be made available to contest groups at cost price. QSL cards and log sheet summaries should be prepared within two months of contest operation, and QSL cards should be sent out by the contest operators through their national bureaux, or direct when the incoming card has been received with the necessary return postage.

"4U1ITU's equipment consists of four hf stations and one vhf station. The hf stations are as follows:

Yaesu FT901DM + FL2100 linear amplifier;
Collins KWM2 + 30-L-1 linear amplifier;
Kenwood TS180S;
Kenwood TS820S + TL922 linear amplifier.
The vhf station consists of a Kenwood TS700G (+ 432MHz converter).
The antennas are at present as follows:
Fritzel FB33, three-element triband beam;
Swan TB33, three-element triband beam;
Inverted-V dipoles for 3·5 and 7MHz;
3λ/4 L-sloper for 1·8MHz.

"Authorization issued by the president, the secretary, the station manager or the station engineer to prospective operators enables visitors to enter the building and the shack at any time of the day or night. The prospective operator's signature on the authorization cards implies that the operator agrees to abide by the rules of the club relating to station operation, especially those concerning non-interference to the nearby International Red Cross Committee station."

Stolen equipment

From a vehicle near Adlington, Wigan, on 14 August: Trio TR2300, serial number 0090574; and Microwave Modules linear amplifier 144/25. Information to Wigan CID or C. P. Richardson, G8YJY, tel Horsham 3231.

From a home station on 11 July: Icom 720, serial number 2402803; Icom 240, serial number 6708947; Yaesu power unit for FT301; and Oskar swr meter. Information to B. Dunckley, G4AJD, QTHR, tel 0980 23254.

From a car near Belle Vue, Manchester: Icom 240 (with desk mic) serial number 6702415. Information to G3ZBZ, QTHR, or Manchester Police.

From a car in Hull: Icom IC215, serial number 7207064; and 5λ/8 whip and magmount. Information to G8FES, QTHR, or Humberside Police.

Sinclair Amateur Radio Users Group

This USA group is an exclusively amateur radio user group devoted to the Sinclair ZX80/81 and MicroAce microcomputers. It is almost 100 strong, and any interested amateurs in the UK and Europe are invited to write to Paul Newman, G4INP, 3 Red House Lane, Leiston, Suffolk IP16 4JZ, for information. SSTV, cw and rtty projects using the ZX80/MicroAce are in hand in the USA, and membership is free provided that postage is paid.

Home Counties Amateur Television Group

This group was formed at a meeting of local amateur television enthusiasts held at Iver, Bucks, on 22 July. Its objects are to promote the interests of amateur television, to arrange demonstrations and lectures for the public and other amateur radio organizations, and to help those who wish to become involved in this aspect of the hobby.

Meetings of the group will be held on the fourth Wednesday in the month at 8pm at the Swan Hotel, High Street, Iver. All who are interested in amateur television are invited to attend. On other Wednesdays a news net is held at 9pm on the atv calling frequency, 144·750MHz fm, when members will be pleased to answer enquiries about the group. Information can also be obtained from John Betts, G4HMG, QTHR, tel Iver (0753) 651652, or Mike Sanders, G8LES, QTHR, tel 01-398 4618.

Proposed Shell club

Malcolm Nisbet, G3OGO, is endeavouring to form an amateur radio club within the Shell Oil Company. All licensed amateurs and shortwave listeners who work for Shell anywhere in the world and who are interested in joining are asked to write to: Malcolm Nisbet, PAF/16, Shell Centre, London SE1 7NA.

Can you help?

In the first item under this heading on p807 of the September issue, the callsign of Ian Jefferson was incorrectly given as G4IXI. This should have been G4IXT. Apologies to both callsign holders for inconvenience caused.

UOSAT HANDBOOK

Britain's first amateur radio satellite, UOSAT, built at the University of Surrey, was due to be launched on 20 September, and AMSAT-UK has produced a loose-leaf technical handbook for the benefit of users of UOSAT.

On publication this handy-sized A5-format handbook contained 22 pages of technical data and operating aids for the sstv system, propagation beacon on 7, 14, 21 and 28MHz, and all the other experiments being made available to radio amateurs world-wide. As the satellite becomes fully operational, the handbook will be updated by the addition, substitution and amendment of pages, which will be free to members of AMSAT-UK.

Non-members of AMSAT-UK can obtain a copy of the handbook by sending £1.16, to cover cost and postage, to Mr R. Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ.

Looking ahead

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

10 October—Midlands VHF Convention, Wolverhampton Polytechnic.
11 October—EI/GI Convention, Ballymascanlon.
23-25 October—Amateur Radio Exhibition, Granby Halls, Leicester. Not be be confused with the ARRA exhibition to be held at Castle Donington on 29-31 October.
29-31 October—Amateur Radio Retailers Association Tenth National Amateur Radio Exhibition, Donington Park, Castle Donington, Derbyshire. **Please note change of venue.**
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.

A high-quality uhf source for microwave applications

by THE RSGB MICROWAVE COMMITTEE

Introduction

This article describes a unit to deliver a minimum of 100mW from a 12V supply, at an output frequency of 360-440MHz, using a fifth overtone crystal in a range 90-110MHz. Its output is intended for multiplication up to microwave frequencies for use as a local oscillator or transmitter, and still has a good quality note at 10GHz. It has been developed by members of the RSGB Microwave Committee from the Plessey AMETS transmitter board.

The design uses a Butler crystal oscillator, which eliminates frequency multiplier stages and gives a very-low-noise output compared with the commonly-used single-transistor circuits. This is due to the loading on the crystal being less, thus allowing a higher working Q to be realized. Leadless disc capacitors are used on a double-sided pcb for efficient decoupling, and the two amplifier stages are run in Class A, contributing to the low-noise performance and making problems with instability very unlikely. All inductors and lines are printed on the board, and only four adjustments are needed to align the unit. Provision is made for on/off keying of the output stage, or for applying fm or fsk to the oscillator. Several dozen of these boards have been built and used in a variety of microwave applications, giving excellent results.

Construction

The unit is constructed on 0·063in (1·59mm) thick double-sided copper-clad glassfibre epoxy board (dielectric constant = 5) with an earthplane on the component side of the board. The use of materials with different dielectric constants could result in incorrect resonant frequencies for the tuned circuits, and should be avoided. The circuit diagram is given in Fig 1, and the artwork for the two sides of the pcb is shown in Fig 2.

Construction is generally straightforward; the layout of components on the pcb is shown in Fig 3. It is important that the component values are adhered to, and in particular that only new, branded semiconductors are used for TR1-4. Surplus types do not usually perform satisfactorily. The earthed ends of the components are soldered to both top and bottom earthplanes, and all components should be mounted with absolute minimum lead lengths. TR2, TR3 and TR4 should be pushed right down on to the top side of the board, and the cans of TR2 and TR3 soldered to the earthplane. TR4 is fitted with a TO5 heatsink.

Care should be taken in the mounting of the 1,000pF leadless disc ceramic capacitors. They are located in slots in the pcb made by drilling several holes close together and then joining them to form a slot. This can be done quite easily using the tool shown in Fig 4, which is made by taking a junior hacksaw blade, breaking off the end with the pin through it, and cutting or filing the end to a taper. The teeth should be oriented as shown. The point is thin enough to fit into one hole at the end of the row and enable it to be opened up, and then the remaining holes can be joined up progressively. The hacksaw blade must be held quite close to the board, and used gently to start with to prevent it snapping off; if it does, it can easily be repaired by filing it to a point again. Another method is to use a 1mm drill bit in a vertical drill as a mill. Hold the drill bit in the chuck so only 3 or 4mm protrude, and move the board sideways so that the edge of the drill bit cuts the slot, joining the holes. Hold the board against a straight edge to ensure a straight slot. If the drill breaks, it can still be re-used. The edges of the slot can then be cleaned up with a flat needle file or nail file. Do not make the slot too wide, otherwise it will be difficult to solder the discs, which should be positioned and soldered exactly as shown in Fig 5. Ensure that the solder flows properly on to the metallization on the capacitors. Various "surplus" leadless discs gave trouble in this respect on some of the prototypes, and the most reliable types were found to be those made by Steatite[1] which are actually trapezoidal (coffin-shaped) rather than round. They proved extremely easy to solder in place, and are thoroughly recommended.

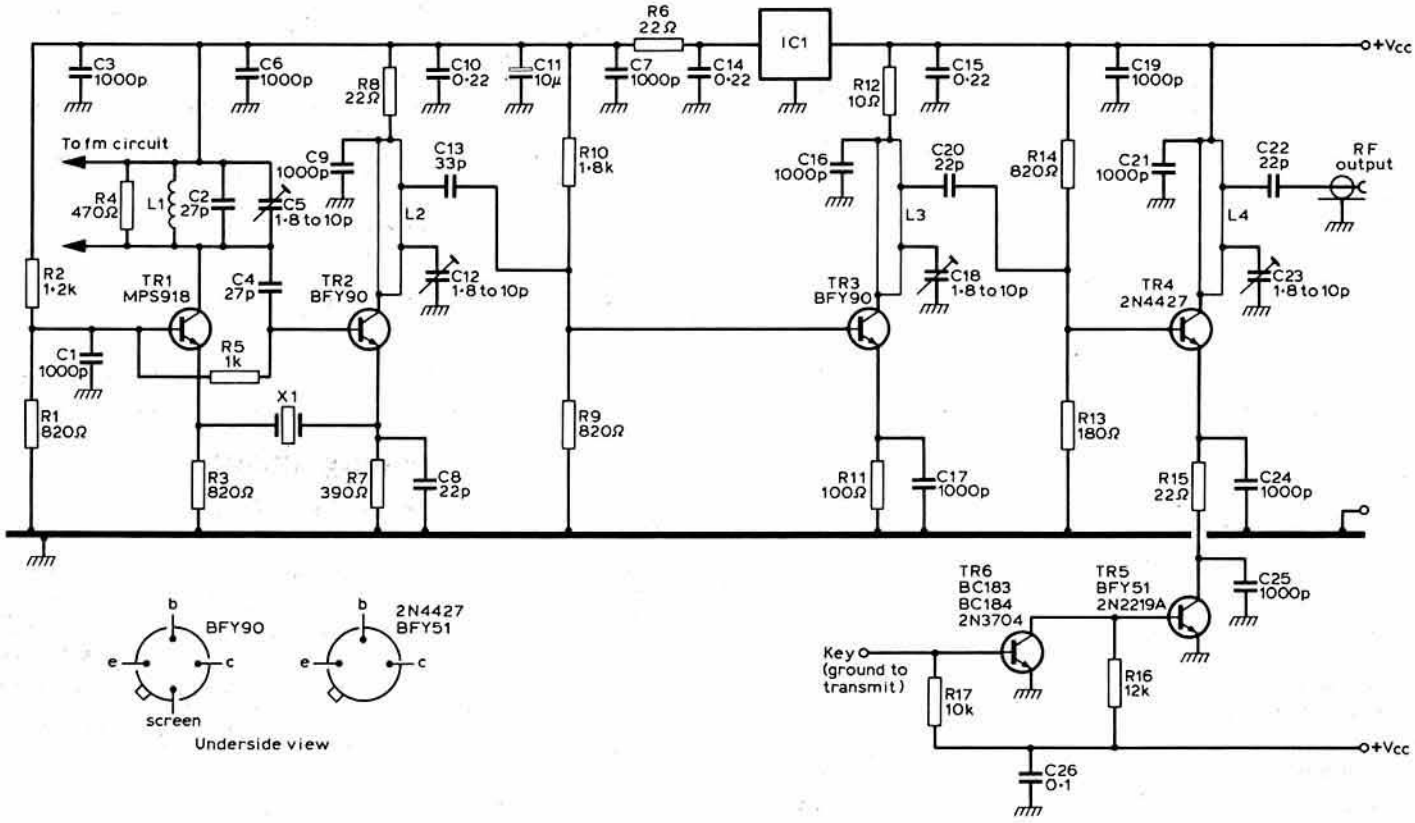


Fig 1. Circuit diagram of the board

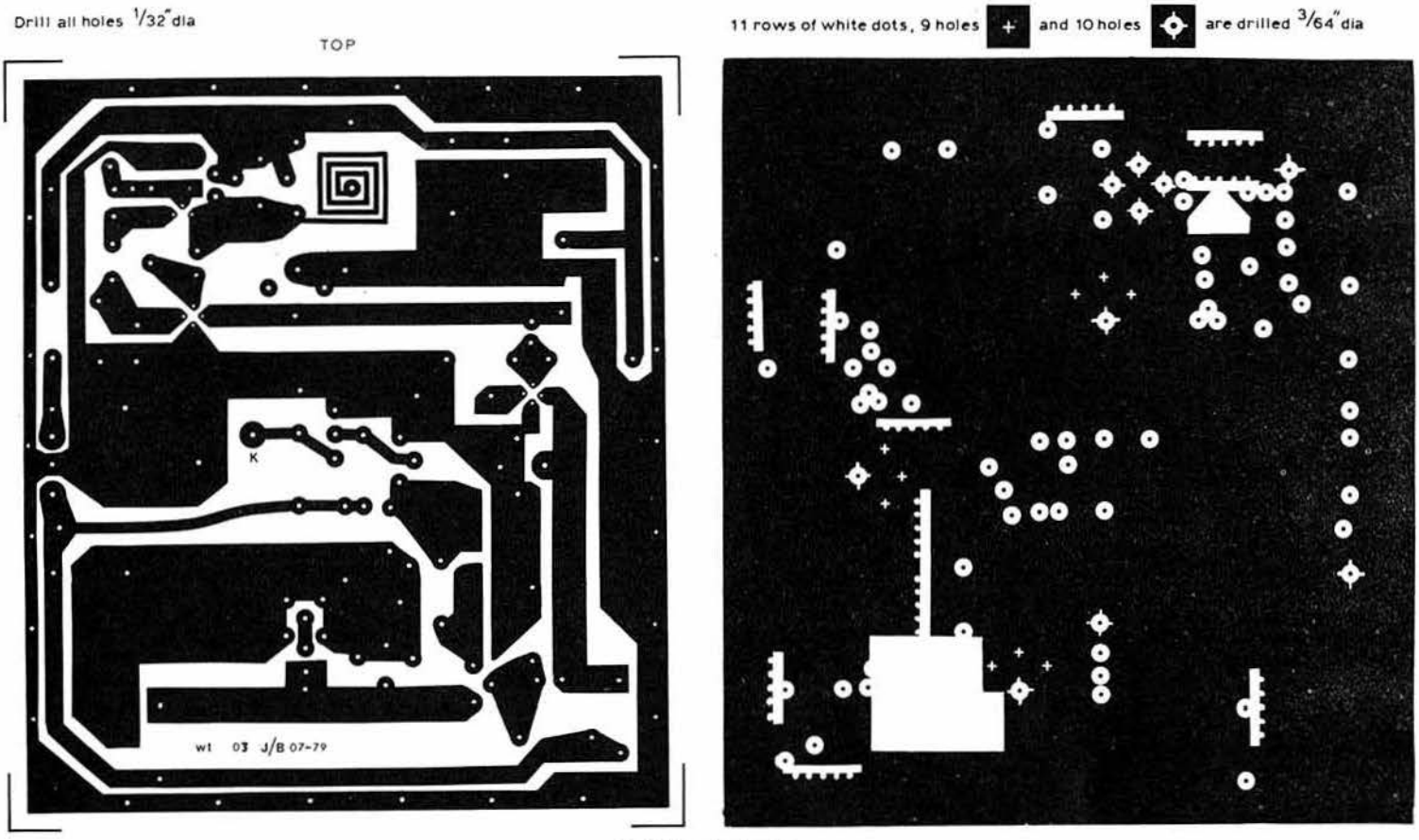


Fig 2. Board artwork

For other types, a useful technique is to heat the edge of the slot first, insert the disc, apply the soldering iron to the disc (not the board), and then apply solder to form a neat fillet. If silver-loaded solder can be obtained, then this is also worth using.

The earthplanes on both sides of the board are joined at many points by wire "worms" which are short lengths of 20–24swg wire (eg scrap component leads) soldered in all the remaining holes that are not cleared on the upper side of the board. These are located all round the edge of the board, as well as in a number of other places. It would be possible to replace the worms round the edges of the board by some thin copper foil, folded and

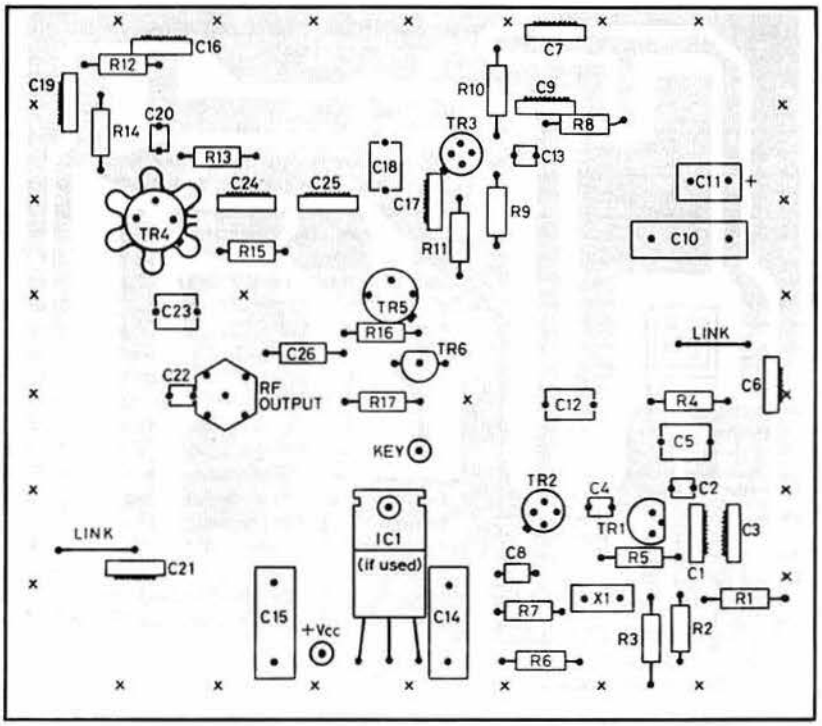


Fig 3. Component layout (x indicates worm joining top and bottom earthplanes)

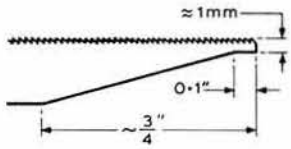


Fig 4. Slot-cutting tool

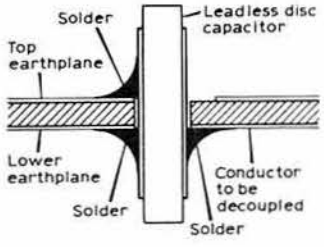


Fig 5. Soldering of leadless disc capacitors

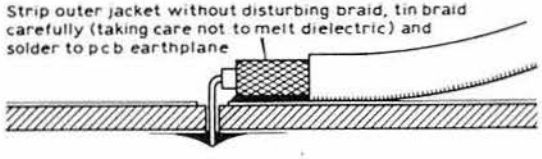


Fig 6. Soldering of output cable to board

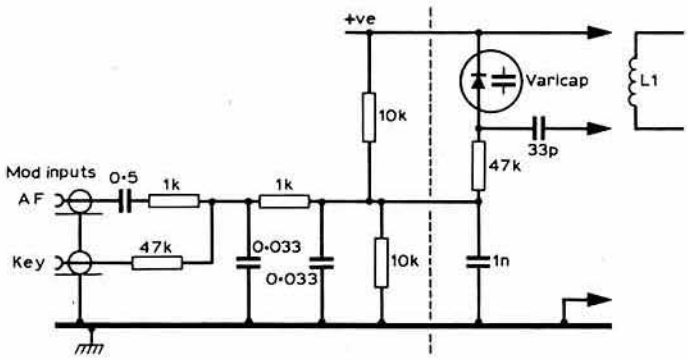


Fig 7. Network for fm/fsk modulation

soldered along the edges of the board, connecting the two earthplanes. Do not forget the two wire links on the board connecting L1 and L4 to the positive supply. Holes are provided for either the 2- or 3-pin types of trimmer capacitor, which should be mounted so that their movable vanes are connected to the earthy side of the tuned circuits to minimize stray capacitance coupling and loading effects when trimming tools are used.

The output can be taken either by small-diameter coaxial cable directly from the board, with the cable outer soldered carefully to the top earthplane (Fig 6), or from an SMB, SMC (Conhex) or SMA socket on the board.

Provision has been made on the board for a TO220 voltage regulator for the oscillator supply, which reduces the chirp on the note considerably if the board is to be A1 keyed. These regulators generally require an input voltage at least 2·5V greater than the regulated output voltage, so if a 12V one is used (eg 7812, LM34OT12), the supply to the board should be at least 14·5V. If only a 12V supply is available, as would usually be the case when operating portable, either use an 8V regulator (7808)—though this may reduce the output slightly—or omit the regulator altogether and insert a wire link between the two outermost regulator holes.

Modulation facilities

The pa stage can be on/off keyed by TR5 and TR6. However, this pulls the oscillator frequency slightly, and the keying chirp at 10GHz is unacceptable unless the oscillator voltage regulator (IC1) is used, and even then it is still noticeable. Frequency shift keying is the preferred method of keying. If the A1 keying facility is not required, TR5, TR6 and their associated components should be omitted, and the end of R15 previously connected to TR5 grounded directly.

Frequency modulation or fsk can be produced using the circuit in Fig 7 in which a varicap diode varies the capacitance across L1. The value of C2 must then be reduced to maintain the total capacitance at 27pF. The

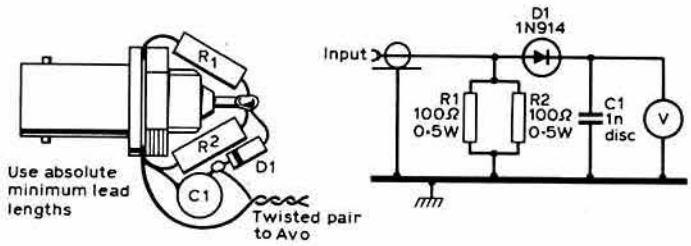


Fig 8. Construction of power meter on bnc socket

BB105B (C = 7pF at −5V) with C2 = 18pF should give a deviation of about 2kHz/V at 10GHz. Wider deviation could be obtained by using a higher capacitance diode such as the BB110G, or a hyper-abrupt type which has a larger capacitance swing, eg the Alpha DKV6520 [6].

Inputs are provided for audio at low impedance (source impedance less than 1kΩ), or cw where earthing the input shifts the carrier about 1kHz hf at 10GHz; the shift can be altered by changing the 47kΩ resistor.

The components to the right-hand side of the dotted line should be mounted directly across the tuned circuit. The rest can be mounted in place of the A1 keying circuit if this is not required, but in any case they should be mounted on the board to avoid earth loop problems. Efficient filtering is necessary on both inputs to prevent any stray af or rf noise causing unwanted sidebands on the output.

Alignment

The tuning-up procedure for this board requires the use of some form of output indicator. An hf/vhf swr meter connected to the board via a short length of coaxial cable can be used, set initially on its most sensitive range, and with a 50Ω load or resistor on its output socket. It is recommended, however, that the power meter described below is used, as it is a simple, yet remarkably accurate way of measuring power in the range 100mW to 2W, up to at least 500MHz. Constructional details are given in Fig 8.

The meter indication, V, is the peak rf voltage across the load minus the forward voltage drop across the diode. This is divided by $\sqrt{2}$ to give the rms value, and the power is calculated from this using the equation

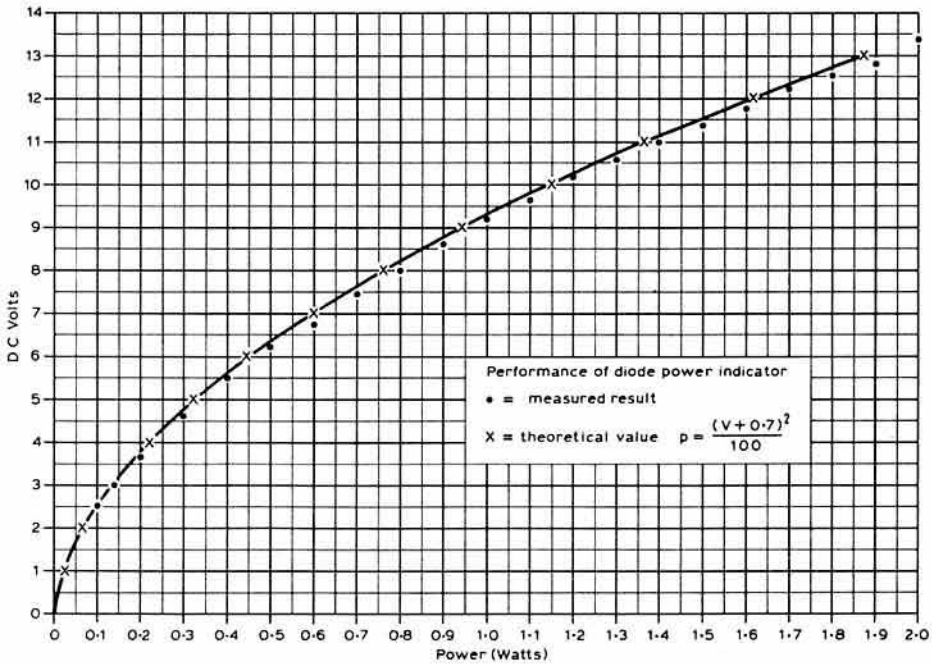
$$P = \frac{(v_{rms})^2}{R}$$

For germanium diodes, such as the OA47, the relationship will therefore be

$$P = \frac{(V + 0{\cdot}25)^2}{100}$$

while for silicon diodes, such as IN914, IN916, IN4149, it is

$$P = \frac{(V + 0{\cdot}7)^2}{100}.$$



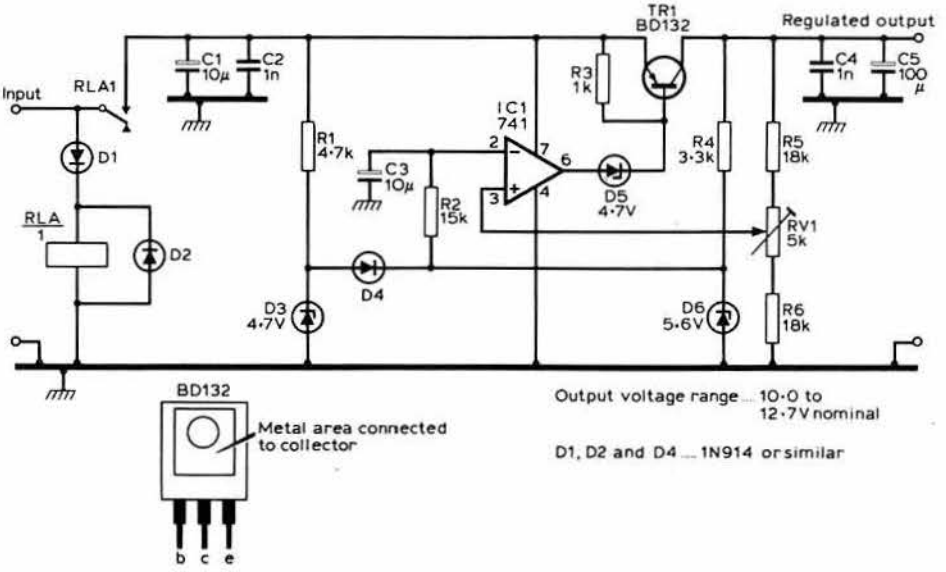
The results from this meter using a IN914 at 500MHz are compared with the actual power in Fig 9, and show the high accuracy obtainable.

Apply power to the board, and check the current drawn (approximately 150mA). For a 96MHz crystal, preset the trimmers to the following positions: C5 about 50 per cent meshed, C12 about 40 per cent meshed, C18 about 80 per cent meshed and C23 about 50 per cent meshed. Some output should be detected, and this is maximized by peaking the trimmers.

It should not be possible to tune up on the wrong frequency using the component values specified, but if in doubt check with an absorption wavemeter. The position of C5 should not be too critical as regards output power, and may be used to trim the frequency. If crystal frequencies outside the range 90–100MHz are used it may be necessary to alter the value of C2 so that as C5 is adjusted over about half its travel, the power output stays constant but the frequency

Fig 9. Power meter performance

Fig 10. Low voltage-drop regulator



pulls smoothly. If necessary the frequency can be raised slightly by putting a 5–20pF trimmer in series with the crystal, but this may reduce the power output or stability, and in general it is preferable to put up with a small frequency offset (which can be calibrated out) rather than compromise on stability.

When the board is tuned up it should produce a comfortable 100mW rf output. It may be possible to increase this slightly by optimizing certain components (eg R10, C8, C22) but if more power is needed it is preferable to add an extra stage, rather than risk detracting from the stability, low noise sidebands and reliability of the oscillator board.

Decoupling, screening and supply regulation

The board is designed to fit in an STC (ITT) 116 by 90mm diecast box (part number 46R CS00 043 A00) with the internal ribs filed away to fit. The board should be mounted, by bolts in its corners, about 5mm off the bottom of the box to avoid excessive damping of the lines by the box, and to ensure that the heatsink on TR4 does not touch the lid of the box. This, or similar screening, is recommended for best results, as any feedback from subsequent stages to the oscillator can degrade the note. Whatever type of power supply is used, it is essential to prevent any rf or af noise from reaching the board on the supply, as this can cause either a noisy carrier, or sidebands on the output, so all connections, eg supply, keying etc, must be thoroughly decoupled. A feedthrough where the leads pass through the box, with a small 10–100μH rfc outside the box, in series with the supply, should be adequate, although a Filtercon is preferable. If possible check with a wide-bandwidth oscilloscope that any voltage regulator circuits are not oscillating—possibly at quite a low level. This can occur at anywhere from audio to tens of megahertz.

The board should be earthed to the box at several places, and the lid should be screwed firmly in place, as any intermittent contact here may cause jumps in frequency. The outer conductor of the rf output should be earthed where it passes through the box, eg by mounting a socket on the box. In general the amount of effort that must be put into these precautions depends upon the factor by which the frequency is to be multiplied.

The on-board regulator, IC1, is probably only worth using if it is intended to use the A1 keying facility, or if a +15V supply is available. Without the regulator the board will operate satisfactorily from a supply as low as 11V, with little drop in output.

For best frequency stability the whole board must run from a stabilized supply, and it is desirable that this should be the same voltage whether for portable or fixed operation, so that the frequency calibration is maintained. This is particularly important when using car batteries, as their voltage varies somewhat according to the state of charge, current drawn, etc (perhaps as much as 11·5V to 16V), and the same is true of some other types of battery. The circuit shown in Fig 10 makes the oscillator well and

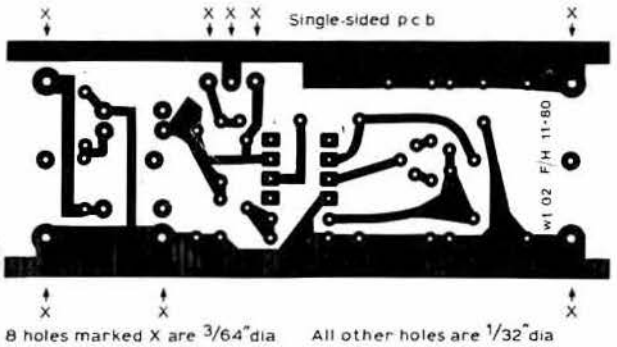


Fig 11. Board artwork for low voltage-drop regulator

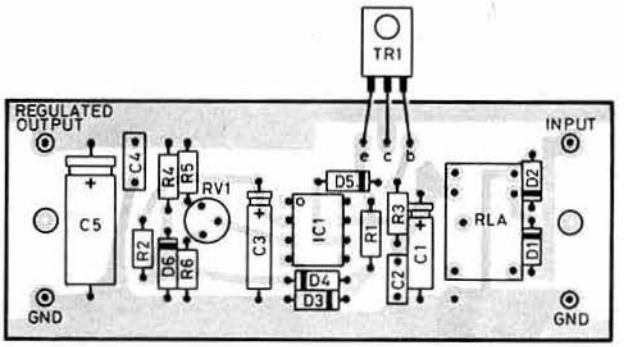
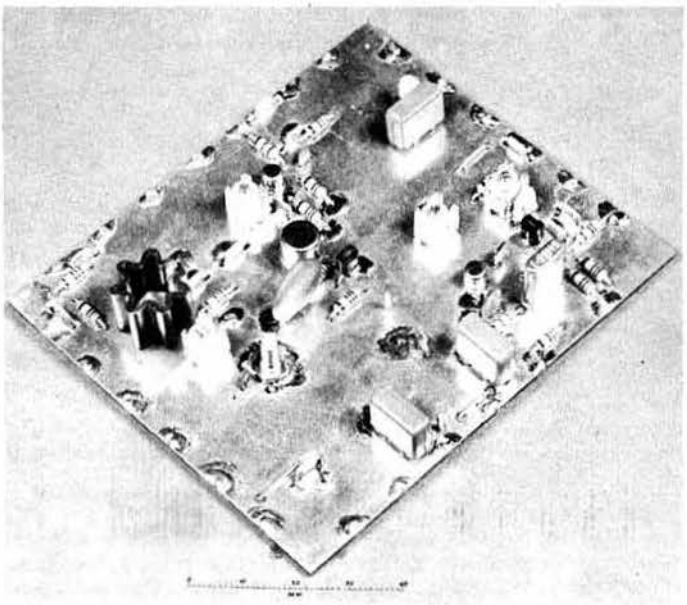


Fig 12. Component layout for low voltage-drop regulator

truly insensitive to supply voltage variations, and provides overvoltage and reverse supply protection. It will regulate down to a minimum voltage drop of approximately 300mV (governed by the Vce_{sat} of the transistor). A pcb design is given in Fig 11, and the board layout in Fig 12.

The relay used for reverse supply protection (Radiospares 348–510) is rated at 1A 28V, so this circuit can be used (and is highly recommended) for all pieces of gear that need a regulated supply up to this rating, and are likely to be used portable. RV1 sets the regulated output voltage;



The assembled board

Components list

MAIN BOARD

R1, 3, 9, 14	820Ω	R11	100Ω
R2	1·2kΩ	R12	10Ω
R4	470Ω	R13	180Ω
R5	1kΩ	R15	22Ω
R6, 8	22Ω	R16	12kΩ
R7	390Ω	R17	10kΩ
R10	1·8kΩ		

All resistors 0·25W TR4 2 per cent (Electrosil, metal oxide)

C1, 3, 6, 7, 9, 16, 17, 19, 21, 24, 25	1,000pF Leadless disc (Steatite 1,000pF/80/20 TEFK7 400V recommended)
C2, 4	27pF subminiature ceramic disc
C5, 12, 18, 23	1·8-10pF film trimmer (Mullard 809-05002 or Radiospares 125-648)
C8, 20 22	22pF subminiature ceramic disc
C10, 14, 15	0·22μF polyester
C11	10μF tantalum
C13	33pF subminiature ceramic disc
C26	0·1μF ceramic disc

TR1	MPS918	TR5	BFY51 or 2N2219A
TR2, 3	BFY90	TR6	BC183 or BC184 or 2N3704
TR4	2N4427		

IC1 (if used)	LM340T12 (National) or 7812 (Radiospares) 12V or 7808 (Radiospares) 8V
X1	HC18/U or HC25/U fifth overtone crystal
L1 to L4	Printed microstrip lines
Heatsink	TO5 (TR4)
PCB mounting socket	SMA, SMB or SMC

LOW-VOLTAGE DROP REGULATOR BOARD

R1	4·7kΩ	C1, 3	10μF 25V
R2	15kΩ	C2, 4	1nF disc
R3	1kΩ	C5	100μF 25V
R4	3·3kΩ	IC1	741
R5, 6	18kΩ	TR1	BD132
D1, 2, 4	IN914, IN916 or similar Si diode	RLA1	Radiospares 348-510
D3, 5	4·7V zener		
D6	5·6V zener		
RV1	5kΩ Cermet D (Radiospares 184 502)		

something like 11·2V is suggested as a reasonable value that will guarantee a regulated output even at the lowest supply voltages. The BD132 transistor is bolted to a suitable heatsink, with the usual insulating washer.

Performance

The following results give typical performance figures measured on the board shown in the photograph:

Supply voltage (V)	Output power (mW)
11	225
12	270
13·5	325
15 (without IC1)	350
15 (with IC1)	330

The spectrum of the output is shown in Fig 13. This varies very little with supply voltage. Unwanted products are better than 35dB down on the main carrier.

Frequency stability (at 10GHz)

Variation of frequency with supply voltage:	without IC1	— 5kHz/V
	with IC1	— <100Hz/V (once regulating)
	with regulator of Fig 10	— hardly detectable
Variation of frequency with temperature:	2kHz/°C (this depends somewhat on the crystal)	

Applications

Most of the boards that have been built so far have been used on 10GHz to provide a local oscillator for the G3JVL 10GHz transverter [2] in conjunction with the G8DEK step-recovery multiplier design [3]. Most of the comments in this article refer to measures required to give a good note at this frequency. For this application a 94·666MHz crystal is used to give an output at 378·666MHz, for a final local oscillator frequency of 10·224GHz. An output power of about 2·5W is needed, so some form of additional amplifier is required. This should not be mounted in the same box as the board.

Amplifiers that have been used with success for this include the Mullard BGY22 module (which requires an attenuator [4] at its input to reduce the power from the board to approximately 50mW) and the Wood & Douglas MD3PA. While the former is very simple and convenient, the latter has rather better spectral purity. The Mullard BGY22/BGY23 combination or the Wood & Douglas MD10PA [5] are also recommended as higher power amplifiers for transmitter-type applications.

Crystal frequencies and rf output frequencies for various applications are given in Table 1.

Table 1. RF output frequencies and crystal frequencies for various applications of the board

Application	RF output frequency (MHz)	Crystal frequency (MHz)
Microwave cw/fsk/fm tx	384	96
1·3GHz converter/transverter (144MHz i.f.)	384	96
2·3GHz converter/transverter (144MHz i.f.)	360	90
3·4GHz converter/transverter (144MHz i.f.)	368	92
5·7GHz converter/transverter (144MHz i.f.)	374·4	93·6
10GHz converter/transverter (144MHz i.f.)	378·666	94·666
24GHz converter/transverter (144MHz i.f.)	381·714	95·4286

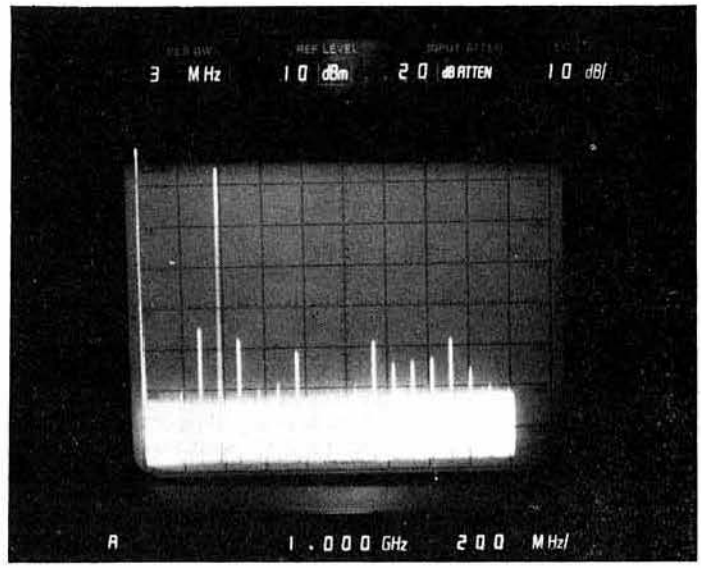


Fig 13. Spectrum of rf output. Horizontal 0·1·8GHz, 200MHz/div. Vertical: top of screen = +30dBm, 10dB/div. Analyser bandwidth = 3MHz

Conclusion

Although the board is quite simple to construct and align, there is no compromise in performance. Its versatility should eliminate all problems of building a new local oscillator strip design for each new microwave project.

References

[1] Steatite-Roederstein Ltd, Hagley House, Hagley Road, Birmingham B16 8QW. (**Note:** £50 minimum order charge. G3YGF has agreed to keep a stock of both these leadless discs and also the ready-drilled pcbs.)

[2] "G3JVL 10GHz transverter". *Rad Com* January and April 1979, pp41, 342, April 1980, pp372-5, February 1981, p146.

[3] "G8DEK BXY41E 10GHz step-recovery diode multiplier". *Rad Com* March 1976, p202.

[4] "Design and construction of simple attenuators". *Rad Com* March 1979, p239.

[5] "Equipment review—Wood & Douglas 384MHz MDO5T microwave drive source and MD10PA power amplifier kits". *Rad Com* June/July 1980, pp650-2.

[6] Alpha Industries, RMC House, Station Road, Witney, Oxon OX8 6BP. □

Feed impedance of loaded λ/4 vertical antennas and the effects of earth systems

by P. J. HORWOOD, G3FRB*

THE author was given the opportunity to make a number of measurements under field conditions of a loaded λ/4 vertical antenna with various earth systems and under different weather and soil conditions, and the results obtained form the basis of this article.

Description of system

(1) Helically wound loaded whip.
(2) Antenna base mounted on earth spike.
(3) Wire radials with insulated free ends.
(4) 50Ω coaxial feeder.

Versions of above items

(1) Antenna No	Band No	Nominal frequency limits
1	1	3·0-3·4MHz
2	1	3·0-3·4MHz
3	2	3·3-3·8MHz
4	3	3·7-4·3MHz
5	3	3·7-4·3MHz

(2) Antenna base	Description	
1	Round metal stake	Stake 50cm long
2	Angle metal stake	
2A	Tufnol stake	
3	"T" metal stake	

(3) Radials	Number of radials
25m long	2
	4
	6
	8

(4) Coaxial feeder. 30m long (electrical length approximately 0·45λ at 3MHz)

Sites	Weather conditions
Short grass	Dry and sunny
Long grass	Damp and misty
Tarmac runway on reinforced concrete	Raining

Method of measurement
Frequency scan with polar display using HP network analyser

Measurements

Twenty-one sets of measurements were made, recording resistive and reactive components of impedance with change in frequency. Figures were tabulated and transferred to a Smith Chart. Equipment and site conditions were logged for each test.

By comparing results the following points were observed:

(1) Comparison between (a) four 25m radials plus earth stake; (b) no radials but with earth stake.

Site conditions: dry grass, weather sunny.

All other conditions: four 25m radials; antenna stake No 2; feeder 30m.

	Calculated minimum vswr	R & X	Frequency (MHz)	Test No
(a)	1·3:1	1·2 − j0·2	3·634	8
(b)	2·4:1	1·75 − j0·9	3·66	7

This confirms that an earth plane has a significant effect over a dry surface.

(2) Comparison between (a) 30m feeder and (b) 60m feeder.

All other conditions similar.

	Calculated minimum vswr	R & X	Frequency (MHz)	Test No
(a)	1·5:1	0·65 ± j0	2·94	19
(b)	1·45:1	0·75 − j0·2	2·94	20

The small improvement in vswr is probably due to the extra attenuation of the reflected wave by the longer feeder. Changes in R & X are caused by the transformer effect of the longer feeder.

(3) Comparison between (a) two radials, (b) four radials and (c) eight radials.

Conditions: wet runway, insulated earth stake, 30m feeder.

	Calculated minimum vswr	R & X	Frequency (MHz)	Test No
(a)	1·1:1	1·1 ± j0	2·95	18
(b)	1·36:1	0·8 − j0·2	2·966	16
(c)	1·64:1	0·65 − j0·2	2·971	17

It would appear that two radials is the optimum condition for minimum vswr, but this is measured related to 1±j0 (50Ω non-reactive), whereas a λ/4 whip should exhibit, in theory, 37·5Ω.

When a whip is adjusted to so-called resonance using a 50Ω vswr bridge, reactance is being added to make the resultant Z equal 50Ω. Thus the difference in radials is altering the loss resistance (R_E) in series with the true radiation resistance (R_R), which is unmeasurable in its own right.

If the feeder impedance were transformed at the antenna to 37·5Ω, the transmitter would see 50Ω at 1:1 vswr. A shortened radiator is so inefficient that anything that can be done to increase the true power radiated is worthwhile. (R_R is unalterable without increasing physical length.)

While a transmitter will *tolerate* very adverse vswrs, the power supplied to the load is severely reduced by tlc action. This is because tlc imposes electrical constraints on the output and it is designed to allow maximum power into 50Ω.

The calculated maximum power available in various non-reactive vswrs and typical best figures drawn from actual measurements made during the design of a solid-state pa with tlc are as follows:

VSWR	R	W calculated	W measured at F	MHz
1·5:1	33 or 75	66	60	2
2:1	25 or 100	50	40	2
3:1	16·5 or 150	33	40	2

The results measured during the same series of tests can be reselected for minimum R & X (lowest non-reactive resistance), and demonstrate below that the eight-radial system is better, as expected.

	Calculated minimum vswr	R & X	Frequency (MHz)	Test No
(a)	1·2:1**	1·0 ± j0·2	2·956	18
(b)	1·4:1**	0·7 ± j0	2·973	16
(c)	1·65:1**	0·6 ± j0	2·977	17

**These figures were calculated in relation to R = 50Ω.

This is true only for (a). The vswr for (b) would be 1:1 for 35Ω, and the vswr for (c) would be 1:1 for 30Ω. The transformer effect of the unmatched feeder is likely to be the reason for R falling below the theoretical 37·5Ω.

Sets of results made on a different site were examined to compare the effects of two, four and eight radials (and on different frequencies) and tend to confirm that it is unwise to assume that antennas of this type should be 50Ω. It can be seen that (c) (eight radials) has a somewhat higher non-reactive R than in the previous set of measurements, due to the poorer earth conditions presented by dry grass rather than wet tarmac.

	Calculated minimum vswr	R & X	Frequency (MHz)	Test No
(a)	1·3:1**	1·2 − j0·2	3·634	8
(b)	1·05:1**	1·05 ± j0	3·637	9
(c)	1·15:1**	0·85 ± j0	3·629	10

**These figures were calculated in relation to R = 50Ω.

(4) Comparison between identical systems on different surfaces, all other conditions being similar

(a) Wet long grass with earth stake.
(b) Dry short grass with earth stake.
(c) Wet runway with no earth stake.

	Calculated minimum vswr	R & X	Frequency (MHz)	Test No
(a)	1:1**	1 ± j0	2·975	2
(b)	1·5:1**	1·2 ± j0	2·982	15
(c)	1·5:1**	0·65 ± j0	2·980	19

**These figures were calculated in relation to R = 50Ω.

At first glance result (a) appears to be ideal, but accepting the premise that the true impedance should be nearer 37·5Ω, provided a transformer were employed to transform the load at the antenna end of the feeder then (c) exhibits lower earth losses. It is thought that the metal reinforcement in

(Continued on page 913)

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Passages through the earth's shadow of AMSAT-Oscars 7 and 8 in 1981

by JÜRGEN RADDATZ, DL3ZK*

Introduction

When radio amateurs are communicating via satellite at night or in the evening they sometimes erroneously assume that, at the same time, the satellite is also orbiting in the dark (within the earth's shadow). But this is not always the case. The circulation rhythm is dependent on the rotation of the earth about its axis, but the satellite is uninfluenced by this rotation—sunset and sunrise with respect to the satellite are determined by different factors. Essentially these are: (1) height of the satellite's orbit; (2) sun declination; and (3) solar time angle.

Height of the satellite's orbit

The greater the distance of the satellite from the earth, the less it will contact the earth's shadow when orbiting around the earth. The best example of this is the moon, which enters the earth's shadow about twice a year (lunar eclipse). A low-flying satellite crosses the earth's shadow much more often.

Sun declination D_S

The equatorial plane and the satellite's orbital plane comprise a fixed angle, the inclination i (Fig 1).

Throughout the course of the year the position of the sun in relation to the equatorial plane changes, and therefore also to the satellite's orbital plane to a considerable degree as well. During the northern summer half-year the sun is north of the equator (declination D_S positive) and during the winter half-year south of it (declination D_S negative). The alteration totals $2 \times 23{\cdot}45°$ ie $46{\cdot}9°$.

The position of the earth's shadow in space changes with the position of the sun, so that different light/shadow relationships exist for the satellite in each half-year. But it must be emphasized that the light/shadow relationships of the satellite are not necessarily identical with those of the earth's surface. With sun-synchronous satellites the light/shadow relationship is precisely opposed to that of the earth's; that is to say, in winter the satellite is more sunlit than in summer.

The solar time angle Ω_S

This is the angle between the midnight meridian (shadow middle-line) and the meridian of the ascending node (EQX, Fig 1). Together with the declination of the sun it determines the spatial orientation of the satellite's orbital plane relative to the sun, and thus also the space-angles, below which the orbital plane intersects the earth's cylindrical shadow. The inclination plays an important role in this orientation, but in the course of the year it does not undergo any considerable change.

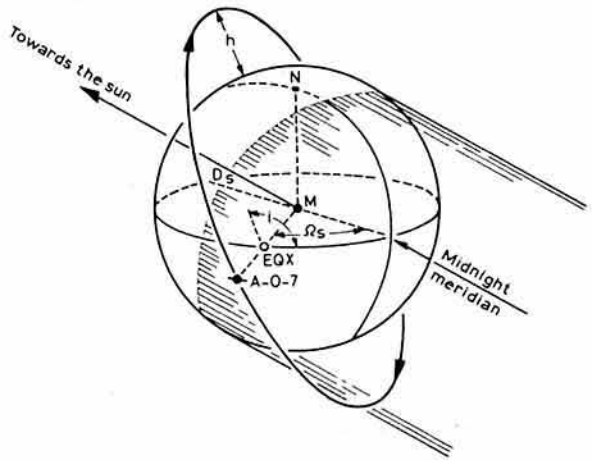

Fig 1. Simplified graphic representation of shadow relationships during the summer of the northern hemisphere

The term "solar time angle" was introduced by the author because it proved to be useful in many calculations of orbits and because it is easy to calculate. It refers to the median sun as is the case with reference to median local time.

$$\Omega_S = EQX - \left(\frac{\text{minutes of the day}}{4}\right) \qquad (1)$$

EQX in °W, with negative values adding 360°. Sun-synchronous satellites show a minimal temporal change of the solar time angle. Solar time angle Ω_S for 1981:

	A-O-7	A-O-8		A-O-7	A-O-8
January	75·8°	57·2°	July	80·3°	62·0°
February	76·5°	58·0°	August	81·1°	62·9°
March	77·3°	58·8°	September	81·8°	63·7°
April	78·0°	59·6°	October	82·6°	64·5°
May	78·8°	60·4°	November	83·4°	65·3°
June	79·5°	61·2°	December	84·1°	66·1°

The orbit of the satellite and the length of the shadow ellipse

When the satellite passes through the earth's shadow during its rotation, the place and time of its entry and exit of the shadow are calculable, but the details of these extensive calculations will not be discussed here. Dealing only with the question as to whether the satellite touches the earth's shadow on a particular day or not, the geometrical relationships of the satellite's orbit (Fig 2) will be examined.

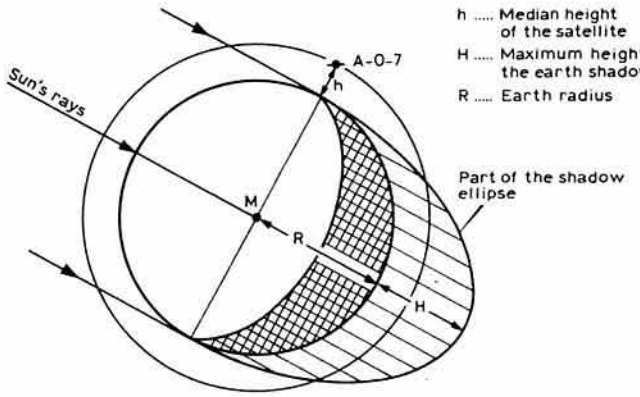

Fig 2. Shadow ellipse as the section of the cylindrical shadow in the orbit of the satellite (= paper plane)

Near earth the earth's shadow assumes a cylindrical form with the diameter of the earth. The orbit of the satellite intersects this cylinder at a certain angle, the result being an elliptical section, the shadow ellipse. Half of the longitudinal axis of this shadow ellipse is composed of the radius of the earth, R, and the maximal height of the earth's shadow above the earth's surface, H; R is known, H is calculable.

In the exceptional case of a circular satellite orbit like those of A-O-7 and A-O-8, the height of the satellite can be regarded as constant. Also, the position of the shadow ellipse inside the circular orbit is insignificant, since the height of the satellite is the same everywhere. The only important factor is the height of the shadow, H. When it is higher than the height of the satellite, h, the satellite has to pass through the earth's shadow. In doing so, it will temporarily leave the sun's illumination in a part of its orbit. If the maximum height of the shadow, H, is smaller than the height of the satellite, h, the satellite remains above the shadow and the entire orbit is illuminated.

Calculation of the height of the shadow, H

The length of the shadow ellipse and the shadow height, H, depend on the orientation of the level of the orbit with respect to the sun. This relative position changes steadily, but the change is independent of the earth's rotation about its axis. It is exclusively a function of the earth's rotation about the sun (annual rotation). It is:

$$H = \frac{R}{\sin D_S \cdot \cos i - \cos D_S \cdot \sin i \cdot \sin(\Omega_S + 180° - \Delta t)} - R \qquad (2)$$

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Table 1. Sun declination D_S and time equation on an angular scale at 0000utc for every Thursday of the year 1981

Date 1981	Sun declination (degrees)	Time equation (degrees)	Date 1981	Sun declination (degrees)	Time equation (degrees)
1 Jan	−23·02	−0·85	9 July	+22·40	−1·26
8 Jan	−22·28	−1·64	16 July	+21·42	−1·48
15 Jan	−21·17	−2·33	23 July	+20·14	−1·59
22 Jan	−19·74	−2·88	30 July	+18·59	−1·59
29 Jan	−18·01	−3·27	6 Aug	+16·79	−1·47
5 Feb	−16·01	−3·50	13 Aug	+14·76	−1·22
12 Feb	−13·79	−3·57	20 Aug	+12·55	−0·86
19 Feb	−11·38	−3·48	27 Aug	+10·17	−0·40
26 Feb	−8·83	−3·25	3 Sept	+7·67	+0·13
5 March	−6·17	−2·91	10 Sept	+5·06	+0·72
12 March	−3·44	−2·48	17 Sept	+2·38	+1·34
19 March	−0·67	−1·99	24 Sept	−0·34	+1·96
26 March	+2·08	−1·46	1 Oct	−3·06	+2·54
2 April	+4·81	−0·93	8 Oct	−5·76	+3·08
9 April	+7·46	−0·43	15 Oct	−8·40	+3·52
16 April	+10·01	+0·02	22 Oct	−10·94	+3·86
23 April	−12·43	+0·40	29 Oct	−13·35	+4·05
30 April	+14·67	+0·69	5 Nov	−15·58	+4·09
7 May	+16·73	+0·87	12 Nov	−17·61	+3·97
14 May	+18·55	+0·93	19 Nov	−19·39	+3·67
21 May	+20·12	+0·88	26 Nov	−20·88	+3·20
28 May	+21·41	+0·72	3 Dec	−22·06	+2·58
4 June	+22·39	+0·46	10 Dec	−22·88	+1·85
11 June	+23·06	+0·14	17 Dec	−23·34	+1·02
18 June	+23·40	−0·23	24 Dec	−23·42	+0·15
25 June	+23·40	−0·60	31 Dec	−23·12	−0·71
2 July	+23·06	−0·96			

H = height of the earth's shadow;
R = median radius of the earth, 6,371km;
i = inclination, A-O-7 = 101·4°, A-O-8 = 98·815° for 1981;
D_S = declination of the sun (Table 1);
Ω_S = solar time angle;
Δt = time equation (Table 1).

The derivation of this equation from the laws of spherical trigonometry cannot be discussed in this short article, but the interested reader can find this information in technical literature.

Table 1 includes the declination of the sun and the values for the angles of the time equation for every Thursday 00·00utc for 1981. The intermediate values are derived through interpolation.

The time equation shows the difference that exists between the theoretical median sun and the true sun. The earth's orbit around the sun is not exactly circular but slightly elliptical. Thus the angular velocity of the earth rotating about the sun varies somewhat. Since clocks operate at a constant speed and the time computation (utc) is co-ordinated with the median sun, differences in time and angle arise between the computed time and that indicated by the sun in the course of the year when using a circular orbit as a reference. The solar time angle is based on the median sun but the earth's shadow is produced by the true sun. That is why the time equation must be taken into consideration with shadow calculations.

Calculation of an example with AMSAT—Oscar 8

What was the height of earth's shadow in the orbit of A-O-8 on 19 February 1981? For this day the following values can be inserted into the equation: $D_S = -11·38°$; $i = 98·815°$; $\Delta t = -3·48°$; $\Omega_S = 58·1°$. The calculation shows that H = 850km. With this the maximum height of the shadow is smaller than the middle height of A-O-8 (916km). On this day the satellite orbited exclusively in sunlight without touching the earth's shadow. A further calculation shows that this was even the case from 5 February to 10 March 1981. All rotations during this period (approximately 470) took place under constant sunlight. The calculations were confirmed by the evaluation of the telemetry data. The temperature in the satellite increased considerably during this period (note the fact that lower figures of telemetry are sent with increasing temperatures).

Contacts of the shadow in 1981

The following survey shows the days on which active Oscar satellites will enter the earth's shadow period in 1981:

A-O-7
5 June–2 July
All shadow contacts take place above the southern hemisphere and are not apparent in northern latitudes.

A-O-8
(1 January)–4 February
11 March–28 September
30 October–1 December
In summer the centre of the shadow contacts are above the southern hemisphere and in November near the equator.

On all other days (1981) the two satellites continuously and exclusively orbit in sunlight during the whole rotation around the earth, and of course during the whole calendar day. Considerable changes of the above-mentioned periods are expected for 1982. A prediction for 1982 will be made by the author in December 1981. □

Feed impedence of loaded λ/4 vertical antennas and the effects of earth systems

(Continued from page 911)

the concrete beneath the tarmac runway makes a superior earth below the earth-plane radials, although no electrical connection was made to it.

(5) Length and disposition of radials
Simple comparisons were made with variation of radial length.

Conclusion. Not critical, only extreme shortening has significant effect. λ/4 at the lowest frequency is recommended. The effect of earthing the radials at the free end was not tried. In all tests the radials were laid direct on the ground, it not being possible to support them above ground for their entire length.

Comparisons were made with altering the spacing between the radials (all measurements having been made with equidistant wires).

Conclusion. As the subtended angle between pairs is reduced the results tend to equate with those of the next lowest number of wires. Recommended that equispacing be used where possible.

(6) Other conclusions
From the mass of measurement data it was possible to calculate the true impedance of the antenna and earth plane, removing the effects of the feeder. These showed that over a "good" surface R tends towards 35Ω, while over "poor" surfaces R will exceed 60Ω.

Typical 3dB bandwidth and "Q" were calculated to be two per cent of centre frequency and 100–150 respectively.

Final summary

Despite the fact that over 100 man-hours were used in making these tests, that transport of expensive test gear and portable power supplies were required, and many hours spent in analysing the results, there is still much that could be done to find answers to an apparently simple antenna problem. The author would have preferred to have made the measurements directly at the antenna, rather than at the end of the feeder—this would be difficult but not impossible, the antenna system having to be rigged above ground with the test equipment located beneath the earth plane. Even so, their presence would have affected the readings, so it is not surprising a simpler method was used.

Having plotted the results on a Smith Chart it is relatively easy to manipulate it to remove the effects of the feeder, but this requires the recalculation of the electrical length of the cable at every increment of frequency, which is highly tedious long-hand, and time and money did not warrant the use of a computer to convert the many hundreds of individual results. Some were calculated the hard way to find the true impedances mentioned above.

The author would like to make similar tests over various vehicle bodies, and wonders how may "facts" read and believed in antenna handbooks are based on factual measurements and not scaled from vhf models where a good earth plane is readily available. Certainly the hf mobile user of today's solid-state transceivers should pay more attention to vswr and true antenna impedance than he does if he wants to radiate more power from his already sorely inefficient antenna, unless he is prepared to accept the loss in power produced by his 2:1 vswr.

The attention of readers is directed to a commercially available variable antenna transformer which has proved useful in vehicle installations, the author having no business connections with the manufacturers. He does, however, wish to thank Decca Communications Ltd for permission to publish the basic measurements and on whose behalf they were made. □

The RX80 Mk2

A 3·0–4·0MHz ssb/cw receiver and tunable i.f. for a complete hf receiver

(Part 7)

by A. L. BAILEY, G3WPO*

THE FM80 I.F. MODULE

Introduction

This is the final module in this series required to complete the receiver as described in the previous six parts of the series. It provides an fm demodulation facility and is a self-contained module with its own i.f. amplifier (455kHz), filter, discriminator, S-meter drive and squelch circuit, on a small pcb housed in a screening enclosure. Input is taken from the 455kHz mixer output on the RX80 i.f., after slight circuit modifications.

The module will also function with any receiver having access to its 455kHz output stage, prior to any i.f. filtering. The output can either be fed back to the receiver's audio stage, or a separate af amplifier built for this module.

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Circuit description (Fig 48)

The heart of the FM80 is a Motorola MC3357P ic specifically designed for nbfm use. This contains a conversion oscillator (for 10·7MHz to 455kHz applications), double balanced mixer, limiting amplifier, quadrature detector, active filter, squelch, scan control and mute switch functions in one 16-pin package. Current consumption is 5mA maximum.

In this application the oscillator and mixer are not used, as no down conversion is required, neither is the scan output, although this is available at pin 13, which is low when no signal is being received, and 0·5V below supply voltage on receipt of a signal, and could be used if such an application was required.

Input to the module is via C1 to pin 16, and is taken from the output of T3 on the RX80 i.f. mixer stage. Due to the fact that the existing ssb filter is also connected to this point, it is necessary to modify the original pcb to enable the filter to be electronically isolated when the fm i.f. is selected. If this is not done, considerable distortion of the audio will result on fm due to the bandpass action of the ssb filter still in circuit. Fig 49 gives the circuit of the modification, which is carried out on the underside of the pcb. R38 is normally connected to +12V, allowing the two switching diodes to conduct, when signals will pass through the filter normally. When the bias voltage is removed, the diodes present a high impedance to signals, and the ssb filter is isolated from T3. The choke provides the dc

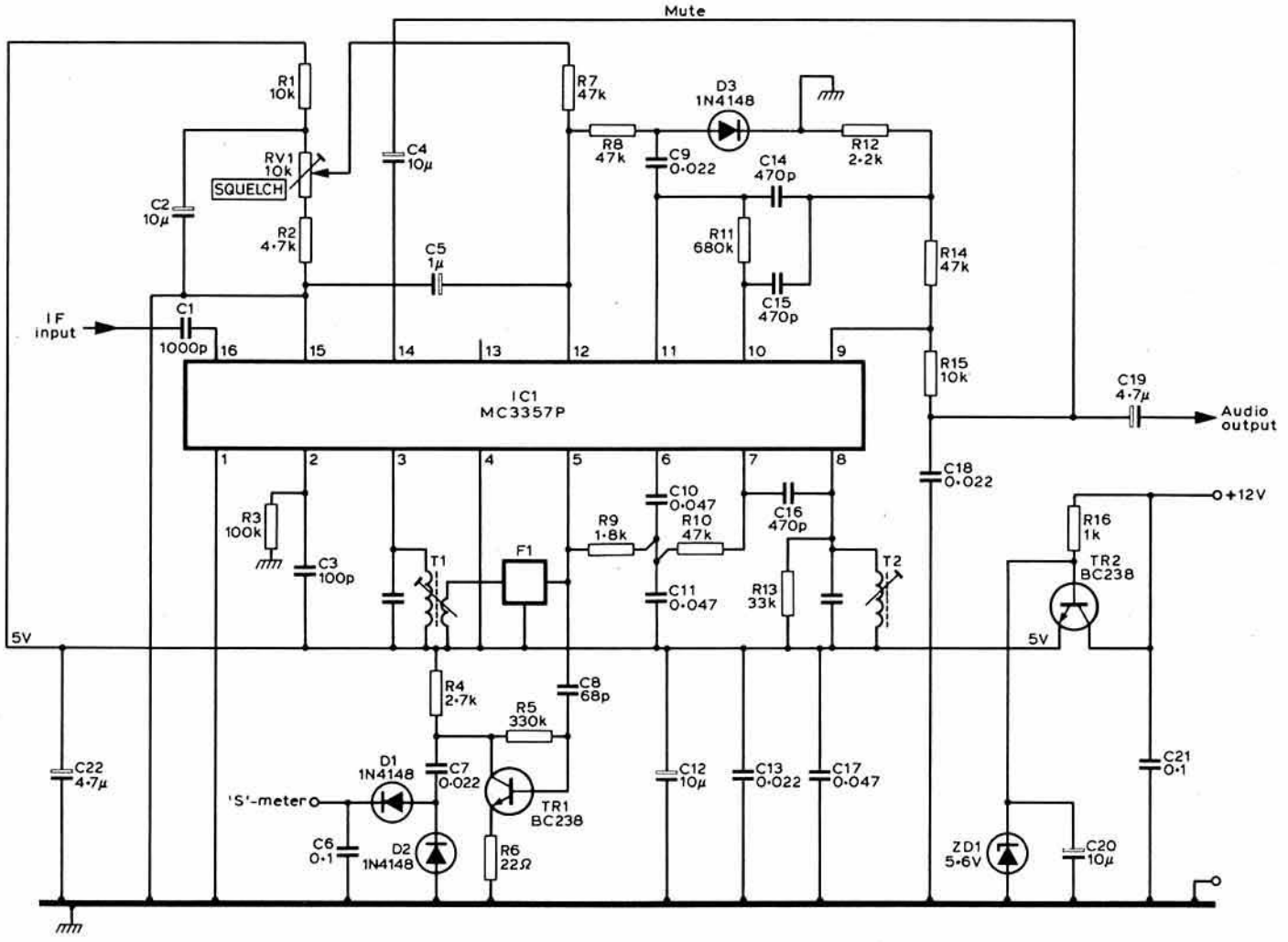


Fig 48. FM i.f. circuit diagram

return for D9. The connection to the fm i.f. input is left permanently connected to the RX80 i.f.

The fm filter (F1) is a ceramic block filter with a −6dB bandwidth of 8kHz, about the minimum that can be used in this application. T1 provides matching of the filter input impedance to pin 3 of IC1.

After filtering, the signal passes to a five-stage limiter at pin 5, the output of which (pin 7) drives a multiplier, both internally, directly and externally through the quadrature coil (T2) to detect the fm. The output at pin 7 is also used to supply dc feedback to pin 5 with the other side of the first limiter stage decoupled to pin 6. The recovered audio is available at pin 9 and passed to the RX80 i.f. volume control via C19.

A simple inverting op-amp (pins 10, 11) is provided with a filter network to detect and rectify noise above the normal audio band to drive the squelch circuit.

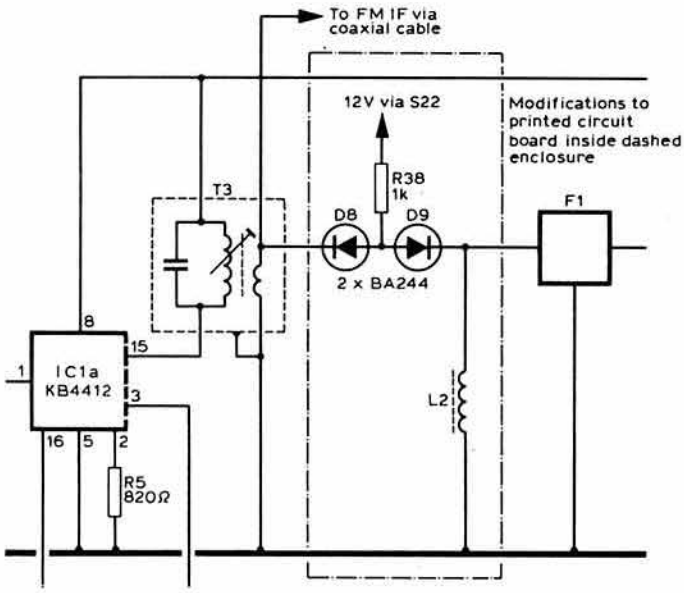


Fig 49. Modifications to switch RX80 i.f. filter out of circuit

An external positive bias (R1, 2, RV1) at pin 12 sets up the squelch trigger circuit such that pin 13 is low, and the audio mute circuit (pin 14) is open circuit. If pin 12 is pulled down to 0·7V by the output of the noise detector (which has a negative output), pin 14 is internally shorted to ground. Pin 12 has about 100mV of hysteresis to prevent jitter, with C5 further helping to minimize chatter on weak or fluttery signals. The audio is muted by connecting pin 14 to the audio output via C4. The squelch setting is preset with RV1 on the pcb, but an external control could be fitted if required by removing RV1 and extending the leads to a front panel control. Alternatively, the "unmute" connection can be taken to one of the switches on the front panel (the attenuator switch is available if the rf gain control has been modified as suggested) and arranged to be switched to earth when selected.

Power for the ic is derived from a simple series stabilizer, TR2/ZD1 and associated components at 5V. The +12V input to the module is switched as required by S22 on the front panel.

An output to drive the S-meter is available from TR1 which rectifies the signal voltage appearing at the output of the filter. Due to the difference in operation between this and the RX80 i.f. S-meter, the connections have to be switched via S22. With the component values shown, the fs of the meter should be approximately correct, although the output is linearly related to the signal and really only useful for comparative readings, and tuning. If the reading is too high, a small preset should be wired in series with the output for fsd adjustment.

Construction

Figs 50 and 51 show the pcb and drilling detail. With this particular module, it is not recommended that the tracks are reproduced with a pen due to the close spacing of many of the tracks. As with all the RX80 modules, the pcb and components are available from one source if required.

The construction follows the lines of previous boards. Note that miniature capacitors are essential in most positions due to the close spacing, and that most of the resistors mount vertically.

1. Solder the four connection pins into place, then the ic socket with its notch agreeing with Fig 52.
2. Solder in all the resistors, including RV1, working from the edges of the ic socket outwards to aid positioning.
3. Solder in all capacitors, watching polarity if appropriate, followed by the diodes and transistors.
4. Carefully solder the two transformers into place, taking great care not to bridge any adjacent pins with T1.

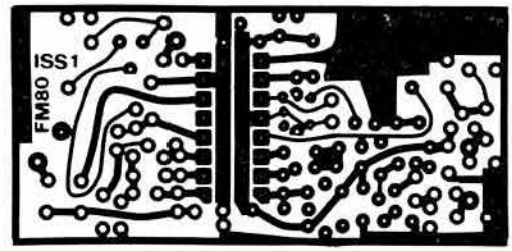


Fig 50. FM80 i.f. module pcb

5. Solder F1 into place, and insert IC1 into its socket with the notch agreeing with the socket.
6. Drill the two extra holes for the feedthrough capacitors on the long side of the enclosure, and solder all four feedthrough capacitors into place using a hot soldering iron. The two on the short side of the case go in the two central holes.
7. Insert the pcb into the enclosure from the bottom until it rests against the punched ridges, and solder the track along the edges of the pcb to the case in several places.

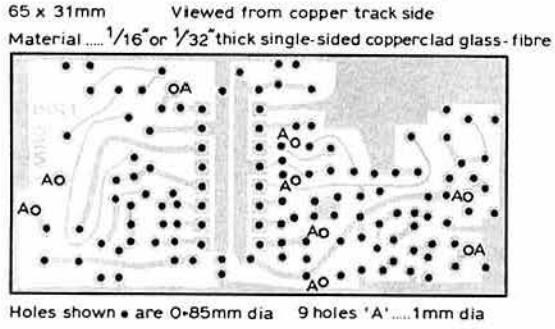


Fig 51. PCB drilling details

8. Solder the two feedthrough capacitors on the short side of the case direct to the pins, and the other two via insulated wire links.
9. Check for solder bridges etc.

Before the module can be checked, the modifications to the RX80 i.f. will have to be made. Fig 53 is mainly self-explanatory. The feedthrough capacitor required for the bias connection is already present on the enclosure, as is the hole for the exit of the miniature coaxial cable to the fm i.f. When drilling the two extra holes in the RX80 pcb, be very careful not

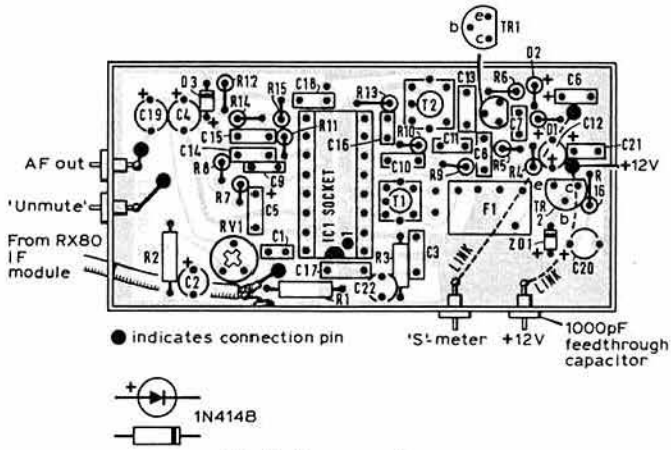


Fig 52. Component layout

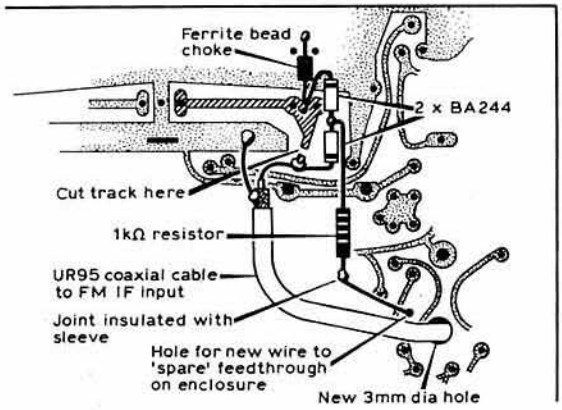


Fig 53. Modifications to RX80 pcb for fm i.f., viewed from track side

to drill through the tracks! The extra components must be situated so that they do not short against any of the pcb tracks, and a length of sleeving should be used as indicated.

When the modifications have been carried out, wire the spare feedthrough capacitor to S22 together with the +12V switched connection, and check that with the fm option not selected the receiver functions normally—selecting the fm button should remove all audio output. (Do not forget to make the switch modification to the cio if this was not done originally—Figs 20, 21). If all is OK, wire up the remaining connections as in Fig 54, with a screened lead from the audio output paralleled with the existing connections to the af gain control.

Alignment

With no antenna connected, and the 144MHz converter in circuit, select fm and peak T2 for maximum noise. Connect the antenna and find an fm signal. Peak T1 for maximum S-meter reading, then adjust T2 for best audio quality, making sure that the signal is correctly tuned to the centre of the filter passband.

With no signal being received, adjust RV1 until the squelch quietens the receiver output, and to a level which suits you with regard to minimum signal strength.

Final comments

The author would like to thank all those people who have made comments on the series (usually constructive) and have taken the trouble to write just to say thank you (even from Japan!) or with specific queries. At the time of writing, there are known to be at least 200 RX80s under construction, with few problems having been reported. If anyone has problems or comments/suggestions for improvements please do not hesitate to contact the author—any worthwhile suggestions will be published.

Details of further additions to the system will be published as they become available—a small antenna tuning unit for this or any other receiver will appear as a further article, together with an a.m. i.f. module as an alternative to the fm module for those who require this facility. A synthesized front end is planned to provide general coverage facilities, but this is a little way off at present.

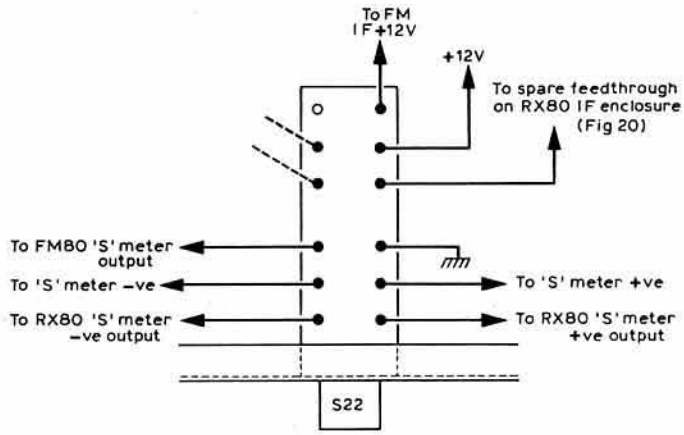


Fig 54. Additional connections to S22 for FM80 i.f.

FM80 components list

R1, 15	10kΩ	C1	1,000pF
R2	4·7Ω	C2, 4, 12, 20	10μF 6V min
R3	100kΩ	C3	100pF ceramic
R4	2·7kΩ	C5	1μF 6V min
R5	330kΩ	C6, 21	0·1μF 15V min
R6	22kΩ	C7, 9, 13, 18	0·022μF ceramic
R7, 8, 10, 14	47kΩ	C8	68pF ceramic
R9	1·8kΩ	C10, 11, 17	0·047μF ceramic
R11	680kΩ	C14, 15, 16	470pF ceramic
R12	2·2kΩ	C19, 22	4·7μF 6V min
R13	33kΩ		
R16	1kΩ		

All capacitors must be miniature types suitable for vertical mounting.

All resistors are 0·25W 5% carbon film

IC1	MC3357P/MPS5701
TR1, 2	BC238
D1-3	1N4148, 1N914 etc
ZD1	5·6V 400mW
F1	NTK LFH 8S Murata CFW 455F
T1	Toko 5MCO184
T2	Toko LMC4200/4201

Also required:
Four 0·1in pcb connection pins
One 16-pin dil socket
Four 1,000pF solder-in feedthrough capacitors
One screening case
Miniature coaxial cable (UR95 or similar)

Components for RX80 i.f. modification

R38	1kΩ
D8, 9	BA244
L2	15 turns 0·25mm (33swg) Cu wire through FX1115 ferrite bead.

All of the above components and the pcb are available from Ambit International. The RX80 modification components come with the FM80 kit. Please enclose an sae with all enquiries.

There are a number of small corrections which have been pointed out over the past few months and these are summarized below, together with a few suggestions on specific problems that have been experienced. Note that the kits are always supplied with latest corrections and documented modifications where improvements have been implemented.

CORRECTIONS

Part 2, CV80 hf converters (February 1981)

(a) Note the revised pcb and layout for the converters published in pages 520-1, June issue.

(b) C24 on the circuit diagram is not actually connected to the tune line, as shown in the circuit diagram, but to R1 instead. This leaves the tune line with no decoupling—this appears to cause no difficulties but can be added on the underside of the pcb if required.

Part 3, ST80 vfo stabilizer case wiring (March 1981)

(a) The two 22MΩ resistors can be replaced by a single 47MΩ resistor with the unused resistor holes shorted out by one of the 47MΩ resistor leads.

(b) The connection to the switchbank for the coaxial lead to the paralleled converter antenna inputs was inadvertently omitted. It is shown in Fig 55 here.

(c) A few people have commented that the holes in the metalwork as supplied do not match the pcb mounting holes. This was due to a slight error in the reduction of the 2:1 artwork for the pcb to below actual size and was rectified as soon as discovered. The boards as published are correct.

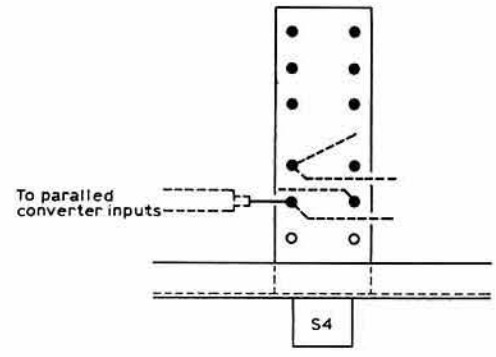


Fig 55. Missing connection to S4 (see Fig 21)

Part 6, CV2 144MHz converter (July 1981)

As shown wired, when the receiver is selected for 144MHz, there is no control whatsoever over the rf gain, which is continually at maximum. This was an oversight on the author's part. Two solutions are possible:

(a) Rewire the attenuator so that it is in circuit after the CV80 converters, and not before. This will allow control of the signal to the RX80 i.f., but not prior to the converters.

(b) Leave the circuit as at present and use another AT80 attenuator module after the output of the 144MHz converter or a fixed attenuator (resistive), selected by a front panel switch if this is adequate for your needs.

OTHER SUGGESTIONS

RX80 i.f. audio

With the pcb wired into the enclosure suggested, there is a tendency for the af amplifier to become unstable due to the feedthrough capacitor connection. This can be cured by wiring a 2·2mH choke (TOKO 7BA type) between the feedthrough capacitor and the speaker output connection pin on the inside of the enclosure.

RX80 i.f. rf amplifier

If the rf amplifier (TR1) still tends to self-oscillate after taking the steps indicated, a ferrite bead over the drain lead of TR1 should cure the problem.

CV80 hf converter oscillator

If the oscillator refuses to run, reduce C22 to 15pF.

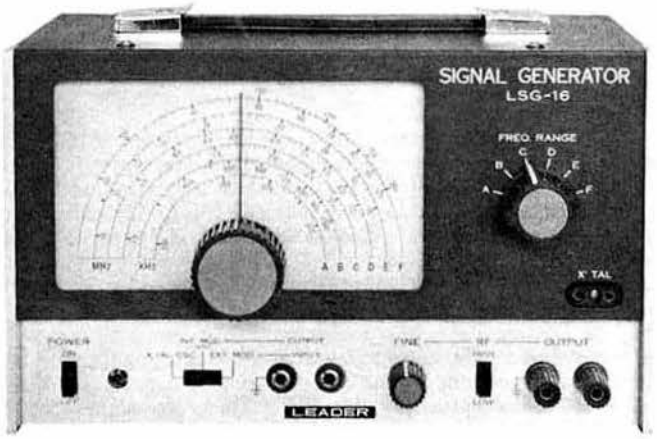
ST80 vfo stabilizer

A few people have fitted an l.e.d. indicator to show that the unit is running properly. An l.e.d. should be wired via a transistor amplifier (BC237 or similar) to either pin 5 of IC5, which will give a flashing gate indicator at approximately 1s intervals, or pin 1 of IC2a, which will show the output going on and off to drive the integrator. □

NEW PRODUCTS

Leader LSG16 signal generator

The LSG16 is a wideband mains-operated signal generator with a frequency range of 100kHz to 100MHz (300MHz on harmonics) over six positions. It has internal modulation of 1kHz or can be modulated externally between 50Hz and 20kHz. Crystal oscillator facility is also provided for 1MHz to 150Hz. The instrument is housed in an attractive professional case and competitively priced at £55 plus VAT. Further details from Sinclair Electronics Ltd, London Road, St Ives, Huntingdon, Cambs. Tel (0480) 64646.



Leader LSG16 signal generator

VHF/UHF antennas

A new range of Yagi antennas for the 144, 432 and 1,296MHz bands is now available in the UK from MuTek. They are manufactured by Hamburger-Antennen—Großhandel and have been developed using the computer-aided "double optimization" technique described by Günter Hoch, DL6WU in *VHF Communications*. This technique ensures optimum gain for a given boomlength, and hence a very clean pattern. A by-product of this design procedure is a reduction in the number of elements for a given gain, and therefore a significant reduction in weight and windloading.

H-A-G antennas have considerable mechanical stability and corrosion resistance due to the use of stainless-steel and marine-grade aluminium. The elements are sprung stainless-steel and are ingeniously clipped to the square boom, thus making for very simple assembly and mechanical integrity.

Good broadband matching is achieved through the use of a precision ptfe balun, handling 1,000W cw/ssb, and 500W at 100 per cent duty cycle. The range includes mam claimed figures:

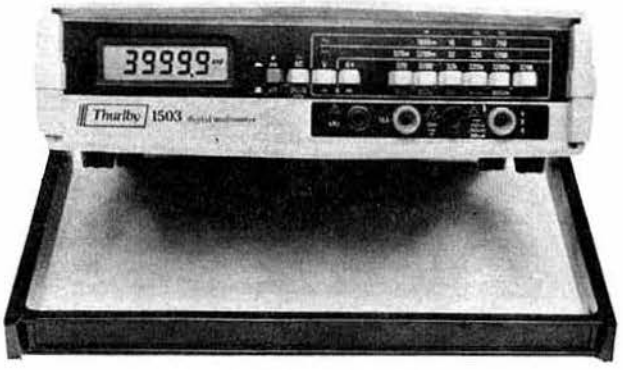
Band	Length (m)	Elements	3dB beamwidth horiz	3dB beamwidth vert	Wind load (N) 120km/h	Wind load (N) 160km/h	Gain (dBi)	Weight (kg)
144	1·04	4	55	70	15	26	9·7	0·45
144	2·75	7	44	51	35	63	12·3	0·98
144	4·91	11	35	38	83	147	14·5	2·20
144	6·72	13*	31	33	160	285	15·6	3·70
432	1·55	10	36	40	22	39	14·3	0·68
432	3·10	16	28	30	59	105	16·5	1·69
432	5·06	23	24	25	91	160	17·9	2·0

*The 13-element is of a different construction, featuring a 20mm square boom, and 7mm-diameter elements. The material is marine-grade aluminium.

More comprehensive data in the form of an attractive wall poster is available from MuTek Ltd for 28p in stamps. Sole UK agents: MuTek Ltd, Bradworthy, Holsworthy, N.Devon EX22 7TU. Tel 0409 24 543.

Thurlby Model 1503 multimeter

This instrument offers the bonus of a built-in frequency meter. Frequencies up to 3,999·9kHz can be measured directly with a resolution of 100Hz. Accuracy is ±1 digit over a 10°C–30°C temperature range and is defined by a 6MHz crystal timebase. A moveable decimal point allows for external pre-scaling by those wishing to extend the measurement range to 40 or 400MHz.



Thurlby 1503 digital multimeter

In normal multimeter mode, the instrument has a high-resolution 4·75 digit scale length and exceptional sensitivity figures of 10μV, 10mΩ and 1nA. Thirty-two ranges are provided, enabling measurement of ac and dc voltage, resistance, diode test, and ac and dc current up to 25A. The display is liquid crystal, and the instrument may be powered from internal batteries or from ac line power. Price in the UK is £139 plus VAT. Further information from Thurlby Electronics Ltd, Office Suite 1, Coach Mews, The Broadway, St Ives, Huntingdon, Cambs PE17 4BN. Tel (0480) 63570.

Variable power modification for the FT221R and FT225RD

by MICHAEL CURRAN, G4ITF, and
BRIAN DAVEY, G4ITG*

AFTER buying an FT225RD, G4ITG was very surprised to find that the power output could not be varied on ssb, although both the descriptive leaflet and the handbook supplied with it indicated that it could be varied for use with transverters or linears. Particularly needing the low power option for use in QRP contests, he took it up with the manufacturer, Yaesu Musen, who said that the power control did vary the power on ssb as well as on fm and cw, and that the transceiver must have been modified by the dealer. This was not the case, and Yaesu Musen were so informed, and a full description of the way the power control operated was given, which made it quite clear that its design did not allow the power output to be varied on ssb. In reply, Yaesu Musen said that although the designer had stated that the power could be varied on all modes, they now agreed that it could not. They suggested that the power output could be varied on ssb by using an attenuator (which would also attenuate the receiver performance and was not therefore practicable) or that the MIC GAIN control could be used, which was also considered unsuitable.

As Yaesu Musen could not suggest any satisfactory method, G4ITG tried to find a local amateur who had modified an FT225 to give variable power, without success. However, G4ITF had modified his FT221RD to provide variable power, and it was found that a similar modification could be carried out on the FT225—and with the advantage that the existing power output potentiometer could be used to give front panel control instead of the internal adjustment used on the FT221.

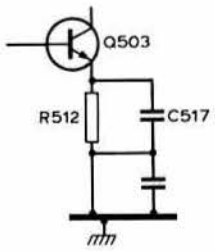


Fig 1. Existing FT221R exciter board

Before these modifications are described, it may be of interest to describe two other methods which were tried on the FT221:

1. Access to the alc is on the back of the rig, which is normally used in conjunction with a linear amplifier, and this could be used to vary the power without any internal modifications: all that is needed is a negative supply. If this is applied to the alc socket via a potentiometer voltage divider the output power can be varied. However, this method was rejected because: *(a)* the alc control is not used when the fm mode is in use because the alc line is shorted to earth in this mode, so power cannot be varied on fm; *(b)* although it would not be difficult to generate a negative supply when used in the shack, this would have been more difficult when the rig was being used portable—a simple battery or a dc/dc inverter could be constructed, but this would have just amounted to another ancillary to be taken out portable; *(c)* it was felt essential to vary the power by the existing control on the FT225, and this would not be possible.

2. It was considered possible to vary the power on all modes by reducing the supply of the pa driver (as is used to vary the power on fm on the FT225), but this was rejected because of the possibility of non-linearity in the driver stage, due to low voltage supply when on ssb.

*31 Somervell Drive, Fareham, Hants PO16 7QL

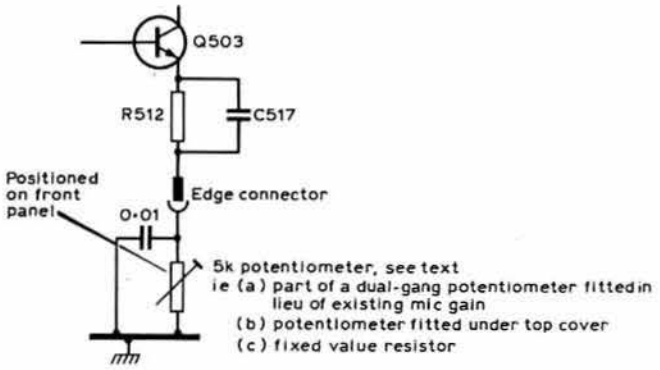


Fig 2. Modifications to FT221R exciter board

Variable power modification for the FT221R

This modification simply varies the gain of the predriver transistor stage, which then varies the drive to the subsequent pa stages. Carrying out the modification at the predriver stage, where only very low power levels are present, ensures that the linearity of the transceiver is not affected. Power variation can be by a front panel control, in which case it will be necessary to replace the existing single microphone gain potentiometer with a double-pole one (as on the FT225RD), or a potentiometer can be positioned under the top cover in any convenient position. Alternatively, a high/low power switch can easily be provided by obtaining a spare af gain/nb combined switch/potentiometer, and installing it in the position occupied by the existing MIC GAIN control.

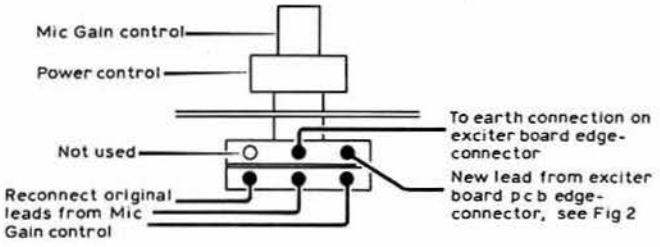


Fig 3. Variable front panel control for the FT221R

Low power modification

Remove top and bottom covers of the transceiver, and remove the exciter pcb PB1466 (Fig 1). Cut the track on this board at the earthy end of R512, the ideal place being at the point where the track is very thin, and reconnect the earthy end of R512 to an edge connector (Fig 2). There are unused edge connectors on the board which are all earthed, and the track around one of these connectors must be removed to isolate it before connecting it to the earthy end of R512. This completes the modification to the pcb, which should be refitted into the transceiver.

Now turn the transceiver over and locate the edge connector for the exciter board. Remove the earth lead from the connection which corresponds with the edge connector on the board previously isolated. Connect a suitable lead to this pin and feed this through the wiring loom to the position of the microphone gain potentiometer. Also connect 0·01μF ceramic disc capacitor from this pin to an adjacent earth point to decouple this line (Fig 2). Connect another lead to run from the earthy end of this 0·01μF

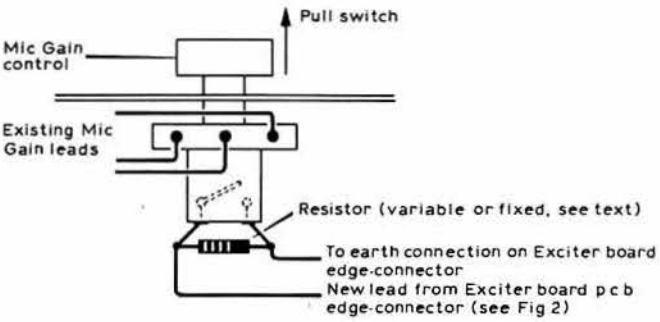


Fig 4. High/low power switching for the FT221R

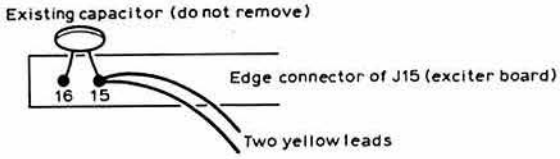


Fig 5. Existing connector of J15 on FT225RD

capacitor, long enough to feed through the wiring loom to terminate adjacent at the microphone gain potentiometer.

The final part of the modification depends on the facilities required by the owner, ie variable power or high/low power switching. If variable power is required the existing microphone gain potentiometer can be replaced by a double-gang potentiometer as used on the FT225RD. The leads for microphone gain are reconnected as originally existing, and the two leads from the edge terminals connected to the new potentiometer as shown in Fig 3 (a dual 5kΩ potentiometer is required).

If the owner only wants to switch between full power and a preset lower output, the following procedure can be used. Remove the existing microphone gain potentiometer and replace it with a potentiometer of the same value which incorporates a switch—a suitable one would be that used on the FT221R for the af gain/nb potentiometer switch—connect this as shown in Fig 4. The resistor can be fixed or variable to produce low power. A 10kΩ resistor gives a few milliwatts of output, and a variable resistor mounted under the easily removable top cover will allow a whole range of low power settings to be selected. When the switch is on (pulled towards the operator) the transceiver runs full power; when pushed in, the predetermined low power setting is selected.

Variable power modification for the FT225RD

After removing top and bottom covers, turn the transceiver upside down on the bench. Locate J15 (edge connector of the exciter board (Fig 5), and remove the two yellow leads from pin 15. Cut two lengths of any suitable wire to run from pin 15 to the existing power control potentiometer located behind the front panel. Carefully thread these wires into the existing wiring loom. Solder an end of one of the wires to pin 15, and an end of the other wire to the two yellow wires removed from pin 15 (as shown in Fig 6). Carefully insulate the joint—a piece of pvc sleeving is ideal. This completes work to the bottom of the transceiver, unless very low power is required as described below.

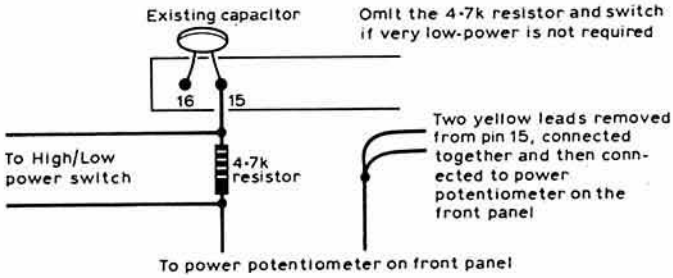


Fig 6. Modifications to edge connector J15 on FT225RD

Now turn the transceiver over and locate the power control potentiometer (Fig 7), located on the front panel. Carefully remove the existing wires from this potentiometer, solder the blue and blue/white wires together and insulate the joint with a pvc sleeve. The green wire is left open-circuit and should be insulated for safety. (This isolates the original power control.) Connect the two new wires from pin 15 on J15, and from the two yellow wires removed from pin 15 to the terminals on the power control potentiometer as shown in Fig 8. The modification is now completed.

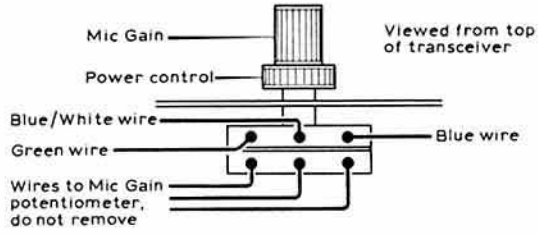


Fig 7. Existing power control of FT225RD

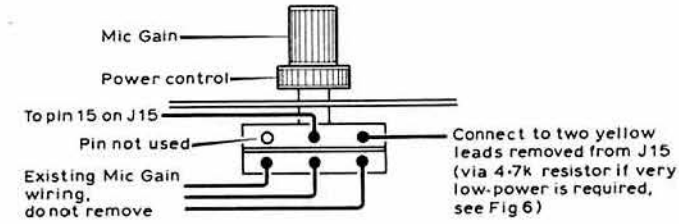


Fig 8. Modifications to the FT225RD power control

On G4ITG's FT225 the power on fm, cw and ssb can be varied from 2 to 25W, and a.m. can be varied from 750mW to 8W. This power variance may be sufficient for some owners, but G4ITG required lower power for QRP contests and for driving a transverter. To provide this the following additional modification was carried out to provide two power ranges from 300mW to 2W in the low position, and from 2 to 25W in the high position (these measurements are for fm, cw and ssb).

Low power modification

A switch must be installed to select high and low power. In order to avoid drilling the chassis, the spare blanking plate on the back of the transceiver (next to the tone pad input jack) can be removed and a suitable switch fitted into it. The new lead soldered to pin 15 is removed and a 4·7kΩ resistor soldered in series. Wires soldered on each side of this resistor are connected to the new switch (Fig 8). When the switch is open the resistor provides the necessary resistance to produce a low power range from 300mW up to 2W. When the switch is closed the resistor is by-passed, and the power can be varied from 2 to 25W as previously described. Carefully insulate all joints with pvc sleeves, and the modification is completed.

As an alternative a 10kΩ potentiometer can be fitted in place of the existing 5kΩ one, but this is part of a ganged pair and a 10kΩ/10kΩ dual potentiometer would be required in order to retain the existing ssb MIC GAIN control.

Conclusion

The method described has been used on the FT221 for about four years without any problems, and on the FT225 for about two years with entirely satisfactory results. It is hoped that the instructions are sufficiently simple and explicit to enable any owner with little skill to complete this worthwhile modification. However, do check with the distributor if the guarantee is still in force. □

LITERATURE RECEIVED

Doram Electronics

A new 44-page catalogue from Doram contains details of a large range of discrete components and semiconductors and details of the "project packs". These packs are based on magazine articles and also original designs, and they cover about 70 different projects. Primarily suppliers to the home constructor market, Doram Electronics are part of the De Boer Elektronika group of companies based in the Netherlands. This means that they are able to draw on their stocks and long expertise in dealing with the home constructor market.

Copies of the catalogue are obtainable for 40p from Doram Electronics, Market Place, Swaffham, Norfolk.

Erg resistors

A new four-colour, technical brochure on the Erg ER series of miniature, power, wirewound resistors, is now available, free, from the manufacturers. This new publication contains colour photographs, line illustrations and charts, and gives full technical details of resistors ranging from 0·30Ω to 100kΩ with power dissipations from 2·5W to 14W. Information giving characteristics and details of packaging are also included. Free copies are obtainable from Erg Components, Luton Road, Dunstable, Beds LU5 4LJ.

Going HF mobile—some experiments in vehicle suppression methods

by R. V. HEATON, G3JIS*

Table 1. Results of suppression test experiments

Line	Component	3·5MHz S-meter reading	3·5MHz Approx attenuation	14MHz S-meter reading	14MHz Approx attenuation	28MHz S-meter reading	28MHz Approx attenuation
1	Lucas 1μF capacitor with 6in lead	S1	25dB	S6	10dB	S8·5	1dB
2	Lucas 1μF capacitor with 0·38in lead	S1	25dB	S1·5	33dB	S8	1·7dB
3	Lucas 1μF capacitor with 0·13in lead	S0·25	35dB	S1	35dB	S3·5	16dB
4	Lucas 3μF capacitor with 3·5in lead	S0·5	30dB	S4·5	17dB	S9	0dB
5	Lucas 3μF capacitor with 2in special lead	S0·25	35dB	S3	25dB	S5·5	11dB
6	Lucas 3μF capacitor with 1·5in special lead	S0·25	35dB	S2·5	27dB	S4·5	14dB
7	Lucas 3μF capacitor minus lead	S0·25	35dB	S1	35dB	S3·5	16dB
8	VHF feedthrough filter 0·001μF + 0·001μF	S8	4dB	S3	25dB	S3	17dB
9	0·1μF cylindrical foil 160V	S0·5	30dB	S1·5	33dB	S5	12dB
10	Four 0·1μF ceramic in parallel	S0	36dB	S0·5	45dB	S1·5	23dB
11	Homebrew choke 18t 16swg 0·38in dia ferrite core 2in long	S7	5dB	S2	31dB	S0·5	32dB
12	Homebrew choke 18t 16swg with vhf filter	S4	14dB	S0	45dB	S0	38dB
13	0·1μF + 100Ω (Radiospares)	S8	3·8dB	S8	2·9dB	S8	1·7dB
14	Lucas set of five chokes for windscreen wiper	S6	8dB	S4	18dB	S2	20dB
15	Lucas set of five chokes + 0·1μF + 100Ω	S4·75	12dB	S2·5	27dB	S1	26dB
16	Lucas set of five chokes + 0·1μF	S2·5	17dB	S0·25	47dB	S0·25	38dB
17	Lucas set of five chokes + four 0·1μF	S1·5	22dB	S0	51dB	S0	48dB
18	Lucas set of five chokes + 1μF with 6in lead	S2	18dB	S1	35dB	S2	20dB
19	Lucas set of five chokes + 1μF with 0·13in lead	S1·25	23dB	S0	51dB	S0·25	38dB

The attenuations quoted are only approximate. They are derived from the S-meter readings produced by the calibrated attenuator on the Avo signal generator. The S-meter is non-linear and shows changes of linearity and receiver gain as the band is changed.

WITH the availability of solid-state hf transceivers increasing, it would be surprising if more amateurs were not considering mobile operation on the hf bands, but there are several problems which make mobile operation different from fixed station working. One of the main problems is suppression of electrical interference from the vehicle in which the transceiver is installed. If suppression is not fitted, the receiver noise level with the car engine running will probably be between S7 and S9, depending on the engine speed and the band in use.

Suppression tests

Prior to installing suppression equipment, the author carried out some simple experiments which it was hoped would point to the way out of any difficulties should they arise. A circuit to test the components was set up (see Fig 1) and the test procedure was as follows:

1. The signal generator with its associated "L" pad was connected directly to the receiver.
2. The output attenuator was adjusted until the S-meter read S9.
3. Suppression components were placed between the signal generator and the receiver as shown in Fig 1.
4. As each component was put in circuit the S-meter reading was noted.

The results of the above experiments are shown in Table 1.

Brush noise suppression test. To test the efficiency of various suppression components, a test circuit using a small dc motor was set up with a 3V supply (Fig 2). The results are shown in Table 2.

On-car test procedure. A screened coaxial dummy load was connected to the receiver input to check that no interference was reaching the receiver by routes other than the antenna, eg supply leads or poor receiver screening. No interference was apparent during this test.

Suppression methods

1. The coil was suppressed as shown in Fig 3(b).
2. The alternator was suppressed as shown in Fig 4(b). The lead was fabricated for the 3μF capacitor from four thicknesses of coaxial outer braid slipped inside a sheath of copper coaxial cable outer braid. The lead was then carefully insulated and made as short as possible.
3. The instrument regulator was suppressed as shown in Fig 5.
4. Transceiver supply lead was suppressed as shown in Fig 6. While the 25A crocodile clips have a powerful grip on the lead battery lugs, it is essential to ensure that the clips cannot touch any part of the battery securing bracket or any other earthed component, as at this point the circuit is not fused. It is advisable to anchor the power lead to ensure that a pull at the transceiver end of the lead cannot dislodge the crocodile clips. If in doubt the clips can be bound with insulating tape.
5. The ignition distributor and plug leads were loosely bound with aluminium cooking foil which was earthed to the cylinder head.

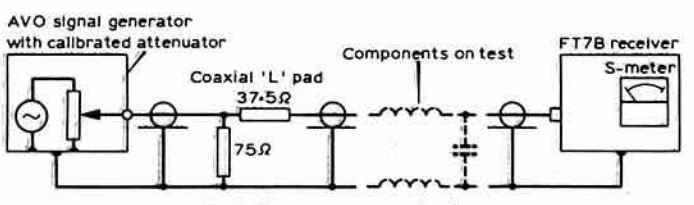


Fig 1. Component test circuit

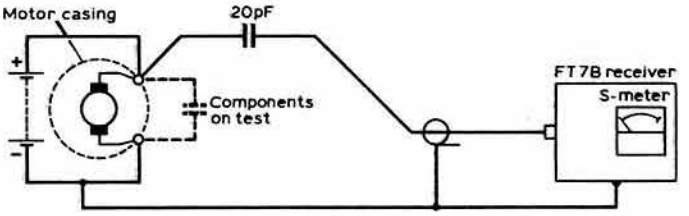


Fig 2. Brush noise suppression test circuit

Auxiliary equipment suppression

1. The two-speed windscreen wipers were completely suppressed by the use of a set of five Lucas chokes with 0·1μF capacitors fitted across the brush feeds (see Fig 7).
2. The two-speed fan for the heater was suppressed by 0·1μF capacitors in shunt with series inductors of 40μH, ie 26 turns of 20swg wire wound on a 0·38in (9·5mm) diameter ferrite rod (see Fig 8).

Effectiveness of suppression methods

The only interference remaining after the above items had been suppressed was very slight ignition interference on 28MHz. The installation of resistive plugs RN-9Y removed the remaining noise completely.

The only detectable difference on the receiver between having the engine running or switched off was that the receiver was slightly more sensitive with the engine running—and the dial lights were brighter.

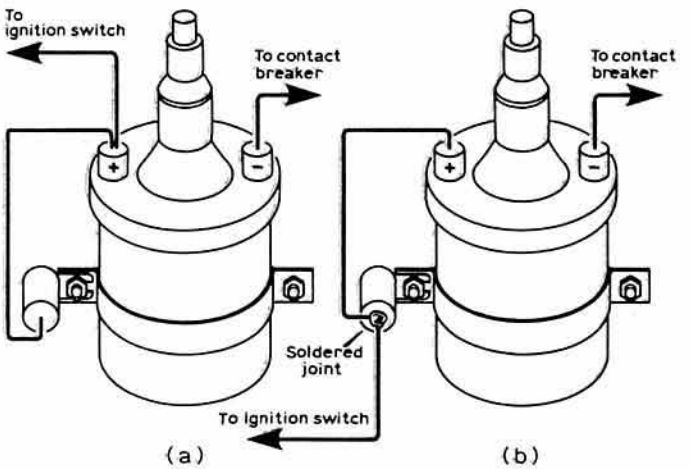


Fig 3. Coil suppression methods. (b) provides approximately 15dB (32 times) more attenuation at 28MHz than (a). See Table 1, lines 1 and 3

*20 Tewkesbury Avenue, Davyhulme, Urmston, Manchester M31 1RJ.

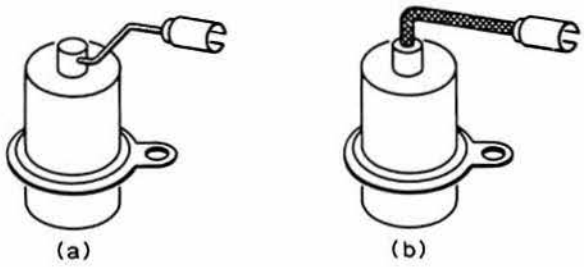


Fig 4. Alternator suppression methods. The use of a braided and shortened lead gives approximately 11dB (12 times) more attenuation at 28MHz than (a). See Table 1, lines 4 and 5

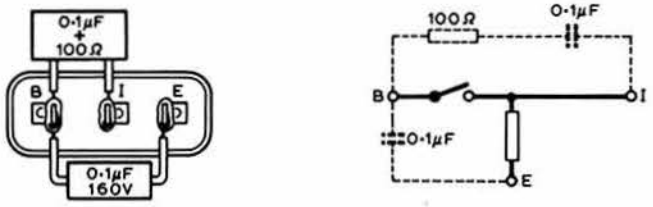


Fig 5. Instrument regulator suppression. All joints soldered

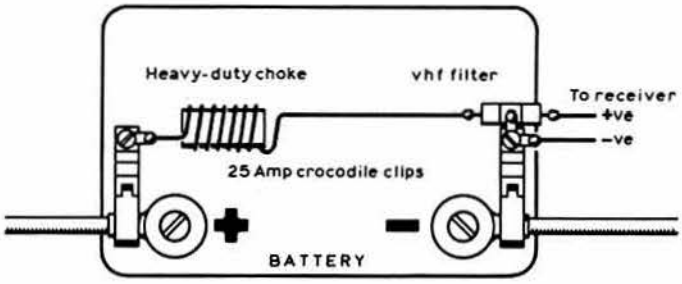


Fig 6. Supply lead from battery suppression arrangement

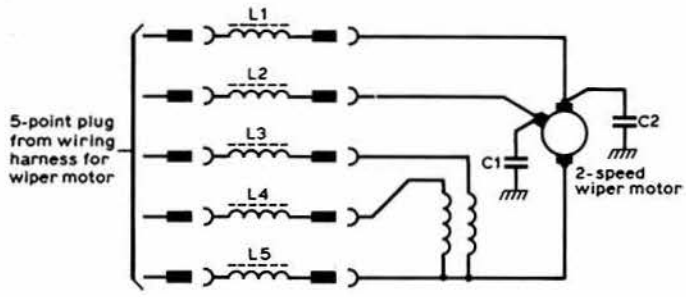


Fig 7. Wiper motor suppression

Table 2. Results of brush noise suppression tests

Test No		3·5MHz Reduction of interference S-points	Approx attenuation	28MHz Reduction of interference S-points	Approx attenuation
1	Earth motor casing	1	4dB	1	2dB
2	3μF cap 3in lead	2	8dB	2	5dB
3	3μF cap 2in thick lead	5	14dB	5	15dB
4	100Ω + 0·1μF	2	8dB	2	5dB
5	0·1μF 160V	5	14dB	5	15dB
6	1μF 6in lead	2	8dB	5	15dB
7	Four 0·1μF	6	15dB	6	17dB

Recommendations

1. Read the article "Suppression of vehicle interference for mobile radio operation", by D. W. Morris, G3AYJ, *Radio Communication* May 1976, p336-43.
2. Obtain a copy of *Radio Interference Suppression* published by Lucas Electrical Ltd, publication number PLT 6338A, free from any Lucas branch.
3. Both capacitors and inductors should be installed to provide broadband suppression.
4. The suppression capacitors are installed in such a way that lead length is minimized.

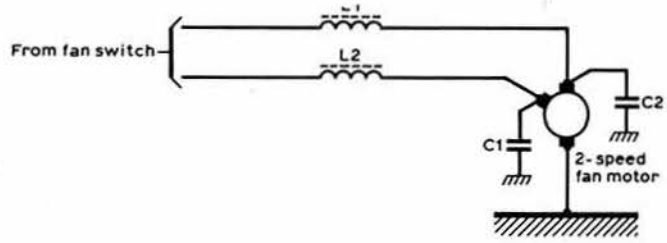


Fig 8. Heater fan motor suppression

Conclusions

Capacitors are effective suppressors across the band of frequencies 3·5 to 28MHz, and are most effective up to 14MHz. Radio frequency chokes have very little effect at 3·5MHz but become extremely effective above 14MHz.

Suppression of a vehicle is an easy and interesting task which makes mobile operation a pleasure. With reasonable conditions QSOs over ranges of 3,000 to 5,000 miles are commonplace on 21 and 28MHz.

Relevant data

Vehicle	—Austin Maxi
Transceiver	—FT7B 50W p.e.p.
Antenna	—G-Whip flexiwhip
Heavy duty choke in Fig 6	—18 turns of 16swg wound on 2in (51mm) length of 0·38in diameter ferrite rod. □

BOOK REVIEW

A Newcomer's Guide to FM Simplex and Repeater Operation on Two Metres, by Antony Askew, G4BPC. Revised edition. Published by UK FM Group (London), 67 Downswood, Tattenham Corner, Epsom Downs, Surrey KT18 5UJ. 16pp plus advertising. Price: 75p incl p&p. Obtainable from the publishers; cheques and postal orders should be made payable to UK FM Group (London). All income goes towards the upkeep of the four 144MHz and two 432MHz repeaters run by the group.

As its unusually verbose title indicates, this well-produced little volume is aimed at the newcomer to vhf fm. It fulfils its declared function quite well, covering most of the basic operating techniques applicable to this aspect of the hobby. Perhaps not surprisingly, rather more emphasis is placed on repeater than simplex operation. This is no bad thing, given that repeater users need to exercise a much greater degree of mutual co-operation than is necessary for simplex working. It is good to see that, rather than just laying down a set of rules, the guide attempts to explain the reasoning behind them.

Although it is a revised edition the guide contains several pieces of information which are out of date. In particular the band plan contains none of the revisions made at the Brighton IARU Conference in April. One might also quibble at some of the definitions given in the glossary, and it is interesting to read that "pedestrian" is not recognized, even though my licence clearly states that it is. However, most of the errors are such that they will not unduly inconvenience the beginner at whom the work is aimed.

As well as for the complete newcomer the guide should also be useful for the hf man who is considering vhf for local or mobile, and for anyone who has been off the air for a while and needs a "refresher" course.

Contents: Foreword; Introduction; The band plan; Repeaters; The "K" break; Accessing and tonebursts; Jamming; Input listening; Signal reports; Deviation and microphone gain; Bandwidth; Operating; Callsigns; Mobile working; Aerials; Future developments; Glossary. *G4ANB*

Converting the Icom IC240 to 24 channels

by R. C. STERRY, G4BLT*

Introduction

Several circuits for adding extra channels to the IC240 have already been published in various journals, but they all involve the use of an external unit, or else they involve fairly major modifications to the IC240 itself. For mobile use there is nothing to beat the standard rotary switch for selecting channels with the minimum of danger to other road users. Since the IC240 is supplied with 22 programmable channels, and since the switch actually has 24 click positions, the author decided that it should be a fairly simple task to convert the set to 24 channels. The modification involves nothing more daunting than three cheap components and a few inches of wire.

Description

The rotary channel switch feeds +9V to the appropriate set of matrix diodes, and hence to the required inputs on the programmable divider chip in the synthesizer. There is provision on the matrix board for 23 sets of diodes, but the 23rd position is not normally wired to the channel switch. To add this extra channel, simply run a length of insulated wire from the 23rd position on the matrix board to the spare tag on the channel switch. (Note that the diode position number on the matrix board does not necessarily correspond with the channel number shown on the dial.)

Obtaining the 24th channel is rather more difficult. The 24th click position on the switch is occupied by the "common" or "wiper" contact, and so cannot be used to select another set of matrix diodes. However, in all the other positions the switch will be drawing current from the +9V rail (approximately 1mA per matrix diode). A simple circuit senses when the switch is open circuit, and selects the extra set of diodes. The circuit is inactive in the other switch positions. An external passive channel-selector unit can, if required, be used in conjunction with this extra position to obtain the full 80 channels for base-station use, while retaining a programmed channel for mobile use.

The circuit is shown in Fig 1. When matrix board positions 1 to 23 are in use, between 1 and 7mA flows through the channel switch, depending on the number of matrix diodes used for that particular channel. This current

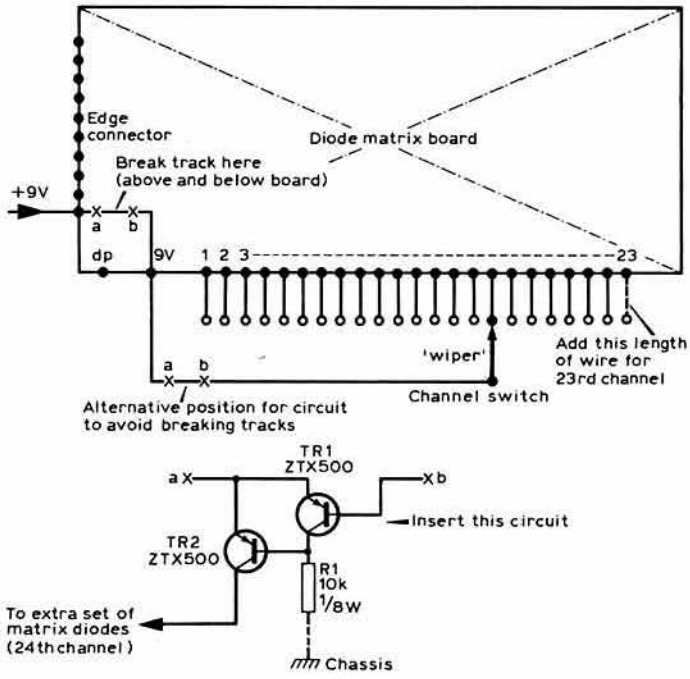


Fig 1. Theoretical circuit

flows through the base-emitter junction of TR1, which introduces only a slight voltage drop in the +9V feed to the matrix diodes. Thus TR1 is held fully "on", which holds TR2 fully "off", so that the collector of TR2 is effectively open-circuit. When the 24th position is selected, current no longer flows through the switch, so TR1 turns "off". Base current now flows into TR2 base via R1, turning TR2 hard "on", which feeds +9V to the extra set of matrix diodes.

This modification has a useful side effect. Normally, when the channel switch is turned, there is a rather annoying burst of noise from the loudspeaker due to the synthesizer momentarily unlocking. When the modification is fitted the noise tends not to occur, as the synthesizer momentarily reverts to the 24th channel instead. (Do not confuse with S24). If the 24th channel is busy, a fragment of speech may be heard instead, but this is far less irritating.

The 24th channel can be used as a priority channel if required, simply by arranging for a separate priority switch to open-circuit the lead from TR1 base to the channel switch. The synthesizer will then revert to the 24th channel, regardless of the setting of the main channel switch.

An external 80-channel passive channel selector unit could be used in conjunction with the 24th channel, provided its +9V feed is taken from the wiper of the channel switch (TR1 base). As soon as the unit is

*1 Wavell Garth, Sandal, Wakefield, W Yorkshire WF2 6JP.

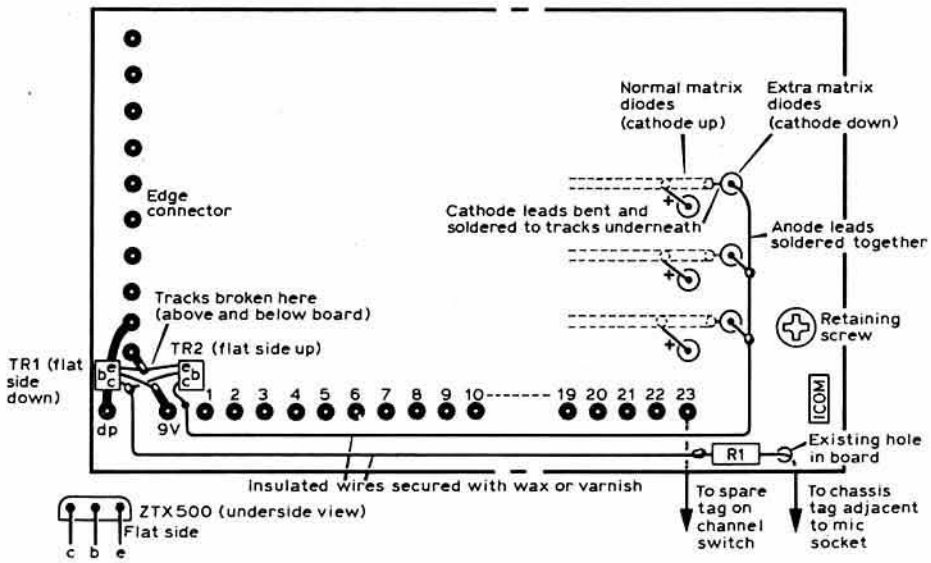


Fig 2. Diode matrix board

connected to the IC240, then provided the 24th channel is selected on the IC240, current will flow through TR1, de-activating the circuit, and allowing the external unit to select the channels. The active unit designed by G8JCA [1] should also work satisfactorily, again provided that its +9V feed is taken from the wiper of the channel switch. (Note that this has not been tried by the author, although no problems are anticipated).

Ferranti ZXT500 transistors were chosen because of their compact size and flat profile. They can be soldered direct to the matrix board, after first cutting the +9V tracks above and below the board. The resistor can be mounted in an existing hole in the board, and the free end plus the wiring can be held down with a few spots of wax or varnish. The extra matrix diodes are mounted in extra holes drilled adjacent to the 23rd position. (For this reason, it is a good idea if this channel does not require too many diodes.) As there are no copper tracks available, it is best to mount these diodes the opposite way up to the rest, ie with the cathodes down. The cathode leads can then be bent at right-angles on the underside of the board, and soldered to the tracks running the length of the board. The anode leads are then soldered together above the board, and wired across to TR2 collector. (Beware of the diode leads fouling the casing, or the brass pillar and screw securing the matrix board.) A wire must be run from one end of R1 to the chassis tag adjacent to the microphone socket, or some other convenient point. If the idea of cutting circuit board tracks brings people out in a cold sweat, then the circuit could easily be mounted on a separate tagstrip, and wired across to the matrix board (Fig 2).

The author has wired in all channels 0 to 23, with matrix board position 1 for channel 1, 2 for channel 2 etc, and position 24 for channel 0, which is a much less confusing arrangement. So that the dial actually shows the channel number in use, and not "B" or "F" or other strange letters, a replacement dial marked "1" to "22" plus two dots was obtained from the UK importers at modest cost [2]. The two dots represent channels 0 to 23, and it should not be too difficult to alter these to show the correct numbers if required.

Conclusion

The author's IC240 has been in use with this modification for almost 12 months with no problems, and the circuit has been tried successfully by other amateurs.

Finally the author would ask people to study the 144MHz band plan [3], before they innocently deposit themselves on unoccupied channels (or frequencies, for the benefit of the purists).

References

[1]. "An 80-channel selector system for the IC240" by G8JCA. *Rad Com* August 1980, p780.

[2]. Thanet Electronics Ltd.

[3]. "RSGB 144-146MHz Band Plan". *Rad Com* April 1979, p340. □

RSGB QSL BUREAU SUB-MANAGERS

(At 1 September 1981)

G2 calls:	C. H. Adams, RS10906, 4 Park Gate Gardens, East Sheen, London SW14 8BQ.
G3AA-ZZ: G4AA-ZZ: G5 calls:	Mrs C. Pope, G4CMM, 136 Ridgeway Drive, Bromley, Kent BR1 5DD.
G6AA-ZZ: G8AA-ZZ:	F. J. T. Harris, G4IEY, 4 Merestones Drive, The Park, Cheltenham, Glos GL50 2SS.
G3AA-DZZ:	C. A. Bradbury, BRS1066, 13 Salisbury Avenue, Cheltenham, Glos GL51 5BT.
G3EAA-HZZ:	S. L. Newport, G4DEV, 101 Elibank, Road, Eltham, London SE9 1QJ.
G3IAA-KZZ:	P. Lumb, G3IRM, 14 Linton Gardens, Bury St Edmunds, Suffolk IP33 2DZ.
G3LAA-NZZ:	J. G. Holland, G3GHS, 26 Grand Avenue, Berrylands, Surbiton, Surrey KT5 9HU.
G3OAA-PZZ:	J. H. Brazzill, G3WP, 43 Forest Drive, Chelmsford, Essex CM1 2TT.
G3RAA-TZZ:	Mrs C. Pope, G4CMM, 136 Ridgeway Drive, Bromley, Kent BR1 5DD.
G3UAA-VZZ	M. J. Newton, G3UKW, 11 Chestnut Close, Rushmere St Andrew, Ipswich IP5 7ED.
G3WAA-XZZ:	F. G. Rylands, G2VF, 39 Parkside Avenue, Millbrook, Southampton, Hants SO1 9AF.
G3YAA-KZZ:	I. Batley, G8TKU, 3 Folidon Avenue, Fulwell, Sunderland, Tyne & Wear SR6 9HP.
G4AAA-AZZ:	C. Johnson, BRS31379, 118 Harvest Road, Smethwick, Warley, West Midlands B67 6NG.
G4BAA-BZZ:	R. F. Rawlings, G3WBV, 74 The Lindens, Fieldway, New Addington, Surrey CR0 9EL.
G4CAA-CZZ:	P. Jobson, G3HLF, 41 The Avenue, Gravesend, Kent DA11 0NA.
G4DAA-DZZ:	D. Buckley, G3VLX, 16 Wood Ride, Petts Wood, Orpington, Kent BR5 1PX.
G4EAA-EZZ:	P. C. Barry, G8OPA, 32 Rutland Avenue, Sidcup, Kent DA15 9DZ.
G4FAA-FZZ:	Mrs A. R. Burchmore, G8LXK, 49 School Lane, Horton Kirby, Dartford, Kent DA4 9DQ.
G4GAA-GZZ:	L. Craven, G4EQI, "Grass Moor", Radford Road, Alvechurch, Birmingham B48 7DT.
G4HAA-HZZ	Mrs J. Brakespear, G8RZO, The Chequers Stores, Eastchurch Road, Minster, Sheppey, Kent.
G4IAA-IZZ:	C. J. Webb, G4JFF, 153 Apsley Road, Oldbury, Warley, West Midlands B68 0QT.
G4JAA-JZZ:	K. Baker, G3WTV, 33 Ashdown Drive, Borehamwood, Herts WD6 4NA.
G4KAA-KZZ:	K. Draycott, G3UQT, 175 Oliver Road, Kirk Hallam, Ilkeston, Derbyshire DE7 4JW.
G4LAA-LZZ:	C. Lennox, G4LXU, 65 Westover Road, Bramley, Leeds 13, West Yorks.
G4MAA-MZZ:	Mrs Gwen Thomas, G4JYL, 36 Chelwood Crescent, Leeds LS8 2AQ, West Yorks.
G4NAA-NZZ:	John Brakespear, G8RJP, The Chequers Stores, Eastchurch Road, Minster, Sheppey, Kent.
G6AAA-LZZ:	Mr and Mrs D. R. Brooks, G4IAQ/G4IAR, 28 Avon Vale Road, Loughborough, Leics LE11 2AA.
G8AAA-CZZ:	F. J. T. Harris, G4IEY, 4 Merestones Drive, The Park, Cheltenham GL50 2SS.
G8DAA-OZZ:	T. Batley, G8TKU, 3 Folldon Avenue, Fulwell, Sunderland, Tyne & Wear SR6 9HP.
G8PAA-RZZ:	Mrs C. Pope, G4CMM, 136 Ridgeway Drive, Bromley, Kent BR1 5DD.
G8SAA-SZZ:	K. Baker, G3WTV, 33 Ashdown Drive, Borehamwood, Herts WD6 4NA.
G8TAA-TZZ:	K. Draycott, G3UQT, 175 Oliver Road, Kirk Hallam, Ilkeston, Derbyshire DE7 4JW.
G8UAA-ZZZ	C. Lennox, G4LXU, 65 Westover Road, Bramley, Leeds LS13 3PB.
GB calls:	C. Turner, G8NL, 56 Sunny Bower, Tottington, Bury, Lancs BL8 3HL.
GD calls:	W. P. Waid, GD3GQX, 1 Mount William, Summer Hill, Douglas, Isle of Man.
GI calls:	R. P. Parsons, GI3HXV, 45 Erinvale Avenue, Belfast BT10 0FP.
GJ calls:	H. J. Chater, GJ2LU, 106 Rouge Baullion, St Helier, Jersey, CI.
GM 2-letter calls: GM4AAA-ZZZ: GM5AAA-ZZZ: GM6AAA-ZZZ: GM8AAA-ZZZ:	D. R. Macadie, GM6MD, 11 Marchmont Road, Ayr KA7 2SB.
GM3AAA-ZZZ:	J. Johnston, GM3LYY, "The Dolphins", Montgomerie Drive, Fairlie, Ayrshire.
GU:	W. E. Butt, GU2FZC, "Meo Voto", Green Lanes, St Peter Port, Guernsey, CI.
GW2, 3, 4, 5:	J. Reid, GW3ANU, 28 Waterson Road, Gabalfa, Cardiff CF4 2SS.
GW6 and 8:	J. Lewis, GW8UZL, 14 Gareg Y Gad, Llanfair PG, Anglesey LL61 5QF.
BRS and A:	D. Borne, G4CYW, "Roughways", Chub Tor, Yelverton, Devon PL20 6HY.

TECHNICAL TOPICS

Pat Hawker, G3VA

"AMATEUR radio has always seemed something like a miracle to me, and the more I understand it, the more of a miracle it still seems to be . . . the farther away someone is the more excited I get talking to him . . . even when I have the equipment and antennas to talk literally anywhere in the world, I am pretty much at the mercy of nature . . . I still get a tremendous kick out of it."

This quotation is from the *QST Profile* of Bill Leonard, W2SKE, president of CBS News (CBS is one of the three major television networks in the USA), an amateur since 1934 and someone who has spent 30 years with CBS as news correspondent, broadcast personality, producer, writer and executive. It is this sense of wonderment at what can be done with just a few watts of cw or ssb or fm or rtty that has kept so many of us absorbed in the miracle of long-distance radio. But will this sense of wonderment be regenerated in those who come after us? Or will satellites and ocean cables and the ability to pick up a telephone and dial through to Sydney or San Francisco destroy the feeling that radio is a near miracle. Looking towards the future, Bill Leonard puts it thus:

"The real test for amateur radio will come when the entire generation of the original radio enthusiasts has passed on. Then the question is whether the next generations care enough about the spirit of experimentation and the miracle of through-the-air communications to carry it on, and inspire others to get interested and become involved."

Bill Leonard believes the hobby will last at least another 100 years—but not, I suspect, if the challenge of radio dx propagation ever disappears.

VXO 14,000 to 14,025kHz

On a number of occasions we have pointed out that frequency synthesizers are not usually the ideal solution for high-performance hf or vhf amateur equipment (although they do have their uses): it is partly a question of the fixed increments, but even more the appreciable noise sidebands generated in low-cost synthesizers. There is and seems likely to remain a role for the really good variable frequency oscillator, and one of the most effective approaches, if you can accept a limited tuning range, is the variable crystal oscillator (vxo) which should provide a stability a hundred times better than an LC oscillator, provided the degree of crystal pulling is restricted.

There have been few fundamental changes in vxo design during the past 20 years or so, but Frank Noble, W3MT (*QST* March 1981, pp34–7) provides an interesting tutorial on vxo design and supplies the circuit arrangement shown in Fig 1. With a suitable crystal (partially-plated AT cut, fundamental mode, type HC6/U, 14,030kHz, 32pF) and good-quality components for all frequency determining components, W3MT reports that it can be adjusted to provide a virtually rock-steady output (within about 10Hz over 30min) at the lowest frequency, ie where the crystal is being "pulled" most so that stability is at a minimum. C2 is adjusted so that this frequency is 14,000kHz, and the oscillator can then be tuned over about 14,000 to 14,025kHz using a dual 140pF capacitor, preferably with midline plates. With a change of crystal, other similar frequency ranges can be selected.

Refinements include two buffer stages and a 14MHz half-wave filter for harmonic attenuation. W3MT built his unit around a perforated, matrix board rather than printed wiring. He notes that although the oscillator keys quite well, there is inevitably a degree of chirp, and for full break-in operation he recommends a heterodyne-type arrangement. The key component is likely to prove to be the series-loading inductor, L1, and it might be interesting to discover whether stability could be further improved by using one of the high-stability Oxley inductors described in *TT* June 1981, pp531–2. A "netting" frequency-spotting facility is included, which may come as a welcome feature to those who have struggled to find some way of accurately zero-beating to incoming signals on modern hf transceivers!

Coping with 18 and 24MHz

The possibility that operation on a "secondary" basis may be permitted next year (at least in some countries) on the new 18 and 24MHz bands (18,068–18,168kHz and 24,890–24,990kHz) is concentrating a good deal of thought on multiband antennas. One of the simplest wideband antennas would be a centre-fed dipole, cut for 14MHz and using balanced open-wire or 300Ω feeder in conjunction with a suitable atu providing a balanced output: Fig 2. A 33ft centre-fed dipole could be used in this way on 14, 18, 21, 24 and 28MHz despite what you may have read elsewhere on the need to have a resonant "top". The effectiveness of a good centre-fed dipole should never be underestimated. But there are many amateurs who will seek to achieve gain and directivity from their antenna without all the problems (and inefficiency) of nested elements and where the size or "aperture" of the 14MHz dimensions is utilized to provide additional gain on the higher frequency bands. One possibility, mentioned later, is to form log-periodic or long-wire antennas with "stretched" elements; another possibility, requiring less space, would be a symmetrical centre-fed W8JK "flat-top" bidirectional driven array, again provided that it was fed with balanced open-wire or 300Ω balanced line from a suitable atu.

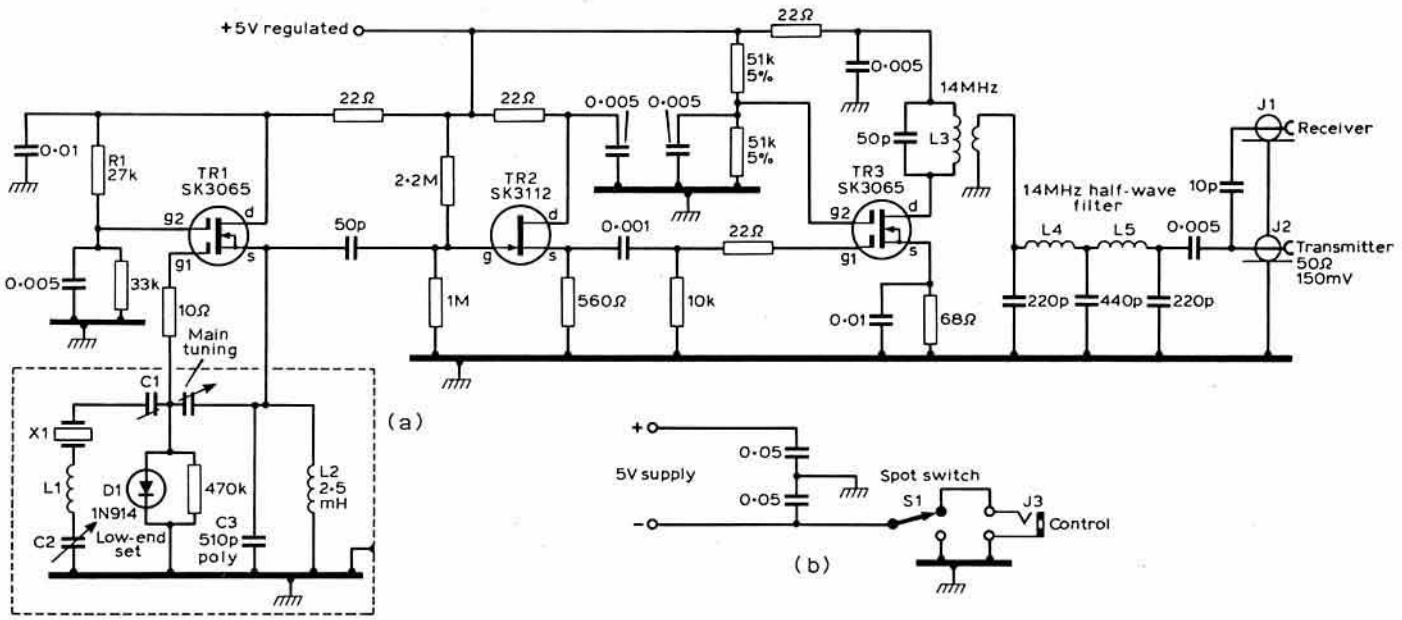


Fig 1. The W3MT high-stability vxo. The control jack J3 allows the oscillator to be energized from a tr switch and provides a spotting switch for netting with the main transmitter "off". C2 is air-variable 140pF. L2 is 12μH (typically 64 turns at 32tpi, 0·5in dia, 24awg). L2 is 2·5mH rfc. L3 slug-tuned ceramic coil, 0·37in diameter, 1·6-3·1μH set about 2·6μH with two-turn link over cold end. L4, L5 0·57μH, six turns hook-up wire as L3.

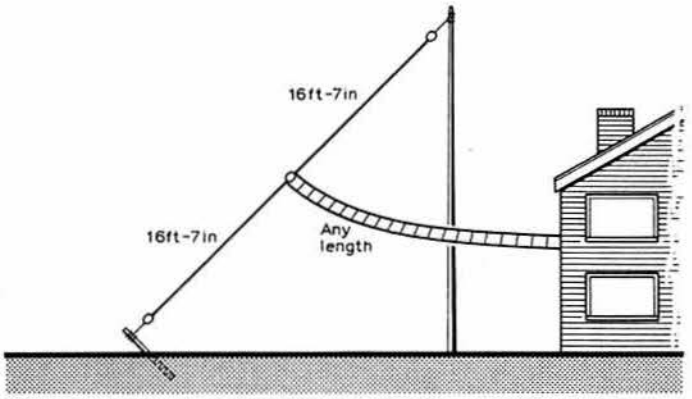


Fig 2. A "guy wire doublet" cut for 14MHz should work reasonably effectively on 14, 18, 21, 24 and 28MHz provided it is fed with open-wire or 300Ω balanced line from suitable atu

A new look at the W8JK

For many years the W8JK, first of the "flat-topped" close-spaced arrays, has suffered a decline in popularity when compared with the unidirectional Yagi and the various unidirectional driven arrays discussed below. All close-spaced arrays, driven and parasitic, unidirectional and bidirectional arrays derive from the basic work at RCA of Dr G. H. Brown (*Proc IRE* January 1937, pp78–145). Historically, the driven bidirectional arrays of Dr John Kraus, W8JK, of Ohio State University, were the first flat-top arrays to become popular on the amateur hf bands from 1937–8 onwards, both for rotary and fixed arrays.

In *Ham Radio* (July 1981, pp60–3) Frank Regier, OD5CG, of the American University of Beirut, takes "A new look at the W8JK antenna". He goes right back to the original design based on two close-spaced transposed dipoles centre-fed 180° out of phase with balanced line: Fig 3. He shows that despite the disadvantages of bidirectivity for reception, lower gain (at resonance) than an equivalent Yagi and its low radiation resistance, the W8JK does possess some useful advantages.

He draws particular attention to the fact that, as with the centre-fed dipole, it will operate reasonably satisfactorily over something like a 2·5:1 frequency span, with gain increasing on the higher-frequency bands. Theoretical free-space gain with $\lambda/2$ elements is about 4–4·5dB, but this increases to about 6dB at twice resonant frequency, and up to 7dB at 2·5 times resonant frequency. In practice rather lower gains can be expected. Element spacing is relatively uncritical and $\lambda/8$ spacing at the design frequency remains satisfactory throughout the frequency span. Finally, he claims that such an array will work surprisingly well at low heights where it does not suffer from the detuning effect of earth which tends to degrade Yagi performance.

OD5CG in fact claims that the W8JK array can outperform an equivalent three-element Yagi array when the height is less than about $\lambda/2$ above ground, provided that the symmetry of the W8JK array is maintained (ie it is all sufficiently far away from nearby structures, trees etc). He suggests that an array with an overall length of 40ft (11ft element spacing) would give good results on every band from 10 to 28MHz (including good reception on the various broadcast bands) though his own array is smaller: 30ft long, 8ft spacing, and is for 14 to 28MHz. He uses 300Ω balanced twin feeder; which is convenient except when it rains, when the impedance tends to become erratic (open-wire line avoids this problem).

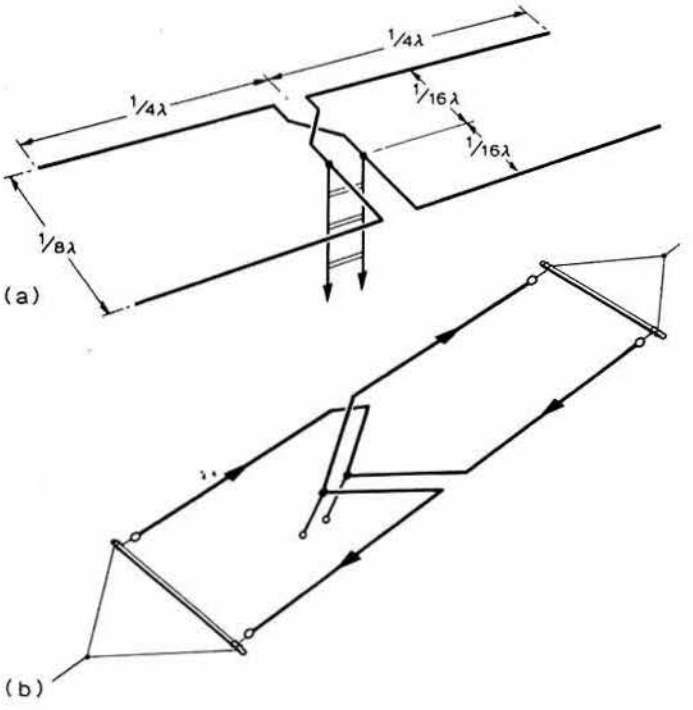


Fig 3. (a) Basic single-section centre-fed W8JK bidirectional array. With a 14MHz design frequency it should work well (and with some extra gain) at all frequencies to 28MHz. It consists of two closely-spaced dipoles fed out of phase. Spacing is non-critical but symmetry should be preserved and the array fed from balanced line through suitable atu. (b) W8JK implemented in wire form as fixed array, but note that the low radiation resistance calls for good insulation and minimum coupling off the ends into supports (use nylon or plastic rope etc rather than support wires)

Zapping a nicad

An article "Understanding and using the nicad battery", by Dave Ingram, K4TWJ (*CQ* May 1981, pp26–27) gives some advice on the useful, if rather uncertain, process of rejuvenating a faulty cell by zapping it with high current. He writes:

"As time continues and life progresses, the inevitable happens: a cell discharges, reverses polarity, and short-circuits. This cell can often be located with a sensitive voltmeter by lack of voltage and possibly low internal resistance. There are two alternatives: the first is to replace the faulty cell. The second is to attempt rejuvenation by directing a heavy burst of current into the cell *for less than a second*. Briefly connect a 12V source providing 5–12A for one or two half-second periods, with positive-to-positive, negative-to-negative connections. If three short zaps are unsuccessful, the cell is probably beyond help."

Unidirectional driven arrays (monoband)

George Brown showed that when two elements are fed 135° out-of-phase with equal amplitudes a cardioid-type pattern results. Over the past 45 years various ways of implementing such arrays as flat-top beams have been devised, of which the "HB9CV" and "ZL-Special" are among the better known, although the "G8PO" enjoyed a brief spell of popularity for fixed arrays because it was readily reversible.

The ZL-Special was so named and first described in print by Fred Judd, G2BCX. Although the design is often also credited to G2BCX, his original article in *Short Wave Magazine* (July 1950, pp337–9) made the position clear: "Data on the aerial to be described came to the writer from New Zealand, hence the name ZL-Special. Little is known of its origin save that it was designed in the USA, just prior to the late war, for commercial purposes. Since the war it has been modified and developed for amateur use by W5LHI, W0GZR and ZL3MH. Further tests and measurements made by the writer may be of interest". A later writer confirmed that in 1949 ZL3MH was using the system on 14 and 28MHz "with outstanding results".

The ZL-Special, of which there are several slightly different versions, basically consists of two close-spaced dipole elements, both of which are driven (preferably with near equal amplitudes) with a phase difference of approximately 135°: Fig 4. The 135° difference is achieved by using $\lambda/4$ (45°) phasing section which is transposed so that 180° − 45° = 135°. The elements may be folded-wire dipoles or rod elements; one version uses 300Ω twin cable throughout, another uses coaxial feeder and rod elements.

A more sophisticated version of what is essentially the same form of antenna was developed by Rudolf Baumgartner, HB9CV. In this case, self-supporting rod elements are normally used with T-match or gamma-match sections between the transposed phasing section and the driven

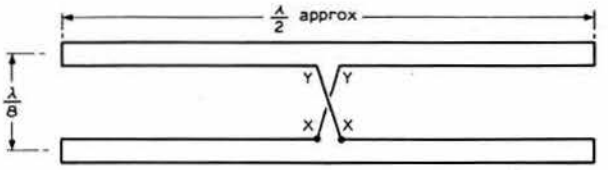


Fig 4. Basic arrangement of ZL-Special unidirectional driven array (monoband) using open-wire line or 300Ω feeder for the folded elements. Usually fed with low-impedance 120–150Ω twin line or, less correctly, 75Ω coaxial cable at points XX. Other variations include use of unequal lengths for elements

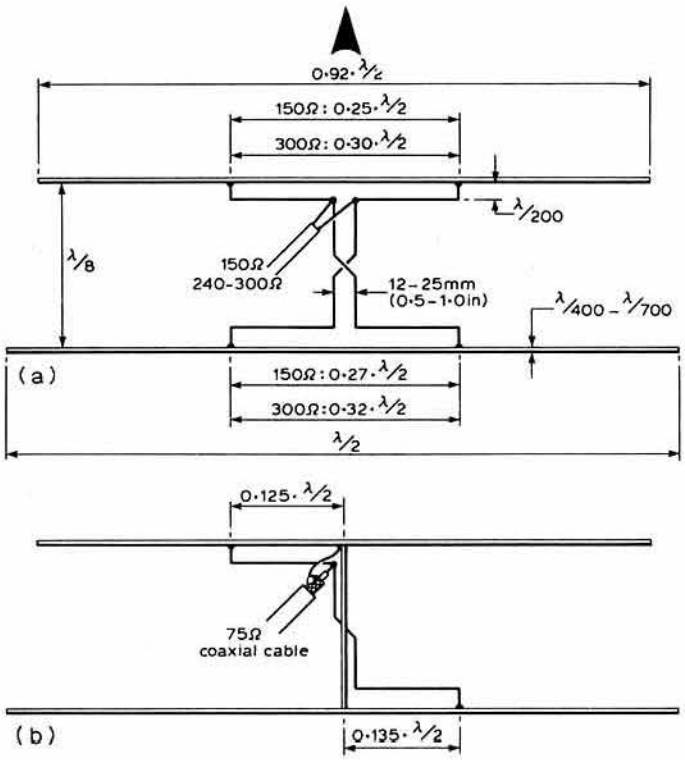


Fig 5. Basic arrangements of the HB9CV unidirectional array showing use of (a) T-match; and (b) gamma-match sections

elements; Fig 5. The array is suitable for use with either 75Ω coaxial cable or balanced feeders of from about 150 to 300Ω. A long, detailed account of the origin and principles of the HB9CV array has been published quite recently in *Radio-REF* (March 1981, pp155-71) although the antenna itself has been quite widely used for over 20 years (a 144MHz HB9CV portable array was published some years ago in *TT* and appears in recent editions of *ART*).

Les Moxon, G6XN, in "Gains and losses in hf aerials—Part 1" (*Rad Com* December 1973) noted: "There are several popular designs of two-element beams in which both elements are driven. In principle the advantage of driving is that phase and amplitude can be adjusted independently so that spacing is less critical and deep nulls are obtainable in back directions even with dipole elements. Unfortunately the usual methods of phasing are based on the false assumption that 'one eighth-wavelength of line equals 45° of phase shift' which is true only if a perfect match exists *at the elements,* whereas phasing, matching and current ratio are all critically interdependent. Since the radiation resistance is in the region of 15Ω, for maximum gain with dipole elements a matching device (eg T or gamma match) is essential, and this is usually not provided."

Judged on this basis the HB9CV emerges rather better than the ZL-Special, although it should be appreciated that the latter design is to some extent self-compensating and can provide a good front-to-back ratio in many cases. G6XN noted that while a good two-element Yagi can approach the theoretical maximum forward gain of 5·2dB reference dipole, a ZL-Special is unlikely to exceed 3-4dB gain. This figure is nowadays generally accepted, although originally optimistic claims of 6-7dB were commonly made.

It will thus be clear that the gain of a bidirectional W8JK (4-4·5dB) may well exceed that of a unidirectional monoband driven array. One does, of course, lose the advantage of the good cardioid-type back-to-front ratio when receiving, but instead one finds quite deep nulls at 90° and 270°.

It is true that amateurs often judge the performance of an array on the basis of front-to-back ratio and frequently adjust the arrays on this basis (in the case of a Yagi or quad, losing about 1dB or so of forward gain in the process). But then in practice in some circumstances the receiving front-to-back ratio may prove as operationally important as additional forward gain.

Stretching the log-periodic

The notes (*TT* June 1981) on VK5NN's experiments with stretched 144MHz and hf antennas attracted the attention of a number of readers, including "Dud" Charman, G6CJ, whose article in the July 1961 issue of

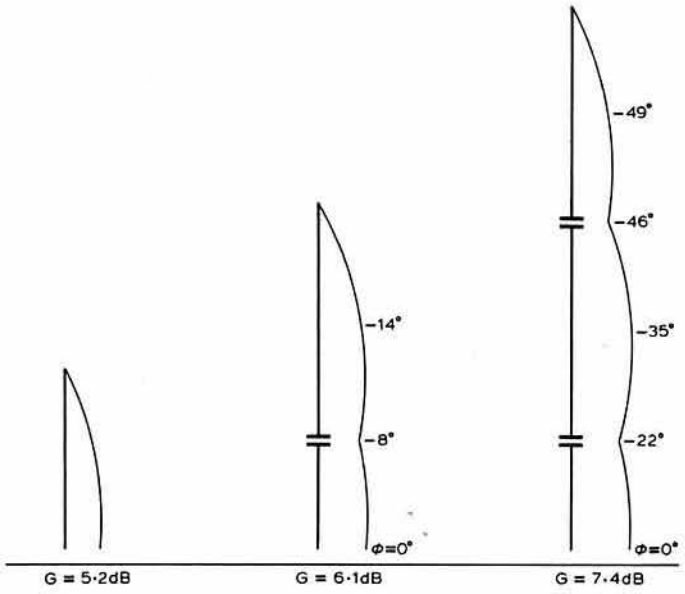


Fig 6. Use of stretched elements in vertical monopoles. The omnidirectional low-angle gain figures are relative to isotropic, and in practice the basic λ/4 monopole in amateur use seldom achieves the theoretical vertical-radiation-pattern directivity gain due to site conditions (*TT* July)

RSGB Bulletin remains the basic source of information on this technique. G6CJ drew on the EMI work on this type of loaded wire antenna which began with E. C. Cork's formulation of the principles in 1938 and included the effective but "unfashionable" EMI tilted-wire Band 1 television receiving antenna of the early 'fifties. In the mid-'fifties, in his professional capacity, G6CJ developed a Band 3 array based on this technique, and went on from there to adapt the system for hf bands as described in his 1961 article.

G6CJ pointed out that stretched antennas have enhanced directivity and provide inherent gain over conventional dipoles or monopoles (for a multiplication factor of two you get an extra 1dB, for n=3, 2·1dB; and for n=4, 3·2dB); Fig 6. The system is particularly attractive as a monopole or ground plane antenna for low-angle radiation, not only

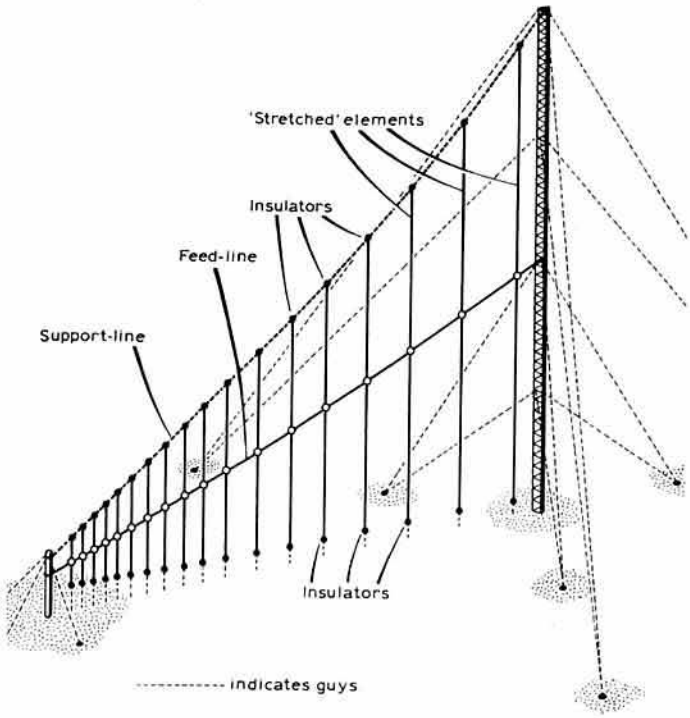


Fig 7. The TCI Model 510 professional "extended aperture" (stretched) vertically-polarized log periodic array. Very high gains can be achieved in this way but the system does require very high supports to achieve good low-frequency performance (over 200ft at about 7MHz)

because of the sharpened-up vertical radiation pattern but also because the increased radiation resistance reduces ground losses and increases bandwidth. The system is also of considerable interest in the long wire form since radiation is concentrated into a single (or bidirectional if unterminated) lobe rather than the conventional beam splitting and sidelobe radiation pattern of long wire antennas.

But the principle is now being exploited professionally in a manner not mentioned in G6CJ's 1961 article. This is in the form of high-gain extended aperture log periodic arrays. While the commercial models made by TCI use one or two masts some 210ft high, it would be possible for an amateur to erect a fixed vertically-polarized log-periodic array of this type covering, say, 18 to 70MHz with a stretch factor of two, using a single mast or support about 55ft or so high. Patents on this form of stretched antenna are held by TCI, and it would be an infringement of these to manufacture such arrays for sale; but this, of course, does not prevent amateurs from erecting a homebuilt array for their own use.

Gordon Sinclair, G4BWH/W6, who is a senior antenna engineer with TCI, has sent details of the large point-to-point arrays (TCI Models 510 (Fig 7) and 512 series) together with technical notes by Dr Robert L. Tanner, president and technical director of TCI.

These antennas, occupying relatively compact areas by professional standards, provide the high gains more usually associated with very large rhombics with an overall span of some 1,700ft. Traditionally, log-periodic arrays of dipoles or monopoles have been regarded as useful broadband arrays for medium-distance point-to-point or hf broadcasting operation, but are seldom considered as having high gain in relation to their size. This is because in the log-periodic form of array only those elements fairly close to resonance at the operating frequency are "active", the rest are virtually passengers. To quote the TCI technical notes:

"Conventional log periodics consist of arrays of dipole elements of progressively increasing length. At any particular frequency almost all the radiation from the antenna comes from a small number of elements adjacent to each other, which is known as the 'active region' of the antenna . . . This sets a clear limit to the broadside gain in the E-plane dimension that can be achieved with conventional log-periodic antennas. The practical effect is that most log-periodics have been used where moderate gains (10 to 14dBi) are required. Where gains of the order of 18dBi were desired, users generally settled for rhombics or very large log-periodics. The extended aperture antenna brings the desired broadside action into play, resulting in very directive, compact (relatively) antennas with great material and land savings and greater structural reliability." In effect at any given frequency more of the stretched elements are in the "active region" of the array, due to the lower Q of the elements.

It would be equally interesting from an amateur point of view to find out what sort of results would be achieved using stretched elements in a bidirectional W8JK fixed array!

A more conventional (non-stretched) but conveniently lightweight broadband log-periodic antenna is described in *QST* (July 1981) and we may return to this subject later.

Stretching and the slotted cylinder antenna

Ivan James, G5IJ, who recalls that the basic principle of stretched loading of antenna elements was noted by Beverage in 1923 in connection with his very long wire antennas, points out that there are alternative methods of stretching an element: instead of series-capacitance loading, shunt inductance loading can be used, provided that two (or more) terminals are readily available to shunt the inductance(s) across. Apart from applications of such a technique to the Beverage antenna, what he has in mind is the "slotted cylinder antenna" as disclosed by Alan D. Blumlein of EMI (who established a historic name in television, stereo records etc before his tragic wartime death while flight-testing H2S radar) in British patent 515684, applied for on 7 March 1938, although the antenna is often ascribed to Alford.

G5IJ shows that, mathematically, the slotted cylinder antenna element (as used, for example, by the BBC in many of their vhf/fm broadcasting installations) can be represented as a transmission line of series inductances, shunt inductances and capacitors forming the equivalent of a bandpass filter with stretched waves. He mentions that G3JVL has done some excellent work in adapting the slotted cylinder for GB3IOW, and has also developed a centre-fed 2λ-high slot, only 1·5in in diameter, in which the standing wave is increased by four times, providing a 1,296MHz horizontally polarized antenna for mobile operation, based on the so-called Alford slot.

G5IJ believes there is increasing interest among amateurs in the slotted cylinder for 432MHz and above: some basic references to such antennas include: "Long slot antennas" by Andrew Alford, *Proc National Electronics Conference*, 1946, pp143–5; "Slotted cylinder antennas", by Jordan & Miller, *Electronics*, February 1947, *20*, pp90–3; and *VHF-UHF Manual*, by D. S. Evans, G3RPE, and G. R. Jessop, G6JP (3rd edition pp727–8).

Three-wire 14MHz ground-plane

G. V. Entwhistle, G3MXT, is one of a number of readers who have contributed to the discussion on vertical antennas (*TT* July etc). He writes:

"It seems to me that the great advantage of verticals over horizontals in many average locations is that they are less affected by the modern profusion of parasitic horizontal wires such as overhead telephone lines etc.

"Fig 8 shows a 14MHz groundplane antenna which has been in use at G3MXT since 1964. It was found by practical experiment that the optimum number of radials, in this case, was three; it would work well with four or two radials but, according to the swr indicator, three sloping radials provided a near 'perfect' match.

"Under short-skip conditions, comparing this antenna with a horizontal λ/2 folded dipole, the differences are very noticeable. It is rarely possible to maintain a European contact for more than about 10min with the groundplane, yet it appears to be omnidirectional as far as low-angle dx is concerned, in spite of numerous local telephone wires.

"To anyone who has never tried a groundplane antenna before, or who has been disappointed with a conventional coaxial-fed type, I can recommend this one."

The antenna uses a three-wire folded λ/4 element with three sloping radials. The feeder is ribbon-type 300Ω twin using the technique described in *TT* several years ago (*ART7*, p313) of removing "window slots" from the ribbon dielectric to reduce losses but primarily to minimize wet-weather changes.

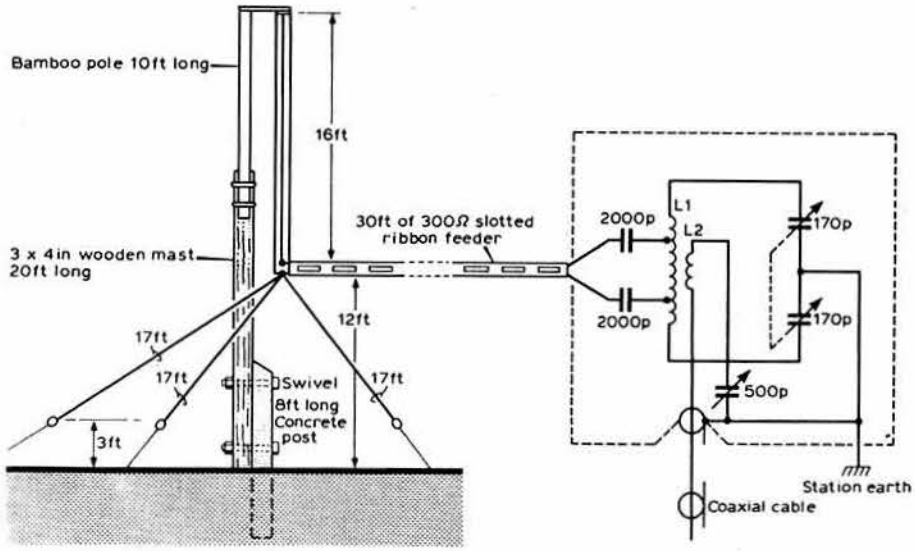


Fig 8. G3MXT's 14MHz three-wire (folded) groundplane using 7/029 pvc cable for vertical element with wires 1in apart with paxolin clamps every 3ft. The atu consists of L1 10t, 14swg. L2 4t, 16swg enam wound over centre of L1 with internal diameter 1·5in, 2·5in overall length, feeder taps 2·5t from each end. Feeder is 300Ω ribbon with "window" slots

Multiband groundplane

Bert Whatley, G2BY, has for several years been using a multiband form of the inverted-T groundplane (see July *TT*) with two in-line radials (ie 180° spaced) and finds it gives "really excellent results, seemingly with no preferred directions". He has tried adding additional elevated radials but find these make virtually no difference except in so far as they may either assist or hinder the impedance matching on the various bands.

In his case he uses a 26ft vertical element in a Butternut differential reactance vertical well suited to limited-space conditions. There are no traps, the whole 26ft being used on all bands from 3·5 to 28MHz, except on 21MHz where the λ/4 is terminated by a linear decoupler. Separate pairs of radials are used on the bands, with the exception that the 7MHz radials also serve as 3λ/4 radials on 21MHz.

G2BY has the vertical element mounted on the top of a 17ft wooden mast (using 3 by 3in timber) standing out from the rear wall of his bungalow by about 18in. Since this is at the gable end, the sloping radials go nicely down the sloping gables on tall stand-off insulators. The 7/21MHz radials go to short posts mounted on the garden fences on each side of the bungalow (presumably he does not have any 3·5MHz radials). The antenna is "grounded" at the feed point via a heavy wire running down the mast to two buried stages as a protective measure. The wooden mast is hinged to a U-bracket at the lower end, so that to lower the mast and antenna it is necessary only to release the mast from the stand-off wall bracket and "walk" it back, having first released the radials from their stand-off insulators; a single-handed job!

This antenna convinces G2BY that Dr George Brown was right in originally specifying just two in-line radials for his original ground-plane antennas; incidentally he recalls hearing strong signals from the American police between 30 and 45MHz during the 1937–8 sunspot maximum period.

More on meteor scatter

The recent notes on the professional use of meteor scatter for traffic handling (*TT* July) brought comments from Chris Bartram, G4DGU, and Jan Martin Noeding, LA8AK, both of whom have considerable experience of using this mode for amateur-type contacts.

G4DGU draws attention to a little-known method of reducing the overall path loss; this is to orientate antennas to use dense meteor trails nearly overhead the distant station, rather than the more conventional technique of aiming at trails roughly midway between the two stations: Fig 9. For a typical station separation of about 1,000km, a little simple geometry shows that there can be a very useful 8·3dB reduction in path loss. Other advantages can also result: the high upward angle of one of the antennas means that its height above ground is of little or no consequence. A four-element Yagi array shooting upwards can give reasonable results. G4DGU mentions that many observations have shown the advantages of overhead reflection at one end of the path—but he finds it difficult to convince other ms enthusiasts.

LA8AK has been endeavouring to raise transmission rate up to about 300wpm (1,500 letters/min) using morse code keying of 144MHz ssb

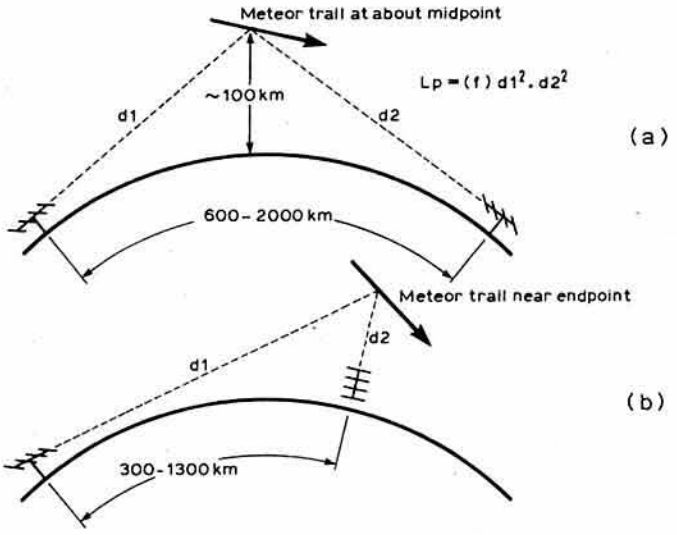


Fig 9. Showing how the path loss of meteor-scatter signals can be reduced by using endpoint reflection: (a) conventional path with meteor trail at about mid-point; (b) meteor trail near endpoint

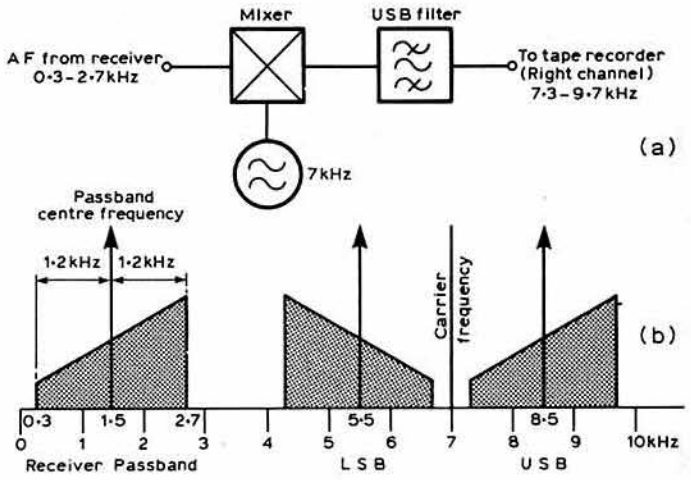


Fig 10. (a) Audio-frequency up-converter used in conjunction with high-speed morse signals for meteor scatter. (b) Problem of the selectivity characteristics of the audio usb filter

transceivers, with incoming signals recorded on tape and then later replayed at about one-tenth speed for transcription. He believes that up to 600wpm might be possible, but points out the problem of "ringing" of signals passing through an ssb crystal filter. On his Kenwood (Trio) TR7010 the filter introduces quite severe distortion at 1,500 letters/min (ie about 240 baud).

To provide a clean signal he uses a 1,500Hz tone oscillator (zero-crossing keyed) to the microphone input socket of the transceiver, and has been testing an audio up-converter in the receive chain during the past one-and-a-half years (about 50 contacts) and believes it represents a worthwhile improvement.

Normally a 1,500Hz tone recorded and replayed at one-tenth speed produces a tone at about 150Hz. With an up-converter, he records the 1,500Hz tone at about 8,500Hz so that the slowed-down signal is still a useful 850Hz. He has found it quite a problem to make sufficiently sharp af filters, and the sound seems lower in frequency than it really is because of interference beats between 8,500Hz and 5,500Hz, but several of the Scandinavian ms enthusiasts are currently working on this problem.

LA8AK is amused to find that some of the keen microprocessor enthusiasts cannot understand why their decoding systems cannot cope with more than about 400 letters/min, even when using sophisticated equipment designed for over 1,000lpm rtty fsk-mode. LA8AK believes that the human ear, with the aid of a tape recorder, is still more effective!

Nicad charging from car batteries

Leo Finkelstein, WA4AOL (*QST* June 1981, p.57), uses the arrangement shown in Fig 11 to enable him to operate a Trio TR2200A from his car battery while at the same time recharging the internal nicad battery pack.

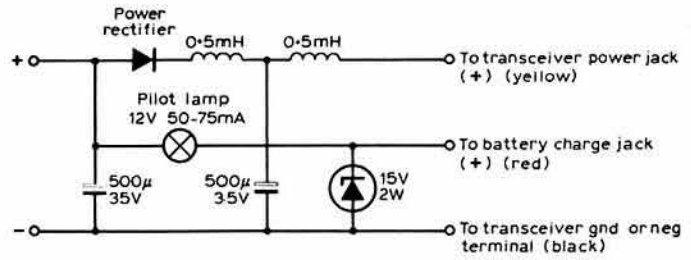


Fig 11. WA4AOL's system for charging nicads in his transceiver from the vehicle battery while operating from the battery. For negative earth systems

The circuit includes reverse voltage protection, hash filter, and a voltage and current regulator for the nicad charging arrangement. The rectifier should be rated at 50V 2A, and the wiring colours relate to the TR2200 accessory power cable. The circuit arrangement assumes the customary negative-earth car electrics.

Capacitors for shunt-fed amplifiers

George Jessop, G6JP, was interested in, but not entirely happy with, LA8AK's proposals for increasing the efficiency of stripline 144MHz

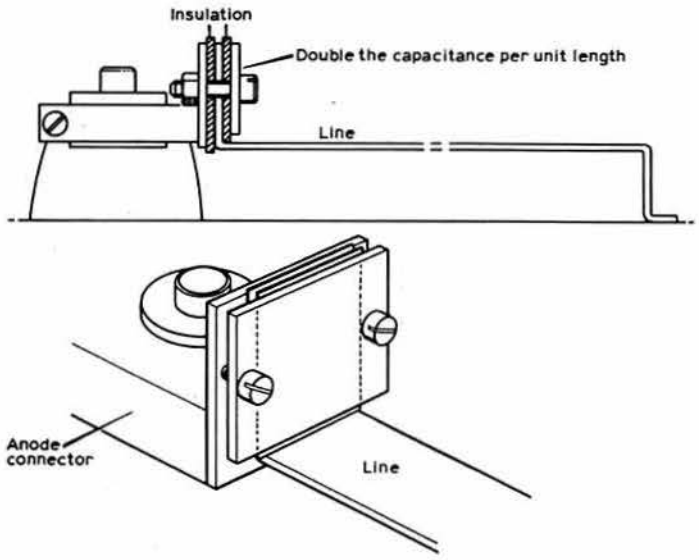


Fig 12. G6JP's suggested form of capacitor for strip-line 144MHz amplifiers using λ/4 lines to provide extra capacitance per unit size compared with the arrangement used by LA8AK. This capacitor should be easy to make on the kitchen table, preferably with mica dielectric which is also a reasonably good thermal conductor

using shunt-fed anode circuitry and λ/4 lines (*TT* July 1981, p629). Some of the points that may deserve further thought, he suggests, are:

(1) It is preferable to keep high voltages away from large pieces of metal.

(2) The use of ptfe for insulation is not an entirely satisfactory choice since it has a low dielectric constant, thus increasing the size of the capacitor plates for a given capacitance. G6JP feels that mica, although more fragile than ptfe, would be the more suitable material. Mica is also a reasonably good thermal conductor, so helping to remove heat from the valve.

(3) There may be some possibility of increased harmonic output due to the relatively long anode lead, which could prove, for instance, harmonically resonant at 432MHz.

G6JP mentions that the *VHF/UHF Manual* has two 144MHz slab-line amplifiers with 2,000pF shuntfeed capacitors. He also points out that a rather different form of construction (Fig 12) makes it possible to double the capacitance for a given unit size of plate.

Defence hf communications

For about a decade—from roughly 1965 to 1975—there was a tendency in the UK to believe that the future of defence communications, except those of a local, tactical nature, would be found in such satellite projects as "Skynet". Consistency, reliability, economics, size etc, it was argued, were all in favour of satellites, all against any major use of hf. The second world war had shown how vulnerable hf is to interception and direction-finding; while "multipath" severely limited maximum rates of traffic handling. Admittedly the jungles of South-East Asia had shown that, even over short ranges, vhf could be very unreliable. So it was confidently predicted that the day would come when almost every vehicle and every ship would have its own small dish, possibly with some back-up use of hf/vhf for tactical purposes. It was much the same in the USA where the most elaborate digital, secure speech circuits were planned that would allow the President to speak directly to every front-line soldier (it was only later that people began to get a little worried about what the front-line soldiers might say to the President!).

Recently, however, there seems to have been a significant shift in the forward planning: NATO countries are currently planning to spend at least £100m on hf communications, using such "ancient" systems as low-speed rtty (50–75 baud), unprocessed analogue speech (ssb), and "even" hand-speed morse.

C. R. M. Noonan ("HF communications in defence", *Communication & Broadcasting*, Vol 6, No 3, June 1981) notes that "this picture does not conform to the accepted image of defence radio communication, and seems "old hat" when compared to wideband satellite communications, microwave line-of-sight or tropospheric scatter systems, with their capability of providing multi-channel, digitally-encrypted links carrying speech and high-speed data." He points out, however, that the properties of hf, for all their vagaries, still offer important advantages—and that "it is now believed that in time of war an orbiting satellite would be vulnerable to enemy action". He also admits what many amateurs have long believed: "Morse can continue to pass traffic in conditions which would defeat other systems".

There is another factor, not specifically related to frequency, that appears to be causing increasing concern to defence planners: protection against the destructive electromagnetic pulse (emp) that would follow a nuclear explosion in the upper atmosphere. Because of the extremely rapid rise time of an emp, normal surge and static protection provided on solidstate communications equipment is unlikely to prove effective, although various combinations of gas- and spark-gaps etc are being considered.

According to a recent article in *The Guardian* (brought to my attention by Tony Harwood, G4HHZ) a single nuclear explosion 300 miles high could devastate unprotected electronic systems over much of a continent. While the question of "hardened" communications and control systems may not seem of direct concern to amateurs (I doubt if we need to worry about preserving our equipment for amateur operation after a nuclear holocaust), emp protection seems likely to lead to a revival of interest in miniature thermionic devices: valves, like hf, could be on their way back!

For instance, *The Guardian* writer claimed that: "Western military technologists received a shock akin to emp itself when they lovingly dismantled the equipment on board the (Russian) MIG-25 which landed in Japan in 1976 with a defector at the controls . . . The body design was unexpected. There was little use of titanium, and the body shell was in the form of a Faraday cage. Although the on-board computers and control systems used up-to-date circuit designs, they employed a host of miniature thermionic valves . . . the correct interpretation is that the Russians were already designing for maximum hardness against emp . . . the thermionic valves are at least a million times more resistant to emp than conventional (solidstate) electronics."

While that "million times" may represent a degree of poetic licence, and I suppose it is always possible that the Russians had simply run a bit short of integrated circuits, there can be no doubt that solidstate devices are, and seem likely to remain, extremely vulnerable to lightning discharges, static build-up etc, as well as emp, particularly when connected to large elf/mf/hf antenna systems.

HF transmitters: solidstate or valves II

In the June *TT* I included some brief comments on the sort of questions that amateurs need to ask themselves when considering whether their next transmitter or transceiver should be "all-solidstate". As I noted then, such a decision depends upon the individual circumstances: for example, whether the rig is required exclusively for mains operation or partly for mobile/portable operation. Indeed I tried to present a reasonably impartial case, for and against, while leaving it to the reader to make up his or her own mind.

One or two readers felt that my comments were not "positive" enough and were clearly finding it difficult to make up their minds purely on the basis of current advertising etc. I must admit that I had thought that readers who had followed the various comments in recent months on solidstate reliability, parasitic oscillation in transistor amplifiers, the problems of home servicing etc, would have had little doubt that I, for one, have yet to be convinced that for fixed station operation the days of the valve should be regarded as over! For home-construction I would echo VK5NN's comment (*TT* April 1981) that "for transmitters, transverters, receivers and converters of practical simplicity, valves remain imcomparably superior for one-off, homebuilt projects". Of course there are exceptions: for low-noise uhf/microwave front-ends no valve can touch the low noise of the gasfet! For portable operation, who would wish to waste power in heaters? And few people would ever want to go back to all the problems of high-voltage mercury-vapour rectifiers etc once they had savoured the silicon diode. It is all a question of "horses for courses". And my reading of the race-card is that for output powers much in excess of 10W, all-solidstate still has relatively little in its favour, when it comes down to basic communications effectiveness, when using mains supplies.

One recognizes that some amateurs actively dislike the process of manually tuning up a transmitter when they change bands, and that for an ardent hf contest operator the few seconds saved with broadband circuits could be important: though one notes that many of the broadband transmitters are preferably used in conjunction with atus to overcome the operational problem of transistor protection circuits that automatically reduce power output when the swr is more than 2:1. Additionally, there is the problem that with such protection circuits you may find that certain types of swr meter become difficult to use. Likewise they virtually rule out any of the older (pre-swr meter) methods of tuning up. Valve equipment is generally less likely to suffer a major calamity and is almost always easier to repair.

One suspects that a major inducement for an amateur to go all-solidstate is the feeling that valves, valveholders, high-voltage mains transformers and the like will soon be virtually unobtainable. Certainly small-signal and receiving-type valves (including tv line-output valves so often used in hf transceivers) are no longer manufactured in large numbers; nevertheless it seems unlikely that valves such as the 6146B etc will disappear entirely for a considerable time, though undoubtedly they will become increasingly expensive: the wise precaution is to buy some spares now.

There are many reasons why the professionals favour solidstate at least up to about 1kW; relatively few of these reasons apply to amateur operation, and virtually none to the one-off homebuilt unit or to the factory unit that you want to use as a flexible test bed for a variety of antennas etc.

Another expanded-scale voltmeter

The notes on expanded scale voltmeters by G3NXM and GI4CRQ (*TT* June and August) have encouraged V. S. Evans, G4AVT, to add a few further ideas. He writes:

"While G3NXM is using an accepted and simple method of spreading a small segment of voltage over the full scale of his meter, the use of a 50μA meter with a 60kΩ series resistor leads to a very non-linear reading due to the zener diode being starved of current. The BZY88 and other commonly available zener diodes require several milliamps before they are on the linear portion of their characteristics. So at least 1mA should flow through the diode, in this case at the low end of the voltage range.

"It is preferable to use a meter with an fsd of 5 or 10mA, with a correspondingly lower value series resistor. A sensitive meter can be used, if convenient, but with a shunt resistor connected across it to provide an fsd in the range indicated.

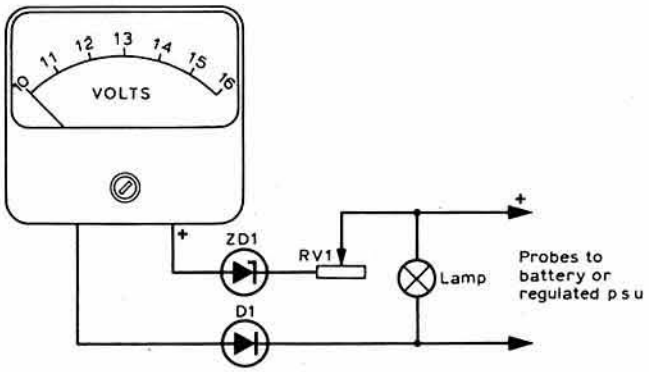


Fig 13. G4AVT's expanded-scale voltmeter

"For many years I have had such an arrangement (Fig 13) in a plastic case for the checking of my car battery on and off charging voltage and/or starter load. It is designed to read 10–16V, and has an ordinary diode in series to protect the meter from reverse polarity connection. There is also a 14V, 100mA les lamp mounted on the case so that I can read the meter in the dark.

"I always carry this meter with me on mobile expeditions etc, and it has proved invaluable on such occasions."

Cable tvi and ivt

An increasing number of television viewers in North America now receive their television signals from cable rather than off-air, and it might be supposed that this reduces the problem of tvi. In practice, however, there does seem to be arising a new problem. The wideband multichannel systems now being used mean that the channels are spread over a very wide segment of vhf, including the 144MHz band. In *QST* (June 1981, p57) Roy Williams, W6VON, reported that in his neighbourhood a popular sports channel is distributed at 145·25MHz (nominal). Since modern coaxial cables are relatively "leaky", this means that every time he attempts to transmit in the American 144–148MHz band "my neighbours suffer severe disturbance". Similarly, the leaky cable ensures that there is a good deal of unwanted radiation of the television signal to interfere with weak signal reception on the 144MHz band.

W6VON points out that while the local cable company responds promptly to appeals for assistance from its customers in curing individual problems, there is a need for legislation covering the entire American cable industry. In the UK this type of problem is largely confined to 3·5MHz, where some of the older hf distribution systems are susceptible to strong local signals; but generally vhf coaxial systems in the UK have so far been designed for only 4 to 6 channels and have no need (nor would they be authorized) to distribute at 144MHz—thank goodness! If, eventually, cable distribution is taken over by optical fibres, this type of problem might be entirely eliminated, but this still seems in the fairly distant future, although optical systems are already in limited use for the main trunk distribution in a few places.

Another problem that mainly affects American amateurs is that of rfi-related private lawsuits. The June *QST* reports that a long record of difficult and expensive litigation since 1977, arising from interference to a stereo radio system, has finally resulted in Donald Jellinek, K2AHL, agreeing in court to close down his station. Unfortunately, at one stage, he had formally offered to supply his neighbour with filters that would clear the interference, but despite considerable effort these filters have never proved entirely effective. Legislation in some parts of the USA makes it possible for tvi sufferers to bring private lawsuits on the formidable grounds of "trespass, nuisance, intentional infliction of emotional distress and deprivation of the right of privacy"! The fact that the interference might not have occurred had the domestic equipment been better designed from an electromagnetic-compatibility (emc) viewpoint does not seem to be an adequate defence.

Recently, Senator Barry Goldwater, K7UGA, has introduced an Amateur Radio Bill that seeks to improve the legal position of the amateur in a number of ways: it would set rfi susceptibility standards for domestic electronics equipment; permit the FCC to prohibit delivery of radio transmitters or amplifiers to any person unable to produce a valid amateur licence; make possible some minor exemptions from the secrecy provision of the Communications Act, facilitating self-regulation of the amateur bands; permit the FCC to use volunteer monitoring of the amateur bands by licensed amateurs; allow amateurs to provide assistance in the preparation and administration of amateur examinations; and double the term of American amateur licences from 5 to 10 years. Of course it still remains to be seen whether these amendments (to the American Communications Act 1934) will ever be approved.

Robert N. Wilderman, K3SRO (*QST* June 1981, p57) relates that in the USA more and more residential property now has protective covenants that prohibit the placing of any tower, pole or similar structure on what the purchaser fondly thinks will become his or her own property. This is quite apart from all the problems of local authority planning permissions and/or local restrictions on housing estates that seek to prohibit all outdoor antennas for reception or transmission. Protective covenants, once entered into, are legally binding and it is very difficult to have them set aside. The practice seems to be spreading in many countries (including the UK) and, while the keen environmentalist may sometimes have a good case for imposing restrictions on the community at large, it is perhaps unfortunate that such covenants seldom make any distinction between large "monstrosities" (to their eyes) and virtually invisible antennas. And it has always seemed to me that in the USA there are so many overhead power lines and their supports that an occasional antenna support mast or tower can hardly be said to disfigure a neighbourhood!

Tips and topics

In *QST* (June 1981) Keith D. Baker, VE2XL, suggests that extendable aluminium ladders can provide excellent temporary supports for hf and vhf antennas during contests, field days etc. They are readily transportable and can be erected, if necessary, by just one man. However, he points out that the lightweight pulley system usually fitted should be replaced by a heavy-duty pulley and rope, and even then *never* climb or stand on the ladder once it has been extended, even so much as one rung. He warns: "if the locking mechanism should fail, you would likely lose a limb or two, if not your life . . . never, never stand on the ladder and attempt to raise or lower the upper section. Do all the extending and retracting with the heavy-duty rope and pulley!" And, of course, keep the aluminium ladder and the antenna well clear of any overhead power lines etc.

Ivan James, G5IJ, was interested to see the circuit diagram of the 1940 Germany "spy" (Afu) transmitter (*TT* July) which could be used either with a crystal or as a self-excited keyed oscillator. It reminded him of his pre-war 1·8MHz (then 1·7Mc/s) 10W one-pentode transmitter that he described in the old *T&R Bulletin* (August 1935) and photographs of which appeared in several pre-war editions of *A Guide to Amateur Radio*. This used an Osram DET8 rf pentode with suppressor grid brought out to a separate pin permitting a.m. telephony with an af amplifier delivering only about 1W output. The crystal/vfo circuitry was almost identical. Interestingly enough, one of the first "suitcase" transmitters I recall being described in print was one used by Ted Cook (now ZS6BT) during travels around Africa in the mid-'thirties: this had a 25W transmitter built into one portable radio carrying case, with an O-v-2 receiver in a second, similar case. □

MICROWAVES

Charles Suckling, G3WDG*

High-efficiency dish feeds for 1·3 and 2·3GHz

The feedhorns to be described were developed from an original design by W2IMU. They are primarily intended for eme operation using circular polarization, but can be used as very efficient feeds for linear polarization also. They are designed for optimum operation with dishes having f/d ratios in the range 0·5–0·6, but can be used, albeit with reduced efficiency, with deeper dishes, eg f/d 0·3.

These horns differ from more conventional designs in that the waveguide operates in two modes, TE_{11} and TM_{11}; the horns are termed "dual-mode" for this reason. The TE_{11} mode is launched by the probe in the smaller diameter section, as shown in Fig 1. The tapered section converts some of the dominant TE_{11} energy into the TM_{11} mode in the larger diameter section. When both modes reach the front of the horn their relative phase and amplitudes give zero field at the periphery of the aperture, resulting in very low rear and side radiation; and thus minimum noise pick-up.

The generation of circular polarization is performed by the 10 screws in the smaller diameter section of the horn. These load the waveguide in the direction parallel to the axis of the screws and cause a delay of 90°, but have no effect in the perpendicular direction. The feed probes are oriented at 45° to the polarizing screws, and thus generate equal components parallel and perpendicular to the screws. The parallel component is delayed in phase by 90° compared to the perpendicular component, and thus circular polarization results. One port produces right-hand circular polarization, while the other produces left-hand. This is exactly what is required for eme, since the sense of the polarization is reversed on reflection from the moon. Thus the transmitter is connected to one port permanently (no high-power relay required), while the receiver is connected to the other port via a small isolating relay which is required since the two probes are not totally isolated. The degree of coupling between the probes depends on a number of factors, such as the exact orientation of the probes with respect to the polarizing screws, the efficiency of the polarizer and the formal length of the dish. A small post mounted on the short-circuit back plate is used to reduce the coupling between the probes.

Construction details of the feed horns should be apparent from Fig 1. The prototype 1·3GHz version was constructed out of 0·8mm brass sheet, with the short circuit plate cut from 3mm brass plate. The cone to cylinder joints were secured by means of many small tabs which overlapped the sections to form a butt joint. The rear plate was soldered in position. The writer's 2·3GHz version was constructed from 0·5mm tinplate throughout.

OZ9CR adjusting his feedhorn

The alignment of the feedhorn may be carried out as follows. The procedure may seem a little involved, but has proved to be successful in practice. It is perhaps worth noting that at least one station has had excellent results on 1·3GHz eme by just building the horn exactly as described with no setting-up at all!

First, the nulling post should be set up for minimum coupling between the probes. File a slot radially in the end plate centred on the nominal position indicated so that the post can be moved. Next apply a low-power signal (100mW–1W) to one port and connect a detector to the other. Adjust the position of the probe for minimum coupling; the angle between the probes may also be optimized for minimum coupling of 30dB. The screw securing the nulling post must be tightened fully after each adjustment.

The feed probes may then be adjusted individually for best vswr by cutting the probes a small amount at a time. Ensure that for all measurements the feedhorn is in the clear and not pointing towards anything which could cause stray reflections.

Next, insert the polarizing screws and set them to the nominal length. Remove one feed probe and adjust the penetration of the screws (adjust each screw by the same amount) for best circularity; aim for less than 1dB change as the sampling antenna is rotated. Use a dipole antenna spaced 5·75cm above a 23cm diameter groundplane connected to a detector to sample the radiated field. The sampling antenna should be located at least 1m away from the feedhorn for this measurement. The settings of the polarizing screws should be the same for both probes; if not, check that the probes are exactly at 45° to the polarizing screws, and then reinsert the first probe and recheck the circularity. If it is seriously degraded (ie more than 3dB maximum to minimum) recheck the nulling post for minimum coupling between the probes, and reset if necessary.

*46 Windsor Close, Towcester, Northants.

(Continued on page 931)

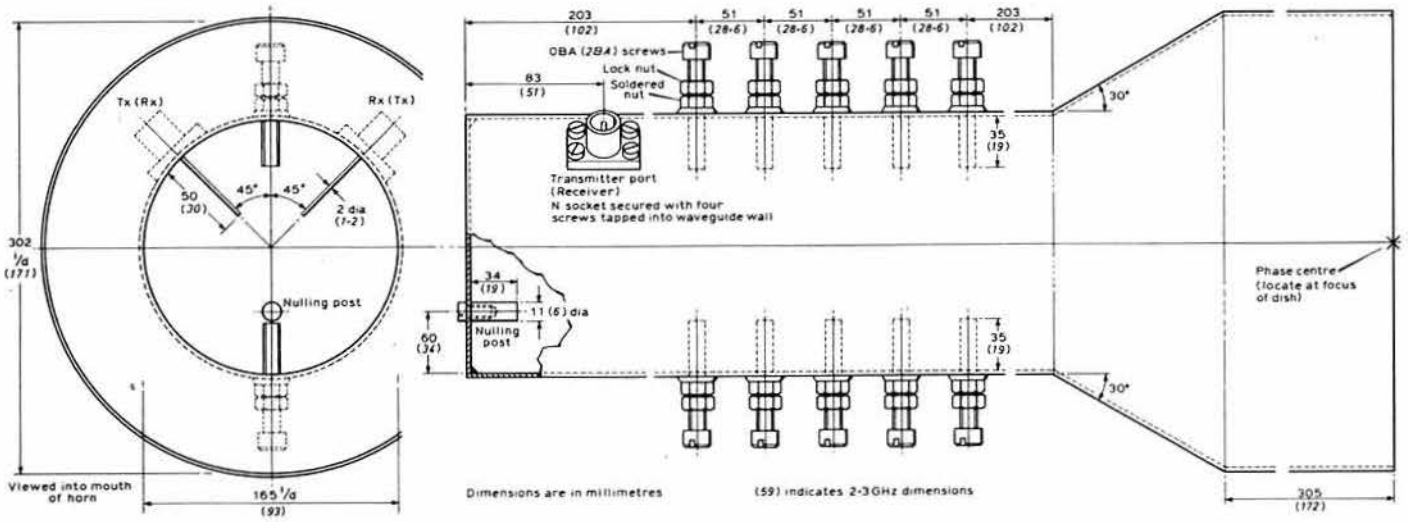


Fig 1. Feedhorns developed from an original design by W2IMU

SWL NEWS

Bob Treacher, BRS32525*

Getting it taped . . .

G3ZAY reports that, following his recent mini-expedition to GJ, he received a very different form of QSL card. In fact it was a complete 90min tape of his signals on 21MHz which was sent by a W8 swl. There seems no better way of reporting a QSO than by sending the station a tape recording of his signals; perhaps the only drawback would be the cost. G3ZAY was extremely impressed and remarked that further tapes would certainly be QSLd!

1·8MHz

Following the mention of operating habits on 1·8MHz, your scribe was contacted by G2WI who, with G4BWV, runs a mixed mode net daily on 1,948kHz at 2000. Listener reports are appreciated, and the net attracts plenty of G activity. For those who like their ssb dx from further afield, check around 1,835kHz. Perhaps someone might still consider running a net, or giving some further insight into 1·8MHz dx operating habits. Any offers?

Newcomers

Mark Wastie, BRS46708, uses the receive side of an FT200 and a trap dipole for 28MHz.

Peter Norris, RS47513, has been a listener since January 1981; his main interests centre on dx on 1·8 and 21MHz, and he finds 1·8 a hard nut to crack although so far has six countries confirmed. He uses a 150ft long wire and an atu with a Trio 9R59DS, and has been working on an rf attenuator. His best 21MHz QSL returns are 9N1MM, VS5PP and P29NRG. For Peter and other members' information, the rules for the countries table can be found on p1311 of the December 1980 *Radio Communication*. RSGB HQ may have spare copies for those who were not members at that time.

Bryan Johnson, BRS47999, joined the Society in July. He uses a Trio R1000 receiver with a 100ft long wire and a Mizuho KX2 atu. His listening times are usually 2200–0130 when he has heard A4, A7 (now A71— A7XD is now A71AD), FY7, HZ, JA, JY and IE9UDB on Ustica Is. Bryan comments on the multitude of USA prefixes, with which most newcomers seem to experience difficulty; for instance, AB4X. This is USA, but these prefixes are given to USA dependencies and are that much rarer—AH, AL, KH1–0, KP1–4, KL, KS6, KV4 and KX6. Any other prefix in the A, K or N series is almost certain to be located in mainland USA.

Norman Painting, RS44786, sends a copy of this photograph of his shack with every QSL card

* 79 Granby Road, Eltham, London SE9 1EH

1981 countries table

Station	28	21	14	7	3·5	1·8	Total	Mode
RS42604	187	196	192	157	117	29	878	ssb
BRS14585	189	196	199	134	121	19	858	ssb/cw
BRS25429	186	207	208	112	105	32	850	ssb
BRS8841	152	194	222	114	95	5	782	ssb/cw
BRS48909	165	212	216	84	61	18	756	ssb
A8808	172	166	164	106	96	34	738	ssb/cw
BRS1066	136	163	161	83	64	38	645	ssb/cw
BRS44703	131	139	154	96	89	8	617	ssb
ARS42503	92	125	146	28	32	0	422	ssb
BRS35509	70	119	133	49	37	2	410	ssb
BRS44266	116	74	125	43	34	8	400	ssb
BRS18529	48	60	111	69	71	20	379	ssb
RS44218	81	85	111	26	21	5	329	ssb/cw
BRS40705	95	85	92	31	24	1	327	ssb
BRS41992	48	44	101	55	47	15	310	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

Robert Stevens, BRS43888, wrote from Glenrothes. He had been brushing up on his morse and was to attend RAE classes in September. He uses a KW202 and a 75ft long wire, plus a vertical for 14–28MHz.

Norman Painting, RS44786, started listening in June 1980 with a Trio R1000 and a wire around the loft, but he now has a Hy-gain 18AVT vertical, and a Mosley TA32 beam in the loft. He has 126 countries confirmed and a number of first-class awards.

George Griffiths, BRS47586, has an FRG7 and is mainly a keen cw listener on 14 and 21MHz. He is an ex-RAF radio operator, so morse presents no problems to him.

DX swl

Ananda Bose, RS47891, in Nagpur, India, had been receiving stations for just one month when he wrote. He was hoping that he would soon pass his Grade 2 amateur licence examination and obtain a VU2 licence. He monitors 14–28MHz with an HRO and three dipoles, and wonders if some kind person could send him details of a preamp which he could use to boost the strength of signals. Any offers should be routed through your scribe or direct to A. Bose, 58 Shivajinagar, Nagpur - 440010, India.

144 and 432MHz

Your scribe was delighted at the response from swls and other amateurs concerning the reporting of vhf and uhf activity while conditions permit good dx reception. G4HAO commented that this aspect had been neglected for some time. G4ANB said that swl QSLs for 432MHz and up are rare, and therefore welcome and likely to get a reply.

Now on to actual reports of conditions: your scribe managed to catch the tropo conditions of 30 July when stations in central Europe were audible. 144MHz was wide open to DL, and as choice extras OK1KHI/P in HK29b; OK3RMW/P in GJ46e; OK1IDK/P, GJ28h; OK1AFN/P, IK52a and OK1MBS, HK48a; SP6IWQ/6 and SP6JLW/6 in IK65a; Y23BD in GM square; and SM6GFS, GR11j were logged. On 11 August a sporadic-E opening occurred to EA, and ZB2BL in XW64g was audible at 1920. The Perseids meteor shower promoted much activity both on ssb and cw on 11 and 12 August; the shower peaked at around 0400–0500 on the 12th. DX stations copied on ssb at the writer's QTH included EA3LL, I4CIL, OE3OBC, OK1GGP, OK2BFH, OZ9QV, SM7IXU, YU1EU, YU2RAQ, YU2RGO, YU3ZV and Y23FG.

Dave Whitaker, BRS25429 (ZN03h) commented on the Es opening on 10 July. He was able to log EA5BXF, ZX26f; EA5MR, ZZ48g; EA7AJY; EA4PR; EA6FB, AY07j; EA5AMR, ZZ47a; EB4DF, YA42e and EA4ATT, YZ48d. He also mentions logging five new countries during the 30 July tropo opening, and DL, F, OZ and GJ stations during the 25 July aurora event. There was a lift on 12 August to the west, and Dave managed to log EI6AS, EI9EH, EI4CL, EI6EF, GD4GNH, GD6UQ/P, GI4GVS and GI4MBM. His 144MHz score stands at 19 countries and 60 QTH squares heard. Perhaps we could run a countries/squares table for 144 and 432 next year if there is sufficient interest.

Paul Tittensor, A8808, had been bitten by the vhf bug too after spending a couple of weeks with the GM3OUL/P expedition. He has purchased the 28–28·5MHz xtal for his R4B, an MM converter and a 16-element F9FT Yagi. Your scribe awaits his reports from Huddersfield with interest. Anyone needing a card from GM3OUL can QSL via Paul.

HF news

VU7AN (Andaman Is) came and went with only about eight hours activity on ssb, and no swls who reported this month caught up with them. Neville Spry, GW4KGR, (ex BRS17567) reports a QSL return of 140/210. He is

only too pleased to reply to all swl reports received. On the question of QSL returns, Dave Whitaker offers his experience over the last three years. In 1978 he sent 173 QSLs via the bureau and so far has received 38. In 1979 he sent 40 and has had 11 returned. On direct cards, he sent 65 in 1978 and received 58 back. In 1979 he sent 23 and had 18 returned. In 1980 51 have been returned out of 68. Some interesting percentages can be derived from these figures.

Nigel Fairbairn, RS44218, has successfully negotiated both RAE and morse test and was hoping to receive his G4 call soon. Grahame Caselton, RS44984, has also joined the transmitting fraternity. Congratulations to both.

Robert Small, BRS8841, always seems able to report a worthwhile month, and the latest is no exception. TL8CN, EK8R and DL2GG/YV5 were his best on 7MHz. HH0N, J73PS, CE9AH, 9M8PW, WB0ICS/KH7 and FO0KW star on 14MHz, while XZ9A, TL8DC, 7Q7LW, WB2REM/HC8 and 9X5MB figure on 21MHz. Robert now has 308/312, thanks to AD0S/KH5K.

Mark Mullins, RS42604, reported JT0YFU for country No 286, and provided a lengthy list of other good dx heard. Brad Bradbury, BRS1066, commented on a good QSL return for August, including A9XE, HV2VO, J20/A, SV0BM/9, T5TI, VP2MDG, VR6TC, 9U5WR and 9V1TL.

Paul Crankshaw, BRS48909, noted 28MHz openings to ZS, the Indian Ocean and VP8 during August, while early morning 7MHz sorties produced some useful dx to improve his table scores. Paul reported country No 269—in just under two years listening—in the shape of 7Q7LW on 21MHz.

Next deadline is 20 October, for the December issue, while the deadline for the January 1982 issue is 17 November. □

RAE courses 1981-2

(See also August issue p721 and September issue p821)

Burgess Hill. Marle Place Further Education Centre. Courses commenced 22 September. Tuesdays, 7.30–9.30pm. Details from the tutor, T.N. Carter, G3BPV, QTHR, tel Burgess Hill 2501.

Canterbury. Canterbury College of Technology,New Dover Road, Canterbury, Kent. Mondays. Course tutor Derek Bradford, G3CCK. Details from the college, tel Canterbury 66081.

Central London. Starcross School, Nr Kings Cross, Central London. Mondays, 6.30–9.30pm. Course commenced 21 September. Run by Grafton RS Lecturer B.C.Bond, G3ZKE, tel 01-485 7065 for details.

Chester. Chester College of Further Education. Thursdays, 7–9pm. Course commenced 21 September. Details from G3SES, QTHR.

Ilkley. Ilkley College, Wells Road, Ilkley, West Yorks LS29 9RD. Details from D.P Appleby, G8FUW, QTHR.

Loughborough. Loughborough Technical College, Department of Electrical Engineering, Radmoor, Loughborough, Leicestershire LE11 3BT. Tuesdays, 6–7pm, morse; 7–9pm theory and regulations. Course commenced 15 September. Tutor Doug Doughty, G3FLS. Course fee £15.05. Details from the college, tel Loughborough 215831.

Seaton. St Claire's Adult Education Centre, Fore Street, Seaton, Devon. Course commenced 29 September. Details from the warden, at the college, tel Seaton 21904, or G8AOJ, QTHR.

Southall. Southall Technical College, Beaconfield Road, Southall, Middx. Morse classes also available. Details from the college, tel 01-574 3448.

Stevenage. British Aerospace Dynamics Ltd, Site B, Gunnels Wood Road, Stevenage. Two courses, run by Stevenage & DARS, one for the December, and one for the May RAE. Tuesdays, 7.30pm. Details from Frank Collett, G3OVT, QTHR.

Stockton-on-Tees. Stockton-Billingham Technical College, Oxbridge Avenue, Stockton-on-Tees. Course commenced 21 September, 6.30–9pm, and a second course may be held on Tuesdays. Morse tuition began on 24 September, 7-9pm. Details from J. Ross, tel 0642 552101, work, or 0642 64974, home.

Swindon. WI Hall, Dores Road, Upper Stratton, Swindon. Thursdays, 7.30pm. Course started 3 September, run by Swindon & DARC. Details from Ken Saunders, G8SFM, QTHR, tel 066-68 307.

MICROWAVES

(Continued from page 929)

An alternative method of adjusting the horn, which is probably almost as efficient and simpler, is to use two helix antennas, wound with appropriate pitch, connected to detectors. The polarizing screws and nulling posts can be adjusted for maximum signal on one helix and minimum on the other. The photograph shows OZ9CR using this method to adjust his feedhorn.

If the circular polarization facility is not required, eg for tropo work, the polarizing screws, the nulling post and one of the feed probes can be omitted. The length of the smaller diameter section can also be reduced by a factor or two; the length of the larger diameter section should not be changed.

New European record on 2·3GHz

On 30 July, during the superb spell of tropo conditions, DL7QY (FJ61e) worked SM6HYG (FS58f) on 2·3GHz for a new European record of 1,018km. The QSO was arranged via 1·3GHz, and signal reports of 529 were exchanged without difficulty on 2·3GHz. The equipment in use at DL7QY consisted of 60W of rf, a 1·5dB nf NE218 gasfet preamplifier and a 1·3m dish.

DL7QY also reports that he copied the GB3BPO beacon 5dB above noise during the same opening on 1·3GHz. He is equipped for most microwave bands (including 10GHz cw/ssb) with relatively potent equipment, and can be found during lifts on 432·21MHz or can be telephoned on (0)79517418.

Awards corner

It is hoped that the publication here of the various categories of microwave awards (see August *Microwaves*) will encourage more claims for microwave awards. Two of the most recent microwave distance awards went to G3OSS of North London, and G8GRT of Huntingdon. At the end of July, award No 29 for 1·3GHz went to G3OSS for a 950km QSO with SK6AB. In mid-August G8GRT gained No 30 for his QSO with DF9LN at 730km. This was from a QTH only 60ft asl using 2·5W and an indoor antenna! A week later another 1·3GHz award was issued to GM8MBP of Aberdeen, only the second to go to Scotland (the last was in 1976!). GM8MBP worked PA0TAB on ssb over a 711km path to qualify for his first QSO beyond 600km.

Two microwave distance awards were issued recently for 10GHz; No 53 went to G8ADP (now G4MBS) for a home station QSO, and No 54 went to G3MTG/P. □

BOOK REVIEW

Projects in Amateur Radio and Short Wave Listening by F. G. Rayer, G3OGR. First edition 1981. Published by Newnes Technical Books in their "Constructors Projects" series. 90 + vi pages (216 by 136mm). £2.95 (limp covers).

Over several decades the late Frank Rayer, G3OGR, contributed countless articles to the electronics technical press, including *Rad Com*, many of them simple constructional projects. He had a sure eye for projects that would prove repeatable, even by less experienced constructors, and eschewed complex, innovative designs. His death last July leaves a considerable gap, and he will be much missed by editors and readers.

This new book, typically, presents clear constructional detail on nine useful projects, including an antenna tuner, hf converter, add-on bfo, direct-conversion 3·5MHz receiver, three-waveband (1·8 to 30MHz) trf receiver, 144MHz converter, 144MHz preamplifier and simple super-regenerative receiver covering 110 to 180MHz. There are also sections providing reference data and some practical information on hf and vhf antennas. All the projects can be assembled using plain perforated matrix board. Some, but not all, of the units should provide a performance having applications for licensed amateurs, the others being more suitable for swls. Constructional details, diagrams and illustrations should prove easy to follow. Only one criticism: what is called an "artificial aerial" is, in fact, a simple "active aerial"—a curious mix-up of terminology that I hope is not becoming general.

G3VA

4 - 2 - 70

John Morris, G4ANB*

Aurora

Every once in a while an event occurs for which none of the usual expressions of excellence seem quite adequate. Suffice it to say that the largest European aurora ever recorded took place on 25 July.

The period 21–26 July had been expected to be disturbed, but in fact there was a solar hurricane with massive solar flares and a proton event thrown in. There were so many sudden ionospheric disturbances that a count was not kept. The geomagnetic "A" index at Meudon reached 125 units on 25 July. On other days the "A" index was at sub-storm to severe storm levels, giving an average of 44, the highest weekly level ever recorded.

The first aurora started during the afternoon of 23 July. From 1430 to 1800gmt GI8UPV (XO31g) worked through a long string of DK, EI, F, G, GJ, GM, ON, OZ and PA stations on 144MHz. Among the best were OZ2ZB (EQ36a) at 1455gmt, closely followed by OZ1FJJ (FR71f). Altogether GI8UPV made 42 auroral contacts during the afternoon, G3IPV (AM18a) heard weak auroral cw from SM6AEK at 1830gmt. On 70MHz both G4BPY (YM30d) and G3TCT (ZL56d) found a few UK stations at about 1800gmt.

For a few operators the event was repeated on the following day. GI4LKA (XO21j) found 144MHz auroral signals coming from the east and worked several new countries; among the stations worked were DK8ZB (EL05c) and F6KBF (BI01j). The event closed at 2000gmt. There appeared to be little propagation into Scandinavia, although GI4KSO (WO40f) heard one SM station on cw. A second phase took place during the small hours.

After these early warnings the main opening came on 25 July. A proton event began at 0600gmt and continued until a peak was reached at 1320gmt. It was at about this time that the aurora started. It would be impossible to fully reproduce all of the reports received, but some of the highlights may be picked out.

Starting with 70MHz, GI3TLT (XO22e) was kept busy almost continuously from 1445 to 1738gmt; 13 QTH locator squares were worked, from ZK in the south to YQ in the north, at a constant beam heading of 40°. During the closing stages, from 1900gmt, the best beam heading moved towards the north. EI9BG (VM27c) found that his rare locator square was very attractive on this band, and it took G3TCT (ZL56d) 40min to get through the pile-up before working EI9BG at 1847gmt. Some evidence of non-reciprocal paths (ie greater path loss in one direction than the other) was noticed. For G4BPY (YM30d) the best 70MHz contact was GM4FZH (YS33d) at 1917gmt. Earlier, at 1445gmt, G4BPY had worked SM6PU by 28–70MHz crossband. SM6PU also completed crossband contacts with three other UK stations, and heard many more on 70MHz. G3TCT commented that this was the best night for 70MHz activity that he had ever heard.

Most of the activity was concentrated on 144MHz, where G3CHN in Devon worked LZ2KBI/P (LD square) for what is thought to be the first UK–Bulgaria auroral contact. Another claimed "first" was EI9Q to Italy. In the middle of all the activity G3POI was busy trying to work UA3LBO near Moscow, 2,154km away. Signals were copied in both directions, but unfortunately the high level of QRM prevented completion of the contact.

Other excellent dx contacts, selected almost at random from the large number reported, included: G3BDQ (Hastings) to OH0JN (KU71j) on Aaland Is, UQ2NX (MR54f), OH2BBF (LT15b) and SM1BSA (JR34a) in Gotland; GM3XOQ (XP37a) to F6CEL (CJ41g) and SM7IXU (GP49h); G4GUF (AM49b) to I3TJQ (GF square), YO2IS (KF) and I4EAT (FE); G4IFX (YN57j) to SM7FJF (GQ56b). BRS32457 (YL79j) was alerted to the opening by a warning on the local repeater, and from 1425 to 1600gmt logged stations in 13 countries, including I4BXN (FE38c), YU3ES (GF39d), HG5FMV (JH25a), OK2BFH (JJ13b) and I6WJB (HC24g).

For some operators the conditions faded at about 1945gmt, but by 2330gmt the aurora was back in full swing. For G4GUF the opening finally disappeared at 0115gmt after working SM6AEQ (GQ square), but other reports mention contacts being made at intervals until 0500gmt on 26 July.

Some stations avoided the crowded conditions on 144MHz by moving up to 432MHz. G3OSS worked into West Germay and the Netherlands on this band, as did G8RZO and G8RZP. The doppler shift on uhf reached the very high level of 2·5kHz, and even on 144MHz some ssb operators had difficulty in finding the correct offset to get their signals into the passband of the receiver at the other end.

An indication of the strength of the event is given by the equipment used by some stations. G4IFX, for example, needed only a two-element "ZL Special" in the shack to work seven countries, including Sweden.

Many thanks to everyone who sent a report on the aurora, and apologies to those who have not been mentioned. As usual, all reports will be forwarded to the Propagation Studies Committee of the RSGB for detailed analysis. PSC log sheets for reporting auroral and other openings are available from G4ANB in exchange for an sae.

Tropo

There were good tropo conditions on several occasions during July and early August, with an exceptionally fine opening on 30–31 July. Many UK stations made 144 and 432MHz contacts with countries all over Europe, from Sweden in the north, through Poland and Hungary in the east, and down to the south coast of Spain. Many reports on the good tropo conditions have been very gratefully received. As with the auroral reports it would be impracticable to fully reproduce these, but some of the more spectacular results may be described.

On 30 July G4GUF (AM49b) worked SP6IWQ/P (IK65j) on 144MHz and OK1KHI/P (HK29b) on 432MHz. Another lift on 3 August brought SM6FHZ (GQ02c) on uhf and SM7DLZ (IQ53h) on the lower band. G3BDQ broke his personal best by working 23 Czechoslovakian stations on 144MHz in a single session from 2014 to 2319gmt on 30 July. The best dx included OK2VMD/P (IJ54g), SP6GZZ (LH45i) and Y21IF (HL12d). Early next morning the band was still open, bringing a string of Scandinavian contacts, including SM5CNQ (HS46c). G3JKV in Surrey also stayed on 144MHz and picked up OK2KK (JJ square) and SP6BQA (IK) with just 10W of ssb. At about 1900gmt on 30 July G3JKV heard a very faint signal which appeared to be giving a CN8 callsign. Later, F8ZW said he had worked CN8BA.

GI4LKA (XO21j) took the unusual step of getting up at 6.45am on 31 July, and after an hour of calling managed to raise OK1KHI/P, who had apparently been active all night. GI4LKA then joined the queue for SP6DWL/P in neighbouring IK square, but failed to attract their attention before they closed down at 1000gmt, much to the fury of the waiting pile-up!

G4BPY also managed to work OK1KHI/P during the morning of 31 July, in this case on 432MHz. G4DHF (ZM19f) stayed on vhf and was very grateful for the cw which helped him get through to OK2BUP (IJ07a), HG5KDQ (JH35c) and SP6GZZ (IL54h). G4DHF finally rolled into bed at 0730gmt, the conditions having been too good to miss during the night. Many meteor bursts were also noticed on signals.

For GM4IHJ the biggest surprise of the month came from the trials being carried out by GM8ZNZ from his excellent vhf site at YQ73a. There was almost daily super-refraction ducting on the North Sea or Irish Sea paths. An Irish Sea duct on 27–28 July favoured Cumbria, Northern Ireland and the coast of Wales, but despite the QRM GM8ZNZ needed only 10W to work EB1AK (VD square). The DL0PR beacon (144·910MHz, EO54c) was also audible for long periods on many days during July and early August.

In Geneva G3NAQ/F0ZY seems to have got the 144MHz set-up at 4U1ITU into shape. Since 1 July 16 countries have been worked, three by Es and the rest by tropo, and the 4U1ITU callsign features in the logs of several correspondents.

In addition to those mentioned above, many thanks to G8XMP, G8RZO, G8LFB, G8IZV, EI4DU, G3IOR and G8TFI for reports on the good tropo conditions.

Sporadic-E

Several more reports have been received about the superb sporadic-E opening on 10 July described in last month's *4-2-70*. GI4LKA (XO21j) worked EA3LL twice, first from the car while travelling home, and again on arrival at 1700gmt. By 1945gmt the event appeared to have finished, and GI4LKA, GI4GVS and GI4KSO started their usual "post-mortem". This was interrupted by a torrent of French and the meeting broke up in disorder. During the next 10min GI4KSO (WO40f) worked ZB2BL, and,

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in one of the most outstanding contacts reported, GI4GVS (XO21b) worked CN8BA in Casablanca. Nothing further was heard after 2010gmt. For G4IFX (YN57j) the best dx was EA5AMR (ZZ47a) at 1707gmt.

A brief Es opening on 15 July gave G8LFB (ZL30f) the chance to work YU2CCB (IF35c), YU4VIP (JD12c), I6KLE (HC42h) and I6MQS (GD69e) between 1445 and 1458gmt. Throughout the second half of July and first half of August there were several short, localised Es openings on 144MHz, and it was those who were alert and ready to go on the air at short notice who got the dx. G8RZO and G8RZP were ready to go at 1930gmt on 11 August when ZB2BL was worked.

More details have been provided about the 70MHz contacts between the UK and 5B4AZ reported in August's *4-2-70*. The licence position in Cyprus is that a special permit has been granted to run the beacon on 70·113MHz. If the beacon is heard it may be stopped and two-way tests carried out for propagation research. G3SLI, who once operated as ZB2VHF, has sent his congratulations to the new record holders from the old record holders. To recap, ZB2VHF worked GM3EGW on 11 June 1967.

G3OHC, who also worked 5B4AZ on 7 June, heard ZB2VHF on 70·120MHz at 1650gmt on 11 August. A series of telephone calls at 30min intervals eventually raised ZB2BL at 1855gmt for a contact. While waiting for ZB2BL, G3OHC completed an ssb contact with the GM3WOJ/P 70MHz expedition (XS79f). The contact was completed in 20s in strong meteor bursts, which G3OHC has described as being almost as good as sporadic-E.

50MHz

Kenneth Price, XE1TIS, has sent a report on recent 50MHz happenings in Mexico. Since late April there have been F2 openings into Argentina and Australia, with the muf going all the way up to 52MHz, into the Australian allocation. Although 28,885kHz is often used for co-ordination, some of the openings have been good enough to make this unnecessary. More recently, Es openings to the USA and Canada have become an almost daily occurrence, and in one five-day period XE1TIS worked over 500 North American stations on 50MHz.

The ZB2VHF 50MHz beacon was regularly heard by several UK stations during July. G3BDQ has again noticed the seventh harmonic of a 7,246kHz broadcast station appearing on 50,723kHz, but apparently no longer coming from Mauritania. He has surmized that the transmitter and associated crystal have been sold and are being used somewhere along the north coast of Africa. At 1825gmt on 23 June G3BDQ heard LU9AEA in Buenos Aires on 50,110kHz, but was unable to raise him on 28MHz for a crossband contact. LU9AEA has now been alerted to the crossband possibilities and will be looking for Region 1 beacons and television.

SM6PU has recently joined the RSGB and has sent details of his 50MHz listening and crossband working over the past year. On 2 June a crossband contact was completed with ZS3AK. SM6PU is unsure of the propagation mode, but on both 2 and 10 June, when ZS3AK was again heard, sporadic-E was evident on the lower bands. On 13 December last year SM6PU heard very weak signals from JA4MBM at 0900gmt on 50MHz. The following day JH4JPO was heard at 0952gmt. Both stations were beaming towards Hong Kong at the time. This is thought to be the first time Japan has been heard in Europe on 50MHz.

Repeater news

After the usual last-minute scramble, uhf Phase 6 has been submitted to the Home Office to be considered for licensing. The final list is as set out in May and June with one addition and one deletion. GB3XX (RB15, Daventry, Northants) has been added, but GB3GH (RB15, Gainsborough, Lincs) has been put back to uhf Phase 7.

VHF Phase 5 is also nearly ready to go to the Home Office. The provisional list is as follows:

Callsign	Channel	Location	Locator	Contact
GB3AE	R5	Barnoldswick, Lancs		
GB3AM	R6	South Birmingham	ZM51j	G4KZH
GB3BX	R2	North Birmingham	YM30b	G4JLI
GB3ES	R7	Hastings, East Sussex	AK03d	G3ZFE
GB3EV	R4	Appleby, Cumbria	YO38e	G3WJH
GB3HG	R1	North Yorks	ZO55h	G4ATZ
GB3LM	R5	Lincoln	ZN68f	G8VGF
GB3MB	R0	Manchester	YN39b	G3LEQ
GB3PW	R3	Newtown, Powys	YM43b	G3UQH
GB3RD	R7	Reading, Berks	ZL45h	G4CCC
GB3TY	R6	Hexham, Northumberland	YP80d	G8VDM
GB3WD	R4	West Devon		G4GWJ

The paperwork for one or two of these proposals may not be quite ready by the time the batch is submitted, in which case they will be held back to vhf Phase 6. The proposed channel for GB3AE may also be changed before submission.

GB3GY (RB11, Grimsby) is newly operational. GB3TW (R5, Tyne and Wear) and GB3ZI (RB11, Stafford) are back on the air after periods off. GB3EX (RB0, Exeter) has been taken out of service until a new site can be found. GB3PI (R6, Barkway, Herts) was due to be off the air for most of September for complete re-engineering. Clearance has been received for the site change of GB3BP (R6, Crawley, W Sussex).

A few readers have enquired about the progress of the RSGB repeater maps. These seem to have suffered a few setbacks in production, and G4ANB's spies have been unable to discover any definite publication date. In the meantime, a handy 432MHz repeater "datacard" is being given away with the October issue of *Practical Wireless*. On one side of the card is a map of the uhf network, showing callsigns and channels, with main motorways marked. The reverse gives an alphabetical list of currently licensed units and some hints on repeater operating. This useful aid, which is a companion to the 144MHz card recently issued, should be helpful to any travelling user of uhf repeaters.

Class B operation on 70MHz

Several rumours have been circulating over recent months concerning the possibility of Class B licensees being given permission to use the 70MHz band. Most of the rumours are false. The following explanation may help clarify matters.

Until now there has been an internationally agreed requirement for all radio amateurs to pass a morse test before being licensed to use frequencies below 144MHz. At the 1979 WARC it was agreed that this frequency should be lowered to 30MHz. The new regulation will come into force with most of the other WARC decisions on 1 January 1982. For most European countries the change from 144MHz to 30MHz is academic, as the only recognized amateur band between these frequencies is 50MHz, which is not allocated in Region 1. In the UK, however, there is 70MHz, and several people seem to have assumed that the change of regulations will make this band available to Class B licensees.

Unfortunately, the situation is not quite so straightforward. The 70MHz band is specially allocated to radio amateurs in the UK until further notice. It is not an internationally-recognized amateur band and so the general International Telecommunication Union regulations do not apply. Because of this, it is *not* expected that Class B licensees will be given permission to use 70MHz.

Beacon news

With the help of members of the RNARS the new solid-state 70MHz beacon transmitter for ZB2VHF has been transported to Gibraltar, where it is now fully operational. The transmitter, which replaces an old and rather unreliable valve unit, is on the air 24h a day on a new frequency, 70·120MHz, from the shack of ZB2BL. Several UK amateurs have already reported hearing the beacon, and a few UK–Gibraltar 70MHz contacts have resulted. Thanks are due to all involved in getting the new beacon running, but especially to E. J. Harland, G3VPF, who very efficiently built and tested the unit, which is already proving to be a very useful propagation indicator.

The Cornwall vhf beacon GB3CTC (144·915MHz, XK64a) has been forced to close down by the retirement of the beacon keeper, G3CZZ, to whom thanks for having so diligently looked after the beacon over the years. New arrangements for GB3CTC are being investigated, and it is hoped that the unit will soon be back on the air.

GB3SU (70·695MHz, ZN61a) was taken off the air at the end of July to allow replacement of the floor of the building in which it was housed, but it should be back by the time this is published.

Propagation warning systems

Paul Whatton, G4DCV, and Lee Bennet, G3ZEG/DA2PE, have sent their thoughts on the possibility of using beacon or other transmitters to send out propagation warnings. They both share the concern expressed by GM4IHJ in August's *4-2-70* that any propagation warning system should not interfere with normal beacon monitoring.

G4DCV has pointed out that what is needed is a locally-based network of transmitters which could carry the data transmissions and can be monitored with simple receivers without tying up the main station equipment. Such a system is already in existence in the form of the UK repeater networks. Many vhf operators keep a separate fm rig in the shack, and G4DCV has suggested that data transmissions would not impede normal repeater operation, in the same way that the callsign is usually ignored. It might even be possible to encode the data, perhaps using a sub-carrier, so that only those who wanted the information would be aware of its presence.

G3ZEG, however, does not favour the use of repeaters, because of their on-off nature, but believes that beacons are the obvious choice as they are

UK 432MHz REPEATER NETWORK, AUGUST 1981

Callsign	Channel	Location	Locator	Contact
GB3AB	RB14	Aberdeen	YR70e	GM4BYT
GB3AV	RB2	Aylesbury, Bucks	ZL16c	G6NB
GB3AW	RB10	Ashmansworth, Berks	ZL53c	G4EEE
GB3BD	RB4	Bedford, Beds	ZM68e	G8FMG
GB3BK	RB11	Upper Basildon, Berks	ZL45h	G4CCC
GB3BN	RB0	Bracknell, Berks	ZL47f	G8JWD
GB3BR	RB6	Race Hill, Brighton	ZK20j	G4EFO
GB3BS	RB10	Bristol	YL48a	G8KGE
GB3CB	RB14	Central Birmingham	YM41a	G8IMN
GB3CE	RB14	Wivenhoe, Colchester	AL15b	G3WRT
GB3CH	RB2	Liskeard, Cornwall	XK27c	G8AGU
GB3CI	RB2	Corby, Northants	ZM37e	G8AMG
GB3CK†	RB0	Charing, Ashford, Kent	AL65h	G3MDO
GB3CR	RB6	Mold, Clwyd	YN75a	G3LEQ
GB3CW	RB6	Newtown, Powys	YM43b	GW8SOE
GB3DT	RB0	Wimborne, Dorset	YK20d	G8AAY
GB3DY	RB10	Wirksworth, Derby	ZN73e	G3ZYC
GB3ED	RB14	Edinburgh	YP04c	GM3GBX
GB3EK	RB2	Margate, Kent	AL48f	G3MDO
GB3ER	RB10	Danbury, Essex	AL23b	G8NMP
GB3EX†	RB0	Exeter, Devon		G4GUN
GB3FC†	RB2	Fylde Coast, Lancs	YN15c	G8HED
GB3FE	RB6	Fife	YQ64c	GM3OLK
GB3FN††	RB15	Farnham, Surrey	ZL62h	G8UVF
GB3GC††	RB4	Goole, Humberside	ZN26a	G3VBI
GB3GF	RB13	Guildford, Surrey	ZL68h	G4EML
GB3GL	RB14	Glasgow	XP19a	GM3VTB
GB3GR*	RB11	Grantham, Lincs	ZM07j	G4FUO
GB3GY	RB11	Grimsby, Humberside		G4IPE
GB3HA††	RB15	Hornsea, Humberside	ZN10f	G5GX
GB3HB††	RB15	St Austell, Cornwall	XK56b	G8ARH
GB3HC†	RB6	Hereford	YM77d	G3WRA
GB3HD††	RB2	Huddersfield	ZN22f	G3SDY
GB3HE	RB14	Hastings, Sussex	AK03d	G3ZFE
GB3HN	RB11	Hitchin, Herts	ZL09c	G4ARL
GB3HO	RB14	Horsham, Sussex	ZL79f	G4EFO
GB3HR	RB14	Bushey Heath, Herts	ZL29f	G4KUJ
GB3HU	RB10	Hull, Humberside	ZN29h	G4HYD
GB3HW	RB13	Gidea Park, Essex	AL32g	G4GBW
GB3HZ*	RB4	High Wycombe, Bucks	ZL27j	G4CYR
GB3IH	RB4	Ipswich, Suffolk	AM76c	G8CJL
GB3IW†	RB4	Isle of Wight	ZK34a	G3WXC
GB3KL	RB4	King's Lynn, Norfolk		G8KOC
GB3LC	RB13	Louth, Lincs	AN51h	G4IPE
GB3LE	RB4	Leicester	ZM24j	G8CAC
GB3LH	RB4	Lyth Hill, Shrewsbury	YM27f	G3UQH
GB3LI	RB10	Liverpool	YN45b	G3LEQ
GB3LL	RB4	Llanddulas, Colwyn Bay	YN52d	G3LEQ
GB3LS	RB2	Lincoln	ZN68f	G8VGF
GB3LT	RB10	Luton, Beds	ZL08d	G4CPE
GB3LV	RB2	Enfield, North London	ZL30e	G3KSW
GB3LW	RB6	Central London	ZL40e	G8DWP
GB3MA	RB4	Central Manchester	YN39h	G3LEQ
GB3ME	RB6	Rugby, Warwicks	ZM54b	G8DLX
GB3MK	RB0	Milton Keynes, Bucks	ZM76h	G4BPX
GB3ML	RB10	Blackhill, C Scotland	YP11a	GM3VTB
GB3MR	RB14	Stockport, Cheshire	YN60c	G3LEQ
GB3MS	RB0	Malvern Hills, Worcs	YM79a	G8TXG
GM3MT*	RB12	Bolton, Lancs	YN28e	G3LEQ
GB3MW	RB10	Leamington Spa	ZM53e	G8IXE
GB3ND*	RB14	Ilfracombe, Devon	XL70g	G5HD
GB3NF*	RB11	7km S of Southampton	ZK14h	G8TLE
GB3NH	RB14	Northampton	ZM66a	G8LHR
GB3NK	RB4	Wrotham, Kent	AL52j	G3MDO
GB3NM	RB6	Mapperly, Nottingham	ZM05a	G4AFJ
GB3NR	RB0	Norwich, Norfolk	AM37a	G8GTZ
GB3NS	RB10	Banstead, Surrey	ZL59c	G8CUX
GB3NT†	RB0	Newcastle upon Tyne		G4DOB
GB3NX	RB2	Crawley, W Sussex	ZL70e	G4EFO
GB3NY	RB0	Scarborough, N Yorks	ZO58a	G4EEV
GB3OH*	RB4	Stirling	YP02b	GM8MUU
GB3OS	RB2	Stourbridge, Worcs	YM50g	G4ISQ
GB3OX*	RB4	Oxford	ZL24a	G4DPA
GB3PB	RB10	Peterborough, Cambs	ZM39c	G4FMG
GB3PD††	RB10	Peterhead	ZR41b	GM8HGD
GB3PF	RB0	Blackburn, Lancs	YN18d	G4BLH
GB3PH	RB2	Portsdown Hill, Hants	ZK15a	G8GNB
GB3PT	RB12	Barkway, Herts	AM71f	G8MEI
GB3PU*	RB0	Perth	YQ53b	GM8KPH
GB3PY	RB14	Cambridge	AM61g	G4BEL
GB3SD	RB14	Weymouth, Dorset	YK38a	G3EGV
GB3SH*	RB11	Honiton, Devon	YK15j	G4GUN
GB3SK†	RB6	Folkestone, Kent		G3MDO
GB3SM*	RB13	Leek, Staffs	ZN71h	G3LEQ
GB3SO	RB0	Boston, Lincs	AM09b	G3NNQ
GB3SP	RB4	Pembroke, Dyfed	XL26c	GW4CBR
GB3ST	RB2	Stoke-on-Trent, Staffs	YN80e	G3LEQ
GB3SV	RB0	Bishop's Stortford, Herts	AL01d	G3DNQ
GB3SW*	RB6	Salisbury	ZL71c	G3YWT
GB3SY	RB6	Barnsley, S Yorks		G4LUE
GB3TD*	RB13	Swindon, Wilts	ZL32f	G8KWC
GB3TH	RB13	Tamworth, Staffs	ZM32a	G8OSX
GB3TS*	RB14	Middlesbrough		G8MBK
GB3UB	RB4	Bath, Avon	YL49e	G3VEH
GB3UL††	RB2	Northern Ireland	XO32h	GI4BWM
GB3US	RB0	Sheffield	ZN43e	G3WXI
GB3VH	RB13	Hatfield, Herts	ZL29b	G8FPR
GB3VS*	RB13	Glastonbury, Soms	YL77h	G3YBY
GB3WF	RB14	Leeds	ZN02e	G3KKP
GB3WG	RB6	Port Talbot	YL32h	GW3VPL
GB3WN	RB0	Wolverhampton	YM30e	G8IXI
GB3WP††	RB11	West Pennines		G3VDS
GB3WS†	RB6	Sudbury, Suffolk		G8EAO
GB3WU††	RB15	Wakefield, Yorks	ZN33c	G3SPX
GB3WY	RB10	Queensbury, W Yorks	ZN11e	G3UGF
GB3XX††	RB15	Daventry		G8SWL
GB3YL	RB14	Lowestoft, Suffolk	AM39d	G8YAL
GB3ZI	RB11	Stafford, Staffs	YM20f	G8OTC

Notes

*Licensed, not yet operational.
†Temporarily off the air.
††Submitted to Home Office (uhf Phase 6).
GB3MT and GB3PT are rtty repeaters.

on the air 24h a day. To avoid interference with the use of a beacon as a propagation indicator, G3ZEG has proposed that an audio tone of at least 3kHz should be used to amplitude modulate the beacon carrier. The data would be sent either in cw, using on-off keying of the tone, or by rtty, using afsk. Thus the student of beacon strength would tune the carrier to the centre of a normal 3kHz-wide ssb filter, putting the modulation sidebands well outside the passband. A narrow cw filter would be even better. Those wishing to receive the propagation information would tune to one or other of the sidebands, in the same way, so that the afsk could be received as normal fsk and the modulated cw as ordinary cw. This approach would make it necessary to keep beacons fairly well separated in frequency to avoid overlapping of their sidebands and the confusion this would cause.

One point which should be kept in mind throughout this debate is that any national or international propagation warning network, however organized, will require a massive investment of time and effort to set up, and even more to keep supplied with data. For this reason it is unlikely that any full network will be available in the near future. Most probably there will be a series of individual "one-off" units, which may *eventually* be integrated into a coherent network.

Awards news

The first-ever claim for the 20 countries and 125 squares sticker in the 144MHz 4-2-70 Squares series of awards has been submitted by G3BW in Cumbria, following G3VYF's jump straight to the top 20+150 category. On the same band G8TGM has claimed the 15+60 sticker to add to his basic award No 38. G4IYA and G8HRO/A have both skipped the 10+40 award and gone straight for the 15+60 category. The G8HRO/A claim, which was made in respect of operation from Crawley Telephone Exchange, prompts the reminder that awards are available for /A, /P and /M as well as the normal "main address" operation. Separate QSL cards must of course be obtained for each class. Basic 144MHz 10+40 certificates Nos 56 and 57 have been earned by G3JFO and G8TKP respectively. The G3JFO claim was notable in that all of the contacts were made using only 6W from a 65ft asl site.

In the Four Metres and Down series, 144MHz Standards Nos 580 to 582 have gone to G8NVP, G4JDL and G8TKP. 432MHz Standard No 161 has been taken by G8PNN in Northumberland.

Finally, a request from the vhf awards manager: "Please may all Squares award claims be arranged in alphabetical order? It makes checking twice as easy."

Computer-aided Yagi design

The saying that "the antenna is the most important part of the station" is as old as amateur radio itself. For vhf/uhf dx operation "antenna" usually means "Yagi". Unfortunately, accurate and reliable measurements of Yagi gains and polar patterns are notoriously difficult to make, and we tend to rely largely on claims in handbooks and advertisements. A few amateurs have made serious efforts to compare Yagi designs, with interesting results: the main conclusion of one Swedish group was that some antenna manufacturers must use different size decibels to everybody else!

It would be useful if a computer program could be written to accurately predict Yagi performance. Not only would this resolve some of the uncertainties, but it would also allow antennas to be designed and optimized without the need to build and test a long series of prototypes. With just these aims in view, Peter Burden, G3UBX, and Ian White, G3SEK, have been working on a computer model of the Yagi antenna, as outlined by W2PV in a series of articles in *Ham Radio* during 1980. Agreement between the computer predicted and measured properties of existing Yagis is encouraging, but further development is needed before the model can accurately reflect all of the properties of the long Yagis used at vhf and above.

G3SEK and G3UBX would like to hear from anyone else who has

implemented the W2PV model and can therefore make a positive contribution to the project. Although they feel they are close to their objectives they are unwilling to comment on existing antennas until the model has been thoroughly tested. Unfortunately the complexity of the problem makes it unsuitable for the present generation of "home" computers. G4ANB will gladly forward any correspondence on this subject to G3SEK and G3UBX.

At least one antenna manufacturer is already using computer-aided design techniques. The Hamburger-Antennen-Grosshandel range of 144 and 432MHz Yagis, which have recently become available in this country, were designed using a "double optimization" technique developed by DL6WU (*VHF Communications*, 3/1977 and 4/1977). Many Yagis have either constant director lengths or constant director spacings. Double optimization allows both of these to be varied along the length of the antenna. It is claimed that this approach gives higher gain, by 1–1·5dB, for a given boomlength; lower sidelobes; broadband matching; and fewer elements for a given boomlength, thus giving lower windloads.

It will be interesting to see whether the calculations being made by amateurs can reproduce the commercial results. Perhaps we may even be close to that long sought-after prize; the ultimate vhf Yagi!

Scatter

Plans are progressing for the 1982 RSGB National VHF Convention at Sandown Park, but the contingencies of the racing season have caused the planned date to be set back a week to 20 March 1982.

Helen, GM4KNQ, and Clive, GM4FZH, Smith are equipped for 70MHz cw, ssb and rtty operation from their home in the north of Scotland (QTHR), in locator YS33d. At the moment a four-element beam is used with a MMT70/28 transverter, and skeds would be very welcome.

On 14 August G3OHC notched up his 10th country on 70MHz by working GU3HFN, the station of the Guernsey ARS. It is reported that GU3HFN was using the one and only 70MHz rig on the island, belonging to GU4ASO, and that the club will be happy to arrange skeds for club nights to give others the chance to work this "rare" 70MHz country.

SM6PU has asked 70MHz operators to listen for him on 28,885kHz during openings, as he is keen to make 28–70MHz crossband contacts, by Es, ms, aurora or tropo.

G8HBR has claimed a "first" for using a synthesized-speech "CQ-caller" during VHF NFD on 432MHz under the club callsign G6BRS. The unit sends a CQ call and then listens for 3s. If no reply is detected another call is transmitted. The unit was used during the small hours, when voices began to flag. If nothing else, it attracted attention, and a few stations were moved to call in the same inflection-less voice. It would also be possible to generate reports and serial numbers, but G8HBR considers this to be "going a bit too far—at least this year"!

Just before the 432MHz rtty contact between G8PWX and LA3EQ reported last month, G8RBY worked LA3EQ on 144MHz rtty, which is also thought to be a "first". G8RBY, QTHR, is looking for 144MHz rtty contacts with AK, XK, XM, XN, YO and AN squares to complete his set of all squares in G and GW.

Thus we come to the end of what can only be described as a vintage month for vhf/uhf dx: tropo, sporadic-E, aurora, and the ever-faithful Perseids meteor shower in the middle. So many euphoric band reports were received, and so good were the conditions, that at one stage G4ANB would hardly have been surprised if the moon had suddenly jumped so close to the earth that it was possible to work eme with 10W to a dipole. If this, or anything else of interest does happen, please write to G4ANB with the details. All news for December to arrive by 17 October (late news by 27 October) and for January 1982 by 14 November (late news by 24 November) please. □

RAYNET

G. Cluer, G4AVV*

Raynet frequencies

There was a time, or so it is said, when one could buy a crystal for the 14MHz band with a guarantee from the manufacturer that it would be the only one sold on that frequency. Now, not only are the hf bands fully occupied but the vhf bands are becoming equally busy. Various groups representing special interests have laid claim to certain frequencies on 144MHz, and the RSGB, through the VHF Committee, has attempted to keep the peace by producing band plans to separate mutually exclusive modes.

Raynet, like a number of other interests, has a number of agreed frequencies on 144MHz and other bands, and it is hoped that they can be kept clear of other traffic so that emergency communication is not hampered. Frequencies set aside for Raynet use are: 144·26±, 144·800, 144·825, 144·850, 144·875, 145·200, 145·225, and 145·800MHz. Of these, 145·800MHz lies at the edge of the space band. In order not to jeopardize future spacecraft the Raynet Committee has agreed with the RSGB to ask new groups not to adopt this as a working frequency. The frequency is still used by many groups as an inter-group frequency and as such it is a vital channel to Raynet in any large emergency.

According to reports it appears that at Brighton a proposal was adopted which would extend the beacon band and cause it to overlap with 144·850 and 144·875MHz. At present the Raynet Committee is not asking groups to vacate these channels; many groups have, in fact, only recently moved there from 145·8MHz. It is the writer's hope that in practice no interference will be caused between the two services and that both will be able to live together in peace in a crowded band. However, it is worth noting that the original agreement was that frequencies below 145MHz should not be used for local channelized nets, and this recent development makes it even more important that groups should use these frequencies with care for Raynet business and not just for local chatter.

Although no-one, other than the Home Office, has the power to enforce observation of any rules about the use of any part of an amateur band, it is Raynet's hope that the above frequencies can be kept clear. It is a sobering thought that one day a life could be at stake. Raynet frequencies on other bands are: 70·350 to 70·400, 433·200 and 434·800MHz.

News from the groups

Richard Trotter, G8EIA, controller of Cleveland Raynet, has sent a report of a night exercise with the Red Cross on the North Yorks Moors at the time of a sponsored walk. Particularly impressive are the details of a home-constructed cavity resonator for 144MHz used to enable in-band talkthrough; a copy of his notes and diagram will be sent to any group on receipt of an sae at the address below. G3KWT has sent news of the recently-resurrected West Yorkshire Raynet Group, and they too have been covering a walk and also horse trials at the request of the St John Ambulance Brigade.

Although the event took place last year your scribe's attention has recently been drawn to "Operation White Rose", an exercise of the London Emergency Aero-medic Detachment at which York & District Raynet group took part, and he is grateful to the group controller, Mr R. A. Exley, G4IUE, for letting him see an excellent report on the event. A new group has been formed in Sussex; John Houlihan, G4BLJ, can give details of all the very active groups in that area. Mr R. Needs, G8MHZ, would like to hear from anyone interested in joining Raynet in the Milton Keynes or Aylesbury areas, and G8MZF reports on the progress of SW Hants group.

Finally a note about Raynet/React co-operation. Eric Walton, G4FSN, for example, writes "In Greater Manchester we have no plans whatever to use cb or to join forces with any other organization. We consider that the provision of emergency communication requires the highest standards of discipline and training and we are not prepared to lower our standards in any way." Eric also puts me right on the organization of Raynet in Greater Manchester. Ten local government units, nine boroughs and one city corporation, have been made into five pairs, each to have its own Raynet group, and the five Raynet controllerships are: Bolton & Wigan Group, controller G4FSN; Bury & Rochdale, controller G4GOM; Trafford & Salford, controller G8VSM; Stockport & Manchester city, controller G8XQB; and Oldham & Thameside (no Raynet organization at present). Addresses of these controllers (and any other controller) can be sent to any prospective member who sends an sae to the writer. □

*12 Bingham Road, Addiscombe, Croydon CR0 7EB.

THE MONTH ON THE AIR

John Allaway, G3FKM*

An idea currently being heard in a number of places is that the 28MHz band should be made available for the use of Class B licence holders. While this would be an admirable way to fill the band with signals during sunspot minima it is not likely to be authorized, as the World Administrative Radio Conference in 1979 approved Article N30/41 which states quite clearly that "any person seeking a licence to operate the apparatus of an amateur station shall prove that he is able to send correctly by hand and to receive correctly by ear, texts in morse code signals. The administrations concerned may, however, waive this requirement in the case of stations making use exclusively of frequencies above 30MHz . . ."

ZL1AH is anxious to trace the whereabouts of any of the operators of FR7ZU/Europa Is (November 1969) or XU1AA (July 1973). Please send any information to John Wightman, Rocky Cutting Rd, RD 5, Tauranga, New Zealand.

G3PSC is receiving QSLs for "5A2BM". He has no connection whatever with such a station, who is clearly a pirate, and he does not act as QSL manager for anyone.

G4MMV (formerly G6BBE) wishes all to know that he is now on the air. He has an FT101ZDFM and would appreciate reports, all of which will be answered.

IEE lecture

This lecture will be held at the Institution of Electrical Engineers, Savoy Place, London WC2, on Friday 6 November at 5.30 pm. It will be given by Mr F.M. Smith, G8KG (better known as "Smithy" to his friends), who is well known to readers of this column for his highly informative commentary on the progress of sunspot Cycle 21. The lecture will be entitled "F-layer propagation above 30MHz during the sunspot maximum of Cycle 21", and while not strictly by definition an hf lecture it will certainly be of great interest.

DX news

The *DX Bulletin* recently carried out a reader survey of "most wanted countries", and 66 European replies were received. These revealed the following (the numbers indicate how many of the 66 have not yet worked the country): China (62), Burma (50), San Felix (49), Kamaran (49), Heard Is (48), Laccadive Is (41), Yemen (People's Democracy) (39), Albania (36), Bouvet Is (32) and Malpelo Is (30). Andaman Is, Kampuchea, Crozet Is, Sao Thome, Tokelau Is, Vietnam, Kermadec Is, Afghanistan, Clipperton Is and Kingman Reef were all needed by between 20 and 30 of those taking part.

It now seems that all QSLs for contacts made with 6O0DX commencing from 20 July 1980 are being accepted by ARRL for DXCC credit. The problems involving the first few days of the activity appear to have been resolved and QSLs are being despatched.

The *DX Bulletin* reports that despite a favourable vote by ARRL's DX Advisory Committee regarding country status for the Sovereign Military Order of Malta (1A0KM), the league's HQ Awards Committee has tabled the matter until additional documentation can be obtained. Proof of sovereignty in terms of DXCC countries list criterion 5B is being sought.

XZ5A and XZ9A continue to be worked and the stations now have a triband beam and linear amplifier. In addition, a 7 and 3·5MHz vertical antenna is now set up, and cw operation around 7,005kHz has been noted. Other frequencies often used are between 14,170 and 14,175kHz, and around 21,275 and 28,570kHz. HF band cw operation seems to take place about 7kHz from the lower band edges.

UA3KBP/4K1 is located in Antarctica (CQ Zone 39) and is reputed to be found on 7,005kHz, often from 0200.

D4CBC is keeping schedules daily and appears regularly at 1700 on 21,270kHz, after 2300 on 21,300kHz, and after midnight on 14,215kHz.

5X5FS has been reported to be active again. He is also EI9G, and he has been worked on 14,105, 21,205 and 28,505kHz. QSLs should be sent to his Irish address. Les, 7Q7LW, joins YU1FW, W7RQ, and others for a daily "list" operation at 1500 on 21,250kHz. This is mostly for Europeans — another schedule is kept at 1700 on 21,285kHz for N Americans.

VP8ZR is located on S Orkney and may often be found on 21,280kHz between 2100 and 2230. QSLs go to G3KTJ. Another S Orkney station is VP8AJM, who has been worked from the UK on 14MHz ssb around 2000.

According to the *Long Island DX Bulletin* ZK1CG keeps daily schedules on 14,300kHz from 0200 to 0300, and on 14,331kHz between 1200 and 1400. The new Willis Is station VK9ZG has been heard in the UK on 14,175kHz and is said to be on the air mostly between 1000 and 1300; the operator's name is Graeme. From another VK9 area — Cocos Keeling Is — VK9NYG keeps a schedule on 21MHz at 1300 when he transmits on 21,190kHz and listens on 21,290kHz. VK9YC has also been worked from Cocos Keeling, this time on 28MHz ssb around 1100.

Doug, (ex-G3KCT and VS7DB) is now T30DB and has been reported on 14,210kHz at 1100. He is also active on 21 and 28MHz with his FT101ZD and three-element beam.

G3SVK points out that there is now a "Round Table DX Club" which has been specially formed to assist financially with dxpeditions. It meets nightly at 1930 on 14,175kHz, and all stations are welcome to join in— members or not. More information may be obtained from Fred or from G4HPM, QTHR.

Stations in Qatar are now using A71 instead of A7X as a prefix. A7XD now being A71AD.

Overseas news

Graham Mott, G4KLP, met Tim Chen, BV2A/BV2B, during a recent business visit to Taiwan. It seems that during the typhoon season between July and November Tim takes down his three-element beam for safety reasons. There have been some additional problems this year, however, as the offices of the China Radio Association (where his equipment is located) are currently being renovated. This means that he will be off the air for an indefinite period but that when he resumes activity he will at least have an air-conditioned shack.

Tom Merrills, G3VBS, offered his apologies some time ago for his inability to answer QSL requests for his A4XHU operation because his cards were en route to the UK from Oman. Unfortunately Murphy struck again and Tom left for Tanzania before they arrived! To make matters worse he has just heard that the baggage has now been misdirected for a trip around the Arabian Gulf — but if and when it catches up with him he will deal with the problem. Tom's current call is 5H3TM.

Mark Phillips, A22ZM, originally gave KA2GNJ as his QSL manager. The latter is now KB2WS, but A22ZM has lost contact with him recently and understands that no cards are being sent out, nor is any reply being received to letters. Mark asks those who have been unlucky to reapply to his new QSL manager — ZS5CU — whose address appears in "QTH Corner". Total QSOs by A22ZM so far are in excess of 6,000.

Fred Sawyer, 9J2KO (formerly 5Z4KO, ZS6AGS and G3SLN), has provided news on the current situation in Zambia. There are about 25 valid licence holders at present, but less than a dozen of these are active. No new licences have been issued during the past five years, although a number of applications by properly qualified people have been made. Fred is leaving early in November and is uncertain about future movements. All QSLs after 14 October should be sent to his G3SLN address (see "QTH

Tim Chen, BV2A/BV2B (standing), entertaining Graham Mott, G4KLP (left), and DL6FAG

* 10 Knightlow Road, Birmingham B17 8QB

Corner"). QSLs sent via the Zambian bureau take months to arrive, and there is no outgoing bureau.

Graeme Phanco, GM4KHE, reports that he is acting as QSL manager for Ray, VP8AJL, who is with the British Antarctic Survey at Signy Base in the S Orkney Is. Ray previously asked for cards via GM3ITN, and any sent to him are being forwarded to Graeme who keeps a schedule about three times weekly near 14,275kHz at 2000. Please send all cards now to the address in "QTH Corner".

Richard Newstead, G3CWI, leaves soon for Antarctica for a three-year tour as radio officer at Rothera on Adelaide Is—also for the British Antarctic Survey. He hopes to operate a great deal on 1·8, 3·5 and 7MHz as well as on the higher frequencies. On 1·8MHz he will transmit between 1,800 and 1,810kHz and listen between 1,820 and 1,830kHz. Richard's callsign will be VP8ANT—chosen to be similar to G/GB4ANT where he operates during contests. A very attractive QSL card has been designed, and for the time being cards should be sent via G3ZAY—a direct route will be announced later, and any applicants are promised a quick reply. Bureau cards will have to await the arrival of logs in the UK and this may only happen about every nine months. VP8ANT will be in S Georgia between 16 and 20 October and arrive in Antarctica on 6 November.

Expeditions

ZL1AMO is believed to be planning a visit to the Kermadec Is sometime during November or December.

Members of the N California DX Club will be making two visits to Niue during the autumn. The first will be by WA6AHF and WB6EXW, who will be there from 21 to 29 October, and the second by K6RU, AA6AD and N6HR from 25 November to 3 December. All bands 1·8 to 28MHz will be used, and both sections of the CQ WW DX contest will be entered. Callsigns will not be known until arrival on the island.

Members of the Wiesbaden ARC will be visiting Luxembourg for the phone section of the CQ WW DX Contest on 24 and 25 October, and they will also be on the air before and after the contest. Their callsign will be DA1WA/LX and operation will cover all bands 3·5 to 28MHz.

GM3YOR says that Dave, GM3OLK, will be in Bangladesh at the end of September. He has applied for operating permission and is taking equipment with him. Dave will be remembered as VU2OLK when he was in Bombay. Any QSLs should go via GM3YOR.

FM on 28MHz

The Society's HF Committee has discussed the use of fm on 28MHz and believes that any such activity should take place preferably between 29,600kHz and 29,690kHz, with 29,600kHz being used as a calling frequency. This part of the band is already in use in the USA and other countries for fm contacts.

Top band

Conditions have been excellent during the summer—especially on the N–S path (as will be seen from the 1·8MHz reports listed later). Claims for "firsts" on the band continue to arrive and will be summarized and published at a later date.

G3XTJ reports that his QSL for a contact with Y47TX in February 1980 has been returned marked "Pirat", and that UT5AB hopes to visit Turkmen (UH) later this year for some 1·8MHz operation.

VS5RP left Brunei in September and is now G3REP once more. Those still in need of a QSL should contact him at his home QTH, and confirmations will be sent out when his logs and QSLs arrive with his freight. Bob says that S-meter readings of S9 due to static were usual on three out of four days. He regularly worked VK3IM over a 3,000 mile path, and found that his 40ft vertical was two or three S-points better than his 500ft long wire at 40ft above ground over this distance.

1982 Jamboree-On-The-Air

This will take place over the weekend of 17–18 October. It is not a contest but gives an opportunity for Scouts all over the world to become acquainted with amateur radio. Last year 382 stations were active from the UK and between them they contacted or heard 713 overseas JOTA stations in 57 countries. World Scout frequencies are as follows: (Phone) 3,740, 7,090, 14,290, 21,360 and 28,990kHz, and (CW) 3,590, 7,030, 14,070, 21,140 and 28,190kHz. (*See JOTA article on page 947*—Ed).

There are a number of regular Scout nets which meet as follows: UK, every Saturday at 0900 local time on 3,740kHz; European, every Saturday at 0930 on 14,290kHz; Scandinavian, first Sunday in the month from 0830 on 7,090kHz; Australian, fourth Sunday in the month from 2300 near 14,120kHz; Norwegian, every Saturday at 1420 on 3,740kHz; and Danish, every Saturday at 1030 on 3,740kHz. A French-speaking net meets on third Saturday in the month at 1700 on 14,320kHz.

South African guest licence

Information on the requirements for the issue of licences to visitors to ZS has been supplied by Andrew Ince, ZR1HF/G6BYP. Applicants should provide the following details: name (in capital letters), age and date of birth, place of birth, class of licence presently held, period of visit (state dates), purpose of visit, present callsign, name and address of host in S Africa (with callsign), a photocopy of own licence (certified by a "reliable witness"), details of itinerary, and a fee of R10. It is important to apply at least 90 days before the intended arrival date, and the licence is valid for three months. The importation of radio gear is allowed, but it must be declared to customs and a deposit of about 30 per cent of the value may be required—this is refunded on proof of export. Applications should be sent to: The Postmaster General, Telecommunications Dept, Private Bag X74, Pretoria 0001, Republic of S Africa. The SARL is happy to answer queries, and these should be directed to Ulli Dehning, ZS1UD, at SARL HQ, PO Box 3911, Capetown 8000.

Very High Speed Club

The VHSC was founded by PA0LXL in May 1961 and is a focal point for operators who enjoy high-speed cw operation. Membership is gained by having four 30min contacts with existing members at a speed of at least 40 wpm. Copy must be solid, and no keyboard or decoders may be used. The four recommendations should be sent with the application and accompanied by 10 ircs. A declaration that a keyboard or decoder was not used must be included, and all sent to the secretary: D.J. Hoogma, PA0DIN, Schoutstraat 15, 6525 XR Nijmegen, Netherlands. Life membership is granted with no further payment.

Welcome . . .

. . . to the following new members who live outside the UK and who joined the Society recently: DA4DM, G4HEH (ZS), G4JXD (DL), HE9PYG, IW2BSW, I1RYS, K1JA, LA0BM, LA5IM, LX1JW, N6BTT, SM6FZD, TF3SB, VE6BDG, VK3AJW, WB6YLI, ZE5JJ, 5B4JM and 8P6AS. Listener members include M. Brunsdon (A6), M. Pitot (3B8), G. Wilson (9V), A. Bose (VU), R. Mash (ZS), G. Ronan (EI), M. de Sweemer (ON), N. Potter (HB), B. Kaim (F) and M. Saxton (DL).

Contests

CQ WW DX Contest

0000 24 October to 2400 25 October (Phone)
0000 28 November to 2400 29 November (CW)

All bands 1·8 to 28MHz. Exchanges consist of RS/T plus *CQ* zone number (UK is 14). One point is earned for a contact with a station in one's own continent, three for those in other continents. Stations in one's own country may only be contacted for multiplier credit, and no QSO points claimed. The multiplier is the total of DXCC countries and *CQ* zones worked on each band (added together for multi-band entries). There are three categories of entry: (a) single-operator single- or multi-band, (b) multi-operator multi-band (single-transmitter), and (c) multi-operator multi-transmitter. In category (c) only one signal may be radiated on each band at any time. Entrants should use separate log forms for each band — *CQ* log forms now have 80 QSOs per page and none is available from G3FKM. Log and summary sheets may be obtained from *CQ* by sending a large self-addressed envelope and ircs to the sponsors: CQ Contest Committee, 76 N Broadway, Hicksville, NY, 11801, USA. The requirement for photocopies of the log to be sent seems to have been dropped this year. Entries should be sent to the *CQ* office (as above) and should be clearly marked "Phone" or "CW" on the envelope. Entries must be posted before 1 December for the phone section, and by 15 January 1982 for the cw event.

WA-Y2 Contest

1500 17 October to 1500 18 October

3·5 to 28MHz phone and cw. Full rules available from G3FKM (sae please).

The OK DX Contest

0000 to 2400 8 November

1·8 to 28MHz; cw and phone but not crossmode. Exchange RS/T and two figures to indicate ITU zone (UK is 27). A station may be worked once on each band, and three points are gained for each completed QSO with a Czechoslovakian station, one for all others. The multiplier is the total of ITU zones worked on each band. There are single-operator multi-band, single-operator single-band, and multi-operator multi-band categories. Separate logs should be kept for each band and should show date, time, station worked, numbers sent and received, points, and if multiplier. Entries must contain a declaration that all rules and regulations of the contest and amateur radio in the operator's country were observed, and

Bob Parkes, VS5RP (standing), with Les Higginbotham, VS5LH

QTH CORNER

A22ZM	via ZS5CU, 29 Firtree Av, Cleland, Pietermaritzburg, Natal, Rep of S Africa.
A35RX	Box 48, Nuku'Alofa, Tonga
C31NM	via PA0GIN, G. Heenstra, Noorderkroostr 16, 9742 XD Groningen, Netherlands.
CR9JA, CR9UT	via JA1UT, Y. Hayashi, 4-20-2 Nishi-Gotanda, Shinagawa, Tokyo, Japan.
FW0BE, FW0BF, FW0BK	via DJ9ZB, F. Langner, Carl Kistnerstr 19, D-7800 Freiburg, Fed Rep of Germany.
K5VT	Dr V. Thompson, 4028 Perlita -Apt 4, Los Angeles, Cal, 90039, USA.
KH6LW/KH7	via KH6JEB, R.I. Senones, 95-161 Kauopae Pl, Mililani Town, Hawaii, 96789.
DA1WA/LX	Dr H. Jakobljevik, Am Weinberg 10, 6200 Wiesbaden-Auringen, Fed Rep of Germany
S9VCT	via K5VT (see above).
UA1PAM	via UK3SAB.
VE1AWS/1	via W3HNK, J. Arcure, Box 73, Edgemont, Pa, 19028, USA.
VK9ZG	via VK3OT, S. R. Gregory, Box 622, Hamilton 3300, Vic, Australia.
VP2MMR	via KL7IHP, Box 2115, San Leandro, Cal, 94577, USA.
VP8AJL	via GM4KHE, G. Phanco, 1 Carleith Tce, Duntocher, Clydebank G81 6HZ.
VP8ANT	via G3ZAY, M. Atherton, 7 Wood Rise, Petts Wood, Orpington, Kent BR5 1PZ.
VQ9QA	N3QA, C.E. Coursey, PO Box 68, Stevensville, Md, 21666, USA.
VS5RP	R. E. Parkes, G3REP, 42 Valley Rd, Bude, Cornwall.
XF4S	via WD6DRM, S. Pence, 3950 Virginia Rd, Long Beach, Cal, 90807, USA.
ZF2DZ, ZF2FF	via W3GPR, 10 Jackson Dr, Danbury, Ct, 06810, USA.
3X1Z	via W4FRU, J.H. Parrott Jr, 4640 Ocean View Av, Virginia Beach, Va, 23455, USA
9J2KO	F. Sawyer, G3SLN, 3 Addison Dr, Middleton, Manchester M24 2PL.
VS5RP	R. E. Parkes, G3REP, 42 Valley Rd, Bude, Cornwall.

should be posted by 31 December to: CRC, PO Box 69, 113 27 Praha 1, Czechoslovakia. Note that the "100 OK" and "S6S" awards may be applied for on the basis of a log entry without the need to send QSL cards.

Results of the 1980 SAC contests have been supplied by SM6EWB. In the cw section (single-operator) top UK entrant was **GW3HCL** with 33,900 points, with **G3ESF** second with 31,392. Others were G3SGQ (28,608), GW3MPB (13,851), G6DK (5,520), G3YBH (4,440) and G3DOT (4,312). In the phone section **G4CHP** led with 15,200 points, followed by G3IQM (10,920), G3OLU (7,991), G4FVK (3,240), G4KAL (2,680) and G4EDR (266).

ALARA Contest
0000 to 2400 14 November
Organised by the Australian Ladies ARA. Copies of rules available from G3FKM (sae please).

Results of the WAB Top Band Contest were as follows: (Multi-op) G4LAB/P (78,105). (Single-op) G3ONT (60,180), G4AVA (47,500), G4AZN (18,605). (Mobile) G4FGO/M (4,960). (Listener) RS45019 (6,840). In the LF Phone Contest (Multi-op) G4LAB/P (346,380). (Multi-single) G4AVA (275,145), GW3ONT/P (182,750), G3WWX (163,785). (Mobile) G4FGO/M (17,510), G3MGI/M (17,280). (1·8MHz only) G4HPU 24,850). (3·5MHz) G4BFY (39,150), (GM section) GM4GPP (13,475). (Listeners) J. Raynes (187,250) and M. Williams (33,930). Rules of WAB contests are available from Del Roberts, G4FQO, 12 Chestnut Avenue, Cranwell, Sleaford, Lincs NG34 8HT.

HA QRP Contest
0000 to 2400 1 November
Copies of rules available from G3FKM (sae please).

Awards

USA Counties Award
G4JLU has recently written to the US Printing Office for a copy of POD 26. He was told that this has now been replaced by the 1981 ZIP Code Directory. This cost him about £15 (including postage) and now seems to be an expensive aid for working towards the award. David kindly offers to give county details to anyone who has a difficult location to place. An sae must be enclosed with the request, which should be sent to David Wilkins, 802 Kenton Lane, Harrow Weald, Middlesex HA3 6AG.

Radio Vaticana Award
This is being issued by Vatican Radio on the occasion of its 50th anniversary, and requires proof of contact with two of the three Vatican amateurs (HV1CN, HV2VO and HV3SJ) between 1 October 1981 and 31 January 1982 on any bands/modes. Stations outside Europe and the contiguous states of the USA need only work one HV. Listeners may apply with confirmed reports. Applicants should send photocopies of QSLs to HV1CN, Radio Vaticana, Citta de Vaticano, before 31 December 1983.

Certificate Hunters Club
Members may recall that this was very active a few years ago under the control of Clif Evans, K6BX. There were problems when K6BX died, but the organization has now been revived by Scott Douglas, KB7SB, "to provide a vehicle for the exchange of information and ideas in all areas of amateur radio with the prime goal of award hunting and improvement of the required skills for such pursuit". Membership of CHC is available to licensed amateurs and listeners and costs US$6. Previous members need pay only US$3. New members receive a membership certificate and those rejoining who would also like a certificate should pay the new-member fee. It is requested that new members show that they have acquired at least three awards. Membership is for life and there are no annual dues. Members are asked to file self-addressed envelopes and ircs for the future mailing of club information. There are CHC nets on all bands 3·5 to 28MHz and a "general interest" net meets on 14,300kHz from 0130 to 0400. Applications should be sent to Scott Douglas Jr, PO Box 46032, Los Angeles, Cal, 90046, USA.

VK1 Award
Issued by the ACT Division of WIA for 10 contacts with different VK1 stations since 1 January 1978. Send log details (including date, time, mode, band, station worked and signal reports) plus five ircs to Awards Manager, WIA (ACT Divison), PO Box 46, Canberra, ACT 2600, Australia. Listeners may also apply.

The White Rose Award
Further to the information given on p827 of September *Rad Com*, readers will be interested to know that the award manager is G4JYL, QTHR.

WPX Award
It is understood that applications should now be directed to Norman Koch, K6ZDL, PO Box 1351, Torrance, Cal, 90505, USA.

The MPR-60-MPR Award
Issued by the Radio Sport Federation and Central Radio Club of Mongolia to celebrate the 60th anniversary of the country's revolution. Available to licensed amateurs and listeners for acquiring 60 points from contacts with or reports from Mongolian stations between 1 January and 31 December 1981. Non-Asian stations count 15 points for contacts with JT60AB and JT60WB, 10 for those with JT club stations, and five for individual stations. The same station may be worked on more than one band for credit. Send certified log data to: Award Commission, Central Radio Club, PO Box 639, Ulan Bator 13, Mongolia. There is no charge.

Around the bands

G8KG writes: "Any fears that the low solar activity in June marked the end of nearly two years of high activity were soon dispelled, as mean activity rose steadily throughout July and August with the 27-day average solar flux climbing back to 224 sfu by the end of the period.

"The monthly means were 198 sfu for July and 218 for August, with 'highs' on 265 sfu on 26 July and 270 on 28 August, giving two more months with a peak daily value above 250 sfu. There was a major geomagnetic disturbance (A index = 125) on 25 July. The corresponding SIDC provisional monthly sunspot numbers were 144·2 and 158·2 for July and August respectively.

"On the eve of the 1981–2 dx season it is interesting to try to forecast how the sun will behave over the next few months. It is unlikely that the average level of activity will be as high as in the past two seasons, but the decline is not likely to be enough to cause a marked change in the bands up to, and including, 28MHz. The prospects for 50MHz depend rather critically on the pattern of minor peaks and troughs. During the past two years the average interval between troughs has been about six months, with the period gradually shortening. If this pattern continues there should be a minor trough in November or December with a recovery early in 1982.

This profile is by no means certain but should it occur it is likely to result in substantially fewer 50MHz openings, particularly on the N Atlantic path, than occurred in the previous two seasons."

Several correspondents have been finding great interest in the 28MHz beacons and some apparently unusual conditions on that band. G3HCT noted that ZS6DN was only two S-points weaker on the long path than on the short path one evening, while at the same time ZS6PW was inaudible on the long path. He also noted a signal from W1AW at 2100 peaking from the SW—and the only USA station to be heard.

The following contributed to this part of the column this month: G2HKU, G5JL, G3s GHY, GIQ, GVV, HCT, IGW, IMW, KSH, LOL, NWG, GM3PPE, G3XTJ, GM3YOR, G3ZFC, G4AXD, GD4BEG, G4s DJY, DJX, EHQ, GW4KGR, G4LDS and RS1066.

Stations listed in italics were using cw.

1·8MHz. 0000 *LU9EIE, PYs 1ARS, 1ZAE, 2CW, UD6DHC.* **0100** *LUs 1DZ, 8DQ, OJ0MA, ZS5LB.* **0200** *YV4TI, ZD8TC.* **0300** *HI8LAF, K2GNC, VO1IA, W2BHM.* **0400** *VE1BVL, W1-W2.* **0500** *OA4AWD* (QSL to VE2AQS). **2100** *C31HD.* **2200** *LZ1CQ, UA9SAX.* **2300** *FC0GQQ, LZ1KDP, PY1MAG, UL7CBM, ZD8TC.*

3·5MHz. 0400 C31LM, PY2SZH. **0500** *LU4MDR,* K3UZE, W5XZ, K9KA. **2000** *XT2AW.* **2200** *4K1A.* **2300** VK6LK, *ZD8TC.*

7MHz. 0000 *C31KI* (QSL to DL5KV), J88AH, *DK6NJ/ST2, DF4FM/ST3, 4K1A, 4K1B, 4U0UN.* **0100** *S9VCT* (QSL to K5VT), *VE1AWS/1, KA3BUJ/8R1, 9U5AV.* **0300** *S79WHW.* **0400** *WB2REM/HC8, VP1AI, VP2VJ.* **0500** *CO, FC0GQQ* (QSL to DJ6ZM), HH0N, *VK* (until 0800), *K7US, ZL* (until 0800). **0600** *W1-W5.* **0700** *VP9CB, 6Y5HN.* **1900** *S79WHW, ZL2GH, 5B4JP.* **2000** *KP4KK/DU2, ZD8TC.* **2100** *JA, VS6JW, XT2AW, ZS5MY, JA2KLT/3B8, JA2KLT/3D6.* **2200** *CE8ABF, CR9JA, JT0WA, JW5NM, VP2ACQ, 4S7MX, 9U5WR.* **2300** *A4XIH, G6ZY/CN, HH2VP, DF9OO/JW, DK6NJ/ST2, TR8IG, UK1PGO,* VK6LK, *VK6LW* (ex-G4EHF), *9L1WS, 9N1BMK.*

14MHz. 0600 *FO8HD, KH6, KL7, S9VCT,* VK, W4-W0. **0700** AH2L, *FO8GL,* J6LT, KH6, WB0KS/KH7, KL7, W6-W7, VK2AGT/LH, ZK1CG, ZL, 3X1Z. **0800** A35RX, KH6LW/KH7, W6, YJ8RG, 9M8PW. **1200** *9U5VT.* **1300** EK8R. **1600** JT1BG, UK1PGO, 4K1A, *9N1BMK.* **1700** AP2HB, VK6NS, 7Q7LW. **1800** VS5DD, 3B8AE/3B9. **1900** *HL9UF,* JA, VP8AEN, *ZL.* **2000** *A71AE, FY7YE, P29EJ, VE1AWS/1,* VK, VP8, A7XAB/9K2. **2100** HH0N (QSL to WD4JNS), *7Z1BDF* (QSL to Box 1999, Jeddah), *9X5SP.* **2200** *S9VCT, SV1NA/9.*

21MHz. 0400 *W6-W7.* **0500** *JA, VY1CJ.* **0600** *JT0WA, KH6IJ.* **0700** FOs 0FB, 8SH (QSL to KA3A), *AH6A, KL7RJ,* VK, ZL. **0800** AH3AA, *KH3AB,* KX6BU, ZL, *4S7MX.* **0900** *H44DX, T30AE* 9N1BMK. **1000** FR0FLO/E, *P29NL, VP2DI* (QSL to W0DX), ZL. **1100** KH6BU, *TL8CN, UK1PGO.* **1200** *W7.* **1300** D68AM, *VS6JW.* **1400** A71AE, *A9XE, TR8BJ/M, 5R8AL.* **1500** VK9YC, W6-W7, XZ9A, 9L1AP. **1600** DU1MX, HS0HS, *DK3SN/KP2,* VS6CT, *YI1BG, 9Y4VU.* **1700** KH6, W6-W7, 5N8PBN. **1800** EP2TY, KH6BOG, S83H, *TN8VT,* 3D6AC, 7Q7LW, 8Q7AV, *9N1BMK.* **1900** *HF0POL,* JT0WA, *KG6JFO, KH6,* EI5V/OD, S79MC (QSL to AK3F), 9X5PP. **2000** A71AD, HV2VO, JA, *J87WW* (QSL to W8WW), KC4AAC, *S9VCT,* T5TI. **2100** *WB2REM/HC8, HS5AID,* JA, *KL7,* VE4-VE7, VK2, W6-W7. **2200** *FR7BP/J, DK6NJ/ST2, VU,* W6RO, *ZP5XJA.*

28MHz. 0700 VK6. **0900** VK (until 1500). **1000** FR0FLO, *JA, VS6JW, ZL, JA2KLT/3B8, 4S7MX,* 5H3TM. **1100** UA9, *VK6, XT2AW,* ZD8TC/P. **1200** *JL1MUT,* JY, *S9VCT,* VK9YC. **1300** FP8HL, VK4VAX, *VP8AGY.* **1400** JA, SU1AA. **1500** H5AK, HK0FBF, XZ9A, 9M02OK. **1600** FH8OM. **1700** A22s AA, BX, W1-W5, VP8GQ, 9Q5FL. **1800** W1-W5, YC1GJ. **1900** PY, *9U5WR.* **2000** CE6COR, VP8QG, W1-W6. **2100** G3MUV/CE0, J73CB, Ws, VKs (LP).

Many thanks to all who contributed to this month's column, including the authors of the following for items extracted: **QRZ DX** *(K5FUV),* **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),* and the **Ex-G Radio Club Bulletin** *(W3HQO).*

Please forward all items for **December** issue **to reach G3FKM** no later than 28 October □

HF propagation study

Band predictions for October 1981

UTC	28MHz 000001111122 024680246802	21MHz 000001111122 024680246802	14MHz 000001111122 024680246802	7MHz 000001111122 024680246802	3·5MHz 000001111122 024680246802
EUROPE					
Moscow	....68875...	....3999995..	2..877778963	985321124788	+52.....4++
Malta	....775551...	....39999971.	321877778985	99852124799	+++2....24++
Gibraltar	....354231...	....8988871..	11.387778983	998742223799	+++4....4++
Iceland	.....2432....	.....178874...	78788961	986643234688	+++4....35+
ASIA					
Osaka	...175.....	....58741....	1..363345544	1561	23
Hong Kong	...499851...	....47878641.	2...33347876	1574	.....25.
Bangkok	...6++971...	....36778972.	4...13347987	1.....1576	244
Singapore	...6888882...	....45778972.	4...3247997	1575	242
New Delhi	...6+9982....	...1457787211	631..2247888	51.....1578	2.....245
Teheran	...7++9972...	1.2756789731	8562.1247998	851.....1578	52.....245
Colombo	...7++9982...	...1446789831	73...1247998	5.....1578	2.....245
Bahrain	...7+88972...	2.2655789842	8651..237999	851.....1578	52.....245
Cyprus	...5+98883...	1..888899831	856654568998	8841...13688	++2....3++
Aden	...7++89851..	312644689975	9761..137999	851.....1578	52.....245
OCEANIA					
Suva (s)	.....136611...	.....5778651..	..156434771..	...21...11...	.....
Suva (I)	11..1331...274	331676532774	..375323672..	...2...11...	.....
Wellington (s)	.....57741....	.....28877651.	..166434773..	...1...12...	.....
Wellington (I)	11...21....43	34246431.475	.13663224731	...1...11...	.....
Sydney (s)	...5988741...	.....78878861.	353347962	.....151.	.....2.
Sydney (I)	.....2.....21	221.7421.175	..1363224762	.....1...141.	.....
Perth	...7888641...	1.1577788631	3...23247997	1572	.....24.
Honolulu	.....3.....	.....21...472.	.3336422651.	...341...1...	.....
AFRICA					
Seychelles	...77776331.	312544778875	973...237999	83.....1568	+.....235
Mauritius	...788889621	422545789986	963...236999	72.....1578	4.....245
Nairobi	...788887732	522644579997	9861...36999	861.....1577	53.....244
Salisbury	1..677888853	641744479998	9962...36999	862.....1578	54.....255
Capetown	1..477889864	751755569999	9974...16899	873.....1578	54.....245
Lagos	21.2++88+974	761774458999	99872...5899	7872.....478	455.....45
Ascension Is	11..9877864 3	762485446898	99985...1699	7874.....168	454.....35
Dakar	11..9++8+973	663396446998	999861...1699	7774.....168	444.....35
Las Palmas	.....7988873.	11.199889983	886776556899	888521.1379	+++2....5+
S AMERICA					
South Shetland	11..27888873	663377776788	899863221256	4564.....1	+23.....
Falkland Is	....48+88873	553287755688	9998632...157	6874.....2	3+5.....
Rio de Janeiro	29867741	553277544686	999763...169	8874.....15	555.....2
Buenos Aires	38988872	453187644587	9997631...47	7874.....2	455.....
Lima	.....188861.	232.14754466	8996532...16	68841.....1	355.....
Bogota	.....1+88861.	222..5753366	8985342...17	78741.....1	454.....
N AMERICA					
Barbados	.....8+88861.	222.18743586	9986532...58	87741.....4	554.....
Jamaica	.....1+88861.	221..5764465	88844421..17	68741.....1	454.....
Bermuda	.....5+88861.	221.17755685	8884542...158	77741.....3	554.....
New York	.....188885.	11...5776784	887244321257	68741.....2	355.....
Mexico	.....18874..	11..1.575444	78725233....3	28741.....	55.....
Montreal	.....178874.	11...5777784	886244332357	67741.....3	345.....
Denver	.....4762..	11....177653	675231233114	26741.....	35.....
Los Angeles	.....1762..	11....58642	5752411341.2	15741.....	24.....
Vancouver	.....241..	1.....17742	564231136324	14741.....	4.....
Fairbanks	.....1.....	11124531	553353236655	12441...11...	.....

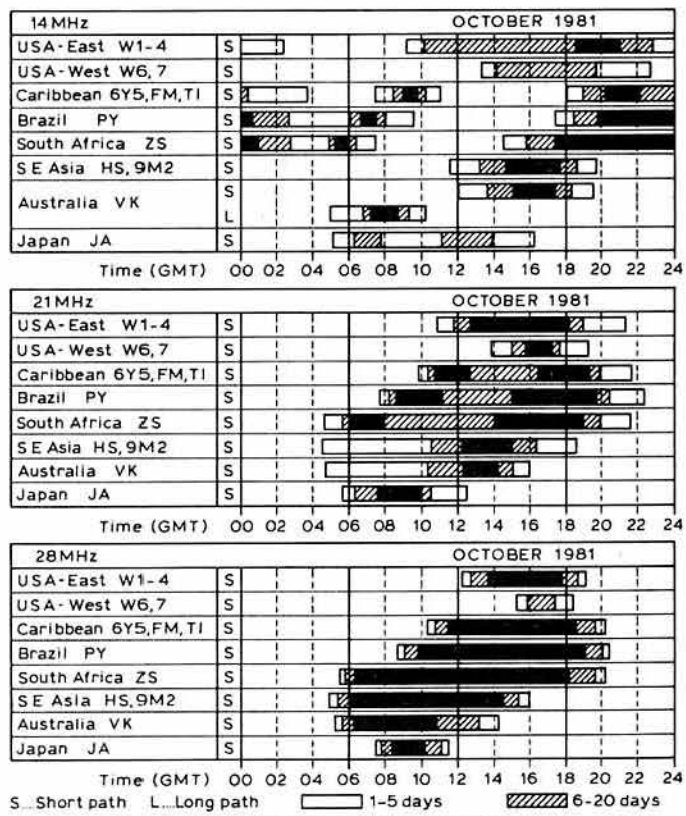
Propagation predictions

October is a very favourable month for the radio amateur. The F2 mufs which were at their lowest during summer will rise steadily during October. This year the seasonal rise will be less marked, as we are now in the declining arc of the sunspot cycle. This decline is mostly steady, but can occur quite suddenly at times, so conditions can vary considerably from month to month. A sudden fall in sunspot activity cannot be forecast, so this uncertainty will have to be taken into account for the predictions for the coming months.

Accepting that sunspot activity will steadily fall, **28MHz** will be open in all directions. Short-skip conditions (over about 800 to 1,800km) will only occur under exceptional circumstances during this month and the coming winter season. The same applies to **21MHz** – as on **28MHz**, all continents will be heard on **21MHz**, and traffic with western North America will be certain. The **14MHz** band offers good dx during the evenings, and during daytime it will be open for dx as well as local European traffic.

Distances covered will lengthen on **7** and **3·5MHz**. There will be no occurrence of the dead zone during daytime. As the season advances chances of dx on 7MHz will increase when the longer part of the path lies in darkness. The best chances for dx on this band will be after midnight. Local traffic will only be interrupted by the dead zone in the latter half of the night.

The provisional sunspot number for July 1981 from the Sunspot Index Data Centre was 144·2. During the last week of the month the daily number several times exceeded 200. The predicted smoothed numbers for November, December and January (82) are 118, 116 and 114 respectively.



COUNCIL PROCEEDINGS

A brief report of the Council meeting held on 25 June 1981

Present: Mr B. O'Brien (President, in the chair), Dr E.J. Allaway, Messrs J. Anthony, J. Bazley, R. Bellerby, P.F.D. Cornish, Dr D.S. Evans, Mr L.N.G. Hawkyard, Mrs J. Heathershaw, Messrs. G.R. Jessop, I. Kyle, W.J. McClintock, D. Pratt, G.M.C. Stone (members of Council), D.A. Evans (general manager/secretary), A.W. Hutchinson (editor), R.F. Stevens (telecommunications liaison officer) and Mrs H.M. Allin (minutes secretary).

Apologies for absence were received from Messrs R. Barrett, GW8HEZ; K. Fisher, G3WSN; and G. Knight, GM8FFX.

Financial report
Mr Cornish reported that he had circulated the end-of-March accounts and report to the Finance & Staff Committee, which had recommended a 16 per cent increase in subscriptions from 1 October 1981.

Some discussion ensued, after which it was agreed by 10 votes to 3 to accept the proposal to raise the corporate membership subscription to £14.50 on 1 October 1981, with commensurate increases in other subscription rates.

It was further agreed that the hon treasurer and general manager would discuss the rates for overseas members, to allow for higher postal charges.

General manager's report
Mr Evans reported that:
(i) Approximately 7,100 persons attended the Alexandra Palace exhibition, which was slightly up on the 1980 attendance.
(ii) The M & R and F & S committees had agreed a limited experiment whereby a register of stolen equipment be kept on the Society's data processor.
(iii) The ARRL were now handling the Society's publications in the USA and had advertised RSGB books in the July issue of *QST*.
(iv) Membership now exceeded 29,000, with an approximate net rise of some 13 per cent anticipated during the 1980-1 financial year.
(v) A new full-time programmer was about to take up employment with the Society. A number of major system changes were planned, to allow for increased membership and Society business.

Elections for 1982 Council were discussed.

Review of committee business
Education
Mr Anthony reported that the committee had been asked to up-date the amateur radio section for the Duke of Edinburgh Award Scheme syllabus.

Finance & Staff
Mr Stone raised the question of the cost of imported equipment. Some discussion followed and the question was referred to the committee for further discussion.

HF
The minutes of two meetings of the committee were accepted with one amendment.

HF Contests
The minutes of one meeting were accepted without comment.

IARU
There was praise for the article on the IARU Region 1 Conference in the July issue of *Rad Com*.

The Council approved the election of the Fiji Society of Radio Amateurs as a member of IARU Region 3.

Dr Allaway reported that an hf working group had been set up within IARU Region 1 and needed a representative from the Society's HF Committee. It was agreed to refer this to the HF Committee.

Interference
The minutes of one meeting were accepted without comment.

Membership & Representation
The minutes of one meeting were accepted without comment, as were the minutes of a meeting of the GB2RS *Ad Hoc* Committee.

Microwave
Council approved the addition of Mr M.A. Gould, G8IXI, to liaise with the Repeater Working Group.

Rally & Exhibition
Mr Hawkyard reported on arrangements for the Woburn Rally.

Mr. Jessop commented on the success of the recent Alexandra Palace exhibition. The future of this event was discussed briefly.

Propagation Studies
Dr Allaway drew Council's attention to the fact that the data services of the World Data Centre for Solar Terrestrial Physics at Boulder were to be discontinued after September.

Raynet
Mr Jessop drew Council's attention to the resolution asking Council to confirm that only RSGB members be allowed to vote or stand for election to the RSGB Raynet Committee. Dr Evans pointed out that the Green Book set out clearly that committee members be Society members, although if necessary the committee could co-opt non-members to serve in a non-official role.

A discussion on Raynet commenced; however, it soon became apparent that much more information was needed by Council members. Accordingly, Mrs Heathershaw, a Raynet controller, was asked to prepare a discussion paper, with the assistance of all relevant persons, to provide background information for Council.

Technical & Publications
The HF Committee had submitted a list of items for possible equipment reviews, and Dr Evans said the committee would welcome similar input from other committees, bearing in mind the need to cater for all tastes.

Telecommunications Liaison
Dr Evans said that he felt there should be vhf and microwave facilities included in any future proposals relating to a novice licence. Mr Bazley replied that the committee would be willing to discuss any proposals put forward by the Microwave and VHF Committees.

Proposals to streamline the Class A licence had been submitted to the Home Office and an acknowledgement had been received.

After discussion it was agreed that Mr Bazley would write to Mr Fisher, G3WSN, to obtain the views of the VHF Committee.

VHF
Mr Stone drew attention to arrangements for next year's VHF Convention.

VHF Contests
Mr Hawkyard said that details of the meteor scatter contest had not been well publicised by European societies. The number of entries was disappointing.

Membership
Council approved the waiving of subscriptions, on medical grounds, of nine members.

Council granted affiliation to: Army School of Mechanical Transport, North Humberside; Bolsover Amateur Radio Society, Derbys; Club VBSA, SK7JC, Sweden; 1st Crockerne Scout Group, Avon; Five Bells Group, Spalding, Lincs; Gilwell Scout Amateur Radio Group, Essex; Highfields Disabled Centre, Cardiff; ITT Components Group, Paignton, Devon; Polytechnic of North London Radio & Electronics Club; RAF North Luffenham Amateur Radio Club, Rutland, Leics; Reading Telephone Area Radio Club; Red Rose Radio Society, Bolton, Lancs; Robert Gordons Institute of Technology Amateur Radio Society, Aberdeen; South East Derbyshire Amateur Radio Society; Speyside Repeater Group, Aberdeenshire; Wakefield & District Radio Society, West Yorks; West Yorks Metropolitan Police Amateur Radio Club; Wigan College of Technology Amateur Radio Club; South Glamorgan Institute of Higher Education Radio Amateur Club.

Life membership was granted to Mr H. Balyoz, W6YBP.

Trade exhibitions
The general manager outlined the situation with regard to the two proposed East Midlands radio exhibitions: ARRA at Castle Donington and an Amateur Radio Exchange-organized exhibition at Leicester, both in October. Amateur Radio Exchange had suggested that the Society organize the trade exhibition.

The minutes of the Rally & Exhibition Committee meeting held on 23 June were read by Mr McClintock, and Council agreed the committee's recommendations: (a) that the Society should not form a trade association; (b) that the Society should not become involved with the organization of an exhibition in the East Midlands in 1981.

It was further agreed that even if the two exhibitions were to be held simultaneously, the Society should be represented at both events if possible, as it was Society policy to be present at all major amateur radio events.

Class B licensee, cw privileges
Mrs Heathershaw raised the possibility of cw practice on a set frequency and time.

Mr Stevens replied that the Home Office would not permit cw sending by unqualified persons, but that a Class B licensee could send cw using a Class A station under the direct supervision of the Class A licence holder.

IARU Region 1 Conference report
This item was postponed as Mr Hughes, G3GVV, the UK delegation leader, was unable to be present. It was agreed that Mr Hughes would be invited to attend a future Council meeting if necessary, or if Mr Hughes wished to bring any item to its attention.

Mr Stevens had received a letter from the Polish society, thanking the RSGB for its hospitality at the conference.

Honorary officers
Mr Stevens, the telecommunications liaison officer, gave a brief summary of the WARC bands progress. Referring to the problem of interference in the Isle of Wight/Isle of Man, he reminded Council that the Syledis frequencies were not governed by the Home Office.

Dr Allaway, the hf manager, announced that from 10 June the FCC was permitting the full use of 1,800-1,900kHz in the USA.

Emergency communications manager. It was agreed to defer this matter until the whole subject of Raynet had been considered. Following a brief discussion regarding the appointment, it was agreed to amend the terms of reference to exclude direct HO liaison prior to a new appointment being made. Any such liaison to be made only through the TLO.

Correspondence
The President said he had received many letters of gratitude and praise for the RSGB from national societies, following the IARU conference.

Mr O'Brien had received an invitation from VERON to attend their Day for the Amateur on 31 October. It was agreed that the President and the general manager would attend this event.

Mr O'Brien had also received an invitation from REF to attend a function in France.

Proposed ITU region
Mr Stevens reported on a recent ITU meeting in Geneva convened to discuss the possibility of a 4th ITU region (Africa). At an early stage in this meeting it was agreed that the amateur and amateur satellite services would be among the small number whose frequency allocations should not be altered by any decision of the meeting.

YOUR OPINION

AGAINST HAMSPEAK AND CB SPEAK

The Editor
Radio Communication

Sir—The letter from G4BHY in the June issue was like a breath of fresh air in the present jargon jungle. I do not object to the use of many of the traditional abbreviations which originated in live telegraphy—phrases which set my back hair on end are "that's a Roger" meaning "Yes", "negative" for "no"—will we have "negatory" soon?

Another of my pet hates is the operator who gives his/her name or location once and then fires off a string of phonetics far too fast for me to translate even if the need existed. My main operation these days is on 144MHz fm; usually, with strong signals, a reduction of 50 per cent in the speed of speaking coupled with clear diction is far more effective than phonetics as generally used.

Finally, a point not unconnected with the first paragraph. May I suggest that a stand be taken for amateur radio by mobile operators. If clear signs "NOT CB—Home office licensed" were exhibited on cars it would perhaps reduce the annoying "Is it cb mister?" so frequently heard, and could lead to a reduction in the theft of rigs by making it clear that the equipment is of no use for cb.

Ralph C. Taylor, GW2HCJ

Sir—I feel that I must write to say how much I disagree with the views expressed by G4BHY (*Rad Com* June 1981) on the use of cw terms during phone contacts.

For me much of the fascination of talking to and listening to other radio amateurs lies in the traditional mode of conversation, using such terms as QSO, QSY, QTH, xyl etc to which G4BHY takes exception. Every hobby and sport has its own jargon, and if one is sufficiently interested one very soon learns what it is all about. Operators whose first language is other than English will surely have less difficulty understanding such terms taken from the Q-code than so called "plain" language.

The reference to the telephone conversation is completely irrelevant—one does not take the trouble to obtain an amateur transmitting licence to merely have an alternative to using a telephone!

No sir! Stations contacted by me will have to endure my use of such terms as QSO, QSY and xyl, and I hope most sincerely that the general use of such terms will continue as it has for many years past.

Don Eckley, G3UFQ

Sir—Like Mr Kleeman I enjoy my contacts with people around the world by radio. Unlike him, however, being a Cockney, I do not speak perfect English and therefore would not presume to comment on the way anybody else speaks. Perhaps he would like to suggest that "Spoken English" should form part of the licence examination throughout the world? Until that comes about perhaps he would be better off sticking to telephoning his friends so that he does not have to resort to using the "meaningless claptrap" (albeit universally understood) that he objects to—quality of Post Office lines permitting of course. As I should probably fail the language test I shall use my remaining time communicating with the other savages in pidgin, or any other way I can understand and be understood. Even, as a last resort, shouting and waving my arms in the best English tradition—although for this I must get QRV on sstv; sorry, there I go again.

Jim Leigh, G4ILK

DX OPERATION

The Editor
Radio Communication

Sir—Being a keen cw operator on the hf bands it is seldom I find myself moved to express admiration for a particular station and its operator. I must confess my main endeavours are toward the dx stations, and have spent many hours hammering the old "up-and-downer" in an effort to compete with those "European dx hogs", some of whom appear to be motivated by "If I can't work him, neither will you".

In addition to the above QRM, I, like many others, can only boast an indifferent antenna, due to the usual reasons. It is therefore that I speak with admiration of my recent cw contact with VK9NL on 20 May at 0713. It must have been a tremendous effort of concentration and patience that enabled Kirsti to pick out my poor weary and weak signal from all the "boomers". It must be said that I have had similar experiences with other dx stations, notably ZK2VU at 0807 on 10 December 1980, but these are rare occasions indeed.

J. R. M. Hewitt, G3SGH

Sir—Perhaps G4FXU (*Rad Com*, May) has noticed that most dxpeditions use the same spots on each band; frequencies which have been determined by experience as being best for expedition purposes. Typical factors affecting the choice of such frequencies are the licence conditions in various countries and freedom from long-duration QRM.

Likewise other common-interest groups often agree a meeting place on each band, also determined by their needs and experience. World Scout frequencies in the 21MHz band are 21,140 and 21,360kHz (*MOTA* June/July 1980). Presumably JOTA stations would have a better chance of meeting each other and of having a clear channel over a long period if they operated around these frequencies.

While nobody has a monopoly of any frequency, it makes for easier working if some attention is paid to what is, after all, an unofficial form of band planning. Doubtless if G4FXU had been operating on 3,650kHz when an RSGB newsreader started up, and declined to move because he was there first, the comments would have been equally "arrogant and offensive".

D. E. C. Lockyer, GW3HCL

144MHz CW

The Editor
Radio Communication

Sir—Where is everyone on 144MHz cw? I have been operating 144MHz ssb/cw for the last five years on and off, but only recently have I been very active. Over the last five months I have had only 10 QSOs, yet I have spent more than 700 hours of calling, tuning and listening to achieve those QSOs—it just does not make any sense at all. Why do I do it? 144MHz is a very unpredictable band, especially when, like me, you use only an IC202S (3W) and an 11-element Yagi—but the real reason is the sheer predictability of hf, except that on hf there are always thousands of waiting operators, unlike 144·050MHz.

So come on G2s, 3s, 4s and all, let's have some real activity on 144·050MHz, and then it will make at least one impoverished morse maniac happy.

D. B. Andrews, G4EZZ/FOCVO

LICENCE RENEWAL

The Editor
Radio Communication

Sir—On returning from my summer holiday recently I was dismayed to receive a letter from the Home Office notifying me that, since I had failed to renew my licence—which I have held continuously since 1956, and which had expired the previous February—it had now been withdrawn. Being certain that I had paid the renewal fee in good time, I rang the Home Office man who had signed the letter, who referred me to their Accounts Department. They insisted that they had no record of payment. Fortunately I had kept a note of the cheque number and my bank was able to produce the cancelled cheque which proved beyond doubt that the Home Office had cashed the cheque for the renewal three days before the licence had expired.

I am writing to point out the dangers of assuming that in sending off a cheque with the yellow renewal slip one has automatically renewed one's licence; the Home Office does not, unless requested, send a receipt. In light of this experience I would advise all amateurs to write on the renewal form "Receipt required" and to keep a record of cheque numbers and dates, since otherwise, as in my case, it could be extremely difficult to prove payment.

Brian Johnson, G3LOX

QSL BUREAU

The Editor
Radio Communication

Sir—May I utilize your good offices to state that the QSL Bureau could still use one or two volunteers willing to collect cards and sort them at home on a weekly or fortnightly basis.

Although one should never look the proverbial gift horse in the mouth, members will know what I mean when I stress that enthusiasm is not enough—nothing is really achieved if a helper takes some six weeks to sort what my wife and I could have cleared up in two or three evenings. Some hours spare time each week are desirable, and the job may appeal to a retired person, to a lady who is at home all day or, in these unhappy times, someone who is unemployed.

Kindly contact the writer—my number is in the telephone directory and my address is in every issue of *Rad Com*.

While writing, may I comment on the letter from Mr Barnish, J6LOU, on page 547 of the June *Rad Com*. This gentleman states that there is no QSL Bureau in J6, St Lucia, but I would respectfully point out that for the past two or three years this facility has been undertaken by Clem Bobb, J6CLT; this information being included in the *Radio Amateur Callbook* published in the USA. Members may rest assured that for some time the RSGB QSL Bureau has been forwarding J6 cards to Mr Bobb without any complaints.

E. G. Allen, G3DRN,
manager, RSGB QSL Bureau

OBITUARIES

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

Dr M. S. W. Bisdee, OBE, GD5DZ
Dr Bisdee died on 1 August, aged 72. He was a keen and active amateur, and maintained weekly contact with friends worldwide. He was a regular visitor to the Isle of Man ARS meetings, and was keen to help those beginning in the hobby.

Mr J. Davis, G3RRJ
John Davis, who died early this year aged 57, was winner of many CQ DX awards.

Mr A. Edwards, G8YEB
Bert Edwards died on 13 June. He was involved with radio all his life, including his service with the RAF, and was keenly interested in the amateur field. He was a member of RSGB and RAIBC and had been a respected member of the Exeter and Exmouth ARSs. Recently licensed, his call and friendly personality were well known in Devon and Cornwall. Failing eyesight had restricted his constructional work, but he derived great pleasure from operating on the 144MHz band on which he had been very active.

Mr L. Frankland, G3GEE
Len Frankland died on 26 August, aged 79. He was one of the post war original members of the Blackpool & Fylde Club, and latterly a member of the Thornton Cleveleys Club, respected and admired by all who knew him. He was instrumental in the formation of the Two Meter Henpecked Club, which described the adventures and misadventures of the mythical henpecked husbands. He was also keen on cw.

Mr J. Frisby, G8CA
John Frisby died on 10 June. He was president and a founder member of the Axe Vale ARC. He was very keen on dx and cw operation.

Mr K. Hooper, G3UJW
Ken Hooper died on 18 June, aged 61. He was a long-time member of the Plymouth RC.
(Last month G3UJW's callsign was wrongly printed as G3UUW. We apologise to Mr Hooper's family and to G3UUW for this error.)

Mr R. A. Scanes, RS45286
Roy Scanes died on 3 July, aged 60. He was a member of the Saltash & DARC, and had been studying for the RAE whenever heavy business commitments allowed.

Mr E. M. Wagner, G3BID
Edgar Wagner died on 13 July, aged 75. An enthusiastic hf bands mobile operator with 220 countries confirmed, he was a founder member of the Amateur Radio Mobile Society, winning its annual Maurice Margolis Award Trophy three times, and was a past recipient of the Calcutta Key. He was a keen member of the RSARS.

Also:

Mr N. P. Blaxter, G8SKC;
Mr A. V. Browne, G4FPW, on 11 June;
Mr H. Harding, GW2HH, on 21 May;
Mr H. T. McFarlane, G8SK, on 17 June;
Mr K. B. Pearse, G3MLC, on 20 July;
Mr A. J. H. Watson, G2YD, on 7 June;
Mr J. H. Watt, G4HAF, in July.

National Field Day 1981 results

The contest, held over the weekend of 13–14 June, attracted 91 entrants, which is slightly below the 100-plus which has been the norm for NFD. Band conditions were very good over the southern part of the UK, with excellent openings to North America on both 21 and 14MHz. There was also good propagation to Europe on the lower frequencies, and many groups, particularly in the Restricted section, concentrated on building their scores by using 7 and 3·5MHz as the anchor bands.

Further north in Scotland and Northern Ireland, hf conditions were less attractive and a number of groups reported that it was hard-going to make any good runs of contacts on 14MHz, although the logs suggest that Open section entrants found plenty of work. Conditions on the lower frequency bands were as good as, or slightly better, in the north, than those experienced in the midlands and parts of the south.

The weather over the UK was also varied, with the south having a mini-heatwave for most of the Saturday and Sunday. Other parts of the country had cooler weather and local rain showers. Some of these were quite heavy and one group had to close down for a period for mopping-up after they had been washed out.

The downturn in the overall number of entrants, which mostly affected the Restricted section, seems related to the mid-June date, as a number of groups have complained about it conflicting with the holiday season and its nearness to VHF NFD. Traditionally, NFD is always held over the first full weekend in June unless this clashes with the Continental Whitsun holiday, as it did this year. The dates are internationally agreed to ensure the participation of the HB and DL stations and there is nothing that can be done to alter the dates, without losing this participation. Most groups would agree that NFD without them would be a pretty poor event. VHF NFD is also held on an agreed date, so again any change would be difficult.

Another difficulty confronting the smaller groups is the problem of finding enough contest-minded cw operators to man a station. This problem hit a number of entrants and it seems likely that it will get worse as many of the newly-licensed G4s have little or no interest in cw and regard the morse test as a means of getting on the hf bands to work ssb dx. The larger groups did not have this shortage and a number were able to field two stations.

NFD Trophy

Guernsey ARS ..... 3,423 points

Bristol Trophy

Great Western Contest Group ..... 3,041 points

Gravesend Trophy

Gravesend RS ..... 3,169 points

Scottish NFD

Glenrothes & D ARC ..... 2,195 points

Frank Hoosen (G3YF) Memorial Trophy

Southgate RC ..... 1,408 points

Leading scores on individual bands

Open section		
1.8MHz	Torbay ARS	650 points
3.5MHz	Harlow & D ARS	1,060 points
7MHz	Salisbury R & ES	901 points
14MHz	Southgate RC	1,408 points
21MHz	Sheffield ARC	1,201 points
28MHz	Guernsey ARS	715 points
Restricted section		
1.8MHz	Wheatsheaf Contest Group	634 points
3.5MHz	Stockport RS	582 points
7MHz	Worthing & D ARC	1,445 points
14MHz	Red Dragon DXers	667 points
21MHz	East Notts Contest Group	432 points
28MHz	SRCC Croydon	494 points

Overseas stations giving most points to entrants

Europe: YU7SF/M — Australasia: VK6PG
Africa: ZD8TC/P — North America: W3ARK

Open section

With the generally good hf band conditions, entrants in this section were able to take advantage of their beam antennas and clocked up some pretty impressive scores. As will be seen from the summaries of equipment that was used some quite sophisticated antenna farms were used with many groups being able to select a number of different antennas for each band. The choice facing many entrants was whether to stay on the hf bands and work the dx, or to use the lower frequency bands for working the EU/P stations, which seemed to be endless in numbers! The top-scoring stations used a combination of bands and shared their operating time between hf and the lower frequencies, with 1·8 and 28MHz to give them useful bonus points.

The overall leader was the Guernsey group, GU3HFN/P, which claimed a record score in excess of 3,500 points. In common with every single entrant, the group lost points in the checking, but still ended with an outstanding 3,423 points from a total of 924 contacts. It used an FT101B transceiver feeding a TH6DXX tri-band beam, a multiband trap dipole and a separate folded dipole for 1·8MHz. Even though the group admitted to having an advantage with the GU prefix, it was still a very good effort and the operators, GU3MBS, GU4CHY and GU4EON, are to be congratulated.

The Gravesend RS group was second with a checked score of 3,196. The 786 QSOs made by G4BUO and G4FAM give G3GRS/P the Gravesend Trophy (home at last!). The group used a TenTec Omni-D, a tri-band quad, a 40m quad, a 40m loop and a number of single-band dipoles. In third place was the Leicester Polytechnic group, G3SDC/P, operated by G3ORY and others. The group gave minimal information on its entry, so its equipment cannot be listed nor its operators and antennas (A note on the main cover sheet stating that the details are given on the band cover sheets is not enough, as the logs are widely separated throughout members of the HFCC for the checking process and the information does not always reach the scribe).

Restricted section

Most groups in this section concentrated on using the lower frequency bands, although in the south and south-west of the country hf band conditions were good enough to provide entrants with some useful scores on 14, 21 and 28MHz. The winners, G3NKS/P, the Great Western Contest Group (Cheltenham area), found 14MHz to be in good shape and used this band in conjunction with 7MHz for its main efforts. The group also used 3·5MHz and made short excursions to the other bands to collect bonus points. Using an FT401 transceiver with a 264ft centre-fed inverted-V G3MZV and G3NKS made a total of 773 contacts for a checked score of 3,041 points, and won the Bristol Trophy.

In second place was the Northern Contest Group, G3VMW/P, previous winner of the section. The group scored 2,950 points from 749 contacts and used a TS830S transceiver and a 264ft c/f wire, with G3VMW and G3WPF paddling the keyer. Stockport 'A', was in third place with 2,887 points from 703 QSOs. G6UQ/P used a 200ft c/f wire and a TS520S transceiver.

Scottish NFD Trophy

Once again this award goes to Glenrothes 'A', GM4GRC/P, in the Open section of the contest. This year, the West of Scotland group, GM4AGG/P, gave them a close fight and when the checking was completed there was only 30 points difference. Glenrothes finished with 2,195 points from 595 contacts, made by GM3OLK, GM3YOR, GM3ZSP, GM4BRM, GM4EJI and GM4IPS. They had a number of antennas including a three-band quad and single-band dipoles etc, and their transceiver was a TS830S. West of Scotland was also in the Open section and used a TS520S transceiver feeding a number of different wire antennas to give a score of 2,165 and 582 QSOs.

1·8MHz (Report from BRS20249)

There is an imponderable factor on this band when the results are compared with last year. Two less groups used the band this year and while dx such as ZD8TC and the USA were missing from the logs, the outcome was higher checked scores than in 1980. Perhaps everybody submitted more accurate logs, although checking took its toll and only five groups ended with a clean sheet.

The first inter-G contact was recorded at 2036 and the last to appear in any log was at 0208. In that 5·5h, 71 groups totalled around 4,400 contacts, which averages out at 62 per group. Most groups only paid one visit to the band, but five came back for a second helping.

The highest checked score was made by Torbay, G3NJA/P, with 650 points from 93 contacts made in 3·5h operating in the Open section. Runner-up was the winner of the Gravesend Trophy, the Gravesend group, G3GRS/P, which made 622 points from 90 contacts. In the Restricted section, the band leader was the Wheatsheaf Contest Group who should have been able to go home at 0208, as the group only used this band for their NFD total of 90 contacts and 634 points. Runner-up was the Northern Contest Group, G3VMW/P, which finished with a checked score of 600 from 85 QSOs. The group spent 2·5h on the band.

There were conflicting comments about the levels of activity, but most said it was high and well worthwhile with the bonus points. The lack of QRN was noted by many entrants, as it is quite unusual for the time of year.

3·5MHz (Report from G3KKQ)

A total of 81 logs was received, with 48 in the Open section. Band conditions were very different in various parts of the country with the Midlands, the North and the South-East being favoured. Other areas did not do as well, but with 14MHz being open for most of the night, many stations were tempted to stay there rather than work the EU/Ps at four points a go.

The top scorer was Harlow & DARS, G6UT/P, operated by G3WRO and G4GHU, who only used this band. They made 359 contacts for a checked score of 1,060, a substantial margin over the second placed station, G4FRS/P, the Farnborough DRS Group 'B' station. The operators were G4BJQ, G3ZUM, G3ZFT, G4KHA and G4JNT and they worked a one-hour shift system throughout the 24h in almost military fashion! Both of these entries were in the Open section with Harlow using a TS510 transceiver and a dipole. Farnborough used a Delta loop antenna fed by an FT101B transceiver.

In the Restricted section, Stockport RS 'A' station took the honours with 582 points from 160 contacts made in a total of 5h on the band. G3PEK and G3NOM manned the TS520S with a 200ft c/f wire as the radiator. East Barnet made 565 points from 148 contacts to give the group second place, spending 4h on the band, with G3YDX, G3XTJ and G3RPB the operators.

An analysis of the antennas used will be given later in this report, but mention must be made of the two-element wire beam used by the Kingsway Technical College Group, GM4AAF/P. Little dx was worked and no more than a handful of logs showed contacts with stations outside Europe. ZD8TC was on the band and he managed to make contacts with five UK/P groups. At times his signal was very good and a comment from G6KQ/P–"He could have been in Barnsley!" reflects this. Other stations commented on the lack of activity and the difficulty of making contacts during daylight hours. Full comments are listed later.

In general, logs were not very good and two stations lost a large number of points, one for having unmarked duplicate contacts and the other because of an arithmetic error. Most stations lost some points in checking, mainly because of incorrect callsigns and reports. Some didn't know which band they were working on!

7MHz (Report by G3MXJ)

7MHz rarely moves from its position as the 'bread and butter' band and this year was no exception. The only limiting factor was how many stations could cram into the 30-40kHz that was available, and it seems that the number and ability to sort them out never ceased to amaze.

Conditions for inter-portable contacts were good over the whole of the 24h with no evidence of any significant skip-zone. With very strong signals from Europe throughout the contest, dx working required considerable patience. Those with good ears picked out ZD8RH, ZD8TC/P, LU8DQ, ZL3GQ, VK6PG and a handful of Ws. VK6PG reports hearing many more short-path portables than he was able to work.

Wives and children joined Thames Valley ARTS operators for a picnic at their NFD location at Guildford

The highest scoring station on the band was the Worthing group, G3WOR/P, which operated in the Restricted section. The group used an FT101ZD and an inverted-V with operators G3FXB, G3LQI, G3YIQ and G4FNL to make 1,445 points from 487 contacts, including 302 portables. The runner-up was the Echelford group, G3UES/P, who operated only on the band in the Restricted section with G2FNK, G3KKQ, G3MCK and G3YCQ as the operators.

In the Open section, Salisbury, G3FKF/P with 901 points was the leader with operators G2FIX, G3PAV, G3ZNH and G5YN. They used an FT101E with two dipoles at right-angles, and among their 314 contacts were 244 portables. The runner-up was the Guildford 'B' station, G5OD/P, keyed by G3GJX, G3YXX, G4BCY and G5OD.

14MHz (Report from G4BUO)

In general conditions to North America during the night favoured the more southerly stations in the Open section, but many of the northern groups compensated by working large numbers of EU/P stations. Many groups commented that it was not worth chasing dx when there were ample short-skip contacts to be made. Only a few groups managed to contact JA, but most made it to VK and ZL and there was an abundance of North American stations active. Very little other dx was worked, even though there was a lot about.

In the Open section, three groups concentrated exclusively on the band with Southgate, G3SFG/P, once again winning the Frank Hoosen (G3YF) Memorial Trophy with a leading score of 1,408 from 449 contacts. The group added a four-element beam to the rhombic, ZL-Special and dipole it used last year. Operators were G3KTZ and G3RWL and they were one of the few stations in the contest to use a separate receiver and transmitter (Drake R4T4 series). Edgware & DARS should have been safe for second place, but failed to make a proper check of the log and had some unmarked duplicates, so Farnborough 'A', who were below them on claimed score, beat them to it because of a more accurate log. Both groups used V-beam antennas to good effect.

Unmarked duplicate contacts also took their toll in the Restricted section, but Red Dragon DXer's, GW8GT/P, managed to win the band despite losing 177 points. Operators were GW3NJW, GW3NYY and G3OAY and they used an Omni-D and 232ft c/f wire to make their 667 points. Second was the Northern Contest Group, G3VMW/P, with 656 points.

21MHz (Report from G6LX)

Band conditions for both dx and EU working were good for most of the contest period and many groups used the band to good effect. Others, especially those in the Restricted section, found it was easier and faster to collect points on other bands, so the results table shows a wide variation of scores for the band. Logs were generally of a poor standard and there were a number of stations who lost points because of careless recording of callsigns and reports. There were a few stations that lost points because of unmarked duplicates and one group who failed to notice that it had changed bands and submitted a log with many 7MHz contacts mixed into its 21MHz dx! Another group sent in a log complete with crossings-out, overwritten callsigns and tea stains (or was it beer!) and parts of this could not be read!

In the Open section, G3NEO/P, the Sheffield group, was the band leader with 1,201 points from 411 contacts. The team was G3HOG, G3JCJ, G3NEO and G3PHO, and they used an FT101Z and a three-element Yagi at 30ft. Next was the Guernsey group, GU3HFD/P, who used the band to make 1,047 points to help on the way to the NFD Trophy.

Restricted section entrants were generally less happy with their results as they found that they were not competitive against the beams and the higher antennas used by the "open" entrants. The leader, G3TBK/P, the East Notts group, finished the contest with a checked score of 432, which was made by G3YCT and G3SHY using a TS520S and a 264ft c/f wire. In second place was Stockport 'B', G4MCC/P, who scored 398.

28MHz (Report from G6LX)

For the first time in an NFD contest all six continents were worked on 28MHz and a number of groups made the WAC. Although the openings were of short duration and some were at unusual times, 44 different countries appear in the logs. These included VK, ZL, JA, 9V1, 9M4, 4S7, VU, ZD8, 9J, 5Z4, KP2A/D, HZ, ZC4, UJ8, UI8, UH8, UA0, W, VE, HK, LU, PY, YV, ZP and various Europeans.

To work the dx, it was necessary to check the band at frequent intervals and even so many of the 66 groups that used the band missed out, particularly during the Saturday evening of the contest and during the early hours of Sunday morning. The band was open to North America around 2000gmt and stayed open in short bursts until after 2300. The next opening was at 0430 and a few entrants found VK and ZL stations to work. Again around 0500, the band was open, this time to Japan, and a number of contacts were made by the five groups that happened to be listening at the time. There were a number of other short openings during the remainder of the contest period and another good opening to North America towards the end of the afternoon. There was a lot of traffic between UK portable stations, and some contacts were over quite long distances. A number of EU/P stations were worked, but in general this path was best for the northern stations.

The leading "open" entrant was the Guernsey group, GU3HFN/P, who made a record 28MHz score of 715 from 119 contacts. The group is the highest overall scorer on the band, with Croydon, G6LX/P, in the Restricted section, next, scoring 494 points and having 70 contacts. Third highest scorer was Sutton & Cheam, G2DMR/P, who made 412 points in the Open section, with Northern, G3VMW/P, second in the Restricted section with 328 points. Guernsey receives the band certificate for the Open section to add to the NFD Trophy, and Croydon receives the Restricted section certificate to add to the 14 previous NFD band awards.

Equipment and antennas used

Apart from four stations who used "separates" all other entrants used transceivers, with the FT101 series being the most popular. Next most used was the TS520 and TS520S, closely followed by the TS830S and the TS820. Other transceivers in use included the SB101, IC701, IC720, FT107, FT250, FT301, FT401, FT901, FT902, TS510, Uniden 2020, Swan 500, TR7, Omni-D and several others. One group confessed to using homebrew equipment and several mentioned the use of additional filters and other modifications to commercial rigs. Only three groups in the Open section declared that they were using additional monitoring receivers.

Diesel- and petrol-driven generators were the norm with only a minimal use of battery-driven equipment. These appeared to be more reliable this year and only a few groups reported any trouble. Running out of petrol seemed to be a popular pastime and comments such as "generator stopped—lack of fuel" appear on quite a number of logs.

For the three hf bands, the majority of entrants in the Open section preferred multi-band rotary beams, with the three-element being the most used. In all, 32 of these antennas were in use and a smaller number of groups had four- and six-element tri-banders. The quad, once the most popular of NFD antennas is on the wane and only 14 were used, mostly two-element tri-band interlaced units. One group had a five-element four-band quad and another a six-element single-band quad for 21MHz.

There was an increase in the number of 7MHz rotary beams, and Yagis, quads and delta-loops were in use. As mentioned in the band reports, one group had a beam on 3·5MHz! Most "open" entrants used dipoles for the lower frequency bands and as back-up antennas for 14 and 21MHz. A few used V-beams or rhombics, while slopers, verticals and long-wires were also in use. Single-element loops were widely used and there was one group who used a "five-element dipole beam" (?).

The Restricted section mainly used centre-fed wires of varied length from 120ft to 700ft. Once again almost every group seemed to have their favourite length of top plus feeder to give them easy band change and a minimum of rf in the "shack". Mention was made by a number of entrants of the use of separate tuning units for each band to permit quick QSY. One unusual antenna was the ground-fed long-wire operated against 1,000ft of radial counterpoises. Trap dipoles, G5RVs and end-fed wires were also used, but these seem to have lost their popularity when compared with that of a few years ago.

As for the past few contests, the lighting service vehicle was again in use to support a beam and other antennas. This year use was also made of a mobile builder's platform (?), a works fire engine with turntable ladder, and the usual mobile Versatowers and Westowers.

COMMENTS FROM COMPETITORS

(Rules, scoring and organization)

"As a new club, we were delighted with the contest and the arrangements, please leave everything as it is"-*Leeds.*

"We have no complaints about the rules or any other aspect of the contest"-*Northern.*

"Our first NFD. Thanks for organizing such an enjoyable event"-*Grand Union Contest Group.*

"Why not an earlier start?"-*Medway*

"We need all the time we can get to sort out the bugs"-*Addiscombe.*

"Why not start at 1600gmt to give persons a chance to get home earlier?"-*G3VGG.*

"Rules and timings excellent"-*Guernsey.*

"No changes please"-*Croydon and West of Scotland.*

"Excellent rules"-*Shirehampton.*

"Bonus points for 28MHz are diversive—scrap it"-*Gt Western.*

OPEN SECTION

Posn	Name of club or group	Callsign	Points 1·8MHz	3·5MHz	7MHz	14MHz	21MHz	28MHz	Total	Number of contacts
1	Guernsey ARS	GU3HFN/P	354	174	288	845	1,047	715	3,423	924
2	Gravesend RS	G3GRS/P	622	535	633	534	483	362	3,169	786
3	Leicester Polytechnic ARS	G3SDC/P	514	534	599	679	420	200	2,946	756
4	Crawley ARC	G3TIR/P	564	289	806	310	505	312	2,786	686
5	Wiltshire Contest Group	G3KLH/P	420	179	429	798	648	277	2,751	793
6	Verulam ARC 'A'	G3VER/P	484	435	821	486	268	214	2,708	708
7	Medway Radio Contest Group	G3ZSU/P	484	240	384	818	621	152	2,699	733
8	Shefford & D RS	G3FJE/P	564	200	624	586	532	166	2,672	720
9	Hornsea & D ARS	G3ZRS/P	456	521	538	713	289	40	2,557	697
10	Torbay ARS	G3NJA/P	650	204	411	627	393	220	2,505	633
11	Scunthorpe ARC	G4FUH/P	532	401	320	325	790	134	2,502	663
12	Cheltenham AR Association	G5BK/P	400	362	485	770	274	162	2,453	644
13	Maidenhead & D ARC 'A'	G3WKX/P	372	273	397	742	299	300	2,383	622
14	Addiscombe ARC	G4ALE/P	432	426	499	446	410	144	2,357	613
15	Leicester RS	G3LRS/P	500	432	813	501	92	12	2,350	615
16	Racal AR Group	G3RAC/P	428	399	863	443	42	96	2,271	588
17	Sutton & Cheam RS	G2DMR/P	586	378	458	354	73	412	2,261	527
18	Glenrothes & D ARC 'A'	GM4GRC/P	456	211	317	845	290	76	2,195	595
19	West of Scotland ARS	GM4AGG/P	434	190	399	883	241	18	2,165	582
20	Liverpool & D ARS	G3AHD/P	424	322	423	615	313	58	2,155	567
21	Leyland Hundred AR Group	G3GGS/P	440	230	468	645	222	122	2,127	528
22	Reading ARC	G3ULT/P	510	512	626	296	35	106	2,085	512
23	Gloucester ARS	G3MA/P	540	250	549	419	170	96	2,024	503
24	Dundee Kingsway Tech Coll ARS	GM4AAF/P	260	259	456	766	180	88	2,009	545
25	Plymouth RC	G3PRC/P	436	60	483	534	395	80	1,988	519
26	Moray Firth ARS	GM3TKV/P	428	148	173	425	641	60	1,875	478
27	Scarborough ARS	G4BP/P	364	265	500	408	204	10	1,751	457
28	Wirral ARS	G3NWR/P	0	104	758	551	308	24	1,745	509
29	Newbury & D ARS	G3WOI/P	442	260	510	241	63	190	1,706	393
30	Grimsby ARS 'A'	G3CNX/P	476	384	560	167	46	22	1,655	405
31	Ilford RSGB Group	G3XRT/P	462	359	629	204	3	0	1,654	428
32	Sheffield ARC	G3NEO/P	452	0	0	0	1,201	0	1,653	469
33	Loughborough Falcon ARC	G3RAL/P	458	165	672	264	80	8	1,647	409
34	Conway Valley ARC	GW6TM/P	476	101	457	447	75	0	1,556	379
35	Easington & Hartlepool ARCs	G3IDV/P	364	183	486	359	105	0	1,497	366
36	Ainsdale RC	G2OA/P	440	259	512	186	46	40	1,483	359
37	Grand Union Contest Club	G3NUB/P	220	376	470	269	65	48	1,448	381
38	Southgate RC	G3SFG/P	0	0	0	1,408	0	0	1,408	485
39	The Hamsters	GM3SSB/P	292	108	303	594	46	3	1,346	360
40	Clifton ARS	G3GHN/P	0	404	504	311	0	48	1,267	356
41	Greenock & D ARC	GM3ZRC/P	0	12	188	272	691	62	1,225	360
42	West Kent ARS	G3WKS/P	0	180	750	227	0	0	1,157	320
43	Farnborough & D RS 'A'	G3RRA/P	0	0	0	1,116	0	0	1,116	359
44	Edgware & D ARS	G3ASR/P	0	0	0	1,114	0	0	1,114	368
45	Harlow & D ARS	G6UT/P	0	1,060	0	0	0	0	1,060	359
46	Chelmsford ARS	G4DAN/P	76	198	772	0	0	0	1,046	290
47	Farnborough & D RS 'B'	G4FRS/P	0	918	0	0	0	0	918	300
48	Crystal Palace & D RS	G3VCP/P	296	20	175	240	98	78	907	213
49	Salisbury R & ES	G3FKF/P	0	0	901	0	0	0	901	314
50	Bromsgrove & D ARC	G3VGG/P	0	65	178	289	262	34	828	261
51	Maidenhead & D ARC 'B'	G3TWG/P	0	135	386	148	3	20	692	175
52	Mid-Lanark ARC	GM3PXK/P	0	16	61	113	239	0	429	139
53	Barry RS	GW4BRS/P	108	136	76	16	0	0	336	88

Number of contacts made are claimed figures only.

"Bonus on 28MHz ensures band is used. Without it there would be no activity"–*Croydon.*
"Bonus on 28MHz benefits everyone. Any gripe about it is just sour grapes"–*Northern.*
"Not enough log sheets—again"–*Croydon and 12 other groups.*
"Super"–*Guildford.*
"Please limit output power to 10W and run the contest like AFS with 24h period and five entries maximum from each group"–*G4FDC and G4HUW.*
"Congratulations to contest organizers for a very excellent weekend"–*G4FRS.*

(Conditions)
"Bands seemed very dead at times"–*Shirehampton.*
"Conditions excellent for most of the 24h"–*Sheffield.*
"Conditions not very good"–*Kilmarnock and Loudoun.*
"Conditions very good"–*Medway.*
"Conditions patchy"–*Torbay.*
"Good dx conditions"–*Shefford.*
"Conditions fair at start, but improved as contest went on"–*Guernsey.*
"Lower frequency bands gave more points"–*Ainsdale.*
"Conditions poor throughout weekend"–*N Bristol.*
"Good for Stateside"–*Northern.*
"Conditions ideal for Europe"–*Echelford—7MHz.*
"No doubt someone has found the right time to be on 21MHz"–*Sutton & Cheam.*
"Oh for a beam and the Open section-conditions rotten"–*Bracknell.*
"Conditions well down"–*Leicester.*

(Equipment)
"RF got into the IC701 on all bands"–*Bracknell.*
"20min into the contest—a loud bang followed by clouds of smoke = loss of the FT-901DM"–*Echelford.*
"When the beam was assembled it might have been wrong with the elements put in incorrectly. It had a good swr—but it didn't radiate too good!"–*Racal.*
"When we dismantled the quad we found that the tuning stub was disconnected—the owner has been liquidated!"–*Addiscombe.*
"Silencer fell off the generator in the wee hours and woke up the operator"–*Stockport 'B'*
"Had a scare during the pre-contest warm-up when noise level rose by 10dB or more. Silencer had come off generator, but we managed to get it braced on again just in time"–*Gravesend.*
"No explosions this year"–*Bracknell.*
"Everything worked for a change"–*Reigate.*
"The club now owns a TH6DXX, which is much better than the old three-element"–*Guernsey.*
"One of our group is head of a local works fire brigade and he brought along a turntable-ladder which not only allowed us to erect bigger beams, but also saved us the problems of a rotator. We needed an extra hand on the controls—but it was well worth it"–*Anon by request.*

(General)
"We would have worked more stations but for a nearby air display. One biplane giving an aerobatic display used our quad as a marker for dive-bomb runs—and we all had to duck!"–*Scunthorpe.*
"Our thanks to all the non-competing Gs who gave us points"–*Wiltshire Contest Group.*
"Many groups not keeping a checklog"–*Echelford.*
"Could your committee please ask someone to write an article for *Radio Communication* on how a check log should be kept. We need an instant checking system for duplicates"–*Kilmarnock.*
"Weather depressive"–*Mid-Lanark.*
"No thunderstorms this year"–*Stockport 'B'.*
"WX first rate"–*Guildford.*
"FB WX"–*Shefford.*
"Wonderful weather"–*Medway.*
"Thanks for selecting the sunniest weekend this year"–*G4FRS.*
"Weather could not have been better"–*Croydon.*
"Weather first-class"–*Grand Union.*
"We shivered on our mountain top with high winds and non-stop rain. For most of the contest our tent was awash and we had to use felt pens to write the log as the ballpoints would not work on the damp paper"–*Northern.*
"First time it hasn't rained for years"–*Gt Western.*
"But you don't get any more points for working the Deseches Is DXpedition KP4A/D"–*East Barnet.* (The expedition was worked by over 60 groups-on 28 and 21MHz)
"We had a visit from a couple of local cb operators, but unfortunately the RSGB inspector called at the same time. We assumed he was another cber and we resolutely ignored him and would not let him into the tent"–*Northern.*
"Several visits from 'childrens band' good buddies!"–*Croydon.*
"Why not get together with the VHF Contest Committee and do the job properly by arranging for NFD and VHF NFD to be held over the same weekend—they are so near now, you might just as well"–*G4KF Contest Group.*
"Contest date this year much too near VHF NFD"–*Croydon and 16 other groups.*
"A most enjoyable contest-see you all next year"–*ZD8TC/P.*
"Thanks for all your efforts"–*Reigate.*
And in conclusion:
"Had a visit from a deputation of cbers who saw us setting-up. Their spokesman told us 'we fort you was busbies wot wos putting up a directional fing to track us all down'. All ended well as they agreed not to send the heavy mob to do us during the night!"–*Medway.*

RESTRICTED SECTION

Posn	Name of club or group	Callsign	Points 1·8MHz	3·5MHz	7MHz	14MHz	21MHz	28MHz	Total	Number of contacts
1	Great Western Contest Group	G3NKS/P	530	534	807	584	348	238	3,041	773
2	Northern Contest Club	G3VMW/P	600	394	610	656	364	326	2,950	749
3	Stockport RS 'A'	G6UQ/P	574	582	666	570	254	241	2,887	703
4	SRCC Croydon	G6LX/P	548	182	770	569	199	494	2,762	648
5	Guildford & D RS 'A'	G5RS/P	520	335	629	631	294	304	2,713	708
6	Red Dragon DXers	GW8GT/P	514	407	833	667	104	122	2,647	752
7	Stockport RS 'B'	G4MCC/P	464	344	464	628	398	118	2,416	628
8	East Barnet ARCC	G6KQ/P	312	565	783	508	159	78	2,405	626
9	Hereford ARS	G3YDD/P	580	241	597	473	184	121	2,196	534
10	Bracknell ARC	G4BRA/P	428	398	610	511	124	80	2,151	543
11	East Notts Contest Group	G3TBK/P	332	415	617	321	432	32	2,149	571
12	G4KF Contest Group	G4KF/P	392	348	500	425	165	317	2,147	528
13	Colchester Radio Amateurs	G4CRA/P	510	441	683	220	59	154	2,067	495
14	Leeds & D ARS	G4LAD/P	268	422	656	588	108	4	2,046	575
15	Catterick Garrison ARC	G4RS/P	430	438	552	333	202	84	2,039	474
16	Shirehampton ARC	G4AHG/P	428	324	629	578	6	42	2,007	545
17	North Bristol ARC	G4GCT/P	562	276	406	556	109	80	1,989	493
18	Oxford & D ARS	G2DU/P	494	260	494	286	182	144	1,860	441
19	White Rose ARS	G3XEP/P	452	264	430	440	153	54	1,793	468
20	Vange ARS	G3YCW/P	442	270	575	249	81	98	1,715	407
21	Reigate ATS	G5LK/P	332	302	534	333	92	76	1,669	407
22	Stroud & D ARC	G3SZS/P	532	146	661	204	37	0	1,580	381
23	Verulam ARC 'B'	G3WFM/P	450	351	744	0	0	0	1,545	397
24	Southdown ARS	G3WQK/P	64	448	799	143	13	28	1,495	440
25	Kilmarnock & Loudoun ARC	GM5KF/P	370	193	258	483	150	0	1,454	382
26	Worthing & D ARC	G3WOR/P	0	0	1,445	0	0	0	1,445	461
27	Blackpool & Fylde ARS	G5ND/P	0	158	765	306	185	12	1,426	377
28	Thames Valley ARTS	G3TVS/P	432	286	308	148	150	52	1,376	329
29	Ayr ARG	GM3MHG/P	314	4	356	465	204	0	1,343	357
30	Preston ARS	G3KUE/P	156	272	472	363	34	0	1,297	350
31	Echelford ARS	G3UES/P	0	0	1,215	0	0	0	1,215	343
32	Havering & D ARC	G4HRC/P	16	236	622	221	36	80	1,211	338
33	Thornton Cleveleys ARS	G4ATH/P	190	234	411	256	8	0	1,099	290
34	Guildford & D RS 'B'	G5OD/P	0	0	1,070	0	0	0	1,070	371
35	Eccles & D ARS	G3GXI/P	0	0	976	0	0	0	976	280
36	Glenrothes & D ARC 'B'	GM4KTJ/P	0	154	288	306	94	10	852	241
37	Wheatsheaf Contest Group	G3VIP/P	634	0	0	0	0	0	634	91
38	Grimsby ARS 'B'	G3YMF/P	0	72	138	80	12	0	302	88

Number of contacts made are claimed figures only.

Comments from the HF Contests Committee

Check logs

The committee is very grateful for the efforts made by overseas and non-competing UK stations to work contestants during NFD. This year nine check logs were received and we have also used the entry from the Warrington & DARC for checking. They did not follow the entry procedure and also sent their logs to the wrong address so they did not reach us in time to be included. Logs were received from G3IFF/P, ZD8RH, ZD8TC/P, VK6PG, VK6RV, OH3EE, YU7SF/M, W1OPJ and W3ARK. Certificates will be awarded to ZD8TC/P, VK6PG, YU7SF/M and to W3ARK, as these stations gave the most points from their continent to UK /P stations. No check logs were received from Asia or S America.

Logs

The committee is puzzled by the strange behaviour of many groups who enter NFD. On the one hand their operators work very hard to make as many contacts as possible during the contest, while the person responsible for the entry negates their efforts by sending in logs that cannot be read, have large numbers of unmarked duplicates, have wrong points totals and other silly mistakes. In all some 6,900 points were lost by entrants this year during the checking process. Every group lost some points, although several may notice that their scores are higher than claimed. This is the result of their arithmetic as they still lost points due to inaccuracies.

A number of entrants will be shocked to see how their final results differ from their claimed scores. Several groups lost over 200 points and one unfortunate lost in excess of 300points—all because they failed to check for unmarked duplicate contacts before sending in their logs! This year, the adjudicators penalized duplicates at a rate of five times the claimed score for the contact, but it appears that this is still not a sufficient deterrent. It has already been suggested that a penalty of 10 times the claimed score may have to be adopted for future contests.

The problem of "dirty" logs has been mentioned and points were lost because the adjudicators were unable to read some of the log entries. Another careless error (noted in some logs) was that contacts made on one band were claimed for another. The adjudicators had no option but to void these QSOs. The majority of groups kept a running log during the contest and then made copies to provide the individual band logs. In recent years, we have noticed a move to keep separate running logs for each band and to submit these as their entry. By doing this they hope to avoid errors in the copying, but it seems to us that the "cure" may be worse than the "illness" as the chance to double check for duplicates and obvious callsign errors is lost.

Inspections

Station inspections were re-introduced this year and a number of groups had visits from the appointed RSGB officials. The committee are very grateful to all those members who assisted them with this task.

Rules

Our thanks also go to the many entrants who have commented about the contest, the rules and scoring system. Apart from the date of this year's contest, the majority seem well satisfied. Two entrants ask for the starting time to be brought forward as they consider 1700gmt is too late to enable operators to pack up and get home at a reasonable hour on the Sunday.

While a 1500 or 1600h start might be acceptable to stations in the Restricted section, it seems from various comments in the entries that Open section groups are often hard-pressed to have their stations ready by 1700gmt.

There was one suggestion to abolish the 28MHz bonus, but most entrants feel that it is a worthwhile incentive to get groups to use the band, and many have specifically asked that it should be retained.

A number of entrants in the Open section have commented on the use of the extra receiver for monitoring the bands. It would seem that this facility is not much used and many seem to feel that it is not required.

In conclusion

This year, the entry arrangements were handled by G4BUO, who also checked the 14MHz logs, wrote the band report, and organized the inspection arrangements. BRS20249 accepted the logs and did a sterling job in summarizing them for the adjudicators. He also did the various tabulations and additionally checked the 1·8MHz logs. G3KKQ checked 3·5MHz and G3MXJ looked after 7MHz. Both these bands were heavily used, and the checking and report writing proved to be a mammoth task. 21 and 28MHz were checked by G6LX, who also prepared and wrote the overall NFD report. All the adjudicators are members of the HF Contests Committee and a total time in excess of 500 man-hours was spent on the checking and report writing. This would have taken longer if it had not been for the efforts of BRS20249 in doing all the preparatory work on the logs.

The 1982 contest will revert to the first weekend in June.

CONTEST NEWS

June 70MHz Contest 1981 results

This event will be remembered for the excellent contacts made via sporadic-E by a lucky few stations who worked 5B4AZ in Limassol, Cyprus. For most of the rest of the entrants the Es made life difficult, the eastern European fm broadcast stations being very strong during the afternoon. Tropo conditions were generally described as average. The number of entrants has increased compared to last year, with several new callsigns on the band. The increasing activity on 70MHz is apparent from the greater numbers of contacts made.

Looking through the cover sheets, nearly all fixed stations use four-element Yagis, with the portable stations using more elaborate antennas, ranging up to the four stacked six-element Yagis of GW3XBY/P. Valves are still the favoured pa device, mostly QQVO640A, with about 40 per cent of entrants using solid state devices. Two stations used 4CX250Bs, one a pair of QY3-125s, and one a 3-500Z. It would be interesting to learn how satisfactory operation on cw with these large valves is achieved with the 50W input declared by the entrants.

Several entrants asked for a 70MHz cumulative contest. When this was last tried a few years ago, it met with little support and some criticism. The committee would appreciate your views on support for such an event during the winter months.

Congratulations to G3WHK, the winner of section 'F', and runner-up G4IBA. G3WHK also receives a certificate for the largest number of QSOs in this section. This

extra award has been introduced to encourage stations whose geographical position tends to limit their scores. This does not seem to apply on this occasion, as the award in section 'O' also goes to the overall winner, the Wulfrun Contest Group, GW3XBY/P. GW4ALE/P receives an award as runner-up in section 'O'

G3XDY

SECTION F

Posn	Callsign	Points	QSOs	QRA	Power	Best dx	Km
1	G3WHK	395	75	ZL49	100	GM4BVE/P	465
2	G4IBA	389	65	ZL74	120	GM4BVE/P	461
3	G3UKV	376	64	YM28	50	G5KW	403
4	G3JXN	353	67	ZL39	50	GM4BVE/P	440
5	GD2HDZ	281	30	XO68	80	G4FAW/P	435
6	G3PSP	275	58	ZL29	100	GM4BVE/P	435
7	G4AGE	263	50	ZN64	100	GJ3YHU/A	425
8	G3OHC	240	22	ZM31	120	5B4AZ	3,392
9	G3VIP	239	33	ZN40	80	GM4GRC	346
10	G3LVP	219	49	AL33	25	GM4BVE/P	485
	G4FRO	219	37	YL37	100	GM4BVE/P	386
12	G4HMG	205	57	ZL38	100	GM4BVE/P	437
13	G3OIC	177	41	ZM41	10	GJ3YHU/A	348
14	GM4GRC	176	21	YQ65	50	G3ORA/P	552
15	G6CW	164	37	ZM05	100	GM4BVE/P	290
16	G5UM	147	38	ZM35	16	GD2HDZ	266
17	G3IOI	145	33	AL33	–	GW4ALE/P	299
	G3PGN	145	37	AL22	25	GW4ALE/P	280
19	G4FKI	136	38	AL31	10	GJ3YHU/A	290
20	G4BFJ	132	41	ZL59	10	GW3UCB/P	270
21	G3UAX	119	29	ZL45	10	GJ3YHU/A	252
22	GM3TAL	112	14	YQ73	80	G4ERP/P	465
23	G5DF	62	9	ZO51	50	G3JXN	328
24	G4LRT	54	13	ZM45	15	GW3UCB/P	159
25	G4JDS	5	7	AL23	15	G4EGU	39

SECTION O

Posn	Callsign	Points	QSOs	QRA	Power	Best dx	Km
1	GW3XBY/P	916	114	YM44	130	GM3LUD	458
2	GW4ALE/P	772	92	YM04	130	GJ3YHU/A	420
3	GW4ASR/P	660	76	YM55	100	5B4AZ	3,463
4	G4FAW/P	635	83	AM67	125	GM4GRC	526
5	GM4BVE/P	569	53	XO10	50	G3LVP	485
	G4ERP/P	569	94	ZL01	130	GM3TAL	465
7	G3ORA/P	508	72	YL68	35	GM4GRC	552
8	G3LCH/P	455	75	ZN61	40	GJ3YHU/A	425
9	G3JEQ/P	431	80	ZL77	50	GD2HDZ	420
10	G4HEV/P	373	43	ZO65	10	GJ3YHU/A	546
11	G3UUP/P	313	65	ZL26	60	GM4BVE/P	417

SWL SECTION

Posn	Station	Points	QSOs	QRA	Best dx	Km
1	BRS15822	171	39	ZL40	GM4BVE/P	443
2	BRS28198	97	15	AK04	GW3UCB/P	340

144MHz Contest May 1981 results – erratum

The station placed seventh in the Single-operator Fixed Station Section of this contest was G3JKV and not G3JKY as shown in the results tabulation. Apologies are extended to both members.

144MHz Fixed Contest rules

0900 — 1700gmt, 6 December 1981

The following general rules, published in the January 1981 issue of *Radio Communication,* will apply: 1, 2, 3, 4d, 5a, 6a, 7a, 9, 10a, 11a, 12a, 13-24.

All entries and checklogs to: VHF Contests Committee, c/o Mr W. McClintock, G3VPK, Maple Leaf, Great Braxted, Witham, Essex.

7MHz Contest rules—addition

Due to an oversight, the rules for the receiving section were omitted from the rules published in the August 1981 issue of *Rad Com;* these are given below.

RECEIVING SECTION

Rules as in transmitting section except as superseded below.

1. The general rules for RSGB hf receiving contests to be published in the January 1982 issue of *Radio Communication* will apply.

2. Eligible entrants. British Isles: RSGB members only. Rest of world: All listeners.

3. Scoring.

(a) British Isles listeners should log only overseas stations in contact with British Isles stations. European stations logged count five points, others 15 points.

(b) Overseas listeners should log only British Isles stations participating in the contest. European listeners may claim five points per QSO logged, others 15.

4. Multiplier. As transmitting section.

5. Logs. Log sheets must be headed: date, time (gmt), callsign of station heard, callsign of station being worked, if multiplier, and points claimed. Note that the callsign of the stations being worked may only repeat once in every six contacts logged.

6. Declaration. As transmitting section, plus "I certify that I do not hold a Class A transmitting licence" *(NB. Holders of Class B transmitting licences are now permitted to enter hf receiving contests).*

Second 1·8MHz Contest 1981 rules

1. The general rules for RSGB hf contests, published in the January 1981 issue of *Radio Communication*, will apply.

2. Eligible entrants. Single-operator stations only. British Isles entrants must be members of the RSGB.

3. When. 2100gmt Saturday 14 November to 0100gmt Sunday 15 November.

4. Sections

(a) British Isles stations.

(b) Overseas stations including EI.

5. Contacts. CW (A1) only in the 1·8–2·0MHz band.

6. Exchange. RST and serial number commencing at 001. British Isles stations must send their appropriate county/region code, as published in the January issue of *Radio Communication.*

7. Scoring

(a) British Isles section. Three points for each completed QSO, with a bonus of five points for the first contact with each county/region or country outside the British Isles.

(b) Overseas section. Three points for each completed QSO with a British Isles station, with a bonus of five points for the first contact with each county/region.

8. Logs. RSGB hf contest log sheets, written on one side only; or A4 sheets with seven columns headed; date/time gmt, callsign, RST/serial number send and received, code received bonus and points.

9. Declaration. Each entry must be accompanied by the following declaration: "I declare that my station was operated strictly in accordance with the rules and spirit of the contest and I agree that the decision of the Council of the RSGB shall be final in all cases of dispute". The declaration must be signed and dated.

10. Address for logs. RSGB HF Contests Committee, c/o M. Harrington, 123 Clensham Lane, Sutton, Surrey SM1 2ND.

11. Closing date for logs. Logs must be postmarked no later than 30 November 1981.

12. Awards

(a) The Victor Desmond Trophy will be awarded to the leading British Isles entry.

(b) The Maitland Trophy will be awarded to the Scottish station scoring the highest aggregate number of points in this contest combined with the First 1·8MHz Contest 1982.

(c) Certificates of merit will be sent to the first three stations in the Overseas section and to the leading station in each overseas country.

(d) Certificates of merit will also be sent to the first three stations in the British Isles section.

(e) A certificate of merit will be awarded to the highest placed entry from a station which has not entered a Second 1·8MHz Contest before. Candidates for this award should mark their logs "First time award".

White Rose RS Second SWL Lower Frequency Bands Contest rules

1. From 1200gmt 23 January 1982 to 1200gmt 24 January 1982, with competitors choosing their own period of 18 consecutive hours.

2. The contest is open to anyone in the world and there will be two sections – phone and cw. No mixed mode entries.

3. The 1·8, 3·5 and 7MHz bands are to be used.

4. The practice of logging a series of contacts made by one station is deprecated. Log entries must not include the same callsign in the "Station worked" column more than 10 times on each band.

5. The object of the contest is to log as many stations in as many countries as possible. Scores should be compiled as follows: one point for each station heard on each band from one's *own* continent and five points for each station heard on each band *outside* one's own continent. Total points to be multiplied by the number of different countries heard on each band *added* together.

A list of countries heard must be furnished and a separate log must be submitted for each band.

6. The call areas of the USA, Canada, Australia and New Zealand will each count as a separate country: ie W1, W2, W3, W4, W5, W6, W7, W8, W9, W0, VO1, VO2, VE1, VE2, VE3, VE4, VE5, VE6, VE7, VE8, VY1, VK1, VK2, VK3, VK4, VK5, VK6, VK7, VK8 and ZL1, ZL2, ZL3, ZL4. All other countries will be determined by the ARRL Countries List.

7. NO, CQ, QRZ or similar calls will be allowed to count for points. /AM or /MM stations are not to be included in the entries.

8. Log sheets to show the following information: date, time, gmt, band, station heard, station being worked, report at swl QTH. Points may be only claimed for stations actually heard and the callsign must be shown in full. If points are claimed for both stations, the callsign must appear in the "Station heard" column.

9. Entries should be sent to the contest manager, Mr David McGregor, G4IDJ, c/o White Rose Radio Society, 8 Manor Court, Shadwell, Leeds LS17 8JE, to arrive not later than 16 March 1982.

Comments on the contest will be appreciated and competitors are asked to give details of their receiving equipment and antennas.

10. Certificates of merit will be awarded at the discretion of the White Rose RS, and its decision will be final.

Barking R&ES 144MHz Contest 1981 results

TRANSMITTING SECTION

Posn	Callsign	County	Points	Multiplier	Total
1	G8SRC/P*	Wilts	198	45	8,910
2	G4DEZ/A*	Essex	208	42	8,736
3	G4HRO/P*	Staffs	173	49	8,477
4	G8RZP*	Berks	181	43	7,785
5	G8ZHP	Lincs	147	41	6,027
6	G8KAX/P*	Essex	139	40	5,560
7	G8YLH	Hants	146	38	5,548
8	G8VLL	Norfolk	139	39	5,421
9	G8MLO/P	London	164	28	4,592
10	G4IJJ	Beds	126	32	4,032
11	G8OCV/A*	Essex	121	30	3,630
12	G8NQP	Wilts	94	36	3,384
13	GM8YJU	Dumfries	86	38	3,268
14	G8RXK	Herts	112	28	3,136
15	G8TVL/A	Herts	133	21	2,793
16	G3ZVW	London	130	21	2,730
17	G8PUB	Essex	117	23	2,691
18	G4GAN/A	Kent	116	23	2,668
19	G8YMA	Kent	96	21	2,016
20	G8MDG/P	Kent	95	21	1,995
21	G8RBT	Essex	89	21	1,869
22	G4ERG	Humberside	66	27	1,782
23	G8RZA	Essex	85	20	1,700
24	G8TGM	W Sussex	64	24	1,536
25	G6APZ	Derby	63	24	1,512
26	G8WUU	Essex	79	19	1,501
27	GW3NYY	W Glamorgan	48	28	1,344
28	G3FIJ	Essex	62	20	1,240
29	G6AJX	Essex	75	16	1,200
30	G3JFY	Hants	56	21	1,176
31	G4KVI	Bucks	66	14	924
32	G8LXY	Beds	59	15	885
33	G8VGQ	Herts	37	15	555
34	G8ZVL	Dorset	31	15	465

*Certificate winners

Checklog gratefully received from G4CIB

LISTENER SECTION

Posn	Station	County	Points	Multiplier	Total
1*	R. Thomas, BRS15822	London	83	23	1,909
2*	N. Henbrey, BRS28198	E Sussex	44	18	792

Cray Valley RS Weekend Activity Contests—1981 rules

Contest No. 1 14MHz. 1400gmt until 1900gmt 14 November 1981.
Contest No. 2 144MHz. 1000gmt until 1300gmt 15 November 1981.
Contest No. 3 1·8MHz. 1400gmt until 1700gmt 15 November 1981.
Contacts. 1·8MHz and 144MHz. An exchange of reports and serial number (starting with 001) and *administrative* county. In the case of Cray Valley members, CV. Contacts via repeaters will not count for points. Maximum power limit on 144MHz is 25W p.e.p.

14MHz. An exchange of reports and serial number (starting with 001). In the case of Cray Valley members, CV.
Entrants. The contests are open to all licensed operators and swls using either fixed, portable or mobile.
Special sections:
Novice. Open to operators who have been licensed for less than one year at time of contest.
Homebrew. Open to operators who have built and only use their own home-built tx or rx during the contest.
Scoring. 10 points for working Cray Valley RS club stations (G3RCV and G8FCV). 3 points for non-Cray Valley stations working Cray Valley stations. 2 points for Cray Valley stations working Cray Valley stations. 1 point for other contacts.
Final score on 1·8 and 144MHz total points scored in contest to be multiplied by the number of counties plus countries, worked/heard. On 14MHz total points multiplied by the number of countries worked.
Logs. The following must be shown: Date, time, callsign worked, RS(T), serial number sent, RS(T) and serial number and county received, points claimed. Completed logs to be sent (postmarked not later than 14 December 1981) as follows: **1.** Non-Cray Valley members to Bob Treacher, BRS32525, 79 Granby Road, Eltham, London SE9 1EH. **2.** Cray Valley members to Owen Cross, G4DFI, 28 Garden Avenue, Bexleyheath, Kent DA7 4LF.
SWL entrants. The above rules apply but with the following additions: logs must show date, time, serial number and county given by station heard, station being worked, report at SWL QTH, point claimed. Only stations taking part in the contest may be logged. The practice of logging a series of contacts made by one station is deprecated. Log entries must not include the same callsign in the "Station worked" column more than 10 times.
Certificates. These will be awarded at the discretion of the CVRS Committee and its decision will be final.

Contests calendar

3-4 October	VK/ZL (Phone) *(Rules in September issue)*
***4 October**	RSGB UHF/SHF *(Rules in August issue)*
	IARU/UHF/SHF *(Rules in July issue)*
10-11 October	VK/ZL (CW) *(Rules in September issue)*
October/ November	432MHz Cumulatives *(Rules in August issue)*
	1,296MHz Cumulatives *(Rules in August issue)*
11 October	21/28MHz (Phone) *(Rules in May issue)*
18 October	21MHz (CW) *(Rules in May issue)*
25 October	70MHz Fixed *(Rules in August issue)*
***8 November**	144MHz (CW) *(Rules in August issue)*
14-15 November	Esperanto (ILERA) *(Rules from G4MR, QTHR)*
14-15 November	Second 1·8MHz *(Rules in October issue)*
15-16 November	European DX (RTTY) *(Rules in July 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)*
20 March 1982	AGCW—DF uhf/vhf cw (432MHz) *(Rules in June issue)*

*IARU co-ordinated date

Mobile rallies calendar

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

11 October — Great Lumley AR&ES Mobile Rally, Community Centre, Great Lumley, Nr Chester-le-Street, Co Durham. Talk-in on S22 (GB4GLR) and GB3TW (RS). Usual attractions including bring and buy stand. Doors open 11am. Further information from G8HPW, QTHR, tel Hylton 3946.
13 December — Leeds & DARS Christmas Rally, at Pudsey Civic Centre, Cote Lane, Pudsey, W Yorkshire. Open 11am. Talk-in on S22. Details from G8NVP, G3YEE or G4FIM.

The Scout International Jamboree-On-The-Air

This annual event, now known throughout the world as "JOTA", has become very popular, and it may surprise many to learn that in 1983 it will have been running for a quarter of a century. As JOTA is organized by the various Scout associations around the world for their own members, it has not been the policy to circulate much publicity outside Scout circles. However, with some 1,000 radio amateurs now taking part in the UK the aims and organization of the weekend might be of interest.

The event is intended to bring together all amateurs, both here and overseas, who have a direct connection with the Scout movement; in the UK a JOTA operator must have some definite link with the Scout movement in order to satisfy British licence conditions. In all countries it is usual to invite Scouts to join the operator, or for him to take his equipment along to a local Scout site. The Scouts become involved in the exchanges, which are usually of a most interesting character—in fact the event becomes a jamboree-on-the-air!

JOTA is held on the third *full* weekend in October each year and, as it is not a competition, the commencement and conclusion times are not really important. They are advertised as 0001 Saturday until 2400 Sunday (local times), but in the UK many stations commence operation early on the Friday evening and finish early on the Sunday evening.

It is important for operators to match their effort to the interest they expect the Scouts to show. Participation can vary from having a few Scouts at a station for limited operating periods (often the most successful arrangement) to continuous operation with multiband stations set up in a local hall to enable a large number of visitors to attend. Where operators organize additional exhibits etc to interest their visitors, these should only be complementary to the main objective — to make contacts with JOTA stations overseas. Past experience reveals that the large JOTA stations often return the smallest number of overseas Scout stations contacted, which really defeats the object of the exercise. It also follows that this is not really the event for the vhf enthusiast, except when making local calls to relieve congestion on the hf bands or to provide talk-in facilities for visitors. Individual Scouts or ex-Scouts may join the event as they please, and all participants are free to choose the length and times of their operating periods—no station is expected to operate continuously for the entire 48 hours.

It is not essential to obtain a special GB exhibition callsign for the event, and no operator should fail to take part because of insufficient time to do so. Experience shows that the special call makes little difference to the total number of JOTA stations contacted.

The event is organized on a world basis by the World Scout Bureau (HB9S) in Geneva, and in the UK by a national organizer, G3BHK, in close co-operation with the Scout Training Department at Gilwell Park (G3WGP), near Chingford, North London. Information leaflets concerning the event are obtainable from Gilwell, and all participants should also obtain report forms from there or G3BHK prior to the event. Station organizers giving prior notice of their intention to take part normally receive a late newsletter giving information of the proposed activity by overseas stations and any other items of interest.

As soon as possible after the event completed report forms should be forwarded to the national organizer — preferably before the end of October. From these forms a UK report is compiled and circulated to all who have submitted station reports, the World Scout Bureau, some overseas JOTA organizers and other interested parties, including the RSGB. The bureau in Geneva compiles a world report from the national reports received there, and copies of this are circulated to Scout organizations around the globe.

Participation certificates are also issued to all those taking part — usually on the basis of one per operator and one per Scout troop or group involved. These are obtainable from the national organizer.

While one would expect to make at least 20 overseas contacts during the weekend, the quality of the information exchanged is the most important factor. Hundreds of contacts over vast distances are not required, and more often than not the most interesting reports originate from stations having only modest installations but which have extensively involved the Scouts in the activity. It is not the event for the keen dx competition-type operator; it requires patience, a willingness to describe what is happening, and the capability to make friendly contacts while extracting the maximum amount of interesting information from the other station. Three or four Scouts spending, say, two-hour shifts with an operator, helping him keep the log and make out QSL cards, will become far more interested in the event than a large number of visitors who do not actively participate or do not receive stimulating answers to their questions.

The local Scout interest will obviously wax and wane over the years, and amateurs should not organize stations on an annual basis if interest has reached a low level. (This does not restrict individual Scout amateurs from taking part on their own behalf of course.) Often, where stations have ceased operation after years of participation, interest revives once more and they rejoin the event for a further period. Propagation conditions normally ensure that each event differs from the last, and JOTA is always an interesting and rewarding weekend, often holding many surprises.

In 1980 UK JOTA stations were in contact with over 700 different JOTA overseas stations in 57 countries. It is impossible to estimate the world participation, but this normally involves thousands of stations in around 70 to 100 countries. During the last event Australia had 389 JOTA stations on the air, the UK had 382, Portugal 205, Holland 175, Norway 154, New Zealand 140, and Japan 100; these seven countries alone totalling over 1,500 JOTA stations. Scouts seem to spring up everywhere, and during the last event a Cub Scout Leader together with an Australian Rover Scout operated VK0KC at Mawson in Antartica for a rare JOTA location. Most of the small islands scattered around the world seem to boast a Scout membership, and many are represented by JOTA stations during the weekend.

If you intend to participate in the next event please apply for the latest information leaflets whether or not you have previously taken part. The next JOTA will take place on 17–18 October 1981, and the addresses for information are as follows: J. Davidson, The Scout Association Training Department, Gilwell Park, Chingford, London E4 7QW (Tel 01-524 5246) and L.R. Mitchell, G3BHK, 28 Darwall Drive, Ascot, Berks SL5 8NB (Tel Winkfield Row 3322). Please enclose an sae (to fit folded A4) with all requests.

Scout amateurs have an active programme outside JOTA weekends, and enquiries for information should be addressed to Gilwell. Finally, amateurs who are keen to organize extensive display stations covering many aspects of their hobby (and these are not appropriate to a JOTA weekend), should contact their local Scout District or County Commissioner with a view to providing such an activity at a large Scout event. There are many international camps etc held during the summer months, and these are ideal sites for such activities. Operators will enjoy a captive audience, and inclement weather will only help to increase the number of short-wave enthusiasts!

G3BHK

RSGB SLOW MORSE PRACTICE TRANSMISSIONS

Alterations and additions to this list should be sent to the organizer, Mr M. A. C. MacBrayne, G3KGU, 25 Purlieu Way, Theydon Bois, Essex.

Clock time	Callsign	MHz	Mode	Town	Notes
Sundays					
0915	G3LEQ	144·250 145·250 1·950 29·250	A1/A3J F2/F3 A2/A3 F2/F3	Knutsford, Cheshire	[6]
0930	G3WNR	145·450	F2/F3	South Shields, T & W	[1]
1015	G3CGD	1·875	A1/A3	Cheltenham, Glos	
1100	G2FXA	1·910	A1/A3/A3J	Stockton-on-Tees	
1100	G3XJJ	3·535	A1/A3J	Northampton	
1100	G4BFJ G4DKK	144·625	F2/F3	Banstead, Surrey Tooting, SW London	
1130	G3BLS	145·375	F2	Osney, Oxford	[1]
1200	G3HVI	145·250	F2/F3	Stoke-on-Trent, Staffs	[1]
1200	G3GNS	1·910 3·550 144·250	A1 A1 A1	Locking, Avon	[13]
1400	G3LZV	145·250	F2/F3	Manchester	[3]
1800	G3WNR	145·450	F2/F3	South Shields, T & W	[1]
1800	G4DVZ	1·910	A1/A3J	Leeds, Yorks	
1815	G3LEQ	144·250 145·250 1·950	A1/A3J F2/F3 A2/A3	Knutsford, Cheshire	[6]
1900	GW3WSU GW4GSH	145·250	F2	Barry, S Glam	[1] [9]
1930	G3LDW	144·160	A1/A3J	Halesowen	[1]
2000	G3LZV	145·250	F2/F3	Manchester	[3]
2000	G4JBB	145·425	F2	Birmingham	[10]
2100	G4EWK	144·850	F2	Burton-on-Trent, Staffs	[7]
Mondays					
1100	G4IRI	3·550	A1/A3J	Bolton, Lancs	
1830	G3GNS	1·910 3·550 144·250	A1	Locking, Avon	[13]
1900	G4ILD	145·525	F2/F3	Rishton, Lancs	[1]
1930	G4BFJ G4DKK	144·625	F2/F3	Banstead, Surrey Tooting, SW London	
1930	GI3SXG	144·100	A1/A3J	Newtownards, Co Down	
2000	G3LZV	145·250	F2/F3	Manchester	[3]
2000	G4IRI	3·550	A1/A3J	Bolton, Lancs	
2000	G4JDL	144·250	A1/A3J	Solihull, W Midlands	[2]
2030	G3ASR	1·875 144·175	A1/A3J A1/A3J (lsb)	Harrow, Middlesex	[1] [12]
2030	G2FKO	145·525	F2	Bideford, Devon	
2100	G3LQI	144·250	A1/A3J	Lancing, Sussex	[14]
Tuesdays					
1200	G3GNS	1·910 3·550 144·250	A1	Locking, Avon	[13]
1830	G4CWN	144·100	A1/A3J	Stoke-on-Trent, Staffs	
1900	G3ZRZ	1·975	A1/A3	Blackpool, Lancs	
1900	G4RS	3·565 145·525	A1/A3J F2/F3	Catterick, N Yorks	[1]
1930	G3ZYY	145·550	F2/F3	Saltash, Cornwall	[5]
1930	G4BFJ G4DKK	144·625	F2/F3	Banstead, Surrey Tooting, SW London	
2000	G3VHE	145·350	F2	Swindon, Wilts	[1]
2000	GM4ELV	144·250	A1	Arrochar, Strathclyde	
2000	G4FEX	145·250	F2/F3	Horsley Woodhouse, Derbyshire	[1]
2030	G3IRM	1·975	A1/A3	Bury St Edmunds, Suffolk	
2030	G3OHM/A	144·180	A1/A3J	Birmingham	
2030	G3KGU	1·915	A1/A3	Theydon Bois, Essex	
2030	G2FKO	145·525	F2	Bideford, Devon	
2100	G4EWK	144·850	F2	Burton-on-Trent, Staffs	[7]
2200	G3AWL	144·110	A1/A3J	Easington, Co Durham	[8]
Wednesdays					
1830	G3WNR	145·450	F2/F3	South Shields, T & W	[1]
1830	G3GNS	1·910 3·550 144·250	A1	Locking, Avon	[13]
1900	GW3WSU GW4GSH	145·250	F2	Barry, S Glam	[1] [9]
1900	G2ABC	145·250	F2/F3	Truro, Cornwall	
1900	G3ULY G4EXD	1·960 145·475	A1/A3J F2/F3	Culgaith, Cumbria	[1]
1900	G4ILD	145·525	F2/F3	Rishton, Lancs	[1]
1930	G3ZYY	145·550	F2/F3	Saltash, Cornwall	[5]
1930	G4BFJ G4DKK	144·625	F2/F3	Banstead, Surrey Tooting, SW London	
2000	G3SWP	144·180	A2/A3J	Doncaster, South Yorks	[1]
2000	G3LZV	145·250	F2/F3	Manchester	[3]
2000	GM3ZAS	145·550	F2/F3	Prestwick, Ayrshire	[3]
2030	G2FKO	145·525	F2	Bideford, Devon	

Clock time	Callsign	MHz	Mode	Town	Notes
Thursdays					
1100	G4IRI	3·550	A1/A3J	Bolton, Lancs	
1830	G3GNS	1·910 3·550 144·250	A1	Locking, Avon	[13]
1900	G4BNA	3·590	A1	Swindon, Wilts	
1900	G3BLS	145·375	F2	Osney, Oxford	[1]
1900	G3ZRZ	1·975	A1/A3	Blackpool, Lancs	
1900	G4RS	3·565 145·525	A1/A3J F2/F3	Catterick, N Yorks	[1]
1930	G3ZYY	145·550	F2/F3	Saltash, Cornwall	[5]
1930	G3ASR	1·875 144·175	A1/A3J A1/A3J (lsb)	Harrow, Middx	[1] [11] [12]
1930	G4BFJ G4DKK	144·625	F2/F3	Banstead, Surrey Tooting, SW London	[15]
2000	G2ACZ	1·808	A1	Mablethorpe, Lincs	
2000	G3LZV	145·250	F2/F3	Manchester	[3]
2000	G4IRI	3·550	A1/A3J	Bolton, Lancs	
2000	GM4ELV	144·250	A1	Arrochar, Strathclyde	
2000	G4JDL	144·250	A1/A3J	Solihull, W Midlands	[4]
2030	G2FKO	145·525	F2	Bideford, Devon	
2100	G3LQI	144·250	A1/A3J	Lancing, Sussex	[14]
2100	G4EWK	144·850	F2	Burton-on-Trent, Staffs	[7]
Fridays					
1830	G4ILW	145·450	F2/F3	Gateshead, T&W	[1]
1830	G3GNS	1·910 3·550 144·250	A1	Locking, Avon	[13]
1900	G4FIM	145·550	F2/F3	Leeds, Yorks	
1930	G3HVI	145·250	F2/F3	Stoke-on-Trent, Staffs	[1]
1930	G4BFJ G4DKK	144·625	F2/F3	Banstead, Surrey Tooting, SW London	
2000	G3WQK	144·775	F2	Hailsham, Sussex	
2030	G2FKO	145·525	F2	Bideford, Devon	
2200	G3AWL	144·110	A1/A3J	Easington, Co Durham	[8]
Saturdays					
0915	G3LEQ	144·250 145·250 1·950	A1/A3J F2/F3 A2/A3	Knutsford, Cheshire	[6]
1100	G3LZV	145·250	F2/F3	Manchester	[3]
1200	G3GNS	1·910 3·550 144·250	A1 A1 A1	Locking, Avon	[13]
2000	G3LZV	145·250	F2/F3	Manchester	[3]
2000	G4JBB	145·425	F2	Birmingham	[10]
2000	G4FEX	145·250	F2/F3	Horsley Woodhouse, Derbyshire	[1]
2030	G2FKO	145·525	F2	Bideford, Devon	

Notes

[1] Omnidirectional
[2] Horizontal to SE
[3] Vertical to S
[4] Horizontal to NW
[5] Vertical to E
[6] Slant polarized to WNW
[7] To SW
[8] To S
[9] To NE
[10] To NNE
[11] First and third Thursdays in each month
[12] Horizontal
[13] Reports to RAFARS Locking
[14] Horizontal to E and W
[15] Starting speed 12wpm

Special event stations

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

GB2IC, 6 October
This station will operate at the Imperial College (London) Fresher's Fair. It will operate on 7, 21, 70 and 144MHz. They hope to receive calls from former members of their radio society, but all contacts are welcome. The station will be used from 1–28 October to introduce students to the hobby. Details from G5YC, QTHR.

GB2IDP, 12-16 October
Birmingham Rehabilitation Centre will operate this station, with the help of local disabled operators, as part of the International Year of the Disabled. They plan to operate on 3·5, 7, 14, 21 and 28MHz ssb and 144MHz fm. They will try to link up with centres in other EEC countries. Visitors to this station are invited to look round the centre. Details from G4BFY, at the Employment Rehabilitation Centre, Vincent Drive, Birmingham B15 2TD.

GB4IYD, 16-18 October
Operational on hf and vhf between 10am and 4pm by handicapped amateurs at the Ladyhill Centre for the Disabled, Newport, Gwent, as part of the IYDP. Special QSL cards on request at time of QSO. Details from GW8JOY, QTHR.

GB4NNG, 17-18 October
The station, run by the 99th Glasgow Venture Scout Unit, is joining the Jamboree-on-the-Air, operating on 144MHz and 3·5–28MHz, at the Scout Hall, 166 Kingsbridge Drive, Kings Park, Glasgow.

GB2PS, 17-18 October
The 1st Penn Scout Group will operate this station from The Church Hall, Vicarage Road, Penn, Wolverhampton, on hf and 144MHz. Details from G. Piper, G4LLU, 104 Swan Bank, Penn, Wolverhampton WV4 5PZ.

GB2OSH, 18, 19 and 20 October
Old Swingford Hospital School RS (G4CVK) and 6th Stourbridge Scout Troop will operate their fifth JOTA station using 3·5MHz through to 433MHz. Scout contacts will be the main priority. Visitors to the station at Hagley Road, Stourbridge, West Midlands, are welcome. Details from G4IEB. QTHR.

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.

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 **December** issue should reach them by **15 October** and for the **January 1982** issue by **12 November.**

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)—13, 27 October. Ainsdale Scout HQ. Details from sec Norman Horrocks, G2CUZ, tel 0704 77604.

Blackburn (East Lancs ARC)—6 October (Demonstration of large screen video), 3 November (Home-made construction night), 7.30pm. Shadsworth Centre, Blackburn, PRO Norman Jenkin, G4CGT, tel 0254 75037.

Blackpool (B & Fylde ARS)—6 October, 3 November. Details of venue from Jim Newland, G5ND, tel 0253 64508.

Bolton (B&DARS)—7 October (Surplus equipment sale), 21 October ("70cm colinear", by P. I. Higginson, G8IZR), 28 October (Natter night), 4 November ("Rig testing", by C. J. Moulding, G4HYG). 8pm. Horwich Leisure Centre, Horwich, Nr Bolton. Sec. Alan Hartley, G8PRH, tel Bolton 49023.

Bury (BRS)—13 October (Construction competition), 7.30pm. Mosses Community Centre, Cecil Street, Bury. Informal meetings 6, 20, 27 October. Pub sec Peter Butterworth, 6 Wilton Avenue, Prestwich, tel 061-798 0970.

Leyland (LHARG)—12 October, 7.30pm. Rose & Crown, Ulnes Walton, Leyland. Details from sec Arthur Jolly, G4JCO, 20 Crawford Avenue, Chorley.

Manchester (South Manchester RC)—2 October ("DX reception of commercial tv", by Chris Muriel, G3ZDM), 9 October ("Test and measurement equipment", by Tim Winter, G4AOK), 16 October ("Microwave experiments, Part 2" by Colin McKenzie, G8LQO), 23 October (Discussion evening), 30 October ("Working in Antarctica", illustrated with slides, by Ron Smith, G3SVW/VP8LK), 6 November ("Computer abuse", by Michael Wood), 8pm. Sale Moor Community Centre, Norris Road, Sale. Informal meetings Mondays, 8pm. Sec David Holland, G3WFT, tel 061-973 1837.

Thornton Cleveleys (TCARS)—5 October (Any questions), 12 October ("Communications", by Lt B. Ramsay), 19 October (Constructors competition), 23 October (AGM with pie and peas supper), 26 October (RAE class), 7.30pm. Thornton Cleveleys Sports Centre, Victoria Road, Cleveleys. RAE classes Fridays, 7pm. Slow morse transmissions on Tuesdays and Thursdays, 7-8pm on 1·975MHz. Sec Arthur Parr, G3IWP, tel 0253 884931.

Warrington (UK FM Group Western)—1 October, 5 November, 8pm. Grappenhall Community Centre, Bellhouse Lane, Warrington. Details from Gordon Adams, G3LEQ, tel 0565 4040.

Winsford (Mid-Cheshire ARS)—7, 14, 21, 28 October 7.45pm. The new location is St Chads Church Rooms, Gladstone Street, Winsford. Sec Rob Linton, G8XMZ, tel Pickmere 3601.

Wirral (WARS)—7 October (Practical demonstration—an amateur station on the air), 21 October (AGM), 7.45pm. Sports & Recreational Centre, Grange Road, Claughton, Birkenhead. Sec Gary O'Keefe-Wilson, G8VPF, tel 051-677 1531.

Wirral (W&DARC)—14 October ("Satellite communication", a video tape lecture), 28 October (to be arranged), 8pm. Sports Concourse, West Kirby, Wirral, 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)—4 October, 1 November 7.30pm. The Royal Hotel, Church Street, Barnsley. Sec G8PLJ.

Halifax (H&DARS)—This is a newly re-formed club and details may be obtained from G4LEC, 70 Dean Lane, Sowerby, Sowerby Bridge HX6 1HE.

Harrogate Repeater Group (HRG)—At a recent committee meeting progress was reviewed and equipment target dates set. It seems as if it may be early 1982 before the licence is issued, but other progress is satisfactory. Information from G4ATZ.

Hornsea (HARS)—Wednesdays. 14 October (AGM at the new library), 21 October ("Safety", by safety officer of Reckitts), 11 November ("Computers", by Andrew Blake), 8pm. The club now has a TS700G for contest and club use, and the FT101 is now up to all-mode standard. 100 per cent RAE pass for this club. 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. This society has a new constitution. 12 December (Christmas do, at The Jester, in Leeds, details from G3KWT). Details from club sec Dave Coomber, G8UYZ, PO Box 73, Leeds LS1 5AR.

Pontefract (P&DARS)—9 October (Disco dance, bar extension, prizes etc, all for club funds), 15 October ("American ham radio", talk/slides by G4KYL), 29 October (Film night), 12 November ("Wehrmacht wireless of World War Two", by G4ESP, illustrated talk about communications in Hitler's army). G6BGN showed all the older hands how to win a foxhunt, walking off with the Bill Hartley Trophy. Details from G4ISU, tel 72784.

Scarborough (SARS)—Mondays, 7.30pm. Scarborough Cricket Club, North Marine Road, Scarborough. Early August saw the club's first vhf df hunt with fox G4EDR found in about 1h by G4HWO's team. Preparations have begun for the Christmas dinner, and it is estimated that about 50 students will sign up for RAE classes in Scarborough this autumn. Sec G4JAQ, tel Scarborough 862638.

Wakefield (W&DARS)—6 October (On the air), 20 October (Homebrew evening), 3 November (Pie & pea supper, Rose & Crown Inn at Methley), 17 November (Slide show), 8pm. Holmfield House, Denby Dale Road, Wakefield. The club hopes to make their amateur radio identity clear by having a wall plaque sited by the front door of Holmfield House. Sec G4BLT, tel Wakefield 255515.

Wakefield (West Yorkshire Metropolitan Police ARC)—Second Tuesday in each month, 8pm. The Police Academy, Wakefield, West Yorks. The club have had the call G3WYP re-issued to them (the previous holder is now in Australia) which of course is the ideal complement to their G8WYP. Their new hf rig is operated on club nights but sec G4IEJ reminds everyone that membership is for police and ancillary staffs only.

Wharfdale Repeater Group—The group is sponsoring a 432MHz city repeater for Leeds currently accepted by the RWG under Phase 7. RB13 is the provisional frequency being suggested. Details from G3KKP.

York (YARS)—Fridays, 7.30pm, except the third in each month. United Services Club, Micklegate, York. Sec G3WVO. G3WVO recently received a letter from VK5ZO (ex-G3BAK), who had traced his family line back to the name of Rawdon in about 1780 in York. and who asked G3WVO if he could put him in touch with anyone able to help him trace it back even further. While not strictly amateur radio, the contact arose from a common interest in the hobby.

In the past a number of club secs made the point to RR2 about putting news into these notes rather than just forthcoming dates. (The editor has included a request for news items in the introductory paragraph of "Club News" for many years, and has repeated it to RRs.) But where are they all now! York's entry this month certainly shows that members outside the region notice what is going on. Three clubs in the region report that they have had 100 per cent RAE passes. I look forward to visiting more clubs this coming season, but would secs give me as long a notice as possible in order to fit visits into my shift roster.

REGION 3—RR H. S. Pinchin, G3VPE, 61 Cole Bank Road, Hall Green, Birmingham B28 8EZ. Tel. 021-777 1320.

Birmingham (Midland ARS)—20 October (AGM), 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. 4 November (AGM). 8pm. Hampstead House, Fairfax Road, West Heath, Birmingham B31 3QY. Details from sec G4GZI, tel 021-427 7104.

Birmingham (UoB ARS)—Fridays during term, 7.30pm. Tuesdays (RAE classes), 7.30pm. Club room gatherings every lunch time during term, second floor Students' Union (above shop). Sec Dave Thomas, G4HHJ.

Bromsgrove (B&DARC)—9 October (Surplus sale), 8pm. Avoncroft Art Centre, Bromsgrove. 27 October (Informal at Parkgate Inn), 8pm. Club net Wednesdays, 144·850MHz, 8pm. Sec G4HFP, tel Stourport (02993) 3818.

Kidderminster (K&DARC)—13 October ("Staff location systems", by Dave Hicks, G8EPR), 27 October (Informal evening), 8pm. Aggborough Community Centre, Hoo Road, Kidderminster. Sec G4TLQ, tel Kidderminster (0562) 4930.

Malvern Hills (MHRAC)—13 October ("Printed circuits" by Dave Davies, G4EYJ), 7.30pm. The Red Lion Inn, St Ann's Road, Great Malvern. Sec G4BVY, 9 Wyche Road, Malvern, tel Malvern (06845) 62900.

Redditch (RRC)—8 October ("Keys I have used" by Ray Dobdinson, G3RGD), 22 October (Informal), 8pm. WRVS Centre, Ludlow Road, Redditch, Sec G3EVT, tel Alcester (0789) 762041.

Shrewsbury (Salop ARS)—15 October ("Digital multiplexing—Part 2", by R. Millington, G4AZV), 22 October (Natter night), 29 October (Surplus sale), 5 November (Natter night), 8pm. Albert Hotel, Smithfield Road, Shrewsbury. Sec G3VWH, tel Shrewsbury (0743) 51833.

Solihull (SARS)—10 October (Demonstration station at Heart of England School, Balsall Common), 20 October (AGM), 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)—19 October ("Air traffic control", by Ken Parkes, G8AIR), 7.45pm. Library, Longlands School, Brook Street, Stourbridge. Sec G8JTL, tel Lye (038482) 4019.

Telford (T&DARS)—7 October (Informal evening, G3ZME on the air), 14 October ("Slow scan tv", by Gerry Craig, G4IUT), 21, 28 October, 4 November, 7.30pm. Phoenix Centre, Webb Crescent, Dawley, Sec G8UGL, tel Telford (0952) 584173.

Walsall (WARC)—14 October (Surplus sale), 28 October (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)—19 October ("Phase-locked loops", by Andy Crofts, G4GKB), 2 November (Members' home constructed equipment display), 8pm. 61 Emscote Road, Warwick. Club net Mondays on non-meeting days, 145·350MHz, 8pm. Sec G8RZR, tel Warwick (0926) 496453.

Wolverhampton (WARS)—5 October (AGM), 12 October (Natter night), 19 October (Members' slide and film show), 26 October (Natter night), 2 November (Surplus sale), 8pm. Wolverhampton Chamber of Commerce & Industry, 93 Tettenhall Road, Wolverhampton WV3 9PE. Sec G8EDG, tel Wolverhampton (0902) 763617.

Worcester (W&DARC)—5 October ("Receiver performance", by Roger Dixon, G4BVY), 2 November ("Cosmic radio transmitters", by Dr Alfrey from Birmingham University), 8pm. Old Pheasant, New Street, Worcester. Sec G4EKG, tel Evesham (0386) 41105.

REGION 4—RR M. Shardlow, G3SZJ, 19 Portreath Drive, Darley Abbey, Derby DE3 2BJ. Tel Derby (0332) 556875.

Derby (D&DARS)—7 October (Junk sale), 14 October ("Amateur television (fast scan)", by G8OZP and G8VBA), 21 October ("Aerials—a personal view", by G4AFJ), 28 October ("The Radio Society of Great Britain", by David Evans, G3OUF), 4 November (Bring & buy sale), 7.30pm, 16 October (Vintage radio night). Morse classes, 7pm, Tuesday and Thursdays. 119 Green Lane, Derby. Sec Jenny Shardlow, G4EYM, tel Derby (0332) 556875.

Grimsby (GARS)—8 October (AGM), 22 October (Junk sale), 7.30pm. New Alexandra Social Club, Cleethorpes. Sec Trevor Matthews, G3RGC, tel Grimsby 884060.

Ibstock (IARS)—13 October (DF hunt), 27 October (Club outing—contact G8UZQ for info), 7.30pm. Hastings Arms, Ibstock. Sec Steve Haywood, G8UZQ, tel Ibstock 62158.

Nottingham (ARCoN)—1 October (Forum), 8 October ("Aerials", by G4AFJ), 14 October (To be announced), 22 October (Visit to BBC Radio Nottingham), 7.30pm. The Sherwood Community Association, Woodthorpe

House, Mansfield Road, Nottingham. Sec Mike Shaw, G4EKW.

RR4 has received reports from four clubs out of the 32 affiliated in Region 4. Ask your club secretary why your club does not send its programme for inclusion in "Club news".

REGION 5—*(RR to be elected)*

Cambridge (CUWS)—Mondays. First meeting 12 October ("Moonbounce", by G4EZN). Other meetings include "Propagation and poly-phase sideband". St John's College. Contact the members at the Societies Fair, 5 and 6 October, Kelsey Kerridge Sports Hall, Details from Chris Budd, G8OPB, St John's College.

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—"The exploitation of natural phenomena", by G3KLT), 8pm. Elmhurst Youth Centre, Fairfax Crescent. Details from G8BQH, tel 0296-04 64783.

Bracknell (BARC)—Second and fourth Wednesdays in each month. Details from G4DSE, tel Bracknell 53911.

Burnham Beeches (BBRC)—First and third Mondays in each month. St John's Ambulance HQ, Burlington Road, Nr Chalvey, Slough, Berks. Details from David Ayers, tel Maidenhead 28108.

Chesham (C&DARS)—Wednesdays, 8.30pm. Chesham Whitehill Centre. Details from Andy Scott, G8PUC, tel 0494 785625.

High Wycombe (Chiltern ARC)—25 November (Junk sale), 30 December (Natter night). Details from P. B. Steers, G4LLM, tel High Wycombe 24095.

Maidenhead (M&DARS)—5 November (Junk sale), 17 November (Talk by Pat Hawker, G3VA, on direct conversion receivers). Sec John Patrick, G3TWG, tel Bourne End (06285) 25275.

Reading (RARC)—10 November (Constructional contest, inter-club quiz), 24 November (Junk sale), 8 December (AGM), 22 December (Christmas dinner). Details from sec G4CCC.

REGION 7—RR P. J. Walker, G8HMG, 12 Brownlow Road, Redhill, Surrey RH1 6AW.

Croydon (Addiscombe ARC)—The club now meets in The Woolpack, 154 Gloucester Road, Selhurst, Croydon. Informal meetings continue to be held as usual from 9pm Tuesdays. Sec Peter Hart, G3SJX, tel 01-656 9054.

Crystal Palace (CP&DRC)—17 October (Junk sale), 8pm. Emmanuel Church Hall, Barry Road, London SE22. Sec G3FZL, tel 01-699 6940.

New Cross (Clifton ARS)—Fridays, 2 October (Film show), 9 October (subject to confirmation), 17/18 October (AGM), 8pm. Upstairs at the New Cross Inn, junction of New Cross Road and Clifton Rise, SE14. Jamboree-on-the-Air at St Michael's Church, Champion Crescent, Sydenham. Club net, Mondays, 8.30pm, 144·41MHz ssb. Sec Reg Hinton, 42 Sutcliffe Road, Welling, Kent, tel 301 1864.

REGION 8—RR K. A. Crouch, G4KEN, 14 Victoria Road, Capel-le-Ferne, Folkestone, Kent CT18 7HB. Tel 0303 55241.

Brighton (BRC)—7 October (Junk sale), 7.45pm. 47 Cromwell Road, Hove.

Burgess Hill (Mid-Sussex ARS)—1 October (Talk by Ron Roden, G4GKO, on his travels), 15 October (RSGB talk/slide show by G3OUF or G3ZNI), 7.30pm. Marle Place, Leylands Road, Burgess Hill. Further details from G3JMB, tel Hassocks 4965.

Canterbury (East Kent RS)—1 October (AGM and construction contest), 5 November (ATV talk by G8GHH). 7.30pm. Dominican Hall, Canterbury. The club is now running an RAE class. Details from G3MDO.

Chichester (C&DARC)—6 October (Club meeting), 17/18 October (Jamboree-on-the-air, for the Chichester District Scouts). More details about activities from S. Talbot, G8FCX, tel Littlehampton 5082.

Dover (South-east Kent YMCA RC)—7 October (Natter night), 14 October (Weather forecasting), 21 October (G3LCK and his adventures in the Welsh mountains), 28 October (Slide show of club activities and members), 7.30 for 8pm. YMCA, Dover. Talk-in on GB3KS or S20. Morse class first half-hour by G2FLT. Further details from G8KEN, QTHR.

Gillingham (MARTS)—23 October (Film "Dawn of an industry" and "End of the road"), 7.30pm. No 1 Hall, St Lukes Church, King Williams Road, Gillingham. Contact Peter, G4EVY, tel Medway 76463.

Horsham (HARC)—This club now meets on the first Thursday in each month at The Guide Hall, Denne Road, Horsham and *not* as per July *Rad Com.* 1 October (Autumn junk sale), 8pm. Contact G. Garden, G4LJR, tel Billingshurst (040381) 3657, G3NPF.

Kent Repeater Group—Information now from chairman/sec D.N.T. Williams, G3MDO.

Tunbridge Wells (West Kent ARS)—16 October ("Measuring ssb p.e.p. output power", by G3ROO), 30 October (Colour tv). Formal meetings, alternate Fridays at The Adult Education Centre, and at The Drill Hall, Victoria Road, for informals on the following Tuesdays. Contact Brian Castle, G4DYF, tel 0732 56708.

RR8 thanks all the club secretaries for their very nice letters and they will see that their entries are listed as above. If club programmes are printed in a newsletter please send them to me and I will extract the details and send to "Club News". If no information is received that club's entry will not be seen again until January and it will probably lose some members. Hope to visit some of you soon.

REGION 9—RR W. J. Colclough, G3XC, Highview, Indian Queens, St Columb, Cornwall TR9 6LL. Tel 0726 860485.

Camborne (Cornish RAC) Computer Section—Third Monday in each month. 19 October ("Flow charting", by G3OUZ, part of a series of lectures). SWEB Club Room, Pool, Camborne. Sec Bob Reason, G4GFB, 24 Mitchell Road, Camborne.

A regular item on the programme is basic technology, conducted by Bert Hammett, G3VWK. Recently Keith Harding, G3XFL, gave a most informative talk on the manufacture of printed circuit boards for the amateur constructor.

For those getting inquisitive about computers and their uses other than to play with, and those already past this stage, the section try their best to satisfy all needs from the nuts and bolts to the completed and usable stage of the technology.

Exeter (EARS)—Letters for Arthur Courtney, G8XIP, as the AR for RSGB Exeter seem to be going astray. RR9's notes give the following details, if these are incorrect a note to him would be appreciated: RSGB AR for Exeter, Arthur C. Courtney, G8XIP, 11d Lakeside Avenue, Exeter, Devon EX2 7BL, tel 0392 875295. A Scouts & Guides Moot is being held at the Whipton Show Ground, Exeter, on the 19 and 20 September. A station is being provided by the Exeter ARS. The AGM is to be held on 12 October at the Community Centre, St Davids Hill, Exeter, Pro Geoff Draper, 1 Carlyon Close, Heavitree, Exeter, Devon EX1 3AZ.

Newquay (N&DARS)—Due to school holidays and the closure of Treviglas School, a number of outdoor activities have been arranged. The Club Repeater GB3NC has been much in demand by the visitors to Cornwall, the members of N&DARS would like to record with thanks the discipline and agreeable operation by visiting amateurs, club stations operated in the recent VHF NFD and the 70MHz contests.

Saltash (S&DARC)—Recent outdoor activities included a visit to British Telecom Earth Satellite Station at Goonhilly, a barbecue, and a trip up the Tamar to Cremyle. Sec Eddy Hayden, G4LZU, Treetops, Three Corners, Chilsworthy, Gunnislake, Cornwall, tel 0822 832838.

Torbay (TARS)—The usual summer activities have taken place, two more yls have passed their RAE. By the time these notes appear in print the annual rally will be over; thanks are due to all those who have given their time etc to make it possible to hold this event in 1981.

RR9 notes that only a few reports have been received from club secretaries. A reminder that it is up to the officer of the club to send in reports to the RR of activities other than routine details; unless this is done the Club will only see its name in print twice a year, July and January. It is up to you.

I would like on the region's behalf to thank Len, G4UZ, for his services to you and the RSGB during his term of office. *RR9.*

REGION 10—RR P. A. Jones, GW4HAT, 68 Pastoral Way, Tycoch, Swansea SA2 9LY.

Barry (BCoFERS)—Thursdays, 22 October (AGM), 7.30pm. Barry College of Further Education, Annexe, Weycock Cross, Barry. Details from Colin Beynon, GW3WSU.

Cardiff (CRSGBG)—12 October (AGM and constructors' contest), 7.30pm. The Pantmawr Inn, Pantmawr Estate, Cardiff. Further information from Joe Brooke, GW3GHC.

Swansea (SARS)—1, 15, 29 October. 15 October (Slide show and off-air recordings presented by Brian Davies, GW3KYA, of his recent visit to the west coast of USA), 8pm. Lecture Room 'N', Applied Sciences Block, Swansea University College. Club net each Sunday, 1000gmt, 28·530 ±QRM. Net controller Cen, GW4BIQ. Other stations in the locality are welcome to call in. Further details from Roger Williams, GW4HSH, tel Swansea 404422.

REGION 11—RR B. H. Green, GW2FLZ, 1 Clwyd Court, Tan-y-Bryn Road, Colwyn Bay, Clwyd LL28 4AH. Tel 0492 49288.

Colwyn Bay (Conwy Valley ARC) (GW3TM)—1, 15 and 22 October. 4 October (Special meeting for the visit and talk by the RSGB President, Mr Basil O'Brien. Members of other societies within the area invited, please contact sec), 2.30 pm. 8 October (Talk by Mr J. T. Lawrence, GW3JGA), 7.45pm. Green Lawns Hotel, Bay View Road, Colwyn Bay. Sec Mr J. R. Wright, GW4KGI, 11 Bryn Derwin, Abergele, tel 0745 823674.

REGION 12—RR F. Hall, GM8BZX, 45 Priory Cottages, Lunanhead, Forfar, Angus, DD8 3NR. Tel 0307 67565.

Dundee (Kingsway TCARC)—Tuesdays, 6.30pm. Electrical Laboratory, Kingsway Technical College, Old Glamis Road, Dundee. The club has now resumed after the summer recess. Programme details from sec Nick Stewart, GM8YRT, 23 Clive Road, Dundee.

Tayside (Raynet Group)—All amateurs in Tayside who are not members of the group and who would like to join are invited to contact the group controller, GM4FLP, for details of membership, exercises, and message handling sessions.

RR12 would like to hear from club secretaries regarding meeting times and general club information. This is your column, why not make use of it to keep the membership informed.

He would also like the views of the members resident in Region 12 as to whether they would like a regional meeting held in the near future.

REGION 16—*(RR to be elected)*

Colchester (CRA)—1 October (AGM), 7.30pm. Colchester Institute, Sheepen Road. Details from Frank Howe, G3FIJ, tel Colchester 70189. The club is also holding a top band df hunt together with the Chelmsford club on 11 October. Details from Ian Butson, G4HKC, tel Colchester 860724.

Haverhill (H&DRS)—2 October (Informal), 9 October (RSGB tape/slide lecture on radio aurora), 16 October (Junk sale), 23 October (Informal), 30 October (RSGB tape/slide lecture on astronomy and cosmology) 7.30pm. Steeple Bumpstead Road. Details from Dave Hickford G6BPS, tel Haverhill 61207.

Ipswich (IRC)—14 October (Planning for Jamboree-on-the-Air), 28 October ("HF antennas", by Philip Ashton, G3XAP), 8pm. Club Room, Rose & Crown, Norwich Road. Details from Jack Tootill, G4IFF, tel Ipswich 44047.

REGION 17—RR H. G. Cunningham, G8FG, 235 Station Road, West Moors, Wimborne, Dorset BH22 0HZ. Tel Ferndown (0202) 876018.

Basingstoke (BARC)—Third Wednesday in each month, 7.30pm. Chine House, Popley. 21 October (AGM). Sec G4LEF, tel Basingstoke (0256) 67308.

Some of the members of the Salisbury R&ES who attended the Swindon & D ARC mobile rally. *Photo:* G4AJD

The committee of the South Dorset RS, seated l to r: G3SDO, G8EOJ, G6SV, G8XZO, G3YWG and G3ZGP; with members of the society. *Photo:* G3VOO

Chippenham (C&DARC)—Tuesdays, 7.30pm. Chippenham Sea Scouts HQ. Sec Peter Tuck, G8UGY, tel Bromham (0308) 850289.
Fareham (F&DARC)—7 October ("The microprocessor and rtty", by G4FJO), 14 October ("Audio filter project", by G8VOI), 21 October (Natter night), 28 October ("Making bits for 10GHz", by G8HND), 7.30pm. Room 9, Porchester Community Centre, Sec Brian Davey, G4ITG, tel Fareham (0329) 234904.
Farnborough (F&DRS)—14 October (pre-AGM discussion), 28 October (Ron Ham evening), 7.30pm. Railway Enthusiasts Club, Access Road (near M3 bridge). Sec Ivor Ireland, G4BJQ, tel Farnborough (0252) 43036.
South Dorset (SDRS)—First and third Tuesdays in each month, 6 October (RSGB night with G5HD and RR17 in attendance), 7.30pm. Civilian Canteen, Army Bridging Camp, Wyke Regis, Weymouth. Sec G3ZGP, tel Weymouth (0305) 812893.
Swindon (S&DARC)—Thursdays, 7.30pm. The WI Hall, Dores Road, Upper Stratton, Swindon. RAE course is being run by the club. Sec Ian Browne, tel Swindon (0793) 485564.

REGION 19—RR R. J. C. Broadbent, 94 Herongate Road, Wanstead Park, London E12 5EQ.
Cheshunt (CDRC)—7 October (Natter/practical), 14 October ("AMSAT-UK", by G3AAJ, plus UOSAT), 21 October (Natter night), 28 October ("The Apollo Programme—Part 2", by Nick, G8NDR (VTR talk)), 8pm. The Church Rooms, Church Lane, Wormley, Herts. Info from Jim Sleight, G3OJI, tel Ware 4316.
Chiswick (ABCARC)—20 October ("Experiences with the Argonaut 515", by G3OJX), 7.30pm. The Committee Room, Chiswick Town Hall, W4. Sec G3GEH, tel 01-992 3778.
Edgware (EDRS)—9-14 October (Edgware activity period), 15 October (Informal), 29 October ("QRP operation", by H. Durry, G4HMD), 8pm. Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. Details from sec G4HMD, tel 01-952 6462.
Grafton (GARC)—9 October ("A history of the vtr", by G8NGF), 11, 18, 25 October (The Grafton Top Band Contest—a.m./cw/ssb), 23 October (A giant junk sale (that's better—*RR19*)). Meetings are now held at the new QTH, The Five Bells, East End Road, East Finchley, London N, on second and fourth Fridays in each month, 8pm. Sec John, G8SYD, tel 01-957 8785. It is said that you don't have to go through the bar to get to the club meeting. Who wants to know that kind of info anyway, seems to me to miss the point of radio meetings! *RR19.*
Harrow (HRS)—2 October (Informal/practical), 9 October (Surplus equipment sale), 16 October ("Guide to pll synthesizers"), 24 October (Informal/practical), 30 October (Radio fones and pager systems), 8pm. Harrow Arts Centre, High Road, Harrow Weald. Sec G4AUF, tel 01-868 5002.
Ilford (IRSGBG)—It is said that this meeting is still alive and well, unfortunately they do not have any programme of events or talks. However, all are welcome at 50 Mortlake Road, Ilford, the QTH of Jim, G3PCA. Sec G3LRE, tel 01-500 7196
Imperial College, London (ICARS)—21 October ("Oscar", by Richard Limebear, G3RWL). Visitors to this venue are always welcome but the courtesy of a telephone call to Mike Bull, 01-589 5111, ext 1301, is required for entrance during the evening to the premises for obvious reasons.
Silverthorn (SRC)—A very fine newsletter is always received by RR19 from this club *but* it never gives any forward dates that can catch the deadline for this column. Details of meetings from Chris Hoare, G4AJA, tel 01-529 2282.
Southgate (SARC)—8 October ("RTTY"), 7.30pm for 8pm. St Thomas Church Hall, Prince George Lane, Oakwood N14. Val Austin, G4MCD, tel 01-360 5832, for information.
Stevenage (S&DRC)—1 October (Talk by the chairman, G8KMG), 15 October ("UOSAT", by G3AAJ), 5 November (Talk on ICL by Dave Mussen). The Staff Canteen, British Aerospace Ltd, Site B, Gunnels Wood, Stevenage, Herts. Sec G8LXY. Publicity G8KCV, tel 0438 64624, evenings. This club also runs RAE and morse classes.
Wanstead (ELRGSBG)—No programme received to date. Contact G3AMF, tel 01-989 9224, for all details.
Watford (WRC)—This club has now had its first AGM and has elected officers to manage their affairs. No list of speakers is yet available but information is obtainable from sec C. Tredwell, G8CHW. Meetings are held at Small Hall, Christ Church, St Albans Road, Watford.

RR19 has had a request for help from the local Sea Cadet Training Commander F. R. Price-Fox. It would appear that he is in dire need of a person with some operating experience to train some of tomorrow's citizens in the art of rt and morse code etc.

The local Training Cadet Corps is T.S. "Chester" at Vicarage Lane, East Ham E6. Meeting can be made to suit the instructors. There is a ward room for staff. If any licensed amateur feels he would like to get involved in this worthwhile, unpaid job, please contact the RR or Commander Price-Fox on 01-550 7243, 4 Windermere Gardens, Redbridge, Ilford, Essex. There is a vast range of very good equipment waiting for the right person to use it. Come on lads, let's show the public that we can do something other than use a microphone on 144MHz. *Ron Broadbent.*

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. 17/18 October (Club operating in JOTA, helpers most welcome), 27 October (AGM, all members urgently requested to attend). Further details from G8GFZ.
Bristol (BRSGBG)—On 26 October the Bristol RSGBG welcomes Sir Evan Nepean, G5YN, BT, MA, CEng, MIEE, who will be talking about "The life and times of G5YN". The venue is Queens Building, Bristol University, at 7.15pm. Further details from G8GLQ, tel 0272 621253.
Bristol (North Bristol ARC)—Fridays, 7.30pm. C/o Self Help Enterprise, Braemar Crescent, Northville, Bristol. 30 October (Coach trip to Donington Park Exhibition). Details from G4EUV.
Cheltenham (CARA)—Regular meetings first Thursday and third Friday in each month, 7.30pm. 1 October (Junk sale), 23 October (Natter night), 30 October (Coach trip to Donington Park Exhibition). Further details from G4ILI, tel 0242 43891.
Gloucester (GARS)—Thursdays, 7.30pm. Chequers Bridge Centre, Painswick Road, Gloucester. 8 October ("Transatlantic meteor scatter", by Dave Butler, G4ASR). Club station G4AYM active most Thursdays. Further details from G3MA.
Portishead (Gordano ARG)—Meetings at present fourth Wednesday in each month, 8pm. The Ship Hotel, Down Road, Portishead. 28 October (Exhibition of amateur radio equipment by G3NXU (Booth Holdings)). Further details from G3LJD.
Yeovil (Y&DARC)—Thursdays, 7.30pm. Building 101, Houndstone Camp, Yeovil. 1 October ("What is power output?", by G3MYM), 8 October ("The world at their fingertips", video tape), 15 October ("Modulation", by G3MYM), 22 October ("Balanced mixers—why?", by G3DSS), 29 October (Natter night). Details from Don, G3NOF, tel Yeovil (0935) 24956.
RR20 thanks the above clubs who sent in their news for this issue. If your club is not included please request your secretary to send me details of your club's activities by the date given at the beginning of "Club news".

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

RADIO AMATEUR INVALID & BLIND CLUB

Chairman: W. A. Scarr, MA, FBIS, G2WS
Vice-chairman: D. H. Acheson, G3WJT
Secretary: Mrs F. E. Woolley, G3LWY, 9 Rannoch Court, Adelaide Road, Surbiton, Surrey.
Club nets: G4IBC, 3,750kHz, 11am Tuesdays
2pm Wednesdays
Cheshire Homes, 7,080kHz,
1.30pm Thursdays

Brian Goddard, G4FRG, RR20, with some of the members of the Yeovil ARC. l to r: swls T. Healey, M. Flannigan, F. Parkhurst and V. Baker (front), G4FVW, G4FDG, G4FRG, SM4EMO (visitor), G6AFL, swl S. Jarvis, G3NOF (secretary, front), G3KSK (back) and G3MYM (chairman). *Photo:* G8VUZ

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 **22 October** (December), **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

CW eight-pole filter, 400Hz for TS820 Fox-Tango, £12.50. 12AVQ, indoor use only, £20. Avanti 144MHz windscreen mount, £10. SMCHS 7/8 whip, ball base, £5. Yaesu YD148 mic hi/low impedance, £10. All plus postage. G3DOG, QTHR. Tel Walton-on-Thames 26706.

35ft lightweight strong Duralumin 10in triangular lattice mast, comprising bolted 6ft sections, comp with heavy duty hinged base, 4:1 winch, £100. Buyer dismantles/collects. G3OFK, QTHR. Tel 0734 733674.

Ex-RAF "antique"sounder/relaying ref 10G/117, £15. 12V 30A transformer, £10. 12/24V 1kVA transformer, £15. Nickel alloy powder toroidal rings, believed better than ferrite for tvi, coils etc, various sizes, ex-ships transmitter parts, ex-ships tr p/ps, 580V and 1,150V, £10 each. Hallicrafter SX36A, BC787B, fault hence, £25. Auto transformers, 750VA, £10, 1kVA, £12. Scope tubes, Taylor valve tester, £8. AVO7X with shunts in case, £15. Prefer collect. G4DVH, QTHR. Tel 0229 54466.

Creed 75 equipment manual, maintenance, £5. DT600 terminal unit, £30. Candler morse and typewriting courses, £5 each. *Wanted:* Thruline elements KW low pass filter. Microscope slides, etc. MSF clock. 117MHz xtals. Platten knob, 45 baud gears for Creed 75. G3AZI, QTHR. Tel Preston 37815.

Liner 2, 2m ssb, £85. Heath amateur bands rx RA1, £30. Buyer collects or will deliver semi-local at cost. G4BWW, QTHR. Tel Southport (0704) 29036.

Icom IC240, as new, in orig packing, £130. Trio TR2400 handheld, as new, in orig packing, £155. G8EFQ NOT QTHR. Tel 051-922 4140, office hours.

American DI04 astatic xtal mic on desk stand with "grip to talk", high-Z output, imported directly from the USA, has special ceramic insert, brand new, unused, in orig cartons, £25 plus postage. G6RF, QTHR. Tel Liskeard (Cornwall) 45459.

FRG7, as new, buyer collects or pays carriage, no mods, hardly used, £135. G8YAL NOT QTHR. Tel Peter, Diss (Norfolk) 51193, after 6pm.

Icom IC202S for quick sale, nicads, charger, carrying case, mint cond, orig packing, cost £215, will accept £130. G8PPM, QTHR. Tel Chris, Worthing (0903) 38309, evenings/weekends, 01-760 7182, during office hours.

Icom 720A PS15 and Icom 260E, three months use, mics, GW4 going 9V1, where these illegal, £800 and £290 respectively. Collect. Tel 0492 58030, after 6pm.

Kenwood TS820 hf tx/rx, good performer, as new cond, £475. Eddystone 770R 19-165MHz, £120. 680X 550kHz-30MHz rx, £90. MM144/28LO converter, new, £20. Pye compact 70cm, £25. G4AFY, QTHR. Tel Kidderminster 63358 or 753358.

70cm Westminster with control gear on SU20, £65. Pye F27 base on 70·26MHz, £30. Burgoyne wireless with 78rpm player, £12. Over 300 valves, some unused, £20 the lot. G3XVL, QTHR. Tel Chesham (0494) 784883.

FT207R, mint, orig packing, £160. 10W pa, £15. Pocket phones on RB14, £30. WW synthesized tx/rx kit, tx and rx boards built, synthesizer needs attention, ics ok, £40. Datong morse tutor, £35. Collection preferred, post arranged. Moore, G4LWU. Tel 021-308 2458.

Paddle logic for rg keyboard, includes QSK cct, £7. Homebrew cmos touch paddles, £4. G3RVM QSK unit, £5. *Wanted:* keypad for IC701. 250+250pF split stator. Fraser, G4BJM, QTHR. Tel 0908 72463, home, 653961 work.

50Ω dummy load resistors ±20 per cent, easily dissipates 150W in air for 1min, good for 250W in oil, suit coaxial construction, brand new, £20. G3PVD, QTHR.

Mosley mini beam, 2kW, exc, £95. FRG7 digital, ssb filter, mint, £150. G3VZJ, QTHR. Tel 024 365 312.

Trio R1000, one year old, used three months only, as new, 2m Microwave Modules converter incl, £185 the lot. HP or Barclaycard, Howard Welchman, 11 Springfield Place, Landsdown, Bath. Tel Bath 318128 or 310940.

High power 2m fm rig, Sommerkamp TS280FM, 80ch, 45W output, incl auto toneburst and repeater input listen, under 1yr old, £140 incl Securicor. Adrian Andrews, G4LKI, G8AVR, QTHR. Tel Templecombe (0963) 70587, evenings.

Nelson-Jones stereo fm tuner, as new, professionally aligned, perfect cond, see Integrex advert in *WW* for specs, £40. High band fm bantam pcb only, rx xtals for S20, 22, R4, needs only two pots and a case to make ideal hand portable rig, £15. Nearly everything needed to construct PL509 hf linear amp, all psu, fan, case, hd relays, valves, bases, handbook, etc, £20 plus carr. P. I. Martin, 3 Birch Close, Broadstairs, Kent. Tel 0843 20592/61448.

2m antennas, 10XY, 6-el quad, 8-over-8, 5-over-5, some unused, half price or less. G3XNH. Tel Godalming (Surrey) 29757, evenings.

Special six-pin plug for mic socket, FT207R and other Yaesu, £5. Bound copy manual, Bearcat BC220 (fb), £3. Bound copy american book frequencies and details rtty stations, £3. Crispino Messina, Via Di Porto 10, 50058 Signa (FI), Italy.

G2DAF Mk2 tx and rx, mechanical filter versions, operational all bands, full drive, 10m, built by advertiser, well finished in cabinets, photographs available, recently overhauled, revalved. 6146Bs. incl quality dynamic mic, spare valves, £100. G3EGC, QTHR. Tel 0204 51502.

Trio QR666 rx, nice cond, handbook, £80 ono. Tel Menai Bridge (0248 712) 763.

LM13 wavemeter, similar to BC221 but with voltage stabilization, incl spares, £20. G5UZC, QTHR. Tel 0481 54833.

Discone GDX2 all band tx/rx antenna, mint cond, used for only one week, prefer buyer collects, a gift at £29. Gone hf. Tel Bolton (0204) 653230.

IC22A, R1-7, S20-24, £120. FT2F, seven channels, £70. Pye Bantams, R6-S20, case, battery, £35. Sentinel mf converter, £18. Jaybeam 6-el quad, new, £24. Murphy base station, 25W a.m., offers. GM8BQV, QTHR. Tel 031-441 2348.

IC215, nicads, charger, 25W linear, mobile mount, mag mount, £100. AR88, £30. BC221 built-in psu, £15. AR22 rotator and control, £20. Veritone CR150 gc rx, S-meter, etc, dial cord fraying, hence £15. G2CCH, QTHR. Tel Erith 37073.

FB ham station, KW2000, KW600, KW107, HQ1 rotator, indicator, cables, G8KW ant, BCC69 2m a.m., £420. Consider offers separate items. Buyer calls, inspects and collects. G3CPS. Tel Eastbourne (0323) 643172.

TS520S in perfect cond, used little, as new, £395. Buyer collects. G4HMW, 54 Walgrove Road, Brampton, Chesterfield, Derbys. Tel 36496.

Icom 240, new, £130. Trio rx JR500SE, £40. 14AVQ, 10-40m, £22. TF390F sig gen, 10-150MHz, £15. LM14 freq meter, £10. 8-el Yagi, 2m, £5. KW Vespa plus handbook, £55. CT54 vvm, £8. Many items. Buyer collects. G3FJ, QTHR. Tel 07014 52442.

TS700 2m, multimode, rx preamp, auto toneburst, mic, leads, handbook, 240/12V, exc cond, boxed. G8OEU, QTHR. Tel Midsomer Norton 414858.

KW204, exc cond, instruction manual, reasonable offer please. Prefer buyer collect. G2DZ, QTHR. Tel Byfield (0327) 60530.

Icom IC240, as new, in orig packing, handbook, accessories, etc, used little, going QRT, £150 ono. G8OSF. Tel 01-393 9275.

IC202E, 144·0-144·4, 144·6-145, comp nicads, charger, deluxe case, strap, £140 ono. FDK Multi 11, S16-23, R0, R3-7, toneburst, 4ch scan, mobile mount, £130 ono. Both in orig packing. Wilson 6ch 2W handheld, comp nicads, charger, helical, £70. G8YRF. Tel Nottingham 786858.

FT221RD, mint, £295. Mizuho 2m ssb, £80. KW202, £125. Hammarlund SP600, £135. KW77 rx, £75. FRG7, fine tune, £135. R4C cw filter, £25. Standard C7800, £165. MM2000 rtty, £95. G3RCQ. Tel Hornchurch 55733, after 6pm.

2200GX, fitted eight channels, nicads, charger, power lead, case, about £85. G3UNV, QTHR.

HF5 with HE5R radial kit, comp, as new, £50. G3DWS, 173 Black Haynes Road, Birmingham B29 4RE. Tel 021-475 6267.

Pre-war Brown's headphones. *Wanted:* Valves, 866Jr, 81 and 45. Hammarlund ceramic UX5 valveholder and small pre-war USA rx. G4IMT, QTHR. Tel Marshfield 254.

Trio TR2200G, fitted R0, RR0, S13X, S20-23, R3-7, nicads, charger, case, mobile mount, Autotone VB2200 10W pa, £140 ono. Trio TR7010 mobile mount, used little, 144·1-144·35 ssb/cw, £120 ono. G4CZZ NOT QTHR. Tel Milton Keynes (0908) 502207.

Watkins-Johnson WJ26938 twt preamp for 13cm or 9cm bands, 26dB gain, <5dB nf, supplies built in, cost $4,600, £50 ono. *Wanted:* Circuit diagram, info, Hallicrafters S39 Sky Ranger rx, G4JIU, 21 Kite Hill, Eaglestone, Milton Keynes. Tel 01-952 8902, office hours only.

Chinon XL555 super eight movie camera, macro power zooms, lens, back light control, fade-in fade-out, editor screen, title set, carrying bag, hardly used, £120 ono. Exchange for Icom 202S or similar, cash adjustment. Tel South Benfleet 58364.

Pye Pocketphones RB14, tx/rx, £25. Two sets nicads for above, £8. Pye nightcall charger, immac cond, worth £20, £13. Will split or all for £40. GM8YIK, 38 Glebe Park, Duns, Berwickshire TD11 3EE.

Radio Communication and *Bulletins* etc from mid 'thirties, yours for the taking or pay carriage. You can give a donation to any charity for 50 years of history. B. Hamilton, GI3VYY NOT QTHR. Tel Belfast 743520, 8am to 6pm.

IC2E with ICHM9 spkr mic, both mint cond, purchased May 1981, £140 ono or exchange Trio 2300 in similar unmodified cond. Want to try rtty? Creed 7D with ST5 tu, both 100 per cent operational, £40. Will split. G4EMK. Tel Bourne (Lincs) (07782) 5224.

KW2000A ac psu, exc cond, £150. MMT28/144 transverter plus ant with magmount, coaxial relay for immediate switching from 2m to 10m, £80. Will deliver for cost of petrol. G4JHE, QTHR. Tel Tilbury 6077.

Trailer 6 by 5ft, drop tail, jockey wheel, front steadies, £105. Joystick vfa, comp with tuning unit, £17.50. Tel Broadwater 2309.

IC202S with nicads, charger, £130. IC240 with asscys, £110. Pye W15U Westminster, 70cm, 10ch, £100. G3VSJ, QTHR. Tel 09924 68052, after 6pm or weekends.

FT225RD, £460. FTDX560, £200. SEM Z-Match, 80-10m, £35. Datong up-converter, £75. Tech ABC1 audio filter, £25. Mains tfmr, prim 240V, sec 800-0-800 at 300mA, £10. G4GUI QTHR. Tel 0924 72717.

Bearcat 220FB, new cond, scanning rx 30-88, 118-174, 430-512MHz. a.m./fm, comp, extra vhf antenna, £215 ono. Tandberg 3300 X-field reel-to-reel stereo tape deck, snip at £130. GM8LTN, QTHR. Tel Alan, East Kilbride (035-52) 21071.

Collectors item: Hallicrafter SX24 Skyrider Defiant, gen cov rx, bfo xtal phasing, avc etc, comp with 240-110V converter, good wkg order, offers or exchange for atu. BRS47908. Tel 051-327 5804, evenings.

TS520S with cw filter, as new cond, boxed, £350. SB200 linear amp, mint cond, £250. Carriage extra on both items. Jones, G3RCU NOT QTHR. Christchurch 484211, daytime, 475048, evenings.

Drake T4XC, R4C, AC4, MS4, nb cw filter, eight xtals fitted, Rolls Royce station, £750 or separate. 520SE. Both as new. G4KCA, ex-G8WBS, 80 Sale Lane, Tyldesley, Lancs. Tel 061-702 8616.

2200GX 2m portable, R6 and 7, S20-22, all accessories incl helical whip antenna, orig packing, HA202 Heathkit 10W pa, all connecting cables included, £110. G3ZZL. Tel 01-508 7573.

Radio Communication back issues, 1976-79 (November 1978 missing), £5. Old Taylor sig gen, needs attention, £3. G3DHH, QTHR. Tel 093-588 365.

Yaesu YO100 mon scope, vgc, £80. Heath GD1W gdo, two sets coils, lf, hf, mint cond, £12. 4m Cambridge FM10, 70·26 and 70·48, vgc, £20. Carriage extra. Tel 0202-522796.

Sale! Gone multimode: Icom IC2E, mint cond, six months old, nicad, charger, orig box, £110. Standard C78, 70cm fm, mint cond, four months old, nicads, charger, orig box, £180. 70cm pa, 12W for 1W in, suit C78, £25. GDX2 discone 80-480MHz, £15. 2m ssb tx/rx, 5W p.e.p., good rx, consists of ORP 20m tx/rx and transverter on same chassis, good basis for 20m rig, £65 ono. G8EPQ NOT QTHR. Tel Milton Keynes (0908) 640 249, evenings.

Swan Astro 150 plus PSU5, 235W with matching tuning mic, used few times only, ultra stable, £475. Sommerkamp TS802 handheld, comp with nicads, charger, leather case, used twice, £97. G3XKF, QTHR. Tel Aylesbury (Bucks) 748256.

RTTY tu and monitorscope, Creed 7E, £60. Tel Melton Mowbray 822339.

Trio 2300, mint cond, orig packing, £120. G3MJT, QTHR. Tel Harrogate (0432) 886505.

TR2200GX, fitted S20-24, R3, RR3, R6, RR6, nicads, charger, helical, case, mobile mount, ASP629 (5λ/8) magnetic mount, boom mic, foot switch, £150 the lot. Can deliver. G4DWV/A. Tel Guy Simmons, Leeds (0532) 752715, after 6.30pm.

FT221RD, fitted Mutek type "crunch-proof" front end, simplex xtals (88 channels), 600kHz, 1·6MHz repeater shifts, YC221 digital display, immac, £375. GPV5 144MHz colinear, £17. Labgear 7026 teletext adapter, connects into antenna socket, £110. G3OHC, QTHR. Tel 021-308 2512.

Computer, Newbear 77/68 20k ram, Carter keyboard, plenty of software, £130. RTTY ST6 terminal, PLX vdu, keyboard, £75. FTDX401, mint, KW E-Zee Match matching spkr, 14AVQ antenna, £275. Buyer collects. Tel 021-357 5126, evenings.

Atlas 210X with ac pu, deluxe mobile bracket, Atlas mobile antenna, matching transformer, G-whip triband-er helical with 80 and 40 loading coils, two whips, all in good wkg cond, £325. G3KLF. Tel Fareham 236906, weekends or evenings only please.

CPU2500 25W 2m fm tx/rx, mobile mount, mic, £170. Two ex-computer psus, 24V, 2A, 30V, 2A, free to collector. G3VLQ, QTHR. Tel Reading 599591, after 7pm.

FT707, comp rig: FP707, FV707, FC707, immac mobile or base station, three months old, only used as base station, used little, reason for sale—need the money, £750. G4MIO. Tel 01-348 6110, after 6pm.

Casio FX140 scientific calculator, 10 digit, 50 function, £12 incl postage. G8VGR. Tel 0424 429757.

IC260E, exc cond, £240. G4LGB. Tel Norwich (0603) 897694.

KW109 power atu, £90. 940 Eddystone comprehensive rx, £120. KW204 all modes tx, Shure mic, key, £160. All exc cond, comp hf station, worked all countries, ex a.m. wavemeter incl, Spare 6146B, £370 the lot. Double wound isolation safety transformer, 240 in, 240 out, 3,500W, £12.50; same 500W, £5.50, fraction of cost. Going QRT while moving. Can deliver SE corner or petrol charge. G4IBY, QTHR. Tel Pett (Sussex) 3392, before 9.30am or evenings.

Yaesu FRSDX400, immac cond, 160-2m, all options, realigned, revalved, spare valves, spkr, manual, £160 cash. Eddystone 888A ham bands rx, super cond, prof realigned, revalved, spare valves, manual, £80 cash. Buyers collect. G6AYX. Tel 0284 61951 (Suffolk).

SR550 rx, £18. AT5 tx, incl mains psu, Labgear 12V psu, suit AT5, £20. Crofton cctv camera, wkg but needs attention, £25. 9in cctv monitor, £5. 4m 4-el Jaybeam, £5. Buyer must collect. G3XFM, QTHR. Tel Dave, York 798409.

QTH: three bed detached bungalow, two car garage, on nice estate, overlooking Bolton, property is 10yr old, in exc cond, good vhf site 750ft asl, sell £28,500 or will consider exchange in Bournemouth or Christchurch. G8CVO, QTHR. Tel 0204 57775.

RAK wire trap dipole, 23m length, 1·5kW power rate, 75Ω balun, 14, 7, 3·5MHz, traps available for 28, 21MHz, and spare 75Ω balun, used four years, £20. GM4EGW, QTHR. Tel 031-669 8844.

Trio TS130 atu, covers new bands, £95. SP130, £25. CW filter YG455C, £40. Three months old, orig cartons, 18AVT gp antenna, £35. G4KGG. Tel 0509 68561.

FDK Multi Palm Sizer, 2m fm handheld, external spkr, mic, £125. G8CHN, QTHR. Tel Bradford 683608.

IC22A, all repeater channels fitted, five simplex, DL2RZ fast-to-slow sstv converter, C type bulkhead sockets, offers for all these items. Tel 0501 33442, after 6pm.

Realistic DX200 communications rx, 150kHz to 30MHz in five bands, bandspread on all bands, a.m., cw, ssb xtal calibrator, six months old, £95. Tel Horsham (0403) 67908.

Vertical trap antenna, Hokushin hs-hf five band, 10-80m, radial kit, HF5R, five band, 10-80m, used for eight months, £30. Horley, G4KME, 50 Hillswood Drive, Endon, Stoke-on-Trent. Tel Stoke 503444.

Atlas 210X solid-state 200W p.e.p. tx/rx, exc cond, 10-80m, ideal for portable/mobile or fixed station, £310 ono. 60 ircs, £12. SAE please. Reed, 73 Dudley Road, Brighton, Sussex BN1 7GL. Tel 0273 504634, evenings or weekends.

FT101E, cw filter, £350. 4m Europa, £50. 16-el Tonnas, offers. Liner 2, offers. G8CQS 70cm transverter, £50. 70cm Tonna, offers. 2m Lunar preamp, £10. GM4IGS, QTHR. Tel Troon 312329.

NEMS Clark tunable vhf rx, continuous tuning from 50-250MHz, type 1672, or similar rx considered. Price etc to David Jones, 65 Cameron Street, Stonehaven, Kincardineshire AB3 2HE.

AR88, unmodified, spkr, spare valves, £45. Series Four Ferrograph professional tape recorder with large quantity of tape, £35. Imhof equipment cabinet, 4 by 19in panels, rear door as new, £50. 2m converter i.f. 28MHz, £3. CRT 5FP7, £3. G8BJP, QTHR. Tel 0843 31069.

Trio 2300, charger, case, nicads, helical, handbook, matching VB2300 10W amplifier, both six months old, £195 ono. Liner 2, works well, £65 ono, £245 ono for the lot. Carriage charged at cost. GM8YQN, QTHR. Tel Lesmahagow (0555) 893025, evenings.

TS700G 2m multimode mic, handbook, £290 ono. G-whip, 10-20 with 80m coil, £20. Jaybeam 5/8 2m whip, £10. G3PHJ, 9 School Lane, Buckden, Huntingdon. Tel 811445.

FT101E, mint cond, matching spkr, all leads, orig packing, £400. G3TAW, QTHR. Tel Kidderminster (0562) 745628, after 6pm.

FT101B, £250. FT7, £250. IC22A, £100. All ono. GW3COI, QTHR. Tel Abersoch 2675.

RAE correspondence course, unwanted having passed May exam, good clean cond, £20. Tel Deal 2834.

Microwave Modules 2m transverter MMT144/28, £65. 70cm transverter MMT432/28S, £99. DFM MMD050/500, £45. All recent and mint. 4m converter MMC70/28LO, b/l conns, £12. Hodec (SMC) mains psu, 12V dc, 3A reg, vgc, £8. G3AAV, QTHR. Tel Leeds 751100.

Multi 700E, exc cond, £125. R216 vhf rx, cw ac psu, £65. Prefer collect/inspect or carriage extra at cost. Two old scopes, one large, free collection by any club. G3ADZ, QTHR. Tel Rugby 815222, evenings.

KW77 rx, amateur bands only, preselector, calibrator, tunable slot, 500 cycle selectivity, handbook, phones, loudspkr, spare valves, £50 ono. Must be collected. Smith, 65 Leggatt Drive, Bramford, Ipswich. Tel Ipswich 41226.

Sphinx ssb tx suitable spares, delta control unit, £25. G4HSU, QTHR. Tel 0303 54196.

G3PLX rtty video display, comp with tu and afsk generator, 1k ram memory, built-in psu, separate keyboard, three baud speeds, incl 12in tv monitor, £150 ono. G8DDW, QTHR. Tel 01-858 3579.

Yaesu FT200/FP200, exc cond, £190. MM transverter, 28/144, used few times only, £50. PM2 converter, 160/40m, 9V supply, £10. Garax Two mobile tx/rx, good cond, £40. Delivery at cost. G3YLR, QTHR. Tel Finmere 7929, evenings.

Liner 2, used little, in mint cond, signal clean on spectrum analyser, fitted PA3 preamp, no other modifications, £110. Trio 2200G, fitted S18-23, R3-7, auto toneburst on repeater channels, no nicads, exc cond, £75. G8JUH, QTHR. Tel Walsall 32193.

KW2000 tx/rx, ac psu, dc psu, Shure mic, lpf manual, spare valves, £135. KW E-Zee Match, £25. Datong speech processor, £20. AEC swr/pwr meter, £12. Western five-way coaxial switch, £8. All first rate wkg cond and appearance. G3HBZ, QTHR. Tel 093-27 82262.

Computer, Nascom 2, cased, comp with manual, ideal for radio amateur use, sstv, etc, £260. Buyer collects. G4BGY, QTHR. Tel 01-777 9061.

TR2300, charger, nicads, helical, with λ/4 asp mag mount, all in good cond, £130. G4FAS, QTHR. Tel 061-437 7784.

Sommerkamp FT250, hb psu, all 10m xtals, manual, 160m transverter, spare pa valves, first offer of £120 ono secures. Was my fb rig for 10yr and just replaced by 101Z. G3YQB, QTHR. Tel Don, Princes Risboro (084 44) 6715.

TS520S, £375. 520 vfo, £50. SB614 monitorscope, £85. HB12A, £45. HB23B psu, £30. IC202S, nicads, four xtals, £140. Swan Cygnet, £140. All immac. Buyers inspect, collect. *Wanted:* Bird Termaline vhf hi-power directional couplers, uhf, 4CX250 linear, TS830S, IC22A. G4HME, QTHR. Tel Ipswich 51319.

SRX30 rx, gen cov, £110. Marconi Atalanta, 25kHz, 28MHz, 10 bands, inboard mains unit, external spkr, recently checked by Marconi, 100 per cent, £145. VHF converter, SEM mains battery unit, £15. Antenna coupler CL22, £15. Items exc cond. Tel 0472 88 2392.

R1155A rx with mains power pack, works well, best offer secures. Buyer collects or pays carriage. G6CHM. Tel 0902 893167.

KW2000B ac psu, 6146Bs final spare valves, Shure 444 mic, £185. *Wanted:* Osker SWR200 meter. G4AKX, QTHR. Tel Northwich 76538, evenings.

ATU Amtech 300, random wire or coaxial fed, five months old, current price £39.95, suitable 160-10m tx and rx, handles 200W, £25, cash. Tel Malvern 4665.

Trio 2200G, exc cond, xtalled for S20, S22-23, R0, R3, R5-7, comp with carrying case, strap, battery charger, set of new nicads, handbook, earpiece, external power supply lead, £85 ono. Tel Bromsgrove 33943.

Comp hf station: exc cond, Yaesu FT7, mobile/base station, 80-10m, mic, IC3PE psu, £250. MFJ901, atu, £35. AEC swr bridge, £7.50. KW trapped dipole, 80-10m ant, £20. Would exchange for Olympus photo equip. G4DFS, QTHR. Tel 0226 790043.

TS520, £295 or free if you purchase my 1935 Morris Eight Smokey Joe, low mileage, orig interior and bodywork, used through the summer months when dx cond bad. Ideal for going to the seaside, £1,750. G4KRG. Tel Ron, Disley 3650.

Two Pye Cambridge AM10Ds, six channels modified for 2m fm, fitted toneburst, one xtalled, R5-6, S20-23, £55 ono. One fitted R0, R0R, £35 ono, or £80 the pair incl manuals. G4DEN, QTHR. Tel Newton-le-Willows 6099.

Icom IC30A 432MHz fm, looks like IC22/240, xtals for all repeaters and simplex, 10W/1W, auto tb, mic, etc, £160 or offers. Eimac 4CX350A, high power 250B, new, with data, £27. Details G4FBK, QTHR. Tel 01-864 1412.

IC202, 144·0-144·4, 145·8-146·0, £120. IC22, mic, mobile mount, R0-7, S20-23, £100. QM70 tripler/converter, 2m-70cm, £30. G3RSJ NOT QTHR. Tel Exeter (0392) 32797.

Trio TR2300, mint cond, 12 months old, used little, comp with case, nicads, charger, spare dc lead, manual, box, all cost £180 new, yours for £130. G4ETP, QTHR. Tel 075 54 3377.

Trio TR2400 2m fm synthesized handheld, with carrying case, mains charger, 12V quick charger, eight months old only, orig packing, £165. G4LJY. Tel Wickford (037 44) 67947.

IC202, £139. TR2300 with nicads, £139. Both in vgc, orig packing. G8M1A. Tel Reading 341176, evenings only.

Collectors' items, war surplus: 19 set atu variometer, Russian inscription, £8. Class C wavemeter, 1,000kHz xtal unit, £3. National HRO mobile vibrator psu, £7. Air Ministry power unit type 270, output 600V dc, 200mA, £10. Tuning units TU61, 1·5-2·0 and TU54 12·0-18·0MHz master oscillator and doubler, £5 each. 1945 working instructions for 38 set, £2. 38 set, no case or valves, £5. Joystick mobile car-top harness, £3. Minimitter base-loaded 160m whip antenna, £8. Commercial 2m halo, £3. Pre-war Hammarlund Super-Pro rx, wkg, power pack, handbook, £25. Hermes long-carriage semi-electric Swiss commercial typewriter, some accounting features, cover, £65. Lacrosse stick, £4. 7lb putting shot, £3. Agreed carriage/collect. G2FKS. Tel 0223-247220.

Icom IC2E with base charger plus spare BP4, BP3, leather case, accept £160. Buyer collects. G6DAU. Tel Phil, St Albans 72528, evenings only, please.

Trio TR7200G, eight channels, 2m fm tx/rx, £100. G3XIR. Tel Trowbridge 65748, weekends.

Trio R1000, mint, manual, orig packing, £230. Tel Rustington (Sussex) 73089.

Eddystone S640 s/meter spkr, £20. Heathkit gdo GD1U, £10. Hand mic GH12A, £5. Taylor sig gen, 65C, £10. Xtal calibrator No10, £5. All with handbooks. UM1, UM2, £5. Valves, transformers, relays, meters. SAE list. G2FCA, QTHR. Tel Newport Pagnell 613523.

FDK Multi U11, £170. Europa B, £50. Philips EL8000 bw camera, £50. Lafayette HA55A aircraft rx, £15. *Wanted:* MMT432/144R, MML144/100S. G4IZT, QTHR. Tel Leeds 675527.

FT7B tx/rx, never used mobile, mic, bracket, leads, manual, 50W out, £260. HB psu, suitable 6146x2 750V ht, £10, plus carriage. *Wanted:* 2-30MHz transistor pa, 25W or so. G4GXU, 6 Spinney Bank, Kings Sutton, Banbury, Oxon, OX17 3RL.

FT200, FP200, in orig boxes, full 10m cover, spare 6SJ6 pa valves, mic, speech processor, prefer buyer to collect, £200. G4JHD. Tel 0703 444266.

Property of the late G3AYK: TS510 and psu, £150. TenTec PM3A, £35. Joystick wire ants, atu, £10. EK9X keyer, £12. Class 'D' wavemeter, £5. Valves, meters, other oddments, enquire G3XWI, QTHR. Tel Leeds 822443.

TS500/PS500, remote vfo, £160 ono. Eddystone 888A comm rx, ham bands, £85. CW extension spkr, both units in good cond. Tel David Fowler, Chalfont St Giles 3158.

KW200B ac psu, manual, many spare valves, £225. SWR meter, £10. KW E-Zee Match, atu, £30. EC10 Mk2 ac psu, 2m converter, £75. GW3YTL NOT QTHR. Tel Knighton (Powys) 528030, 6 to 8pm only.

FT707 tx/rx, mint, three months old, never used mobile, £485. FP707 matching power supply, £85. FC707 atu and dummy load, £65. All above items as new. Can be viewed operating. Genuine reason for sale. G4MCK. Tel Stevenage 68564.

FT101EE, all accessories, fitted 350Hz cw filter, immac cond, £365. TR2200GX, ch19-24, R3, reverse R6, reverse R7, one channel spare, nicads, charging unit, car bracket, carrying case, immac, £100. GM3TRI, QTHR. Tel 26941.

2m converters: Microwave Modules 144/28, £12. G8AEV 144/28, £5. G4HLX, 43 North Drive, Harwell, Didcot, Oxon OX11 0PE.

Re-advertised owing to timewaster: immac Drake C-line: T4XC tx, R4C rx, extra xtals, filters, £699. Barlow Wadley XCR30 portable gen cov rx, unmarked, £95. First come, first served! GM3WTA, QTHR.

Heathkit SB300 and SB400, both exc cond, sensible offers please. BC221, FL8A audio filter, grid dip meter, other items sae for list. G3FLD, QTHR. Tel Telford (0952) 3758, evenings, weekends.

Multi U11, fitted 13 chs, £175. SP60 Versatower incl plate-mounted rotator, buyer to collect, £275 ono. Modular Electronics 2-15W pa, £15. G4CTZ, QTHR. Tel Derby (0332) 71875 or 799452.

QTH: Good-sized semi, three bedrooms, large extension, garage, corner site, central heating, fitted wardrobes, carpets, curtains. Tri-bander on 40ft mast if required. G3VW, QTHR. Tel 01-205 1443.

Yaesu FT707, FC707 atu, mobile bracket, perfect, boxed, guaranteed, going abroad, must sell, £525. GWISP. Tel 035283 226, after 7pm.

TV camera, studio type with viewfinder, ccu, control panel etc, very nice cond, £75. 25in Philips video monitor, £15. 19in colour monitor, £60. 1in Vidicon scan coils, £3. Pye uhf tx/rx, rk mount, solid state, £35. G8GQS, QTHR. Tel Brian, 0427 3940.

MM4000 rtty tx/rx unit with keyboard, few months old, mint cond, £275 ono. TS102S with PS30 cw filter, superb cond, rarely used, £425 ono. G3KQS, 5 Cottingham Grove, Bletchley, Bucks. Tel 0908 647076.

KW2000E, psu, Shure mic, handbook, recent overhaul by KW, £250. G3XBP, QTHR. Tel Marlow 3186.

KW2000E tx/rx, 160-10m, £200. KW1000 linear, £100. Grimshaw, G3TQX. Tel Bury St Edmunds 4847.

FT01Z, 12 months old, £385. 100W 6ch 2m fm tx, £50. Cordless telephone, as new, £75. 12AVQ, £15. Tel Dunstable (0582) 601401.

TR2200G, 12 channels, S20-23, R3-7, R0, R00, 144·840, nicads, case, carry strap, charger, psu, λ/4 whip, manuals, psu lead, nic, vgc, £90 ono. J. Fish. Tel Knowle 2702.

FRG7, exc cond, used little, fine tune, no mods, orig packing, manual, £155 ono. G8XEZ, QTHR. Tel Fareham 286194, evenings.

Trio TS520S, cw filter, mint cond, £400 ono. GPV7 70cm colinear, two months old, £20 ono. G4IRO, QTHR. Tel 061 747 0935.

Swan linear 1200, spare valves, £100. SB610 monitor, £50. Mombrex rf generator model 29X 150kHz-220MHz, £20. Buyer collect. Carriage extra. G3FPJ, QTHR. Tel 0803 812588, evenings.

Swan 350 with ac power supply, manual, spare set of valves, Shure 444 mic, £150. G4BVI, QTHR. Tel Ipswich (0473) 53270.

FT101E with cw filter, as new, used receive only, £450. Leader LAC985 atu, as new, £50. Will split or £480 the lot. Prefer buyer inspect and collect. Orig boxes, handbooks, spare pa valves included. GM8JQF, QTHR.

FT101 Mk2, G3LLL clipper, fan, mic, new spare 6JS6Cs, manual, orig packing, £295. Collect or Securicor extra. Ken Ballance, G3KNB, QTHR. Tel 021-553 5551 daytime, Stafford (0785) 662105 evenings.

Two low band Bantams, 3ch, clean, unmodified, £20 each. Ferrograph tape recorder Series 5, three speed 7·5, 3·75, 1·175ips, clean, £30. Tel John, Kineton 640416, after 7pm.

FL2100Z linear, latest model, three new bands, brand new, unused, £300 (£85 under list). G2FK, QTHR. Tel 072 681 2337.

Video genie, with green screen monitor, books, tapes, £250. Tel 01-330 4662, after 6.30pm.

FT101, all leads, orig packing, £225. TA32JN, £20. 1155 rx, £15. Codar AT5, £15. Azden PCS2000 scanning 2m tx/rx, £175. Datong processor, £20. 20ft conc alloy masts, £10 each. Rigonda tv, needs power, £5. G4FVB, QTHR. Tel Erith 31115.

FRG7700M Yaesu rx, only a few months old, 150kHz-30MHz, 12 channel memory, incl FRV7700A converter for 118-130, 130-140, 140-150MHz, FRT7700 antenna tuner unit. Total new was £490, bargain for someone at £340. Ikegami PM950 9in b/w high resolution tv monitor, as new, used little, suitable for rtty reader or video, cost £150, a giveaway at £80. Yaesu YR901 cw/rtty reader, hardly used, beautiful instrument, all leads, manual, cost £425, selling at £270. Ikegami cctv bw camera model VR622, 25mm f1.9 Cosmicar lens, manual, £60. BW 11in tv monitor, £35. Sony HP511A radio record player, pair 10in spkrs/cabinets, manuals, exc cond, £80. Tel Bulls Green (Welwyn, Herts) 219.

FT101E hf tx/rx with cw filter, £315. Modular Electronics FM151 linear amp, ideal for TR2300 etc, £35. FDK Palm 4 6ch, 70cm handheld with 11 xtals, £125. Codar PR40 hf, preselector, £7. Buyer collects. G8KMV, QTHR. Tel 0438 54689.

70cm ssb Liner 430, 12 months old, mint cond, £125. Two 813s with bases, used but ok, £7. Pair 813 htr transformers, £5. Buyer arranges collection. G3UHP, QTHR. Tel Rugeley 3100.

IC240 with superscan, brackets, manual, £165. 16 ram chips type 4027, £25. Jingle machine, new, £90. Mullard high speed valve tester, 1,400 cards, £40. Rhythm box, £25. G3TGF, QTHR. Tel Orpington 26802.

Pair Burndept type 471 handheld tx/rxs with two spare nicads, charger, tx/rx 445-675MHz vhf, can be adapted three-channel, Burndept maintained perfect order, list price £470 each, will sell lot £250. Details, tel Manston (Kent) 368.

Trio 2400, £160. ST1 base stand fast charger, £35. SMC24 external spkr/mic, £11. SC3 soft carrying case, £7. 10W pa, 12V, 1W ip, £25. Pocket TRS/80 computer with cassette interface, amateur software available, £80. HF5V all-band vertical, £35. Jaybeam 144MHz slotfed 8/8, £10. STE Arac 102 28/144MHz all-mode rx, £65. KX2 atu, £15. Datong AD170 with psu, £20. All mint, ovno. *Wanted:* Datong vlf, Yaesu FT290R, Trio TR9000, Jaybeam X6/2M/X12/70, Datong FL2. G8IYK, 120 Birmingham Road, Redditch, Worcs. Tel 64885.

Icom 211E 2m multimode, immac, orig packing, £500 ono. G8THU, QTHR. Tel 0282 812248.

TR2400 with spare set nicads, £165. IC260E, used little, £300. All in orig packing. G3XHY, QTHR. Tel 0632-679106.

Pye FM10D 2m tx/rx, toneburst, £50. Liner 2, as new, clean tx, rx preamp, £75. ITT 70cm Starfone, £80. All good order and ono. G3TXA, QTHR. Tel 01-882 5292, evenings etc.

70cm Electronic Developments basic linear, fitted blower antenna relay heater, transformer, anode meter, £70. Sentinel auto preamp, £15. PBM18/70cm Parabeam, £12. Buyers inspect and collect. G3ARU, QTHR. Tel 01-989 3196, after 6pm.

Catronics 500MHz prescaler, £15. 12·6V, 2·5A stabilized psu, £10. Heath HD1234 coaxial switch, £5. Hi-mound mechanical bug key, £3. Buyers inspect and collect. G3ARU, QTHR. Tel 01-989 3196, after 6pm.

144MHz linear amp, single 4CX250B, SK600 base, self-contained power supply, £150 or offers. G4HDF, 26 Haydn Road, Basingstoke, Hants. Tel 0256 79 2282.

Icom IC215 2m fm, exc cond, 14 channels, fitted large nicads, built-in 12V charger, helical whip, £99 ono. Matching power supply incl built-in spkr also available. G8PJQ, QTHR. Tel Mr Cole, 01-432 1730, day, 05827 68783, home.

Sommerkamp TS310DX, 10m, fb rig, worked VK mobile, £120. FRG7000, mint, £195. Brand new, unused Bird Termaline power meter, TS118A/AP, 20MHz-1·4GHz, 500W, £95. Airmec 210A modulation meter, am/fm 3-300MHz, £70. Pye Olympic 12 channel, unmodified, £90. F9UHF base, ditto, £95. G3PIZ. Tel Caterham 47892.

KW Atlanta vox vfo, mic, exc cond, £240. Trio 7010, orig packing, never used mobile, £130. Cambridge dash mount, exc, four channels, S20, 145·8, R3, R5, £45. Prefer buyer collects, G3OLZ. Tel 0287 40681.

FT101 Mk2, FV101, SP101, 3LLL clipper, cw filter, fan, spare valves, £375 ono. Buyer collects. Ham 2 rotator, £85 plus carriage. *Wanted:* Prop-pitch motor. Sherwood 125cs filter for R4C. Desyn txs and indicators. G3FPQ, QTHR. Tel 0420 23168.

MMT144/28 transverter, £65. G4IZH, QTHR. Tel 0632 567780.

Trio TS520S, fitted with cw filter, spkr, handbook, perfect cond, £325. Heathkit gdo with handbook, case, all coils, £15. GM4JEM, QTHR. Tel 031-661 4429.

Yaesu FT480R 2m multimode, exc cond, used only as base station briefly since operator more interested in portable operation, still under orig guarantee, £280. Several additional items also available. G6AUO. Tel 021-429 8376, after 6pm, weekdays.

Trio 9R59DS rx, £50. Codar PR40 preselector, £10. Prefer buyer inspects and collects. A. W. Lawrence, Leggatts Park, Potters Bar, Herts EN6 1NZ.

Racal 98A isb adaptor, mint cond, £40 or would exchange for a copy of Admiralty Handbook BR1771. Tel Watford (0923) 36986.

FT207, charger, spkr/mic, used little, £130. Buyer collects. Tel 021-429 6783.

FT227RB scanning 2m tx/rx, £180. FP12 psu, 12A, £50. Sentinel SEM power amp/preamp, 50W, £40. Books, Acorn Atom computer, write for list. G4JNW, 63 Hoxton Road, Scarborough, North Yorkshire. Tel Scarborough 69576.

IC2E, new, boxed, extra battery pack, hardly used, house move forces sale, £150 ono. FT227R with mods, £150 ono. G4BSK, QTHR.

FT901DM, fitted every extra, YD148 desk mic, SP901 spkr, immac, £550. FV901DM scanning vfo, 40ch memory, unmarked, superb, £160. Matching FC902 antenna coupler, unused, mint, £90. Genuine reason for reluctant sale. Delivery negotiable. G3XTN, QTHR. Tel Ron, 0926 56862.

Stephen-James multi-tuner Mk2, brand new but surplus to requirements, £28 ono. Ex-Army R107 rx in wkg cond, buyer collects, £15. Tel 0508-470273, after 6pm.

Ex-RAF ground station morse key, all brass, completely enclosed, mint, £16. Solid-state psu transformer, mains input, sec 14V 6-10A continuous duty, oil-cooled, Parmeko type, new, unused, £9 plus postage. HRO spares, coils, i.fs etc, sae list. MMT28/144, new, £80. G3GUU, QTHR.

International 4600 music synth, four-oct keyboard, 4xVCO etc, integral patchboard to equalizer and output, most suitable multitrack recording, £500 ono. Brian King, G3SGK, NOT QTHR. Tel Haddenham 291280.

Blaupunkt 'Frankfurt' car radio sw/mw/lw/vhf, exc cond, £65. 1940 universal wavemeter (collector's item), £10. R209 Mk2, rx, £20. Old German rx c1939, £8. Wavemeter TF975, comp, £6. B2 tx/rx, £40 ono. Canadian 29 set, £15. G3UCT. Tel Fleet (02514) 6998.

TR2300, VB2300, mobile mount, helical, nicads, charger, used little, in orig boxes, £175. HF5 trap vertical, used for brief tests only, £35. Buyer collects or pays carriage. G3RFI, QTHR. Tel Potton (0767) 260800.

MMT144/28 transverter, £50. Creed 6S6 tape sender, £10. Gresham Lion 7V 2A psu, set to 5V, fully regulated, £10. All in exc cond, buyers to collect. G4FLY, QTHR. Tel 0734 594495, after 6pm.

Wolfsen 1200 2m 12 channel scanning monitor rx with vfo, orig packing, vgc, £35. Tel Dave, 0632 402997, after 6pm.

FT707, ideal hf mobile or base station, £419 (new £529). Matching units: FC707 atu, £59 (new £81); FP707 psu, £79 (new £109); FV707 remote vfo with scanning and 12 channel memory, £139 (new £186); MM82 mobile mounting bracket, £9 (new £16); YM35 scanning mic, £9 (new £13); Selecta deluxe G-whip system with coils for 10, 15, 20, 40 and 80m, £35 (new £50). All units in superb cond, boxed, manuals, etc. Further reduction for sale of comp station. G4HHR, QTHR. Tel Thanet (0843) 42930, evenings, 01-460 6618, daytime.

Late G3AKW: FDK Multi 700X 2m fm synthesized, pll new April, £155 or realistic offer. New QQVO640A and QQVO320B, offers. Will deliver FDK free Merseyside. G3UJX, QTHR. Tel Wirral (051-677) 1518.

Trio TR7200G, S0, S20-23, R3-7, £98. Icom IC211E, £350. Part exchange five-band hf vertical considered. GW4GOQ. Tel Caldicot (0291) 423918 or Kenfig Hill (0656) 743262.

Nascom 2 computer, fully cased, toolkit, Naspen, Nasdis, zeap, games etc, fully documented, £500. Nascom imp printer, bargain at £200. Any demonstration. G4FMD, QTHR. Tel Great Dunmow (0371) 3119.

Creed 54 teleprinter, comp with integral perforator, silence cover, loop supply, all ac/mains perfect, £40. Creed 7E, exactly as above, suitable for cheap hard copy for microcomputer, info available, £35. Creed 6S6 tape reader plus spare head, £10. TR1985 vhf aircraft tx/rx, with manual, no xtals, £10. Ferrograph 4A professional mono reel tape recorder, £35. Will exchange any above for rx, wkg or faulty, cash adjustment either way. Bentley, 27 De Vere Gardens, Ilford, Essex. Tel 01-554 6631.

Standard C146A with nicads, charger and helical whip, £75. G4FAZ NOT QTHR. Tel Yeovil (0935) 29003.

TS770E, immac cond, boxed, used little, £600. G8WVV. Tel Cambridge (0223) 314855, day, 51544, evenings.

IC720, £565. MMT144/28 transverter, £65. Pye U450L with rtc, RB4, RB14, £45. RTTY vdu, £100. ASCII vdu, £55. Several telephones: 746, £5; 706, £3. FDK Multi-U11, £110. Music synthesizer Transcendent 2000, £95. OS1 minifloppy computer, £575. G8VLJ, QTHR. Tel Mobberley 2452.

Yaesu FL101, FR101 processor fitted, matching spkr, spare valves, convertible to new bands, £550. Yaesu FV250 2m transverter, £70. Trio AT200 atu, £45. Mirage B3016 150W amp/preamp, £90. Ringo Ranger, £12. G3VEZ, QTHR. Tel 0202 425044, after 5pm.

New valves: QQVO640, £9; 4X150, £13; 6CH6 (for KW2000), £3.50. 4m fm handheld Ultra with nicad, £24. Working 10X new Siemens t/p relays, £10. *Wanted:* 6146B. For more details contact G3SLI, QTHR. Tel Reading (0734) 479850.

Eddystone 880/2, professional high stability rx, 0·5-30MHz in 1MHz bands, ssb/cw/a.m., filters, handbook, spkr, exc cond, £195 ono. 100kHz xtals, new, £2 each. G3PGN, QTHR. Tel Blackmore (0277) 822891.

FT250, FP250, Shure 444 mic, as new, £200, collected. G3UUZ, The Lighthouse, Pendeen, Penzance. Tel 0736 788418.

Trio TS700G, 2m multimode, mains or 12V, manual, preamp, piptone, £260. G8PYB, QTHR. Tel 0553 86306.

Panda Explorer, £15. KW lp filter, new, £10. New mic, £4. TF144, £4. New bug key, £5. EK9X keyer, £5. Cowl gill motor with power pack, £25. CT432 calibrator, £12. Many other items, buyers collect. G3IPM, QTHR.

Icom 240 2m, mic, vgc, Birch scanner model 240, will also scan 70cm with MM transverter, £135. G6AUW. Tel Weymouth 786930.

FRG7, good condition, no mods, £100. G6BBE, QTHR. Tel 0482 881613.

FDK Multi 11, 2m fm mobile, 18W, R1, R3-7, S16-17, S19-23, toneburst, £100. G8CCV. Tel Mick, 0908 316052.

Nelson-Jones stereo fm tuner, six pre-set push-buttons, mosfets, varicap diode tuning, perfect, £14. G8KW trap dipole, traps, centre insulator, orig data sheet, £5. Both postage extra. GM3GNM, Eastferry, Dunkeld, Perths. Tel 03502 590.

TS520S, DG5 digital display, MC50 matching microphone, pair 6146Bs, mint cond, £425. G4MAQ, Flat 2, Lister House, Lister Road, Margate CT9 4AE. Tel 0843 294656.

HW7 QRP tx/rx £35. G4GMA, QTHR. Tel Kidderminster 515405.

Complete fixed/mobile station: IC240 with mic, mobile mount bracket, handbook; ZL Super Slim-Jim 2m ant; PX402 mains psu, 13·8V dc 3-4A regulated output. All new January 81, mint, £185. Tel Bath area (0373) 64694.

ASR33 teletype, as new, full service handbooks, tapes, rolls etc, £375. FTV250, £95. IC22, mobile bracket, S0, S20-23, R3, R7, £80. Pump-up mast, 30ft, £75. *Wanted:* 2m multimode. G4FYY, QTHR. Tel Crawley 514788.

Drake R4C rx with matching spkr, as new, £200. BRT402K rx, offers. Marine vhf handheld, new, in box. RCA 16mm film projector, offers or exchange for hf gear. Tandberg tape language lab recorder, £50. G3DVF, QTHR. Tel Alnwick 602487.

Liner 2 with mains psu, £50. G3WWH, QTHR.

KW2000B psu, mic, 10-160m ssb, 6146B pa, £210. Datong rg speech processor, £25. HRO, eight coils, 6 bs, £25. G3ZBC, QTHR. Tel Northampton (0604) 51422, after 6pm.

CW rtty keyboard, £100. FT75 with dc/ac power supply, £90. AR88 rx, perfect, £50. Buyer to collect, or would swop the lot for a good FT101E. Tel Nottingham 257396.

Drake R4A MS4 with G8KW dipole joystick, Joymatch atu, £140 ono. Could split. Chris Lee, 315 High Road, Chadwell Heath, Romford, Essex. Tel 01-734 5491, or 01-597 7740.

FR50B Yaesu communications rx, top band, manual, vgc, £68. Buyer collects or carriage extra. *Wanted:* Trio 9R59DS in first class cond, no mods. G3FK, 9 Forest Road, West Moors, Wimborne, Dorset BH22 0EU. Tel 0202 873175.

TC630 professional tape recorder, amp, spkrs, (Sony), immac, £225. Creed 75, 50/75 baud, 45·5 gear, spare keyboard, £40. DX32, vgc, £70. AKG K240 headphones, mint, £28. part-exchange above for scope, Datong asp clipper, rx, transverter, or w.h.y.? Jackman, 26 Parkdale, Wolverhampton. Tel 25324.

C4 tri-band vertical dipole, £30. Lafayette HA63A gen cov rx, not wkg, some spare valves, £30. Partridge swl atu, £5. Codar PR40 pre-selector, £10. All ono. Buyer collects. GI4CUV, QTHR. Tel Belfast 776615.

100W linear with preamp MML144/100P, £99. Trio TR2400, £145. Jaybeam 2m glassfibre colinear, £32. All new this year with orig packing. *Wanted: QST* and *Ham Radio* backnumbers. G8ZPC. Tel Holmes Chapel (0606) 33011 (near Manchester).

Western DX5V five-band vertical, 80-10m, £40 ono. G3RVM, ultimate keyer, £10. Burns SP1 speech processor board, £4. Catronics RATG1 repeater access tone generator board, £2. G4HHR. Tel Thanet (0843) 42930, evenings, 01-460 6618, daytime.

FT101 Mk2, 160-10m, 600Hz cw filter, fan, little hf use on tx, comp with mic, manual, ac/dc power leads, £290. G3TQF, QTHR. Tel Leicester 394873.

RTTY complete system: 7B, silence cover; 65S6 reader; 7TR3 punch; control unit, psus; FSY1·1 tu (old tones, can modify); CRM3 tuning monitor, circuits, some spares, £60 ono. 85R printing reperf, £15. All excellent cond. G8JUG, QTHR. Tel 07373 50040.

TR2300, nicads, charger, reverse repeater, handbook, boxed, new 5λ/8 mobile mag mount, £160 ono. Codar AT5 tx, Pye desk mic, new. Two Pye Europas, high band fm, cw mic/power lead, handbook, tuned 144-146MHz. All offers. Tel Durham 45750.

Eddystone EA12, hf amateur bands rx in good cond, £120. G8VIB, QTHR. Tel 0670 817539.

AR30 rotator and control unit, D8/2m 8-over-8 2m beam, new August '80, £45. G2FLB, QTHR. Tel 01-467 1078.

Heathkit SB104A kit, recently completed, used 4h only, cost £800, will accept £400 ono. Trio 9R59D, mint cond, £40. Lafayette model HA230, needs a little attention, £25. Buyer collects or carriage extra. GW3KYT, QTHR. Tel Colwyn Bay 55156.

FT101Z 250cs filter fan etc, superb cond, £400. Buyer collects. Tel 0474 534694, evenings.

Yaesu FT101 Mk2, mic, fan, immac, orig packing, £300. Spare valves, £10. SP101, £15. Hammarlund SP600 rx, £95. Datong rf clipper, £35. Glassfibre 2m 5/8 whip with no-hole boot mount, £10. G3VOW, QTHR. Tel 0635 43048.

IC22A, 23 available channels, fitted with eight repeaters, auto toneburst, four simplex, best offer near £110. TS700 vfo and fully rocked, £265. G3MTX, QTHR. Tel 0424 210177.

TR9000, £300. IC2E, £145. FT227R, 143-150MHz, scanner, £165. Multi U11, £130. Swan 100MX, £270. General Electric 10m ssb mobile, £100. Yamaha B35 electronic organ, £600. G4JQP, QTHR. Tel 0761 34216.

Liner 2, exc cond, orig packing, spare bulbs and fuses, optional xtal alters coverage to 144·15-144·33, plus 144·39-144·42, fitted mosfet preamp, £90 ono. Tel 05432 23608, evenings.

FT7B, 100W, used little, not fitted mobile, as new, £300. ATU, £15. SWR bridge, £9. Hustler mobile antenna with coils, 10-80m, £60. G2DTS, QTHR. Tel 0285 72489.

Lowrey TLOR electronic organ, 16, 8, 4 and 2·66 stops, Leslie spkr, AOC wah-wah, reverberating rhythm, etc, £550. G8CIA, QTHR.

TS700G, fitted piptone, mint, £275. IC255E, 25W mobile fm tx/rx, scan, mic, mint, £185. IC215 3W fm portable, nicads, charger, exc cond, £85. Data Dynamics ASR33 teletype printer, in good wkg order, offers. G4JXU, QTHR. Tel Basingstoke 28241.

TR9000 2m multimode, eight months old, vgc, £295, no offers. 2m mag mount with 5λ/8 and λ/4 whips, £10. Also 7λ/8 gutter mount and cable, comp, £15. G8WTI. QTHR. Tel Bracknell 50831.

15MHz dual beam portable scope with variable delay, SE Labs EM102 mains or battery supply, perfect mechanical and electrical cond, handbook, £180. G3VXZ, QTHR. Tel Maidenhead 27350.

Yaesu FT225RD, as new, no mods, orig packing, £450. G8UEG, QTHR. Tel Leeds (0532) 821020, evenings.

SB101, HP23A, SB600, nice cond, used little, re-valved, £180 ono. G3OBP. Tel 04747 2645.

Racal RA17L rx, good cond, £200. GEC RC411 solid-state rx, synthesized 10kHz-30MHz in 100Hz steps, usb lsb, etc, £350. Both with handbooks. Sensible offers considered. Tel 01-567 8771, after 6pm.

UK101 rtty software, receive and transmit, message store etc, £6.25. QTH distance calculator, bearing etc, £2.95, or swap other programs hardware, w.h.y.? Anyone interested in an informal user group/net? G4HHT, QTHR. Tel Coventry 610408.

Drake R4C serial 23324, comp with six additional xtals incl 29/30MHz, unmodified, in exc cond, £280 ono. G8KFR. Tel Cambridge 842223.

Datong D70 morse tutor, orig packing, learn at your own speed, £40 ono. Tel Wolverhampton (0902) 764214.

TR7 owners, new bands plus any five other segments, easily changeable with matrix board, please write for details. Collins filters F455FC60, £5. F455Z5, F455Z7, used, £10. XF9E, new, £10. Xtals: HC6U, used, 455, £1; 7·705; 6·312; 6·354; 4·022; 10·968; 50p. Roller coasters, ex-Collins pa ccts, marked 9·0-15, 5·5-9·0, 3·3-5·5MHz, make 100W atu or trap coils, GI, EI only, Mullard L271, L270, L333 vhf set, offers. Coils, £2 pair, good quantity discount. G4HPI, QTHR. Tel 0604 864284.

Yaesu FR50B rx, exc cond, 10-80m, 160m 2m a.m./ssb, built-in spkr, manual, £95 ono. Buyer collects. *Wanted:* Holdings clipper for FT200. Circuit diagram for Pye Olympic. GM4GIL, QTHR. Tel 032481 4269.

50ft free standing lattice tower in five sections, comp with guys, guy anchors, rotator shaft-driven from base mounted motor, direction indicator, £65. Buyer collects. *Wanted:* Vibrokeyer, single paddle for electronic keyer. G4IDL, QTHR. Tel Rotherham (0709) 874100.

FT101E, mint cond, fitted cw filter, manual, orig packing, £350. Eagle swr meter, £8. Joymatch atu Z500, £4. G4GKN, QTHR Bristol area. Tel 0761 52461, day, 0272 833572, evenings.

FT480R 2m multimode, good cond, under guarantee, £290 ono. Trio TR7010 2m ssb/cw tx/rx (base or mobile) bracket, £125. G6ARA. Tel Worcester (0905) 423723, evenings or weekends.

Yaesu FT202R, six channel handy talky, NC1 fast charger, nicads, new, unused, £95. Ascot 5λ/8 whip, sprung mount, glass fibre base, blank-off, £8. Postage extra. Tel 0747 840138.

Drake SPR4 xtal, programmable communications rx, fitted with marine and amateur band xtals, £150. G8YUF. Tel Kevin, Brayford (N Devon) (05988) 612.

Morse key, Air Ministry type F, £3. Army No 9 key, £3. BBC 69 handbook, £2. Pye early signal generator with 2V valve, collectors item, un-tested, £5. KW2000 three gang preselector tuning condenser, £3. G3MBL, QTHR. Tel 01-445 4321.

IC202E, mint cond, £120 ono. 25W homebrew linear 2m, BF900 preamp and RS coaxial relays, £35. Power supplies: 228V 2A, £20; 12V 1·5A, £20. Speech processor, *PW* design, in case, £10. G8PPE, QTHR. Tel 4526, after 6pm or weekends.

Sommerkamp FT767, FP767, FC767, comp base, mobile station, £560 ono. Tel Conway 2447.

FT227R 2m fm tx/rx, good cond, 5λ/8 mag mount, mains psu, £145. Will separate. G8IJG. Tel Reading 882170.

Icom IC255E fm 25W tx/rx, mobile, orig packing, mint cond, £195. G8PZU, QTHR. Tel Nelson 62977, office hours.

Trio 2400 144/148MHz, quick base charger, spkr mic, leather case, etc, cost new £280, accept £220. Trio desk mic, £20. All as new. Will take part exchange. G4JKP. Tel Russ, Leicester (0533) 899958.

FRG7, fine tune, £135. Datong morse tutor, £37. G3HSC morse records (set of three), £2.50. RSGB stage 1 cassette, £2. All items as new. Buyer collects or pays carriage. G4LVP (ex-G8SJH), QTHR. Tel Hitchin 58728.

FT901DM comp with 12V leads, handbook, manual etc, no mods, still under guarantee, as new, in orig packing, £600 ovno. Buyer tests and collects or delivery by Securicor arranged at cost. G3LPA, QTHR. Tel Kettering 760336, evenings.

TS520SE, immac cond, no mods, used little, £385. Matching AT200 atu, £70. Matching SP520 spkr, £15. All mint, orig packing. G4GGN, QTHR. South Birmingham. Tel 021-705 0759.

Colour television, homebrew, per *Television* 1972. ECL1043, Pye 697, i.f. decoder, aligned, spare lopt, PY500, PL509, PCF802, Mazda A66120X, good emission, mains isolated, attractive cabinet on shepherd castors, wkg full data, offers around £50. *Wanted:* Small rotator. G3XKA, QTHR. Tel Woking 73620.

FT227RB, unmodified, perfect cond, mobile mount etc, orig packing, G3EWU modification thrown in, unadded as no time, £190 ono. TR7010 ssb/cw tx/rx, exc cond, mobile mount etc, orig packing, £130 ono, going multimode. G8TYA, QTHR Gloucester. Tel 045385 2226.

Yaesu 902DM and FC902 atu, never used, four weeks old, £750. Tel Derby 557705.

Europa 2m transverter, £45, incl carriage for UK. AR88D, faulty bfo unit and on/off switch, hence price £30. Buyer collects. IC240, vgc, boxed, manual, £125. Prefer buyer inspects and collects. G3ZXZ NOT QTHR. Tel Wakefield 279110.

Trio 2200GX, R2-7, S20-22, nicads, charger, accessories, in orig packing, £110 ono. 18AVT/WB, wkg but needs renovation, £20 incl radials. G3WGN, QTHR. Tel Wakefield 0924 863456.

Icom IC202S, nicads, charger, case, as new, used less than 3h since September 1980, for quick sale, hence £135. G8PPM, QTHR. Tel Chris, Worthing (0903) 38309, evenings/weekends, or 01-760 7182 during office hours.

Yaesu FT107M six-band, FP107E power supply, mic, manual, £625, no offers. Buyer collects. G3WYU, QTHR. Tel Ramsgate (0843) 587548.

KDK2025, 2m, only 4h use, £170 ono. 12-el ZL-Special, £20 ono. SMC colinear, £15 ono. All first class. All items can be seen and tried before purchase. GI6BGF. Tel Dick, Glengormley 3463, evenings.

Electronic organ, Yamaha 4B, two manuals, base

pedals, stool, exc cond, £180 ono. BC221AK, mains psu, charts, £20 ono. Would swap for hf tx/rx, or matched pair. G3XHC. Tel Dartmouth (Devon) 3621, after 5pm.

FT101Z fan, YD148, mic, Hansen FS601M meter, £425 ono. FT7, comp with FL110 100W amplifier, mic, headphones, FC707 atu, all comp with handbooks, orig packing, £385 ono. Going 70cm. G8TGA, QTHR. Tel 0703 864456.

Icom IC210 2m fm tx/rx, 10W, vfo, mains psu built-in, auto toneburst, £150. Tel Peter, Stevenage (0438) 50507, evenings.

290-0-290 at 0·2A, 4V, 2A, 6·3V, 6·2A; 445–0–445, current unknown but huge; 415–0–415 at 0·36A, all normal mains input, fully screened, all £5 each plus carriage. G4ERA, QTHR.

WANTED

VFO for multi Quartz-16 with 600kHz repeater shift. Mark Wilson, 97 Rosepark, Donaghadee, Co Down, N Ireland BT21 0BN. Tel 0247 888113.

KW Atlanta remote VFO4A, non-wkg example acceptable if clean and complete. GW4JPC, QTHR. Tel Gareth, 0792-896815.

Creed 444 in good cond, preferably with gears for 45·45 bauds, Wixon, 34 Lime Road, Hanham, Bristol BS15 3AR. Tel 0272 601576.

Bulletins prior to 1940. *Handbook* edition three and earlier. G4HUE, QTHR. Tel 01-554 0399.

Europa transverter, 4m version, 2m multimode, prefer TS700S, Dentron AT1K or similar atu, Hygain BN86 balun, G3GHB, QTHR. Tel 0386-792582, after 6.30pm.

D33 Telequipment scope manual, GEC tube, LD924E, Advance counter manual, TMC1, Venner counter manual TSA/3336/1, Racal counter manual 815R, Racal 5MHz xtal. D. Griggs, 5 Collingwood Avenue, Muswell Hill, London N10. Tel 01-883 3474.

Telescopic tower, beam and ancillary equipment, P60 or similar, must be in good cond. G3FEV. Tel Rossendale 220904.

For the wireless museum—old radio books, magazines, catalogues, QSL cards. Special request for Gamages catalogue of early 'twenties. Collection arranged. Details please to hon curator G3KPO, QTHR. Tel Ryde 62513.

KW107 E-Zee Match, KW108 monitorscope, KW low pass filter, must be in good cond. G4AXU, QTHR. Tel 0635 64001.

National HRO loudspkr output transformer. G2VF, QTHR. Tel Southampton 775064.

Noise blanker for Drake 2C rx. Drake 2NT cw tx. G3VTT, QTHR. Tel 0622 39936, after 6pm.

HRO power supply type 697, 230V using type 80 valve and HRO loudspkr type MCS. G2VF, QTHR. Tel Southampton 775064.

Any Collins TCS equipment, tx, rx, pu, atu, control unit, cables, or plugs alone, prefer unmodified but anything considered. SX28 rx — well above average price offered for good one. BC221, comp with charts, psu, any original handbooks for ex-service rxs and txs. S.A. Wright, G4LBY, 22 Crown Street, Mansfield, Notts NG18 3JL. Tel Mansfield 29473, evenings or weekends.

Codar PR40 preselector or similar. Tel Keith, 01-290 5827, evenings.

Versatower P40 or equiv. Ham 2 rotator or similar. Hygain TH3 Mk3. G3TBF NOT QTHR. Tel 045 3824853.

Pye W15U uhf tx/rx, boot or dash mount, pref no mods, good price paid. Would consider complete uhf system incl base station. Clews, G4HDQ, QTHR. Tel 0902 790541 or Standeford (0902) 790819.

Codar preselector, battery model preferred. Tel 0292 42526, evenings/weekends only.

Codar PR40 preselector, any information, circuit diagram, manual, etc, to photocopy, postage refunded. M.J. Ganley, 4 Walnut Grove, Trowbridge, Wilts BA14 0HR.

Power supply unit, wkg or otherwise and service manual for Tektronic oscilloscope type 555. Collection arranged. G8CQP NOT QTHR. Tel 061-834 2286, during office hours.

Kokusai filter MF45515CK or 10CK. Collins F455-FA-21 or H31. Brush TL2D5A, any sideband xtals. BC453-4-5. 898 or similar dial. SWL. 45 Chanel Road, Artane, Dublin 5.

Sketch of earthing straps and leads on tuning gang of Eddystone 940. *For sale:* Eagle RX80 shortwave rx, sensitive, selective, £35. Tel Lindars, 01-647 6157.

Creed 444 gear wheels to convert speed to 45·45 bauds. GI4GUH, QTHR. Tel Banbridge 27496.

DVM/RVM with rf probe. GM3UCI, QTHR.

Any TW (Withers) equipment, ie two mobile. Also literature or circuits. *For sale:* MM rx converter type 432/144S, £25 ono. G4IIL, QTHR. Tel Brighton 607737.

Trio VFO30G for use with TR2200GX. Saunders, "Feldings", Church Road, Rotherfield, East Sussex.

Century 21 cw rig, 570E analogue model preferred. G3TSS, QTHR. Tel Corbridge (043 471) 3125.

Buy or borrow for copying—handbook for signal generator AP71115 CT378. G3ISD, QTHR. Tel Sittingbourne 77431.

HRO coil packs fgh 100 - 900kHz. GI4CRQ, QTHR. Tel 0232-644537.

Three Henry choke, tapped at 25 and 50 per cent, Varley DP18 or any make valve type L21, L2 or HL. Four pin valveholder. Tunnel diode IN3719. 500μH adjustable printed circuit inductor. Tel Upminster 21523.

Eddystone 358X (Navy B34) manual, loan or purchase. Expenses refunded. Withers, G3AIN, 12 Weston Court, Hull HU5 5NG.

KW E-Zee Match and KW2000A mobile dc psu. G8YLF, 43 Copse Avenue, West Wickham, Kent. Tel John, 01-777 2340.

HW101, HW100, SB series, KW2000A/B etc. Anything cheap by way of hf tx/rxs considered. Must be clean, fully functional and with psu. G4INP, QTHR. Tel 0728 830853.

Info on mod required to provide fm/a.m. facility on Bearcat 220FB rx. Please phone 0323 762252 and I'll ring you right back. Secondhand *DX Call Book* for Russian amateur unable to obtain one in USSR. G3MHF, QTHR.

Mains transformer, 240V input, approx 600/700-0-600/700V 250mA output. Few 807 valves. G3BRV, 49 Shorncliffe Crescent, Folkestone, Kent CT20 3PF. Tel Folkestone (0303) 55672.

Info on how to produce authentic black-crackle finish on restoring BC348, R1155 etc. Experimentor-built tv, using R1355/R3645 units, VCR97, or 62 unit, parts uncased, not wkg preferred. Postage refunded. GM8BFG, QTHR.

Trio antenna tuner unit AT200, SP520 or SP820, vfo 520S. DG5 digital readout. G4LVK. Tel Alan, 021-445 2088, after 6pm or Sundays.

Xtals, 10X, 10XAJ, FT241 to suit 10MHz band, ssb/cw transverter for top band, input 3·5–28MHz. Roger Basford, G3VKM, NOT QTHR. Tel Aldeby (050 277) (Norfolk) 622.

Ex-wd rx R206 Mk1 (*not* Mk2). Racal RA66 Panadaptor with RA17 mod unit, scruffy cond or us crt ok, provided complete. G8LIU, QTHR. Tel Uxbridge (0895) 30006.

FT75 with xtal exchange for the FT7. FT75 could be working or not? M Bulmer, G4FZS, Searchlight Workshop, Newhaven, East Sussex.

RXs BC348 type J, N or unmodified, cond or parts of BC348. Original manuals of BC348. Goods will be shipped to a given address in UK. Tony Velge, PO Box 100, Tilburg, Netherlands. Tel 010-3113634041, evenings.

Suitcase type tx/rxs, especially: type 3 Mk2, type A Mk2, type A Mk3, Mk119, Mk122, Mk128, Mk217, BP3, AP4, Paraset, rx Mk XV, rx 53 Mk1, tx 51/1, AR11. Orig manuals, any parts, broken or incomplete sets welcome. Racal RA117E, comp in good cond. G3UCT. Tel Fleet (02514) 6998.

TH2 Hygain or Mosley TA32 hf beam, Have HQ1 mini beam as part exchange if required. G3UAA, QTHR. Tel 0533 875241.

Marine vhf radio telephone. RTTY atv gear. LG300 tx, Cabinet for Racal RA17. G4HVK, QTHR. Tel 021-353 3896.

A case for Trio JR500S, scrap rx considered, needed to house matching homebrew tx. G8CIA, QTHR.

For ICL7181 vdu, handbook/info/circuits. Have several for sale. Adamson, Woodend, Victoria Road, Kingsdown, Deal, Kent CT14 8DY. Tel Deal 03045 3788.

RS Components catalogue, current issue (Jul-Oct). Workshop manual for Trio TS700. GW8IQC, QTHR. Tel Rhiwderin (0633-43) 4708.

Eddystone rx EC10 Mk2, consider Mk1, in good cond. Suitable 2m converter, another smaller rx for 160/80m ssb. Morris Minor van. G3OWB, QTHR.

Handbook for Admiralty B28 rx BR1430, pattern W2835D, or photocopies. Handbook for Bendix MN26C compass rx. Plastic logging scale for Hallicrafters S20 rx, or scrap rx. G3MBL, QTHR. Tel 01-445 4321.

Racal RA117E. Rotary psu for Canadian 52 set. 62 set. Type 3 Mk2, (B2) suitcase set tx/rx manual, spares box, key, phones, mains plug adaptors etc. *For sale:* Blaupunkt Frankfurt car radio sw/mw/lw/vhf, exc cond, £65. 1940 universal wavemeter, £10. G3UCT. Tel Fleet (02514) 6998.

Ultimate keyer, comp, or pcb with any parts. Bencher paddle, G4JQI, QTHR Whalley, Lancs.

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MS-7	Matching Speaker for TR-7 and R-7	29.90	2.00
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RTM-7	Range tcve. modules for Aux-7 (500kHz)	5.75	0.50
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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)	549.70	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
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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	24.15	1.50
MC35S	First microphone 50k impedance	13.80	1.00
MC30S	First microphone 500ohm impedance	13.80	1.00
LF30A	HF lowpass filter. 1kW rating.	18.40	1.00
RD300	1kW oilfilled dummy load	48.30	1.50
TS770E	2m/70cm all mode dual band transceiver. European repeater shifts	730.25	5.00
SP70	External speaker unit for all TS700 series	18.40	1.00
TR9000	2m synthesised multimode mobile/fixed station transceiver	345.00	5.00
PS20	AC power supply for TR9000	44.85	5.00
BO9	Base plinth for TR9000	32.20	5.00
TR7800	2m FM synthesised mobile/fixed station 25W transceiver	268.00	5.00
SP40	Mobile speaker unit for TR7800, TR9000 and TR8400.	26.89	1.50
RM76	Microprocessor control unit for TR7600/7625	60.95	1.50
TR2300	2m FM synthesised portable transceiver	166.75	5.00
VB2300	10W amplifier for TR2300	49.45	1.50
MB2	Mobile mount for TR2300 and VB2300	17.25	1.00
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	1.50
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	43.70	1.50
BC5	12V quick charger	17.25	1.50
SC3	Soft carrying case. Includes belt hook	11.50	0.50
LH1	Hard leather holster type case	18.50	0.50
PB24	Spare battery pack and charger lead	14.26	1.50
TR8400	70cm FM synthesised mobile transceiver. 430 440MHz	279.00	5.00
PS10	Base station power supply for TR8400	63.00	5.00
TR3200	70cm FM portable receiver. 3 channels fitted	164.45	5.00
PB10	Pack of 10 NiCad batteries for TR2300/3200/2200 series	10.35	0.50
PL1	Spare power/charge lead for TR2300/3200/2200 series	1.30	0.15
R1000	Synthesised 200kHz 30MHz receiver. Price includes dc kit fitted	285.20	5.00
SP100	External speaker unit—Matching aerial tuner. See KX2 in Mizuho section	26.45	1.50
HC10	Digital station world time clock	55.20	1.50
HS5	Deluxe headphones for all Trio equipment	21.85	0.75
HS4	Economy headphones	10.35	0.75
TS830S	160 10m transceiver with the new bands. Successor to the TS820	639.52	5.00
VFO230	Digital VFO with memories and digital readout	194.45	5.00
AT230	All band ATU and power meter. Matches TS830S	106.72	1.50
SP230	External speaker unit with switched filters	33.14	1.50
DS2	Optional dc pack for TS830S	39.90	1.50
DFC230	Digital frequency remote controller. Four memories, etc	163.13	1.50
*NB	The DFC 230 will drive the TS830/130 or TS120 series rigs		
YK88C	500Hz CW filter	26.45	0.50
YK88CN	270Hz CW filter	28.75	0.50
SM220	Station monitor scope	197.80	4.50
BS8	Panoramic display for TS830/180/820 series	48.30	0.50
BS5	Scan board as above for TS520 series	48.30	0.50
R820	The ultimate amateur band receiver	690.00	5.00
YG455C	500Hz CW filter	58.65	0.50
YG455CN	250Hz CW filter	60.95	0.50
YG88A	6kHz AM filter	34.50	0.50
TS180S	160 10m solid state transceiver. Digital memory system. 200W pep	679.65	5.00
VFO180	External VFO	96.60	1.50
SP180	External speaker unit with high and low pass filters	36.80	1.50
AT180	Matching 200W antenna tuner and powerful meter	95.45	5.00
YK88C	500Hz CW filter	26.45	0.50
YK88S	Second SSB filter option	26.45	0.50
PS30	AC power supply for TS180S.	85.10	5.00
TS130S	8 band 200W pep mobile transceiver	491.05	5.00
TS130V	8 band 20W pep mobile transceiver	404.34	5.00
DFC230	Digital frequency remote controller. Four memories etc	163.13	1.50
TS120V	80 10m 20W pep mobile transceiver	347.30	5.00
TL120	200W pep linear for TS120V	128.80	5.00
MB100	Mobile mount for TS120/130 series	17.25	1.00
YK88C	500Hz CW filter	26.45	0.50
YK88CN	270Hz CW filter	28.75	0.50
YK88SN	1·8kHz SSB filter	25.30	0.50
VFO120	External VFO	89.70	5.00
SP120	Base station external speaker unit	25.30	1.25
SP40	New mobile speaker unit	26.89	1.50
AT130	100W antenna tuner including new amateur bands	72.89	1.50
PS20	AC power supply for TS120/130V	44.85	5.00
PS30	AC power supply for TS120/130S	85.10	5.00
MA5	New Trio 5 band mobile aerial system. Absolutely complete.	74.75	5.00
TL922	160 10 metre 2kW linear. 3 500Z tubes included	595.75	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	20.70
PMH2/4M	2 way phasing harness for two 4m yagis	12.19
2 metre Antennas		
DC1/WB	Wide band discone (100-470MHz)	41.40
LR1/2M	Omnidirectional vertical gain colinear	24.15
C5/2M	5dB glass fibre colinear, omni-directional	44.27
5Y/2M	5 element golded dipole yagi with 1" boom	11.27
8Y/2M	8 element folded dipole yagi with 1" boom	14.49
10Y/2M	10 element folded dipole 'long yagi' with 1¼" boom and trombone support	31.05
PBM10/2M	10 element Parabeam with 1¼" boom and trombone support boom	36.80
PBM14/2M	14 element Parabeam with 1¼" boom and 45° braces	44.85
5XY/2M	Crossed 5 element yagi with 1¼" boom	22.77
8XY/2M	Crossed 8 element yagi with 1¼" boom	28.40
10XY/2M	Crossed 10 element yagi with 1¼" boom	37.72
X6/2M/X12/70cm	Dual band crossed yagi	38.52
PMH/2C	2 way phasing harness for circular polarisation	7.47
Q4/2M	4 element quad yagi	23.69
Q6/2M	6 element quad yagi	31.40
D5/2M	Double 5 slot-fed yagi with 1" booms	20.12
D8/2M	Double 8 slot-fed yagi with 1" booms	27.14
SVMK/2M	Mounting kit for vertical polarisation for 2 slot-fed yagis	7.24
UGP/2M	Unipole and ground plane	10.12
HO/2M	Mobile 'halo' head only	4.55
HM/2M	Mobile 'halo' with 24" mast	5.40
PMH2/2M	2 way phasing harness for two 2m aerials	9.89
PMH4/2M	4 way phasing harness for four 2m aerials	23.11
70cm Antennas		
C8/70cm	8dB glass fibre colinear, omnidirectional	50.02
D8/70cm	Double 8 slot-fed yagi with ¼" booms	20.70
PBM18/70cm	18 element Parabeam yagi with 1¼" boom	25.30
MBM48/70cm	48 element Multibeam yagi with trombone mounting	28.75
MBM88/70cm	88 element Multibeam yagi with trombone mounting	39.33
8XY/70cm	Crossed 8 element yagi complete with phasing harness and 'N' type connector	34.15
12XY/70cm	Crossed 12 element yagi complete with phasing harness and 'N' type connector	42.32
PMH2/70cm	2 way phasing harness for two 70cm yagis	8.51
PMH4/70cm	4 way phasing harness for four 70cm yagis	18.05
23cm Antennas		
D15/1296	Double 15 slot-fed yagi with 'N' type connector	34.04
PMH2/23cm	2 way phasing harness for two 23cm antennas	25.41
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
511	Heavy duty spring	11.84
499	Flush body mount	11.84
417	De luxe spring	9.02
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

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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	

We will let others make exhibitions of themselves but we shall be open through OCTOBER including the SATURDAY and SUNDAY of the LEICESTER EXHIBITION with many special offers and new products

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HF TRANSCEIVERS

IC730 200W	£574.00
IC2KL 500W linear	£799.00
IC2KLPS Power supply	£199.00

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	£37.00
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	See below
FP707 Power Supply	£109.00
FC707 ATU	£88.00
FU707DM VFO	£189.00
FT480R 2m Multimode	POA
FT290 2m Portable multimode	POA
FT207R 2m	POA
FT767DX Sommerkamp	£559.00
FT101ZD Sommerkamp all options	£649.00
FT277 Sommerkamp	£847.00

All Accessories available, including FV902, FC902, YP901P, YK901 POA

FT707 + FP707 PSU
£610.00

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

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C7800 70cm Mobile	£270.00
C78 70cm Portable	£209.00
C58 2m	£235.00

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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	£95.00

KENPRO

KR250	£44.00
KR400	POA
HAM IV	£145.00
CHANNEL MASTER 9502	£50.00
CN620 1·8–150MHz Pwr/swr	£52.00
CN2002 2·5 kW PEP auto ATU	£190.00

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**
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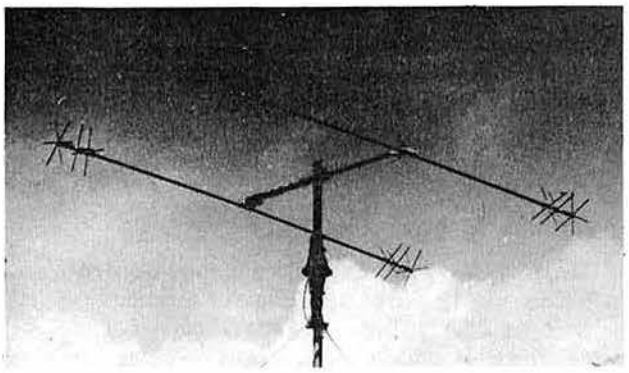

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MML144/100-S

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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

CONVERTERS

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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
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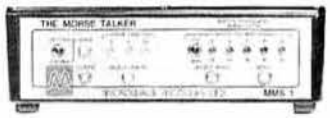
MMC1296/28:	23cm down to 10M	£32.20	A
MMK1296/144:	23cm down to 2m	£59.80	A



MM51

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

MMD050/500

LINEAR AMPLIFIERS

		Price inc VAT	Post Rate
MML28/100-S:	10m 100 watt/switchable preamp	T.B.A.	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

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MM4000:	RTTY transceiver	£269	B
MM4000KB:	RTTY transceiver + keyboard	£299	D
MMS1:	Speech synthesised morse tutor	£99	B

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
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MMS384:	384MHz frequency source	£27.60	A
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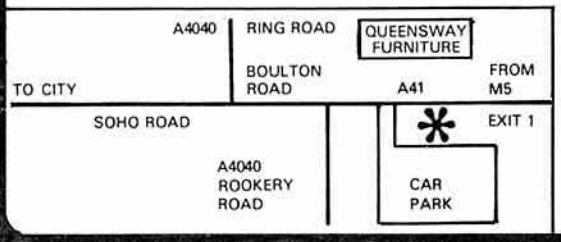

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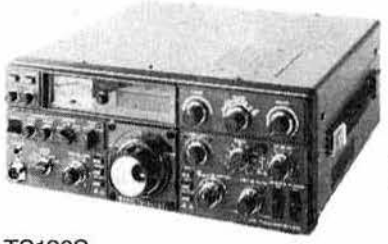

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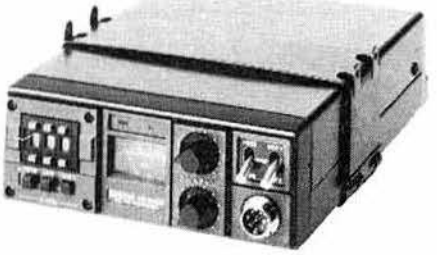

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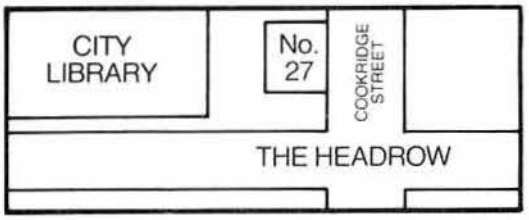

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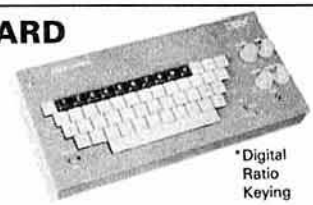

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144·4 (433·2)	b	e	b	e	e	b	e	e	e	e	e
144·480	e	e	e	e	e	e	e	e	e	e	e
144·800	c	e	e	e	e	c	c	c	c	c	e
144·850	e	e	e	e	e	e	e	e	e	e	e
145·000/ROT	a	c	a	c	c	b	b	b	a	a	c
145·025/R1T	a	c	a	e	e	b	e	b	e	e	e
145·055/R2T	a	c	a	e	e	b	e	b	e	e	e
145·975 R3T	a	c	a	e	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
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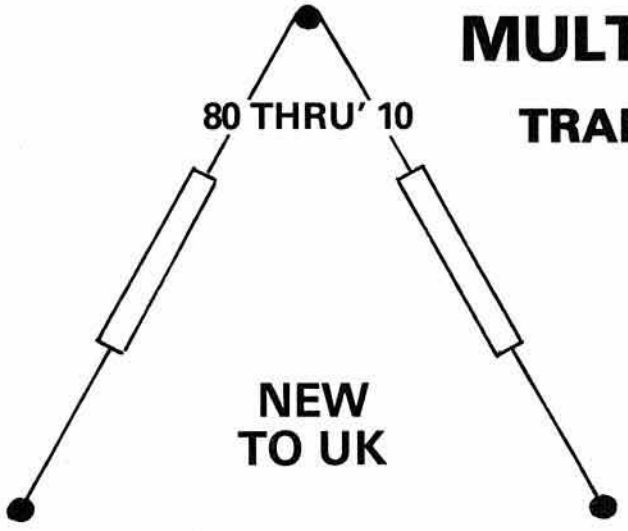

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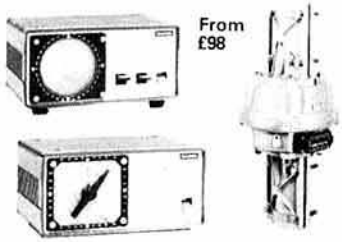

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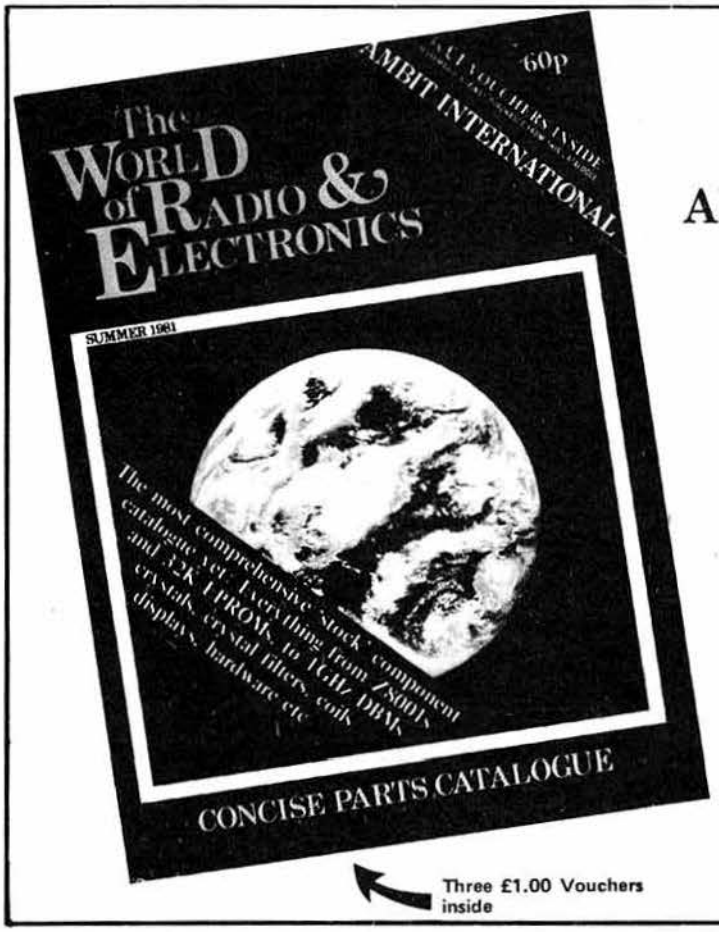

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The FT707 "The Wayfarer" is an ultra-compact solid-state transceiver ideally suited for the home station or as a travelling companion, providing performance previously proffered only by the "Top liners".

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The FT707 is THE radio of the eighties: 80, 40, 30, 20, 17, 15, 12, 10 metres—100W output (10W 'S' model) 50% developed in 3:1 VSWR—Digital, bright orange LEDs in mode sensitive counter plus analogue readout—Transceiver status at a glance from string LED and 5 single displays—16 poles of crystal filtering provides continuously adjustable IF bandwidth 2·4kHz to 300Hz (N.B. This is true "variable bandwidth" that minimises much of the adjacent channel interference not "IF shift")—Noise blanker of most advanced design using local AGC loop—Schottky diode ring module, power transistor buffers, ultra clean and low noise local oscillator are all combined to produce, size and price notwithstanding a most remarkable receiver.

The illustration to the left shows part of the FT707 System, here neatly mounted in the MR7 rack unit along with a YM35 fist microphone with scanning controls. Alternatively there are two other 600 ohm fist mics, the noise cancelling YM36 or the larger YM37 and the choice of two 50K/600 ohm swan neck desk mics, the standard YM34 or the scanning YM38.

The FC707 ATU can match loads from 10 to 250 ohms into 50 ohms. An accurate illuminated power meter (15 and 150W FSD) and SWR bridge (to 5:1) plus an inbuilt 150W dummy load complete this attractive package.

The FP707 20 amp supply with inbuilt loudspeaker permits operation from 100-117/200-234V 50/60Hz of the FT707 (illustrated under).

The FV707DM is an external digital VFO that uses an advanced twin loop PLL to provide 10Hz tuning steps with excellent spectral purity. The addition of this 1" high package, with its 12 channels of memory with Receiver independent tune and internal/external (mic), up/down, fast/slow scanning, perfects the FT707 for mobile or contest use.

The FTV707R transvertor (not shown) is the latest addition to the 707 system. This main frame takes any one of the standard transvertors for 6, 4, 2 or 70cms.

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