RADio COMmunication

JULY 1985

1925 1985

DIAMOND JUBILEE OF THE

Journal of the Radio Society of Great Britain

Amcomm of London

CALL NOW FOR THE LATEST PRICES

2 YEAR GUARANTEE on MANY PRODUCTS

01-422 9585 FOR FAST DELIVERY

Yaesu

FT1 HF Transceiver	P.O.A.
FT980 HF Transceiver	1475.00
SP980 Speaker	64.40
FT77 Mobile HF Transceiver	479.00
FP700 PSU	145.00
FC700 Tuner	105.00
FMU77 FM Board for FT77	28.35
GXFT757 HF Transceiver	759.00
FC757 Auto A.T.U.	245.00
FP757HD Heavy Duty PSU	179.00
FP757GX Switched Mode PSU	140.00
FT290 2m M/Mode Port/Transceiver	329.00
FT290 With Mutek front end fitted	359.00
MMB11 Mobile Bracket	28.75
NC11 Charger	10.75
CSC1 Carrying Case	4.60
YHA15 2m Helical	5.75
YHA44D 70cm ½wave	9.95
YM49 Speaker Mike	20.30
FT230 2m 25w FM	269.00
FT730 70cm 10w. FM	239.00
MMB15 Mobile Bracket	14.55
FT203R NEW 2m H/Held/C/W FNB3	185.00
FT209R NEW 2m H/Held/C/W FNB3	239.00
FT208 2m H/Held	209.00
FT708 70cm H/Held	189.00
MMB10 Mobile Bracket	8.80
NC9C Charger	9.60
NC8 Base/station Charger	56.75
PA3 Car Adaptor/Charger	16.85
FNB2 Spare Battery Pack	23.00
YM24A Speaker Mike	23.75
FT726R 2m Base Station	839.00
430/726 70cm Module for above	270.00
MH1B8 Hand 600 8pin mic	16.85
MD1B8 Desk 600 8pin mic	64.40
MF1A3B Boom mobile mic	19.95
YH77 Lightweight phones	14.95
YH55 Padded phones	14.95
YH1 L/weight Mobile H/set-Boom mic	14.95
SB1 PTT Switch Box 208/708	17.25
SB2 PTT Switch Box 290/790	14.55
QTR24D World Time Clock	34.50
FF501DX Low Pass Filter	29.90
YP150 Wattmeter/Dummy Load 150W	97.75
NEW MODELS	
FRG8800 HF Receiver	P.O.A.
FRV8800 Convertor 118-175 for above	P.O.A.
FT703 70cm H/Held	P.O.A.
FT709 70cm H/Held	P.O.A.
FT270R 2m 25W F.M.	P.O.A.
FT270RH 2m 45W F.M.	P.O.A.
FT2700R 2m/70cm/25W/25W	P.O.A.
FRG 9600 60-900Mhz Scanner	P.O.A.
FL 7000 500w HF solid state linear	P.O.A.

AR 2001 Receiver 25/500 MHz
£339:00 inc VAT
add £3:50 carriage

ANTENNA COUPLERS

THP HC200 1.8-30MHz 20w pep	82:95
THP HC400L 1.8-30MHz 350w pep	149:00
THP HC2000 1.8-30MHz 25w pep	T.B.A.
AMTECH 300B 1.8-30MHz 300w pep ★ STAR BUY ★	54:00
ICOM IC AT500 AUTOMATIC	399:00
ICOM IC AT1000 AUTOMATIC	Phone
YAESU FC 757 AUTOMATIC	245:00
YAESU FC 102 WARC 2Kw	Phone
WELZ AC38 1.8 300MHz	73:95

VAT included. Amtech 300B 1.50 others £6 Securicor.

Prices correct going to press E. & O. E
But may be subject to change due to currency fluctuations

Icom

IC751 HF Transceiver	1239.00
IC745 HF Transceiver	898.00
IC730 Mobile HF Transceiver	P.O.A.
PS15 P.S. Unit	135.00
PS30 Systems p.s.u. 25A	259.00
SM6 Base microphone for 751/745	36.50
IC290D 2m 25w M/Mode	469.00
IC290E 10W Multi-Mode Mobile	399.00
IC271E 2m 25w M/Mode Base Stn.	699.00
IC271H 100W version of above	889.00
IC25H 2m 45w FM	359.00
IC27E 25W FM mobile	359.00
IC45E 70c 10w FM	345.00
IC47E 25w 70cm FM mobile	449.00
ICBU1 B/U Supply for 25/45/290	24.50
ICR70 General Coverage Receiver	599.00
ICR71 General Coverage Receiver	699.00
IC02E 2m H/Held	259.00
IC2E 2m H/Held	199.00
ML1 2m 10w Linear	69.00
IC4E 70cm H/Held	259.00
IC04E 70cm handheld	269.00
BC30 Base Charger	56.35
HM9 Speaker mic	18.55
IC3 Carry Case	5.50
ICBP3 Std Battery Pack	27.50
BP5 High Power Battery Pack	52.80
CP1 Car Charging Lead	5.50
DC1 12v Adaptor	13.75

Aerial Rotators

9502B 3 core Light Duty	69.50
AR40 5 core Medium Duty	115.00
KR400 Med/H Duty	109.95
KR500 6 core Elevation	139.95
KR400RC 6 core Medium Duty	132.50
CD45 8 core Heavy Duty	189.95
KR600RC 8 core Heavy Duty	189.50
HAM1V 8 core Heavier Duty	299.00
T2X 8 core Very Heavy Duty	365.00
Hirschman 250	49.50

EMOTO – all models POA

SWR/POWER METERS

WELZ SP200 1Kw	82:00
WELZ SP300 1Kw	115:00
WELZ SP400 150w	82:00
WELZ SP15M 200w	41:00
WELZ SP250 2Kw	57:75
TOYO TM1X 3.5 150MHz 120w	18:80
TOYO T430 145/430MHz thru line watt meter 120w	44:65
TOYO T435 145/435MHz thru line watt meter 200w	49:35

VAT included. Add £2 per item carriage.

VHF LINEAR AMPLIFIERS

THP HL30V 0.5-3w in 30w out	39:99
THP HL82V 10w in 85w out	144:50
THP HL110V 10w in 110w out	179:95
THP HL160V 10w in 160w out	244:52
THP HL160V 25w in 160w out	209:73
MML 144/30LS	75:00
MML 144/50S	92:00
MML 144/100S	149:95
MML 144/100HS	149:95
MML 144/100LS	169:95
MML 144/200S	245:00

UHF LINEAR AMPLIFIERS

MML 432/30L	139:95
MML 432/50	129:95
MML 432/100	245:00
THP HL20U 1-3w in 20w out	77:99
THP HL45U 10w in 45w out	152:77
THP HL90U 10w in 90w out	268:59
ALINCO ELH250C	114:95

B.N.O.S. complete range also in stock.
VAT included. Add £2 per item carriage.

CLOSED MONDAY
HOURS: 10:00 – 5:30
SAT. 10:00 - 5:00

★ NEW ★

YAESU FRG 9600
ALL MODE VHF/UHF SCANNER

60-905MHz, Wide and Narrow AM/FM with 5, 10, 12½, 25 and 100 steps on FM + 1KH/100Hz AM and 1KHz/100Hz SSB and much, much more including optional interface unit for computers and video IF unit for TV reception. Call or Write.

Call now for price

HEIL ACCESSORIES

HEIL HC3 Microphone Element	22:85
HEIL HC5 Microphone Element (Icom SM5/6)	25:40
HEIL HM 5 Desk Microphone (300Hz-3KHz) cardoid fwd	59:00
HEIL MM5 Hand Held Mic with HC3 Capsule	37.00
HEIL SS2 SPEAKER ... see page 10	65:00
HEIL EQ300 Mic Equaliser	65:00
HEIL BM10 8OZ HEADSET/BOOM MIC	65.00

Carriage and VAT included.

TELEGRAPH ACCESSORIES

Hi Mound Keys	
HK 708 Hand Key with base	13:67
HK 707 Hand Key with base and dust cover	14:48
HK 706 Hand Key with base and dust cover	15:60
HK 702 Key with marble base and dust cover	29:65
MK 704 Dual lever paddle, no base	12:76
MK 705 Dual lever paddle marble base	23:78
COK-2 Practice oscillator	7:99
KENPRO Iambic Electronic Keyer KP100	79:00
KENPRO Iambic Memory Keyer	169:00
Bencher	
BY1 Squeeze Key, Black base	53.95
BY2 Squeeze Key, Chrome base	69.95
Auto CW/RTTY	
Tono 9100E	799.00
Tono 9000E Reader/Sender	P.O.A.
Tono 550 Reader	299.00
Tono 5000E	899.00
Microwave Modules	
MM2001 RTTY to TV converter	189.00
MM4001 RTTY terminal	269.00
MM4001KB RTTY term with keyboard	299.00

VAT included. Add £1 carriage per item.

UNADILLA/REYCO

The world's finest Traps precision moulded coil forms, all stainless hardware, aluminium tube, irridite finish, absolutely weather proof.

KW 10 resonant at 28.675
KW 15 resonant at 21.275
KW 20 resonant at 14.175
} **£18.99** inc VAT and Carr

VHF CONVERTERS ★ Star Buy ★

The following frequencies from any HF Receiver.

FRV 7700 A 118-150MHz
B 118-130, 140-150, 50-59MHz
C 140-170MHz
D 118-130, 140-150, 70-80MHz
E 140-150, 150-160, 118-130MHz
F 150-180, 180-170, 118-130MHz

All models, £65.00 inc VAT and Carr

Goods normally despatched by return.

Amcomm SERVICES LTD., 194 NORTHOLT ROAD, SOUTH HARROW, MIDDX. HA2 0EN. ENGLAND. (Opp. South Harrow Underground Station) TEL: 01-422 9585. TELEX: 24263

JULY 1985

VOLUME 61 No 7

RADio COMmunication

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

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

Tel 0245 84938

Office hours: 0915 to 1715

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

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

Tel 0707 (from London, 77) 59015

Business hours: 1000 to 1600

CONTENTS

Front cover photograph: A Marquise cut diamond, *by courtesy of the Diamond Information Centre*

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

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

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

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

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

ABC MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS 35,405 copies per issue average circulation in 1984

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

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

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

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

London Lowe Electronics Ltd.
223/225 Field End Road, Eastcote, Middx.
Tel: 01-429 3256

Glasgow Lowe Electronics Ltd.
4/5 Queen Margarets Rd, off Queen Margarets Drive.
Glasgow. Tel: 041-945 2626

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

Cambridge Lowe Electronics Ltd.
162 High Street, Chesterton, Cambridge.
Tel: 0233 311230

Cardiff Lowe Electronics Ltd.
102 Clifton Street, Cardiff.
Tel: 0222 464154

Hants/Dorset Lowe Electronics Ltd
27 Gillam Road, Northbourne, Bournemouth.
Tel: 0202 577760.

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

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

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

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

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

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

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

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

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

Devon Reg Ward & Co Ltd.
1 Weston Parade, Axminister, Devon.
Tel: 0297 34918

W. Yorkshire Amateur Radio Shop
4 Cross Church Street, Huddersfield.
Tel: 0484 20774

Kent Thanet Electronics Ltd.
143 Reculver Road, Herne Bay, Kent.
Tel: 02273 63859/63850

The **Trio TS430S** . . . HF amateur band transceiver **and** general coverage receiver

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

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

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

TRIO-KENWOOD CORPORATION

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

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

TR9130 TWO METRE ALL MODE TRANSCEIVER

This rig is proof, if one needed it, that TRIO do not bring out new models just for the sake of it. The TR9000 is remembered as a classic rig and today people are still asking for second hand ones. They're even a rarity on our S/H shelf. The TR9130 incorporates the improvements that all amateurs asked for, green display, reverse repeater, tune whilst transmitting, higher power, more memories and of course memory scan. TRIO's answer, the TR9130.
TR9130 . . . **£499.00** inc VAT.

TS780 DUAL BAND BASE STATION TRANSCEIVER

The TS780 is the perfect base station VHF/UHF transceiver for the enthusiastic operator. The rig has all the necessary control functions essential for operating on both today's busy two metre band and the wide open spaces of seventy centimetres. Full repeater facilities plus reverse repeater are included and the transceiver has the usual memory channels (10), two VFOs, up/down frequency shift microphone. IF shift, two priority channels, memory and band scan etc. A superb rig, I have one myself, write for a full enthuse!
TS780 . . . **£948.00** inc VAT.

TR7930 TWO METRE FM MOBILE TRANSCEIVER

Those who have used or owned a Trio TR7800 will know what I mean when I say that Trio, with the introduction of the TR7930 have improved on the unimprovable. The Trio TR7930 improves on the TR7800 by giving a green floodlit liquid crystal display, extra memory channels, both timed and carrier scan hold, selectable priority frequency and correct mode selection (simplex or repeater). The most significant change is the liquid crystal display, but closely following this must be the ability to omit specific memory channels when scanning and the programmable scan between user designated frequencies.
TR7930 . . . **£329.00** inc VAT.

R2000 GENERAL COVERAGE RECEIVER

The amateur bands are only a very small part of the radio spectrum, many other transmissions are available for the short wave listener. Broadcast stations provide an alternative source of current information both political and regarding the life style of the country. Fitted with the internal VHF converter the R2000 covers continuously frequencies from 118 to 174MHz giving access to amateur two metre transmissions (am, fm, ssb and cw) plus a lot more. Having 10 memories, memory scan and programmable scan the R2000 provides in one rig the perfect receiver.
R2000 . . . **£479.47** inc VAT.

TS930S HF TRANSCEIVER WITH GENERAL COVERAGE RECEIVE

Much has been said about the TS930S transceiver and it now has a place high in the affection of those amateurs fortunate enough to own one, indeed it has become the "flagship" of the TRIO range. Providing full amateur bands plus a general coverage receiver (150kHz to 30MHz), the TS930S has every conceivable operating feature for today's crowded frequencies.
TS930S . . . **£1295.00** inc VAT.

TR2500/TR3500 HANDHELD TRANSCEIVERS

Two first class hand held transceivers, one for two metres and the other for seventy centimetres. Ten memory channels, band and memory scan, repeater shift, reverse repeater and a low power position make the rigs extremely useful for the radio amateur who wishes to keep in touch with his local scene. A comprehensive range of accessories, base station charger, speaker microphone, mobile mount etc, can be added to enhance operation, accessories used with one rig being compatible with the other.
TR2500 . . . **£258.00** inc VAT.
TR3500 . . . **£270.00** inc VAT.

TS530SP HF AMATEUR BAND TRANSCEIVER

A logical progression from the reliable TS520 series the TS530S was the most popular HF rig in the range. I use the term "was" because TRIO decided to cease production and supplies were no more, however the demand from radio amateurs worldwide for the transceiver have continued and TRIO have reintroduced the rig. A standard HF valve transceiver without the frills but providing today's amateur with all necessary facilities for reliable worldwide communication, the TRIO TS530SP now with notch filter.
TS530SP . . . **£698.00** inc VAT.

just a part of the range

The following TRIO models although not shown are still current and available.

TS430S	HF T'ceiver	**£720.00**	TM201A	2M Mobile	**£296.00**
TS830S	HF T'ceiver	**£832.75**	TM401A	70cm Mobile	**£316.00**
TS130S	Mobile HF T'ceiver	**£633.06**	TM211E	2M Mobile with DCS	**£365.00**
TR9300	6M Multi-mode	**£569.97**	TM411E	70cm Mobile with DCS	**£399.00**
TH21E	2M Micro h'held	**£170.00**	TW4000A	2M/70cm Mobile	**£522.00**
TH41E	70cm Micro H'held	**£199.00**	TS711E	2M Base Station	**£768.00**
TR2600E	2M H'held with DCS	**£275.00**	TS811E	70cm Base Station	**£895.00**
TR3600E	70cm H'held with DCS	**£292.00**	R600	Gen. Cov. Receiver	**£299.52**

All prices include VAT. Carriage £7.00
Prices shown on the Lowe Electronics Ltd advertisement pages are subject to change without notice.

LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE
Telephone 0629 2817, 2430, 4057, 4995.

send £1 for complete mail order catalogue.

FOUR WHEEL DRIVE

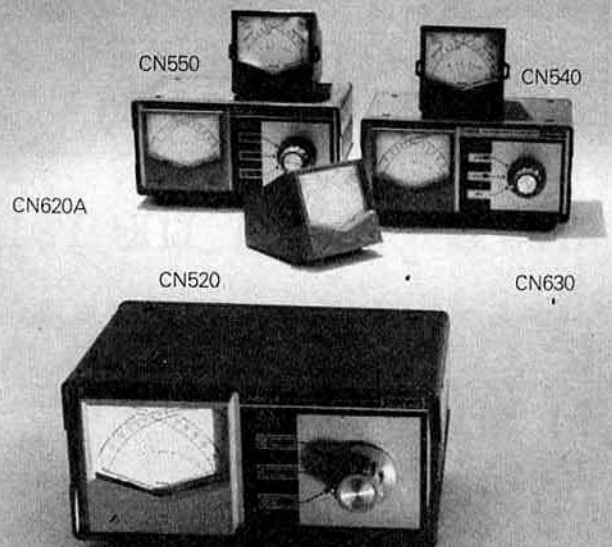
For as long as amateurs have used directive beams, be it either on the HF, VHF or UHF bands there has always been a need for a means of turning the array. Some have used string, the more fortunate amongst us have used a rotator. When buying a rotator, our advice up to now has always been, buy the largest you can afford. Our reasoning being that your aerial array will undoubtedly grow and sooner or later the overloaded rotator will break. Usually your aerials are also destroyed.

The new range of rotators from DAIWA, the MR series make this advice obsolete. They are designed so that additional motors can be added around a central core, each motor increasing the rotator's turn and braking capacity. The MR series will accept up to four motors being initially supplied with one. As the number and size of aerials increases, additional motors can be added, and both turning capacity and braking effort increased. Additional motors can be added at any time, each adding 700 kg/cm of torque and 5000 kg/cm of brake power. No additional cable runs are required, an internal harness for each motor being included, and, of course the main frame and reduction gear train have been designed to handle extremely large aerial arrays that would require the full set of four motors. There are four models, pre-set and standard and two high speed versions for the operator who can afford to sacrifice a degree of torque in order to increase the speed of rotation.

A full colour leaflet describing the rotators in detail is available on request.

MR750E standard model	£193.00 inc VAT
MR750PE pre-set model	£217.64 inc VAT
MR300E high speed version (39 sec)	£193.00 inc VAT
MR400E high speed version (25 sec)	£193.00 inc VAT
MR750U standard motor unit	£64.64 inc VAT
MR300U high speed motor unit	£64.64 inc VAT
DMC tower mast clamp	£14.00 inc VAT

for "cross needle" metering, DAIWA



What's so special about "cross needle" metering? Well, it's typically Daiwa to go direct to the heart of the matter and develop a system which will give you the true value of forward power, reflected power, and SWR all at a single glance. The elegant simplicity of the idea hides a great deal of thought, which of course is the hallmark of Daiwa products.

You will see from the photographs that the meter displays have two scales, one reading forward power, the other reflected power. Since SWR is calculated using these two values, Daiwa have arranged the meter pointers so that SWR is shown at the crossing point of the two meter needles.

Why don't other makers use the idea? Basically it's a question of power meter accuracy. The usual type of single or twin meter "SWR/power meter" uses a simple strip line to measure the VSWR on the transmission line. You will note that I have said "VSWR", and this is important. These so-called power meters are in fact only measuring the voltage standing wave and in order to display power, you need to monitor both voltage and current in the line. Daiwa meters of course, do just that, and consequently are very accurate indeed. The cheaper so-called power meters depend for their accuracy in being terminated in a load, and exhibit wild inaccuracy when terminated in a reactive load. In other words, when the indicated VSWR on the meter is other than 1:1, their accuracy is quite badly affected.

To summarise; the Daiwa cross needle power meters give you easy, unambiguous readings at a glance, and what's more those readings are accurate even in lines displaying high SWR, and since Daiwa meters measure true power, they are accurate at any point in the feedline from transmitter to aerial.

As with all Daiwa products, their meters show the Daiwa approach design, combining accuracy, ease of use and interpretation, and that indefinable feel of quality which is the sure sign of a good product. Once owned, never discarded.

CN410M	3·5–150MHz		£48.00 inc VAT
CN460M	140–450MHz		£52.00 inc VAT
CN520	1·8–60MHz		£39.50 inc VAT
CN500	1·8–60MHz	mini	£19.50 inc VAT
CN620A	1·8–150MHz	up to 1kW	£66.21 inc VAT
CN630	140–450MHz	up to 200W	£98.11 inc VAT
CN650	1·2–2·5GHz	up to 20W	£129.50 inc VAT

Carriage on "4 & 5" series meters £1.50, on "6" series £2.50.

LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE
Telephone 0629 2817, 2430, 4057, 4995.

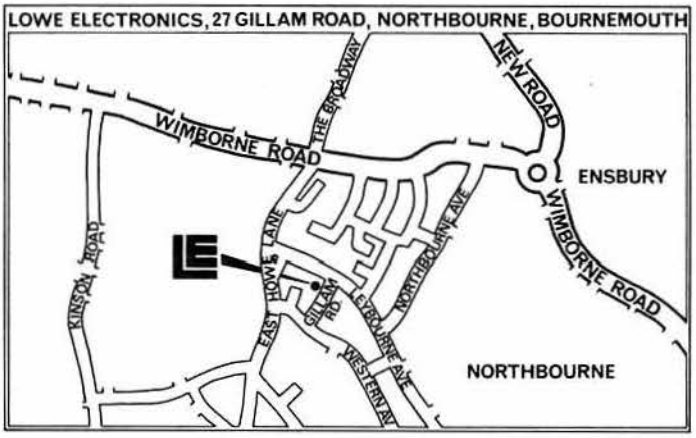
send £1 for complete mail order catalogue.

EMPORIUM NEWS

Good Morning

It was the birthday of David, one of our workshop engineers, and the staff had arranged a **Kissogram** for him. Surprised quite a few of our customers when this **scantily clad girl** in black basque, black stockings, red toenails, high heels and an unbelievably small pair of black panties delicately trimmed with red lace, walked into the showroom and planted **a big kiss** on his cheek. Overwhelmed he was. Of course I wasn't there personally and can only recount the deed by the careful details taken by David G4KFN! I think I was answering a telephone enquiry at the time! Anyway, it turned out the girl's Father was a radio amateur and could we take a look at his . . . sorry, I jest.

Well, the **Bournemouth shop** is now well and truly open. **Colin** G3XAS is in charge, and to judge from the reaction to our "Sunday Afternoon" in Christchurch (between 150 and 200 people in the first



hour), it would seem that amateurs from the south coast welcome our presence. Colin, I am sure, will become a friend to many, both young and old, experienced or just beginning. **The Department of Transport** have now commenced building operation work next door, knocking holes in the wall between the two units. I look forward to the new road signs in the area. On Saturday, 4th May, I was a little perturbed that several amateurs had difficulty in finding the shop. Indeed, one or two were talked in by local amateurs. To anybody who helped in this way may I say a **thank you** on behalf of the company. To help until the "Driving Test Centre" signs go up I re-print the excellent street map of the area that appeared in a recent edition of **Practical Wireless**. I'm not suggesting that you cut out the map and spoil your **RadCom** but perhaps it would be a good idea to make a mental note of which issue it is in. The TH41E is **just back in stock** but undoubtedly by the time you read this, the situation will probably have changed. I am not surprised. The **TH41E** from Trio is the **ideal transceiver** for use with the many 70cm repeaters dotted up and down the country.

Simple to operate and having full repeater facilities (including reverse repeater), the **TRIO TH41E** is supplied with Nicad battery pack, charger and helical antenna and a full range of accessories are also available. **The TH41E** costs **£214.50**, carriage £7.00. Also in stock, for 2 metre operation, is the **TH21E** which costs **£188.46** including VAT. I have used both and must say the combination of size and performance make the transceivers ideal for portable operation. Indeed on size alone **the rigs** have **no competition**. Visit a Lowe Shop and see for yourself.

Just for the record, I'd like to mention our **"Lowe Card"**. The card has been designed to make your purchase of radio equipment much simpler, to give you the opportunity to buy at current prices and **spread the cost**. Your **Lowe Card** can be used to make a purchase at any **Lowe Shop** and you can, of course, use it to place your order by mail or telephone. The advantages of being a **Card Holder**, one of the family, are the special offers once a quarter. The response to last quarter's offers was fantastic. I must say the offers were all exceptionally attractive. As **Card Holders** received their statements our 'phones began to ring, and by mid-day the majority of items had been sold. **The savings were considerable.** I won't list them; why not talk to a Lowe Card Holder and ask him to show you his last Special Offers list. For further details why not call at your local Lowe Shop and ask for details. To those who ask, "How much does it cost," the answer is simple. At the end of each month a small charge is added to the balance owing on your account. This is at present calculated at 2.35% in the Pound **(APR 32.1%)**. This rate is subject to change at our option. Don't forget though, the saving on one of our quarterly Special Offers could go a long way to paying the interest charges.

I have on my desk the L.C.D. **digital multitester** model **KD508**. Well made and easy to use the meter specification is as follows: DC voltage 0-2-20-200-1000 volts, AC voltage 0-200-500 volts (RMS), DC current 0-2-20-200 mA and resistance 0-2K-20K-200K-2 Meg ohms. **Complete with test leads** the KD508 costs **£32.64**, including VAT, carriage £1.50. A photograph of the meter which is supplied in a neat bubble pack is shown below. Just right for the shack.

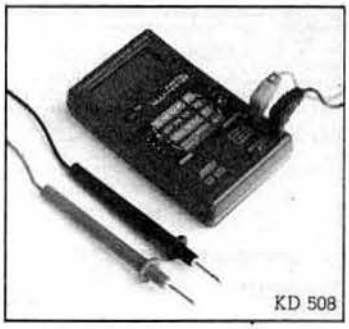
LOWE ELECTRONICS 1985 OPEN DAY

Time flies. Our 1985 Open Day will soon be with us—the day chosen is Saturday, 17th August. The day starts around 10.0 a.m. and this year I hope to have a talk-in station on site on S22 from about 9.0 a.m. Special attractions are at this moment being arranged: more on these next month. Regular features, the **free raffle**, conducted **tours of the workshop** will be as previous years. As usual a chance for you to see what we have to offer here at **Matlock**. The weather will be **perfect** and you will be able to combine a visit to ourselves with a day out in the glorious countryside which surrounds Matlock.

Back in stock is the **Mizuho KX3** aerial tuning unit. Anybody who has a short wave receiver should seriously consider adding one to his shack. The **KX3** is available at **£53.74**, including VAT, carriage £2.50.

We also have an **HF balun**, code **HS50B** 1.8-50 MHz with a 1:1 ratio. Cost of the balun is **£18.74**, including VAT, carriage £1.50. Don't forget egg insulators—large 65p, small 40p, carriage 50p each. Best to add a few insulators to your next order. They are always useful items to have and so save yourself the carriage charge.

I've always admired TRIO's attention to detail, especially in the field of ergonomics. At the **NEC** I was pleased to demonstrate the **new TS711E** 2 meter base station transceiver to a **blind couple**: they found it easy to operate. **Digitally encoded voice** for frequency, **CW** tones for **mode** of operation and a **bleep** indicating **position one** when using **memories**. They must have been impressed with the rig as, a week later, they popped along to Matlock and bought one. Received a kind letter from them recently telling of their joy with the new transceiver. SSB and FM operation with no problems. **My only worry** is that their two Alsatian guide dogs, **Nem** and **Purdy**, will not get as much exercise as before as more time is spent on the air.


KD 508

Anyway, that's about it for now. **The photos** of the **Kissogram girl** have arrived and seeing as I didn't see her in the flesh, so to speak, I must make do with a picture!

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

David G8GIY

MICROWAVE MODULES LTD

Microwave Modules Ltd is a full time professional organisation, established over **16 years** ago in **1969**, and currently employs over **30 full time**, on site staff based in our two modern, purpose built factories. In addition, a similar number of "Outworkers" are involved in assembly and mechanical operations.

OUR EXTENSIVE RANGE . . .

Our Product Range now exceeds **50 individual items** in total and is the widest range available from any one manufacturing company. Our technical resources have enabled us to not only become **the largest** and **most successful** designer and manufacturer of R.F. products, such as **Linear amplifiers** and transverters, but also designers and manufacturers of **innovative** microprocessor and digital products such as **The Morsetalker**, MMSI, and the RTTY to TV Decoder, MM2001.

ALL BRITISH . . .

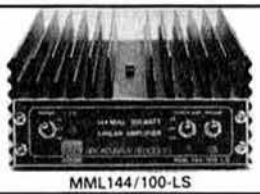
Every product in our range is designed and manufactured in the UK by our own employees, and wherever possible British Components are utilised.

GUARANTEED . . .

All Microwave Modules products are **fully guaranteed for 12 months.** This includes all semiconductors and **PA transistors.** We have built our reputation around our customer service and back-up which is second to none.

OUR RANGE OF LINEAR AMPLIFIERS . . .

MML144/50-S

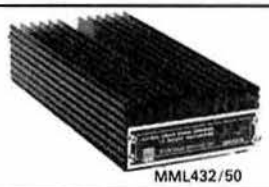


MML144/100-LS

MML144/200-S

PRODUCT	Input Power	Output Power	Modes of Operation	Preamplifier		Power Requirements	RF Vox*	PRICE inc VAT
				Gain	N.F.			
MML144/30-LS	1 or 3W	30W	SSB, FM, AM, CW	12dB	<1·5dB	13·8V @ 4A	✓	**£82.90** (p&p £3.50)
MML144/50-S	10W	50W				13·8V @ 6A	✓	**£92.00** (p&p £3.50)
MML144/100-S	10W	100W				13·8V @ 12A	✓	**£149.95** (p&p £4.00)
MML144/100-HS	25W	100W				13·8V @ 12A	✓	**£149.95** (p&p £4.00)
MML144/100-LS	1 or 3W	100W				13.8V @ 14A	✓	**£169.95** (p&p £4.00)
MML144/200-S	3, 10 or 25W	200W				13·8V @ 30A	✓	**£299.00** (p&p £5.25)

MML432/30-L



MML432/50

MML432/100

PRODUCT	Input Power	Output Power	Modes of Operation	Preamplifier		Power Requirements	RF Vox*	PRICE inc VAT
				Gain	N.F.			
MML432/30-L	1 or 3W	30W	SSB, FM, ATV, AM, CW	12dB	2dB	13·8V @ 6A	✓	**£145.00** (p&p £4.00)
MML432/50	10W	50W		12dB	2dB	13·8V @ 8A	✓	**£129.95** (p&p £4.00)
MML432/100	10W	100W		–	–	13·8V @ 20A	✓	**£299.00** (p&p £5.25)

* The RF VOX can be overridden and hard wired.

CONNECTORS . . .

144MHz products—Our standard connector on these products is SO239. We use a high quality PTFE socket of superior quality, but we are able to supply the choice of BNC or 'N' type at no extra charge. Please specify.

432MHz products—The MML432/30-L is fitted with BNC connectors, 'N' type available, please specify.
The MML432/50 and MML432/100 both have BNC input sockets and 'N' type output sockets. If this is not to your preference please specify when ordering.

DATA SHEETS . . . A full printed data sheet is available on each product, and is free on request.

CATALOGUE . . . A copy of our latest catalogue can be obtained free of charge upon request.

AVAILABILITY . . . Our products are normally available from stock, either direct from ourselves or any of our 75 UK outlets.

Access BARCLAYCARD VISA
WELCOME

MICROWAVE MODULES LTD
BROOKFIELD DRIVE, AINTREE, LIVERPOOL L9 7AN, ENGLAND
Telephone: 051-523 4011 Telex: 628608 MICRO G
CALLERS ARE WELCOME, PLEASE TELEPHONE FIRST

HOURS:
MONDAY-FRIDAY
9-12.30, 1-5.00
E. & O.E.

		Inc VAT	Carr
JRC EQUIPMENT			
NRD515	New synthesised HF monitoring receiver	965.00	7.00
NHD518	Multi channel memory unit for NRD515	264.00	7.00
NCM515	Remote frequency controller	169.75	7.00
NVA515	Matching loudspeaker unit	45.41	3.00
JST100	Digitally synthesized 160-10M transceiver	998.00	7.00
NBD500G	Matching PSU for JST100	181.35	7.00
NVA88	Matching speaker for JST100	44.19	3.00
NFG97	ATU/SWR/POWER meter for JST100	150.00	7.00
VHF/UHF MONITOR RECEIVERS AND SCANNERS			
AR2001	NEW VHF/UHF scanning receiver 25-550MHz	378.01	7.00
SR1000E	DAIWA 1000 channel PLL receiver 144-154MHz	96.04	2.50
DAIWA ROTATORS			
MR750E	NEW Multitorque rotator controller	193.00	7.00
MR750PE	As above but with round and preset controller	217.64	7.00
LMC	Lower mast clamps for pole mounting	14.01	3.00
MR750U	Additional motor unit to increase torque and braking	64.64	3.00
DR7500X	For HF 3 element beams. Preset controller. 6 core cable	142.98	7.00
DR7500R	As for DR7500X but using the DAIWA round controller	153.67	7.00
DR7600X	Heavy duty. Up to 2 el 40m beam. Preset control	189.37	7.00
DR7600R	As for DR7600X but using the DAIWA round controller	213.41	7.00
KS065	Deluxe bearing for fixing stays to rotating mast	27.30	3.00
KR500	Elevation rotator (not Daiwa)	144.90	7.00
DAIWA POWER and SWR METERS			
CN410M	3·5-150MHz mobile cross needle power/SWR meter	48.00	1.50
CN460M	140-450MHz mini cross needle power/SWR meter	52.00	1.50
CN520	1·8-60MHz mobile cross needle power/SWR meter	39.50	1.50
CN500	1·8-60MHz mini cross needle power/SWR meter 20W.	19.50	1.50
A500	Fixing bracket for CN500 series	2.10	0.30
CN620A	1·8-150MHz cross pointer pwr/SWR meter. Up to 1kW	66.21	2.50
CN630	140-450MHz cross pointer pwr/SWR meter. Up to 200W	98.11	2.50
CN650	1·2-2·5GHz cross pointer pwr/SWR meter. Up to 20W	129.50	2.50
CNW419	1·8-30MHz 200W general coverage tuning unit	159.64	7.00
CNW919	2M Power meter and antenna tuning unit	104.99	3.00
CNW518	3-30MHz 8 band hi power tuner cross needle pointer	233.09	7.00
CL680	1·8-30MHz 200W gen cov ATU (100W at 1·8MHz)	81.50	3.00
DAIWA POWER SUPPLY UNITS			
PS300	DAIWA heavy duty PSU 30A max 22A continuous	176.80	7.00
PS120M	DAIWA AC PSU 3-15V variable 12A maximum	87.33	7.00
PS80M	DAIWA AC PSU 3-15V variable 8A	72.68	3.00
PS50M	DAIWA AC PSU 9-15V variable 5·6A	55.91	3.00
DAIWA LINEAR AMPLIFIERS			
LA2035	DAIWA 2m lin amp, very small. 0·5W/30W at 13·8V	56.00	2.00
LA2035R	As above but with rx preamp	63.20	2.00
LA2065R	2M linear amplifier with rx preamp. 60W o/p	108.71	3.00
LA2155	DAIWA 2M 150W SSB/CW/FM amplifier	198.00	7.00
DATA COMMUNICATIONS EQUIPMENT			
CWR685E	TX/RX unit for RTTY/CW/ASCII with built in monitor	771.64	7.00
CWR670E	RX only unit RTTY/CW/ASCII requires external monitor	392.80	7.00
PK675	Printer kit for above unit	189.00	7.00
CWR610E	RX unit RTTY/CW/ASCII Code practise generator inc.	195.00	3.00
AMTOR10A	Comprehensive AMTOR unit	253.20	3.00
DR100	TRIO DATA-MITTER Modem for transmitting ASCII	148.10	3.00
NOVEX12A	Good quality 12" monitor. Amber phosphor	85.00	7.00
NOVEX12G	As above but with green phosphor	89.00	7.00
DM091G	9" Green monitor. All have metal cabinets	79.50	7.00
KEYS AND KEYERS			
CW3	Self contained morse practice oscillator	9.80	1.50
HK708	Straight key. Ball bearing pivots. Non skid base	16.30	2.50
HK702	Deluxe version of above on marble base	31.03	3.00
MK704	Squeeze paddle	15.40	1.50
EK150	Electronic keyer. Built in sidetone	103.38	3.00
MK1024	Electronic keyer with 1024 bit memory	185.52	3.00
HOKUSHIN MOBILE AERIALS			
2E	2M 5/8, 3·4 dB gain, foldover base	11.26	2.00
2NE	2M 7/8, 4·5 dB gain, foldover base	17.06	2.00
HS430HB	430MHz mobile gain aerial on half wave extension	8.30	2.00
OSCAR430	70cm 5/8+5/8+5/8 supergain mobile aerial	21.45	2.00
320	2M stainless 1/4 wave on PL259 plug	2.62	1.00
OTHER ACCESSORIES			
SWR50	The ever popular twin meter SWR bridge. 1·8-150MHz	14.95	2.00
DL60	60W dummy load with SO239 fitting	7.87	1.00
DL150	150W dummy load SO239 fitting	19.68	1.50
DL600	600W aircooled 50ohm dummy load	39.36	2.50
WA1	AKD wavemeter. 120-450MHz. Absorbtion type	24.95	1.50

LOWE SHOPS

In Glasgow the LOWE ELECTRONICS' shop (the telephone number is 041 945 2626) is managed by Sim GM3SAN. Its address is 4/5 Queen Margaret's Road, off Queen Margaret's Drive. That's the right turn off Great Western Road at the Botanical Gardens' traffic lights. Street parking is available outside the shop and afterwards the Botanical Gardens are well worth a visit . . .

In the North East the LOWE ELECTRONICS' shop is found in the delightful market town of Darlington (the telephone number is 0325 486121) and is managed by Don G3GEA. The shop's address is 56 North Road, Darlington. That is on the A167 Durham road out of town. A huge free car park across the road, a large supermarket and bistro restaurant combine to make a visit to Darlington a pleasure for the whole family.

Cambridge, not only a University town but the location of a LOWE ELECTRONICS' shop managed by Tony G4NBS. The address is 162 High Street, Chesterton, Cambridge (the telephone number is 0223 311230). From the A45 just to the north of Cambridge turn off into the town on the A1309, past the science park and turn left at the first roundabout, signposted Chesterton. After passing a children's playground on your left turn left again (between the shops) into Green End Road. Very quickly, and without you noticing it, Green End Road becomes High Street. Easy and free street parking is available outside the shop.

For South Wales, the LOWE ELECTRONICS' shop is located in Cardiff. Managed by Richard GW4NAD, who hails from Penarth, the shop (the telephone number is 0222 464154) is within the premises (on the first floor) of South Wales Carpets, Clifton Street, Cardiff. Clifton Street is easily found, being a left turn off Newport Road just before the Infirmary. Once in Clifton Street, South Wales Carpets is the modern red brick building at the end of the street on the right hand side. Enter the shop, follow the arrows past the carpets, up the stairs and the "Emporium" awaits you. Free street parking is available outside the shop.

For South Coast Radio Amateurs, there's a LOWE ELECTRONICS shop in Bournemouth. Its manager is Colin G3XAS. The shop's address is 27 Gillam Road, Northbourne, Bournemouth. That's the north side of town just off the Wimborne Road. The telephone number is 0202 577760. Easy to find, the shop has free street parking immediately outside.

LOWE ELECTRONICS' London shop is located at 223/225 Field End Road, Eastcote, Middlesex (the telephone number is 01 429 3256). The shop, managed by Andy G4DHQ is easily found, being part of Eastcote tube station buildings and as such being on the Metropolitan and Piccadilly lines (approximately 30 minutes from Baker Street main junction). For the motorist, we are only about 10 minutes' driving time from the M40, A40, North Circular Road (at Hanger Lane) and the new M25 junction at Denham. Immediately behind the shop is a large car park where you can currently park for the day for 20p. There is also free street parking outside the shop.

Although not a shop there is on the South Coast a source of good advice and equipment—John G3JYG. His address is 16 Harvard Road, Ringmer, Lewes, Sussex. (telephone 0273 812071). An evening or weekend telephone call will put you in touch with John.

Finally, here in Matlock. David G4KFN is in charge. Located in an area of scenic beauty a visit to the shop can combine amateur radio with an outing for the whole family. May I suggest a meal in one of the town's inexpensive restaurants or a picnic on the hill tops followed by a spell of portable operation.

MAIL ORDER

You don't need a 1750 Hz tone to gain access to the fastest mail order service for all radio amateurs and short wave listeners. With a copy of the LOWE ELECTRONICS catalogue and antenna book in the shack (send £1 for your copy) the best in amateur radio is quickly available.

I ENCLOSE £1. PLEASE SEND ME CATALOGUE & ANTENNA BOOK

☐ HF
☐ VHF/UHF
☐ RECEIVERS

Tick your special interest

NAME.....

ADDRESS.....

.....RC75

LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE
Telephone 0629 2817, 2430, 4057, 4995.

RADIO EXCHANGE

373, UXBRIDGE ROAD, ACTON, LONDON, W3 9RH

AKD Armstrong Kirkwood Developments

Jaybeam

TET

SWR METERS, MORSE KEYS, ANTENNAS FOR ALL OCCASIONS. POWER SUPPLIES, CONNECTORS, CABLES, BOOKS & HARDWARE. YAESU NOW BACKED BY MAJOR IMPORTER. ICOM TRANSCEIVERS & RECEIVERS – BUY WITH CONFIDENCE

PRICES—STILL THE —STILL THE SAME FROM BRENDA'S RECIPE

FREEPOST MAIL ORDERS ENQUIRIES

Amateur Radio Exchange
FREEPOST
LONDON
W3 9BR

AUTHORISED YAESU

RSGB

DRAE

GRANVIC

RAC ANTENNA

DATONG

TONNA

FOR FURTHER DETAILS PHONE **01-992 5765/6**

AE

AUTHORISED YAESU

AMATEUR ELECTRONICS

510/512 Alum Rock Road Alum Rock Birmingham B8 3HX

FRG-9600

The FRG-9600 all mode scanning receiver covering 60 through 905MHz continuously, with 100 keypad programmable memory channels.

FM wide, FM narrow and AM wide and narrow, SSB (single sideband) reception up to 460MHz, and the new ACSB mode. Seven tuning/scanning rates between 100Hz and 100kHz.

Scanning system allows full or limited (keypad programmed) band scanning memory scanning, with auto-resume. Carrier sensing scan stop, audio scan stop sensing. Scanning steps selectable. Signal strength indicated by a two-colour graphic S/meter. A 24-hour clock timer recorder output automatic power on/off switching and recording Multiplexed (FM wide) output, AF and RF mute.

Yaesu CAT System provides a direct control link to the cpu allowing operators with personal computers to add virtually unlimited customized control functions.

12VDC, using the optional PA-4B/C AC adapter from the AC line.

£475.00

FT-2700RH

FT-2700R 2M and 70cm Dual Bander. True full duplex cross band working. Dual receiver front ends, local synthesisers, IFs and Tx RF stages. Two 4-bit microprocessors. Ten memories. Programme mem scanning. Reverse repeater. Priority function. 25W continuous either band. Full duplex or simplex. Distinctive graphical two colour PO/S meter. Optional voice synthesiser. **£559.00**

FT-270R/RH

2m FM Transceiver. Dual 4-bit microprocessors. Dual VFOs. Ten memories. Programmable band scan limits. Priority function. Two scan modes, fixed (6 sec's) or carrier controlled scan resume. High visibility back lit LCD, 5mm digits. Unique aluminium die cast ducted heat sink.

Power outputs: FT-270R 25W and 3W, FT-270RH 45W and 5W (fan assisted cooling).

Optional voice synthesiser.

R £349.00 **RH £399.00**

The new and ultimate Handhelds on 2M and 70cms.

FM, Keyboard entry, Toneburst, Repeater shift, 10 memories, Rev/Simplex, Scanning, Clear/Busy, Twin CPUs, VOX.

FT209R FROM £239.00
FT209RH FROM £245.00
FT709R FROM £28.00

The Tiny Handhelds just right for the pocket.

FM, S/Meter, Thumbwheel frequency selection, Repeater shift, Toneburst, 3 models available on the 2M 203.

FT203R FROM £195.00
FT703R

BRANCHES

S. EAST MIDLANDS
A.J.H., 151a Bilton Rd., Rugby, Warwickshire. Tel: 0788 76473

EAST ANGLIA
Eastern Comms, 31 Cattlemarket St., Norwich. Tel: 0603 667189

NORTHERN
Holdings, 45 Johnston St., Blackburn. Tel: 0254 59595

FREEPOST – MAIL ORDER ENQUIRIES

Amateur Electronics Ltd.
FREEPOST
Birmingham B8 1BR

INSTANT HP AVAILABLE
WRITTEN DETAILS ON REQUEST

FREE FINANCE

Written details upon request

AE LIMITED

Telephone 021-327 1497/6313 Telex 334312 Perlec G

AUTHORISED YAESU

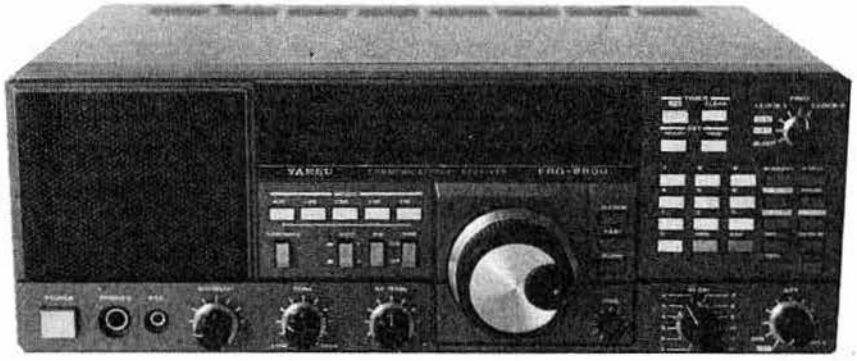
FT-726R/2M

All mode base station. Inbuilt AC power supply. Three modules can be installed at once for cross band operation or pushbutton band selection. 70cm module includes GaAs FET preamp. HF module for 21, 24.5 and 28MHz (make your 726R into a Five Bander). Dual VFOs, tuning 20Hz/Step or local channel steps. Speech processor for SSB and for CW optional 600Hz Narrow filter. IF shift/width. Eleven memories (Store mode as well as band). Scanning. Programmable limited band scan. Priority Function. Full duplex cross band (with sattelite IF unit fitted). Independent tuning/mode and meter functions for Tx/Rx. Dual meters. Seven digit display plus two digit clarifier display. AGC. Noise blanker. RF gain tone/squelch for all modes. Continuously adjustable power, 10w full output. **£869.00**

ALL MODE HF COMPUTER AIDED TRANSCEIVER

- Gen. coverage receiver.
- 12 memory channels. • LSB, USB, CW, AM, AFSK, FM. • Two VFOs.
- Personal computer compatible.
- Tuning steps. 10Hz. 5KHz. + 500KHz (Band). • Centre zero meter.
- CW. Full break-in. • AGC speed.
- Power out SSB. CW. 100w(PEP) AM 25w, FM. FSK 50w.
- IF notch and Audio peak filters. **£1650.00**

FT-980



FRG-8800

FRG-8800. All band all mode Gen coverage receiver. 150kHz to 30MHz. Large liquid crystal display. 100Hz frequency resolution. S/SINPO "bar graph" type indicator. 21 button keypad. 12 internal memories and multi function scanner. AM, SSB, CW and FM. Wide and narrow bandwidths. All mode data/freq can be stored in mem's. Selectable AGC rates. Two 24 hr clocks. 8-bit CPU. Three scan modes. Yaesu CAT system comparable with most personal computers. Programme scanning.

FRV-8800 optional VHS converter (mounts inside) adds 118MHz to 173.999MHz coverage to the 8800 with full frequency readout.

FRV-8800 £90.00 **£559.00**

YORKSHIRE
A.J. Hooker, 42 Nether Hall Rd., Doncaster. Tel: 0302 25690

SOUTH WEST
Uppington, 12-14 Pennywell Rd., Bristol. Tel: 0272 557732

EAST MIDLANDS
R.A.S. Notts., 3 Farndon Green, Wollaton Park, Nottingham. Tel: 0602 280267

Access BARCLAYCARD VISA

FREEPOST – MAIL ORDER ENQUIRIES

Amateur Electronics Ltd.
FREEPOST
Birmingham B8 1BR

ICOM

GREAT SETS...

Isn't it about time you switched to Icom?

IC-751

The IC-751 could be called the flagship of the ICOM range as it features 32 memory channels. full HF receive capability, digital speech synthesizer, computer control and power-supply options. The 751 is fully compatible with ICOM auto units such as the AT-500 and IC-2KL. The IC-751 now has a remote push-button frequency selector pad.

Standard features include: a speech processor, switchable choice of J-FET pre-amp or 20dB pin diode attenuator and two VFO's, marker, 4 variable tuning rates, pass band tuning, notch, variable noise blanker, monitor switch, direct feed mixer in the front end, full break-in on CW and AMTOR compatibility.

The first IF is 70.045 MHz. Any XIT and RIT adjustment is shown on the display. The transmitter features high reliability 2SC2904 transistors in a low IMD (-32dB@100W) full 100% duty cycle. For more detailed information on this excellent set, please get in touch with us.

IC-3200E

A new exciting set is the ICOM IC-3200E FM Dual-band transceiver (144-430/440 MHz). This is the smallest transceiver available.

The IC-3200E employs a function key for low-priority operations to simplify the front panel. LCD display is easy to read in bright places, showing frequency, VFO A/B, memory channel duplex mode and S/RF meter information.

Other features include a 10 channel memory able to store operating frequencies, Simplex or Duplex. A memory lock-out function allows the memory scan to skip programmed channels when not required. The IC-3200E has a built-in duplexer and can operate on one antenna for both VHF and UHF. Options include: IC-PS45 DC. power supply. HS-15 mobile mic, SM6 and SM8 desk mics. SP-10 external speaker and UT-23 speech synthesizer. A great future is predicted for the IC-3200E.

Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Than

ICOM

GREAT VALUE

IC-505, 50MHz A New Dimension for the U.K.

At last, permits are now available in the U.K. for the 50MHz (FM) band. If you wish to use this less crowded amateur frequency the IC-505 SSB CW portable transceiver has already gained an excellent reputation world-wide.

The IC-505 features microprocessor frequency control, dual VFO's and 6-channel memories with memory scan. LCD ensures clear visibility even in sunlight. The 505 accepts a standard dry-cell pack, rechargeable nicad battery pack (BP10) or 13.8V external power supply.

Standard accessory circuits such as split switch, noise blanker, squelch and CW break-in are incorporated in the 505.

Other accessories available include the EX-248 FM unit, BC-15 charger unit and the LC-10 carrying case.

All these features make the IC-505 a great transceiver that will enable you to operate on the 50MHz band, after all the rest of the world does!

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

Please note that we now have a new retail branch at 95, Mortimer Street, Herne Bay, Kent. Tel: 369464. Give it a visit, BCNU.

Authorised Icom dealers in the UK

Alexian Electronics Ltd. Edinburgh, 031-554 2591.
Alyntronics, Newcastle, 0632-761002.
Amateur Radio Exchange, London (Ealing), 01-992 5765.
Amcomm, London (S. Harrow), 01-422 9585.
Arrow Electronics Ltd., Chelmsford Essex, 0245-381673/26.
Beamrite, Cardiff, 0222-486884.
Booth Holding (Bath) Ltd., Bristol, 02217-2402.
Bredhurst Electronics Ltd., W. Sussex, 0444-400786.
Dressler (UK) Ltd., London (S. Harrow), 01-558 0854.
D.W. Electronics, Widnes Cheshire, 051-420 2559.
Hobbytronics, Knutsford Cheshire, 0565-4040. Until 10pm daily.
Photo Acoustics Ltd., Buckinghamshire, 0908-610625.
Radcomm Electronics, Co. Cork, Ireland, 01035321-632725.
Radio Shack Ltd., London NW6, 01-624 7174.
Scotcomms, Edinburgh, 031-657 2430.
Tyrone Amateur Electronics, Co. Tyrone, N. Ireland, 0662-2043.
Reg Ward & Co. Ltd., S.W. England, 0297-34918.
Waters & Stanton Electronics, Hockley Essex, 0702-206835.

Listed here are authorised dealers who can demonstrate ICOM equipment all year round. This list covers most areas of the U.K., but if you have difficulty finding a dealer near you, contact Thanet Electronics and we will be able to help you.

Cue Dee Antennas Special Offer!

CUE DEE antennas are designed to last for decades – the best possible aluminium alloy for this purpose is used (SIS 4212-06).

The booms are made of 28mm tubing with 1.5mm wall, with colour marks clearly indicating where to fit the elements. By using tubular boom, and a synthetic guy wire on the long yagis, the windload is reduced by a factor 0.66 compared to using square shaped material for boom and guying.

The driver element is made of 12mm tubing and features a PTFE (Teflon) insulated gamma match which is pre-tuned at the factory and made for 50 ohm feeder with a PL 259 type connector. No further adjustments or power consuming balun needed. This matching system ensures a clean radiation pattern and transfers the power without losses.

The parasitic elements are made of 6mm solid rod and mounted to the boom with the aid of a CUE DEE element washer, boom to element part and a screw. This, together with our intelligible assembly manual, makes an extremely easy and solid assembly which assures the long life of a CUE DEE antenna.

2 metre Yagis.
4144A – 4 element, 8dBd gain £19.00.
10144 – 10 element, 11.4dBd gain £37.00.
15144 – 15 element, 14dBd gain £49.00.
Order now while stocks last.

ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet Electronics

Dept RC, 143 Reculver Road, Herne Bay, Kent. Tel: (0227) 363859

38, BRIDGE STREET, EARLESTOWN, NEWTON LE WILLOWS, MERSEYSIDE
TEL: 09252 - 29881

MUNICATIONS LTD

REGENCY GENERAL COVERAGE SCANNING RECEIVER

Now with extended frequency cover to 1.3 ghz.

OUR PRICE £395

FREQUENCY
25-500MHz
800-1·3GHz
AM + FM

"FULL DUPLEX"

FT2700RH

Dual Band FM 2M and 70cms
Full Duplex Operation
Aesthetically pleasing LCD Display/'S' Meter
25W power output both on VHF and UHF!
Optional Voice Synthesiser
1MHz/25kHz/12"kHz steps (12½ on UHF!)
'+' '−' Repeater shifts with reverse facility
10 Channel Memory
Priority Memory Scan/Programmable Memory Scan
One piece diecast centre chassis
50(H) × 150(W) × 168(D) mm

£495

WHERE'S EARLESTOWN?

IT'S JUST AT THE OTHER END OF YOUR TELEPHONE.
FOR THE MOST COMPREHENSIVE LIST OF GOODS AVAILABLE ON MAIL ORDER JUST PHONE

092 52-29881

All prices include VAT and are correct as we go to press. However, we reserve the right to vary them if forced to do so by the time this advertisement appears.

FT270RH

"45W FM MOBILE"

Fully synthesised 2M FM Transceiver
45W (RH), 25W (R) Power Output
Dual VFOs
Optional Voice Synthesiser
1MHz/25kHz/12½kHz Steps
10 channel memory
'+' '−' Repeater shifts with reverse facility
Memory Priority and Programmable Memory Scan
17 Function Priority and Programmable Memory Scan
17 Function LCD Display, LED 'S' Meter
One piece diecast alloy chassis
(Fan assisted cooling on 45W model)
140mm W × 40mm × 180mm D

£349

Mail order now, same day despatch from Earlestown. Phone with Access or Barclaycard for any item related to Amateur Radio.

SOME EXAMPLES OF OUR PRICES

YAESU		
FT203	Hand held 2M with NiCad	£195
FT209	Hand held 2M with NiCad	£239
FT290	All mode portable	£299
FRG8800	Gen. Cov. H.F. Receiver	£499
FRG8800	With VHF Module	£559
FT757GX	H.F. Gen. Cov. Transceiver	£779
FC757AT	Auto Tuner	£259
FP757HD	Power Supply	£269
FT726	With 2M Module	£799
ICOM		
IC751	H.F. Transceiver	£1,229
IC745	H.F. Transceiver	£869
ICR70	Gen. Cov. Receiver	£589
ICR71	Gen. Cov. Receiver	£675
IC271	VHF Base Station	£689
IC471	UHF Base Station	£789
KENWOOD/TRIO		
TS940	H.F. Transceiver	£1,595
TS430	H.F. Transceiver	£695
R2000	Gen. Cov. H.F. Receiver	£469
R600	Gen. Cov. H.F. Receiver	£275
TH21E	2M Hand Held	£179
TH41E	70cm Hand Held	£199

FREE FINANCE

HAMPSHIRE, YORKSHIRE, HUMBERSIDE, JERSEY

FT203R/FT703R

The FT203R/FT703R is packaged in a light-weight, high-impact plastic case providing comfort and convenience with high durability. The small size is made possible by using chip components.

Thumbwheel frequency selectors (with 5kHz up button) plus standard repeater shift. Volume and Squelch controls are on the top panel along with jacks for the antenna (BNC), external microphone and earphone.

With the optional external YH-2 Headset, the internal VOX system provides voice-actuated transmit/receive switching, for "hands free" operation when mobile or walking. (As FT209R).

Also included is an S/PO meter for monitoring of relative power output and signal strength. (As FT209R).

The FTE-2 1750 Hz tone Burst Generator, which is standard, is activated manually by a button on the side of the FT203R. (As FT209R).

A range of slide-on Nicad packs or AA-cell cases provides the optimum power source for your needs. (As FT209R).

114-146MHz	430-440MHz
−10kHz (+5kHz)	10kHz (+5kHz)
Supply: 5·5-13VDC	Supply: 5·5-13VDC
IF's: 10·695-0·455Hz	IF's: 21·6-0·455MHz
Selectivity: ±6kHz	Selectivity: ±12kHz
@ −6dB (2:1SF)	@ −6dB (2:1SF)

FT209R/FT709R

The FT209R/FT709R with two 4-bit CPU's and a lithium backed RAM offers features far beyond anything yet conceived, in a package smaller and lighter than any previous CPU-controlled transceiver.

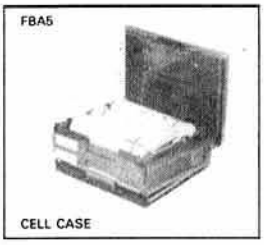
Ten memory channels allow storage of either standard ± shifts, or independent Tx and Rx frequencies for any split/repeater shift on any channel, with touch-key reverse or simplex on either frequency. Scanning capabilities include step-programmable full or partial band memory bank priority scanning etc.

Battery life is greatly extended with a programmable power saver which activates the receiver momentarily at programmable intervals.

Nineteen soft rubber dual function keys provide greater control than ever, yet operation remains easy: the keypad is carefully arranged, colour-coded and most commands are one-touch operations.

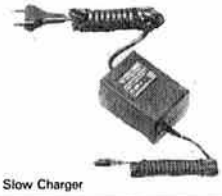
Fat ½" LCD digits are complemented by ten memory and nine special function indicators showing status at a glance.

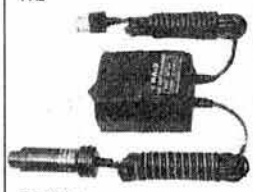
144-146MHz	430-440MHz
25/12·5kHz	50/25kHz
Supply: 6-15VDC	Supply: 6-15VDC
IF's 10·7-0·455MHz	IF's: 21·6-0·455
Selectivity: ±7·5kHz	Selectivity: ±15kHz
@ −6dB (2:1SF)	@ −6dB (2:1SF)


FBA5
CELL CASE


FNB3
10.5V NiCd pack


FNB4
12.5V NiCd Pack


NC9C/NC18C
Slow Charger

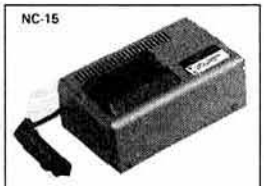

PA3
DC Adaptor


YH-2
Mic Headset (Vox)


MH-12A2B
Speaker Mic


CSC (Series)
Soft Case


MMB-21
Mobile Bracket


NC-15
Quick Charger

Model, supplied cell, power output (Hi/Lo), cases, dimensions				
FT203R	**FT703R**	**FT209R**	**FT709R**	**FT209RH**
1·5/0·2W*, c/w FBA5 CSC6 65W, 34D, 153H mm	1·5/0·2W*, c/w FBA5 CSC6 65W, 34D, 153H mm	1·8/0·2W*, c/w FBA5 CSC10 65W, 34D, 168H mm	1·8/0·2W*, c/w FBA5 CSC10 65W, 34D, 168H mm	2·3/0·3W*, c/w FBA5 CSC10 65W, 34D, 168H mm
2·5/0·3W, c/w FNB3 CSC6 65W, 34D, 153H, 482gms	2·5/0·3W, c/w FNB3 CSC6 65W, 34D, 153H mm, 480gms	2·7/0·3W, c/w FNB3 CSC10 65W, 34D, 168H, 512gms	3·0/0·3W, c/w FNB3 CSC10 65W, 34D, 168H mm, 555gms	3·7/0·4W, c/w FNB3 CSC10 65W, 34D, 168H mm, 512gms
3·5/0·4W, c/w FNB4 CSC7 65W, 34D, 172H, 490gms	3·5/0·4W, c/w FNB4 CSC7 65W, 34D, 172H mm, 495gms	3·7/0·4W, c/w FNB4 CSC11 65W, 34D, 186H, 520gms	4·0/0·4W, c/w FNB4 CSC11 65W, 34D, 186H mm, 570gms	5·0/0·5W, c/w FNB4 CSC11 65W, 34D, 186H mm, 520gms

BATTERY AND CHARGER OPTIONS

Good 50ohm match to liners and antennas
Frequency Modulation (FM-F3-G3E)
Variable Reactance linear modulator
Sensitive quality, 2K ohm condensor mic
±5kHz Max Dev, 16kHz max bandwith
Transmitter spurious output−60dB

FBA5 Battery Case Only
9v* 6 "AA" Dry, 7·2v 6 "AA" NiCd
FNB3 NiCd Pack 10·8 volts, 425mAh
NC9C (15 hours), NC15 (1 hour)
FNB4 NiCd Pack 12·5 volts, 500mAh
NC18C (15 hours), NC15 (1·5 hours)

Large range of accessories available
Supplied with YHA14A/YHA44D helical
Antenna and appropriate soft case
Sensitivity: 0·25μV for 12dB sinad
1·0μV for 30dB S/N
A.F.Output: 450mW into 8ohms @ 10% THD

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

CHESTERFIELD
SMC (Jack Tweedy) Ltd
102 High Street,
New Whittingdon, Chesterfield
Chesterfield (0246) 453340
9.30-5.30 Tue-Sat

BUCKLEY
SMC (TMP)
Unit 27, Pinfold Lane
Buckley, Clwyd
Buckley (0244) 549563
10-5 Tue, Wed, Fri
10-4 Sat

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

GRIMSBY
SMC (Grimsby)
247A Freeman Street,
Grimsby, Lincs
Grimsby (0472) 59388
9.30-5.30 Mon-Sat

JERSEY
SMC (Jersey)
1 Belmont Gardens
St Helier, Jersey
Jersey (0534) 77067
9-5.30 Mon-Sat
Closed Wednesday

BANGOR
SMC (N Ireland)
10 Ward Avenue
Bangor, Co Down
Bangor (0247) 464875

Southampton showroom open 9-5.30 Mon-Fri, 9-1 Sat

HQ & MAIL ORDER S.M. HOUSE, RUMBRIDGE ST. TOTTON, SOUTHAMPTON,

SMC **South Midlands**

2 YEAR GUARANTEE ●

DERBYSHIRE, STAFFORDSHIRE, CLWYD, CO. DOWN

FT ONE	Transceiver General Coverage HF All Mode	1850.00
D3000286	Curtis Keyer	33.35
DCTONE	DC Power Cable	11.50
RAMTONE	Non volatile memory board	14.95
FMUTONE	FM unit	48.30
XF8.9KA	6KHz AM filter	19.95
XF8.9KCN	300Hz CW filter	19.95
XF8.9KC	600Hz CW filter	19.95
XF10.7KC	800Hz CW filter	18.40
FTV107R	Transvertor (main frame only) 2 band capability	49.00*
WMTONE	Workshop Manual	15.00
PARTONE	Parts List	10.00
FT77	Transceiver 8 band mobile multimode 100 watts	479.00
FT77S	Transceiver 8 band mobile multimode 10 watts	449.00
MRKT77	Calibration marker unit option	10.75
FMUT77	FM Board option	28.35
AMUT77	AM Board option	23.35
FP700	Base station external power supply/speaker	170.00
FC700	Antenna tuner	119.00
XF8.9KC	600Hz CW filter	19.95
MMB16	Mobile mounting bracket	15.70
FV700DM	Digital V.F.O.	220.00
FTV700R	Transvertor main frame only	135.00
50TV	6m Transvertor module All models FTV	125.00*
70TV	6m Transvertor module All modes FTV	130.00*
144TV	2m Transvertor module All models FTV	170.00
430TV	70cms Transvertor module All models FTV	299.00*
FT757GX	General Coverage, Ham bands Rx/Tx	829.00
FC757AT	Automatic antenna tuner—Ham bands	290.00
FP757GX	Switch mode psu (50% duty FM service)	180.00
FP757HD	Heavy Duty psu (100% duty FM service)	200.00
FRB757	Switch box for FT757GX to FL2100Z	9.95
MMB20	Mobile mount for FT757GX	20.70
FIF61‡	Computer interface for PC6001 (NEC)	48.70
FIF65(A)‡	Computer interface for Apple II	60.95
FIF80(A)‡	Computer interface for PC8001 (NEC)	122.65
FIF232C‡	Computer interface RS232C	64.80
TST757	Technical Supplement FT757	8.50
FT980	Transceiver General Coverage Rx Amateur Tx	1650.00
D3000286	Curtis Keyer	33.35
SP980	External speaker with audio filter	79.75
SP980P	External speaker with phone patch	105.00
XF455-8MCN	300Hz CW filter (455KHz 8 pole)	52.50
XF8.9HC	600Hz CW filter	33.35
XF8.9GA	6KHz AM filter	33.35
D410004	Interconnect lead FT980 to FC757AT	32.95
TST980	Technical Supplement FT980	8.50
FL2100Z	Linear 160-10M (9 band) 1·2KW P.I.P	739.00
FRG7700	Receiver 0·15-30·0MHz AM/CW/SSB/FM	385.00
FRG7700M	Receiver c/w 12 channel memory	455.00
DCRG7700	DC modification kit	1.50
MEMG7700	Memory option	74.75
FRT7700	Antenna tuner/switch	49.85
FRA7700	Active antenna	43.70
FF5	Low pass filter 500KHz	10.75
FRV7700A	Convertor 118-130, 130-140, 140-150MHz	75.00*
FRV7700B	Convertor 118-130, 140-150, 50-59MHz	75.00*
FRV7700C	Convertor 140-150, 150-160, 160-170MHz	75.00*
FRV7700D	Convertor 118-130, 140-150, 70-80MHz	75.00*
FRV7700E	Convertor 140-150, 150-160, 118-130MHz	75.00*
FRV7700F	Convertor 150-160, 160-170, 118-130MHz	75.00*
WMRG7700	Workshop manual FRG7700	9.00
FRG8800	Rx 0·15-30·0MHz AM/CW/SSB/NBFM	569.00
FRV8800	Convertor 118-175MHz	90.00
FRVWFM	Module for wide band F.M.	TBA
FRG9600	60-905MHz Scanner, FM, SSB, AM, CW	475.00
PA4(C)	DC power supply	TBA

FT203R	Tx/Rx Thumbwheel, 2M, 1·5W c/w FBA5	195.00
FT203R	Tx/Rx Thumbwheel, 2M, 2·5W c/w FNB3	225.00
FT203R	Tx/Rx Thumbwheel, 2M, 3·5W c/w FNB4	230.00
FT703R	Tx/Rx Thumbwheel, 70cm c/w FBA5	229.00
FT703R	Tx/Rx Thumbwheel, 70cm c/w FNB3	259.00
FT703R	Tx/Rx Thumbwheel, 70cm c/w FNB4	265.00
FBA5†	7·2/9V cell case only (6 × AA)	8.80
FNB3†	10·8V Nicd Pack (425mAH)	36.40
FNB4†	12·0V Nicd Pack (500mAH)	41.40
CSC6	Soft carrying case (FBA5 or FNB3)	6.90
CSC7	Soft carrying case (FNB4)	8.45
FTS7†	Sub Audio Tone Board (replaces FTE-2)	29.90
YH2†	Headset (PTT via vox)	15.70
MH-12A2B†	Speaker microphone	18.80
MMB21†	Mobile hanging bracket	8.05
PA3†	Charger/eliminator for 12VDC	18.00
NC9C†	Charger mains (FNB-3)	9.60
SMC8-9AA†	Charger mains (13 Amp style)	8.80
NC18C†	Charger mains (FNB-4)	9.60
NC15†	Charger quick/DC adaptor	65.95
YHA14	Antenna helical (BNC fitting) 2M	8.80
FT209R	Tx/Rx "Keyboard" 2M, 1·8W c/w FBA5	239.00
FT209R	TX/Rx "Keyboard" 2M, 2·7W c/w FNB3	269.00
FT209R	Tx/Rx "Keyboard" 2M, 3·7W c/w FNB4	275.00
FT209RH	Tx/Rx "Keyboard" 2M, 2·3W c/w FBA5	245.00
FT209RH	Tx/Rx "Keyboard" 2M, 3·7W c/w FNB3	275.00
FT209RH	Tx/Rx "Keyboard" 2M, 5·0W c/w FNB4	280.00
FT709R	Tx/Rx Keyboard, 70cms, c/w FBA5	259.00
FT709R	Tx/Rx Keyboard, 70cms, c/w FNB3	289.00
FT709R	Tx/Rx Keyboard, 70cms, c/w FNB4	295.00
CSC10	Carrying case (FBA5/FNB3)	9.20
CSC11	Carrying case (FBN4)	9.95
FT208R	Tx/Rx Handheld, 2M, 2·5W, Keyboard	209.00
FNB2	Nicad Battery Pack	24.90
FBA2	Battery pack sleeve (fits FNB2)	3.85
FBA3	Charging sleeve (for use with FT207 acc)	5.00
SMC8.9AA	Slow charger (13A style)	8.80
NC9C	Slow charger	9.60
NC7C	Base Master	34.65
NC8C	Base Master with quick charge and PSU	64.80
PA3	Battery eliminator and charger from 12V	18.00
SMCFLC5	Heavy duty leather case	25.30
FTS32	Tone squelch unit	POA
MMB10	Mobile bracket	8.80
WMT208	Workshop Manual FT208	9.00
WMT708	Workshop Manual FT708	9.00
FT690R	Transceiver 6M 2·5W multimode synthesised	289.00*
FT290R	Transceiver 2M 2·5W multimode synthesised	349.00
FT790R	Transceiver 70cm 1W multimode synthesised	299.00*
SMC2-2C	Nicad cell, 2·2 A/hr 'C' size	2.70
NC11C	Slow charger (180mA)	11.50
SMC8C	Slow charger (220mA) (13A style)	10.35
MMB11	Mobile mount	31.45
CSC1A	Soft carrying case	5.00
Q3000020	Antenna telescopic (spare)	6.50
YHA15	Flexible helical antenna	7.65
YHA44	Antenna 70cms, 0·5 wave, semi-flexi	10.19
YHA44D	Antenna 70cms, 0·25 wave, semi-flexi	7.65
FL2010	Linear amplifier 2M 10W	69.00
FL6010	Linear amplifier 6M 10W	50.00*
FT230R	Transceiver 2M FM 25W synthesised	POA
FT730R	Transceiver 70cm FM 10W synthesised	239.00
MMB15	Mobile mounting bracket	14.55
FT270R	Transceiver 2M, FM, 25W synthesised	349.00
FP270RH	Transceiver 2M, FM, 45W synthesised	399.00
FT2SYNTH	Voice synthesiser module	24.15
FT680R	Multimode transceiver 6M	379.00
FP80A	Power supply unit	57.50

MMB8	Mobile bracket 680/480/780	9.95
FL2050	Linear amplifier 50W output 2M	115.00
WMT480R	Workshop Manual FT480R	13.00
FT76R(2)	Multimode multiband base station c/w 2M	869.00
FT726R	Main frame only	699.00
21/24/28	HF module for 15M, 12M and 10M	235.00
50/726	6M module	214.65
144/726	2M module	170.00
430/726	70cm module	295.00
SAT726	Full duplex module	110.00
XF455MC	600Hz CW filter	54.80
DCT726	DC Lead for FT726R	8.80
TST726	Technical Supplement 726	9.00
FT2700R	Tx/Rx, 2M/70cms, 25W/25W, full duplex	559.00
FT2SYNTH	Voice synthesiser module	24.15
FYP80	12V power supply	57.50
QTR24D	World time clock quartz	34.50
FF501DX	Low pass filter	31.45
YP150Z	Terminated Wattmeter 5-30-150W FSD	97.75
YC1000L	Data Logger (V, F, T, etc)	419.00*
YM24A	Hand 2K, 6 pin min, speaker/mic, handheld	23.75
YM36	Hand 600, 8 pin, noise cancel	18.80
YM37	Hand 600, 8 pin	9.20
YM38	Stand 600/50K, 8 pin scan	32.95
YM47	Hand 600, 7 pin, scan control	13.80
YM48	Hand 600, 8 pin, keyboard	46.00
YM49	Hand 600, 7 pin, speaker/mic	20.30
YE7A	Hand 600, 4 pin	9.60
YD148A	Stand 600/50K, 4 pin	28.35
MH-1B8	Hand 600, 8 pin scan adjustable tone	17.65
MD-1B8	Desk 600, 8 pin scan adjustable tone	74.75
SP55	External Mobile speaker	14.95
YH55	Headphones padded low Z ¼" jack	16.10
YH77	Headphones lightweight low Z ¼" jack	15.70
MF-1A3B	Boom Microphone Mobile	19.95
YH1	Lightweight mobile headset/boom	15.70
SB1	PTT switch box wired for FT208/FT708	18.00
SB2	PTT switch box wired for FT290/FT790	17.25
SB3	PTT switch box wired for FT202	15.70
SB10	PTT switch box wired for FT2700R/FT270R	17.25

*Special offer—limited stocks.
‡Matches FT980 and FRG8800.
†Accessories for FT209 also.

SPECIAL OFFERS

FRV7700	Converters, all models	£75.00
AM/FMUT102	FT102 AM/FM unit	£49.00
FV102DM	External VFO	£230.00
FV101DM	External VFO	£145.00
SP980P	External spkr w/phonepatch	£105.00
FT101ZD	Warc mod kit A	£13.50
FT301	CW filter XF90C	£21.00
FRG7	Fine tune kit	£3.00
FT301	Counter unit	£39.00
YQ901	Pan adaptor unit	£45.00
FT101Z	Counter unit (B)	£115.00
YR901	Local loop unit	£19.00
FT901	Warc mod kit	£20.00
FT901	Counter unit	£95.00

SPC 3000 ATU

1.5kW. Built-in antenna and SWR bridge.
Balanced—unbalanced feed connections

NOW IN STOCK

SAVE £50! £299

+CARR

***FREE FINANCE**
On many regular priced items SMC offers Free Finance for invoice balance over £120. 20% down and the balance over 6 months or 50% down and the balance over a year.
You pay no more than the cash price!!
Details of eligible items available on request.

SMC SERVICE
Free Securicor delivery on major equipment.
Access and Barclaycard over the phone.
Biggest branch agent and dealer network.
Securicor 'B' Service contract at £5.00.
Biggest stockist of amateur equipment.
Same day despatch whenever possible.

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

Stock Carrying Agents: John Doyle, Transworld Comms, Neath (0639) 52374 Day (0639) 2942 Eve.
Jack McVicar, Scotcomms, Edinburgh. 031-657 2430
Norman Dilley, Dartcomms, Dartmouth (080 43) 3534 (Day)

SO4 4DP, ENGLAND. Tel: (0703) 867333 Telex: 477351 SMCOMM G

Communications ltd.

AUTHORISED YAESU

HAMPSHIRE, YORKSHIRE, HUMBERSIDE, JERSEY,

SCANNING RECEIVER

MS8400 £249 LIMITED PERIOD ONLY £229

The SMC M8400 VHF/UHF Microprocessor controlled scanning receiver with 40 Programmable memory channels, keyboard entry of frequency or command; auto band search; AM/FM selectable, 4 selectable scanning steps, priority channel, connection for external antenna; supplied complete with telescopic antenna, mounting brackets etc.
Specifications:- low VHF 68-88 MHz, mid 108-136MHz High 108-136MHz, UHF 360-512MHz; Scanning steps 5, 10, 12.5, 25KHz VHF; 10, 12.5, 25KHz UHF. AM or FM selectable; selectivity 60dB g±25KHz; power supply DC 12-16V Max; memory backup 9V (pp3) size 190w×250d×85h mm; Wt 1.7Kg. Carriage free. EVEN BETTER WITH MAST HEAD AMPLIFIER 40-800MHz ONLY £30.00.

10M FM BARGAIN

ONLY £65

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

J-BEAM ANTENNAS
FOR STRENGTH

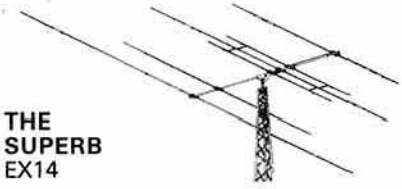
Before buying a Yagi—check the weight/No. of elements ratio. If it is less than the Jaybeam, it is probably skimped; will it last through the winter gales? Buy Jaybeam and be sure of quality.

			inc vat	P&P
4 METRES				
4Y/4M	Yagi 4 element	7dBd	£32.78	£2.65
PMH2/4M	Phasing harness 2 way		£17.82	£1.65
2 METRES				
H0/2M	Halo head only	0dBd	£6.33	£1.50
HM/2M	Halo with 24" mast	0dBd	£7.48	£1.65
C5/2M	Colinear omni vert	4·8dBd	£86.25	£2.65
LW5/2M	Yagi 5 element	7·8dBd	£15.53	£2.65
LW8/2M	Yagi 8 element	9·5dBd	£19.56	£2.65
LW10/2M	Yagi 10 element	10·5dBd	£25.30	£2.65
LW16/2M	Yagi 16 element	13·4dBd	£35.07	£3.65
PBM10/2M	10 ele Parabeam	11·7dBd	£49.45	£3.65
PBM14/2M	14 ele Parabeam	13·7dBd	£60.95	£3.65
Q4/2M	Quad 4 element	9·4dBd	£31.63	£2.65
Q6/2M	Quad 6 element	10·9dBd	£41.40	£2.65
Q8/2M	Quad 8 element	11·9dBd	£51.75	£2.65
D5/2M	Yagi 5 over 5 slot	10dBd	£27.60	£2.65
D8/2M	Yagi 8 over 8 slot	11·1dBd	£37.95	£2.65
5XY/2M	Yagi 5 ele crossed	7·8dBd	£29·90	£2.65
8XY/2M	Yagi 8 ele crossed	9·5dBd	£38.53	£2.65
10XY/2M	Yagi 10 ele crossed	10·8dBd	£43.80	£2.65
PMH2/C	Harness cir polarisation		£11.50	£1.65
PMH2/2M	Harness 2 way 144MHz		£13.23	£1.65
PMH4/2M	Harness 4 way 144MHz		£31.62	£1.65
70 CMS				
C8/70	Colinear Vertical	6·1dBd	£92.00	£2.65
D8/70	Yagi 8 over 8 slot	12·3dBd	£28.18	£2.65
PBM18/70	18 ele Parabeam	13·5dBd	£34.50	£2.65
PBM24/70	24 ele Parabeam	15·1dBd	£46.00	£2.65
LW24/70	Yagi 24 element	14·8dBd	£31.05	£2.65
MBM28/70	28 ele Multibeam	11·5dBd	£23.00	£2.65
MBM48/70	48 ele Multibeam	14·0dBd	£37.96	£2.65
MBM88/70	88 ele Multibeam	16·3dBd	£51.75	£2.65
8XY/70	Yagi 8 ele crossed	10dBd	£45.85	£2.65
12XY/70	Yagi 12 ele crossed	12dBd	£55.20	£2.65
PMH2/70	Harness 2 way		£12.07	£1.85
PMH4/70	Harness 4 way		£24.73	£1.85
23 CM				
CR2/23CM	Corner reflector	13·5dBd	£43.13	£2.65
PMH2/23CM	Harness 2 way		£32.78	£1.65

Carriage extra, mainland rate shown

HF ANTENNAS
VALUE FOR MONEY

Whether the top of the range hygain, the economic Jaybeam or mini Beam/Quads only SMC Stocks them all and at competitive prices.



THE SUPERB EX14

MULTIBAND BEAMS		Inc VAT	P&P
EX14	Explorer 10-20m	£499.00	£7.50
TH3JNR	3 Ele 10-20m	£298.00	£4.50
TH5Mk2	5 Ele 10-20m	£649.00	£7.70
TH7DXX	7 Ele 10-20m	£755.00	£9.75
TB3	3 Ele 10-20 Jaybeam	£212.75	£5.90
HQ1	Mini Quad 10-20	£199.00	£4.00
G4MH	Mini Beam 1-20	£88.50	£4.50
TA33JNR	3 Ele 10-20 Moseley	£177.10	£6.00
Mustang 2	2 Ele 10-20 Moseley	£177.10	£6.90
Mustang 3	3 Ele 10-20 Moseley	£220.80	£6.90
GQ2E	2 Ele 10-20 Quad	£299.00	£5.90
GQ3E	3 Ele 10-20 Quad	£536.00	£9.20
GQ4E	4 Ele 10-20 Quad	£745.00	£10.00
Hyquad	2 Ele 10-15M dipole 20M	£345.00	£8.00
LP1007	Log Periodic 13-20 MHz	£2195.00	DIST
3Y1015D20	3 Ele 10/15M Dipole 20M	£179.00	£5.95
DB10/15A	3 Ele 10-15m	£209.00	£4.80

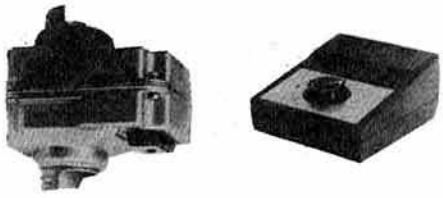
Only **EXCELLENT VALUE TB3**

MONO BAND BEAMS			
103BA	3 Ele Yagi 10m	£99.00	£3.95
105BA	5 Ele Yagi 10m	£220.00	£3.95
153BA	3 Ele Yagi 15m	£135.00	£3.90
155BA	5 Ele Yagi 15m	£339.00	£5.90
203BA	3 Ele Yagi 20m	£259.00	£4.90
204BA	4 Ele Yagi 20m	£420.00	£7.30
205BA	5 Ele Yagi 20m	£499.00	£9.40
VERTICALS			
12AVQ	Vertical 10-20m	£78.95	£2.75
14AVQ/WB	Vertical 10-40m	£106.00	£2.75
18V	Vertical 10-80m taped	£38.80	£2.75
C4	Vertical 10-20m	£89.00	£2.50
SMCHF5V	Vertical 10-80m	£66.50	£3.00
SMCHF5R	Radial Kit for above	£41.00	£3.00
TRAP DIPOLE			
SMCTD/HP	High Power 10-80m	£49.00	£2.65
SMC TD/P	Portable inc coax	£69.00	£2.65
MOBILE			
Tribander	10-20m Slide sw.	£29.33	£2.20
Multimobile	10-20m	£33.92	£1.85
Flexiwhip	10m only	£19.21	£2.20
Extra coils	For above to 160m	£7.25	£1.00
Flexiten	2, 10, 12, 17, 15, 20, 30, 40, 80M	£52.33	£2.35
Bases	For above	£6.90	£1.00

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

THE ONLY FULL SIZED ECONOMIC ROTATOR.

There are other much smaller and slightly cheaper models on the market designed for TV Aerials, but the Oscar FU200 was specially designed for most VHF Yagis.



ONLY £49.95 inc. p/p

ROTATOR—Operating Voltage: 22V/50-60Hz. Motor Current: 1.5A. Vertical Load: 30 Kilograms. Max. Bending Moment: 2650 inch/lbs. Max. Rotary Moment: 250 inch/lbs. Angle of Rotation: 360°. Rotation Time 360°: 60 seconds. Mast: 38-50mm. Rotor Pole: 38-50mm. Dimensions: W 174mm, H 190mm, D 140mm.
CONTROL UNIT—Mains Unit: 110, 220, 240V/50-60Hz. Operating Voltage: 22V/50-60Hz. Dimensions: W 160mm, H 95mm, D 216mm.

NEW
ROTATOR KR5400

THE NEW KR5400 has a combined control unit for azimuth and elevation using KR400RC/KR500 Head Units; The full Kempo range ex-stock—now the most sought after rotators for amateurs world-wide.

ROTATORS CARRIAGE FREE. Cable £1.90 unless SENT WITH ROTATOR.

KR400RC SHOWN

KR250	Bell 6 Core Light Duty.	£ 61.95
KR400	Bell 6 Core Matches KR500	£109.95
KR400RC	Bell 5 Core Medium Duty.	£132.50
KR600RC	Bell 6 Core Heavy Duty.	£189.50
KR200RC	Bell 8 Core Heavier Duty.	£366.50
KR500	THRO 6 Core Elevation.	£139.95

COAXIAL CONNECTORS

UHF CONNECTORS.		
PL259	Standard 112mm	60p
PL259R	Push on 11.2mm	85p
UG175	Reducer 5mm	16p
UG176	Reducer 5.6mm	16p
PL259R	Reduced type 5mm	70p
PL259A	Deluxe 11.2mm	£295
PL259B	Deluxe 5mm.	£2.35
PL259E	Angle 5mm.	95p
PL259M	Metric standard	80p

UHF SOCKETS		
SO239F	4 Hole	60p
SO239F31	4 Hole PTFE	£1.55
SO239T	2 Hole	56p
SO239NI	Nut inner fitting	68p

p&p connectors 65p any quantity

BARGAIN CORNER

Ex demo & s/hand—phone for more details.

MML144-100s Att. 100w-10w drive 2M	£115.00
MS-8400 SMC Scanning Receiver	£215.00
FRG7700 General coverage receiver	£345.00
BEARCAT220 Scanning Receiver	£185.00
KDK FM2033 2M FM Transceiver	£225.00
BNOS 12/12A 12 Amp power supply	£76.00
KP100 Squeeze key CMOS	£66.00
SP4 Speech processor	£49.00
FS500H Power meter 1.8-60MHz	£65.00
2×TAU ATUs Large/Small	£300/79.00
Mirage 3016 160w-30w drive 2M Amp	£189.00
FRG7700M General coverage receiver	£365.00
2 HANS EN F300V SWR/PWR	£40.00
FS500 Power meter 1.8-60MHz	£65.00
SX200 Scanning receiver	£215.00

SMC

South Midlands

DERBYSHIRE, STAFFORDSHIRE, CLWYD, CO. DOWN

VERSATOWER COPIED BUT NOT EQUALLED

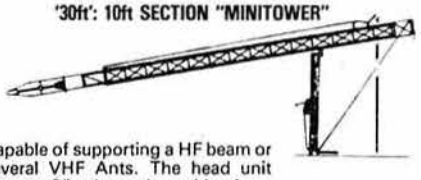
TELESCOPIC & TILT OVER RADIO TOWERS 25-120ft

15 years of continuous development keeps us ahead with versatowers—why risk your safety on anything less or copies using inferior components?

Below is a photograph of the versatowers chosen for the important approach lights of Manchester Airport. Others are in use from the Antarctic to dessert regions. All conform to current B.S.S. requiring minimum designed wind speeds of 85 m.p.h. and up to 117 m.p.h.

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.

'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.

SEND NOW FOR SPECIFICATIONS/PRICES

They cost less than you would expect:

Post mounting 30ft inc. VAT	**£429.92**
Post mounting 60ft inc. VAT	**£573.96**

DELIVERY AT COST

MOBILE VERTICALS HF-UHF ANTENNAS 10,000 UK AMATEURS CAN'T BE WRONG

The SMC range lead in the development of the modern mobile antenna, unbeatable quality of both construction and performance—get value for your money. Some inferior copies are actually dearer.

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

78F

NEW

MOBILES

SMC38F 2m ⅝λ 1·5dB 0·77m
SMC70N2S 2m ¼λ 0dB, 70cm ⅝λ 3·2dB 0·47m
SMC70N2DX 2m ⅝λ 4·5dB, 70cm 3 × ⅝λ 7·2dB 1·55m
SMC2N5M 2m ⅝λ 3dB, 6m ¼λ 0dB 1·15m

BASE:-Fibreglass one piece

SMC70N2FG 2m½λ 2·8dB, 70cm 2 × ⅝λ 5·7dB 1·2m
SMC358FG 70cm 3 × ⅝λ 7·2dB 1·7m

PRICES T.B.A.

SMC-HS MOBILE ANTENNAS		£	P&P
SMC6P2T/PL	Telescopic 2M PL259 fitting ¼λ	5.75	0.85
SMCT144h	Telescopic 2M ½ wave BNC	10.35	0.85
SMC6P2T/BNC	Telescopic 2M BNC fitting ¼λ	6.90	0.85
SMC2H/PL	Helical 2M PL259 fitting	5.95	0.85
SMC2H/BNC	Helical 2M BNC fitting	6.90	0.85
SMCHS430S	70cm ½ wave BNC 2.5dB¼	8.75	0.65
SMC2QW	2M ¼ wave 0dB¼ 1.6'	2.70	1.85
SMC2NE	2M ½ wave fold 3.0dB¼ 4.3'	7.95	2.00
SNC2VF	2M ½ wave fold 3.0dB¼ 3.5'	14.66	2.00
SMC78F	2M ½ wave fold 4.5dB¼ 5.7'	16.95	2.50
SNC78B	2M ½ wave ball 4.5dB¼ 5.6'	16.95	2.59
SMC78SF	2M ½ wave short 4.7'	16.95	2.50
SMC88F	2M 8/8 wave 5.2dB¼ 6.5'	22.95	2.50
SMC118M	Colinear 2M 11/8 7dB¼ 9.7'	39.85	2.65
SMC258	70cm 2 × ½ fold 5.5dB¼ 3.1'	26.95	2.00
SMC268E	70cm section colinear 6dB¼	29.95	2.00
SMC358	70cm 3 × ½ 6.3dB¼ 4.7'	20.95	2.00
SMC70N2M	Dual band 2M 2.7dB¼ 70cm 5.1dB¼ (¼λ & 2⅝λ)	20.95	2.00
SMCHS770	144/432 Duplexer 50W	19.55	1.85
SMC20SE	20M 1.72M 100W PEP	21.50	2.50
SMC15SE	15m 1.72M 130W PEP	16.85	2.50
SMC10SE	10M 1.72M 200W PEP	15.95	2.50
SMC17SE	17M 1.915M 200W PEP	18.75	2.50
SMC12SE	12M 1.915M 200W PEP	16.85	2.50
RSL-28b	Yaesu 10M mobile whip	10.65	2.00
SMCGCCA	Gutter clip 4 mtrs cable	11.50	2.00
SMCSOCA	Cable assembly 4M PL259	5.65	1.50
SMCSOCAL	Cable assembly 6M PL259	5.95	1.50
SMC50CALLR	Cable assembly 5M PL259	6.65	1.50
SMCROL	Rollet, 10mm thick (for above)	1.15	0.50
SMCTMCAS	Trunk mount c/w 6M cable	10.65	2.00
HDTMCA	HD trunk mount c/w 5M cable	16.10	2.00
SMCSOMM	Magnetic base c/w 4M cable	11.95	2.00
SMCSOWM	Adjustable wing mount base	4.95	0.90
SMCGCD	Gutter clip deluxe	5.30	1.50
SMCBSD	Bumper strap deluxe	10.95	1.50

POWER METERS—QUALITY + VALUE

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

SMC offer the best: Hansen range with 30 models to choose from. The top of this range is THF FS710 this is a flat frequency response, peak envelope power and average in-line watt meter with many novel features, noteably being the 'Power Independent' SWR Scale—no forward power calibration knob, just direct reading SWR. To the economical and the most popular T3-170L.

T3-170L
only
£17.25

SWR50B
only
£30.50

FS500H
value at
£81.95

FS710V
value at
£107.80

Carriage free by post

HANSEN				
FS710V	50-150MHz	15/150W	Pep	**£107.80**
FS50HP	1.8-60MHz	20/200/2000W	Pep	**£106.70**
FS50VP	50-150MHz	20/200W	Pep	**£106.70**
FS500H	1.8-60MHz	20/200/2000W	Pep	**£81.95**
FS500V	50-150MHz	20/200W	Pep	**£81.95**
FS300H	1.8-60MHz	20/200/100		**£53.50**
FS300V	50-150MHz	20/200		**£53.50**
FS200	1.8-150MHz	20/200	Pep	**£59.35**
FS601M	1.8-30MHz	20/200W	Pep	**£62.15**
FS601MH	1.8-30MHz	200/2000W	Pep	**£62.15**
FS603M	430-440MHz	5/20W	Pep	**£62.15**
FS210	1.8-150MHz	20/200W Auto/SWR		**£65.50**
FS301M	2-30MHz	20/200W		**£42.25**
FS301MH	2-30MHz	200/2000W		**£42.25**
FS711H	2-30MHz	20/200W Head/Display		**£43.65**
FS711V	50-150MHz	20/200W Head/Display		**£43.65**
FS711U	430-440MHz	5/20W Head/Display		**£43.65**
FS5E	3.5-150MHz	20/200/1000W	HF	**£42.75**
FS5S	1.8-150MHz	20/200/2000W	HF	**£42.75**
SWR3E	3.5-150MHz	20/200/1000W	HF	**£28.75**
SWR50B	3.5-150MHz	Twin Meter		**£30.50**
FS20DL	3-150MHz	1/10W		**£43.65**
FS20D	3-150MHz	5/20W		**£43.65**
FS-800	1.8-150MHz	6/30/150W		**£130.95**

NB: PRICES INCLUDE VAT AT 15%

Communications ltd.

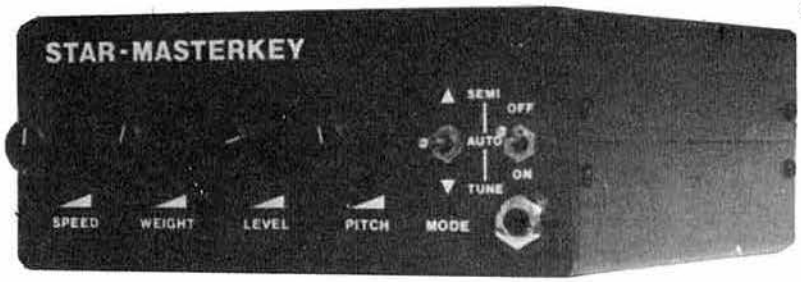
AUTHORISED YAESU

DEWSBURY ELECTRONICS

G4CLX

APPROVED TRIO DEALER

APPROVED TRIO DEALER



THE NEW ELECTRONIC KEYER STAR-MASTERKEY

The STAR-MASTERKEY has been designed with both the established CW operator and the newcomer in mind.

Featuring full IAMBIC keying, together with the facility for SEMI-AUTOMATIC keying, the STAR MASTERKEY has DASH/DOT memories, SPEED ranges from 1-55 WPM, and the facility to allow the user to select either POSITIVE OR NEGATIVE keying, thus suiting both the latest transistorised transmitters and the valved transceivers.

The built-in SIDETONE OSCILLATOR and LOUDSPEAKER offer the facility of monitoring the generated morse code. For practice purposes a HEADPHONE socket has been provided on the rear panel.

Power may be derived from a user supplied 9 volt battery (internally mounted) or from a 6-15 volt DC external power supply, making the KEYER ideal for shack or field day and portable use.

The STAR-MASTERKEY is attractively packaged in a custom designed black vinyl covered steel enclosure with screen printed, anodised aluminium front panel.

The STAR-MASTERKEY has been BRITISH built in response to the soaring cost of imported equipment, and is fully guaranteed for a period of five years.

The STAR-MASTERKEY is available, complete with DC power lead and all necessary plugs from DEWSBURY ELECTRONICS and other discerning dealers for only **£49.95** including VAT.

Available by mail order Post and Packing £3.00.

Suitable mains power supply **£10.00** P&p £1.50. Paddles available for the above from **£15.00**.

Dewsbury Electronics offer a full range of **Trio Equipment** always in stock

We are also stockists of DAIWA—MET ANTENNAS—MUTEK—WOOD & DOUGLAS—TASCO TELEREADERS—MICROWAVE MODULES—ICS AMTOR—AEA PRODUCTS—DRAE

Dewsbury Electronics, 176 Lower High Street, Stourbridge, West Midlands.
Telephone: Stourbridge (0384) 390063/371228.
Telex: 337675 TELPES G

BARCLAYCARD VISA

Instant finance available subject to status. Written details on request.

Access

RADIO SOCIETY OF GREAT BRITAIN

THE NATIONAL SOCIETY REPRESENTING ALL UK RADIO AMATEURS

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

PATRON: HRH PRINCE PHILIP, DUKE OF EDINBURGH, KG

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

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

EDITORIAL

THE YOUNG IN AMATEUR RADIO

Amateur radio is one of those few, marvellous activities in which people of all ages can come into and participate essentially on an equal basis. What is perhaps a little surprising in the case of amateur radio is that this can and does happen despite it being one of the few hobbies controlled by national and international regulations. Indeed, it always seems to be rather remarkable that traditionally reserved legislators should allow those under 14 years of age to obtain their Amateur Radio Certificate which permits them to operate and gain experience until they can obtain a full licence at the ripe old age of 14. The Society supports this philosophy by allowing those over 14 and under 18 years of age with a transmitting licence to become full corporate members of RSGB—a most unusual situation.

There is, of course, another aspect of encouraging young people: they represent the future of amateur radio. Here, in practice, the future looks somewhat less than rosy. There is little doubt that fewer young people have been coming into amateur radio over the last few years. One acceptable reason of course, is that there are fewer young people! A second reason, far less acceptable, is that fewer are interested in amateur radio. This is clearly indicated by the relative lack of activity in schools and universities. Various causes can be identified: an obvious one is that we now live in a world of domestic satellite intercontinental communication. Another is, or has been the glamour of digital electronics as compared with rf electronics—something that has been of major concern to industry as well as to amateur radio.

We could all suggest things that should be done. For example, satellites are regarded as having considerable potential in terms of their role in education, while the recent growth of genuine use of computers in communications—involving, for example, sstv, rtty, Amtor and packet radio—may prove to be one of those bridges between activities which will prove of great benefit to both computer and amateur radio enthusiasts.

D A Evans, G3OUF

SIXTY GLORIOUS YEARS!

A personal view by PAT HAWKER, G3VA

"Sixty glorious years" was the phrase popularly used at the time of Queen Victoria's Diamond Jubilee in 1897—but now purloined to commemorate 60 years of the RSGB's journal.

Volume 1 Number 1 of the T & R Bulletin *was published in July 1925. Now 720 issues later we trace its story, covering the growth of the hobby from around 1,000 "experimental" transmitters in 1925 to over 50,000 licensed British amateurs today. It is based on an updated version of "Bulletin reflections" that appeared in the Golden Jubilee issue of* Radio Communication, *July 1975.*

Pat Hawker, G3VA, who claims he can hardly remember a time when he was not interested in radio, having built his first (0-v-1) short-wave receiver exactly 50 years ago in 1935 and holding an "artificial aerial" licence in 1936 at the age of 14 years. Sometimes kicks himself for having started *Technical Topics* in 1958 without realizing what a burden he was taking on!

BIRTH OF THE "BULL"

By 1925 the first heady excitement of short-wave dx was over, transmitters (mostly single-stage power oscillators) and Schnell and Reinartz "straight" receivers had been made to work down to "20m"; spark had been superseded; broadcasting was pushing British amateurs off "440m"; aircraft communications had taken over "1,000m". Daylight dx had come with the opening of the short waves; the Radio Transmitters Society had fused with the Transmitter & Relay Section (the active transmitting group within the still prestigious, but not always effective, Radio Society of Great Britain, then concerned with many aspects of "wireless"). Radio amateurs were divided into two rival groups—the "giants" of the recent dawn of international dx and those who had helped pioneer broadcasting in Britain by phone and music transmissions on medium waves.

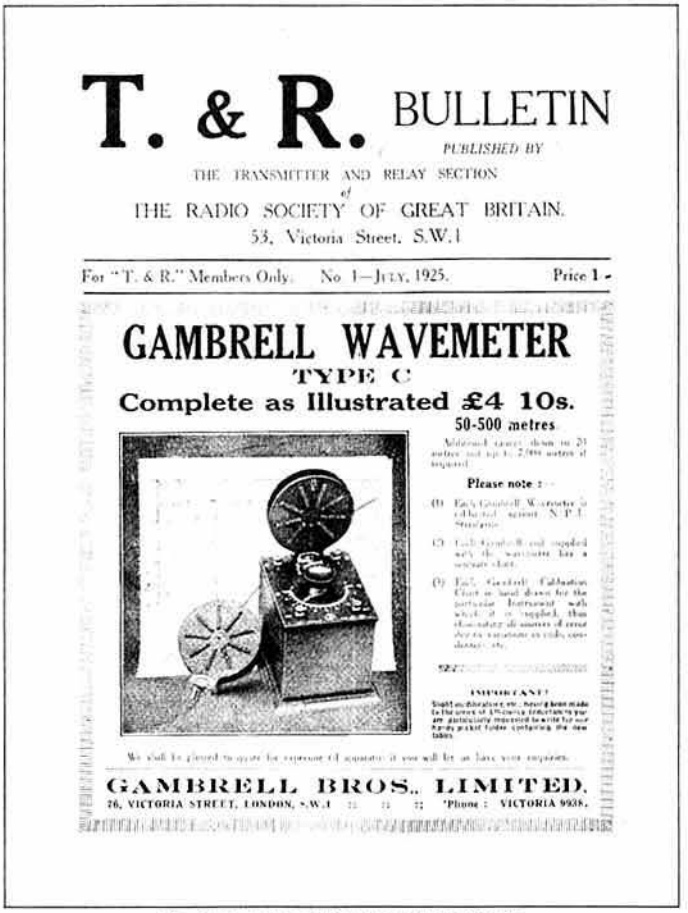
Until 1925 *Wireless World* had been the official journal of the Society, and there had been no regular Society publications. As interest increased in broadcasting reception, the commercial publications gradually devoted less space to transmitting topics, and in 1924 Gerry Marcuse, 2NM, wrote to the editor of *Wireless World*: "Considerable dissatisfaction seems to exist in the minds of various members, the causes of which appear to vary, but the feeling is, I believe, that we require a periodical of our own, similar to *QST*."

Even then, no immediate action resulted, and the idea might have lapsed had there not been a change of ownership of *Wireless World* in February 1925 (a change that arose out of the journal's support for international working by British amateurs when, in 1924, the Government attempted to close this down). The new owners were reluctant to continue the official association with the RSGB, and it was arranged that *Experimental Wireless* should become the Society's journal. This was a magazine which had supported amateur radio since its first issue in 1923, particularly the "more serious experimenters". But it had never minded chastising in print those "who never perform any experimental work, who buy their sets ready made, who usually know no morse whatever, and who are best known for the great number of gramophone records which they send."

So by 1925 Gerry Marcuse and H Bevan Swift, 2TI, then chairman of the T & R Section, felt something must be done urgently if the British amateur movement was not to split up again, as it had done several times in the early 'twenties. Bevan Swift has described what happened:

"With this thought in mind, we (*2NM and himself*) resorted to a Lyons teashop, and over a cup of coffee discussed what could be done. If we could only issue a bulletin, say once a month, detailing the activities of the section, it would give the provincial membership some satisfaction. The original idea was a simple, four-page leaflet without advertisements.

A rough draft was prepared and taken to a committee meeting of the section who immediately approved the idea and suggested that instead of a leaflet an actual magazine should be issued . . . . The T & R Section committee decided to go ahead with the *Bulletin* and to shoulder the expense as best they could. To lighten the burden it was resolved to include a few advertisements; Arthur Hambling, 2MK, was able to approach the radio trade for advertising. J A J Cooper, ex-5TR, was the first editor, and with Bevan Swift, Gerry Marcuse and Ralph Royle, 2WJ, made up the first editorial committee.



T. & R. BULLETIN

PUBLISHED BY

THE TRANSMITTER AND RELAY SECTION

of

THE RADIO SOCIETY OF GREAT BRITAIN.

53, Victoria Street, S.W.1

For "T. & R." Members Only. No 1—JULY, 1925. Price 1/-

GAMBRELL WAVEMETER

TYPE C

Complete as Illustrated £4 10s.

50-500 metres

Please note :-

GAMBRELL BROS., LIMITED.

76, VICTORIA STREET, LONDON, S.W.1 'Phone : VICTORIA 9938.

The front cover of the first *T & R Bulletin*

The first editor of the *T & R Bulletin*, J A J Cooper, ex-5TR

'Vol 1 No 1 was hailed with general approval . . . some wanted a *Bulletin* every week and twice the size."

The first 12-page issue, of which nearly five pages were filled with advertisements, included a description of a single-stage "23m" transmitter by Ralph Royle, 2WJ. The components were mounted on a wooden baseboard; there was a home-made blocking capacitor made of zinc sheets separated by photographic plates; the large single valve was mounted in a wooden supporting frame; the power supply used "chemical rectification" from the mains. Another article described a new "tetrodyne" superhet mixer using a four-electrode valve; there were many humorous asides which depended on the close-knit nature of the early amateurs. The *T & R Bulletin* was off to a promising start.

One result was a large increase in membership of the T & R Section which soon outgrew in size the main body of the RSGB; since members of the Section were not automatically members of the main Society the anomaly led to a drastic reorganization of the whole Society: the T & R Section as such ceased to exist and became the controlling factor in the Society, but the name was retained for the journal until 1942.

It is easier to start a magazine than to keep one going, but fortunately there was plenty of enthusiasm and an obvious willingness to lend a hand. G W Thomas 5YK, took over the editorship when J A J Cooper had to step down. Arthur Milne 2MI, drew many hundreds of the early illustrations. Horace Freeman of Parr's Advertising took on the problem of obtaining advertisements. Members of the editorial committee seem to have been ready to take their jackets off and tackle every aspect of production. One of these was Jimmy Mathews, 6LL, the pioneer of transatlantic working on 28MHz in 1928.

Gradually, in the early 'thirties the size of the *Bulletin* increased, more rapidly after John Clarricoats, G6CL, became the Society's full-time secretary in 1932, later secretary-editor and finally editor.

It was his remarkable energy and dedicated vision that in those early days converted what was still in many respects an amateur newsletter into a substantial publication of high repute, with the full-time help of Miss May Gadsden and the voluntary efforts of an enthusiastic group of members.

Later, in the stringent days of the second world war, he had the frustration of seeing the size fall back almost to its earliest levels with thin 16-page issues, but nevertheless an issue did appear each month, and the journal was for a time published from his home in Southgate.

GERRY MARCUSE AND EMPIRE BROADCASTING

We have noted how credit for the launching of the *"Bull"* belongs to Gerry Marcuse, Bevan Swift and the first small editorial committee. Marcuse, having conceived the idea, seems to have been willing to leave the implementation largely to others—hardly surprising in view of the enormous enthusiasm with which he pursued almost every branch of amateur activity and organization during the 'twenties.

One story, even though it is not directly connected with the *Bulletin*, is worth telling, if only to illustrate the spirit and resourcefulness of the early pioneers: the launching of Empire broadcasting by Marcuse in 1927.

This was on 9·5MHz, which was at that time one of the favourite dx bands. For this was a period when amateurs picked for themselves 13, 9·5, 8, 7, 3·5, 2·7 and 1·8MHz for most of their operation. This was part of their inheritance based on the original American licences of 1912 that gave amateurs unlimited access to "200 metres and down" (1·5MHz and up).

Marcuse was among the most successful of the small number of British amateurs who were in at the dawn of international dx. 2NM found that his telephony operation brought him correspondence from listeners who were overjoyed to hear a voice from the "mother country". This was in 1925–6 when there were no British broadcasting stations on short waves.

And so he began, with Post Office permission, a daily series of broadcasts directed to listeners in the British Empire. And these really were *programmes*. With his friends he organised concerts and song recitals, inviting many well-known musicians and singers to his home "Coombe Dingle" in Queens Park, Caterham, and to that of a friend, Percy Valentine, in whose home a studio and control room were set up; they even had a special Post Office distribution link between the two houses in the form of two telephone lines.

Marcuse had a fabulous site 700ft (213m) above sea level with a 100ft (30m) mast and Zepp antenna; he ran about 1·5kW on "32·5m" and was regularly heard all over the world. His special Post Office licence permitted him to broadcast so many hours each week. Soon, many overseas stations (including those in Sydney, Ceylon, Singapore, India, New Zealand) were re-broadcasting his programmes on medium waves to local audiences.

These amateur broadcasts continued for about two years until, in 1929, soon after the BBC had begun some experiments on G5SW at Chelmsford (it was not until 1932 that they launched the Empire Service), the Post Office told him to close down; his frequency was wanted. It had cost him some thousands of pounds out of his own pocket, but he had proved what he set out to show—that there was a demand in the Commonwealth and Empire for short-wave broadcasting from Britain.

THE 'THIRTIES

In the years that ended with the cessation of amateur activities on 1 September 1939 the *"Bull"* achieved a remarkable balance and range, largely free of the economic and industrial problems that have beset post-war publishing. There were constructional articles; a constant flood of new information on antennas (some, including the "VIS1AA", described first in its columns); vhf and micro-waves; design trends; workshop notes by "Shack" (G6SN); book and "contemporary literature" reviews; Contact Bureau notes (later "Research and Experimental Section"); articles for newcomers by Austin Forsyth, G6FO, and later Jerry Walker, G5JU; social happenings and the annual convention (an annual highspot from 1926 to 1938); district notes; new members and new addresses; a monthly editorial by "Clarry"; the often pungent humour of "Uncle Tom" (L H Thomas, G6QB).

This was in the days when although most British amateurs were officially limited to 10 or 25W input, some had permits up to 500W or so, and fooling the PO inspector became something of a legend.

Making up the pages of the *Bulletin* in the early days. L ro r: the late 2CX, the late 6LL, 5YK, and an unidentified fourth volunteer

Antenna wizard Dud Charman, G6CJ, at the controls of a massive home-built receiver in the 'thirties. The receiver is believed to have been one of the very first communication receivers built in the UK that included a crystal-gate filter

It was, however, not all fun, frivolities and "baby broadcasters" (to use a then-common term of abuse). Dud Charman, G6CJ, was showing us how to get dx to order; the careful observations on 28MHz of Dennis Heightman, G6DH, have probably never been excelled (his identification of the nature of the "hiss phenomenon" remains one of the important amateur contributions to radio astronomy); H A M Clark, G6OT, was giving advice on how to avoid tvi soon after the opening of "Ally Pally" in 1936.

Print and postage were cheap and quick. The lifting of restrictions on American imports brought in a flood of Hallicrafters, National, Hammarlund, Tobe-Deutschmann and RME receivers and the ubiquitous 6L6, T20 and T55 valves. Components such as variable capacitors, slow-motion dials, and plug-in coils were readily available from Eddystone, Raymart, JB, Hamrad, Formo and others.

A note appeared under the heading "The Month on the Air" in September 1936: "The editor is considering introducing a new monthly feature which will contain interesting news items mainly concerning dx operation. Such a feature can only be prepared by a member who is regularly on the air . . ." To this invitation John Hunter, G2ZQ, (one of those who became a "silent key" in the war) responded, his first column suggesting that "the stumbling block for WAZ seems to be the zone including Tibet and the Lansu province of China and we would like to hear of any *authenticated* contacts . . ." The column was later taken over by H A M Whyte, G6WY (VE3BWY), and then Arthur Milne, G2MI, who spanned the war years.

Amateurs were on 56MHz before the end of the 'twenties (16-mile contacts were being reported in 1925) but much of the early work used simple self-excited oscillators; a big step forward was a crystal-controlled transmitter described in the *"Bull"* in November 1935. An excellent account of uhf communication, including an experimental transmitter for 600MHz, was written by Eric Megaw, of GX6MU fame, in July *1931*! Regular columns on 28 and 56MHz by Nell Corry, G2YL, Constance Hall, G8LY, and others were a feature of the middle and late 'thirties. All this with a membership gradually rising to almost 4,000 by 1939. The high level of *activity* of the period is shown by the 1938 "band occupancy" checks which revealed (over a few weekends) 1,698 different British calls out of a possible 2,500. In 1938 well over a thousand were regularly active on 7MHz alone. During the period 1933-8 the number of licences doubled from 1,300 to 2,600. Of 2,705 licences in October 1938, 1,812 were for 10W, 503 for 25W. There were also 2,198 "artificial aerial" licences.

Many articles appeared on the early history of the Society—a special 21st birthday number in June 1934 ran to some 80 pages, including messages of congratulation from The Prince of Wales, Sir Oliver Lodge, Guglielmo Marconi, Dr W H Eccles, Sir Ian Fraser (Lord Fraser), Sir John Reith (Lord Reith) and many others. Both E J Simmonds, G2OD, and Gerry Marcuse, G2NM, contributed their own accounts of the pioneering of short waves. In another issue was the very detailed account of "the dawn of international dx" by W E F Corsham, G2UV, who took part in the original transatlantic tests, and accounts of early components by Stan Lewer, G6LJ.

HAPPY HOURS

Throughout the 'thirties, licence conditions in the UK remained virtually unchanged (except for the reduction of unpopular "guard bands" at the edges of each band from 25 to 5kHz). To obtain a "radiating" permit (full licence, minimum age 16 years) it was necessary to pass a 12wpm morse test which could usually be taken in any town (plenty of operators then to be found in the Post Offices) and also to show intention "to conduct experiments of scientific value or public utility", licences being issued "only if the nature of the proposed experiments and other circumstances warrant that course". Many and strange were the applications composed to fulfil that requirement. Perhaps it was fortunate for many of us that once the experimental licence (there were no *amateur* licences at that time in the UK) was issued, the authorities seemed to lose interest in those "experiments": though no British station was allowed to send "CQ" (we used "TEST" instead). "Artificial aerial" licences required no examinations but a full quota of birth certificates, references and the like.

Sometimes it seemed the Post Office engaged the applicant in a form of chess. The would-be amateur would submit a list of proposed experiments to improve transmitter design . . . the GPO would counter by declaring such experiments could be equally well carried out with an artificial aerial permit (which gave no right to radiate signals, merely to install or build transmitters). The frustrated applicant would consult one of the fortunate who had already obtained a licence, and together they would concoct a new thesis, this time bringing in some mention of antennas or propagation; with luck, the authority would relent and ask for "crystal certificates". If you sent only a certificate for 7MHz (doubling to 14MHz) you would get a 10W licence only for 7 and 14MHz; if you were astute enough to send also a 1·7MHz certificate, that band would be included (all other bands had to be applied for later); if you sent only a 1·7MHz certificate you got only 1·7MHz. To add 28 and 56MHz was fairly easy, but 3·5MHz was difficult and the applicant had to have held a licence for at least one year. After six months, you could apply through the RSGB for a 25W permit. Higher-power permits meant that you had to dream up some more "experiments" that would justify them. The few old-timers with 500W permits were the subject of much envy.

During the 'thirties many of the more important technical developments were first applied to amateur work in the USA: this is hardly surprising since by the mid-'thirties there were already more than 50,000 *amateur* transmitters in the USA compared with under 2,000 *experimental* permits in the UK. James Lamb, W1CEI, introduced the concept of single-signal reception in 1932, putting a crystal filter in the i.f. amplifier: although his filter used a circuit developed in the UK by Dr Robinson for "stenode" reception. But the *Bulletin*, in 1939, was able to present an excellent and far-seeing series of articles by E L Gardiner, G6GR, (who had collaborated with Dr Robinson) on *bandpass* crystal filters.

Associated publications began with *What Is Amateur Radio?* in 1932; followed by the first edition of *A Guide to Amateur Radio* in 1933, with annual editions until the appearance of the first edition of *The Amateur Radio Handbook* in 1938—240 pages and priced at 2s 6d (12½p). It was felt this was rather expensive for some prospective amateurs, so *The Helping Hand to Amateur Radio*, based on articles by Austin Forsyth, G6FO, was offered for the princely sum of 3d (1¼p)!

The capabilities of those pre-war amateurs should not be underestimated. After the introduction of Class B modulators in the early 'thirties, dx telephony became more consistent and led to such exploits as an all-continent round-table contact on 4 January 1938. Consider too the nine-element 28MHz rotary beam at GM6RG: six directors, driven element and two reflectors 48ft (14·5m) up, so sturdily constructed that the elements could be adjusted *in situ* from a gangway under the main boom: Brian Groom had this monster in use in 1938 at Galashiels.

Most of the present-day amateur contests were conceived in the 'thirties: NFD in 1933; BERU (initially, a British Empire Radio Week) in 1931; top band, vhf and QRP contests were all popular, and fully reported in the *"Bull"*.

Although the 0-V-1 "straight" receiver remained popular throughout the 'thirties for cw (I made my first VK contact with one in 1939) the period witnessed the great changeover to the superhet communications receiver. The HRO Senior was marketed in 1936; National, Hammarlund, RME and the stream of low-priced Hallicrafters receivers were advertised in the *"Bull"* from about 1937. You could buy a Sky Buddy for £9 9s or a Sky Champion (with rf stage) for £15 15s, or a Super Skyrider for £32. These sets were imported by Webbs Radio, Eves Radio, Raymart, Premier and ACS. Tobe Deutschmann offered a good receiver kit, with excellent bandspread and triple-tuned i.f. transformers. Shortly before the war several British firms took up the challenge. Eddystone put their popular "All-world Two" to one side to bring out the ECR and later the 358 superhet receivers.

In the early 'thirties, transmitting valves were a major problem and very costly for British amateurs. Large audio power triodes such as the PX25 were used, but they had high internal capacitances and it was not uncommon to find the old LS5A still in use. Around 1936 the American "tubes" began to arrive: the "210" and 6L6 at about 8s 6d (42½p), the T20 at 17s 6d (87½p), the T40 at £1 4s (£1.20) and the 35T at £2 10s (£2.50). Wonders indeed. The 807 (developed from the 6L6 about 1936) was seldom mentioned before the war although available in the USA from about 1937.

With coaxial cable virtually unknown, the Zepp and centre-fed dipole with open-wire lines or end-fed antennas were the most popular; the 84ft (25·5m) "W3EDP" enjoyed a vogue. The antenna wizards such as Dud Charman, G6CJ, talked of rhombics and W8JK driven arrays, delta matching and the importance of great circle maps. QSL cards could be bought at 1,000 for 10s (50p) from the "small ads".

WARTIME *BULLETINS*

So the 'thirties drew towards their climax. As one international crisis followed another the *"Bull"* increasingly included items about ARP, the newly-launched Civilian Wireless Reserve and its longer-established Royal Navy counterpart. Amateurs began turning up in unexpected places in unexpected roles. One read of the award of an MBE to "Tich" Emary, G5GH, for his work as a Foreign Office man in the Spanish Civil War—a foretaste perhaps of the many hundreds of amateurs who were sucked into the strange world of ULTRA and Y, double transposition and double-cross (XX), RSS and its VIs, the "Golf Club and Chess Society" at Bletchley, SCU with its farmyard and sense of discrimination, Special Forces, ISLD and Force 136, SOE and SIS. Although the Society was often the vital link that directly or indirectly put members in touch with such organizations, little of these activities appeared in the security-conscious columns of the wartime *"Bull"*.

The blow had come suddenly but not unexpectedly. A notice in the *London Gazette* of Thursday 31 August 1939 proclaimed:

"I, Major The Right Honourable George Clement Tyron His Majesty's Postmaster General hereby give notice that. . .all licences for the establishment of wireless telegraph sending and receiving stations for experimental purposes are hereby withdrawn."

"Bull" cartoons showed the desolate amateurs watching as their equipment was trundled off into storage by Post Office officials.

"The Month on the Air" became "The Month off the Air". Amateurs were soon to be found in every nook and cranny of the world's first electronic war. Industry adapted quickly; it is said that Ernie Dedman, G2NH, of QCC, more used to supplying crystals singly to amateurs, found himself one day with an order for millions!

At first, paper remained plentiful and issues substantial. "Khaki and Blue", "Ham Hospitality", active-service lists and similar columns reflected the change from civvies to uniform. For all too many, a "Silent Key" notice, or years in the "Kriegies" (pow camps) where more than one amateur participated in the building and operation of secret radios, and for whom C H L Edwards, G8TL, organized an efficient service of gift parcels (not all of which, I suspect, were as innocent as they seemed).

For many, in the tedium that accompanies war, the monthly arrival of the *"Bull"*, no matter how thin it became, was a welcome link with the hobby they had left behind—or, increasingly as new members came flooding in after *The Amateur Radio Handbook* became virtually an official Services textbook, a hobby to which they looked forward. Even from thin issues one could learn of the growing importance of frequency modulation and microwaves.

The shortage of paper and the small 6pt typeface used for many of the pages made the early post-war *"Bulls"* a mere shadow of the fat issues of 1939. But one gem of a series in the late 'forties was "In Your Workshop" by "Donex" (Ken Alford, G2DX, who first held a licence pre-1914 and who must be one of the very few people whose amateur activity spans more than 70 years).

An exhibition station of the early 'fifties showing the massive size of many amateur transmitters of the period. This one used with an HRO receiver. Operator is Watson Peat, GM3AVA, currently the BBC Governor for Scotland

Editors who were also amateurs. A photograph in the mid'sixties of (l to r) John Rouse, G2AHL, editor, *RSGB Bulletin*; Austin Forsyth, G6FO, editor *Short Wave Magazine*, John Wilson, G(W)3BGP, editor of *Electronics Weekly*, John Clarricoats, G6CL, former editor *T & R Bulletin* and *RSGB Bulletin*, and F L Devereux, ex-5FA, editor of *Wireless World*

THE SECOND 25 YEARS

To this writer at least, the years appeared to speed up and one can never hope to do justice to the hundreds of members who contributed to the *"Bull"*s" columns during this period. One remembers Louis Varney's (G5RV) efforts in the early 'fifties to show us how to build transmitters that radiated fewer harmonics. For undoubtedly the reduction of tvi (and nowadays other forms of rfi) has remained the single most-worrying aspect of amateur radio, and one that affects directly almost all transmitting amateurs: some excellent articles have helped us all.

Then again there was the consistent encouragement given to vhf and microwave operation. In 1970, Dain Evans, G3RPE, began the first monthly microwave column in any amateur journal.

There were regular columns on ssb, on mobile operation, on amateur television, on Raynet and swl activities. "Month on the Air" has proved the longest-running of all regular features. One remembers with gratitude the re-awakening by Dick Thornley, G2DAF, of interest in the home-building of high-performance receivers and ssb transmitters; an early (1951) introduction to switched wideband exciters by Reg Hammans, G2IG; and some notable contributions by Peter Martin, G3PDM. In a world increasingly dominated by speech there was a memorable account of the morse code and morse keys by J Piggott, G2PT, in 1956. Then there have been innumerable reports from readers and from overseas technical journals in "Technical Topics", which I began with more than a few doubts in 1958, but which has somehow survived 27 years under the same management—from 6ft (2m) racks to "table-top" transmitters, transceivers, transistors, fets and integrated circuits.

John Rouse, G2AHL, succeeded "Clarry" as editor in 1963 and worked diligently and skilfully to improve the journal until his untimely death in 1967. Trevor Preece, G3TRP, and John Adey kept the issues coming until the appointment, late in 1969, of our present editor Alf Hutchinson ("Hutch"). Under his guidance *Radio Communication* has maintained consistently high standards of accuracy and detail. Advertising was taken back in-house in 1972, and with the aid of Colin Lindsay became an outstanding success. Over many years Derek Cole has provided thousands of complex drawings from rough sketches with an expertise and promptness that few other journals could hope to equal.

Behind the scenes for many years was Roy Stevens, G2BVN, chairman of the Technical & Publications Committee, who firmly believed that committees were for *doing*, not just for discussing. All technical contributions go to referees for evaluation; usually members of the T & P Committee, but often outside specialists, and the rôle of these members in maintaining the high reputation for technical accuracy and judgement should not go unacknowledged.

The *RSGB Bulletin* became *Radio Communication* in January 1968—a change that at first seemed not to appeal to the majority of members. Later, however, and particularly after one began to hear the diminutive *"Rad Com"*, the present title was well accepted.

FROM "GOLDEN" TO "DIAMOND"

The decade 1975–85 has seen continuing changes in amateur radio as an inevitable part of the growth of "information technology" and the marriage of computers to communications. The old urge to build-your-own rig has not vanished but has been swamped by the stream of all-singing, all-dancing transceivers mostly stemming from Japan, though *Rad Com* has provided several notable designs for hf transceivers and receivers. The stand-alone "transmitter" has become a rarity. Digital displays and digital frequency synthesis have become established—despite the many warnings

The present editor of *Radio Communication*, Alf Hutchinson ("Hutch"). Although not a radio amateur, he spent 22 years working and visiting the "dx" as a Merchant Navy radio officer with the Marconi Marine Company. He "swallowed the anchor" in 1963 and was editor of the Marconi Marine house journal *Mariner* until he took up his present appointment in 1969

that a digital vfo produces more close-in phase noise than a good analogue design. Similarly, it can be argued that most factory designs are more suited to the ssb mode than cw or rtty—perhaps one reason for the increasingly nostalgic interest in the old "classic" designs of the 1930-60 period, despite the growing scarcity of components suitable for use with high-voltage, valve-type equipment. Component prices, also, tend to make it cheaper to buy factory equipment than to make your own unless you have a well-stocked junk box or access to "surplus" from which components can be salvaged. Valves are still with us for high-power working but progressively less for other purposes.

Amateur satellites, repeaters, Amtor and packet systems have all become established through the pages of *Radio Communication*—alongside the detailed equipment reviews, many of them by Peter Hart, G3SJX.

The decade saw the demise of "aerials" but many pages devoted to "antennas", including among the old favourites some entirely new ideas, several of them resulting from the painstaking work of Les Moxon, G6XN. Equally important have been the attempts to debunk some of the many myths that still surround the whole field of antennas, standing-waves, "multi-hop" hf propagation and the like.

Radio Communication, under the continued guidance of "Hutch", has perforce become more "professional" if only to cope with the doubling of its circulation (Audit Bureau of Circulations figure for 1974 was 17,816 average monthly copies, 1984 no less than 35,405). It is seldom recognized that the UK circulation of *Radio Communication* now exceeds that of any other "hobby-electronics" magazine that has an ABC audited figure!

For many years *Radio Communication* had only one doughty competitor (*Short Wave Magazine*) devoted primarily to amateur radio. The past decade saw the editorial policy of *Practical Wireless* swing over, plus entirely new arrivals in *Ham Radio Today* and *Amateur Radio (UK)*.

January 1981 saw *Radio Communication* burst into a new, larger format with almost 40 per cent more words per page, and the next few years saw more and more pages of editorial and advertising, reaching a peak of 1,128 of the larger pages in 1983.

An increase in publicity for amateur radio in 1979 began a period of several hectic years during which newcomers flooded into the hobby at a remarkable pace, that was further stimulated by media interest in the long-drawn-out controversy over UK cb licences.

The old-established regular columns—*The Month on the Air, 4-2-70, Technical Topics, Microwaves, SWL News, Raynet, Club News*—have all survived the decade. Newcomers have arrived in the form of *Ephemeris, QRP* and *Computing*. Contests multiply—a pleasure to some, a bane to others—and are reported at length. Volunteers continue to provide slow morse practice transmissions.

In 1983 a new editorial board, including Dain Evans, G3RPE, and David Evans, G3OUF, was formed, and helped institute a number of changes in style and presentation as well as bringing more news and more members' letters into the magazine. *Radio Communication* has never been short of technical contributions, indeed the problem has been, and still is, how to reduce the length of the queue in an era when rising costs have brought in train the need to limit and even sometimes reduce the number of pages per issue.

Amateur radio did comparatively well in that great international battle for spectrum space known as WARC 1979, though the full benefit of less-fettered use of 18 and 24MHz still lies ahead. After a banana-skin start the new UK licence schedule has resulted in few major problems—and similarly we have so far little to complain about the transfer of the all-important Radio Regulatory Department from the Home Office to the Department of Trade & Industry.

The traumas surrounding the introduction of cb into the UK have receded, though questions of spectrum abuse and new emc/rfi/tvi problems continue to arise and are reflected in *Radio Communication*. A problem that seems to arise mainly at sunspot minima is some noticeable slackening off in the number of newcomers in process of acquiring amateur radio licences, though this has so far had no effect on the still rising *Radio Communication* circulation: nor is it a UK-only phenomenon; our American friends are now seriously concerned about the numbers of amateurs letting their licences lapse and the rising "average age" of the faithful.

Sadly, several of those who contributed much over many years to our journal in its first 60 years are no longer with us. No account could be complete without mention of Roy Stevens, G2BVN, whose struggle against his long, progressively incapacitating illness finally came to an end in September 1981. Nor should we forget Dennis Heightman, G6DH, whose scientific studies of vhf propagation have made a lasting impact, though his later years were taken up with his professional activities in the field of cable television. Also, we have said farewell to "Uncle Vic" Corsham, G2UV, whose account of the dawn of international dx in the early 'twenties remains a classic *Bulletin* article. Sir Martin Ryle, G3CY, former Astronomer-Royal, never contributed to the *"Bull"* but his 1948 lecture on *Signals from the Sun*—one of the first public lectures on the then new science of radioastronomy—was published in the *Proceedings of the RSGB*, a temporary publication that helped overcome the acute paper shortages of the immediate post-war period.

Sixty years is a long time. Only a tiny handful of those who created or read the first issues are still with us. The majority of present members have joined during the past decade. It is sometimes said that most of us are interested only in what we remember happening—but surely something of the story of our hobby and of the publication which has served it so long and so well should be part of the heritage of us all—young or old.

A society journal is not, of course, just a technical magazine. It must reflect all interests and activities of members. The more amateur radio polarizes or coalesces into factions of specific interest with mode or band rivalries, the more difficult becomes the task of the editor. The man who wants to put up a top band antenna is not going to seek help from articles on microwave plumbing; a channellized nbfm 144MHz mobile rig has something, but not all that much, in common with an hf ssb transceiver. Again some activities seem to engender a desire for exclusiveness and the channelling of information into specialized newsletters.

Constructors want constructional articles; buyers want equipment reviews; some want controversy—some wish to avoid it; a local group or society expects to see its activities reported, even though these may be of local interest only; some would like pages of letters; almost all readers want pages of ads and small ads. Some want more space given to this or that; others resent any space being given to activities in which they personally are not interested.

The greater diversification of amateur interests, and the growing gaps between them are, I believe, the main reasons why one can look nostalgically at those *Bulletins* of the middle and late 'thirties and feel that they had perhaps more central unity and balance than has generally been achieved in the later years. Compared with 50 years ago, there is these days much less humour, less looking towards the future but also less looking back at the lessons of the past.

Of course, today it is more streamlined, efficient, cost-effective and professional, and few of us would have it otherwise, whether or not we question the idea that "bigger necessarily means better". But I must confess that personally when, for any reason, my belief in the future of the hobby occasionally falters, I restore it by picking up some old *Bulletins*. That perhaps is the nature of the ageing process. I hope and imagine that in the year 2000 the new members of today will be looking back with similar warmth to Volume 61.

Happy birthday, O journal

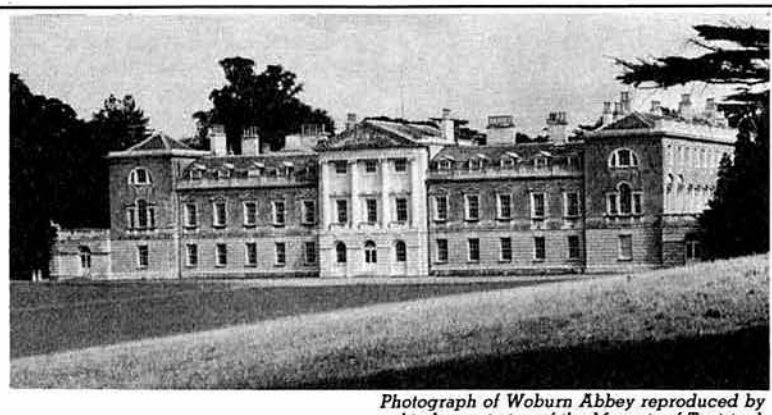
RSGB NATIONAL MOBILE RALLY

SUNDAY 4 AUGUST 1985

Woburn Abbey, Beds

(Coach Park Site)

From 10am



Photograph of Woburn Abbey reproduced by kind permission of the Marquis of Tavistock

- **Large trade exhibition**
- **RSGB bookstall and enquiries stand**
- **Members' Mart**
- **Raynet stand**
- **BARTG stand**

(All under cover)

Members' Mart this year will be charged at **£3 per hour per table**, which will enable members to sell direct. Tables will be offered on a first-come first-served basis but will not be available before 10am.

The RSGB makes no charge for entrance to the rally but all visitors must pay for entrance to Woburn Park, in which the rally takes place, at **£1.50 per car including passengers.**

All the normal Woburn attractions will be available at small extra charges. Various bars and cafés are available nearby.

HOW TO GET THERE

Via the M1—Leave the M1 from north or south at intersection 13, **not 12 as signposted.** After leaving the motorway follow signposts through Husborne Crawley to Woburn Abbey.

From the south via the A5—Turn right at Hockliffe and follow the A50 to Woburn.

From the north via the A5—Turn left at A418, five miles south of Fenny Stratford, and follow to Woburn.

From other directions make for the points indicated above and proceed as indicated.

Avoid routes signposted to "The Wild Animal Kingdom" or "Game Reserve". The rally takes place in Woburn Park and correct routes are signposted to "Woburn Park" or "The Abbey". Also watch for RSGB signs.

Usual talk-in facilities will be in operation by Dunstable Downs RC on 1·8, 70, 144 and 432MHz.

All enquiries regarding this event should be made to Norman Miller, G3MVV, 180 Warley Hill, Brentwood, Essex CM14 5HF.

Mobile Rallies Calendar

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

7 July
Nottingham Amateur Radio Electronics Fair, Victoria Leisure Centre, Gedling Street, Near Nottingham City Centre. 10.30am–5pm (10am, disabled). Details G6MIF, tel 0298 6174.

14 July
Sussex Mobile Rally, Brighton Racecourse. From 10am. Talk-in on 145·50 and 3·5MHz. Details G6YPY, QTHR, tel 07918 5103.

14 July
Droitwich Mobile Rally, Droitwich High School, venue will be signposted, talk-in GB4WRC on S22. Open from 11am. Details G8ASO, QTHR, tel 0905 351565, or Prestel Mailbox 905351565.

20/21 July
Penarth Seaside Radio Picnic & Ragchew. Cliffwalk or Kymin House. From 12 noon to 6pm. Organized by Penarth Holiday Festival Amateur Radio Group. Use junction 33 on M4. Talk-in on S22 and 29·6MHz fm. Details GW3LQE.

21 July
Cornish RAC Rally, Cornwall Technical College, Redruth. 10am–5pm. Talk-in on S22. Details G4RVP, tel Penzance 763549.

21 July
McMichael ARS Mobile Rally, Bells Hill, Stoke Poges, Nr Slough. Talk-in on S22 and SU8. Open 11am. Details G8IHF, c/o McMichael Ltd, Wrexham Road, Slough, Berks.

21 July
Anglian Mobile Rally, Stanway School, Colchester, Essex. Talk-in on 144MHz. Open 10am–5pm. Details G6HQI, 26 Pondfield Road, Colchester, tel 0206 862403.

28 July
Scarborough ARS Rally. The Spa, Scarborough. Open 11am. Talk-in on 144MHz (S22), 432MHz (SU8), and RB0, GB3NY. Details G4YWR, QTHR, ex-G6CXK, tel 0723 360587.

4 August
RSGB National Mobile Rally, Woburn Abbey. See panel on this page for details.

11 August
Derby Mobile Rally, Lower Bemrose School, St Albans Road, Derby (off Derby ring road). Open 10.30am. Talk-in GB3ERD. Details G4EYM or G3SZJ, tel 0332 556875.

11 August
Hamfest '85. Organized jointly by RAIBC and Flight Refuelling ARS. Details Miss E K Howard, tel 0202 671191.

11 August
Wythall Radio Rally. **Cancelled.**

18 August
West Manchester RC "Red Rose Rally", Haydock Park Racecourse, Newton-le-Willows, one mile from M6 junction 23. Talk-in on S22, GB2RRR. From 10am. Details G6TYB.

25 August
18th Preston Annual Rally, Lancaster University. Leave M6 at junction 33 and proceed N on A6 for two miles. Talk-in on 144MHz fm. Entry 50p. Opens 11am. Details G3DWQ, tel 0772 53810.

25 August
BARTG Rally, Sandown Park, Esher, Surrey. Details G8VXY.

25 August
Torbay ARS Mobile Rally, STC Social Club, Old Brixham Rd, Paignton. Talk-in on S22. Details G1EUA.

1 September
Cambridge Amateur Radio Rally, Kelsey Kerridge Sports Hall, Gonville Place, Cambridge. 10.30am–5pm (disabled, 10am). Adjoining multi-storey carpark. Details G6MIF, tel 0298 6174.

8 September
Lincoln Hamfest, Lincolnshire Showground, on A15 four miles north of Lincoln. From 10.30am to 5.30pm. Talk-in on 144 and 432MHz (S22 and SU8). Details G4STO.

8 September
Telford Radio Rally & Exhibition, Telford Town Shopping Centre, Shropshire. Details G8UGL, tel Telford 584173, or G3UKV, tel Telford 55416.

8 September
Open Day organized by Galashiels & District ARS, Focus Centre, Livingstone Place, Galashiels. Open 11am. Details GM3DAR.

15 September
Vange Mobile Rally, Nicholas School, St Nicholas Lane, Basildon, Essex. From 10am to 5pm. Talk-in on 144MHz, GB4VMR. Details G4OJN, QTHR.

15 September
Peterborough Mobile Rally, Wirrina Sports Stadium, Bishops Road, Peterborough. 10.30am–5pm. Details G3EEL, tel Peterborough 62881 after 6pm.

21 September
National Amateur Radio Car Boot Sale. Shuttleworth Collection, Old Warden Aerodrome, Nr Biggleswade, Beds. From 10am to 5pm. Talk-in on GB4SC. Details G6EES, tel Dunstable 607623.

22 September
Harlow Mobile Rally, Harlow Sports Centre, Hammarskjold Road, Harlow, Essex. Open 10.30am. Talk-in on S22. Details tel 0279 725876 or 0279 22365 (daytime).

6 October
Great Lumley ARES Rally. Community Centre, Great Lumley, Nr Chester-le-Street, Co Durham. Open 11am. Talk-in on S22. Details G4OCQ, tel 0385 40827.

24 November
West Manchester RC Mobile Rally, Pembroke Halls, Walkden, Worsley, Gtr Manchester. Details G6YIO, West Manchester RC, Astley & Tyldesley Miners Welfare, Meanley Road, Gin Pit Village, Astley, Tyldesley, Manchester.

16 March 1986
South Essex ARS Mobile Rally, Paddocks Community Centre, Canvey Island, Essex. Open 10.30am. Talk-in on S22. Details G4FMK, QTHR, tel 0268 683805.

23 March 1986
19th White Rose Rally, University of Leeds. Details G4NDU, QTHR, or Box 73, Leeds LS1 5AR.

Amateur Radio News

Shuttle news

As we went to press, the latest position on Tony England's shuttle mission 51-F was that the launch date was likely to be 12 July 1985. The potential amount of amateur radio operation during the mission was not quite clear, and further information will be given via GB2RS and the Headline News Service nearer the date; however, it appears that there will be some sstv operation on 144MHz. Operation on 28MHz will not now take place because of lack of time to complete the necessary modifications to the cargo bay to enable antennas to be mounted. The same window-mounted 144MHz antenna as that used during the 1983 mission will be used, although there is apparently likely to be little opportunity for random voice two-way contacts: the mission is scheduled to last for seven days, and amateur radio operation will not commence until midway through the third day because of mission requirements. W0ORE's operating time will be more limited than that of W5LFL for the same reason.

Tony England offered to fly some form of RSGB memento on *Challenger*, and headquarters has sent an RSGB pennant.

As with the previous shuttle mission, there will be special news broadcasts from headquarters under the callsign GB2RS on the usual frequencies during the mission. The broadcasts will commence at 1600gmt (5pm bst) and will take place simultaneously on 3,650 and 7,047·5kHz and 145·525MHz (channel S21).

Region 2 election result

The result of the recent ballot for the RSGB Region 2 representative was:
Mr P R Sheppard, G4EJP, 96 votes;
Mr C J Thomas, G3PSM, 90 votes.
Mr Sheppard therefore takes over as the RSGB representative for Region 2.

60th anniversary of the IARU

The following has been adapted from an editorial by Richard L Baldwin. W1RU, in *QST* April 1985:

In every walk of life, achievement largely results from the ability of leaders to have a vision of the future and their ability to look beyond today's petty problems and see what might be possible.

Thus it was that in 1924 Hiram Percy Maxim and the ARRL realized that amateur radio had become international in scope and that there ought to be an international organization to take advantage of the progress and to tackle the problems that would surely attend such a growth. So in March 1924 Mr Maxim met a group of talented amateurs in Paris and made preliminary plans for an international organization to be known as the International Amateur Radio Union, and a congress to be held in April 1925 to ratify the permanent organization. Present at the 1924 meeting were enthusiastic representatives from France, Great Britain, Belgium, Switzerland, Italy, Spain, Luxembourg, Canada and the USA.

During Easter 1925 the amateur radio representatives of 23 countries met again in Paris to create officially the International Amateur Radio Union and to adopt a constitution. The original IARU differed slightly from today's organization, but the goals were much the same—to promote and co-ordinate amateur radio worldwide, to encourage fraternalism, and to represent amateur radio at international conferences. In the original organization, individual amateurs became members of IARU, and Mr Maxim was the first. While most of the countries represented at the first meeting were from Europe, there were also representatives from N and S America and Japan.

On 17 April 1925 the proposed constitution of the IARU was unanimously adopted. At the final plenary session on 18 April 1925, by which time 25 countries were represented, all actions of the organizing congress were approved and the International Amateur Radio Union was born.

As an aside, two individuals who participated in the meetings of 1924 and 1925 are still active radio amateurs: Dr Giulio Salom, I0ACL, who regularly operates from his homes in Venice and Rome: he was present at the 1984 Region 1 IARU Conference in Sicily, and is now 82 years of age; and Jean Wolff, LX1JW, who is a familar figure at amateur radio meetings throughout Europe and the USA.

Although the IARU started life with individual memberships, it was later changed to a union of member societies. It now has 121 national societies as members and represents the international interests of 1·5 million radio amateurs.

The history of the IARU has been one of gradually increasing effectiveness, and there are clear signs that the degree of effectiveness has increased markedly in the past decade. The union has grown from one whose emphasis was largely on the issuing of WAC certificates and the reporting of dx exploits, to one whose primary emphasis is in preparation for international telecommunications conferences.

And yet, back in 1925, in the earliest days of any form of international radio regulation, when international dx was still a notable occurence, those men of vision who put together the first IARU consititution recognized that preparation for conferences was an important task for the union. It was the continuing emphasis on that goal of conference preparation which led to the restructuring of the IARU subsequent to 1979: this restructuring has made the IARU more truly international, not only in scope but in administration and leadership. Decisions made in the name of the IARU are now reached by a body known as the IARU Administrative Council, which has on it two representatives from each of the three IARU Regions. (In Region 1 they are our own G3FKM, and PA0LOU—*Ed*.)

There are some growing pains as we adapt to the new organizational structure, but there is every indication that we are better prepared to handle the next General WARC than we were for WARC 79. We have a more truly international leadership and we continue to have the substantial support of the ARRL, whose distinguished president Hiram Percy Maxim got the ball rolling in the first place 60 years ago.

In the history of mankind 60 years is but the blink of an eyelid, hardly to be noticed. In the history of amateur radio, 60 years is a long time. We like to think that in those 60 years the IARU has grown to maturity and that those representatives who gathered in Paris in 1925 to found the IARU would be proud of what they wrought.

QSL Bureau closure

The RSGB QSL Bureau will be closed from 15 to 31 July inclusive. Cards must **not** be sent to G3DRN between those dates.

The sub-manager for callsigns in the G0B-series is the same as for the G4B-series, ie Miss L Harper, 50 Ravenglass Road, Westlea, Swindon, Wilts SN5 7BW.

Silenced in court

On 13 May 1985 Messrs R Glasscoe, B D Boyce and H Dyer, all of South London, pleaded guilty at Clerkenwell Magistrates' Court to attempting to dishonestly obtain by deception an amateur radio licence, value £12, from the Department of Trade & Industry. Glasscoe and Boyce were also charged with three offences under Section 1(1) of the Wireless Telegraphy Act 1949, and Dyer was charged with two offences under the same Act: all three also pleaded guilty to these charges.

All three were fined £200 each for the offence of attempted deception, and £50 for each offence under the Wireless Telegraphy Act. All equipment involved, with a total value of over £2,000, was ordered to be forfeited.

Interception of Communications Bill

Headquarters has been asked whether the new Interception of Communications Bill has any implications for amateur radio. The aims of the new Bill are contained in Section 1(1) which reads as follows:

"A person who intentionally intercepts a communication in the course of its transmission by post or by means of a public telecommunication system shall be guilty of an offence unless its interception is made:

(a) in obedience to a warrant issued by the Secretary of State under Section 2 below;

(b) with the consent of a person occupying the premises to or from which the communication is sent; or

(c) for purposes connected with the provision of postal or public telecommunication services."

In other words, if amateur radio equipment was utilized by an individual to intercept a communication in the course of its transmission by a public telecommunications system, that individual would have committed an offence.

TV repeater changes channel

The UK's first amateur television repeater, GB3GV, which became operational on channel RMT1 from Leicester in February 1984, moved to a new site near Markfield at the beginning of May 1985. Although this change of site had been sanctioned by the DTI, some unforeseen interference with a National Air Traffic Services area radar installation in the West Midlands occurred. As soon as this was discovered, and at the request of the Civil Aviation Authority and the DTI Radio Interference Service, GB3GV was immediately closed down. Following discussions, tests were then carried out to

see whether a solution could be found. The Civil Aviation Authority was extremely helpful, and it became apparent that a frequency change to channel RMT2 and an alteration to the repeater's antenna eliminated the interference. At the Society's request the DTI approved an immediate frequency change from RMT1 to RMT2 on 13 May, and their co-operation was greatly appreciated.

By the time that this is read it is expected that GB3GV will be fully operational using fm input and fm output on channel RMT2 (ie 1,249MHz in and 1,318·5MHz out).

IARU Region 1 news

It has been decided that the 1987 IARU Region 1 Conference will take place at Leeuwenhorst Congress Centre, Noordwijkerhout, in the Netherlands, between 12 and 17 April. Further information will be available later.

The next VHF/Microwave Meeting will be held over the weekend of 8/9 March 1986 in Vienna. The next meeting of the HF Working Group is scheduled to take place at the same time and at the same venue.

Raised in the House

On 29 April 1985 Lord Irving of Dartford asked Her Majesty's Government what representations they had received from the civil land mobile industry regarding the time-scale for establishing large systems in Band 3. In reply the Parliamentary Under-Secretary of State for the Department of Trade & Industry, Lord Lucas of Chilworth, said that a variety of proposals had been received from companies interested in establishing large radio systems in Band 3. Among those responding, several had urged the Government to reach early conclusions on the use of Band 3: one company had stated that if any early date were set for the introduction of a large system, it could be unhelpful to UK equipment manufacturers. The Government hoped to make an announcement on Band 3 in the next few weeks.

On 1 May 1985 Mr Cartwright, MP for Woolwich, asked the Secretary of State for Trade & Industry how many complaints about citizens band radio in the London area were currently being investigated by his department's Radio Investigation Service. In reply Mr Butcher stated that complaints about television and radio reception rarely specified the source of the problem. Since the source of the problem was often identified only after investigation by the RIS, it is not possible to say how many of the complaints currently in hand related to cb radio. Mr Cartwright then asked the Secretary of State for Trade & Industry how many operational staff were employed by the RIS in the London area, and how many prosecutions had been undertaken for illegal operation of cb radio over the previous five years. Mr Butcher replied that the London RIS had 23 officers, including three clerical staff. Between 1980 and 1984, 6,292 people were prosecuted for illicit use of cb. Of these, 6,216 were convicted of offences under the Wireless Telegraphy Acts 1949 and 1967.

Mr Cartwright also asked the average length of time taken to deal with a complaint of interference to broadcast reception in the London area, and what steps were being taken to improve it. Mr Butcher said that the average waiting time for the first visit was three months in north London and six weeks in south London. Subsequent visits might be necessary in order to resolve a case. The department was currently reviewing the activities of the RIS and the information available to the public on dealing with broadcast reception problems, with a view to making the most effective use of the available resources.

Morse test facilities

Facilities for taking the BT morse test will be available at the Brighton rally on 14 July, the Welsh Convention at Blackwood on 6 October and the Leicester Exhibition on 25 and 26 October. Further information is available either from the rally organizers or from Mr Gavin Williams, BT Radio Station, Worston Lane, Highbridge, Somerset TA9 3JY.

News from America

The FCC has adopted a Report and Order which has the effect of making the 24·89-24·99MHz band available to radio amateurs in the USA from 0001 on 22 June 1985: the official announcement was made at the American "Hamvention '85". The power limits and permitted classes of emission were not known as we went to press. The ARRL has emphasized that, as is the case with the 24MHz band elsewhere in the world, the amateur service will not have exclusive use of the allocation until July 1989. For this reason, contest or award credits for 24MHz contacts will not be granted at this stage. Some 48 countries now have access to the 24MHz band, of which the UK was one of the first.

The RSGB Repeater Management Group appears to have inspired a "clone" in the USA. A National Repeater Council has recently been formed, with the task of producing an accurate data base of all "co-ordinated" repeaters: it will consist of regional representatives who will use modern data communication techniques in order to carry out their function. The ARRL is to provide computer and telecommunication facilities. There are some 9,350 repeaters in the USA, with 927 in California alone. Most units are in the 144MHz band, which is 4MHz wide in the USA, but repeaters are also operational in the 28, 50, 220 and 430MHz bands.

Happy birthdays

All Australian radio amateurs are permitted to use the prefix VI between 1 June and 31 December 1985 to celebrate the 75th anniversary of the Wireless Institute of Australia. WIA is the world's oldest national radio society, having been founded in 1910, and Australian amateurs have been encouraged only to use the prefix if they intend to QSL with a card bearing it. The commemorative callsign VK75A will also be on the air until December, and is looking for dx contacts.

The South African Radio League; the French national society Reseau des Emetteurs Francais; and the Swedish national society Foreningen Sveriges Sandareamatorer celebrate their 60th anniversaries this year. Finally, the Dutch national society VERON, and CREN of Nicaragua, celebrate their 40th anniversaries in 1985.

Raynet Controllers' Net frequency

In order to avoid the "dx window" in the 3·5MHz band, the Raynet Controllers' Net has been moved to 3,663kHz. The net takes place officially on the first Sunday of each month at 8.30pm, although in practice it meets every Sunday. A frequency of 3,615kHz is used as an alternative, and also for Raynet rtty operations.

RAOTA

Here is a brief report on the extraordinary general meeting of the Radio Amateur Old Timers Association held at the NEC on 13 April by courtesy of the RSGB. The establishment was re-elected as follows: president, G6CJ; executive vice-president, G6JP: Vice-president G5RV and G6NZ; hon secretary, G3DVV; hon treasurer, Miss Gadsden; committee, G2CVV, G5XB and G5YY; net controller, G3DSI; G2BQY has since been co-opted to committee.

Apart from this, the main topic of the meeting concerned plans for the future. Communication is the keystone of a scattered society, and lack of it in the past was a serious handicap. It is planned to communicate to all members at least once per annum, or as often as resources permit. Also there is a need for local representatives in the main centres who could arrange local meetings etc. Some offers have been received. This all requires co-operation of the membership and also funds. It has been agreed to work as before with an entrance fee (at present £3) plus annual voluntary contributions. Our earlier appeal produced a useful response from about 10 percent of the members, but we need an average of two or three pounds over the whole membership. The treasurer is Miss M Gadsden, 19 Drummond House, Fonthills, Long Lane, London N2 8LF.

G6CJ

Special Event Stations

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

4, 5, 6 July
Meopham Parish RC will be operating from Meopham school, Meopham, Kent, in celebration of the 10th anniversary of the school. Operation will be on 144 and 432MHz and hf. Contacts with other school stations will be especially welcome. Details M J. Hurrell, tel 0732 823662.

5-7 July, GB4CSB
To mark the Chester Scouts Birthday, celebrating 75 years of Scouting in Chester. Operation by Chester & DRS from Eaton Hall, Chester, by kind permission of the Duke of Westminster, on hf and 144MHz. Special QSL card. Details G4EZO, tel 0244 40055.

7 July, G6SL
Eddystone Radio will be operating from Wivenhoe, Colchester, as part of the Marconi sales conference. Operation will be on 3·655 or 3·720MHz under the company callsign G6SL, from 10am till 11pm. Special QSL card. Details Mervyn Dyke, tel 021 475 2231.

7, 14 July, 12, 13 August, 1, 8 September, GB1GWR and GB0IKB
These stations will be operated from the Weston-super-Mare Railway Station by Weston-super-Mare RS to commemorate the 150th anniversary of the Great Western Railway on 31 August. The July and September operations will coincide with special steam excursion trains which will call at the station; and the August operation will mark the visit of the Brunel Exhibition Train; Izambard Kingdom Brunel built the railway. Details G4/KA0NGP.
12-14 July, GB0DAW
Mounted by Cray Valley RS at the Danson Park Show. Operation on most bands. Details G3TAA.
13-14 July, GB2SMR
Operational as talk-in station on 144 and 432MHz at the Sussex Mobile Rally by the Brighton RC, it will also be active on the hf bands. Details from G4IIL.
14-21 July, GB4STD
St Dunstan's ARC will operate this station from Ian Fraser House, Ovingdean, Brighton, on the occasion of the visit of HM The Queen and HRH The Duke of Edinburgh to open the modernized south wing, and to celebrate the 70th anniversary of St Dunstans; the organization for men and women blinded on war service. Active on all bands, cw, special QSL cards will be available via the RSGB bureau. Details G3SEJ, tel 051-638 5514.
20-21 July, GB2DFB
The Pembrokeshire Raynet Group will operate this station on hf during the Dyfed Fire Engine Rally at Haverfordwest (Withybush) airfield. Contacts with fire and emergency service members welcome. Details GW4ODN, tel 06462 3991.
20-30 July, GB2OVV
In connection with "Orkney Viking Venture", a series of camps for Ranger Guides celebrating the 75th anniversary of the founding of the Girl Guides, GB2OVV will operate from a croft cottage at one site overlooking Scapa Flow, on hf ssb and 144MHz ssb or fm. Details GM6WPA or GM3IBU.
26-31 July, GB2MU
A Manchester University ARS dxpedition to Scotland will operate from a site in IO87 or 88 square on 144 and 432MHz, and 1·3 and 10GHz. Details G4TUA, tel 061 226 9628.
27-28 July, GB0RAR
Reading & District ARC will operate from the Shire Hall, Shinfield, Reading, as part of a fund-raising event to alleviate suffering in northern Africa. On all hf bands, 144 and 432MHz, from midnight Saturday to midnight Sunday. Details G8DOR.
27-31 July, GB2CV
On the occasion of the 6th Citroen World Meeting, Cheltenham Racecourse, Prestbury Park, Cloucestershire, organised by the 2CVGB2 club, this station will be operated jointly by Gloucester ARS, Cheltenham ARA and Smith Industries RS. Conditions permitting, all hf, 144 and 432MHz bands will be used, including rtty, sstv and atv if possible. Special QSL card. Details G8UJG, tel 0242 672175.
27 July-3 August, GB2SGC
To celebrate "Peak '85", the Scout and Guide international camp at Chatsworth Park, Derbyshire, this station will be operational on hf, vhf, uhf and Oscar 10. Special QSL card. Offers of help from the Notts/Derby area to, and details from G6NED.
28 July, GB3SLH
Holyhead & District ARC will operate this station from the "Skerries" lighthouse, off the Isle of Anglesey, N Wales, in celebration of the club's first anniversary. This is the first special event station to operate from this location. Operation will be hf only, from 8am to 8pm.
28 July, GB2MLB
Thanet RC will operate this station from the lifeboat house at Margate to commemorate the 125th anniversary of the establishment of a lifeboat station in the town. Operation will be on hf ssb and 144MHz ssb or fm. The club will make a contribution to the RNLI for every QSO made. Special QSL card. SWL reports welcome. Details G4SBD, tel 0843 33213.
August, GB8NTS
GB8NTS will operate from Rugby radio station throughout August. Special QSL card. Stations who worked GB6NTS in June and who also work GB8NTS can apply for the "Newbold Association of Target Sports" Award. There will be a charge of £2.50 for the full colour certificate and all proceeds will be donated to the association's building fund, which is going towards Britain's, first purpose built, international target sports centre, Newbold, Nr Rugby. The station will be active mainly on 144MHz ssb and fm, and is being sponsored on the number of contacts achieved. Details G6ZZE, tel 0533 768181.
August, GB2BR
Swindon & D ARC will operate this station during August from the railway workshops at Swindon, during an exhibition to celebrate the 150th anniversary of the GWR. Details G8SFM, tel 066 689 307.
3 August, GB2PF
Thanet RC will operate from Ramsgate's annual Phoenix Fair celebration, on hf ssb and 144MHz ssb or fm. Special QSL card. SWL reports welcome. Details G4SBD, tel 0843 33213.
3 August, GB2FAA
Yeovil ARC will operate this station from the RN Air Station, Yeovilton, as part of the international air day, on hf and vhf, cw and ssb. Details G4JBH, tel 0935 23873, or G3BEC.
10/11 August, GB2YFT
Operated at the Yeovil Festival of Transport, Yeovil Showground on A37, by Yeovil ARC on hf/vhf/uhf, cw and ssb. Details G4JBH.
15 August, GB0VJD
Operated by Gloucestershire ARS for the Cheltenham and Gloucester Branches of the Burma Star Association to celebrate the 40th Anniversary of VJ Day. From 0001 to 2359 on all hf bands and 144MHz. Details G3LP.
17 August, GB2MSS
At the Mid-Somerset Agricultural Show, Shepton Mallet, Yeovil ARC will operate this station on hf/vhf/uhf, cw and ssb. Details G4JBH.
17-18 August, GB4PFF
Swansea ARS will operate this station at the Pontardawe Folk Festival, near Swansea on hf and vhf. Details GW4HSH, tel Swansea 404422.
17-18 August, GB2TC
To celebrate the 500th anniversary of Henry Tudor's visit to Tamworth prior to the Battle of Bosworth, the Tamworth ARC will operate at Tamworth Castle, on 3·5 and 144MHz from 10am to 8pm on 17 August, and from 10am to 5pm on 18 August. Special QSL card. Details G4SRI.
18 August, GB0LFS
This station will operate from Lutterworth Fire Station, Gilmorton Rd, Lutterworth, to run in conjunction with the station's annual gala day. Special QSL card. Details G4WES, tel Lutterworth 2295.
23-26 August, GB4MOC/GB6MOC
Operational by local clubs to celebrate the Mobil Oil Co centenary at the Pegasus Social Club, Herd Lane, Corringham, Essex.
5 September-2 October, GB4HB
Exmouth RC will operate this station at Hayes Barton, East Budleigh, Devon on hf bands, 144 and 432MHz, Oscar 10 and RS satellites. Hayes Barton is the birthplace of Sir Walter Raleigh who was born here in 1554, and established a colony in North Carolina in 1585, and it is hoped to contact the Raleigh ARS in the city of Raleigh, as part of their 400-year celebrations. It is also hoped to contact the Operation Raleigh ship *Sir Walter Raleigh* callsign GB0SWR/MM on her round-the-world mission. Special QSL card will feature the Elizabethan farm house. Details M Newport, tel 0395 274172.
22 September, GB8SOT, GB4SOT, GB6SOT, GB0SOT
Operated by North Staffordshire ARS from Stoke-on-Trent to mark the 75th anniversary of the amalgamation of the six towns of the potteries, and the 60th anniversary of the granting of city status to Stoke-on-Trent. From 9am to 6pm on hf, vhf, rtty, fstv and cw. Details G6MLI, tel 0782 332657.
11-25 November, GB2ACC
Dunfermline RS will celebrate the 150th anniversary of Andrew Carnegie's birth, operating on hf and vhf, cw, ssb and rtty. Skeds welcomed. Special QSL cards. Details GM4WYR, tel 0383 736401.
29 (or 22) December, GB4OLD, GB8OLD, GB4NEW, G8NEW
Radio amateurs throughout Europe (and the rest of the world!) are invited to join in the Lutterworth New Year celebration. Active on as many bands as possible, GB4OLD and GB8OLD will be used until midnight on New Year's Eve, and GB4NEW and G8NEW after midnight. The stations will operate from St Mary's Church, Lutterworth, Leicestershire. Details G6ZZE, tel 0533 768181.
13-14 March, 1986, GB4PHT
Operating from the Portland Heritage Trust during Portland Carnival, operation will be on 3·5, 14 and 144MHz ssb, cw, rtty, Amtor. A special effort will be made to contact amateurs in the other Portlands worldwide. Details G4RAK, tel 0305 822753.

Other Events

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

2 September
Scottish Amateur Radio Convention, SARCON 85, Dundee.
29 September
RSGB HF Convention, Belfry Hotel and Conference Centre, just outside Oxford on the M40.
6 October
Welsh Amateur Radio Convention. Details later.
12 October
Midlands VHF Convention, British Telecom Training School, Stone, Staffordshire.
13 October
Second Yeovil QRP Convention. Details G4JBH, tel 0935 23873.
16 March 1986
Pontefract & DARS Components Fair, 11am-4.30pm, Carleton Community Centre, Pontefract, mid-way between Pontefract and Darrington on the A1.

OBITUARIES

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

Mr C Abrathat, G4DNR
Charles Abrathat died on 23 April, aged 70. He had been confined to a wheelchair for 27½ years, but became licensed in 1974. He was active on all bands, cw, ssb, and achieved DXCC. A week prior to his death, Charles was presented with the Peter Vella (G3WVP) Memorial Cup, at Cray Valley RS, in recognition of his outstanding contribution to club activity.

Mr A Badiozzaman, G1MIO
Ahmed Badiozzaman died on 2 April, aged 59. Although only a recent member of the RSGB, he was very proud to belong to the Society. With no previous experience in radio he successfully passed the RAE, and practiced constantly to pass the morse code test. Sadly, his death precluded his ambition to go on the air.

Mr F Berridge, G3ITW
Stan Berridge died on 28 March. He had been a keen radio amateur since 1953, and until the onset of his illness was regularly heard on the air.

Mr H R Boutle, G2CLP
Harry Boutle died on 7 May. He had been a very active operator for many years. Since retirement he had played an important part in the organization of the Shuttleworth Collection at Old Warden, and was also honorary secretary of RAIBC, 1976-8.

Mr J A Carter, G3KYH
John Carter died after a short illness, aged 48. Mainly a cw operator, he had been licensed since 1956. He was a keen supporter of RAIBC for the past 25 years, and served as honorary treasurer, 1978-85.

Mr R W Cresswell, G3SUW
Ron Cresswell died on 14 April, aged 62. He was an swl in the early 'fifties, and became licensed in 1964. For the past 11 years Ron had been a member of RAIBC, and was well known in WAB circles.

Mr T Evans, GW4BIF
Ted Evans died on 11 January, aged 72. He was a member of Porthmadog ARC. Ted became licensed late in life, but was very active on hf and vhf.

Mr C Ginders, G3XHA
Cyril Ginders died on 17 March. He was a past-president of the Scarborough ARS, and was one of the best-known local radio hams. He had been a sergeant-instructor in the Royal Signals during the war, and subsequently became involved with, and was a founder member of the Royal Signals Old Comrades Association. Cyril was very active on all bands and very much involved with the Sea Scouts in their communications training.

Mr A Goodwin, GM3RYO
Alf Goodwin died on 19 April, aged 80. He was previously very active on 144 and 432MHz, and was interested in home construction. Recently, Alf was made an honorary member of Stranraer & D RC.

Mr R Harding, G6WPS
Robert Harding died on 2 April, aged 20. Although handicapped for the greater part of his life, and confined to a wheelchair, Robert derived great pleasure from amateur radio.

Mr S L Hill, G8KS
Les Hill died on 26 March, aged 77. Licensed for over 50 years, Les was active until December 1983 on hf and vhf. In the early 'sixties he had been a keen dxer and with G3FKM led the DXCC awards at that time.

Mr G Hughes, G4CG
George Hughes died in his shack on 28 April, immediately after taking part in the North Devon 160m Net. Licensed in 1938, he was an active and enthusiastic radio amateur. George was a founder member of the North Devon RC, of which he was secretary for many years, and area representative. He had been a wholehearted supporter of the GB3ND repeater project, which was commissioned a few weeks before his death.

Mr R J Jackson, G2CKN
Reg Jackson died on 3 April, aged 73. During the war he was a navigator in the RAF. He became a good hf cw dx operator in the post-war years, gaining DXCC. He was an ardent amateur and keen on mobilising, supporting rallies, conventions and the RSGB. Latterly he started again on ssb, gaining the Capt Cook Award, which he much valued.

Mr H G Peers, G3BEZ
Horace Peers died on 25 March, aged 74. Although his home after 1980 was at Tonbridge, Kent, he had been well known in radio amateur circles whilst residing in Eastleigh, Hants. He was a former senior engineer with Southern Television, and was a past member of the Radio Fraternity Lodge of Freemasons. Horace had been a regular participant in the Sunday 9am Net on 3,760kHz. Although a post-war licensee, he had gone to sea as a wireless operator for the Canadian Line, at the age of 16.

Mr E Prouse, G6HSE
Edric Prouse died on 5 May. After a long interest in radio, he became licensed after his retirement, and was a member of North Cornwall ARC. He both received and gave a great deal of pleasure through amateur radio.

Mr J Rawlinson, G8VIJ
Jim Rawlinson died on 5 April, aged 68. His activities centred on 144MHz, ssb. Jim also had a keen interest in auroral happenings.

Mr J A Ruffle, G3YIO
John was a keen constructor and relished overcoming technical problems and inventing new pieces of equipment. He was active on 144MHz and had recently returned to 3·5MHz. His equipment will remain in good use, through his two licensed sons.

Mr J Smith, G8BRH
John Smith died on 6 May, aged 70. He had been a radio enthusiast since 1922. His main interest was in construction and experimentation. John obtained his licence in 1968 and was active on 144MHz, ssb being his favourite mode. He had previously been a member of both Stoke RC and Burslem RC, and at the time of his death was a member of the South Cheshire RS.

Also:

Mr H Barlow, G8ILT, on 8 May;
Mr T A Barnett, G8BAM;
Mr L H Bower, G3BKV, on 19 April;
Mr A H Bygrave, G6VOY, on 18 March;
Mr J Cook, G4SGT, on 24 April;
Mr C B Cumming, GM0AXW, on 20 April;
Mr B J Dodd, G6JLG;
Mr J B Doran, G6YIL, on 3 April;
Mr F H Ford, G4KED, on 6 April;
Mr S R Green, G3APH;
Mr A R Hamilton, G3BTA;
Mr J K Haynes, G6YH;
Mr D W R Hayson, VE1PA;
Mr J A Hordern, G3RTQ;
Mr T W Leary, MBE, G4LTW, on 25 March;
Mr A Newall, G3QV, on 9 May;
Mr W H Peek, G2ZZ, on 9 May;
Mr W G H Robinson, G3EZM, on 22 March;
Mr D J C Rowan, G3XOZ, on 19 April;
Mr G A Sinck, RS84925;
Mr C B Townsend, G1FEQ, on 10 March;
Mr N B Tapson, RS85722, in April 1984;
Mr J V Walters, G4FEK;
Mr J E Williams, G4NDZ, on 16 March

COUNCIL PROCEEDINGS

A brief report on the Council meeting held on 14 March 1985

Present: Mrs J Heathershaw, (President, in the chair), Dr E J Allaway, Messrs J T Barnes, R G Barrett, Dr D S Evans, Dr J N Gannaway, Messrs F D Hall, H M Holmden, G R Jessop, W J McClintock, H S Pinchin, D M Pratt, D S Smith, G R Smith, K E V Willis (members of Council), D A Evans (secretary/general manager). A W Hutchinson (editor) and Ms H M Norman (minutes secretary).

Apologies for absence were received from Mr Cornish and Mr O'Brien.

Honorary treasurer's report
In the absence of both the treasurer and the chairman of the Finance & Staff Committee, the secretary highlighted the significant points arising from the management accounts report for the six months to 31 December 1984, which had been circulated to Council members. A general discussion of financial matters took place.

The role of clubs in RAE training
The President said that this item had been included on the agenda following the January meeting of the Membership & Representation Committee, which favoured both the concept of an RSGB RAE course and, specifically, club involvement with RAE training. This subject was currently being discussed by the Education Committee, and she had invited the chairman of that committee to join the discussion as to the way the Society should proceed. Mrs Heathershaw then welcomed Mr Benbow to the meeting and invited him to open the discussion.

Mr Benbow reported that the Education Committee had recently been approached by the National Extension College which wished to take up the matter of an RAE correspondence course. He passed details around Council, explained the likely costs involved to the Society, and asked for Council's view.

A long discussion into all aspects of the RAE and associated training took place, and various options were aired. It was agreed that the Society should be involved in the training of radio amateurs nationally and at club level. Mr Benbow would be invited to a future meeting of Council to further discuss these questions.

Secretary's report
(a) Membership. Various research projects at present in hand were explained.
(b) Books. The publications status report for the second quarter was circulated and questions answered.
(c) Technical officer. The current position regarding projects was reported, and after discussion it was agreed that projects for beginners were most important.
(d) DTI matters. He was optimistic with regard to obtaining an extension to the 50MHz experiment during 1985. The DTI had agreed to a suggestion from the Licensing Advisory Committee that the special prefix "GV" could be used for a period of seven days from 5 May 1985 in order that groups might celebrate the 40th anniversary of VE Day on 8 May 1985.

Recommendations arising from committee minutes
Education
"That the Society should take a stand in the main exhibition area at the Association of Science Education to be held in York University over three days in January 1986."

This was agreed in principle, dependent on the cost and subject to the approval of the Finance & Staff Committee. It was agreed that it would be advantageous to include a working display of amateur radio.

HF Contests
(a) "That an honorary trophies manager be appointed forthwith to oversee the trophies programme for the Society and to ensure that the trophies are kept in good order and up-dated as required."
(b) "That the Society reverts to its previous practice whereby trophies are presented at the annual general meeting and recipients allowed to retain them for the due period."

After discussion, Council agreed that while in principle it would consider the reappointment of a trophies manager, preferably living near Potters Bar, it would however require a positive assurance that trophies which were presented to recipients would be returned in time for re-presentation. The secretary noted that this had been a serious weakness when the old scheme had been in operation through an honorary trophies manager. Council would also require to have sight of the proposed terms of reference of a new trophies manager and consider the proposed method of operation of the hf awards programme.

Membership and representation
(i) Reduced subscriptions had been granted to a further 32 members.
(ii) Life membership was granted to Mr P D Wolfe, G4EGU.
(iii) Affiliations were granted to:
Aircall Amateur Radio & Computer Club, Luton;
Alyn & Deeside Amateur Radio Society, Clwyd;
Bredhurst Receiving & Transmitting Society, Kent;
Darwen Amateur Radio Club, Kent;
International Police Association Radio Club, Essex;
Lichfield Amateur Radio Society;
Maxwelltown Amateur Radio Club, Dumfries;
Mid-Beds Amateur Radio Contest Association;
Southampton Amateur Radio Club;
Scout Association of Hong Kong;
Woodpecker Amateur Radio Group, Hereford.

(iv) Following ballots, two appointments had been made:
Region 9—Mr A H Hammett, G3VWK; and
Region 18—Mr I Gibbs, G4GWB.

(v) The following area representatives were appointed:

D J Cannings-Bushel, G4WAD	Evesham;
A F Dowling, GW3GUE	Carmarthen;
H Fenton, G8GG	Blackpool & Flyde;
F J W Perry, G8ZXC	West Kent;
S Weglarz, G0AMT	Newcastle-upon-Tyne;
D H Plumridge, G3KMG	Consett, Co Durham.

(vi) It was unanimously agreed to co-opt Mr J Case, GW4HWR, on to Council to represent Zone E for the remainder of this year. It was decided that this should not affect his position as RR10, provided Mr Case was willing to continue.

IARU membership
IARU Proposals 180 and 181 to admit the Kuwait Amateur Radio Society and the Brunei Amateur Radio Transmitting Society were agreed unanimously.

Milne Trophy
Dr Allaway outlined his paper concerning the incorrect allocation of the trophy in 1982 and 1983. He explained that the Milne Trophy was intended to be the "brother" of the Braaten Trophy, the exact terms of reference for the former being; "The leading scorer in the ARRL DX CW Contest all-band section with a UK prefix other than G". After some discussion it was agreed that the President would write to the rightful winners and to those to whom the trophy had been erroneously presented.

Green Book revision
Dr Evans outlined the significant (non-editorial) changes which had been made to the Green Book. Copies of the draft were distributed and Dr Evans requested comments as soon as possible.

Members' Mailbag

THE EDITOR,
RADIO COMMUNICATION,
80 BROOMFIELD ROAD,
CHELMSFORD, ESSEX
CM1 1SS

THE RAE—CGLI REPLIES

Sir—I have followed with great interest the letters to "Members' Mailbag" concerning the RAE, and feel that the time has come to highlight certain facts and express a few opinions of my own.

Harrogate College is, we believe, the only girls' school in the UK to run regular RAE classes for its pupils (successful candidates have access to a well-equipped shack, G4LYZ). Over the past five years many candidates have been rewarded with a pass in the examination and have gone on to apply for their own callsigns.

Having invigilated for the RAE, and being an examiner in Physics for one of the matriculation boards, I have had the opportunity to compare how O-level and RAE examinations are conducted. By far the most important difference, and the one which in my opinion overrides all others, is that the RAE questions can never be viewed outside the examination room. This makes all objective discussion by the amateur radio fraternity impossible! An examination must not only be fair **but must be seen to be fair.** What are the mechanisms by which the suitability of the questions is established? Does the RSGB or its Education Committee have an opportunity to vet or comment on them? If not, who does perform this task?

Having a privileged view of these questions over the past years, I may have serious doubts about the suitability of many of them to assess the syllabus, but since I cannot disclose by example, my thoughts must remain a matter of unsubstantiatable personal opinion. Perhaps a glimpse at the City & Guilds report on page 1034 of *Radio Communication* December 1984 may at least awaken the fears of others in this respect. I refer to the comment that **"There was also a lack of understanding of the difference between frequency and phase modulation circuits".** For me this typifies the way the RAE has drifted towards being a test of electronic theory rather than of a candidate's understanding of the **important** principles which underlie the hobby.

How is a candidate to prepare for the type of question likely to be encountered in such an examination when "mock" questions or text books cannot reproduce them? City & Guilds claim that releasing questions would diminish their available "pool" and raise costs. If this is the case, why do GCE boards charge roughly the same fee for papers containing not only 40 or so multiple-choice questions, but also sections marked by examiners whose fees must be paid? These papers are set twice a year, and in my experience there is no shortage of good questions.

Well-set multiple-choice questions cannot be said to be easier than traditional written-answer types, but they do have rather different objectives in mind. They are ideal for testing the theory of a subject, both in detail and over a wide range of topics, but they are rather poor at trying to get a measure of a candidate's application and experience within a subject. This is why the GCE boards mix the two types in the papers they set.

In the past, when the vast majority of RAE candidates were active swls, the level of knowledge of operating procedures etc was high, and could be tested in the examination by wide-ranging questions such as: "Describe, with reference to available amateur bands, how 24-hour contact could be maintained between two stations situated 200 miles apart". I believe that many candidates who now sit the examination have no such swl background and that this accounts for much of the criticism they receive after obtaining their callsigns. The present examination does not encourage them at all in this "self training" aspect.

Looking again at the C & G report raises another question, how is the pass mark and/or the percentage pass of candidates arrived at? Looking at the figures I would, perhaps naively, have thought that the "boom year" entry consists of many candidates who had little knowledge of amateur radio practices; yet the pass rate is above the relatively-low 1984 figure. Also, a wide swing in entry produces little percentage pass swing; does this indicate a level set by percentage pass rather than a given score in the examination? Does the City & Guilds publish how this is done?

In summary, I feel that the present situation regarding the RAE must not be allowed to continue. The only way any criticism of the entry into our hobby can be attacked is if the qualifying examination is open to scrutiny. If City & Guilds cannot fund such changes from the not inconsiderable revenue they receive from candidates (a simple calculation from the figures), then perhaps the time has come for the RSGB to press as strongly as possible for a change of examination institution.

Richard Horton, BSc, G3XWH,
Head of Physics, Harrogate College

In view of the nature of some points raised in this letter, the City & Guilds of London Institute was asked for its comments. Part of their reply reads as follows:

(CGLI) is Britain's largest technical testing and qualifying body. Each year there are about half a million candidate entries in over 300 subjects. As far as the specific points raised in the letter are concerned, the Radio Amateurs subject has an examinations committee on which, of course, the RSGB is represented. The multiple-choice papers used in the examination are scientifically compiled: each item used has been pre-tested and has its facility value and discrimination index calculated. . . . The multiple-choice paper is at least a positive attempt by City & Guilds to elicit the correct answer from an examination candidate. The traditional essay-type or short-answer question-paper relies on the candidates to express themselves, and unless they can do this well, nothing can be proved. In our experience, the majority of answers will be muddled, misspelt or badly expressed, with the vital points omitted completely.

The security of the papers is a constant problem and it is indeed City & Guilds policy to ensure that all used and unused multiple-choice booklets are returned to us after the examination. There is no objection to teachers seeing multiple-choice papers in the examination room during the examination time or at a time (as soon as possible after) deemed by the local examinations secretary to be more convenient to teachers who wish to look over the papers so long as NO copies of the papers or their contents are taken out and photo-copied. Teacher comments on the multiple-choice items used in the examinations are always welcome. . . .

City & Guilds, like any other examining body, does not publish its pass marks nor does it have a fixed percentage pass rate. . . .

PAY AS YOU USE?

Sir—A suggestion has been mooted that certain mobile and commercial shortwave stations should pay a licence fee directly proportional to frequency usage. Therefore, I would like to propose that radio amateurs should also pay according to band occupancy; ie, those using the busiest bands would pay the highest fee, while others using the least-used bands would have the lowest fee to pay. Anyone for 10GHz?

Douglas Byrne, G3KPO

Seriously, though, there is no reason to believe that radio amateurs will be charged for the use of the spectrum other than through the licence fee. After all, we are very much a national resource.

WHAT ARE THE ODDS?

Sir—I wonder if anyone has had the good fortune to contact what I consider quite an unusual double. While working hf under supervision of G4PNT, I contacted VP2MF, the QSL was via VE3GCO. My next contact, 5min later and 23kHz further up the band, was with CZ3XN, the QSL was via his own callsign, VE3GCO. I wonder if there is anyone out there with a calculator to calculate the odds of doing that again?

Allan Hickman, G6YEP

A ROGUE MORSEMAN PCB

Sir—I have recently built the "Morseman", as described in *Radio Communication*. There are a couple of points I would like to mention concerning it which may be of help to anybody building the Moreseman. First, on my pcb pins 11 + 12 of IC6 were not connected together as they should be, and the second point is that my display did not operate. After making sure everything was as it should be, I found that by shorting pins 18 and 19 of the Z80A, the display worked even though the circuit shows pin 18 unconnected. Perhaps somebody can explain this. This aside, I think it's an excellent project and I enjoyed building it.

H Wagg, G6RYM

We have checked our remaining stock of Morseman pcbs, and pins 11 and 12 of IC6 are properly connected. It looks as though Mr Wagg's board was a rogue, for which we apologise. Pin 18 of the Z80A is the HALT *output and is not used in the Morseman: Strapping it to pin 19,* MREQ*, is emphatically not recommended since it may damage the Z80A. The real problem in Mr Wagg's case is likely to be one which has also cropped up in one or two other Morsemen, namely that because of differences in the internal architecture of the components used for IC6, the clock oscillator may be running at too high a frequency. The Morseman clock should operate at somewhere around 800kHz, and that is an upper limit because of the essentially triangular waveform from the clock oscillator. An oscilloscope connected to pin 6 of IC6 will show the clock output waveform and frequency; if it is higher than about 800kHz, either IC6 should be changed for a different component or C16 should be increased in value. Either a CD40106 or a 74C14 should be used for IC6; other so-called "equivalents" are not guaranteed to work without alterations to associated component values. The Mullard LOCMOS HEF40106 certainly will not, for example.*

MORSE TIPS

Sir—A brief response to your request for cw tips. The following, from hardly knowing the symbols for "SOS", helped many of we ex-aircrew w/ops to take a dodgy 30wpm (eventually) in 1945. Can still cope with about 20wpm.

1. Forget the dots and dashes (as far as possible) concentrate on the **sounds,** not dash dot dot dash, but dah dit dit dah.
2. Have only experienced ops send to you, preferably at one word faster than can be copied normally.
3. Listen to cw at every available moment.
4. This was probably the greatest help. Train oneself to convert everything seen in print, papers, adverts etc, into its cw equivalent.

The best, most pleasant and rhythmic ops heard were/are of course drummers.

Geoff Curtis, BRS20104

BBC MICRO MYTHS

Sir—I feel I must reply to G4RGA on the rather flippant and obviously mis-informed remarks on the BBC micro-computer. His remarks worry me, chiefly not because of the attack on the hardware but because it would appear that the "black box syndrome" is even now appearing in computer software.

Here we have an area where we do not have excuses like "I always end up short of a resistor", or "I can not find a source of this component", and yet we are falling into the old trap of "If it does not work first time I do not want to know about it". I am sure that the software involved could, with a little thought, be made to run on any machine, and that it would take less time than many of the mods people make to their rigs.

On the other remarks concerning the BBC

micro, I would only say that, as a computer engineer, I was present at one of our customers when a bench mark test was set-up using eight micros, and a VAX-Super-mini as a comparison, and of the micros, the BBC came out top on all tests.

Recent magazines show a significant fall in the price of the BBC, and even at the old price to equip other micros to the same level of hardware would cost in most cases a lot more —if, indeed, it could be done at all!

Now we come to memory, In 1977 when I joined my present company, who were and still are regarded as the world leaders in mini-computer manufacture, a medium-sized mini only had 32k of memory, and everyone seemed to manage fine, and that was in a multi-user environment. Now the home computer amateur cannot! The BBC Basic is fast and efficient, and designed to be used in a professional manner. This is the reason for providing "procedure" and "function" facilities which directly lend themselves to memory saving techniques, and also to the more ambitious of us a technique known as "overlaying", which means a program of many times the memory size of a computer can be run provided one is careful and familiar with the technique.

I hope my letter will clear up any myths concerning the BBC, and may I say now that I enjoy GM4ANB's columns: I hope that he will keep his view of no bias to any particular hardware, which would undoubtedly put people from developing their skills in an up-and-coming branch of our hobby.

Gareth McComb, GI4CZO

CONTESTS, ANOTHER VIEW

Sir—The letter from Mr Tom Morris, G4XTM, published in your journal under the heading "Contestants' Comment" in May, cannot go unanswered.

I doubt that contacting as many stations as possible in the shortest possible time can really be said to contribute to (in the words of our licence) "self-training of the licensee in communication by wireless telegraphy". After all, communication reasonably implies sustained contact and the passing of messages of some length and content. Furthermore, most of the two-letter-call amateurs of whom he complains have been doing amateur radio for 40 years or so, and it must be accepted that they have graduated into deeper mysteries than calling "CQ contest" in the process of their self-training!

Concerning his complaint about "pompous windbags intent on boring everyone else to death", may I draw his attention to para 1(b)(i) in the amateur licence which authorizes: "Messages in plain language which are remarks about matters of a personal nature in which the licensee, or the person with whom he is in communication, has been directly concerned."

If Mr Morris listens at length to such personal matters until he is bored and regards them as banal he would appear to be transgressing the Wireless Telegraphy Acts by listening to and reporting on messages not intended for him, and he is also making a social intrusion into other people's private lives.

Not that I personally approve of long rag-chews *or* contests on narrow, crowded bands at peak activity times. We two-letter-call sign pensioners, in all fairness, should do our nattering during the working-day periods of the younger amateurs, and they in turn should tolerate our use of the hobby when keeping in touch with our ageing friends without insensitive criticism of such nostalgia, as expressed by Mr Morris, who will no doubt be old and verbose himself one day!

Norman Sedgwick, G8WV

IT'S NOT AMATEUR RADIO, BUT . . .

Sir—For goodness knows how long, I have been trying to find the words of a poem concerning cricket. The first line, I am sure, is: "One night I lay a-dreaming I was batting up at Lord's", and the poem probably ends: "And just as my 200 runs appeared upon the boards, I woke to think about the duck I made just yesterday."

I have only ever known one person who could recite it, and that was over 50 years ago. I have even contacted the BBC cricket producer, who in turn asked his colleagues, and he asked the Lord's museum curator, but to no avail.

So will all members of the amateur radio fraternity, please ask their fathers, grandfathers and uncles, in an endeavour to save one of their fellow members from going round the bend. I am sure someone, somewhere in Britain must know it.

Roy Gidlow, G3ZFN

CONSPIRACY EXPOSED FEEDBACK

Sir—What a richly deserved rebuke from Gordon Lines RS386997, to the radio amateur fraternity, and how kindly delivered ("Members' Mailbag, May).

Of course, it is ridiculous to apply the identity "amplitude modulation", or in its contracted form "a.m.", exclusively to that particular form of amplitude modulation which employs double sidebands with carrier (ie A3E according to the latest Telecommunications Convention designation) when the much more widely used other classes of emission, cw and ssb, equally qualify as amplitude modulation. These latter classes of emission qualify as amplitude modulation from their undeniable physical natures, and properly come into the amplitude modulation main category (the other two main categories being frequency or phase modulation and pulse modulation) in both the old and the new schedules attached to our licences.

The use of the term "a.m." to distinguish dsb from ssb when these are both forms of amplitude modulation has always been rather misguided, especially when we have the clearly understandable term "dsb" ready to hand. The term a.m. was good enough for use in contra-distinction to fm in connection with the great and late cb modulation controversy, or, as I have seen, for identifying the medium-wave broadcast band from the fm vhf band on domestic receivers, but not otherwise.

I noted that, in my opinion, G3VA fell from grace in this respect in the second sentence of his *Technical Topics* in the April issue, and I nearly reached for my pen then. Now that we have got rid of that other term which stamped us as amateurish, namely "watts rms", let us do the same with "a.m." as being at best misleading when we mean dsb.

Now just in case the good Mr Lines did not write with tongue in cheek when he spoke of "true a.m. with sidebands suitably suppressed" and "transmitters and receivers truly modulating and demodulating carrier waves by varying their amplitudes without benefit of sidebands and with full audio frequency reproduction", I would report that a good show of this being done appeared to be presented by Dr Robinson round about 1930 using a revolutionary medium-wave broadcast band receiver which he had designed and I believe patented,, and to which he gave the name Stenode Radiostat. Dr Robinson argued that sidebands were only mathematical concepts but had no physical existence. His theory was that to take notice of sidebands had all along been misleading. The staggering thought came that there was no fundamental reason why broadcast transmitters should be spaced apart by as much as 9 or 10kHz. He drew attention to the fact that the effect of a tuned circuit of very high Q tuned to a carrier which was being keyed rapidly off/on to produce a square wave envelope was, briefly, to slow the rates of growth and decay and so to distort the square-wave envelope to a triangular-wave envelope. This triangular wave-form could be converted back to the original square wave by the incorporation after the demodulator of something like a differentiator circuit. He called it tone correction. The same thinking would apply to any modulation envelope. His Stenode Radiostat was a superheterodyne with a single crystal to give the equivalent of a single tuned circuit of extremely high Q in the i.f. amplifier. (The subsequent tone correction was therefore easy to carry out accurately). The tuning of the receiver was indeed extraordinarily sharp, so it appeared to be highly selective, and its quality of reproduction was excellent. It was Mr Lines' dream come true, and Dr Robinson claimed that his theory as to the irrelevance of sidebands was vindicated.

By his papers and demonstrations Dr Robinson for many months had half the radio profession and academics convinced, and the other half vacillating between wishful thinking and deep scepticism. Then somebody pointed out that the monkey-chatter from broadcast transmitters working on channels adjacent to the wanted signal was just as great on the Stenode Radiostat as on a conventional receiver, and that this type of interference was explainable only on the assumption that sidebands were real. The Stenode Radiostat turned out to be a flash in the pan.

I am afraid one can no more modulate a carrier without producing sidebands than one can usefully travel from A to B without undergoing acceleration and deceleration.

J Watt, G6ZC

See also *Technical Topics*, June—*Ed*

1985 *CALL BOOK* ENTRIES

Sir—I should like to reassure both friends and enemies that despite my non-appearance in the 1985 *Call Book*, I am still very much alive and licensed! If any other members find themselves suddenly ceasing to exist, a quick note to Chetwynd House should resolve the matter.

Seriously though, an amendment sheet, containing changes of address and corrections, published at regular intervals as an insert in *Radio Communication*, would be very useful.

On a similar note, persons wishing to contact the South Birmingham Radio Society, should write c/o any of the licence holders of G30HM, G40HM, G80HM, or to the address in "Club News"—not the address on the *Call Book*, which has been incorrect for four years. Yes, we have written to the RSGB about it. . . .

Tim Scrimshaw, G8RGQ

The RSGB Amateur Radio Call Book *has always been based entirely on the records of the UK licensing authority. The 1985* Call Book *was for the first time compiled by direct transfer of data from the Radio Amateur Licensing Unit to the Society. Any errors which appear in it reflect errors in RALU records, and the Unit should be notified immediately of any inaccuracies so that the 1986* Call Book *can be more accurate.*

Sir—I visited the NEC on 14 April, enjoyed the exhibition very much and came away with a couple of good buys. One slight criticism, I felt that the stalls were just a little too small, and too close together. Surely the empty and partitioned-off part of the hall could have been used to provide larger stalls with more space between? Apart from that, most enjoyable.

I also purchased the 1985 *Call Book*, and I would like to suggest, to these operators whose callsigns are followed by the words "Particulars withheld at licensee's request", either withdraw this request or have it altered to "station located at (town etc). The reason I suggest this is that the *Call Book* can be purchased by anyone, especially pirates who I have noticed—especially around South Manchester—using varied callsigns yet the same voice, and the callsigns used have all been those in the *Call Book* with no name and address after the callsign.

I know that some people prefer to remain out of print, but it would help to catch or prevent some of the misuse that goes on. It would also help people in other areas to know if and when a callsign is being misappropriated by an unlicensed person. Though I must say that even as I am writing I can think of ways around it as well.

J D Bolton, G4XPP

THANKS FROM G3PSM

Sir—Having received the result of the Region 2 election, may I take advantage of the letters page to thank those members who registered their votes in my favour. As the figures show, it was a close fought contest with an above-average poll.

On this occasion I was not successful, but may I wish Mr Shepherd, G4EJP, success as Region 2 representative, and assure him of my support.

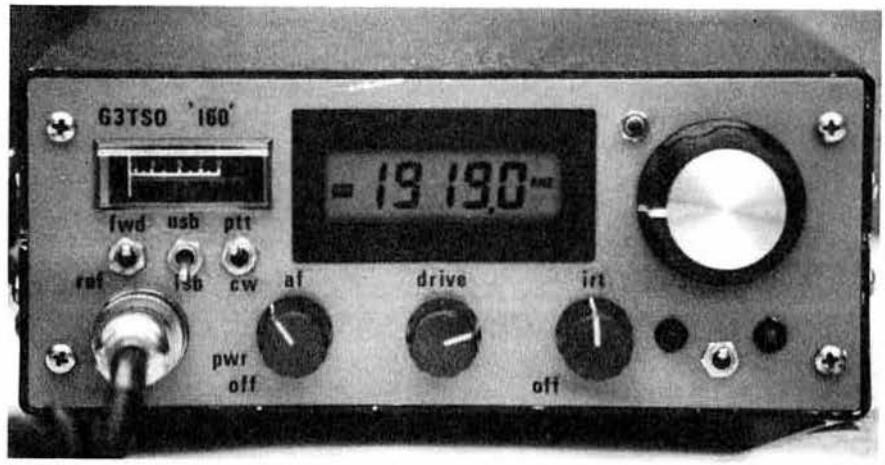
Colin J Thomas, G3PSM

A Solidstate 30W SSB Transceiver for 1·8MHz

(Part 1)

M J GRIERSON, MRIN, AMITD, G3TSO*

Mike Grierson was born in 1945 and began building radio sets in 1958. After a period of self-tuition he passed the RAE in 1961 but did not obtain a licence until 1964. His main interest has been the construction of transmitters and receivers, and portable equipment for the hf bands. After a three-year spell in the electronics industry he made a career in the RAF where, as a navigator, he has operated transport aircraft to many of the world's dx locations.



THE TRANSCEIVER to be described came about as there was no commercial alternative for a small simple 1·8MHz mobile transceiver; the Atlas 180 and 215 were out of production, and the Japanese miniature transceivers did not cover the band. The rf stages were developed in the form of a transverter driven by an FT707 operating on 24·8MHz, but the resulting combination proved too bulky for mobile use. It was, however, considered feasible to build a very small single-band transceiver with mobile operation in mind. Using readily available components, broadband techniques and very little test equipment, a fairly sophisticated piece of amateur equipment has been produced. All metal work and pcbs, with the exception of the main exciter pcb, are hand made, again using very limited equipment. Operation on any of the hf amateur bands would only require simple changes to the basic design. Performance of the completed transceiver is equal to anything currently available on the commercial amateur market.

The ssb transceiver module

The heart of this project is based on a design by G4CLF using the Plessey SL1600 series ics. Cirkit Holdings currently market a kit (91600 module) based on this design, but using a 10·7MHz i.f. instead of the original 9MHz. Unfortunately it suffers from one or two major shortcomings if built in the suggested manner. The design uses a single-sided pcb which may have worked for the designer, but causes lesser mortals nothing but problems. Oscillator leakage into the high gain i.f. strip is a major problem and can only be eliminated by using double-sided pcb and total screening of the oscillators. This leakage normally manifests itself as a form of agc instability. Also, no attempt to match the 10·7MHz filter to the original circuit appears to have been made, and several component changes are necessary for satisfactory performance. Several changes to the audio circuitry were also found desirable. As an alternative to on-board screening, the oscillators could be housed separately in a screened box, but this would increase the size of an otherwise compact unit.

By far the simplest method is to use the Cirkit pcb and glue a sheet of thin copper foil to the component side with Araldite, redrill the holes and countersink the non-earth holes. The same foil can then be used to make the rest of the screens. This method has been tried successfully. The foil should be thin enough to be easily cut with scissors. Fortunately I had an alternative double-sided board available and this was used.

Fig 1 shows the modified G4CLF circuit. On receive, signals are fed to

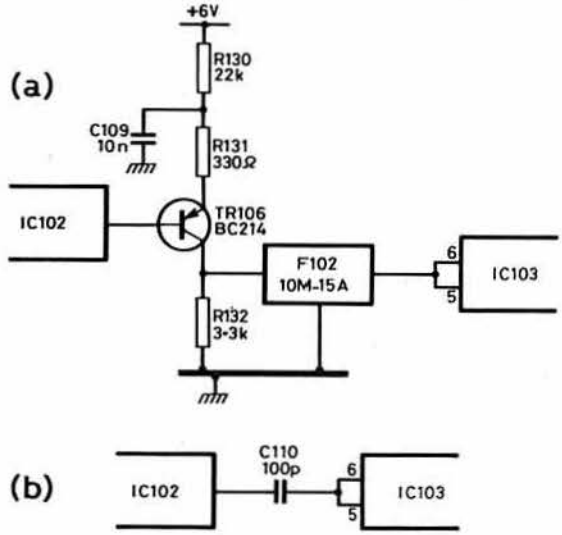


Fig 2. (a) Addition of second 10·7MHz filter. (b) Original Cirkit 91600 module

*9 Coneygar Road, Quenington, Cirencester, Glos GL7 5BY.

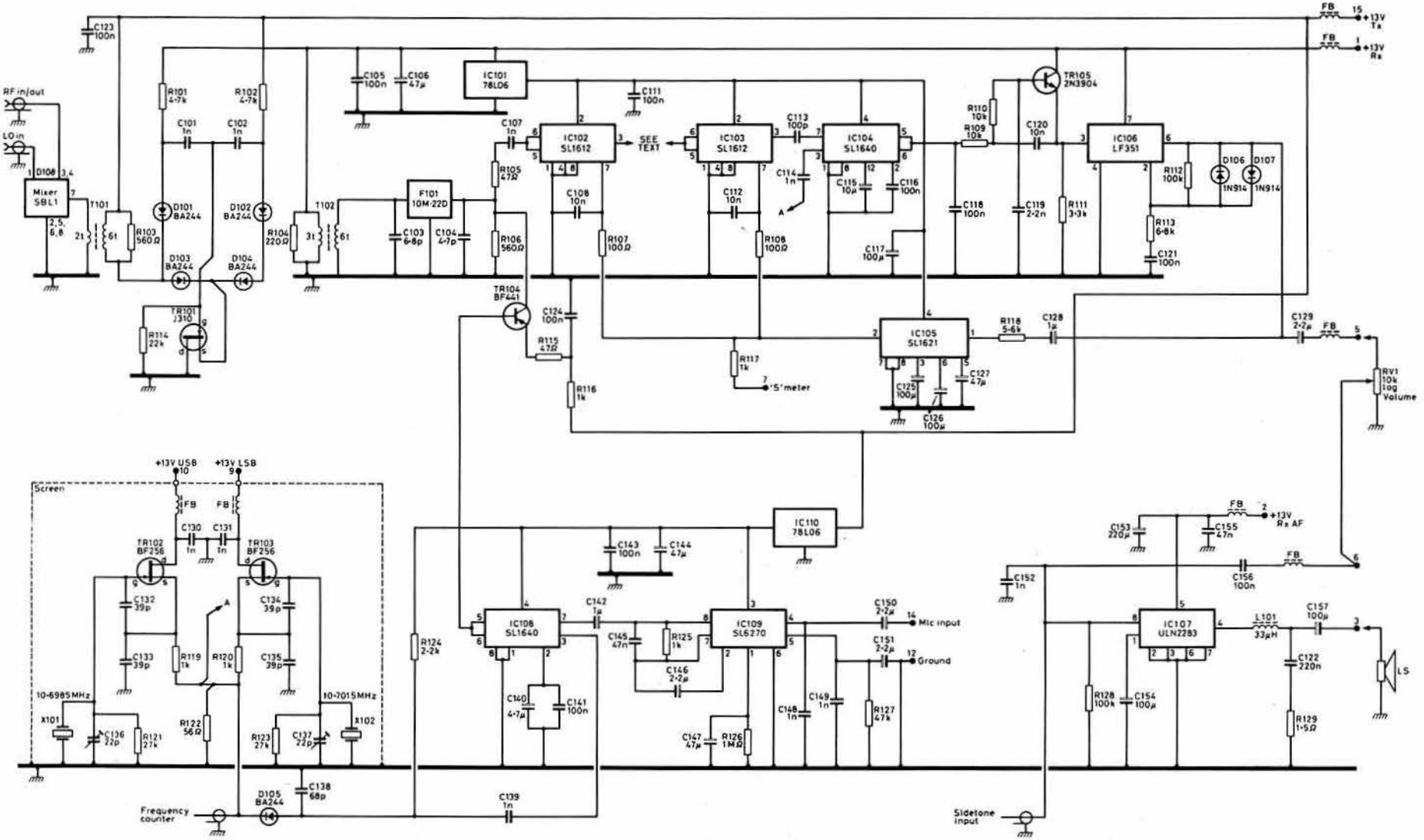


Fig 1. Modified G4CLF circuit diagram

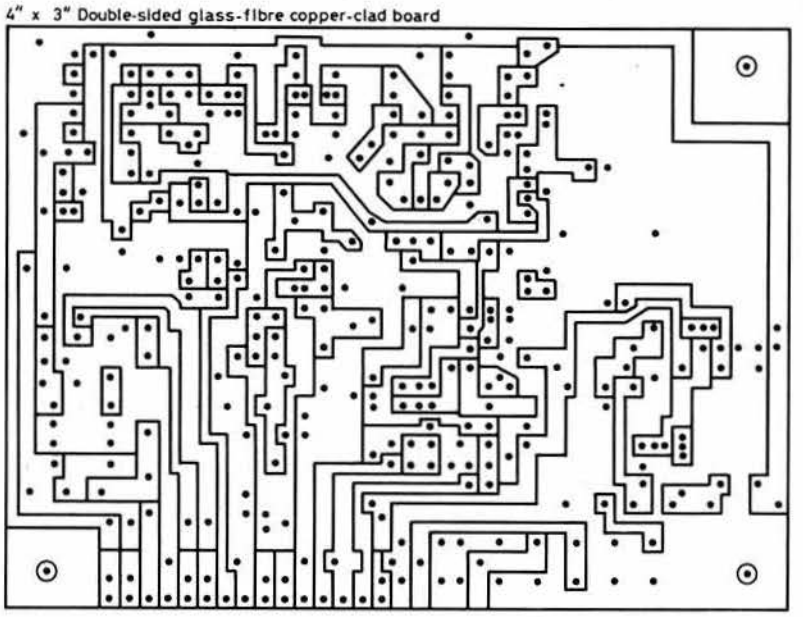


Fig 3. The modified G4CLF exciter pcb used by G3TSO

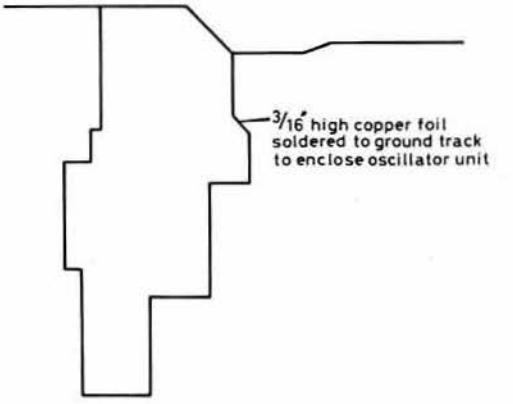


Fig 4. Location of under-pcb screening of Fig 3

the input of an SBL1 diode ring mixer and mixed with a 500mV local oscillator signal. The resulting 10·7MHz signal is amplified by TR101, a J310 bi-directional amplifier, before being filtered by the eight-pole filter. This filter is much more critical to match than many of the 9MHz types, and values of components around the filter were carefully chosen for optimum performance and differ considerably from the original design. The signal is amplified by two SL1612 i.f. amplifiers which are broadband stages and tend to generate a lot of wideband noise. In my transceiver a second 10·7MHz filter has been added between IC102 and IC103 in an attempt to reduce the noise a little. Fig 2(a) shows the circuit with TR106 matching the filter and with sufficient gain to overcome the filter insertion loss. If you are using the original pcb IC102 and 103 are coupled with a 100pF as in Fig 2(b).

IC104 is an SL1640 product detector mixing the ssb signal with the local oscillator TR102 or TR103 depending on which sideband is required. If only lsb operation is required, only one oscillator need be built, thus simplifying the screening process. The resulting audio signal is fed via TR105 and IC106 to IC105 a SL1621 agc amplifier which controls the gain of the i.f. ics. This device has the peculiar characteristic of a long hang time after a signal has gone, and takes a little getting used to. Many designs use a capacitor between pins 2 and 3 of the SL1621, this is an attempt to damp the low frequency instability caused by oscillator leakage. If the leakage is stopped, no capacitor is needed. TR105 and IC106 filter and amplify the audio. IC106 has been changed from a 741 to an LF351 fet op-amp, and diodes D107 and D108 provide a degree of impulse limiting to the audio signal. IC107, a ULN2283 audio amplifier, provides about 1W of audio into an 8Ω speaker. This is adequate for most purposes, but in a noisy car higher power could prove useful. This ic may differ with different Cirkit kits.

Small rf chokes are necessary on many of the input connections to the pcb, and are easily mounted on the board by cutting a thin line across the appropriate track. Chokes consist of 3·5 turns through a ferrite bead (FX1115).

On transmit, microphone signals are amplified by the vogad, IC109, which gives a fairly constant output for a wide range of inputs. Up to 60dB dynamic range is possible, but 40dB is quite sufficient in this design. R125, a 1kΩ resistor, is included between pins 7 and 8 to limit the gain, and C145 should be 47nF. The SL6270 is designed for a low-impedance balance microphone input; this is not common in amateur equipment, and in this project is used single ended with a fet acting as an impedance match for higher impedance microphones. Pin 12 on the pcb is earthed, and C150 is connected in reverse polarity to match the source potential of the fet. Audio from the vogad is fed to IC108 together with the 10·7MHz local oscillator. A double-sideband signal is presented via TR104 to the filter for removal of the unwanted sideband. The ssb signal is now amplified by TR101 before being mixed in the SBL1 to the desired output frequency.

In order to perform as a complete transceiver, all that is needed is a vfo on the appropriate frequency, and a tuned filter in front of the mixer. The same filter will serve to remove the second channel response on transmit. Output power is about 2mW.

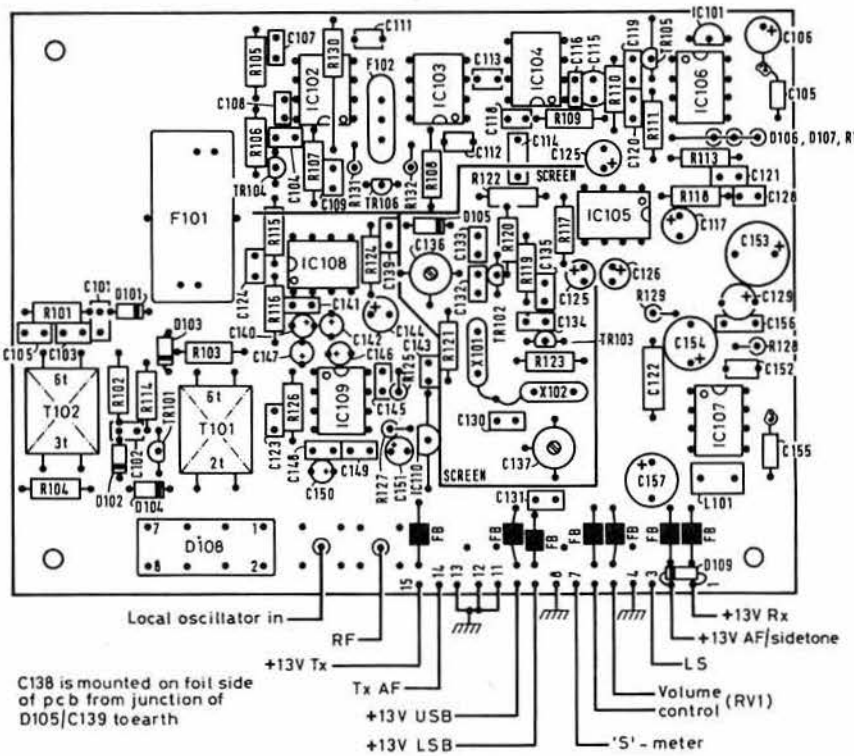


Fig 5. Component layout of Fig 3

Construction

Perhaps the most difficult part of this project is the construction of the main pcb. Component density is high, and many of the supplied components have different lead spacing to the holes on the pcb, but it is assumed that anyone having a go at this board will have a fair idea of what they are doing.

SL1600 ics are fussy about their earth connections; however, with a double-sided pcb all earths have been soldered above and below board. Essentially these devices have separate input and output earths, and in single-sided pcb applications these should be kept apart to prevent circulating currents. On double-sided pcbs they appear far less critical.

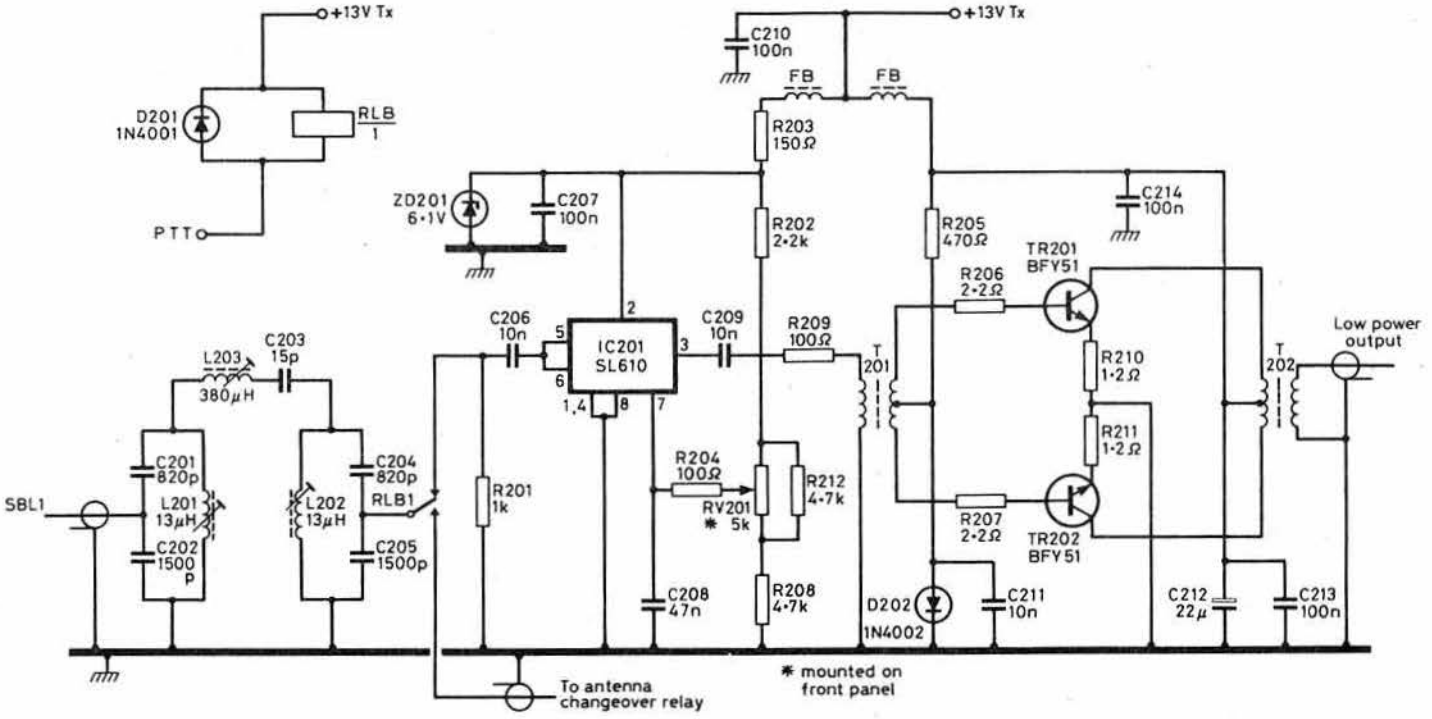


Fig 6. Bandpass filter and transmitter driver circuit diagram

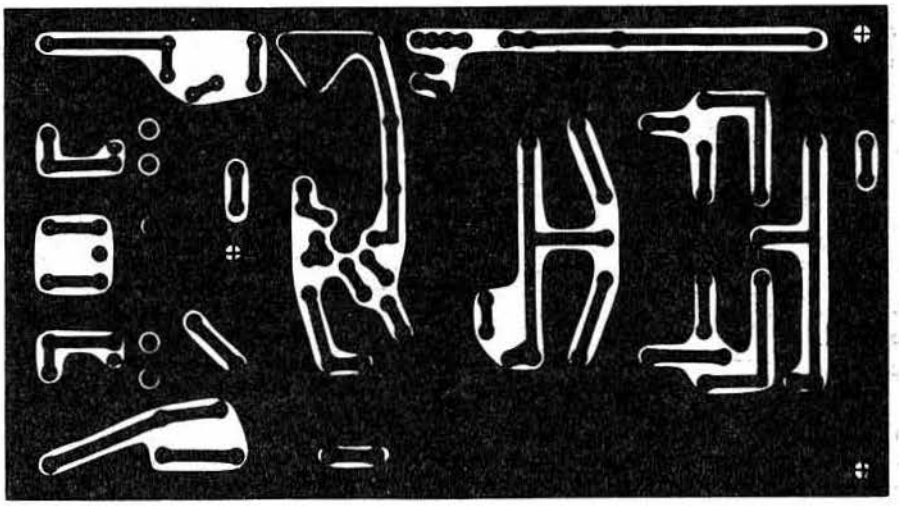


Fig 7. PCB layout of Fig 6. PCB 4·5 by 2·5in double-sided

As a guide, first modify the Cirkit pcb, or make a new one and build it up as per the circuit in Fig 1. Time spent checking which way round and where things go is far better than time spent trying to remove components after they are soldered in. Complete the board and check it for operation before adding all the screening. Screening is cut and bent to shape accurately before soldering in place. A hot pointed iron is needed for this job, take care not to drop solder in unwanted places; trying to find it won't be easy. Do not, under any circumstances, use ic sockets with these Plessey devices, they will not work if you do.

It is important when testing this board to short to earth the transmit 13V line on receive and the receive 13V line on transmit for the board to function correctly. This is done in operation by RLA1 and RLA2. The pcb should be mounted about $\frac{1}{16}$in above a metal surface to aid the screening process.

Fig 3 illustrates the pcb used by the author. Underside screening is shown in Fig 4 and totally surrounds the oscillator section. Fig 5 shows the component layout and screen location. A lid is soldered above the oscillators and has holes for the adjustment of C136 and C137.

No problems have been encountered with this design except for a duff vogad chip which had to be changed.

The bandpass filter and transmitter amplifier (Figs 6, 7, 8)

A simple bandpass filter is the only signal frequency tuned circuit in the transceiver. It acts as front-end preselector on receive, and as a tuned-filter after the mixer on transmit to filter the unwanted 19MHz signal. Attempts to couple two parallel tuned circuits produced a very peaky response, while the inclusion of a series-tuned circuit produced a fairly level response across the entire 1·8 to 2·0MHz band. On receive, signals pass from RL2 through the filter to the SBL1 mixer, while on transmit, signals are filtered by the bandpass filter and routed by RLB to the transmitter amplifier stages. IC201, a Plessey SL610, is used to raise the signal level sufficiently to drive a pair of BFY51s. The SL610 was chosen in preference to an SL1610 as it is totally screened. The device gain can be controlled by varying pin 7 from +2 to +3V, which allows for either alc or manual drive level to be applied. A pair of BFY51s can be driven to between 1 and 1·5W output in a broadband amplifier circuit. Transformers T201 and T202 can be wound on a variety of two-hole cores, including the Mullard FX 2249. Bias is derived across a silicon diode D202. Relay RLB is connected to the 13V transmit rail, which delays it slightly and prevents drive being applied until RLA and RLC, the antenna changeover relay, have operated.

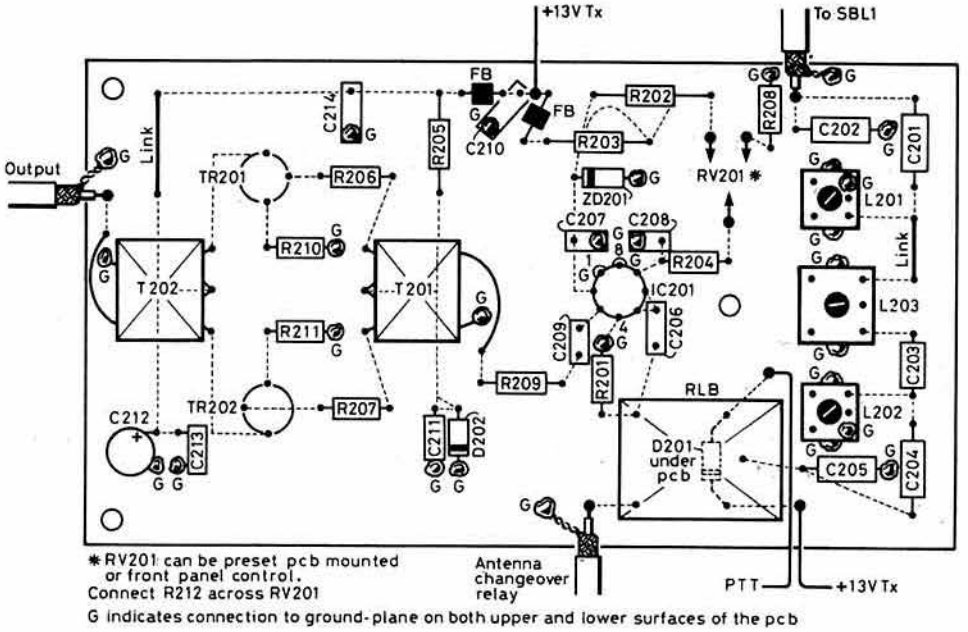
Construction

The unit is constructed on a double-sided hand-drawn pcb as shown in Fig 7. A layout of components is shown in Fig 8; the drive potentiometer RV201 can either be fitted as a preset or mounted on the front panel. The coils L201 and L202 are exceptionally small, with a pin spacing of only 3·5mm. The two rf chokes in the ht line are 3·5 turns on a ferrite bead.

The vfo unit (Figs 9, 10, 11)

The vfo can be constructed as a complete unit first, so that it will then be available for testing the main board when that is complete. TR301 is a conventional Colpitts fet oscillator and resembles the Clapp type of vfo which was very common in the days of valves. Stability at 9MHz can be something of a problem, so particular attention should be paid to this stage. A TIS88 fet was used for TR301, though a 2N3819 worked equally well. The coil L301 is wound on a 0·375in (9·5mm) Aladin former reduced in size to fit the diecast box in which the unit is housed. Ideally, no slug should be used and the coil should be tightly wound and secured with varnish. While silver mica capacitors have always been regarded as desirable in oscillator

Fig 8. Component layout of Fig 6



circuits, the polystyrene type are much smaller and have greater thermal stability and should be used for C310, C311, C313 and C303. C303 required a value of 140pF and was made up from three 47pF capacitors in parallel. On no account use ceramic capacitors in the above locations. C305, the main oscillator tuning, is one section of a vhf type three-gang 30pF unit made by Jacksons and has a built-in slow-motion drive. C306 is a small air-spaced trimmer to set the vfo frequency; a 10pF unit was the only one found to fit, though a 30pF would have required less juggling of the values of fixed L and C. A solid dielectric trimmer was tried with disastrous effect on stability, ceramic types should also be avoided. C304 is a small 6·8pF ceramic npo type trimmer, and can prove useful in counteracting any positive drift. It is only for drift compensation, not frequency adjustment.

IRT (clarifier) is provided by a varicap diode D301; the type is not critical. The values given allow a swing of ±2kHz. The preset pot RV302 permits the irt tuning knob to be set midway with zero shift.

TR302, a 2N3819, operates as a source follower whilst TR303, a 2N2222, acts as a voltage amplifier with its bias taken from the stabilized 8V line and its collector fed from the 13V line. Adjustment of the value of C321 will tune the pi-tank formed with RFC305 and allow maximum output. The output was insufficient to provide the 500mV required across the 50Ω mixer, and TR304, a wideband amplifier, was added outside the main vfo box. C326, a polystyrene type, was found essential to clean up the waveform from TR304. The result is a nice clean sine wave output of 1·5V peak to peak.

The vfo fits snugly into a small diecast box measuring approximately 4·5 by 2·5 by 1in including the tuning capacitor. All components except the capacitor C305 are mounted on a hand-drawn pcb (single-sided) Figs 10 and 11. It may prove necessary to rearrange components depending upon their sizes. All components should be mounted close to the pcb, and any interconnecting wires should not be able to flex. The pcb was originally drawn to take two capacitors in parallel at C310 and C311 as silver mica types were initially used. Once aligned, components in the oscillator stage were held in position with candle wax; Araldite could be used but future changes become difficult.

Alignment of the unit is not difficult but can be a tiresome task, particularly in the final stages. Initially the unit should be adjusted outside its box, it will move low frequency by approximately 100kHz when fitted. The value of C303 can be adjusted to give the desired tuning range with C305, ideally 200kHz plus 10kHz extra at the band edges, 140pF was found ideal for this. The coil was mounted with the gate connection adjacent to the pcb and turns adjusted to achieve the correct operating frequency. The stability achieved using polystyrene caps was far better than with silver mica types, and little or no drift compensation was required. Once working, the unit can be mounted in its box and final adjustments made. This is where it gets tiresome, as it may be necessary to keep removing the pcb to effect minor changes of values; however, once done, the unit should easily be as stable as the average commercial equipment; ie, better than 100Hz in 30min.

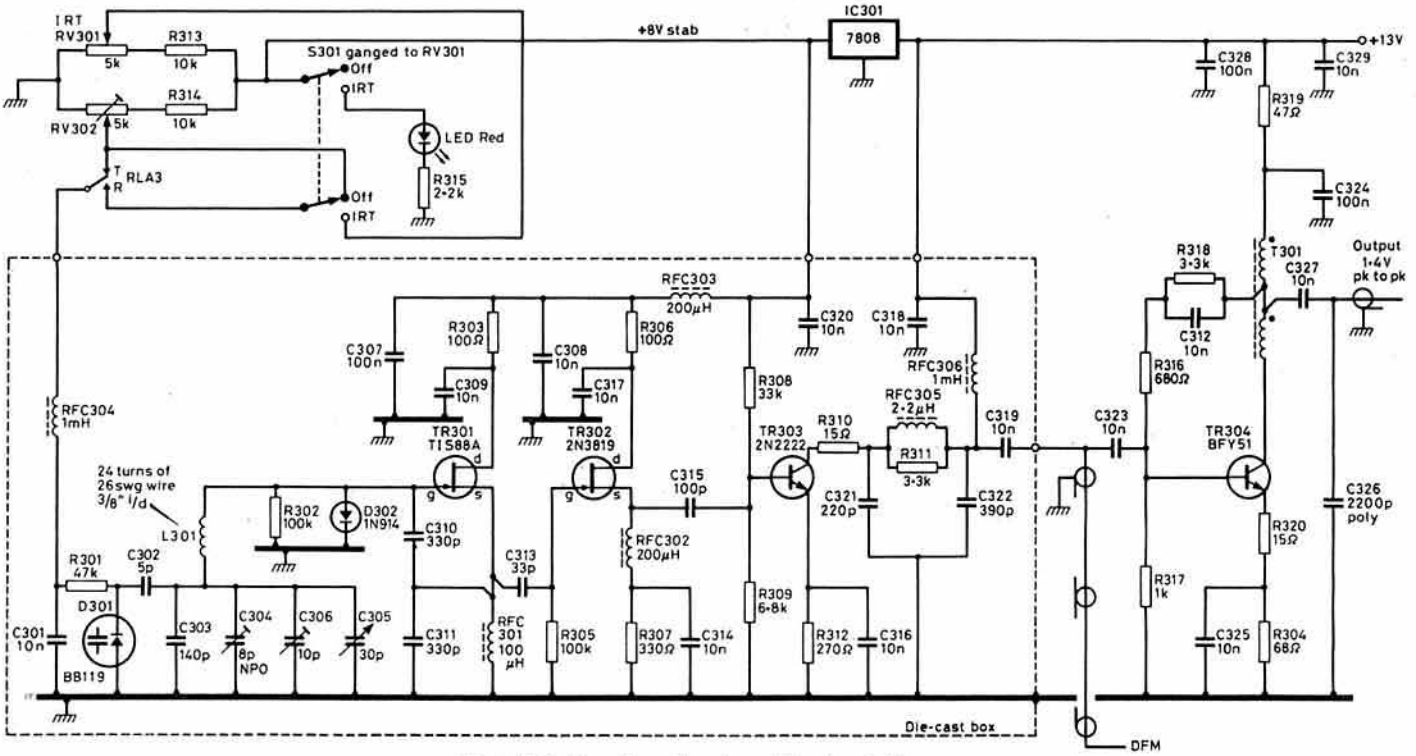


Fig 9. VFO, irt and broadband amplifier circuit diagram

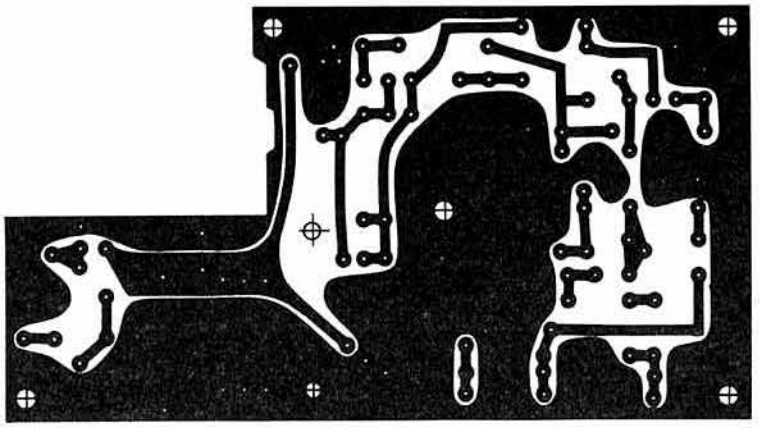


Fig 10. PCB layout of Fig 9. PCB 3·75 by 2·062in single-sided

Fig 12. VFO wideband amplifier pcb, 1·25 by 1·25in double-sided

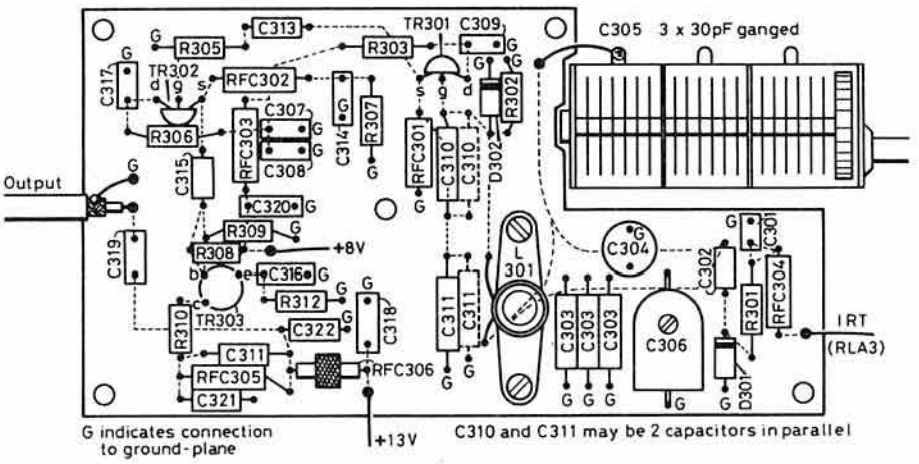


Fig 11. Component layout of Fig 9, viewed from component side

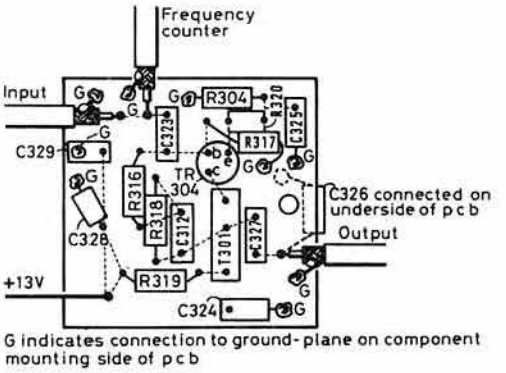


Fig 13. Component layout of Fig 12

The wideband amplifier TR304 was mounted on a 6BA pillar adjacent to the input to the main exciter pcb.

In the original transceiver a small loudspeaker was mounted in the case directly below the vfo unit, but this has been found to be a bad idea as the magnetic field from the speaker effects the oscillator frequency. Ideally the unit should be laid out in reverse to Fig 11 under the chassis, but in practice no adverse effects have been noticed once the case is bolted on.

Digital frequency counter (Figs 14, 15, 16)

Construction of a mechanical dial is not easy, and seemed rather pointless when a complete lcd direct-reading dfm can be bought for about £21. The FC177 dfm available from Cirkit measures only 2 by 1 by 0·312in and is direct-reading with 100Hz resolution to 4MHz. The unit has programmed i.f. offsets, but they do not coincide with the carrier frequencies used for ssb. It is necessary to mix the 10·7MHz oscillator output with the vfo output in order to get a true frequency readout. This is not difficult to do, and another Plessey ic, a SL641, is used as a mixer. This device is a surplus type in a TO5 can available from Birketts, and is probably only slightly out of balance. A screened device is preferred, as the signal generated in this device must not be allowed to see the receiver or transmitter rf stages. In

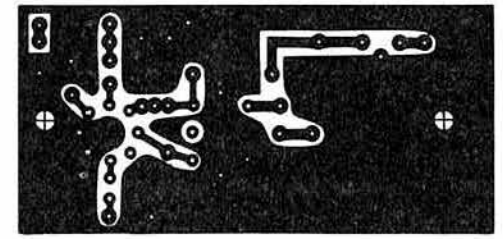


Fig 15. Frequency counter, mixer and psu layout. PCB 2·375 by 1·125in, double-sided

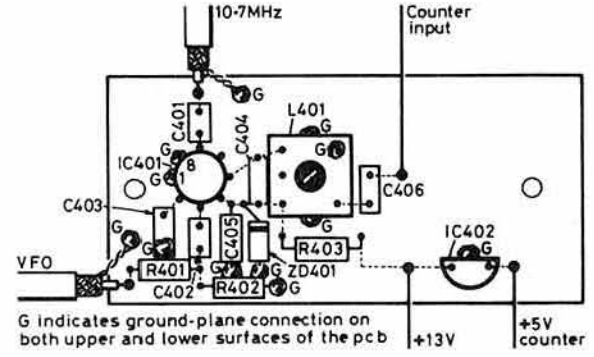


Fig 16. Component layout of Fig 14

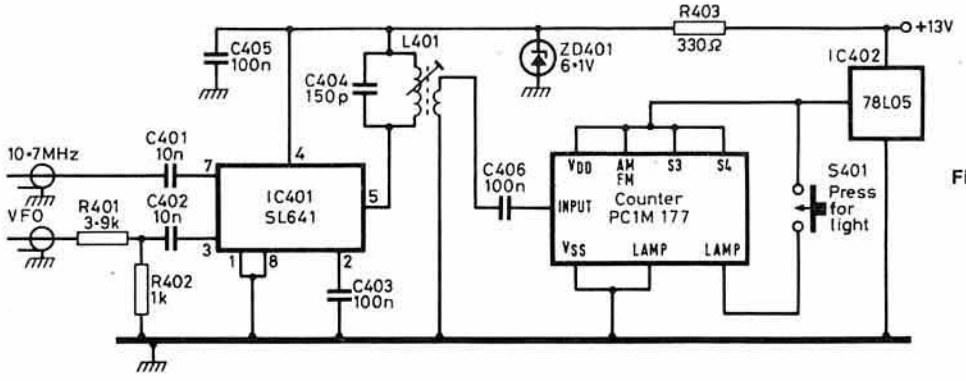


Fig 14. Digital frequency display circuit diagram

practice careful layout has caused no problems. The mixer is constructed on double-sided pcb and mounted directly behind the FC177. A tuned circuit L401 is resonated at 1·9MHz, and the counter will read several hundred kilocycles on either side of this frequency.

The FC177 requires a 5V supply, and has the added advantage of a backlight which is wired through a spring-loaded press switch for night viewing.

TO BE CONTINUED

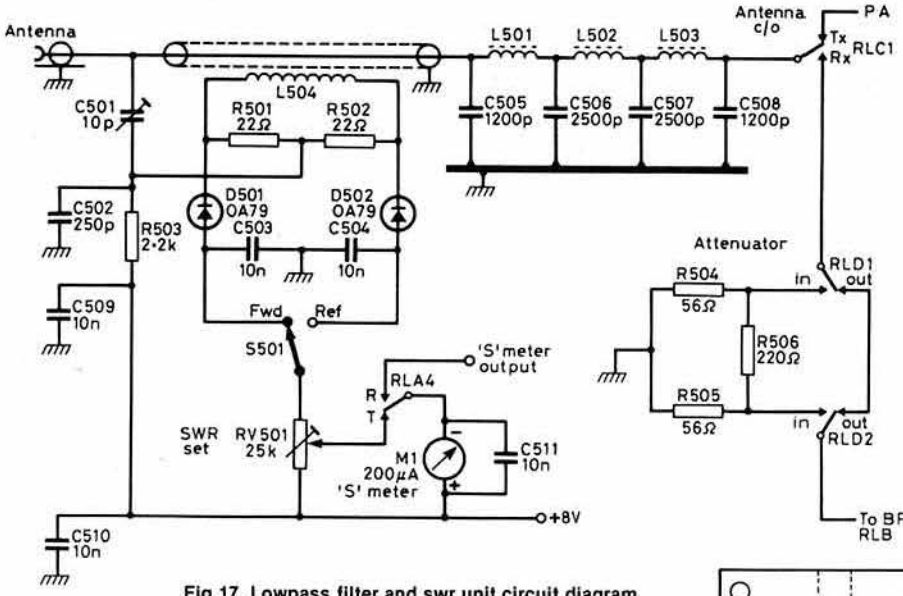


Fig 17. Lowpass filter and swr unit circuit diagram

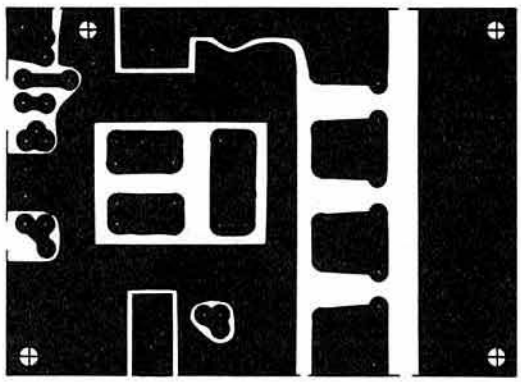


Fig 18. PCB layout of Fig 17. PCB 2·625 by 1·875in, single-sided

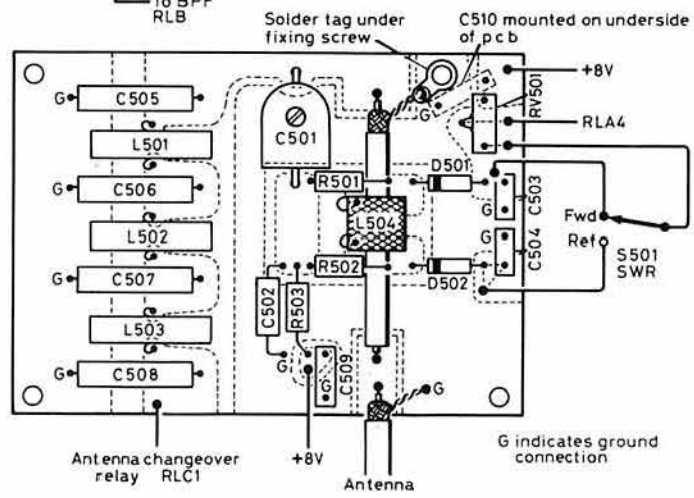


Fig 19. Component layout of Fig 17

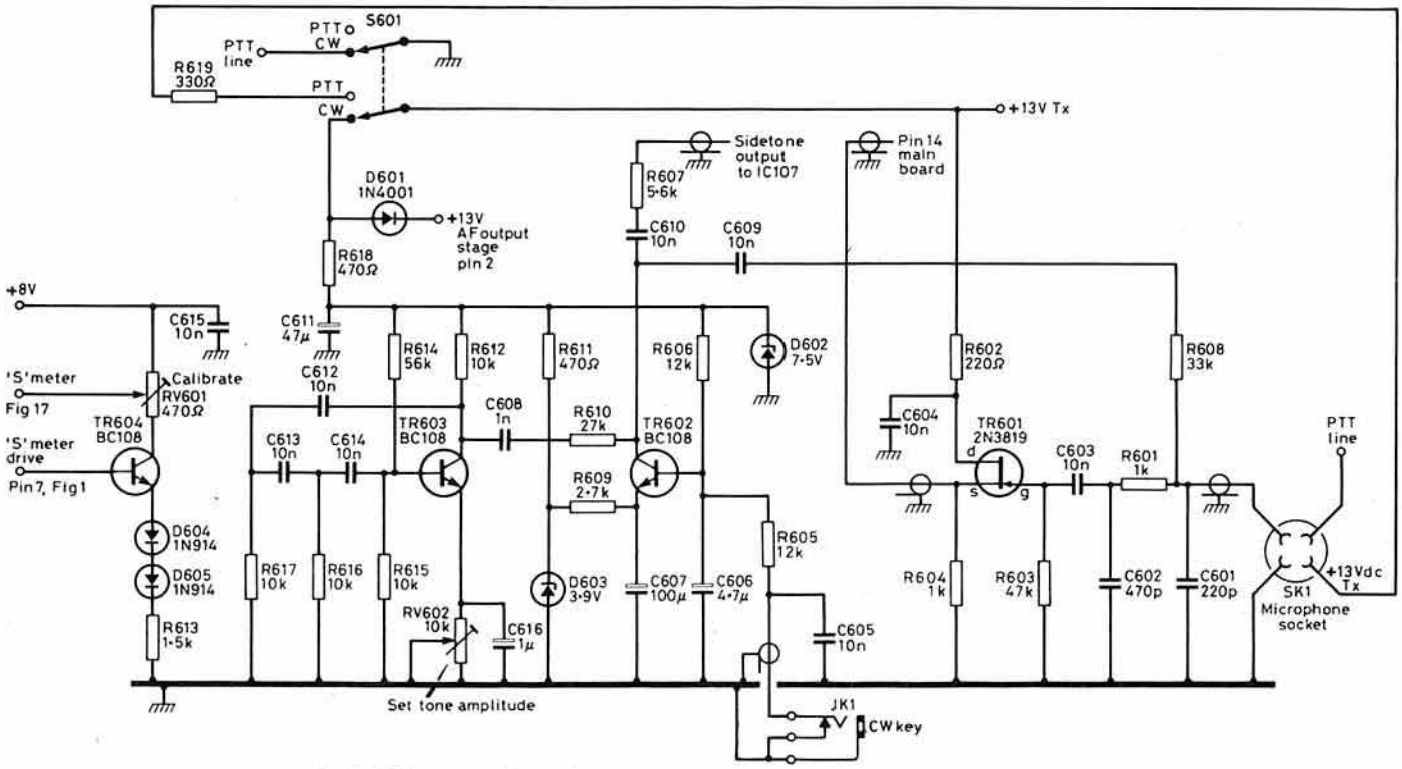


Fig 20. CW tone oscillator, microphone amplifier and S-meter amplifier circuit diagram

MODERN VHF/UHF FRONT-END DESIGN

Ian White, G3SEK*

PART 4. PRACTICAL FRONT-END SYSTEMS

IN THIS FINAL PART I will look at some typical amateur vhf/uhf receiving systems. This time I won't burden you with any maths at all. I've already given you those tools in Parts 1-3, including the TCALC program to take the drudgery out of the calculations. I've also explained how to feed sensible assumptions into TCALC so that you can trust the results. Some of my overall conclusions about typical amateur receiving systems may not go down too well in certain quarters, but they're all based on data from published equipment reviews and backed up by calculations which you can check for yourself.

I have already said that most commercial transceiver front-ends are noticeably deaf—as any vhf/uhf dxer knows! Reviewers have found that the noise figures of most 144MHz transceivers run in the range 3-7dB, though they can vary widely among different samples of the same rig, depending perhaps on whether they were aligned on a Friday afternoon . . . Since the target nf I recommended in Part 1 was about 2·2dB (noise temperature = 200K), this kind of performance leaves a lot to be desired. What can we do about it?

How to choose a preamp

One of the most common things people do to improve their deaf transceiver front-ends is to add a preamplifier. The first thing to do when choosing a preamp is to decide why you want it. Here are some possible reasons:

1. Your existing transceiver is deaf—the most common reason.
2. You want to be able to winkle out the weakest dx while the band is quiet and there aren't any strong signals about.
3. You have large, permanent, unavoidable feedline losses.
4. You work Oscar 10 or moonbounce, so you can take advantage of the lower antenna noise temperatures when pointing skywards.

In the last two cases you can generally get away with a permanently-connected preamp. However, in the first two cases, which are far more common, the preamp will make your system vulnerable to overload by strong signals [1]. Earlier parts of this article explained the different overload mechanisms in more detail. What generally happens is that the gain of the preamp provokes overload in the existing transceiver front-end; it is quite rare for the preamp itself to overload.

There are two cures for overload provoked by a preamp, and you can use both . The first is to use a switchable preamp, so you can get rid of it when there are strong signals about. With a bit more effort you will probably still be able to copy all but the weakest dx, which is far better than having the whole band wiped out by receiver overload! The second cure is to use the least possible amount of preamp gain, and I'll come back to that later.

Having decided whether the preamp needs to be switchable (and it probably does) the next step is to look at some advertised preamp specifications, particularly at noise figure and gain. When you add a preamp to an existing transceiver, the new system nf obviously depends to some extent to on how good or bad the transceiver was in the first place. Since the preamp manufacturers don't know the nf of your particular transceiver, they have no choice but to quote the nf of the preamp alone, as if it were connected to an idealized noiseless receiver. So the quoted nf is always better than you can get in practice. Nobody's trying to deceive you; you simply need to be aware of what the advertised specification really means.

The next thing to look at in preamp specifications is the gain. I'll say it once more: *too much gain is bad.* A typical 144MHz preamp with an nf of 1·3dB and gain of 15dB, as advertised, will improve the 7dB nf of a typical transceiver to about 1·7dB (Fig 17). Fair enough, it will transform a deaf receiving system into one which, allowing for feedline losses, comes pretty close to our target nf of around 2dB. But that 15dB of preamp gain will also transform the strong-signal performance from mediocre to downright bad. That is the penalty of improving the system nf by adding things on to the transceiver rather than tackling the real problem, the existing poor front-end.

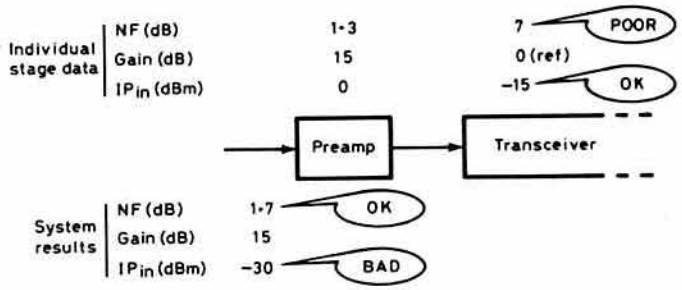


Fig 17. Effect of a preamplifier on a typical commercial 144MHz transceiver

Reputable preamp manufacturers are actually somewhat apologetic about the fact that their products need to have some gain! Manufacturers who boast about the gain of their preamps either have little regard for your technical knowledge, or they don't understand what they're doing [2]. Unfortunately there are always some customers who won't believe a receiver is any good unless the S-meter is perpetually bouncing about and the speaker pours out noise like Niagara Falls! These are the same people who believe in the magic powers of this years's fashionable devices, expecially if they're GaAsfets . . . So read the preamp specifications carefully; and then go over them again, this time reading *between* the lines!

Since the preamp itself is unlikely to overload, except in rather unusual situations, you don't need to pay too much attention to its stong-signal performance. Even so, it's better to buy from a manufacturer who gives some evidence of having considered the problem in the first place, and can give you some support if you do happen to live close by a tv/fm transmitter [3]. Remember these points about intermod performance from Part 3:

(a) *Input* intermodulation intercept is what really matters in a system.

(b) Output intercept looks more impressive, but you have to subtract the gain to get the input intercept.

(c) Input intercepts significantly above 0dBm are unlikely unless the preamp uses special techniques such as negative feedback.

And finally:

(d) Don't be besotted with low noise figures; don't be swayed by this year's fashion; and don't believe in magic!

Adjusting preamp gain

Having fitted a preamp, you can take further precautions against overload by setting the gain to the minimum that is necessary to get your system nf down. Vastly excessive gains (20dB and more) signify bad design, but even well-designed commercial preamps tend to have plenty of gain in order to produce some improvement on even the deafest transceiver. Your transceiver may not be that bad, so you can get rid of the excess preamp gain. Some preamps already include a variable attenuator at the output, so that's a good start [4]. If yours does not, you can easily fit one following the circuit of Fig 18. Take care if the preamp includes rf switching or has a dc power feed up the coaxial cable; if in doubt, check with the technical guru at your local radio club.

It's very simple to adjust the preamp gain down to the minimum your system needs. Start with full gain and tune in a weak and slightly noisy fm signal. Reduce the preamp gain until the audio starts to become noisier, and then increase the gain *very slightly* until you no longer notice the deterioration [5]. That's all it takes: if your system still gets crunched by strong signals, at least you know you've done your best!

What's wrong with commercial transceiver front-ends?

The front-ends of transceivers from the "Big Three" manufacturers are not sensitive enough for vhf or uhf dx working, and they are none too happy with strong signals either. We know this from equipment reviews and from personal experience. If you fit a preamplifier to improve the sensitivity, the strong-signal performance becomes even worse. Yet we also know that it *is* possible to build front-ends which outperform those of commercial transceivers on both weak and strong signals. So, why can't we buy these front-ends from the "Big Three" manufacturers? In their hf models they have recognized our requirements for strong-signal performance as well as sensitivity, and "high dynamic range" is now a strong selling point. But at vhf and uhf all the recent design effort seems to have gone into digital features like scanning, memories, voice synthesizers and now (Lord help us)

* 52 Abingdon Road, Drayton, Abingdon, Oxon OX14 4HP

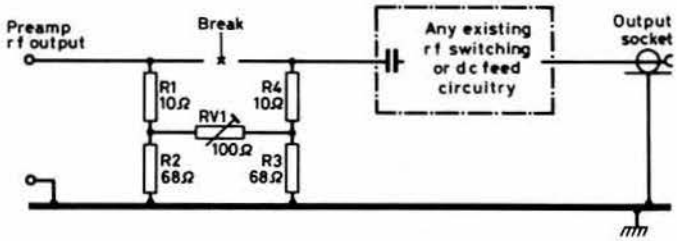


Fig 18. Fitting a 5–15dB variable attenuator to the output of a vhf preamplifier. RV1 is a miniature cermet or carbon trimpot, and all other resistors are miniature carbon film or metal oxide. *NB:* If the preamp has rf bypass switching or a dc feed via the coaxial output connector, make sure that the attenuator never carries rf or dc power

Ascii code identifiers. These are all very well in their way—but what about the radio bit?

Front-end design in commercial vhf and uhf transceivers is still stuck with the dual gate mosfet rf amplifier and mixer—technology over a decade old, and all too reminiscent of the previous decade's valve designs. That was the situation back in 1977 when I made the very first replacement front-end board for my own FT221, and it's hardly any better today. Front-end performance of commercial vhf/uhf transceivers has merely crept forward instead of taking the big strides it should have. New and potentially useful devices have been either ignored or, like GaAsfets, wasted by being plugged into the same tired old circuitry.

Without significantly increasing the price of a top-of-the-line transceiver, it should be perfectly possible for the "Big Three" to mass-produce modern vhf and uhf front-ends with far better performance on both weak and strong signals. After all, they've already done it with their hf rigs.

At present I really can't recommend *any* commercial transceiver for serious vhf/uhf dx and contest working; not without a lot of modification. You can judge for yourself about general operating facilities and the "feel" of the rig. My recommendations here are based mainly on how easy it is to completely replace the front-end, either by exchanging a circuit board or by finding space for a new front-end somewhere inside the box. On those grounds I recommend the IC271, the IC251 and the FT225 as fairly recent transceivers that can be turned into serious 144MHz dx rigs by replacing the existing front-ends. Thus modified, these rigs set the standard by which others can be judged [6]. The older FT221 and IC211 have somewhat higher local oscillator (lo) noise and fewer general facilities, but after modification even these are way ahead of the newest off-the-shelf transceivers when it comes to dynamic range. And they'll stay ahead until the "Big Three" get their acts together.

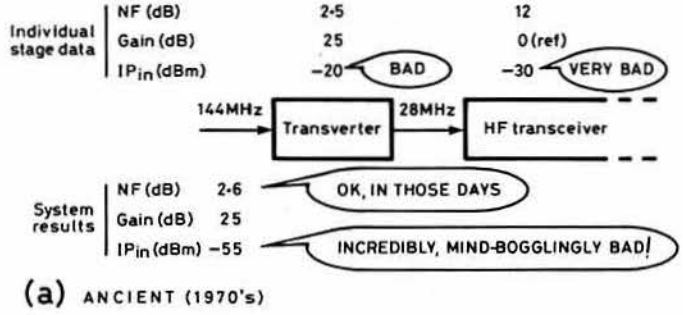
Transverters revisited

VHF and uhf ssb started in the 'sixties when hf ssb enthusiasts added transverters to their hf transceivers. This opened up the vhf bands to the advantages of transceive operation, vfo control, stable and selective receivers, and of course to the advantages of ssb as a dx mode. But by the late 'seventies transverters had acquired a bad reputation for receiver overload, and on 144MHz they have been almost entirely superseded by single-band, single-conversion transceivers for serious dx and contest work. However, transverters have always been widely used on the other vhf/uhf/microwave bands, and now they are making a comeback on 144MHz. So what went wrong with transverters in the 'seventies and what's changed since then?

A transverter followed by an hf transceiver is a multiple-conversion system. The receive signal path in the transverter is very like the front-end of a normal single-conversion transceiver, except for one thing. The lo in a transverter is crystal-controlled on a fixed frequency, and the hf transceiver does the tuning. That means you can't put a narrowband i.f. filter directly after the transverter front-end, so the hf transceiver front-end is vulnerable to overload from the amplified wideband output of the transverter.

Transverters are worth a second look today because the front-ends of commercial hf transceivers have improved in the past few years, while those of vhf/uhf transceivers have not. Also the i.f. performance of hf transceivers has always been a few steps ahead; even today, few vhf/uhf transceivers can offer adjustable noise blankers, switchable filters with really good stopband rejection, variable bandwidth, i.f. shift or notch filtering, all of which could be handy on today's crowded vhf and uhf bands.

The techniques for analysing the performance of a single-conversion front-end will work equally well for a transverter system. Let's start by seeing what went wrong in the 'seventies. At that time, transistorized hf transceivers were just coming in, and we all thought they were wonderful.



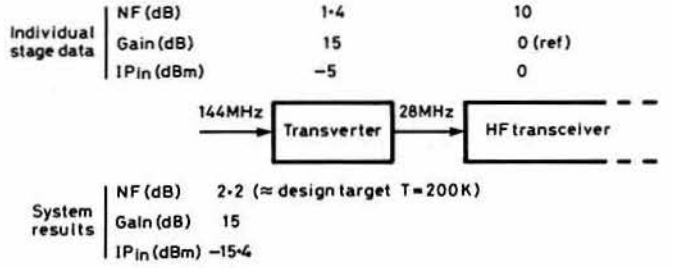


Fig 19. 144MHz transverters with hf transceivers

Actually, their strong-signal handling was rotten: their third-order intermodulation intercepts were −30dB or worse [7]. A 'seventies-style transverter (which you can still buy today!) had about 25dB of gain, which dropped the system input intercept at 144MHz to −55dB or lower. With a system noise floor of −140dBm the dymanic range would be less than 60dB (Fig 19(a)). In practical terms, signals over about S9 anywhere on the band would cause havoc!

Now do the same analysis for a more modern system. A typical nf for an hf transceiver at 28MHz would be 10dB, with a third-order input intercept of 0dBm. Using a transverter designed along the same lines as the front-end in Fig 5 (Part 1), the gain required to achieve a system noise temperature target of 200K would be about 15dB. Assuming there is no intermodulation in the transverter, the system input intercept would be about −15dBm (Fig 19(b)). That's not as good as a single-conversion front-end designed with equal care, but it's a lot better than an ordinary 144MHz transceiver plus preamp. And unlike a single-band 144MHz transceiver, the hf-plus-transverter approach equips you for the hf bands and allows you to add further transverters for 50MHz, 70MHz and 432MHz, or even 1·3GHz. Worth thinking about?

If so, you'd better think about these points too. First of all, you can only get good vhf/uhf strong-signal handling if the hf transceiver itself is good in this department. It's well worth reading the reviews and shopping around for a model which combines a noise figure of about 10dB [8] at 28MHz with a third-order input intercept of 0dBm or better. Second, if you do have an hf transceiver that good, it will show up the deficiencies in transverters which still use the old dual-gate mosfet front-end technology and may have input intercepts of −20dBm or worse. We have already seen that a decent 144MHz front-end with a diode ring mixer can have an input intercept of −5dBm or better. With robust rf and i.f. amplifier devices and high level ring mixers *in the right system design,* the transverter input intercept should definitely be better than 0dBm. A third point to remember is that you can use an attenuator just like the one in Fig 18 at the 28MHz output of the transverter to keep down the gain. The gain of an off-the-shelf transverter will be enough for the deafest hf transceiver, and will be more than you really need if you have chosen your own hf transceiver well.

Turning briefly to the bands other than 144MHz, a target noise temperature of 150K at 432MHz and above could be achieved using a transverter receive gain of no more than 15–20dB. To keep the overall gain this low, a masthead preamplifier would be essential on these higher bands. By the way, don't imagine that there are no problems of front-end overload on the microwave bands; things may be quiet normally, but just wait until a strong portable station comes along and takes your front-end apart for an entire weekend! The "pile on the preamps" attitude is still very strong on the microwave bands, and many preamp/converter systems would benefit from a going-over using TCALC to see how much front-end gain you could manage without. For example, a modern dx front-end for

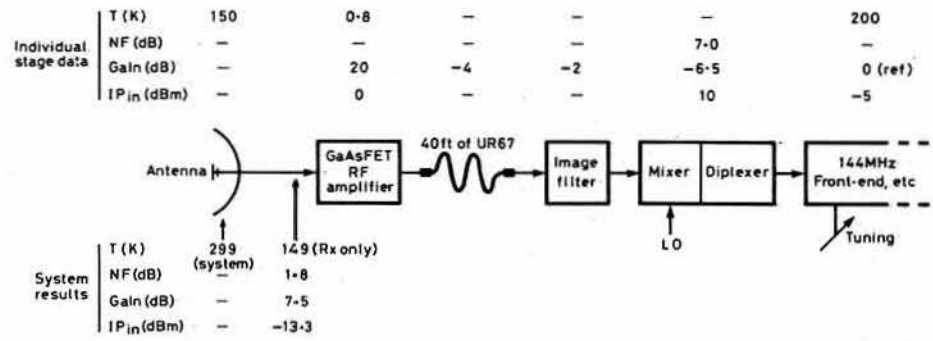


Fig 20. Suggested 1·3GHz dx front-end

1·3GHz could consist of a GaAsfet masthead preamp, a run of UR67 cable down to an image filter, and a good diode mixer feeding a 144MHz transceiver—one with a modern front-end, of course (Fig 20)! Here, just for once, you do need a GaAsfet running at full gain; but you don't need any other rf amplifier, and the overall system gain is still low.

Antenna noise temperatures on 70 and 50MHz are much higher than on 144MHz or above, so the requirements for low receiver noise temperatures are considerably relaxed and the transverter receive gain can be reduced accordingly. On these bands you should be seeing transverter input intercepts better than 0dBm.

Notes and references

[1] A few months ago I was mildly amused to see someone stating in another magazine that although a preamp *theoretically* degrades strong-signal performance he'd noticed no actual signs of it. If he worked dx on the same vhf and uhf bands as you and I, he'd notice it all right!

[2] Reputable preamp suppliers advertise performance figures which are routinely achieved in manufacture, and they can back their claims by measurement. This applies particularly to noise figures, which are not at all easy to measure properly. Less reputable firms seem to advertise the best nf they ever measured, or hoped for; or worst of all merely quote the device nf from the transistor manufacturer's datasheet. The last of these is particularly easy to spot, and generally signifies that the preamp manufacturer hasn't much of a clue, or much test equipment either. Read "The effects of preamplifiers on receiver performance, and a review of some currently-available 144MHz preamplifiers," by Julian Gannaway, G3YGF (*Rad Com* November, December 1981, pp1026, 1120) and draw your own conclusions.

[3] I mentioned in Note [1] of Part 2, the situation where second-order intermodulation products of tv/fm broadcast transmissions fall into the amateur band. If the problem only appears when you add a preamp to your existing transceiver, it's almost certainly due to your preamp having appreciable gain on the broadcast frequencies outside the amateur band, causing second-order intermod in the transceiver itself. It's not likely that the intermod is occurring in the preamp itself. The normal cure is to put a filter between the preamp and the transceiver, or to use a preamp which has a filter built-in.

[4] Preamps with adjustable *input* attenuators are not satisfactory, because attenuation at the input adds directly to the nf. Also avoid preamps which vary the gain by biasing off the transistor; this is a sure invitation to overload in the preamp itself. Look for a preamp with a resistive attenuator at the output, similar to Fig 18.

[5] By making the adjustment on a noisy fm signal you are taking advantage of the "threshold effect" of fm detection. If a signal is weak enough to sound noisy, then even a small decrease in rf signal:noise ratio will make the audio s:n ratio very much worse. This makes a small change in rf s:n ratio quite easy to detect by ear without the need for instruments. (Thanks to muTek Ltd for this tip.)

[6] Peter Hart, G3SJX, prefers the FT225 with muTek front-end (*Rad Com* April 1984, p312) while Angus McKenzie, G3OSS (*Amateur Radio* September 1984) recommends the more recent IC271E, again with a muTek front-end. Other transceivers, even different models from the same manufacturers, are not so convenient to modify.

[7] The third-order input intercepts of various unmodified early models of the FT101 (before the "Z" models, which are quite different internally) have been quoted in the range −30dBm to worse than −50dBm! Many other transistorized hf transceivers of that vintage have equally fragile front-ends.

[8] The sensitivities of hf transceivers are usually specified in terms of microvolts for a given s:n ratio, rather than noise figure. Note [5] of Part 1 explains how to convert between the two systems. A noise figure of 10dB corresponds to a noise floor of about −130dBm (in a 50Ω system with 2·5kHz noise bandwidth); or 0·20μV pd for 10dB s+n:n (as quoted in RSGB reviews); or 0·26μV pd for 12dB sinad (as quoted in reviews by G3OSS). For transceivers with switchable hf preamps, take care to compare sensitivities and input intercepts under the same conditions. Also note that intermodulation performance on 28MHz is often not as good as on the lower bands.

SUMMARY OF THE SERIES

1. A receiver front-end can be designed as a complete system to deliver the optimum overall performance. When you have the system design right, you can then look for circuits to go in the boxes in the block diagram.

2. For ordinary terrestrial dx and contest working, recommended targets for receiver noise temperature are 200K (noise figure around 2·2dB) for 144MHz, and 150K (nf around 1·8dB) for 432MHz and above. These are roughly equal to antenna noise temperatures on the respective bands.

3. Front-ends with lower noise temperatures than recommended above will be unnecessarily vulnerable to overload by strong signals; you may end up hearing *less* dx, not more.

4. There are three main types of front-end overload: gain compression, intermodulation (especially third-order) and reciprocal mixing. The first two are problems in the signal path; reciprocal mixing is caused by noise from the local oscillator. All these overload mechanisms can cause interference to weak wanted signals.

5. Excessive front-end gain is the biggest enemy of good strong-signal performance. Front-end gain should be no higher than is necessary to achieve the target noise temperature. Low-noise devices are useful because they allow you to meet your target for receiver noise temperature while using less overall front-end gain: that is the correct role of low-noise devices in modern front-ends.

6. You can predict the sensitivity and intermodulation performance of front-ends using a home computer program like TCALC. I have shown how to feed sensible assumptions into TCALC so that you can trust the results. By using TCALC you can experiment with the system design and get it right before you even begin to think about detailed circuit design. Even if you buy everything ready-made, TCALC can help you assemble the best possible overall system.

7. With the right system design, quite ordinary components and devices will give good results. With the wrong system design, even magic words like "GaAsfet" won't save your front-end from mediocrity. Good system design is particularly important if you don't have access to advanced test equipment.

8. It is possible to design and build vhf and uhf front-ends which meet the above targets for noise temperature, and also are virtually immune to overload effects—even at "open-contest" signal levels. You are entitled to expect this kind of performance from a vhf/uhf receiver front-end.

9. The front-ends of vhf/uhf transceivers from the "Big Three" manufacturers do not measure up to these standards. I cannot recommend *any* commercial transceiver for serious vhf/uhf dx working unless its front-end is replaced.

10. Preamplifiers are a second-best approach to reviving deaf transceivers. If you choose and use them wisely they can give acceptable results for casual operating.

11. A good hf transceiver plus a modern high-performance transverter is well worth considering as an alternative to a single-band transceiver.

12. To get the best out of a system of ready-made units, you must buy wisely and be prepared to make adjustments. It is always worthwhile to adjust the gain of a preamplifier or transverter down to the minimum that your system actually requires.

Acknowledgements

Thanks to G3OSS, G3SJX, G3YGF and the ARRL for equipment reviews which are a valuable source of data; to W1FB and W7ZOI for their books and articles; and to G3RZP, G4PMK, G4SWX and especially G4DGU for all their frank and friendly comments. □

Technical Topics

by Pat Hawker, G3VA

WHAT DO YOU LOOK FOR when buying a major new factory-built item for the shack? The highest possible technical specification? The lowest possible price? Reasonable performance at reasonable cost? Flexibility and versatility? Convenience of operation? Something you can use mobile or portable when the need arises? The latest and most innovatory technology? Reliability based on the maker's reputation?

Some or all of these features may turn you on. But it seems likely that you would also like to have some assurance—yet have to take on trust—that the manufacturing company will still be in business, and in the amateur radio market, when the time comes for the product to need servicing or spare parts.

The electronics industry

It is a feature of most technologically-based industries, in times of boom-and-bust economies, that companies come and go within relatively short periods. Firms, even if they survive and prosper, tend to merge and coalesce into a small number of international suppliers. Think of all those 35 to 45 separate firms making British television sets in the early 'fifties, admittedly many of them fitting a Plessey chassis. Booms in consumer electronics build up rapidly but subside almost as quickly. In the UK in 1982 and 1983 some 2·2-million video cassette recorders were delivered to the trade each year; by 1984 this figure had dropped to 1·4-million. Personal computer sales last Christmas were about the same as Christmas 1983, but the manufacturers had banked on a further large rise.

There used to be 600 car manufacturers in the USA; today there are four. How many of the personal computer manufacturers (200 in the USA alone) will be around to celebrate the diamond jubilee of Alan Turing's classic proof in 1935-6 that while there was no possibility of a "miraculous machine" that could solve *all* mathematical problems, the feasibility existed of a universal machine that could take over the work of *any* machine by performing the equivalent of human mental activity and computation, albeit for many years in only a crude manner compared with the human brain: the "universal" machine with artificial intelligence, the computer.

Much of the present attraction of solidstate is not so much a question of performance as the fear that thermionic devices, high-voltage components etc will either not be around when they are needed or virtually priced out of the market. As several articles in *Radio Communication* have shown, we are being forced back into a new era of making your own specialized components!

It is a sobering thought that few of the firms whose products are currently

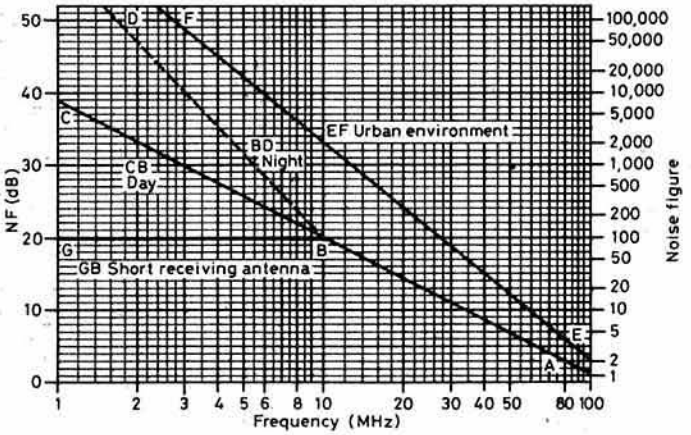


Fig 1. Relationship between maximum usable sensitivity, minimum acceptable sensitivity and frequency from an article by ON4VN/ON4EG in *CQ-QSO*. Note that on hf it is seldom necessary to have receivers with a noise factor much below about 15-20dB, below about 21MHz, unless a very short and inefficient antenna is being used. The line BC and BD represent reception on half-wave dipoles about a half-wave above ground. Minimum acceptable sensitivity is represented by the line EF reflecting a noisy urban environment. An hf receiver with a noise factor of about 10dB can usually be designed to have better strong-signal performance than the typical figure of 6dB of many modern receivers

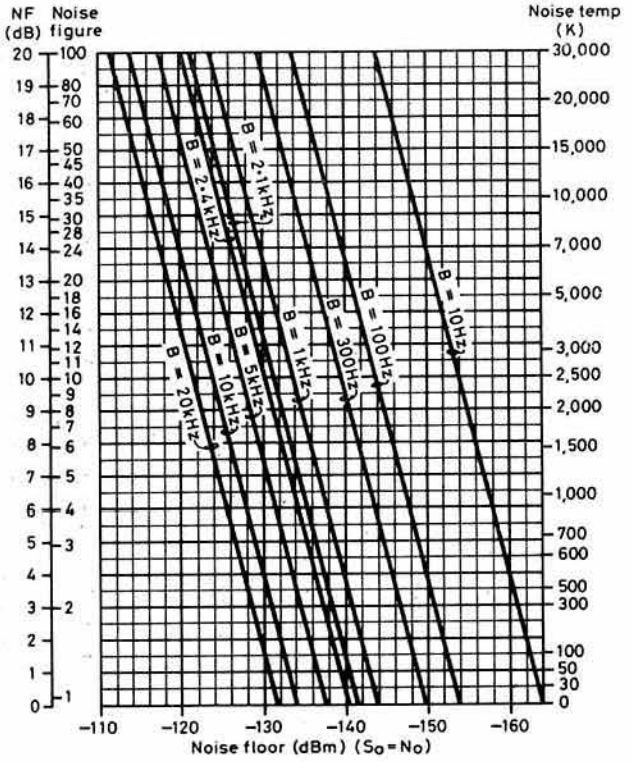


Fig 2. Relationship between the sensitivity of a receiver as defined in terms of noise factor (dB), noise figure or noise temperature and the noise floor (noise = signal) in dBm for various receiver bandwidths. Note how the minimum detectable signal reduces with narrower bandwidths for the same noise factor. From the article by ON4VN

advertised in *Radio Communication* were around 20 years ago—and that even fewer of those that were then well-known are still active in this field. Perhaps as we move relentlessly towards an era of "throw-away electronics" with no attempt to repair modules or even whole equipments, nobody will be worrying about the state of the industry ten, or even five, years ahead!

Weak signal reception

In the 'thirties the sensitivity of a communication receiver was normally defined as the weakest input signal that could be received, in terms of microvolts at the antenna input socket, for a given signal:signal + noise ratio in a *stated bandwidth*. It was to remove the requirement to specify the different bandwidths that the concept of a noise figure or noise factor was introduced in the 'forties. This rapidly became established for vhf receivers, and to a lesser extent on hf where today it competes with such concepts as the "minimum detectable signal" and "noise floor".

But it sometimes seems that we are in danger of forgetting that on any receiver the ability to receive very weak signals with a reasonable snr is governed not only by the internal and external noise but also by the *noise bandwidth*. Look at a smaller portion of the rf spectrum and the less will be the noise with which the signal has to compete: Fig 2.

Clearly there are limits. One needs to look at enough of the spectrum to gather in all the significant information contained in the transmission. In other words, we need ideally to match the received bandwidth with the transmitted intelligence-carrying signal. For double-sideband a.m. we need a minimum of rather more than 6kHz (unless we receive this as ssb, in which case you can reduce the noise bandwidth but throw away half of the information-carrying sidebands). For ssb the bandwidth needs to be about 3kHz or possibly a little less; for nbfm with, say, ±5kHz deviation and maximum af of 3kHz you need a minimum bandwidth of 16kHz; for cw at

less than about 25wpm theoretically you need only about 25Hz, though this would assume a very high standard of frequency stability in both the transmitter and receiver. A cw or fsk signal, incidentally, also has the advantage of containing a very much higher average power content than the peaky waveforms of speech, even processed speech.

Slowly-sent morse or data can be contained in less than 10Hz of spectrum, though a receiver matching this can be difficult to tune and to keep on tune. Nevertheless it is worth remembering that an experimental 100mW hf pocket transmitter developed by RCA in the 'sixties and intended as an emergency system for search and rescue (*RCA Review* March 1966, reported briefly in *TT* September 1966) had a filter only 0·75Hz wide in the base receiver and provided reliable daytime communication on 13 to 16MHz over distances of up to about 2,000 miles. The signalling rate was limited to only three bits/*min*! Similar data rates are also used in the extremely low frequency systems being developed for communication with submarines on *radio* frequencies below 100Hz where transmission bandwidth is extremely limited.

For QRP enthusiasts working at around 100mW it may be noted that the RCA report commented on various portable antenna systems for use with the pocket transmitter, and considered that "the most successful, yet most simple, was a quarter-wave vertical with a driven quarter-wave element laid in the direction of the desired transmission" using thin wire elements. In other words, a half-wave dipole bent to form a vertical radiator with a single quarter-wave radial pointed towards the target area, using for example a branch of a tree less than 20ft high. An alternative system would be an inverted-V dipole, again using a branch to provide the skyhook.

For this emergency system, special receiver techniques were developed to sweep over about 20Hz in order to cope with the problem of achieving a high degree of frequency stability with a portable battery-operated miniature transmitter. To provide a high degree of frequency stability, a zero-temperature-coefficient crystal was cut for a turn-over temperature of 99°F (body heat) and mounted in a small arm-pit enclosure to form a "natural-energy" crystal oven.

The secret of this system was, of course, that *noise power* is proportional to receiver bandwidth, and *noise voltage* to the square root of bandwidth. Yet, there must be a considerable number of amateurs happily using a 2·7kHz ssb filter (with no af filter) for cw reception!

It needs to be recognized, however, that there can be a practical snag with many very sharp narrowband filters: their tendency to "ring". A crystal filter that has a slight ring can actually enhance a wanted (stable) signal, but ringing has an altogether less desirable effect on incoming noise pulses. They cause the filter to ring, prolonging and emphasizing the interference to the wanted signal.

There are many reasons why most modern receivers are less than ideal for the reception of narrowband cw/rtty signals. For example the increasing use of a fairly broad "roofing filter" with the narrowband selectivity achieved late in the receiver may severely limit close-in dynamic range; similarly, frequency-synthesizer phase noise may result in excessive reciprocal mixing. Again, an early narrowband filter followed by the bulk of amplification coming from wideband amplifiers may severely restrict the final signal-to-noise ratio. But perhaps the most obvious drawback when using many modern receivers in the cw/rtty modes is the use of "hang agc" with the control signals derived from a wider bandwidth so that the wanted signal will be reduced in the presence of strong unwanted signals up to about 2kHz or more off-tune; then again the finite attack time of an agc system can reduce the instantaneous dynamic range of the receiver. My personal preference has always been not to use any agc for cw reception but to protect my ears by using a back-to-back (anti-parallel) diode audio-limiter located at a point of reasonably high impedance (for example, directly in the leads to high-impedance headphones).

In any discussion of weak-signal reception one must emphasize the role of the antenna which can amplify wanted signals without introducing additional noise, and can also reduce man-made noise and interference by the use of directional characteristics, electronic null-steering etc. The receiver also benefits from good front-end selectivity in order to reduce the many millions of intermodulation products that can result from the reception of the considerable number of extremely-strong broadcast signals that may be reaching the mixer.

Narrowband receivers

The communication receiver is essentially a general-purpose instrument designed to work reasonably well on a variety of transmission modes: ssb, cw, rtty and, possibly, a.m. and nbfm. This means that the basic i.f. amplifier has to be designed to cope with bandwidths that may even exceed 12 or 15kHz, yet expected to perform well on signals a few tens of hertz wide, inevitably resulting in compromises. It is worth remembering that for many years high-performance receivers used for point-to-point hf communication were produced specifically as radiotelegraph or radiotelephone designs. Ideally a cw/rtty receiver should have distributed selectivity over the entire receiver chain.

The desire to reduce costs by eliminating multiple-ganged signal-frequency front-end tuning and replace this with wide-band or sub-octave front-ends has contributed to the problem of avoiding the generation of intermodulation products due to non-linearity. With a wideband front-end, only a receiver designed to have exceptionally-wide dynamic range can be expected to cope with the extremely-strong signals from broadcast transmitters, or local amateur stations.

In *TT* (October 1982) I drew attention to a paper by R A Barrs of Rediffusion Radio Systems ("A reappraisal of hf receiver selectivity" *The Radio and Electronic Engineer*, Vol 52, No 7, pp315–20, July 1982). This provided a detailed assessment of the limitations still found in professional hf receivers, and suggested that many of these could be minimized by improving front-end signal-frequency selectivity. He pointed out that during daytime there are about 28 transmissions between 2 and 30MHz delivering signals of about 100mV emf at the input of the receiver. For an imd characteristic of 90dBμV, these are liable to produce:

14,644 imps up to third-order at +30dBμV emf;
175,000,000 imps up to seventh-order at +10dBμV emf; and
84×10^{12} imps up to 15th order at −10dBμV emf.

This enormous number of spurious imd products will have the effect of increasing the noise floor of a receiver to about +15dBμV and, possibly, noticeable interference on wanted input signals of up to about +30dBμV emf. The noise floor resulting from a mass of imd products will not normally show up in laboratory measurements of receivers.

To minimize this problem R A Barrs advocated a front-end selectivity on the signals applied to the mixer of the order of −37·5dB at five per cent off-tune, and −20dB at 2·5 per cent. He noted that this can be achieved and bettered with four rf ganged-tuned circuits each with a working Q of 30 to 40. Such an arrangement, requiring a matching accuracy of the tuned circuits of about one per cent over the tuning range is difficult, and very expensive, to achieve. This is one reason why so much effort has been put into improving the performance of packaged doubly-balanced mixers to better than a respectable 90dBμV.

The use of an input rf attenuator can help to overcome the problem of strong signal imd when used expertly and with understanding, although clearly introducing limitations on very weak signal reception.

Signal-frequency crystal filters

Is there any other way, apart from rf attenuators, of improving front-end selectivity at moderate cost? One technique which has been described previously in *TT* is the use of passive or low-gain preselectors external to the receiver proper. Without ganging, a number of tuned circuits can certainly improve matters in those circumstances where the very strong signals are not in, or immediately adjacent to, the amateur bands. Incidentally it is worth stressing once again that the use of variable-capacitance tuning diodes in lieu of variable capacitors is not recommended for really high-performance receivers or preselectors.

A potentially very effective system for those who are prepared to accept the limitation of restricted channels is the use of a front-end crystal filter. This technique was advocated 20 years ago by Stuart Meyer, W2GHK, in an article "Front-end crystal filters for amateur radio use" (*Interadio, 4U1ITU Calling*, 1965). He drew attention to the use at 4U1ITU of a series of filters supplied by Hammarlund to facilitate the simultaneous use of several transmitters. Typically a 14MHz bandpass filter permitted reception over about a 30kHz (±15kHz) segment of the band while providing over 80dB attenuation at more than about 30kHz off-tune. W2GHK noted that the practical nose bandwidth of this range of filters was around 30kHz at 14MHz, 15kHz at 7MHz and 7·5kHz at 3·5MHz, while filters for 21 and 28MHz presented considerable technical problems due to spurious responses etc.

I suspect that the concept of using signal-frequency crystal filters was developed for professional and Defence communications, aimed primarily at overcoming the severe problems experienced on modern naval vessels where a number of transmitters are located in close proximity. I do not think the idea ever caught on widely, at least for amateur applications. In practice, to obtain maximum benefit from a filter used in this way it is necessary to reduce the amount of rf leaking into the receiver, either directly or around the filter. This is not so easy as might be imagined.

It was therefore interesting to learn from P W Haylett, G3IPV, of his efforts over a number of years to develop effective signal-frequency crystal filtering to provide a high degree of rf selectivity without the complexity of multiple LC circuits. He writes:

"I have been experimenting with front-end crystal filters in external preselectors for many years and have at last, after pursuing a number of

false trails, more or less got it all together. One of the main problems has been to produce an amplifier with extremely low levels of internal (positive) feedback when high-Q crystals are placed in its input and output circuits.

"The other problem of leakage of signals around the crystals and via the crystal-holder capacitances can be largely overcome by ensuring that all circuitry is at low impedance.

"I still have one final problem, which consists of a peak of noise which occurs at the centre of the crystal filter passband and which can override weak signals. This peak appears to be associated with the crystals rather than the amplifiers, and can be overcome by keeping down the drive level to the crystal filters."

Presumably the noise and intermodulation signals associated with this peak of noise are not just part of the external noise in the passband of the filter, and may be a manifestation of the non-linearity and non-reciprocity that has been previously noted in *TT* in connection with i.f. crystal filters.

G3IPV continues: "The number of crystals required varies with the band in use and propagation conditions. On 3·5MHz during daytime it is often only necessary to use one crystal, whereas on 14MHz I often use 10 or more crystals.

"In spite of the various development problems which I experienced, but which I have now largely overcome, I am getting some very good results. Often on 3·5MHz around lunchtime at weekends I hear YU, SM and HA stations that nobody else in the UK seems to be receiving. I feel the day is coming when amateurs will no longer tune bands but operate more on fixed hf channels in order to avoid front-end overload and intermodulation problems, especially in densely-populated areas." His arrangements are shown in Figs 3, 4 and 5.

While personally I would not go all the way with G3IPV's views on fixed-channel operation, and would not expect a front-end crystal filter, as such, to improve weak signal reception in the absence of strong signals on nearby frequencies, at least when used with a receiver having a good dynamic range, there is no doubt in my mind that there are already circumstances in which an effective front-end crystal filter could prove valuable. For example, for amateurs using specific "net" frequencies or, again, to protect a QRP calling frequency etc. The prime value would still seem to be for the 4U1ITU-type of situation where a number of transmitters are being operated in close proximity. Nevertheless, for weak-signal reception it would be a more attractive technique than throwing away both wanted and unwanted signals in an rf attenuator pad.

To reduce rf leakage and circulating earth currents, G3IPV appears to have concentrated on developing what he calls "earth-isolated rf technology", with no direct rf connections to chassis. He has also developed a broadband amplifier module having a wide dynamic range to provide sufficient gain to compensate for the attenuation of cascaded filter modules.

Broadband vhf/uhf antennas at ICAP85

The series of IEE/URSI international conferences on antennas and propagation tend to produce some pretty esoteric, highly-mathematical papers, many of them concerned with millimetric and satellite studies,

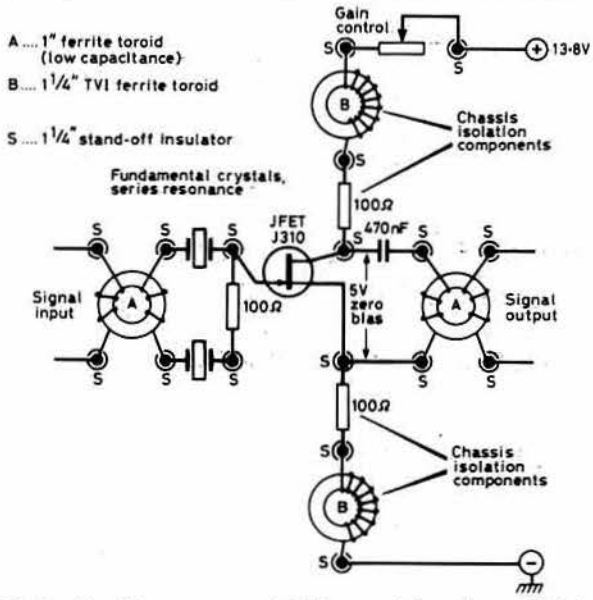


Fig 3. Basic signal-frequency crystal filter module using earth-isolated construction as developed by G3IPV

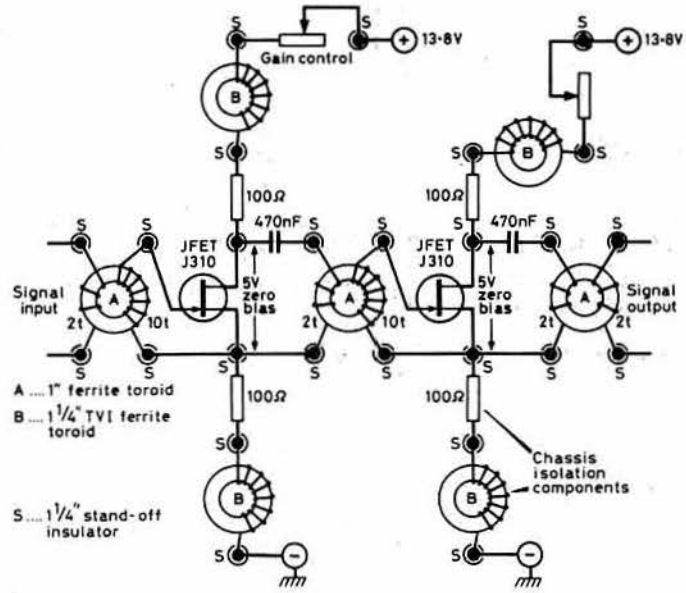


Fig 4. G3IPV's broadband amplifier module using J310 jfets

complex electronically-steered adaptive arrays, massive df systems and the like. The fourth of these, ICAP85, was apparently no exception. The 120 or so papers in *IEE Conference Publication No 248*, 584 large double-column pages, are not exactly light reading in either a physical or metaphorical sense. But here and there one finds papers that give practical guidance applicable to amateur radio.

For example, a BBC paper on "Aerial (*sic*) developments for television outside broadcast links" summarizes a considerable number of broadband uhf designs that have been developed and are now in use. These are for either the 580 to 854MHz band or the 2·5GHz band, and include a number of circularly-polarized arrays used to relay pictures from helicopters or roving vehicle-mounted cameras at race meetings etc. The following is a very brief summary of some of the types of array involved that seem to have possible applications on our bands:

UHF 5-element log-periodic array. This is a fairly conventional log-periodic dipole (lpd) array with a back radiation of −20dB and fairly modest forward gain for use over the range 580 to 800MHz.

1·2m dish with log-periodic feed. Suitable for use 580 to 950MHz. Gain about 14–15dBd. Vertex plate to improve impedance match.

Conical logarithmic-spiral antenna. Circularly-polarized "rove" antenna based on a balanced conical spiral array. This again is for 580 to 950MHz and is constructed from a pvc cone (surely not the most suitable material, see May *TT*) with the two-arm spiral painted on its surface in silver conductive paint, and with feeder and matching networks concentric with the spiral arms. About 6·4dBd gain, front-to-back ratio between 21dB (600MHz) and 29dB (860MHz).

1·2m dish with crossed log-periodic feed. This is a circularly-polarized version of the dish array mentioned above, with a quadrature drive to the two crossed elements provided by a 0dB output ratio wire-line coupler. Vertex plate matching not required. Gain about 14·6 to 16·5dBd, axial ratio 0·8 to 1·8dB.

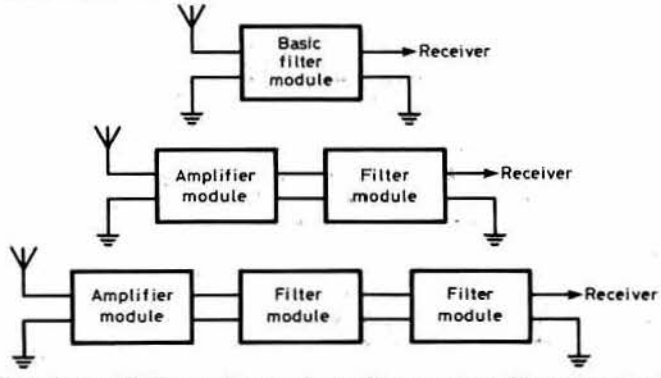


Fig 5. How G3IPV uses filter and amplifier modules. Where two toroid transformers come together in the interstage coupling, one is removed. The ferrite transformers have low capacitance from input to output to simulate transformers using Faraday screens (an alternative technique)

UHF manpack antennas. (1) A vertically-polarized sleeve dipole using a choke and ferrite bead to reduce outer-braid current. (2) A horizontally-polarized antenna based on orthogonally mounted end-fed unipole elements in the form of a quadrant antenna. To provide near omni-directional radiation pattern. Both these antennas are in two versions: *(a)* 580 to 780MHz; *(b)* 720 to 860MHz.

2·5GHz helicopter-link antennas. To replace a linearly-polarized Franklin antenna, circularly-polarized arrays have been developed. (1) With crossed, bent elements mounted in front of two reflector discs. Omnidirectional horizontal radiation pattern with about 1·8dBd gain. (2) A 2·4 to 2·7GHz disc Yagi receiving array for use on the ground to receive circularly-polarized signals from helicopters. Driven elements are crossed folded dipoles whereas the large reflector plate and some 16 parasitic directors are discs, all mounted on a common metallic boom. Gain about 13·5dBd, fbr about 25dB. Can also form the basic of higher-gain arrays using two or four of these structures. This type of disc/rod array has become increasingly popular for tv applications in many countries, and a commercially-manufactured version is the "Golden Rod" antenna. For microwave bands it would appear to be a relatively simple form of construction.

Another ICAP85 paper "The analysis of the directivity properties of the lpp antenna" by R J Katulski of Gdansk University, Poland, includes a formidable mathematical analysis of the "log piramidal periodic" (lpp) antenna described by G J Monser (1964, *Electronics*, 4, pp91-4). But don't be put off by the unfamiliar name. It is simply two log-periodic dipole structures in two planes that come together at the shortest element ends: Fig 6. The Polish work is aimed at providing a practical wideband antenna of good directivity gain for vhf/uhf television reception throughout the range 150 to 900MHz, though I seem to recall having seen this form of structure being used for military surveillance systems etc. The ICAP paper confirms the influence of the separation angle on the directivity gain, and concludes: "an lpp array has the best properties when the value of the separation angle is about 40°. The results of numerical modelling and experiments confirm the usefulness of this antenna for tv broadcasting systems".

Remember that inherently a broadband antenna should prove less critical to build and adjust than a narrowband array, so that in practice the gain can approach or even exceed that of a less-than-optimum narrowband array of the same number of elements. Log-periodic structures which, at least in theory, can be extended to cover any required frequency range are renowned for good sidelobe/fbr characteristics and so help reduce multipath problems.

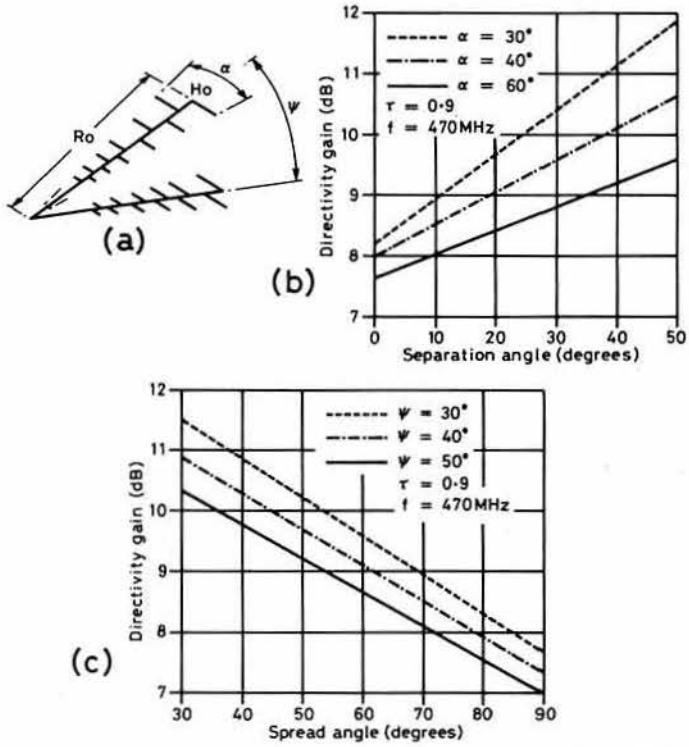


Fig 6. The log piramidal periodic (lpp) antenna comprises two log periodic structures arranged in two planes diagonally. *(a)* Basic arrangement of lpp. *(b)* Showing how directivity gain increases with the separation angle. *(c)* Showing how it decreases with the spread angle. 40° is about optimum

Adjustable l.e.d. level meter

The use of solidstate devices to replace mechanical meters is becoming common practice and, indeed, echoes the traditional usage of torch bulbs as rf indicators. Light-emitting diodes are well suited to bar displays for such applications as modulation meters and audio level meters. With the aid of a single driver/decoder integrated circuit they can be used to form a column of light to replace a VU meter or peak-reading modulation meter etc.

Fig 7 shows the basic circuit diagram of a 12-l.e.d. level meter described, as a constructional project, by David Edwards in *Electronics Australia* January 1985, intended for connection directly to the speaker leads of a stereo audio amplifier. However, he also provides a diagram (Fig 8) of a small auxiliary amplifier to increase input sensitivity when used at lower af levels in lieu of a VU-meter in a tape recorder and suitable also for amateur radio applications.

Heart of the unit is an 18-pin dil Siemens UAA180 decoder ic (stocked by Electrovalue Ltd, 28 St Jude's Road, Englefield Green, Egham, Surrey TW20 0HB, tel Egham (0784 outside London) 33603, price £1.59). With this device a dc voltage applied to pin 17 is decoded to drive a column of 12 l.e.d. devices with the length of light directly proportional to the input voltage. The upper and lower points of the light bar are set by the voltages applied to pins 3 and 16 respectively. When the voltage on pin 17 exceeds that on pin 3, all 12 devices light, and in this application pin 16 is at zero potential. An increase in input level of 0·5V gives a gradual transition; a difference of over 4V an abrupt transition.

Control of l.e.d. intensity is obtained by varying the potential applied to pin 2, preferably using evenly matched l.e.d. devices. With the values shown, the light intensity is about maximum but can be reduced by decreasing the value of 100kΩ leg of the potential divider supplying pin 2. Reference voltage for pin 3 is governed by the 4·7V, 400mW zener diode.

The input arrangement shown has two input connections for stereo applications—only one will normally be needed for amateur radio applications.

The input has a voltage doubler arrangement; the attack time is governed by the 1kΩ, 1μF time constant; decay time by the 100kΩ, 1μF tantalum capacitor. Note that the input 1μF capacitor should be a 50V wkg *bipolar* electrolytic. A 100kΩ trimpot adjusts the input level to the ic via a 100kΩ isolating resistor. The unit is designed to work from either ac or dc supplies.

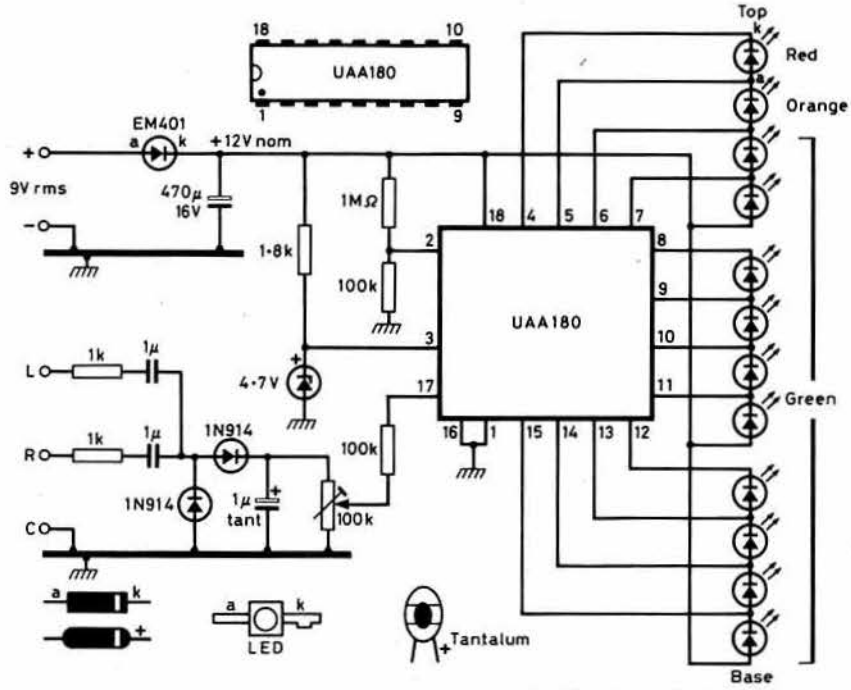


Fig 7. Circuit diagram of the audio level indicator described in *Electronics Australia*

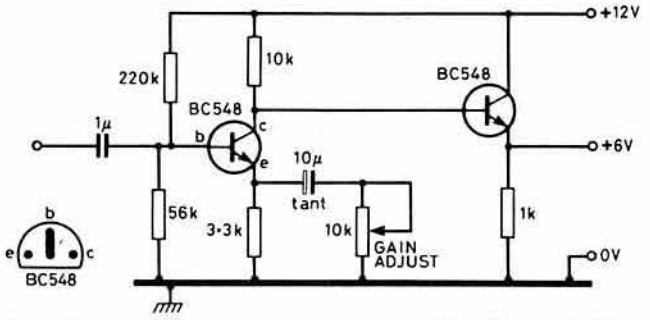


Fig 8. Auxiliary amplifier needed to increase sensitivity of the level indicator at lower signal levels

Slowed-down tuning

The comment by Peter Hart, G3SJX, in his review of the Yaesu Musen FT757GX hf transceiver (May 1985, pp352–6) that "The slow tuning rate of 10kHz/revolution of the relatively small control knob made frequency changes of several hundred kilohertz a tedious business" set me thinking. For many years I have consistently advocated, primarily for hf cw operation, the use of very slow tuning rates, preferably under 5kHz/revolution, while stressing the vital importance of having a "velvet-smooth" tuning mechanism, free from all backlash, and a reasonably-sized tuning knob that suits your fingers at a convenient height above the operating table (about 3–4in).

In fact, with the older equipment still to be found in operational use at G3VA I have usually found it highly desirable to fit an *extra* out-board slow-motion drive to the electrical bandspread tuning spindles of receivers, and to the vfo of an old LG300 transmitter. In fact, a main grumble at the slightly more modern hf ssb/cw transceiver that I sometimes use is the poor tuning mechanism made worse by a knot in the difficult-to-get-at drive cord and the fast tuning rate.

With a tuning rate of 3 to 5kHz/revolution one can really "explore" the response curve of a peaked cw filter response, even with evidently clumsy rather than "safecracker's" fingers. The idea of a plus-100kHz/revolution tuning knob (even on vintage receivers such as the AR88) has always seemed too high a price to pay for the ease of sweeping in a matter of milliseconds from one end of a band to the other, particularly if one only seldom wishes to check the ssb segment. At one time I fixed a small handle to my tuning knob to cater for such eventualities. I recall descriptions in the 'thirties of amateurs fitting small motors to cope with 400:1 reduction mechanisms fitted to general-coverage receivers not having electrical bandspread. Some modern receivers with microprocessor control provide fast and slow tuning rates depending on how fast you start turning the knob, but these tend to be part and parcel of having the dreaded frequency synthesizers as local oscillator (see G3SEK's "Modern vhf/uhf front-end design, Part 2" May 1985 for the reasons why those of us interested in weak-signal reception and close-in dynamic range remain unconvinced that a typical digital synthesizer vfo represents "progress" in transceiver design).

A DUAL-CONVERSION MULTIMODE RECEIVE I.F/AF STRIP—ERRATA

Due to an unfortunate error during printing, Figs 6 and 7 of this article, pps 435 and 438 June issue, were rendered unintelligble. The figures are reproduced below and on the facing page in the form orginally intended. The printers have reimbursed the cost of this reprinting.

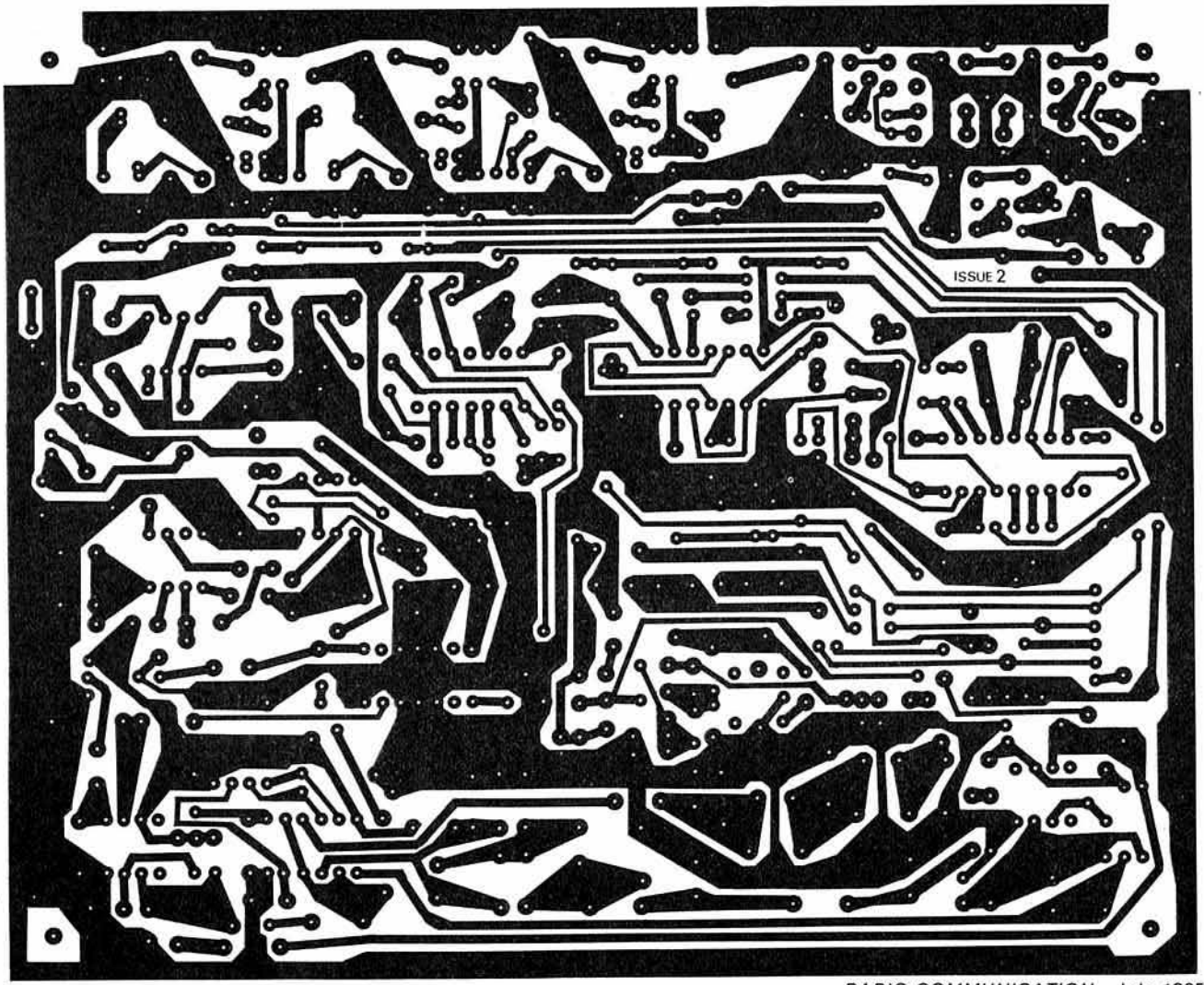


Fig 6. PCB layout

The enterprising *QUA—G4IRC* (1/85) quarterly magazine of the Ipswich Radio Club in its "Workshop 'ints and tipses" column by G4TVT, tackles the problem of the 175kHz/revolution of the SRX30 general-coverage receiver by explaining just how to fit an ex-R1155 16-1 reduction gearbox to the tuning spindle, though this involves a good deal of machining and the addition of two miniature ballraces; clearly not a process that could be tackled by everyone, even if they can locate a spare R1155 drive.

It is, however, usually quite a simple process to add an extra "integral reduction drive" plus a piece of fixing metal (even an old Mecanno strip bent to shape can be used). Similarly some of the very old slow-motion drives can be used provided that they are of the continuously rotatable (360°) type rather than the more common 180°-only type which cannot be used as a second step-down gear for obvious reasons.

QUA also includes some notes on the series of Hammarlund Super Pro receivers (first version 1935; SP10-series 1937; SP110 and 200 (BC779) 1939; SP210 (BC1004) 1942; SP400 1946; SP600 1950) a high-grade built-like-a-battleship receiver that tends to get forgotten in the "vintage" HRO/AR88 debate. The Super Pro also inspired the lower-cost pre-war HQ-120 and the immediate post-war HQ129x models that can still give a reasonable account of themselves (if you can tolerate a large warm-up frequency drift) or can provide the basis for a modernized receiver. A feature of the Hammarlund models was a six-position selectivity switch based on a single-crystal filter.

PCB etchant and chlorine gas

In the May *TT* (p359) R P Bown, G3PCN, suggested that a mixture of hydrochloric acid and hydrogen peroxide provides a pcb etchant with several plus features compared with ferric chloride. Apparently, however, as a "stop press" note inserted at the end of the June *TT* warned, it has also some major disadvantages. Before attempting to use this etchant readers should be aware of a possible hazard both to health and equipment. Dr Tony Webb, G4LYF, writes:

"Attention should be urgently drawn to the dangers associated with this etch mixture. A mixture of hydrochloric acid and hydrogen peroxide will slowly evolve chlorine gas, which is extremely poisonous and which will also, if left near electrical equipment, bring about spectacular corrosion! If the mixture is used at all, it should be out of doors, and should be rinsed away with plenty of water after use. If it is bottled after mixing, the gas evolved will pressurize the container and may eventually burst it."

G4LYF does not indicate the amount of chlorine gas likely to be produced in a given period, but it would seem wise to pay heed to this warning. He adds, on a lighter note, "I was alarmed at W1BG's suggestion that a reasonably-fit middle-aged man should be able to generate 50W continuously for 30–40min from a 'bicycle' generator. Is amateur radio about to join jogging and squash as a pastime causing the premature demise of the middle-aged?" I must admit to being grateful for the availability of the electric supply mains when using my rig!

Tips and topics

Frank Rogers, G3BFR, reports finding another use for plumbers' ptfe tape (*TT* May, p360). It is excellent for tightening "slack" ferrite/iron-powder slugs. If wound so as to tighten when the slug is first screwed in, it does not unwind when the core is unscrewed, and seems almost to become part of the slug. Multiple layers can be put on successfully, for it is difficult to unwrap the tape once it is well bedded into the thread. This is akin to the intended purpose of using such tape on screw threads. G3BFR also uses it on wrapped (non-soldered) joints in wire antennas. □

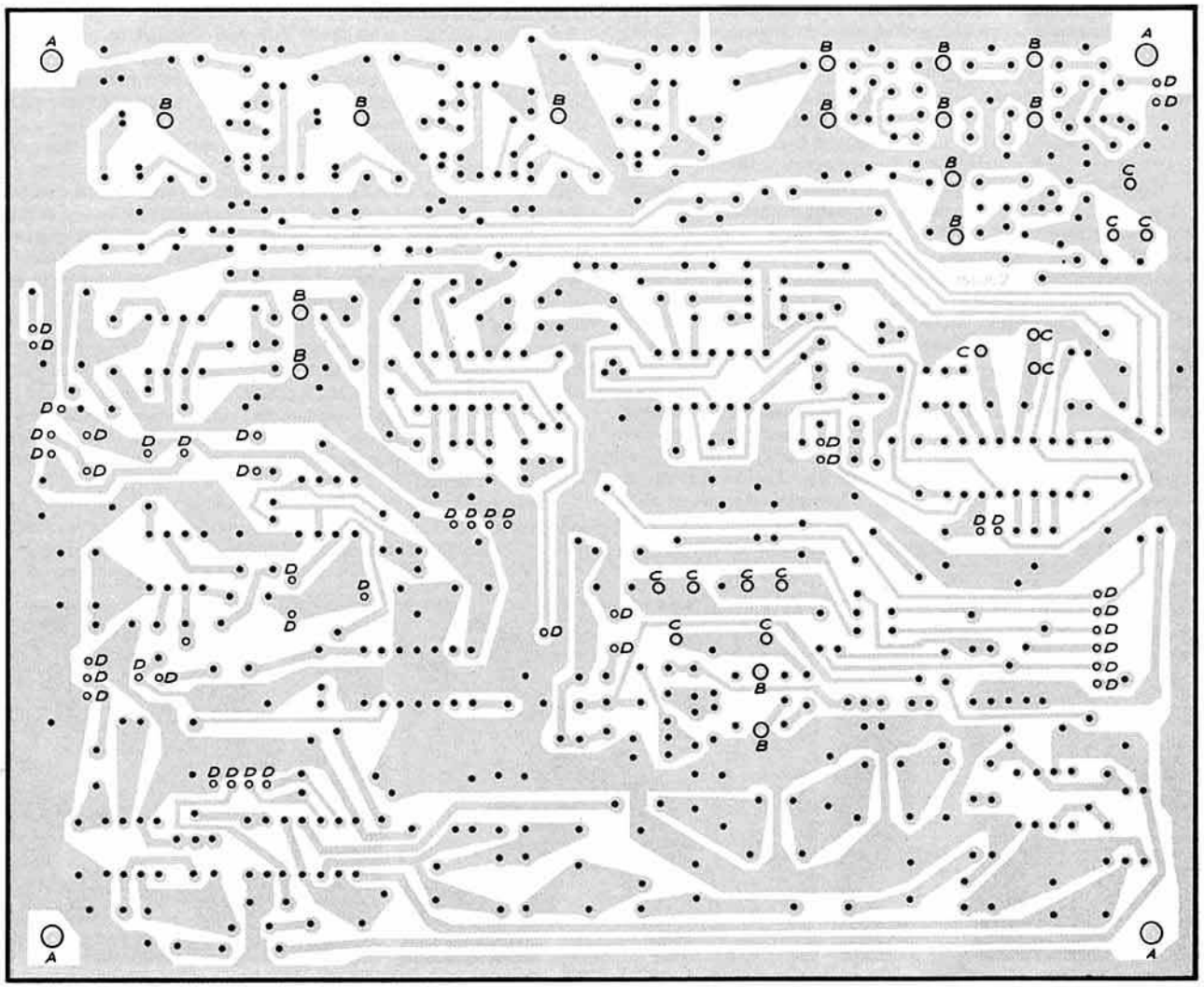


Fig 7. PCB drilling plan. Holes shown ● are 0·85mm diameter. Four holes "A" are 3mm diameter. 15 holes "B" are 1·6mm diameter. 12 holes "C" are 1·3mm diameter. 43mm holes "D" are 1mm diameter

RSGB National VHF Convention 1985

A JOINT REPORT BY

Ken Willis, G8VR; Chris Young, G4CCC; and Charles Suckling, G3WDG

THE RSGB NATIONAL VHF CONVENTION 1985, held at Sandown Park on 23 March, once again broke all previous records for attendance and trade participation. More than 2,600 people passed through the turnstiles, over 10 per cent up on last year, while the number of spaces booked by the trade was also higher than ever before. These statistics point to the very healthy state of vhf/uhf activity in the UK, as well as a steady growth in the issue of Class B licences.

Once again much credit must go to the RSGB Exhibition & Rally Committee under the chairmanship of Norman Miller, G3MVV, for the forward planning and implementation of this popular event. Les Hawkyard, G5HD, organized the trade show, ably assisted by his wife, and their efforts resulted in the display of a wide range of products and components to gladden the eye of the vhf addict. Organizing such an exhibition seems simple enough on paper, but rather more difficult to put into practice since, apart from the administrative work involved, dozens of tables and chairs have to be carried into the hall and manhandled into position before the event can open. On the afternoon prior to the convention, members of the VHF Committee joined their E & R Committee colleagues to form a "heavy gang" to set the scene—and later to clear it all away again long after the last visitor had departed for home.

The event followed much the same pattern as in previous years, with emphasis on home-construction rather than black-box operation, though of course much commercial equipment relevant to the higher frequencies was on show. The ever-popular flea-market was organized by Echelford ARS, and attracted large crowds seeking the bargains and unusual "finds" which this part of the convention offers. For those coming by road, talk-in facilities were provided by the SW London Raynet Group.

An equipment test facility provided by Don Hamilton, G8DON, was able to measure transceiver or preamplifier performance up to the gigaherz region. It proved very popular, while occasionally revealing some hard truths about the front-ends of some favourite rigs when submitted to the searching tests of modern measuring equipment.

The stand manned by the RSGB VHF Committee featured several home-constructed amplifiers and other equipment for the 432MHz band, which the committee is encouraging amateurs to use more actively. The interest shown in these items seems to indicate that the desire to "roll one's own" is by no means dead, though from questions posed by visitors, many constructional articles in the technical press appear to take rather too much for granted in assuming a high level of background knowledge by potential builders of equipment. The VHF Committee stand also provided microcomputer facilities for calculating the Maidenhead QRA locator, and the demands on this were at times overwhelming. Thanks are due to G3UBX for supplying both the software and an immense selection of back-up maps for this purpose.

The convention provided an opportunity for specialist groups to hold informal meetings, and both the 6 Metre Group and the Remote Imaging Group (G3REH) made full use of the occasion for this purpose. The growth of interest in the reception of weather satellites and the presentation of good "off-the-air" pictures from them either by fax machines or microcomputer techniques was obvious from the number of visitors questioning the Remote Imaging Group representatives and the trade organizations offering equipment for this purpose. In another part of the hall excellent television pictures received live from a satellite attracted much interest, this demonstration being linked to a lecture on this topic presented by Dr S Greenhaug.

The afternoon lecture session was formally opened by Mrs Joan Heathershaw, G4CHH, the RSGB's first-ever lady President, who in her address commented on some of the progress made by the Society during the year, including the extension of the 50MHz experiment with the issue of further permits and the authorization for Class B licensees to use morse. Following her address, Mrs Heathershaw presented several VHF Contest Committee awards, after which she declared the lecture session open.

It has become customary to hold three lecture streams concurrently to cater for the different interests of visitors to the convention, and the same system was adopted this year.

Lecture stream A

Ian White, G3SEK, who needs little introduction to vhf *afficionados*, presented a most enlightening lecture on the subject of vhf/uhf receiver front-end design which must have provided food for thought for many in his large audience. The lecture was based on the detailed four-part article in *Radio Communication* April—July 1985. Briefly, Ian stated that weak-signal operation as practised by amateurs is unique to that group, and the results sought by such operators tend to be similar to those expected from the hf bands. This has resulted in the development of commercially-available receivers for vhf/uhf which often leaves much to be desired from the point of view of noise performance and dynamic characteristics. Ian introduced the concept of noise *temperature* and showed how this permitted a much simpler analysis of overall system performance and led to an ability to design, with predictable results, the front-end of a receiver. To the surprise of many in the audience, this was not confined simply to the first or second stages, but embraced several stages, including filtering, up to a point well along the chain which Ian finally accepted to be the "rest of the receiver". The full text of Ian's article, concluded in this issue of *Radio Communication*, makes an outstanding contribution to the understanding of vhf/uhf receiver design, and may even persuade some operators that 15dB gain in the receiver preamplifier is not necessarily going to make the weak ones audible!

The second lecture in this stream was given by a well-known vhf operator, and winner of no less than 24 RSGB vhf/uhf contests in seven years, Geoff Brown, GJ4ICD. His subject was the construction of high-power amplifiers for vhf/uhf, and he brought with him a dazzling array of amplifiers using

L to r: Geoff Brown, GJ4ICD, winner of the September 1984 144MHz Contest "Single-operator" section, being presented with the Thorogood Trophy; the Cotswold & Big M Contest Group were awarded the Arthur Watts Trophy for winning the "Restricted" section of VHF NFD 1984; and B J Morton, G4HWA, receiving the VHF Contest Committee Cup as winner of the 1,296MHz Trophy Contest

The Parallel Lines Contest Group received the Mitchell-Milling Trophy, the VHF Manager's Trophy and the 1951 Council Cup, for winning the September 1984 144MHz Contest "Other station" section, the 70MHz Trophy Contest and the 432MHz Trophy Contest respectively

single or parallel high-power tetrodes, and also one with the YD1336 triode which was a new one for most of his audience. Geoff showed how the amplifiers, whether single- or double-valve, operating on 144 or 432MHz, all conformed to a simple constructional technique which offered maximum isolation between input and output. The LC circuits used were typically flat sheet lines (plates), and he demonstrated how an apparently complex amplifier capable of very high power output with "clean" characteristics was easily constructed without the use of special tools or particular skills. At the conclusion of his talk, the large crowd which gathered around his products was testimony to the interest in home-construction of equipment.

The final session of this lecture stream was devoted to an open forum during which the VHF Committee took the stage to respond to a barrage of questions from the floor covering a wide range of vhf matters. Questions ranged from the Maidenhead locator scheme, the recently introduced *VHF/UHF Newsletter* and its role vis-a-vis *4-2-70*, crossband working by Class B licensees, the morse test and numerous other topics, until the chairman was forced to call a halt because anxious Sandown Park officials were waiting to prepare the room for another function.

Lecture stream B

This session, chaired by Willie McClintock, G3VPK, contained three lectures.

Two members of the Berkshire Downs Repeater Group gave a talk entitled "Genesis of a Repeater". Chris Young, G4CCC, detailed the basic requirements for a repeater—site, equipment, finance, builder and enthusiasm—and then gave case histories, illustrated by slides, of the group's repeaters GB3BK, GB3RD and GB3RU. Andrew Barrett, G8DOR, then dealt with technical aspects, including a reference to diversity reception which will be employed on the 432MHz unit to improve hand-portable coverage.

The second lecture, by Graham Shirville, G3VZV, a member of the Repeater Management Group, was entitled "ATV Repeaters and the Future". It covered the background to the five licensed atv repeaters in the 1·3GHz band, including the application procedure, and was illustrated by coverage maps. Eight possible new repeaters were mentioned, and video tapes of the installation of GB3VR (Worthing) and off-air pictures from GB3TV (Dunstable) were shown. It was apparent to the large audience that atv repeaters offer a new and exciting facet to amateur radio.

The final lecture, a presentation by Ian Wade, G3NRW, described the basic principles and applications of packet radio. First, he looked briefly at the problems of rtty and Amtor, then explained in detail how packet radio overcomes these problems. The talk was well supported by tape recordings, working models and visual aids, including the now renowned "washing line". Numerous slides illustrated the lecture, most of which will be reproduced in Ian's forthcoming book *How Packet Radio Works.*

Lecture stream C

The microwave stream was so popular this year that the lecture room was packed to capacity, despite the fact that two of the lectures were not about amateur radio!

The first speaker was Mike Walters, G3JVL, on the subject of microwave measurements. His premise was that equipment rarely works properly unless made to do so! Measurements are important to highlight any weaknesses so that they can be dealt with. He covered antenna measurements first, since an effective antenna is important for both transmitting and receiving. Antenna vswr should be checked to begin with, mainly to ensure that antennas have been correctly assembled and that cables are not open or short-circuited. The use of a semi-local signal source was recommended for optimizing antennas for gain, as remote signals may suffer from multipath propagation making comparisons between antennas rather difficult. The source should not be too close, though, as antennas —particularly dishes—can be incorrectly set up to focus on the source. He stressed the importance of correct phasing in multi-antenna arrays. Poor sidelobes or a split main lobe are usually a consequence of incorrect phasing.

Receivers were covered next, and G3JVL recommended the G4COM device for optimizing the performance of receiving systems. Once set-up, it is unwise to change interconnecting cables etc, or the performance may be degraded.

Mike then outlined some of the problems encountered with power measurement, and offered the use of a directional coupler with a low-power detector as one solution. Couplers and detectors should of course be calibrated, and this can often be done at microwave round-table meetings where suitable equipment is often available.

He reminded the audience that other parts of the station should, if possible, also be measured. Two parts often overlooked are feeder cables, whose losses should be checked, and transmit/receive relays. Poor relay isolation can lead to the untimely end of an expensive preamp, while high losses can result in the failure of the relay itself, if high power is being used.

The second lecture, "Microwaves in Radio Astronomy", was presented by Dr Ian Morison, G1GZC, who is professionally involved in this subject at Jodrell Bank. He began by describing the work of the pioneers of radio astronomy, who were in fact amateurs. The first discovery was the existence of galactic noise by K Jansky using a non-directional antenna, followed by the mapping of the extraterrestrial noise by G Reber, who built what was possibly the first amateur dish antenna.

Ian then reviewed the history of the Jodrell Bank radio telescope and outlined some of its major achievements, including early radar studies of meteor scatter and moon reflections. Since then, the dish has been used mainly for true radio astronomy, but has also been utilized to monitor interplanetary spacecraft and for communication experiments.

The audience was envious of the receiving equipment in current use, particularly in the area of low-noise amplifiers. In common with state-of-the-art amateur equipment, GaAsfet preamplifiers are now employed in many radio-astronomy receivers, the difference being that these preamps are cooled to liquid helium temperatures (about −265°C) to reduce noise figures to around 0·2dB at 1GHz and 0·6dB at 11GHz!

Ian concluded by describing some of the other uses of microwaves in radio astronomy, in particular for data links between different receiving sites involved in aperture synthesis work. With this technique it is possible to obtain much improved resolution, to the point where today radio astronomy can pinpoint sources more accurately than optical astronomy.

The final lecture was given by Dr Steve Greenhalgh, of Sat-Tel Ltd, on satellite television. He began with a short history of satellite tv, which began in 1962 with the launch of Telstar. At present satellite tv encompasses three main areas: intercontinental links, cable tv distribution and direct broadcasting by satellite (dbs). Only the first two of these are being pursued in the UK at present.

Steve then explained why microwave frequencies are used for satellite tv,

The Surrey Trophy being presented to the winners of VHF NFD 1984, the Sheppey Combined Contest Group

The leading GM entrant in VHF NFD 1984, the South of Scotland Contest Group, receiving the Tartan Trophy

namely the wide bandwidths available and the link budget advantages. FM is universally used, since much higher s:n ratios are achieved from the relatively weak signals (10–15dB above noise) than would be obtained with a.m.

Next, he described hardware used both in the satellite and on the ground. Two relatively recent developments have contributed to the feasibility of low-cost, high-performance ground-station equipment: GaAsfet low-noise amplifiers and dielectric resonator stabilized oscillators.

Finally, he reviewed the development of cable tv distribution by satellite. This has grown to such proportions that one satellite (EUTELSAT F1), originally launched for business communications, is now 100 per cent occupied for tv distribution, and other satellites are being given over to tv to cope with current demands!

Finally

Most people seemed to enjoy it all. If you didn't, please write to the VHF Committee and tell them why. They are always ready to improve an already popular event if this is possible. Thanks are due to Geoff Stone, G3FZL, who was the overall convention organizer and is of course an active VHF Committee member. As the curtain came down the committee was already working on next year's event. Let's hope it is bigger and better than ever. See you at Sandown Park, 1986. □

4-2-70

*by Ken Willis, G8VR**

DURING THE MONTH OF MAY, I attended the North Eastern VHF/UHF Conference in Nashua, New Hampshire, to talk about European-style meteor scatter operation; our American cousins operate only in real-time in this mode and in my opinion miss a lot of fun as a result. One of the highlights of this conference, however, was that it gave me the opportunity to meet several of the American "big-name" operators on vhf such as W1JR, K1WHS, K2UYH, K1MNS, W2CAP and many others including some Canadian amateurs. There is no doubt that vhf/uhf activity is much higher in Europe than in the USA or Canada, except for the relatively few dedicated North American eme and 50MHz operators who contribute so much to weak-signal technology, so there was much to talk about during the weekend.

Some of the results of these discussions can be found in the following text. What became obvious is that USA and Canadian operators are very keen to participate in every possible way in any joint activities between North America and Europe which might further our knowledge of vhf generally, while the long experience of these amateurs in 50MHz operation must surely be of value to us all in the future.

Propagation tests

I am informed by VE2DRO that Dr Jim Koehler, VE5FP, of the University of Saskatchewan, plans to transmit steady carriers throughout the month of July on frequencies 49·999 and 143·999MHz, that is just outside the 50 and 144MHz bands, beaming to the northeast as part of an experiment involving the Canadian Northwest Territory. The transmissions will be 24h a day, and 50MHz operators in particular may wish to monitor the appropriate frequency.

Auroral-E propagation

This mode of propagation has been mentioned from time to time in 4–2–70, but it seems that few operators have experienced it or in fact know what to look for. After an aurora, signals from dx locations are sometimes copied at good strengths but with T9 note instead of the characteristic buzz-saw tones which characterise auroral propagation. Distances between stations suggest that intense ionization is occurring in the E-layer region, not as intense as summer sporadic-E, but clearly associated with the auroral conditions which are usually just fading out when this form of propagation is noticed.

Auroral-E signals tend to be more "fluttery" than is the case with Es. It pays to swing the beam around a bit at the close of an aurora, though keeping in a generally northern direction unless something is heard which suggests another heading, and to listen for pure T9 signals. A CQ call at this stage can often be productive too. W2CAP has asked me to request 50MHz operators (or listeners) in this country to keep a particular look-out for auroral-E in that part of the spectrum. He says that typically in the USA, an aurora starting in mid afternoon which is followed by a second phase between, say, 1030pm and 0030am, will often produce auroral-E signals in this second phase or at its termination.

Nearer home, Andy, GM4IPK (Edinburgh), reports that he often hears and works OY9JD with T9 note or undistorted ssb after an aurora during which they have made contact with the buzzing tones. He felt that the distance between them was perhaps too close for this to be auroral-E, but geometry suggests that this is not impossible. I have also heard tapes of these signals and they certainly contain no trace of auroral modulation. GI4FFL has also noticed this effect on OY9JD after working him during an aurora in the early hours; so the moral seems to be, don't switch off immediately the signals start to go T9 following an aurora but tune around a bit or put out a few calls. You may be pleasantly surprised at the outcome.

Meteor scatter

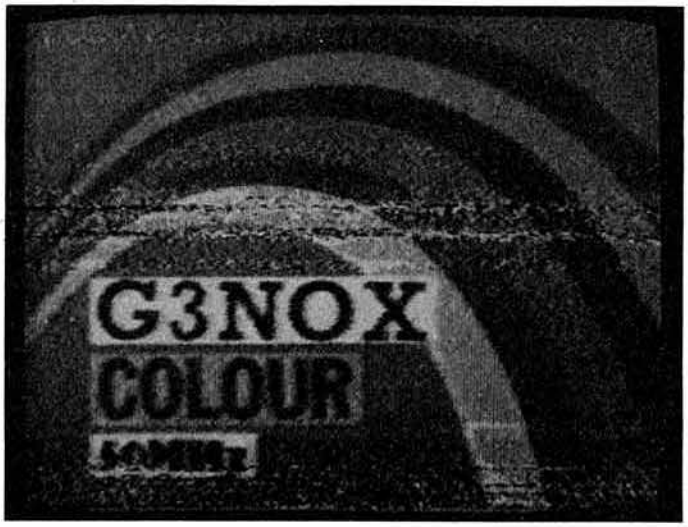
When it was reported last month that this could be a bumper year for ms enthusiasts, it was not appreciated how quickly this would be borne out, but if what happened in May is any guide, things could be very interesting indeed later in the year.

There are two or three minor showers during May, among them the Eta Aquarids, Piscids and Nu Piscids, but in the past these have not produced much in the way of excitement. John Branegan takes up the story: "For years I have noted the Eta Aquarids shower in my log as a morning shower only (below horizon for the rest of the day) between 1 and 9 May, peaking 4th or 5th. In 1982 it really did not show up at all. In 1983 it went absent without leave when I wanted it for a 50MHz QSO with G4GLT. But in 1984 it was quite good on both 6 and 7 May, reaching almost Quadrantids levels on 6 May. It was at this point that I remembered that this stream is dated for when the earth crosses the orbit of Halley's Comet, so I put a note in my log to remind me that 4 May and 20 October 1985 were the days when the earth orbit cuts the comet's track. I have just watched (4 to 6 May) one of the biggest and most consistent meteor showers I have ever seen or heard. Each morning Continental tv came on around 0630, and I have counted more meteor pings and tv-scatter pictures than any previous event in the last eight years, including the 1983 Quadrantids which was a cracker."

We now have operators on 50MHz, and at this lower frequency meteor reflections are much longer and stronger for the same trail ionization density than on 144MHz. Around 0800gmt on 5 May, GM3WOJ worked eight stations on 50MHz in a single meteor burst which persisted for some

*11 Old Downs, Hartley, Kent DA3 7AA

2 minutes. Stations worked in what became a pile-up were G4UPS, G2SP, G2ZIG, G3LTF, G3NOX, G3COJ, G4FXW and G4IJE, with G8VN and G3IMW both there in the pile-up but not worked. Chris says these 2min bursts, which seemed to occur every half-hour or so, were "spectacular." On 7 May, around 0640gmt, a most interesting "first" on 50MHz was achieved when Jeremy, G3NOX (Essex), transmitted a 5min period of colour sstv to Chris, GM3WOJ (IO77WO), who received excellent reflections, one lasting more than 100s at S9. The Piscids shower was active at the time. Chris made a conventional tape-recording of the meteor-burst signal, and sent it by mail to Jeremy who then played back the tape through his Robot 1200 scan converter. The result was an almost perfect reproduction of the transmitted test-card. It is unfortunate that it cannot be reproduced here in colour, but the black and white picture illustrates the very high resolution obtained; the colour values were quite superb.



The tv picture, transmitted on 50MHz in colour by G3NOX, as received by GM3WOJ (also in colour). The colour values of the received signal were excellent

G3NOX was using an Icom 551 transceiver into a 100W solidstate amplifier and two five-element Tonna antennas. Chris used a similar transceiver into a single five-element Yagi. Jeremy hopes that some of the Norwegian amateurs licensed for this band can be persuaded to take part in similar tests. The equipment at G3NOX is similar to that which is proposed for installation in the space shuttle at a future date.

G4IJE reported excitement on 5 May when he worked LA6QBA in Oslo, and later LA6PV, both via meteors. He said that G3IMW also worked LA2AB on a single burst, while in some periods LA6PV was audible for the whole 1min. Paul thinks this may have been due to a residual ionospheric signal, "like the Russian tv", which has to do with the remnants of meteor trails. G5KW got among the action during another hectic period on 12 May (Nu Piscids) which seem to have been good this year. He worked LA6PV and LA9DL, and a tape which he sent of the LA6PV signals sounded more like tropo than ms, since the bursts—if they were ms—went on for over 1min. On the same day G4IJE worked LA6PV and LA9DL, as well as DL3MBG crossband 144/50MHz. Others who were active and successful at the same time were G6XM, G3IMW, G4JCC and G4BPY, and doubtless many others. 50MHz is certainly a great band for meteor scatter, with G4IJE reporting several 3 to 4min bursts from GM3WOJ in this same period. If Halleys Comet is causing all this, watch out on 20 October this year and 4 and 5 May 1986 when the earth crosses its track again, so says John Branegan, GM4IHJ.

Aurora

I make no apology for once again drawing attention to monitoring for auroras, since with the solar cycle getting close to its lowest point the incidence of these events will inevitably decline. This is all the more reason for being on the spot when the rare ones occur, as they will—some of them quite intense, as became evident on 20/21 April. In *4-2-70* April I was wondering whether Wick Radar on 153·213MHz, introduced to us as an auroral indicator by John Branegan, GM4IHJ, would be audible in the south of the country. Part of the answer was provided by someone who spoke to me at the NEC and said that Leicester University regularly monitored it with quite a simple antenna. John Branegan himself now provides additional input, since he has been on his travels outside his native GM-land and took with him a receiver capable of being tuned to the Wick frequency. John heard Wick during auroral conditions (not necessarily very intense ones) while at Blackburn, Lancs, on 19, 20, 21 and 27 April. He heard no actual auroras while at that location but often got ms reflections from Wick, showing what a good indicator this could be for all manner of reasons. John doesn't believe in miracles, however, so even at these portable /A locations he erected a five element antenna (for 144MHz) on a 6ft pole. The band was usually dead when he could hear Wick, but on one occasion Andy, GM4IPK, was a strong signal "tone A" in Lancs when Wick was "up". Moral: build a receiving converter tuned to Wick and connect it to what our USA friends would call a "half-decent" antenna and ergo! an auroral monitor. Maybe some enterprising manufacturer will offer a kit for such a converter (we could do with one for the weather satellites too) which could feed into general-coverage or hf bands receiver, so as not to tie up the main 144MHz equipment which could then be listening for something equally interesting.

GM3WOJ reports that his friend Alex Dunn, GM4NFC IO75SJ or XP square), has spent the winter monitoring 50MHz auroral performance using a six-element Cushcraft 50MHz Yagi into a TS760. Alex remarks on the phenomenon of auroras which peak to the north west on 50MHz while at the same instant signals on 144MHz peak in a north easterly direction. Similarly, panning the beam from NW to NE while monitoring Maghera television on 53·757MHz gives a wide variation in the *pitch* of the received signal. Alex reckons this is due to variation in path lengths for different beam directions, and invites comments. (What about different doppler and/or turbulence from different parts of the patch?) It's good to know he is monitoring Maghera successfully as this was one of the indicators suggested by G3UUT in *4-2-70* April. In the aurora of the morning of 21 April, GM3WOJ (IO77WO) worked five stations on 50MHz via aurora on a QTF of 330°

SM6EAN noted auroral conditions on 432MHz on 1, 19 and 21 April. On 21 April he worked several PA, OH and LA on the higher band, and beacons SK4UHF (432·960MHz) and SK7UHH (432·940MHz) both peaked S6 with Au tone with him. Reg Woolley, GW8VHI, makes a plea for more people to try 432MHz during auroras since, with higher erp these days, contacts on that band using this mode have been shown to be quite feasible.

Martin Harrison, G3USF (Keele), is someone whose scientific knowledge and approach are well known, so information from him is very useful for students of propagation. Martin has been looking back on 1984, and found that it was a better year for auroras than could have been expected at the stage of the solar magnetic cycle. His records indicate that some 97 days were reported as producing aurora on 144MHz at some time and at some locations in the UK. He counted 20 days when a 3h AA Index of 100 or greater prevailed. Such a reading would be expected to produce 144MHz auroral propagation well down to the south of England, probably to the London area. The dates of these were (with Meudon Index figures in parenthesis): 4/1 (119), 4/2 (102), 14/2 (104), 27/2 (104), 1/3 (116), 28/3 (138), 4/4 (175), 5/4 (116), 8/4 (107), 26/4 (175), 13/7 (175), 17/7 (104), 1/8 (116), 5/9 (141), 18/10 (138), 19/10 (116), 20/10 (116), 25/10 (104), 30/11 (104), 15/12 (116).

Martin found no reference in *4-2-70* of auroras on 27/2, 8/4 or 30/11. There were a further 16 days in 1984 when the AA index reached 50 for 24h without ever reaching the 100 mark for any 3h period. These were 30/1, 2/3, 3/3, 29/3, 16/6, 14/7, 27/8, 4/9, 19/9, 24/9, 25/9, 26/9, 7/10, 22/10, 24/10 and 28/12. Martin's rule-of-thumb says that Scottish auroras can occur with a 3h index as low as 50; however, he has not come across any reports of such events in respect of 2/3, 3/3, 16/9, 19/9, 24/9, 22/10 or 24/10.

He concludes by saying that auroras can occur with even lower index readings. On 28 October there was a Scottish event with an index of only 25, while we reported here recently an aurora which GM4VIX/A observed when the index was never higher than 33 (on 17/2/85). One conclusion is that despite the frequent auroras reported by GM stations, there may be more undetected aurora occurring than we think. Index figures can be found by listening to transmissions from WWV.

Repeater news

After reading about the most northerly repeater in the UK in the December *4-2-70*, Mike Allisette, GU4EON, claimed the most southerly slot for GB3GU, Guernsey on RB13 (*not* RB15 as often appears in print). Located at the headquarters of Guernsey ARS (in the parish of St Martin for anyone visiting the island this summer), it has been operative since 27 January. A better site is, however, being sought. The main architects of the repeater were GU4ASO, GU8FBO and GU4EON. The set-up is 5W from a Pye T641 into a G3VEH full-wave dipole with LDF 4-50A heliax feeder. On receive, a Pye R460 with a preamp provided by Mutek Ltd has its own G3VEH antenna and heliax feed. Six cavity filters are used, three in each leg. It is

intended eventually to increase the power to 15W and use Mk 2 logic (GB3US Mk 1 currently being used). Stations as far away as Reading have accessed the machine, but it is not the intention that this should become a dx repeater. All reports to GU4EON, QTHR. However, when GB3GJ becomes operational, GB3GU will no longer be the most southerly repeater in the UK.

Nicholas Negus, G6AWT, is secretary of the Gloucester Repeater Group which was formed in 1984 to provide 432MHz coverage in the hilly terrain around Gloucester & Cheltenham, the only clear view being down the Severn Valley. The group has built the hardware for what will become GB3GH, but has encountered major site problems which mean that switch-on may be delayed until Christmas. RB2 was the original choice of channel, but this may be changed to reduce interference between GB3GH and repeaters in the Shrewsbury and Aylesbury areas. The system is centred upon the Pye T461 and R460 units, logic being a modified version of the GB3US board designed by Tony Whitaker. Funds are urgently needed, plus the donation of low-loss feeder (or information of where to purchase same at a low cost). Longer-term plans are to convert to packet data handling when DTI guidelines are issued on this subject. Contact G6AWT, QTHR, for further information or to make donation of any sort.

Following the mention in the April *4-2-70,* G4TVC has received a number of requests for television repeater information, a copy of which I have also received. It is a well-written detailed outline of the system which would be of interest to atv operators generally as well as those contemplating the construction of such a repeater.

The Cambridge Repeater Group Newsletter No 7 contains its usual wealth of administrative, technical and topical news under the editorship of Chris Lorek, G4HCL. Main items of news extracted from this publication are: a new mast is being constructed by "the owners" at the Barkway site which will eventually mean transferring all antennas there to it, probably after its completion in July. The feeder may be replaced at the same time; improvements in GB3PI (R6) have resulted in many stations being able to access it when barely audible with them (especially those, including mobiles, who use 100W or more amplifiers); transmitter switching is being modified so that in the event of a power failure on site, battery power will take over at reduced input to conserve power while an audio tone emitting a piercing morse B B B... will be heard every time the repeater key is keyed to remind operators to confine use to only important messages: GB3PY on RB14 has attracted many more users since its move to Cambridge; work is in hand on a horizontally-polarized antenna system for GB3PT (RB12) Barkway to be ready in time for the mast changeover. The newsletter also contains an outline of the proposed 1·3GHz fm tv repeater. Suggestions relating to this should go to G4XHM or G4HCL, or both.

Out-and-about this summer

From France, Allee Leo Delibes, F6GUU (ex G3TMQ), says that he will be operating from his local mountain 2,400ft asl every Sunday on 144·300MHz plus or minus 10kHz between 1000 and 1600 local time. The QTH is 20km north of Toulon in DD50g, so keep an ear open for the weaker ones on the calling channel.

GM3WOJ will provide the action on 50 and 70MHz, while GM4NFC will add the 144MHz component during the Perseids, when they plan special fixed-station operation from XR40a (IO77). Frequencies will be 50·222, 70·222 and 144·222MHz, with no skeds, random ssb only using 14,333kHz as a liaison frequency *a la* HG1YA technique.

Rik Royall, G8ESB, together with one or two others, hopes to be active from the Isle of Mull in squares IO66/IO76 from approximately 12 to 20 July 1985. This is not a full expedition but a holiday carrying radio, but quite a radio, since they plan to operate on 144, 432 and 1,296 MHz with 50–100W on 144MHz 50W on 432MHz and 10W on 1·3GHz.

More information has come to hand regarding the G4VIX expedition to North Wales this year. This was planned for June but has now been changed to July. The concensus of opinion from 70MHz operators was that they should go to Gwynedd, and the most sought-after squares appeared to be XN (IO73) or XM (IO72). However, the most suitable site found so far is in YN (IO83). Anyone who has already written to this group will be informed of times and dates of skeds, but others can contact Dave Bartlett, 04024 55870, or QTHR by mail. They plan to travel on 25 July and return on 1 August, being operational between 26 and 31 July. They have over 200W on 144MHz 100W on 432MHz, 100W on 1·3GHz and 100W on 70MHz. All antennas will be 30ft above ground, and the site is about 1,000ft asl. They hope to carry a 50MHz receiver and antenna for crossband. Callsign on 70MHz will be GW4HRC/P, the other bands probably GW4VIX/P. Operators include G4ZTR, G8HGN, GW4ZVQ, G8URI, as well as Dave, and others may be joining in for what seems could be quite a party.

From 9 to 13 August, GW8VHI and friends will be operating mainly cw/ssb ms from XM80f. Reg is another who prefers the old system of locators. They will be on the look-out for good tropo, auroras etc even though the main aim is ms, and they would like skeds with stations at very long range *and* some tests using ms on 432MHz. Frequencies will be 144·335 and 432·190MHz. They have a pair of 4CX250s and 4 × 14-element Cushcraft beams with GaAsfet masthead preamp on 144MHz, plus a YL1110 amplifier and 4 × 19-element F9FTs with GaAsfet on 432MHz. Operators will include G8KBQ, G4HSC, GW6ZHH, GW4WDX, GW9VHI and possibly others. Phone Reg on 0639 821308 for further news or skeds.

Dave Gray, G8YYB (Twickenham), will be active from the Scilly Isles (IN69UW, old WJ square) between 4 and 16 July. He plans to use 200W to 2 × 13 elements on a preferred frequency of 144·200MHz. Although the period includes VHF Field Day, Dave will sign G8YYB/A throughout the trip (ie not /P), but will be glad to give points to portable stations. Being a single-operator expedition, he cannot guarantee to be QRV 24 hours a day, but will try to be around "early and late when tropo might be good" and also to catch any Es which might occur. All contacts will be confirmed by QSL card.

Kris Partridge, G8AUU, will be operating on 144MHz again this summer from Poland, the dates being 1 to 14 July. For VHF Field Day, he plans to be at a mountain site near Wrocklaw with the unpronounceable name of Wzgorza Trzebnickie, QRA locator JO81NG. (5 to 7 July). 432MHz operation from the same site will be provided by SP6AZT/6 for Field Day. When not out portable, Kris intends to operate from a residence in Wrocklaw, so if sporadic-E favours that region during the first two weeks in July, Listen for his ssb signals. His call is SO6AUU/Fixed, so don't confuse that last bit with a "Six".

Beacon notes

Our good friend Jan-Martin Noedling, LA8AK, who produces so many interesting designs for equipment, has sent some information on beacon LA3VHF on 144·880MHz from DS77j which runs 10W to a 10-element Yagi bearing 180°. The beacon has now been modified to send "LA3VHF QTH DS77J" at 75 letters/min for about 20s. It then changes, sending "LA3VHF" at 1,200 lpm for about 40s. This is to give ms operators the opportunity of testing their equipment.

Jan-Martin has also improved the quality of the feeder to the antenna of this beacon. He strongly advocates the above system, or one very much like it, for all 50MHz beacons, present or future, and it would certainly seem like a very good idea since 75lpm is only 15wpm, which most operators would be able to copy, especially as the call is repeated many times.

Chris Tran, GM3WOJ, now at Rosemarkie, Ross-shire, says that there are hopes that the 50MHz beacon there should be operational by mid-summer 1985 using a two-element Yagi bearing 0°. The tentative frequency is 50·060MHz, and Chris says the beacon should be a good auroral indicator as well as an ms source for southern stations. Perhaps there is time to incorporate LA8AK's suggestions in the message format of this beacon. I have a copy of the conversion to the logic of LA3VHF to accommodate the new format if anyone would like to see it (sae please).

Rik Royall, G8ESB, bemoans the lack of 432MHz beacons in the UK and Ireland, especially to the west of the country. The VHF Committee is aware of this and is looking into the Ireland situation, but it is a good point since the same committee is pressing for more of that band.

However, a rather different suggestion comes from John Branegan, GM4IHJ, who says: "Why not listen for high-power Continental tv stations in the appropriate part of the spectrum to monitor conditions." He goes further to express interest in a new scanner by Yaesu, the FRG9600, covering 60 to 905MHz and embracing not only a.m. and fm as most scanners do, but also ssb. John says this could be a real research tool for propagation "buffs", and would enable a watch to be kept on such emissions as the high-power USA tv stations, not forgetting the very powerful PAVE PAWS radars in that country. This might eventually prove whether double-hop ms paths really exist or whether other mechanisms account for some of the observed data.

50MHz

The main news in this part of the spectrum is the part played by meteor scatter in both dx contacts and in the amazing exchange of colour tv signals by this mode between G3NOX and GM3WOJ as reported elsewhere. Many of the Norwegian amateurs who contacted G stations during the Eta Aquarids and Nu Piscids in May had no previous ms experience, but some of the bursts were so long that "proper" ms procedures were almost unnecessary.

My visit to the VHF/UHF Conference in the USA was a reminder, if one were required, that a band of really enthusiastic 50MHz operators resides in New England, ready to carry out transmitting or listening tests at any

Back in October 1983, Shaun Cline, G4MDZ worked OH0NC plus UR2, UQ2, UA1, SP, SM0, LA and OZ during a superb 432MHz opening. He has now received the card pictured above which claims a "first" G-OH0 for the band. Any other claimants for this one?

time. One such has already been proposed by Steve, WA1AYS. He will make calls throughout July and up to the middle of August on 50·110MHz between 0400 and 0600 gmt every Saturday and Sunday morning, and listen for replies on the same frequency. Everyone in the USA recognizes that the chance of F2 propagation at this point of the sunspot cycle is remote, but on the other hand if nothing is attempted, nothing will be gained, and maybe multiple hop ms or reflection from a passing piece of star wars equipment will yield at least a few pings, so why not keep the receiver tuned to 50·110MHz at those times and point the beam towards the northeastern USA?

W2CAP on Cape Cod is as well-placed for any possible transatlantic propagation on 50MHz as anyone, and he certainly exudes enthusiasm for this band. He is most anxious for some co-ordinated tests between the UK and the USA/Canada. In the past he has frequently heard the ZB2 beacon as late as 11pm, while signals from Europe on 49·75MHz have been heard as early as 11am. He is very interested in auroral-E (see elsewhere) and says that most USA 50MHz operators would tend to look west from New England after an aurora for any evidence of this type of propagation. He suggests that UK amateurs keep a look out on 50·1MHz for cw signals from the USA at 11pm in the UK as USA operators will now make a point of transmitting this way, knowing that there will be stations QRV here at that time.

W2CAP makes the point that if the UK experiences an aurora at, say, 4pm, which might lead to a second phase later, stations in the USA will generally be unaware of this. So if anyone feels like telephoning W2CAP to alert him to any special set of conditions which might make transatlantic contacts possible, his number is 0101 617 362 2270 which can be dialled directly.

USA sporadic-E data for the past three years suggests that the best time for multiple-hop paths across the Atlantic on 50MHz would be between 4 and 8pm, USA time (9pm to 1am, here) during the first week in July.

From here and there

Reg Woolley, GW8VHI, writing from what he calls *the real QRA*, YL32F, provides some information for the dx-minded, square-chasing operator as follows: "EA4CVS, who is good for ssb ms skeds on 144MHz is not at the QTH reported here, but can be reached at Jorge Moro, 7-4° G, Navalmoral de la Mata (Caceres), tel 53 23 31. He has 750W to 2 × 16-element antennas and a BF981 preamp, so he should be a good signal. Reg copied a burst of 17s from him plus many other reflections on 22 April. EA7CGH has four × 16 elements, and can also be heard as ED7GEL, a contest group call, from a hill 1,809m asl. Finally, EA7BVD is only QRV from XY in contests since his home QTH is in XX. Readers please work out their own *real* locators if they prefer the Maidenhead system!"

A GM1 station recently licensed is telling people over the air that his good results are due to being located on a mountain which "puts him in the E-layer." To the uninitiated the E-Layer forms (when it does) at heights between 60 and 90 miles above the surface of the earth, give or take a mile or two, so that must be some mountain—quite apart from the fact that the E-layer does not reflect 144MHz signals except under exceptional conditions, such as when Es or Auroral-E are present, when the ionization can be quite intense though very patchy. Who said the RAE is too difficult? Anyway, being 90 miles up on that mountain, he will not have much luck with tropo ducting.

As reported over GB2RS newscasts, what was probably the first 144MHz *narrow-band* fm television contact was made at the NBTV Convention at Nottingham on 26 April when across the convention hall, G3PVH worked G8YXL/A. Pictures were 32-line 12·5 frames/s transmitted by normal fm transceivers, and recognisable faces, callsigns and randomly-chosen digits were successfully received. The G3PVH camera used a 9in scanning disc with a 931A photomultiplier tube, a 3in cathode ray tube being used to display the received signal. Previously NBTV exchanges have been on top band (Melbourne to Sydney) or simply tape exchanges. Most readers, unlike me, will be too young to remember the Baird spinning disc tv sets of the thirties era which, as I recall, used flickering neon lamps instead of all this new-fangled equipment. Write to G3PVH QTHR for any further information, but please enclose a sae.

If you have a neighbouring amateur who causes you problems of "splatter" from a badly adjusted linear amplifier, be glad you don't live near the town of Spring, Texas, where a WD8 station was recently fined $2,000 for operating a transmitter power of 25,000W. He must have run up quite an electricity bill, for at 60 per cent station efficiency his power consumption would be around 40kW, while a 16-element antenna would provide some 500,000W of erp!

Mike Pratt, G6YNM (Reigate), commenting on the Kent Fire Service interference at the top of the 144MHz band (*4-2-70* May) says that a transmitter atop Reigate Hill produces breakthrough which can reach down as far as 145·500 at strength S3, though it operates only spasmodically. He also gets interference from a Continental station at the top of the band. □

Microwaves

*by Mike Dixon, G3PFR**

Fundamentals (8)

Frequently the builder and user of simple 10GHz wideband equipment will "prove" the equipment and his/her operating techniques by either taking part in the cumulative contests/activity periods or by arranging skeds with other interested operators, perhaps over new and untried paths. This can be extremely off-putting in inclement weather, especially on a remote and exposed portable site, and may well deter those operators from using their equipment on anything other than the occasional basis.

Installation and use of the equipment from the home station would be one way of improving equipment/band usage and expertise, and increasing numbers of operators are experimenting with short-to-medium-distance paths which provide the users with a reliable "private" link over which it is possible to transmit speech, data and even video (the latter with the appropriate modifications to the Gunn modulator to cater for the much higher modulating frequencies involved).

Reference will often be seen to the use of narrowband equipment and "fly-swatter" or "periscope" antennas for fixed-station use by the better equipped stations. While these elaborate antenna systems are, indeed, appropriate to the advanced modes in use (and to more than one band, allowing a suitable change of dish feed) it may be appropriate to address the question "What can be done simply and inexpensively, using simple concepts, to enable the use of such an installation from a fixed location?"

First it is not necessary to use waveguide feed (or even central heating copper piping with rectangular to circular-feed transitions) from the shack to the antenna. If it is accepted that a horn antenna or small dish (say 16 to 18in) can be mounted on a mast and that an in-line mixer/oscillator transceiver "head" can also be mounted directly behind that antenna, then it is possible, using even quite low-grade coaxial cable as a feeder, to operate a fixed-station set-up quite easily and inexpensively: it is possible to operate full duplex with a partner station or stations using a single feeder to fulfil several functions simultaneously.

Fig 1 outlines one suggested technique which will enable this type of operation to take place. The only requisites are that the partner station(s) should use a common i.f. and that the transmit and receive frequencies should differ by this amount. Since the amount of frequency shift offered by "voltage pushing" the Gunn oscillator, as a means of remote tuning, may be as little as 10 to 15MHz, care must be taken to align oscillator frequencies fairly accurately before installation on the mast, and it is also

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

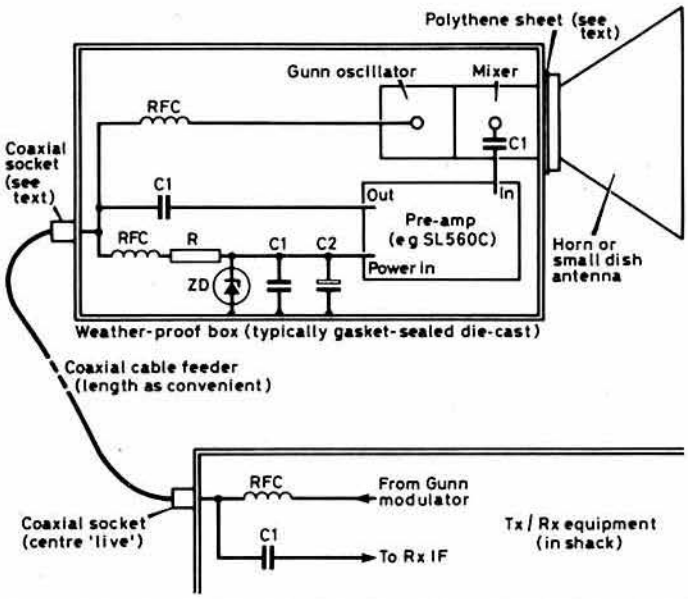


Fig 1. Masthead installation of simple 10GHz transceive equipment. Component values are, typically: C1 = 10nF; C2 = 10μF; ZD—see text; RFC = 100μH; R, adjust on test, see text. For the sake of clarity the normal Gunn anti-parasitic bypassing is omitted, as is detail of the connection between the mixer and the preamp. The coupling, shown as capacitive, could with advantage be inductive (see text). *NB*: a *small* (1 to 1·5mm) hole should be drilled at the lowest point of the enclosure to allow the unit to "breathe": this will aid in the prevention of condensation should slight leakage occur

a good idea to thermally insulate the Gunn oscillator assembly with expanded polystyrene foam within the housing, which itself must be both rigid and weatherproof.

At the shack end of the installation the received i.f. signal is prevented from entering the Gunn modulator circuitry by the rf choke. Similarly the (modulated) dc feed to the remote Gunn oscillator is prevented from entering the i.f. amplifier circuitry by C1 which offers a dc block but a low impedance path for the signal to enter the i.f. At the masthead the modulated dc feed is directed to the Gunn oscillator via another rf choke, and the normal Gunn parasitic "stoppers" (R and C) should be mounted directly across the Gunn terminal: for clarity these are not shown in the figure. A proportion of the Gunn supply is "tapped-off" via yet another rf choke and applied to a network consisting of a resistor (whose value is determined on test), a zener diode and zener-decoupling components C1 and C2. The Zener voltage is relatively uncritical, provided that it lies typically 0·5 to 1V below the normal operating Gunn voltage minimum (measured with the Gunn operating normally). The zener not only supplies a stabilized voltage for the preamp, but also effectively removes the modulation from the supply—the ac modulation voltage is usually of the order of 100 to 200 mV superimposed on the Gunn dc voltage. Smoothing and bypassing of zener-generated noise is effected by C1 and C2. In view of the relatively low voltage available for the preamp, the constructor is advised to use the SL560C (or RS560C) rf amplifier ic, which will work with voltages down to as low as 2V and still provide adequate gain to overcome feeder losses and potential spurious signal pickup: it is also usable over a frequency range of at least 10 to 200MHz with sensibly level gain. It is certainly very advisable to include a degree of LC filtering, for instance using miniature Toko inductors at input to and output from the ic. This has the advantage that the turns ratio on the inductors can be chosen to provide a match from the mixer to the preamp (typically about 1:1 to match a few hundred ohms mixer impedance to an optimum of 200Ω needed by the ic) and out of the preamp into the feeder cable (medium impedance to 50Ω). Thus fed and matched, the ic will be less able to respond to and amplify unwanted signals which lie outside the passband provided by this simple filter than if wideband coupling were used. The zener limiting resistor can be chosen and tested on the basis that the ic will consume about 25mA when configured in the usual common emitter mode: the reader should refer to the manufacturer's data sheet for further details of this versatile ic.

If the reader has any misgivings about using a single feeder to fulfil several functions simultaneously, then similar but simplified techniques can be adopted to use two feeders, one for the Gunn supply and one for the preamp and signal handling.

One or two hints about weather-proofing might be in order, since in many respects this is the most difficult part of such a project! The in-line mixer "sees" the outside world through a slot in the box wall: if this is dimensioned to take a standard WG16 flange (the "window" has a size corresponding to the internal dimensions of the waveguide, ie 0·9 by 0·4in) then it is possible to clamp a *thin* polythene or Mylar sheet between the box wall and the antenna flange. The flange used should be of the type grooved to take an "O"-ring seal, and should be a non-choke variety so that the sheet is firmly clamped in place. With a horn antenna, the horn itself can be protected with a coat of good paint, and little, if any, further protection is needed. If a dish is used, not only will the box "window" need protection but water must also be prevented from entering the feed itself. With the so-called "penny feed" it is possible to protect adequately by "Araldite" thin sheets of mica across the slots or even taping a polythene bag over the end of the feed, though this is really only satisfactory on a temporary basis.

Since even a small dish presents quite considerable "windage", it may be necessary to brace it against distortion in order to prevent damage. Without such bracing, distortion of the dish—either instantaneous or permanent—could effectively alter the position of the feed relative to the dish focus, causing serious loss of antenna gain. For this reason it is often prudent to experiment with a horn before considering the use of a dish. Remember also that moving the masthead unit even a short distance up, down or sideways may make the difference between a fully usable link and one which simply does not work. In this respect the broader beamwidth of the horn may well advantageously offset the loss in gain relative to a dish.

The cable entry socket(s) should preferably be of N-type construction, as these are inherently splash-proof, but never-the-less should be sited where direct water entry is avoided—for instance on the underside of the box. They can be given further weatherproofing by the use of plastic tape, silicone bath-sealer or any other method the constructor likes to devise. Waterproofing other types of coaxial connectors is well-nigh impossible!

It is hoped that this particular technical contribution will encourage new users of the 10GHz band to have a go at establishing a fixed link or two, and I would be very pleased to hear about such experiments (whether successful or not) and also to have other users' views or ideas along these lines. Happy experimentation!

Correction

In "Fundamentals (7)", reference was made to the Plessey CL8630 oscillator: despite careful preparation this was incorrect and should have read Mullard. My apologies if anyone has wasted time in looking for a non-existant oscillator! Incidentally, I have since found that a home-made version of this type of oscilator, built in WG16, locks over a wider range than the Mullard unit. It seems that this oscillator has been deliberately designed to minimize frequency pulling occasioned by varying loads, by virtue of the discontinuity which has been introduced by the "step" in waveguide size.

Operating news

There has been a distinct lack of operating news this month, no-doubt a sign that the cold, wet (or cold, dry—depending where you live) spring has yet to yield significant lifts in conditions.

Frederick, G6FK, reported that as far as he was concerned, on 1·3GHz "the period from 18 March to about 9 April was below the 'norm', although it is difficult to determine how flat, due to low activity". He went on to say that "during this period the usual tests continued, with a few Q2 to Q3 exchanges. However, from 9 to 14 April there was a high level of activity with frequent good signal exchanges"—here he listed nearly 40 stations heard or worked on the band, including Tim, G14OPH, who was mentioned last month as being "about to be active".

A letter from Iain, G4SNL (Saltash, Cornwall), indicated that he, Mark, G4YOI, and Kevin, G0AKH, are now active on 10GHz, wb, from Cornwall. Their first attempt at portable operation took place from Caradon Hill on 31 March, when contacts were made with Chris, G4DGU, over a 40km path, thus proving that the equipment was functional. He said: "The contacts were at very good strength and lasted for about 45min". Then comes the bitter bit: "We braved the wind, hail, rain and cold for the first cumulative, hoping for contacts—but nothing! All I can say is: "Come-on, chaps, point your dishes west—we are waiting!".

Again I would make the plea, especially for geographically remote stations, to give as much information as possible about their activities, well in advance of operation; this will greatly increase their chances of success. I make this observation because, as a result of improved communication (!), activity is rapidly increasing; for instance, along the east side of the Pennines where little activity had previously occurred. Growth in the southwest could be similarly stimulated by increased communication: please send notice of your intentions to Peter, G3PHO, QTHR, who will ensure publicity through the *News Letter*. □

EPHEMERIS

Satellite news and views

*by R. O. Phillips, G4IQQ**

Oscar 10

To start this month, I will return to the two main problems associated with satellite operation that will just not go away.

The first relates to interference by fm operators who will insist on operating on 145·800MHz, which is no longer a recognized fm channel in the IARU band plan. The main consequence of such operation is interference to the downlink frequency of Oscar 10 on 145·810MHz, and in spite of many claims there is little that can be done by the use of filters; the interference is actually falling onto the satellite downlink frequency. Requests to operators to desist from using the frequency have in most cases met with a tirade of abuse and no indication of a willingness to let others use the allocation in the manner accepted by the majority. In other cases the reply from the offending stations has been more physical in nature and totally inconsistent with the aims of amateur radio, both in terms of the generally-accepted purpose of the hobby and, equally significantly, as reflected in the amateur radio licence itself. There is some evidence that the tougher line being taken by the RSGB, as a spectrum monitor, and the licensing authority is having an effect. There is now a recognition that such actions will not be tolerated, and withdrawal of licence privileges is a likely outcome.

The second complaint is much closer to home with the satellite community; that of use of excessive uplink power. The guidelines for operating through all satellites are very clear—use only enough power to maintain an adequate signal strength on the downlink. In addition, when operating through Oscar 10, the strength of the returned signal should not exceed that of the general beacon on 145·810MHz. If you cannot hear the beacon you should improve the receiver, not increase the transmitter power. It has become increasingly difficult to access the satellite on weekends, not just because there are more stations active but primarily due to the high power used by a small number of operators. It might be useful if the amateur satellite groups around the world were to organize more low-power activity periods. This would perhaps bring the message home that it is possible to have very satisfactory contacts with moderate power levels, if everyone plays to the same code of conduct.

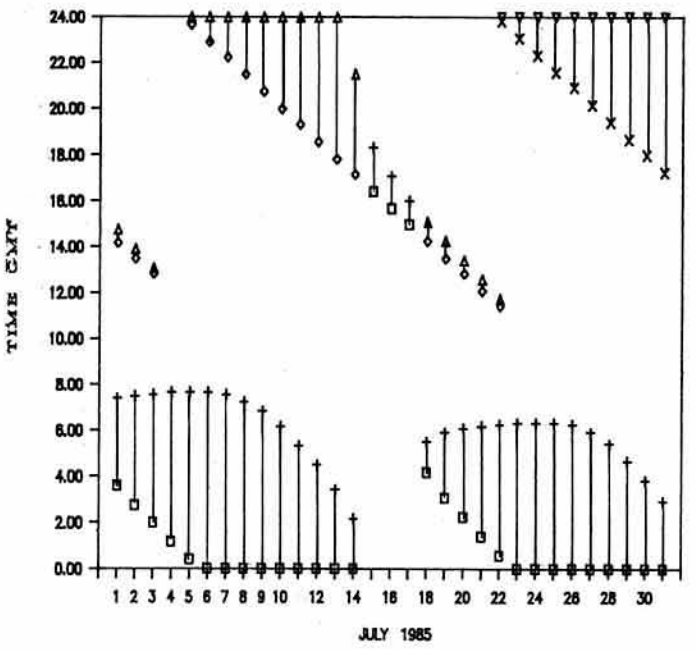


Fig 1. Availability of Oscar 10 (London area)

Turning now to the satellite itself, which continues to function without any apparent problems—unlike many of its commercial counterparts. A minor change was made to the operating schedule from 7 May, namely that the Mode B switch-off time was extended from MA200 to MA220. As I mentioned last month, the next major change to the schedule is likely to take place around mid-August to take account of the changing solar illumination conditions.

The availability of the satellite for the month of July is indicated in Fig 1. From comments received, it is worth stressing that the times indicated are those when the satellite is in range (for a location in the London area); it does not show the state of operations because the figure would then become too cluttered. To calculate the appropriate times when the transponders are switched on, it is of course possible to monitor the bulletin transmissions on the general beacon, which indicate the mean anomaly at that time. This can be rather frustrating if you get up very early to catch what looks like a good pass only to find the transponder is not due to be switched on for another two hours. In fact it is an easy matter to calculate the critical times with just one piece of information—the time of the perigee. What is more, since the period of the satellite is very stable, the times of the perigees may be extrapolated for several months with an adequate degree of accuracy. Listed below are the relevant data to permit calculation of the switching cycles for the entire month.

Satellite period	11h 39·515min
Reference perigee for 1 July 1985	0242 gmt
Orbit number	1541

Status	Mean anomaly	Time after perigee (min)
OFF	0-31	87
Mode B	32-119	328
Mode L	120-137	377
Mode B	138-219	601
OFF	220-256	699

The reference perigees for subsequent orbits may be calculated simply by adding the orbit period to the previous value, then the appropriate minutes added for the switching times.

To take an example, the first perigee on 3 July (orbit number 1545) occurs at 0120gmt, so adding the times given in the table above it can be seen that the Mode B transponder will switch on at 0120 + 87min, ie 0247gmt, which is about 45min after the satellite comes into range (see Fig 1). The switchover to the Mode L transponder then occurs at perigee plus 328min, ie 0648gmt.

As further examples, the progressed perigees for the first three days of the month are given here:

Date	Time gmt	Orbit No
1	1422	1542
2	0201	1543
2	1341	1544
3	0120	1545
3	1300	1546

I hope this additional information will prove useful for operating purposes, and will include it each month in the future. As ever, I would welcome any comments or suggested alternative methods for presentation of information.

RS satellites

I am pleased to be able to report that, at the time of writing, all three remaining satellites (RS 5, 7 and 8) are functioning very well and benefiting from their good solar illumination conditions, which should continue until the end of June.

There is nothing further to report on the status of the new satellites RS9 and 10, except that assembly is reported to be proceeding according to schedule.

Uosat

Listening to the transmissions from Uosat Oscar 9, it is difficult to believe that it has been in orbit for nearly four years, during which time it has collected and disseminated a great deal of data. The operating schedule for the satellite remains as indicated in *Ephemeris* March 1985.

Further trials with the automatic attitude control manoeuvres on Uosat Oscar 11 have shown that it is now possible to re-acquire gravity gradient stabilization after only several days. Most of the recent activity has taken place when the satellite has been in range of the command station in Surrey to enable monitoring of the critical parameters. It is hoped that suitable software can be developed to allow such manoeuvres to take place out of range when orientation of the spacecraft with the geomagnetic field may be more suitable. During periods of orbital manoeuvres the telemetry transmissions are generally set to dwell on channels 1, 2 and 3, corresponding to the X, Y and Z outputs from the navigation magnetorquer. This information allows the command station to determine the orientation of the satellite on a continuous basis. Additionally, channel 52, the battery voltage, is often monitored.

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

Other news

The AGM of AMSAT-UK took place on 20 April, at which the outgoing committee (with the exception of Terry Weatherly, G3WDI, who was not able to continue) were re-elected for a further term. During the discussion following the formal part of the meeting, G3AAJ described a project, "Satellites in Education", that had recently been set up under the auspices of the Micro-Electronics Programme. It was hoped that schools could be made more aware of the use of satellites as teaching aids, with the two Uosat satellites being the most suitable.

On a brighter note, an award of a glass goblet, engraved by Dave Whitebread, G3WIQ, was made to Jim Miller, G3RUH, for his technical contributions to the bi-monthly journal *OSCAR News*. □

SWL News

*by Bob Treacher, BRS 32525**

I AM CONCERNED by two recent references to the possibility of swls obtaining QSL cards by deceit. The first was in *4-2-70* May, where it was suggested that listeners in some countries wait until dx information on past tropospheric lifts or sporadic-E happenings are reported in journals, and then send a listener report purporting to have heard one or both sides of the QSO. The second was to information from G3KMA, the new administrator of the IOTA Awards, who has his suspicions that certain swls are extracting information concerning activity from islands from *DX News Sheet* and then sending cards based on this information. I am glad to say that the culprits do not seem to reside in the British Isles. I hope that British listeners are more sensible and honest and that the topic does not have to be raised again.

Countries tables

Time to make clear several points regarding the 1985 table. First, the idea is that the number of countries heard, rather than the number of stations heard, should be notified to me. Also, entries should reach me by the *first*, not the second, deadline date given at the end of *SWL News* each month, otherwise the score cannot be entered until the following month.

To set the record straight therefore; the table reflects the number of different countries heard on each band during 1985. The entry should show the number of different countries heard, the number heard on each band, and a grand total. There is no starting score this year. I look forward to receiving a few more entries, including some from newly-joined members.

NEC convention

For those who missed my lecture at the RSGB National Convention, there may be a second opportunity at the HF Convention in September. The lecture at the NEC was well supported, but it was disappointing only to meet one contributor to this page. Hopefully, the gathered assembly went away a little wiser about lower frequency swl techniques, and that they are awaiting the start of the dx season so that they can put their new-found knowledge to good use.

Newcomers

Dick Carrick, BRS85196, has been a member of the Society for a little over 18 months, and he uses a Racal RA17, Marconi CR100/4 and a Panasonic DR48 with a Datong SRB2 "woodpecker" blanker, and an SEM multifilter into a Datong AD270 antenna. He wishes to attract the attention of Albert, BRS48461, as he received a QSL card from ZC4AM/A, who appears to have sent his card to Albert, and vice versa, and Dick would be grateful if Albert could send on the misdirected card together with an addressed envelope so that the mistake can be rectified; Dick's address is: 31 Fairfield Lane, Barrow-in-Furness, Cumbria LA13 9AN.

Adrian Gough, BRS86504, has G4VEX to thank for equipping him with a good receiver set up; an FRG-7700, a G4VEX homebrew atu, and a long wire. Adrian provided a thorough and interesting list of the stations he had heard since mid-April. Best dx seems to have been C21DX which, according to Adrian, was called by half the world at once!

Luciano Marquarot, BRS86766, uses a DX302 receiver and two dipoles. He was to sit the RAE in May and hoped to pass first time. His first entry to the 1985 table needed some amendment, but the earlier reference to the table should clarify the rules.

Maurice Wilcox, BRS50930, is a first-time contributor and lives at Hartlepool. He reported QSLs from ZD8KM, YI1BGD (your scribe still awaits his!), BV2B and DU9RG. Most of Maurice's reports go out by airmail with ircs and he is pleased with his return.

1985 HF COUNTRIES TABLE

No starting score

Station	DXCC	28	21	14	7	3·5	1·8	Total
BRS8841	207	19	99	175	117	140	40	590
BRS52543	178	12	67	111	118	132	61	501
BRS31879	166	20	86	124	94	94	55	473
BRS25429	143	7	44	93	103	131	67	445
BRS32525	168	5	37	89	89	130	73	423
BRS1066	133	1	48	89	88	67	50	343
BRS50134	119	0	0	0	105	108	62	275
BRS48909	112	0	0	0	73	92	43	214
BRS28198	84	0	0	0	46	72	35	153
BRS44395	71	0	0	0	52	51	38	141
BRS44083	68	0	7	45	6	46	4	108
BRS62088	58	0	0	35	14	36	16	101
BRS44984	52	0	0	0	27	48	0	75
BRS85124	47	0	0	0	13	35	14	62
BRS86766	39	1	4	33	9	2	0	49
FE8957	14	14	0	0	0	0	0	14

DX report

A few reports of sporadic-E activity on 28MHz have been received, but it made only a small difference to the incredibly low scores for the band so far this year. Will anyone reach 50 countries on the band this year?

Elsewhere around the spectrum, yet another Chinese station has been active—BT0NMN on 14MHz cw. Also on that band were 9V1VG, 9X5MH and several stations using the 7S prefix from Sweden. GV prefixes were also in abundance—to celebrate VE-Day. On 21MHz, little stirred; only occasional openings to Africa and Asia caused partial excitement, with the best dx seemingly 3B8FK.

Dick Stanbridge, BRS31879, reported perhaps the best dx during the period under review in the shape of VR6TC on 7,057kHz at 0525 on 5 May. Elsewhere on 7MHz, Robert Small, BRS8841, caught SM0AGD/3B8, W1BIS/PJ2 and KA1BQ/VP2E. Surprisingly, 3·5MHz seems to have produced the most consistent dx this time around. Various reporters provided these interesting dx stations: N8DLR/J6L, J37AH, J88BK/9Y4, VP9KN, XX9UT and 5H3HM. However, BRS86504's reference to YA4WAR is obviously a misreading of YU4WAR.

Brad Bradbury, BRS1066, reported that in May NL7G/VP2E and several TA stations livened up what was otherwise a poor month. WP4ATF/KP5 provided Brad with country No 260 confirmed. Another to mention the 7MHz signals of VR6TC was Malcolm Harrington, BRS20249.

Some vhf news from Colin Watson, BRS46598, who from his Cumbernauld QTH favours fm dx on 144MHz. Several long-distance repeaters were heard on 8 May, but the best station reported was on a simplex channel in the shape of GM4WMN/M, operating from a tractor near Dundee.

Here and there

Since his last report, Dave Hasney, BRS86386, had suffered antenna damage due to high winds, but a new G5RV antenna should be in place by the time this is read. Dave had also received his first QSL card, a quick response from 3B8FP for a 7MHz ssb report.

Martin Parry, BRS52543, remarked that he was now able to use his Drake 2C for 144 and 432MHz reception. First results suggest an improvement over earlier results with his Trio receiver.

Michel Monteil, FE8957, updated the position from southern France. Work has meant reduced activity, especially on 144MHz where only 14 squares and three countries had been heard since January. On hf, his SR700A had caught up with some of the more recent dxpeditions, including 4X5DS (Dead Sea) which has not been mentioned here before. Most of Michel's dxing had been on 3·5MHz, with good conditions around midnight. On 21MHz OD5NZ and 8R1RPN produced welcome additions. On the QSL scene VK0AN was the best on offer on hf, while on vhf F6EQG/P(DI) and GW8JLY/P(XN) were new. Of interest to vhf dx chasers might be the news that Michel hopes to be active as G6WDK/P in mid-August from the old WJ square (Isles of Scilly). Look for activity from 10 to 20 August.

Finale

To close, please remember to send in your logs for the Society's SWL Contest on 13/14 July. A reminder too of the swl section of VHF/NFD on 6/7 July.

News, views, comments and all-time countries list scores and vhf/uhf table scores for inclusion in the September issue should reach me by 10 July, with late copy by 19 July. □

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

The Month on The Air

*by John Allaway, G3FKM**

SEVERAL comparatively minor changes were agreed at the meeting of IARU Region 1 hf managers in March. They are as follows:

(1) Region 1 societies are asked not to organize ssb contests below 1·85MHz.

(2) Region 1 societies are asked to submit ideas for an interim band plan on 1·8MHz.

(3) The rtty segment on 14MHz should be extended 5kHz down to 14,075kHz.

(4) In order to protect beacon operation on 14,100kHz, operation between 14,099 and 14,101kHz should be avoided.

Band planning on 1·8MHz is difficult, as at present it is only available with restrictions in some countries, and is only allowed for amateur use by special dispensation and on the understanding that no problems are caused to the primary users. In due course the section 1,810–1,850kHz should become available, but some countries may have less than this. It may still prove possible for frequencies outside this segment to be available with restrictions. As long ago as 1981 RSGB presented a paper on 1·8MHz band planning to the Brighton conference but other societies considered that it was too early to begin the process. Much more is known now and the HF Committee will be making proposals. There is criticism of the present state of affairs on the band, and perhaps a start could be made by trying to follow the sentiment in **(1)** and avoid using phone at the low end. However, it must be remembered that in the Federal Republic of Germany telephony is only allowed between 1,832 and 1,835kHz and that this is a licence condition.

DX news

G3DQL's visit to Gambia was mentioned in an earlier *MOTA*. Full details reveal that he will probably use the callsign C56/G3DQL on cw on the low end of 14 and 21 MHz with an FT101 and two slopers at peak times as indicated by hf predictions. He will welcome callers from 5wpm stations (particularly from the UK) and will be on the air until 11 July.

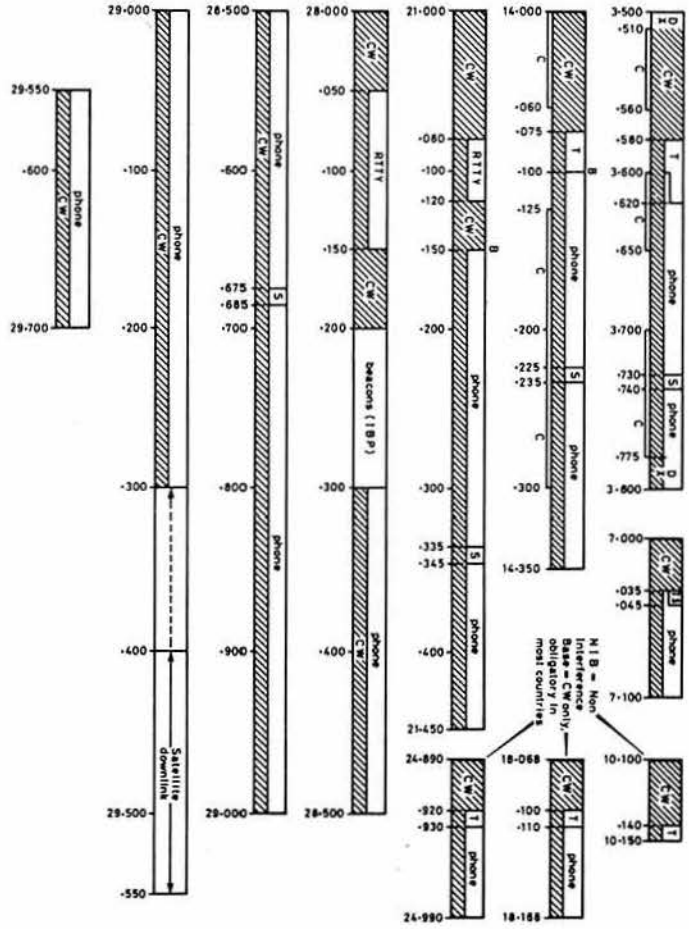
G4VHB reports that FY4CV, Philippe, is active every Saturday on 14,110kHz at 1800 looking for QSOs with young UK operators. He is using the station of the club of the Aerospatiale in Kourou, FY5XRU.

Activity from Micronesia is reported by KC6IN and KC6JC who have both been heard on 14,225kHz around 1200. *DX'press* reports VR6BA on 7,088kHz being operated by Alistair, ZL4DW.

Operator Kamil of YI1BGD now has a "Project Goodwill" transmitter (supplied by ARRL members) and is crystal controlled on about 14,050kHz. He is mostly on the air between 0600 and 1000. It is advisable to clearly mark the operator's name on all YI1BGD QSLs and to enclose ircs—not any other kind of payment for postage.

DX News Sheet notes that stations in Mongolia have been using the JV prefix to celebrate the 40th anniversary of the end of the second world war. The same news source mentions that an amateur from the DDR will be visiting N Korea and that he will be trying to obtain a licence. Should he be successful he will operate around 14,020, 14,040, 14,120, 14,140, 21,020 and 21,040kHz. 9M6MA has been worked on 14MHz ssb around 1700; and 9M8EN, Ted, who has been in E Malaysia since December last, makes a point of looking for UK contacts every Friday between 1500 and 1600 in the 14,215–14,220kHz area. QSLs for contacts with the late 9M8HG can now be obtained from GW3OJB.

Father Moran, 9N1MM, with G3KMA on the occasion of his visit to the Chiltern DX Club. He was presented with the club's Certificate of Merit



IARU Region 1 hf band plan, May 1985

A92EM has been a good signal on 14 and 7MHz cw but, like A92E, is being pirated on 1·8 and 3·5MHz. JY9WR is willing to accept calls after his schedules with QSL manager G4ATS, which take place on Mondays, Wednesdays and Fridays at 1400 somewhere between 14,130 and 14,150kHz. He is also to be found at other times up to 2000 and mostly on cw on 14,004, 7,002 or 3,506kHz. He goes on 1·8MHz when conditions permit on Thursday night/Friday morning and uses a frequency around 1,830kHz. It seems that 12 more Jordanian amateurs have recently passed their examination and *DX News Sheet* reports that they will be permitted to use cw and ssb on the hf bands but may not use 144MHz until they have evidence of having made 180 cw QSOs!

A station using the callsign BT0NMN and giving his location as Namunani, Xizang Province—which would seem to be the present name for Tibet—has been worked on 14MHz cw.

UB5WAD is still active as J5WAD, mostly on 14MHz ssb in the evenings, He will make cw QSOs on request, and is active on all bands 3·5 to 28MHz, but has equipment problems and has only 25W available on 3·5 and 7MHz. On 14, 21 and 28MHz he uses sloping dipoles.

A22BW is Lothar Schmidtke, DK3BW, and he has been in Botswana since late 1974 and licensed since August 1975 (originally as A2CBW). He

*10 Knightlow Road, Birmingham B17 8QB

is active on ssb and rtty with SB101, SB200, Robot 800C, TH7DXX, and 7MHz beam. He also has a two-element delta-loop on 3·5MHz. C53AL has been reported on 3,780kHz from 0500. According to *DX-NL* EL2CJ (Box 398, Monrovia) will be in Liberia until August and active on 1·8 and 3·5MHz. It is rumoured that ET3PS QSLs are not being accepted for DXCC credit as proper documentation has not been submitted. From Mauritius 3B8FB is reported to be active often on 10,103kHz around 1900. 5R8AL is now on 3,502 or 3,777kHz on Saturdays from 0200, and on 7,005 or 7,045kHz one hour later. 9X5WP still maintains a schedule with KF4A on Mondays, Wednesdays and Fridays at 1830 on 14,163kHz.

Chuck, KC7UU, expects to be living in Uganda for several months and expects to obtain operating permission as 5X5UU. Some documentation has been received from 5X5GK by ARRL.

Class E licence holders in France have recently been advised that they must add the letter E to their prefix. This has caused some problems and was not popular. It has now been agreed that they may continue to use their F-only prefix if they wish.

TK5VN and TK5BF have been active on 1·8MHz—the former mostly on cw between 1,830 and 1,840kHz after 0400, and the latter on ssb close to 1,845kHz at the same time.

UW3HY/1 is on almost daily at 0100 between 7,000 and 7,005kHz, and near 14,025kHz around 1200 and 2300. He will arrange schedules on 3·5MHz. Also from Franz Josef Land UA1OT is often on 7,005kHz between 1000 and 1230. There is a net of Greenland stations which meets on 3,650kHz at 2300 on Wednesdays and Fridays. OX3ZM is often near 3,792kHz at 0700, OX3OA on 7,010kHz from 1100, and 14,205kHz from 2300. OX3UD seems to prefer 14,036kHz around 1900, and OX3FG 14,195kHz at about the same time. *Long Island DX Bulletin* reports that TF3KG and TF3SZ appear on 1,835kHz quite often between 0500 and 0600.

3A2LF has advised that 3A2TO and 3A2CZ are pirates. Readers will be very sorry to learn that Jamie, CT1OF became a silent key recently.

QSLs for the 1984 CE0AA operation from San Felix have now all been sent out. However, some may have gone astray and CE3ESS invites anyone whose card has not arrived to send a letter containing log information only (no additional QSL or ircs) to Box 700, Santiago, Chile.

ZL1AMO still has logs and QSLs and can confirm contacts made with VR6HI (March—April 1979); ZK1MB (August 1979); A35EA, ZK2EA, and 5W1CW (August/September 1982); ZK1CQ (August 1979); ZK9RW (October 1983); ZL1AMO/C (November/December 1980 and March/April 1983); ZL8AMO (March 1984); ZL7AMO (May-June 1984); FW0BX (October 1984); A35EA (March 1985); and ZL7AA.

USA county hunters will be interested to know that there should be activity from Kalawao County in Hawaii by a group including KH6LS and using the callsign KH6S.

Sovereign Bases in Cyprus

An official list of ZC4 stations has arrived from Alan Bramley, ZC4AB, and was correct on 1 May 1985. It is as follows: (ZC4) AB-Alan; AM-Andy; ASG-RAF Akrotiri Scout Group; BSG-St Barnabas Scout Group; CZ-Glynn; DY-Dave; ESB-ESBA ARC; ESG; EPI-Episcopi ARC; FE; HMS-Glynn; ID-Ian; JB; JE-Jim; JH-John; JV; MR-Martin; NL-Nick; PM; and WW-Fred. All except ZC4ESB may be QSLd via BFPO 53. ZC4s TEN, UHF and VHF are of course beacon stations. Alan reports that ZC4RB is a pirate who appears to be operating from Akrotiri giving the name Roly and usually using cw. Two-letter suffixes are issued to full licence holders, and three to club stations and for group activities. In future the ZC4Z series will be issued to visitors and temporary licence holders.

1985 RSGB HF Convention

A date to note in your diaries is Sunday 29 September when the Society will be holding the 1985 HF Convention. The venue is the new conference suite at the Belfry Hotel (just off the M40 a few miles east of Oxford) and the programme, with parallel lecture streams, promises to be the best yet. The Propagation Studies, EMC, HF and HF Contest committees will be represented, as well as several other affiliated groups. More details nearer the time.

Overseas news

G4XKR has been told by Gerry, 5X5GK, that he has official documentation to operate amateur radio equipment as from 28 August 1984 and that his papers are now with the ARRL.

SM5AGM noted the remarks by John Morris, GM4ANB, concerning working "fields" and he is already compiling a list of scores. He started with the vhf bands but now has five calls on his hf list—all Swedish. He would very much like to have UK amateurs taking an interest—and at the same time they could be working towards the new "Field" award issued by SSA and described under "Awards". Please send your scores to Folke Rosvall, Vasterskarsringen 50, S-184 00 Akersberga, Sweden.

Charlie, GW4SBB, of GB4DIS, wrote to G4WMP to describe the difficulties which faced anyone operating from the station on board *HMS Discovery*. The equipment had to be lashed with rope to the operating desk to prevent damage, and many times Charlie had to wedge himself into the corner of a day-couch in rough weather. He had to hold on to something with one hand and hold the mike with the other. As he says: "Using the key in those conditions was entertaining but didn't do the cw quality much good. . ."

VP9HK, pro of the Radio Society of Bermuda, responded to the article "Scouts on the Air" in March *Radio Communication* with a letter which says: "We would like it noted that the RSB has been very active in promoting JOTA and we have now reached the stage where, last year, we ended up with 150 youngsters in camp at the national stadium. The RSB generally has three stations active and allows the young people to speak to their fellow Scouts and Guides throughout the world. We also give a few amateurs a shock when they find that they are speaking to the Chief Scout in Bermuda, namely H E the Governor! While we have not been able to let the Governor send a QSL card, the last amateur did receive a signed photograph. We will be on the bands for the next JOTA, and plans are well under way for what might be a surprise for the rest of the world."

1985 ALL BAND TABLE NO 2

	1·8MHz	3·5MHz	7MHz	14MHz	21MHz	28MHz	Total
G4OTU	29	49	85	109	74	23	362 (all cw)
G3KDB	30	43	71	100	62	21	327 (all cw)
G4OBK	76	39	69	47	33	6	270
G3SXW	—	58	69	84	42	9	262 (all cw)
G4XKR	19	13	25	94	43	5	199
GM3YOR	—	50	84	32	12	5	183 (all cw)
G4GOF	12	17	17	33	33	12	124
G3TXF	—	34	35	31	5	—	105 (all cw)

Band leaders listed in heavy type. Next deadline for 1985 table-scores to reach G3GIQ no later than 15 July please.

10MHz TABLE

	All-time	1985
G3IGW	90	49
G4UZN	67	37
G5LP	36	—
G3UYR	33	—
5B4DN	27	4
G4RWP	4	—

28MHz TABLE

	1985		
G3XQU	- 40	5B4DN	- 10
G4XAH	- 39	GW4TEJ	- 8
G4RAB	- 39 (ssb)	G4YWG	- 7
G4MUW	- 28	G4DXW	- 5
G4NXG/M	- 20	G4RWP	- 5
G4OBK	- 14		

Welcome

To the following who joined the Society during April: DJ6OO, EB5EHX, EI9BTB, IW2BNA, YB2AG, ZC4NL, ZL3AAY, ZS1LS, ZS6CAC and Y Wilen (OH), B Goudie (LU), L Lundin (SM), K Pittendrigh and R M Pittendrigh (CT), B Lecluse and J Nguyen (F) and A Mulhem (A9).

24MHz

Amateurs in the USA have had access to 24MHz from midnight on 22 June. They are permitted to use A1A anywhere in the band (24·890–24·990MHz) and types A3E, F3E, G3E, H3E, J3E, R3E, A3C, F3C, A3F and F3F between 24·93 and 24·24·99MHz. F1B is allowed between 24·89 and 24·93MHz and it is understood that the ARRL will encourage F1B users to confine themselves to 24·92–24·93MHz to follow the Region 2 band plan. In the UK only A1A transmissions are allowed for the time being. The USA is allowing 1500W pep output on the band.

News items

G3DRN has supplied evidence that "G8NV/MM" is not a licensed amateur. Following an enquiry by the Society at the request of G4IEY, the operator admitted that he was first licensed in 1936 but spent so little time in the UK that "there is little point in taking out a UK licence."

G3VIE has been working for a long time to snare a QSL for a contact with AX9RY (Papua) in 1970. After a long search involving Geoff Watts, JH3HPX, SM5CAK and P29JS he managed to establish that the operator's name was Ron Johns and that he left P29 in 1978. He then went through the VK list in the *Callbook* and located, in the second column on the first page, an R L Johns, VK1RJ. A telephone call then revealed that he had found his man! Ron sent a list of some 62 other Gs who worked him and who may need QSLs—these are still available to anyone contacting either VK1RJ or G3VIE.

Norman Wilkinson, A92E (ZS1SS, G4HVT), says that his callsign is being pirated and he is receiving QSLs from Europe for alleged QSOs on 3·5MHz—a band not used by him since MP4BBF days. The pirate is using Norman's name and tends to be active around 2230. A92E retires in

QTH CORNER

ex-A24SC	S Craggs, G0BAU, "Arrochar", High Pit Rd, Cramlington, Northumberland.
CT3EU	D King, G3PFS, PO Box 1, Norwich, NR2 1TL.
CT0BI	CT4UW, J A da Silva Paulo, Circular Norte 13 D-1, P-1800 Lisbon, Portugal.
EL2CJ	Nobuhide Tateyama, JH2QHC, PO Box 45, Moriyama, Japan.
EL2FJ	
DA1WA/HB0	(Europe) DL0LC, H Jakobljevick, am Winberg 10, D-6200 Wiesbaden-Auringen, FR Germany.
PI4HSG/LX	PI4HSG, VERON afd Hunsingo, Box 1166, NL-6801 Arnhem, Netherlands.
ZD9CS	H B Thompson, KA1DE, 15 Crestview St, Keene, NH, 03431, USA.
DL7AH/3X	H Lillenthal, F6DYG, 593 A Ronde des Pietons, Predine 2, F-13800 France.
3X0HAB	H Jakob, DL8CM, Pfarrer Theisstr.4, D-6605 Friedrichstal, FR Germany.
5Z4EXP	DJ5RT, W Ruppert, Riesenkopfweg 7, D-8209 Schloberg Stephanskirchen, FR Germany.
7S1SSA	E Jonsson, SM1ALH, Nygards, S-62016 Ljugarn, Sweden.
7S7SSA	U Sjoden, SM6CVE, Dr Linkskg 6, S-41325 Goteborg, Sweden.
9L1AC	Keith Younger, c/o British High Commission, Freetown, Sierra Leone.

November and will return to Norway where he will be on the air in 1986 with a LA call.

Many will remember Ru, CR7IZ, who was rarely missing from the bands during major cw contests prior to the Portuguese departure from Mozambique. G8FF recently visited the Algarve and visited CT1AIZ to find him still full of youthful enthusiasm. Ru has a special QSL to celebrate his 50 years on the air and on it he says "Thanks for being one of those who made this hobby so enjoyable throughout these years." A fine sentiment. CT1SQ is located at Valverde and is available for use by visiting amateurs but G8FF did not give further details.

Awards

The Field Award

The introduction of the Maidenhead locator system on 1 January has been marked by SSA, the Swedish national amateur radio society, by the issue of this new award to licensed amateurs and listeners who have proof of contacts or reception reports with "fields" since 1 January 1985. There are four classes: Bronze (for 100 fields), Silver (for 200 fields), Gold (for 300 fields) and Platinum (all 324 fields verified). Any bands/modes may be used and no endorsements will be issued. The confirmations must clearly indicate either the field or the latitude and longitude or a place name. Applicants should submit a list of verifications, certified by a national society awards manager (G3KDB for RSGB members) with 30 Swedish crowns, 10 ircs or USA $4. SSA may request a sight of a random sample of verifications. Send applications to: Field Awards Manager, SSA, Ostmarksgatan 43, S-123 42 Farsta, Sweden.

Worked All Jersey Island Award

Issued by the Jersey Amateur Radio Society to licensed amateurs and listeners who have worked/heard a licensed GJ station located in each of the 12 Parishes (St. Helier, St Peter, St Saviour, St Martin, St John, St Lawrence, St Mary, St Brelade, St Ouen, St Clement, Grouville and Trinity). All modes may be used and special endorsements will be issued for all-cw and all-rtty. No contacts with visiting stations may be counted or more than one mobile or portable station. For the hf award, contact with club station GJ3DVC is required, and in this case GJ3DVC is the only station which may be worked QTHR or portable. Listeners must produce evidence of having monitored the requisite number of GJ stations, and their logs should show callsign, operator's name, name of parish, time, frequency and mode, as well as signal report of the GJ and the callsign and signal report of the station being worked. The award will take the form of a parchment certificate, suitable for framing, and will depict the outline of the island of Jersey with each parish and the heraldic arms of the bailiwick. Where possible the certificate will be signed by the operators of the GJs concerned. Send log extracts signed by the applicant and countersigned by a club or society official plus 10 ircs to: Awards manager, JARS, PO Box 338, Jersey, Channel Is.

BYLARA Award

Issued to amateurs who have contacted members of the British Young Ladies ARA. Those in Britain and Europe need 15—at least 10 of whom must be in the UK, and others need 10 including at least six in Britain. Contacts must have been made since 29 April 1979, and yls must have been members of BYLARA at the time of contact. All bands/modes may be used and members count once only. Send log data signed by the applicant to Mrs P J Bell, G4KVR, 11 Ram Gorse, Harlow, Essex CM20 1PX, and enclose a fee of £1.50, 12 ircs, or USA $4. BYLARA members meet on Mondays at 1945 (local time) on 3,690kHz, Tuesdays at 1000 on 7,025kHz (cw), Tuesdays at 2130 on 1,952kHz, and Wednesdays at 1030 on 7,088kHz. The sixth of each month is "YL Activity Day" and they call on the hour on frequencies which end in "88"!

Worked All Zones Award

A reminder that the fee for this award is US $10 or ircs at the rate equivalent to 37c—ie 27p. However, if the applicant is a subscriber to *CQ Magazine* the cost is only US $4 or 11 ircs. The fee for the five-band WAZ plaque is US $60 for both subscribers and non-subscribers, and it can only be applied for when all 200 zones are confirmed.

The Black Country Olympic Award

The West Bromwich CRC is offering this to celebrate the 12th "Black Country Olympics" which took place between 8 and 16 June. It may be obtained by working one club member since 8 June. Send QSO details plus £1.25, eight ircs, or USA $3 to W E Ansell, G1EHD, 117 Oxhill Rd, Birmingham B21 8HB.

WIA 75 Award

Some more information on this award (first mentioned in May MOTA) has arrived from WIA. Amateurs located outside Australia can qualify in three ways: (1) Contact the commemorative station VK75A; (2) Contact a radio amateur who has already qualified for the WIA 75 Award—and record his/her award certificate number; or (3) Contact 75 WIA members, no more than 30 in any one call area, and log their WIA number. Note that listeners may apply by submitting log entries. Claims should consist of log entries plus A$2 and should go to WIA 75 Award Manager, Wireless Institute of Australia, 412 Brunswick St, Fitzroy, 3065, Vic, Australia.

Contests

1985 IARU Radiosport Championship

0000 13 July to 2400 14 July.

1·8 to 146MHz—but not WARC bands. Single-operator, phone, cw, or mixed-mode sections (only 36h operating permitted), multi-operator single-transmitter. Single-operator entrants must have off times of at least 30min, and multi-operator must be mixed-mode only. The latter must remain on a band for at least 10min at a time. Exchange RS/T plus ITU zone (UK is 27). The same station may be worked once per band only and cross-mode QSOs are not permitted. All QSOs within own ITU zone count one point, with own continent but in a different zone three points, and with other continents five points. The multiplier is the number of zones worked on each band added together. Final score is the number of total QSO points times total multiplier points. Entrants are encouraged to use official forms (available from IARU HQ —sae plus ircs please) and logs should show time, band, callsign and complete exchange. Mark multipliers and rest periods clearly. Cross-check (dupe) sheets must be submitted if more than 500 QSOs have been made. Entries must be postmarked before 14 August 1985, and any received after mid-October may miss the printed results list. A certificate will be awarded to the high-scoring cw-only, phone-only, mixed-mode and multi-operator entrant in each ITU zone and DXCC country. Achievement awards will be issued to all who make at least 250 QSOs or who have a multiplier of at least 50. An entry may be disqualified if more than two per cent has to be deducted from the score, and will be disqualified if more than two per cent of duplicates are found. Post entries to IARU Radiosport Championship, IARU, Box AAA, Newington, Conn, 06111, USA.

Colombian Independence Contest

0000 13 July to 2359 14 July

CW and phone. Single-operator single-band cw or phone only, single-operator multi-band cw or phone only, multi-operator single- and multi-transmitter multi-band cw or phone only sections. 1·8 to 28MHz. Exchange RS/T plus serial QSO number (from 001). QSOs with HK stations count 10 points, with stations in one's own country one point, and with others five. Logs should give time, callsign, reports sent and received, if multiplier and points claimed. Separate sheets should be used for each band, and summary sheet sent giving full scoring details and signed declaration. Every station who has made at least 50 QSOs (including 10 with HK) for phone entrants and five with HK for cw entrants will receive a certificate of participation. Mail logs before 30 August to LCRA, c/o Direccion de Concoursos y Diplomas, Apartado Aereo 584, Bogota, Colombia.

CO CEE 86 Contest Award

This contest has been devised by URE to mark the entrance of Spain into the EEC. It will run from 0000 2 July to 30 December on even dates only and excluding Saturdays and Sundays. A maximum of three hours operating time may be used each day. 7 and 14MHz only cw and ssb. Each QSO with Spain counts two points and with stations in the other 11 EEC countries one point. QSOs with one's own country do not count. Only one QSO with any station may be made on one day except by using different bands. Exchange RS/T plus serial QSO number (from 001). Logs must show date, time, band, mode, callsign, numbers sent and received. No more than 10 sheets with errors or more than one repeated QSO on every sheet will be allowed. Logs go (before 30 January 1986) to URE, PO Box 220, 28080 Madrid, Spain. A prize donated by the Spanish Foreign Office will be given to the top score and a medal to the second. Certificates go to everyone obtaining at least one third of the winning score.

Around the bands

No report from G8KG this month but conditions much as forecast. A disappointing feature has been the net of ssb stations (including UK and VK participants) which has been meeting on 10MHz. Some have been decrying the attempts of WIA and RSGB (and incidentally nearly all other societies in the world) to avoid this kind of thing. The attitude seems to be "it's not illegal so we'll do it". A pity—and if 10MHz is lost to the amateur service as a consequence of ill considered usage, we will all be the losers.

The following kindly supplied logs for this month's offering:- G2HKU, G3YY, G5JL, G3s GVV, IGW, KSH, LPS, YRM, GW4BLE, G4EHQ, GM4ELV, G4LRS, G4NXK/M, G4MUW, G4OBK, G4RAB, GW4TEJ, G4s UOL, UYR, UZN, XAH, XKR, and RS 10906.

Stations listed in italics were using A1A.

1·8MHz 0200 *LX1BR, K1ZM, OA4ZV.* **0400** *G3ZGC/J6L.* **0500** *W2-W3.* **2200** *UP3BP, 7S6SAA.*

3·5MHz 0000 *W1BIH/PJ2, UA9MEA, UI8OAA.* **0100** *FM4CX, PZ1AP, TF1PSN, TR8IG.* **0200** *EM9BWL.* **0300** CN2AQ, PY7ZZ, RD6ZM, UL7LCW, UM8TOX. **0500** *ZL3GQ.* **0600** *YN1CC, ZLs 3RK, 4IE, 9Y4GR.* **1900** TA1CT. **2000** 3D6AN. **2100** TL8CK, YB0JG. **2200** *EU7L,* VK6s HD, LK, 9M2EV. **2300** *UA0ALQ, UA0AG/R.*

7MHz 0000 *C31TJ, UW3HY/1, ZS6SARL.* **0100** *CE3HAP, VU2KMK.* **0200** *W8UVZ/J6L, YS1OM.* **0300** *FT5WU, KA 8HOK/VP9.* **0400** *TI4DGA.* **0500** *CE, CO, CX, HP, LU, OA, PY, TI, ZL* (to 0700). **0700** *ZL4AW.* **2200** HH7PV, *OE3HGB/YK.* **2300** *CE4GQS, OX3CX, UH8YAF, UI9AAG, VK6RZ, VU2JVX.*

10MHz 0000 *OY7ML.* **0600** *VK4KS.* **0700** *VK2, 3, 5, 6, ZL4QO.* **0800** *W4, W8. ZL3.* **1000** *W8BPO.* **1500** *VE1BB.* **1800** *ZS, 9J2BO.* **1900** *KF6ME/DU, ZC4HMS, 3D6AK, 4X4WF.* **2000** *J28EI.* **2100** *K1UH, ZS6ARW.* **2200** *G6ZY/EA6, KP4II, N6AR, TI2LK, VK3s, V2A, VP2MDC, 5N6HAS.* **2300** *LU6EF/D, OA4SS, VK6ADL, VP2MDY.*

14MHz. 0100 *FG5DL/FS.* **0600** AL7BL, BY1QH, JT1KAA, KH6, T32AF, V85GA. **0700** FO8LV. **0800** *BY1PK,* FO8DO, FW8AF, KH6AT, *UW3HY/1.* **1000** JW0EQ, UG7GWD. **1200** TZ6WC, VS6DO, 7S0SSA. **1400** JA, JY9VQ, 9V1UD.

1600 TA1A, 1Z9A. **1700** AL7BL, TZ6FE, V85GA, 4S7LG. **1800** *C30LBS*, VQ9CK, 5V7HL, 9M2MM, 9X5MH. **1900** J37AJ, JY9CL, KA1BQ/VP2E, XT2BR. **2000** A71BK, TR8DR. **2100** J6LLO, JAS, JW6VDA, G4EWQ/PJ2, DL7FT/SV9, VP2EZ. **2200** J37AH, T77C, V2A, *VP2E/INL7G*, W6TGI. **2300** C6AEY, VP9CP.

18MHz 0900 *EA7EAB/EA6*. **1200** *LU6EF/D*. **1300** *LU1DZ, TK5EL, Y24DO*. **1400** *SM6LQG/MM* (mid-Atlantic), *DL2GG/YV5*. **1600** *9J2BO*. **1700** *LU1DOW, ZS6BMS*.

21MHz. 0800 *HZ1HZ, JAs, UM8MM*. **1000** FT8XB, JAs, JY5CH, VK9XJ, VS6CT, Z21GN, 3B8CA. **1100** JY9MG, VU2ZR. **1200** *JA*, OD5YU, VQ9CK, YC6RY, 6W3BMF. **1300** J28DN, VU2SUN, ZD8s KM, RN, 5Z4RT. **1400** A4XRS, 5Z4DV, **1500** VQ9s CK, RA, 5N8ZHN, 5R8AL, 5X5GK. **1600** 7P8CI. **1700** VQ9CK. **1800** XT2BR. **1900** D68WB. **2100** WB8YUC/VP5.

24MHz 1200 Europe. **1700** *LU1DOW, 9J2BO*.

28MHz 0600 HA. **1100** A92EM, ZS1DL. **1200** J28EB. **1300** EA6MR. **1400** F6DVA/FH, VU2CVP, ZS5EG. **1500** T77C, TU2LT, VU2GDG, ZS, 5H3QM. **1600** Europeans, LU7DEE, UL8AWE, ZS3CK, 9H1HA. **1700** C53CR, EL2AK, TR8SA, TR8JLD, TZ6FE, ZP5MUO, 6W1MS. **1800** CN8MC, 5B4OK. **1900** OE3HGB/YK. **2000** CE3AUU. **2100** CE, CT3BM, EA8YU, LU, PY. *PZ1DT*. **2200** IT9TVF.

Sincere thanks to the authors of the following for items extracted:- *DX'press* (PA0GAM), *CQ Magazine* (W1WY), *DXNL* (DL3RK), *Long Island DX Bulletin* (W2IYX), *DX News Sheet* (G4DYO), the *Ex-G Radio Club Bulletin* (GI3OEN/W6), *Long Skip* (VE3XN), and the *Lynx DX Group Bulletin* (EA2JG/EA3CBQ).

Please send everything for **August** issue to reach G3FKM no later than **18 July**—thank you!

HF propagation predictions for July 1985

Using the table

The time is presented vertically at two-hour intervals 00(00)gmt to 22(00)gmt for each band, ie ⁰⁄₈ = 0000, ²⁄₈ = 0200, ⁴⁄₈ = 0400 etc.

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

	28MHz				21MHz				14MHz				10MHz				7MHz				3·5MHz			
GMT	000	001	111	122	000	001	111	122	000	001	111	122	000	001	111	122	000	001	111	122	000	001	111	122
	024	680	246	802	024	680	246	802	024	680	246	802	024	680	246	802	024	680	246	802	024	680	246	802
EUROPE																								
Moscow						1		12	12	456	545	785	656	544	445	789	764	222	222	468	43			45
Malta								23	1	466	545	896	745	655	556	789	986	432	223	578	†† 4			24†
Gibraltar								1	1	144	333	684	622	665	555	799	986	543	333	578	†† 4	2		24†
Iceland										13	222	364	623	455	555	678	776	543	333	456	454	2		23
ASIA																								
Osaka									1	233	223	132	1	121	112	363				241				
Hong Kong						1			1	233	334	533	2	11	112	465				253				2
Bangkok						11	1		1	224	335	542	31	1	112	477	2			255				22
Singapore						11			1 1	234	331		31	111	112	21	2			244				23
New Delhi						111	1	3	1 2	223	335	762	521	1	112	477	41			256				24
Teheran						112	1 2	54	114	333	335	786	643	1	112	578	731			256	4			24
Colombo						112	1 2		2	223	335	11	321	1	112	354	51			256	2			24
Bahrain				1		112	112	53	213	322	335	787	753	1	112	578	741			257	4			24
Cyprus				11		233	213	661	425	665	556	898	876	433	334	689	873	11	11	367	†4			35
Aden						112	223	4	313	322	345	766	864	1	12	478	751			257	42			24
OCEANIA																								
Suva (S)									1	222		242	13	421	11	342	1	1		11				
Suva (L)									21	2		44	112	41		142	1	2		12				
Wellington (S)									1 2	2		52	223	42	11	63	1	1		131				
Wellington (L)									31			4	333	2		33	12	2		31				
Sydney (S)									2	441	1	1 3	212	421	12	335		1		252				2
Sydney (L)									41	1		5	321	4		25		2		42				
Perth						121			1 3	453			422	221	1 1	23	21			253				24
Honolulu									1	122	2	321	13	432	112	31	1	2						
AFRICA																								
Seychelles						11	224		3	322	345	5	3	1	112	43	331			255	42			24
Mauritius						112	222		3	434	345	51	1 4	2 1	112	454	612			257	43			24
Nairobi						11	234	5	2	422	345	72	1 5	2	12	463	633			256	54			24
Harare			1	1		112	235	6		543	345	73	5 4	311	112	475	744	1		257	542			24
Capetown						11	221			453	344	3		421	112	41	45	2		242	542			24
Lagos			1	3		1	235	74	11	552	235	781	764	42	2	477	774	2		157	542			24
Ascension Is				2		21	13	75		53	235	783	1	31	2	478	6			156	55			24
Dakar				12		21	123	671	42	353	223	687	874	431	1	378	775	2		146	552			24
Las Palmas				1		22	111	462	621	476	556	799	985	654	333	589	886	421	111	268	†† 3			35
S AMERICA																								
South Shetland							13	1			235	63	1	1	112	463	554	1		146	552			24
Falkland Is							122	52		1	335	68	2	1	112	463	454	2		136	552			3
Rio de Janeiro				12		1	122	572	4	4	333	588	851	11	111	268	774			36	552			3
Buenos Aires				1			122	472	62	3	334	578	874	1 1	111	258	775	2		26	452			3
Lima							111	143	71	121	333	347	873	331	11	15	775	21		2	442			
Bogota								133	61	12	332	246	863	321	11	14	675	21		1	342			
N AMERICA																								
Barbados						1	11	143	71	114	322	257	873	321	1	25	775	21		3	442			
Jamaica								22	61	2	332	236	763	1 1	11	3	475	21		1	242			
Bermuda								12	61	3	322	246	763	121	1	24	575	21		1	242			
New York								1	51	2	222	136	663	112	11	13	475	21		1	42			
Mexico								1	41		232	124	454	1	11	1	155	1			22			
Montreal								1	51	2	222	235	664	212	11	23	364	21		1	42			
Denver									31		111	112	344	2 1	111	1	144	21			2			
Los Angeles									211		12	112	235	31	12	1	24	21			2			
Vancouver									2 1	1	11	112	235	321	112	111	24	21						
Fairbanks									1 1	211	111	111	223	421	112	221	1	2						

The provisional mean sunspot number for April 1985 issued by the Sunspot Index Data Centre, Brussels, was 16·1. The maximum daily sunspot number was 37 on 25 April, and the minimum was 0 on 10, 11, 12, 13, 15, 16 and 17 April. The predicted smoothed sunspot numbers for July, August, September and October are, respectively: (classical method) 17, 15, 14 and 13; (SIDC adjusted values) 15, 12, 9 and 6.

Contest News

144/432MHz Contest results

This was the first major 144/432MHz contest since the introduction of the new locator system, and over 90 percent of stations active throughout Europe gave their new locators correctly. Many operators were not sufficiently familar with the new square numbers to recognize immediately, say, 87 square as being in Scotland. Consequently erroneously-copied locators remained uncorrected in the logs submitted to the adjudicator. Adjudication was more difficult because doubtful locators had to be confirmed; a problem compounded by a few non-contesting stations apparently revising their locator during the event, and by the large number of G stations who seemed to work only those 59 + competitors within a 50km radius of themselves. Over 50 percent of QSOs made by leading stations resulted from calls by stations with serial numbers less than 10.

Propagation on both 144 and 432MHz peaked for short periods to no better than average but, for most of the event, remained decidedly poor. The weather throughout the contest was unkind, ranging from the occasional brighter interval to prolonged cold, wet and windy. Several stations shut down early after enduring a miserable night, and some lost antennas and other equipment in heavy gales.

There were a few complaints of splatter caused by high-powered stations, but none was corroborated. Log-keeping was generally good, and distances were calculated accurately and directly from the locator codes. Stations appeared to be taking more care to ensure the exchange was complete before working the next caller, but there are still too many who adopt a casual attitude towards completing the cover and summary sheets correctly. Discrepancies between the data given on the 427/4422 forms and that exchanged over the air are not uncommon; if detected by the adjudicator this inevitably leads to a significant loss of points. Contestants are slowly getting the message that photocopied real-time logs are not treated sympathetically, so that badly corrected logs in this event were fewer than normal.

The Warrington ARC Contest Group triumphed over the Parallel Lines Contest Group in the multi-operator section, with the Sheppey Western Contest Group a close third from a site in south Wales. Congratulations to all the winners and runners-up, who receive certificates. *G2HIF*

144/432MHz COMBINED RESULTS—MULTI-OPERATOR SECTION

Posn	144MHz	432MHz	Total	Callsign/Group		
1	1,000	1,000	2,000	G4CDA/P;	G4RNL/P	Warrington ARC CG
2	980	987	1,967	G4LIP/P;	G4CLA/P	Parallel Lines CG
3	971	976	1,947	GW4BVY/P;	GW8TFI/P	Sheppey Western CG
4	977	778	1,755	G3EFX/P;	G4JNZ/P	Radio Society of Harrow
5	923	602	1,525	G4DEZ/A;	G4BCH/A	Mudhoppers
6	830	524	1,354	GW4MGR/P;	GW8WDC/P	Wirral & D ARC
7	846	498	1,344	G6EKR/P;	G3LTY/P	East Kent RS
8	816	482	1,298	G6HH/P;	G1HHH/P	Hastings E & RC
9	657	556	1,213	G3PIA/P;	G3NNG/P	Harwell ARS
10	881	113	994	GI4VIP/P;	GI6ATZ/P	South Belfast VHF CG
11	611	379	990	G3FVA/P;	G3UHF/P	South Manchester RC
12	953	17	970	GW3OXD/P;	GW8ABI/P	Albright & Wilson ARS
13	479	415	894	G8ZHP;	G4SIV	Five Bells
14	750	56	806	G3VKC;	G4SAY	University of Kent ARC
15	407	329	736	G1DXY/P;	G1HIL/P	Hillingdon ARC
16	596	129	725	G4NUT;	G3TGE	North Bucks CG
17	410	298	708	G4RFR/P;	G4WHY/P	Flight Refuelling ARC
18	648	1	649	G4WET/P;	G6FDO/P	Triple B CG
19	582	60	642	G4WWD/P;	G4WKY/P	Petersfield Area C T
	455	187	642	G4SSS/P;	G4JKN/P	Exmoor RC
21	521	108	629	G8LNC/P;	G6ISY/P	Victory CG
22	452	117	569	G4CRA/P;	G4TZM/P	Colchester Radio Amateurs
23	403	97	500	GW6GW/P;	GW6BK/P	Blackwood DARS
24	367	132	499	G3WQK/P;	G1KAR/P	Southdown ARS
25	287	206	493	G3WIM/A;	G8WIM	Wimbledon DARS
26	365	89	454	G4VAT/P;	G1IKS/P	Stevenage CG
27	259	188	447	G3IGQ/P;	G4WGE/P	University of Surrey EARS
28	293	146	439	G8ZK/P;	G8IGQ/P	Plessey (Beeston) RC
29	285	111	396	G1KMI/P;	G4JNT/P	Clockwork CG
30	353	32	385	G3IZD/P;	G3IZD/P	South Lakeland ARS
31	182	103	285	GW2OP;	GW4VRO/A	Pembroke DARC
32	212	19	231	G1FKN/A;	G1DXL/A	Eastbourne Electronics ARC
33	213	14	227	G1ELC/P;	G1ELC/P	East Lancashire ARC
34	189	(No 427)	189	G4TBR;	G4KVI/A	A E Carter Group
35	59	108	167	G6BRH/P;	G6CJA/P	Braintree DARS
36	107	57	164	G4HVC/A;	G3TBK	Newark DARC
	77	87	164	G8UUP;	G3UUP	Ealing DARS
38	45	110	155	G6WRS;	G6HYR	North Wakefield RC
39	75	43	118	G2LO;	G4IXT/A	Ariel RG Brookmans Park
40	106	11	117	GM3BSQ/P	GM6MGS/P	Aberdeen ARS
41	66	1	67	G8GIZ/A;	G8GIZ/A	Chester DARC
42	37	13	50	G4XML/P;	G6GVI/P	University of Bristol ARS

144/432MHz COMBINED RESULTS—SINGLE-OPERATOR SECTION

Posn	144MHz	432MHz	Total	Callsign/Operator	
1	1,000	938	1,938	GJ4ICD	Geoff Brown
2	541	1,000	1,541	G4NVA/P	Roger Dyke
3	291	512	803	G3JXN	John Tindle
4	69	489	558	G1INK	S Green
5	454	6	460	G5ECD/P	C L Partington
6	302	48	350	G4VVZ/A	C N Wilson
7	129	159	288	G1DOX	J Acton
8	119	153	272	G1JHC	Colin J Mister
9	107	77	184	GW6ZUQ	D J Gordon
10	96	84	180	G8VPE	John Noy
11	112	16	128	G6HXU	E J Loader
12	79	25	104	G6WKK/PE	Godfrey Hands
13	44	57	101	G6BDV/A	R A Stratford
14	32	33	65	GW1JSH	R D Rowland

Check logs gratefully acknowledged from: G1FBH, G1GII, G1GWS, G2DHV, G4LRS, G6MEN, G6ZSJ, G8CHW and one "no call given".

No summary sheet (form 4422) received from: GM1IHD, G4FOH and G6CSY in the single-operator section and G3GWB/P, G4HRC/P, G6JIM/P, GW4NFD/P, G4PSU/P, G4TBR (432MHz only), G4UHF/P, GW4ULX/P, G8HRC/P and G8KQW/P in the multi-operator section. No cover sheet (form 427) received from G4KVI/A.

144MHz MULTI-OPERATOR SECTION

Posn	Callsign	Score	QSOs	Locator	Best dx	Km
1	G4CDA/P	7,105	847	IO93	DF0CT/P	888
2	G4LIP/P	6,966	630	JO03	OK1KRG/P	928
3	G3EFX/P	6,944	707	IO90	DK4VK	732
4	GW4BVY/P	6,905	762	IO81	DL0BI/P	770
5	GW3OXD/P	6,774	750	IO82	DL8GP	1,071
6	G4DEZ/A	6,556	663	JO01	DK1HO	859
7	GI4VIP/P	6,260	464	IO74	DF0OK	925
8	G6EKR/P	6,009	527	JO01	GI4OUP/P	681
9	GW4MGR/P	5,898	721	IO83	DL8GP	817
10	G6HH/P	5,795	552	JO00	DL1EY	766
11	G3VKC	5,329	543	JO01	GI4OUP/P	675
12	GW4ULX/P	5,306	638	IO81	DF0CT/P	862
13	G4UHF/P	5,059	675	IO91	DH0FAF	709
14	G8KQW/P	4,874	559	JO02	DL8HAA	668
15	G3PIA/P	4,669	664	IO91	GM4SUF/P	710
16	G4WET/P	4,606	650	IO92	DF0CT/P	787
17	G3FVA/P	4,341	656	IO93	FC1EWP/P	801
18	G4NUT	4,232	589	IO92	DL0AB	726
19	G4WWD/P	4,137	606	IO91	DJ3XK/P	779
20	G8LNC/P	3,702	438	IO90	DL6EAM/A	704
21	G8ZHP	3,409	327	IO92	DL0UL/P	844
22	G4SSS/P	3,236	367	IO81	HB9CUA/P	888
23	G4CRA/P	3,193	413	JO01	DL0AB	610
24	G4RFR/P	2,914	338	IO80	DD5AN	778
25	G1DXY/P	2,889	524	IO91	HB9CUA/P	759
26	GW6GW/P	2,867	415	IO81	DL9KBP/P	667
27	G8HRC/P	2,834	270	JO01	HB9MAU/P	655
28	G3WQK/P	2,609	300	JO00	DL0NM	814
29	G4VAT/P	2,595	430	IO92	DK0PS	608
30	G3IDZ/P	2,507	360	IO84	PI4ALK/A	552
31	G8ZK/P	2,080	398	IO92	F6APE	607
32	G3WIM/A	2,041	397	IO91	GI4GVS	744
33	G1KMI/P	2,025	336	IO90	GM3BSQ/P	770
34	G3IGQ/P	1,846	353	IO91	GM3BSQ/P	661
35	G1ELC	1,516	220	IO84	FC1TNB	668
36	G1FKN/A	1,511	251	JO00	GI4VIP/P	582
37	G4TBR	1,347	294	IO91	DF0OK	495
38	GW2OP	1,297	142	IO71	ON7EH	660
39	G4HVC	763	154	IO93	GM1KFS/A	453
40	GM3BSQ/P	757	48	IO87	G6HH/P	716
41	G8UUP	549	121	IO91	DF7DJ	547
42	G2LO	530	116	IO91	DL8GP	573
43	G8GIZ/A	468	132	IO83	ON4ASL/A	525
44	G6BRH/P	407	67	JO01	DK1VC	487
45	G6WRS	320	56	IO93	PA3CNX/A	455
46	G4XML/P	260	50	IO81	GM1KFS/A	604

144MHz SINGLE-OPERATOR SECTION

Posn	Callsign	Score	QSOs	Locator	Best dx	Km
1	GJ4ICD	4,495	374	IN89	DK2PH	809
2	G4NVA/P	2,434	360	IO93	DL8GP	740
3	G5ECD/P	2,042	318	IO84	ON4ASL/P	620
4	GM1IHD	1,836	175	IO86	DL2OM	1,400
5	G4VVZ/A	1,359	291	IO92	GM3ZBE	492
6	G3JXN	1,307	236	IO91	DL0AB	684
7	G1DOX	581	141	IO82	GM3BSQ/P	492
8	G1JHC	533	87	IO82	GM1KFS/A	537
9	G6HXU	506	106	IO83	GJ4ICD	445
10	GW6ZUQ	482	86	IO81	DK1VC	705
11	G8VPE	433	43	JO02	GI4VIP/P	538
12	G6WKK/PE	356	68	JO21	G4RFR/P	523
13	G1INK	312	52	IO82	DF0OK	615
14	G6BDV/A	196	61	IO91	GW2OP	305
15	G6CSY	149	25	JO01	GW4MGR/P	415
16	GW1JSH	146	26	IO81	GM4HAA/P	406

432MHz MULTI-OPERATOR SECTION

Posn	Callsign	Score	QSOs	Locator	Best dx	Km
1	G4RNL/P	2,926	370	IO93	DL0PBW	733
2	G4CLA/P	2,889	294	JO03	FD6HYE/P	868
3	GW8TFI/P	2,856	315	IO81	DF1EQ	707
4	G6JIM/P	2,352	309	JO02	HB9MIN/P	730
5	G4JNZ	2,277	293	IO90	DL9HN	747
6	G4BCH/A	1,761	218	JO01	DL9HN	665
7	G3NNG/P	1,626	252	IO91	DF7KB/P	619
8	GW8WDC/P	1,534	225	IO83	DL2KBB	683
9	G3LTY/P	1,458	170	JO01	DL9HN	646
10	G1HHH/P	1,411	181	JO00	DC8QK	625
11	G4SIV	1,215	139	IO92	DL8QS	621
12	G3UHF/P	1,108	216	IO93	DB2VY/A	734
13	G4HRC/P	1,018	122	JO01	DL6WU	564
14	G1HIL/P	963	195	IO91	DK0WP	584
15	G4WHY/P	873	120	IO80	PE1CJW	622
16	G4PSU/P	652	134	IO91	PE1EWR	474
17	G8WIM	604	170	IO91	GI4GVS	744
18	G4WGE/P	550	162	IO91	GM4HAA/P	501

Posn	Callsign	Score	QSOs	Locator	Best dx	Km
19	G4JKN/P	546	92	IO81	FC1BJD/P	417
20	G3GWB/P	544	137	IO92	DL5EBG	494
21	G8IGQ/P	426	113	IO92	GI6ATZ/P	426
22	G1KAR/P	387	73	JO00	PA0GUS/P	434
23	G3TGE	379	116	IO92	PA0ERW	436
24	G4TZM	341	56	JO01	DL0RBW	528
25	GI6ATZ/P	331	35	IO74	G3LTY/P	592
26	G4JNT/P	327	91	IO90	G4YRC	338
27	G6HYR	322	54	IO93	G1HHH/P	352
28	G6CJA/P	316	44	JO01	DG4FAO/P	569
	G6ISY/P	316	81	IO90	G4YRC	372
30	GW4VRO/A	304	34	IO71	PE0MAR	625
31	GW6BK/P	285	63	IO81	G8VLL	295
32	G1IKS/P	261	72	IO92	G1HGJ	348
33	G3UUP	257	91	IO91	ON4YZ	361
34	G4TBR	209	76	IO91	FC1FEM	365
35	G4WKY/P	176	55	IO91	G6HYR	297
36	G3TBK	166	32	IO93	PI4KGL/A	377
37	G4SAY	165	30	JO01	PA3CNX/A	437
38	G4IXT/A	127	37	IO91	G4NVA/P	202
39	GW4NFD/P	103	29	IO81	G6HKM	233
40	G3IDZ/P	93	25	IO84	G3NNG/P	312
41	G1DXL/A	55	17	JO00	G4CLA/P	250
42	GW8ABI/P	51	13	IO82	G4NVA/P	164
43	G1ELC	43	7	IO84	G4JNZ/P	454
44	G6GVI/P	37	11	IO81	GJ4ICD	246
45	GM6MGS/P	33	5	IO87	G3NNG/P	617
46	G8GIZ/A	1	1	IO83	—	—
	G6FDO/P	1	1	IO92	—	—

432MHz SINGLE-OPERATOR SECTION

Posn	Callsign	Score	QSOs	Locator	Best dx	Km
1	G4NVA/P	785	128	IO93	ON7WR/A	504
2	GJ4ICD	737	66	IN89	DG4FAO/P	768
3	G3JXN	402	110	IO91	DL0UD	520
4	G1INK	384	86	IO82	PA0EZ	511
5	G4FOH	127	28	IO92	PA0EZ	355
6	G1DOX	125	36	IO82	GM4HAA/P	291
7	G1JHC	120	23	IO82	GJ4ICD	334
8	G8VPE	66	8	JO02	GW8WDC/P	327
9	GW6ZUQ	57	15	IO81	G3LTY/P	273
10	G6BDV/A	45	26	IO91	GW8TFI/P	173
11	G4VVZ/A	38	12	IO92	GW8TFI/P	190
12	GW1JSH	26	9	IO81	G4RNL/P	191
13	G6WKK/PE	20	10	JO21	PA0GUS/P	132
14	G6CSY	15	3	JO01	G6WGE/P	186
15	G6HXU	13	9	IO83	G1DOX	60
16	G5ECD/P	5	1	IO84	G4RNL/P	147

144MHz SWL SECTION

Posn	Station	Score	QSOs	Locator	Best dx	Km
1	BRS25429	505	65	IO93FX	ON7EH	532
2	BRS52543	485	76	IO83LT	FC1TNB/P	539
3	BRS28198	433	67	JO00HX	GI4VIP/P	590
4	BRS46296	257	65	IO83WI	FC1TNB/P	406

432MHz SWL SECTION

Posn	Station	Score	QSOs	Locator	Best dx	Km
1	BRS52543	117	21	IO83LT	G1HHH/P	412
2	BRS25429	108	18	IO93FX	G4JNZ/P	358
3	BRS28198	99	21	JO00HX	G4RNL/P	298
4	BRS46296	7	3	IO83WI	GW8WDC/P	—

144/432MHz COMBINED SECTION

Posn	144MHz	432MHz	Total	BRS number/name
1	960	1,000	1,960	BRS52543, Martin Parry
2	1,000	947	1,947	BRS25429, D A Whitaker
3	857	846	1,703	BRS28198, Norman Henbrey
4	128	25	153	BRS46296, Michael Oldham

Town & County Contest 1985 results

This three hour 1·8MHz phone contest held on 16 March, proved to be a popular event, with over 200 different stations appearing in the logs of the 49 entrants. This was almost twice the number of participating stations active in the first contest last year. It is regretted that the non-entrants did not send in their logs for checking, as the logs showed that a number would have made very good scores and several would have been near the top of the list.

The HF Contests Committee was very pleased that there were 10 swl entries, with certificates being awarded to Paul Crankshaw, RS548909, Bob Treacher, RS32525 and Mike Toms, RS31976.

There were a number of comments with the logs, including recommendations to the committee to "leave as is", "no changes please", "just right" and other similar requests. The majority of the logs were first class and only a few lost points, mainly through silly errors in logging or totalling scores; there were several who forgot to do this or claim the county bonus, one station claimed bonus points for every contact, while yet another managed to log two unmarked duplicate contacts. This year, all the erring logs were re-scored, but next year they may not be so lucky!

The next Town & County Contest will be in mid-March 1986, and the committee is hoping that more of those active will take the time to write up their logs and send them for checking—who knows, it might be a winning entry. If this is too much trouble, then photocopy the station log and send it as a check; it will be very helpful for cross-checking the other logs.

G4RWW

TRANSMITTING SECTION

Posn	Callsign	Score	Town	County
1	GW3YDX*	705	Mold	CWD
2	G4CBQ*	654	Derby	DYS
3	GW5NF*	630	Newport	GWT
4	G3SSO	600	Cheltenham	GLS
5	GW4UZL	559	Fishguard	DFD
6	G4WQN	555	Nottingham	NOT
7	GW4IOI	553	Swansea	GNW
8	G4OBK	541	Chorley	LNH
9	G4TGE	521	Barton	HBS
10	G3BPM	469	Crewkerne	SOM
11	G3ZGC/A	460	Newbury	BRK
12	G0AOZ	444	Abingdon	OFE
13	G4JBR	421	South Molton	DVN
14	G4NIF	399	Lydney	GLR
15	G3SWC	391	Horsham	SXW
16	G4MFU	373	Hailsham	SXE
17	G4UMS	371	Stanmore	LDN
18	GW4CQZ	335	Denbigh	CWD
19	G4PDQ	327	Cheltenham	GLR
20	G4UWW	321	Colchester	ESX
21	G4YVQ	315	Blackpool	LNH
22	G3MET	306	Stalybridge	MCH
22	G4RWW	306	Croydon	LDN
24	G4NVA	302	Crewe	CHS
25	G4UHU	288	Maldon	ESX
26	G3CCZ	286	Colchester	ESX
27	G4ELZ	281	Newton Abbot	DVN
28	G3WHK	275	Morden	LDN
29	G4ECI	268	Stockport	MCH
30	G4XDE	262	West Bromwich	WMD
31	G4XEJ	254	Birmingham	WMD
32	G4OYY	245	Axminster	DVN
33	G4YWG	237	Leyland	LNH
34	G4YDG	217	Halifax	YSW
35	G4EBK	177	Grimsby	HBS
36	G2CZH	161	Christchurch	DOR
37	GM3IBU	142	Kirkwall	OKE
38	G3ILO	118	Stroud	GLR
—	G4NMS/A	CK	Southampton	HPH

SWL SECTION

Posn	Station	Score	Posn	Station	Score
1	BRS4B909*	487	6	BRS52543	367
2	BRS32525*	481	7	BRS86204	356
3	BRS31976*	474	8	BRS28198	334
4	G6GWR	388	9	BRS20249	290
5	BRS25429	368	10	G6WZU	244

*Certificate winners

March 432MHz CW Contest

Conditions were poor for this contest, with reports of gale force winds and driving rain, "typical contest conditions" in the words of one entrant. Some found the level of activity poor, but allowing for the weather there was still a worthwhile entry of 19 stations. Some comments are: "An exceptionally interesting and enjoyable event played under normal conditions that provided weak signal operation and a test of operators' skill in winkling them out", *G5UM;* "Activity would improve if a European cw contest similar to the 144MHz Marconi Memorial could be held at the same time; also a move to autumn when conditions are likely to be better", *G4RGK.* Overall, entrants enjoyed the contest, and the level of support justifies its retention in the calendar.

Congratulations to GW4MGR/P, the Wirral & ARC (operator G3UVR) and G4BVY/P, the Sheppey Outcasts Contest Group (operators G4BVY and G4GFX). Both are awarded certificates.

G3FZL

Posn	Callsign	Points	QSOs	Loc	Best dx	Km	Pwr
1	GW4MGR/P	376	45	IO83JA	PA0WWM	525	100
2	G4BVY/P	277	39	IO82LB	PA0FRE	513	100
3	G4WVI	180	24	IO95GB	G4MHF	478	100
4	G4NDG/P	176	23	IO80AQ	G5ECD/P	398	90
5	G3SCZ/P	167	37	IO91IH	PA0WWM	407	50
6	G4WAD/P	163	33	IO92CA	PA0WWM	426	10
7	G3ZME/A	161	26	IO82RR	G4MDZ	314	100
8	G4MHF	160	22	IO90AS	PA0WWM	635	100
9	G2LO	141	34	IO91VR	GW4MGR/P	368	100
	G3NVO	141	31	IO91JK	PE1JSE	404	90
11	G4NOK	140	23	IO93FR	G4MHF	330	10
12	G5UM	138	28	IO92MP	G4WVI	255	10
13	G3WIM/P	137	35	IO91VH	PA0FRE	329	80
14	G4XEN	129	25	IO92PH	G4WVI	310	15
15	G5ECD/P	128	14	IO84KF	G4NDG/P	398	5
16	G4RGK	109	31	IO91ON	PA0WWM	367	80
17	G4WRW	83	17	IO81TK	G4WVI	407	30
18	G3TUX	50	16	IO91PC	G4NDG/P	232	8
19	G4YGW/P	7	7	IO94FV	G4CJG	26	1

70MHz Cumulative Contest 1985 results

This year's 70MHz Cumulatives were enjoyed by all: even the portable stations battling through snow and rain in several of the sessions said they would be back for more! Some of the regular callsigns were noticeable by their absence; it is hoped they will return for 1986 to increase the number of entrants, which was slightly down on last year.

Conditions were generally poor, with only Session 3 bringing any dx and high activity to the band; indeed, the eventual winner accumulated over half his points from this session. Most contestants favoured the regular Sunday morning slot for the cumulatives, with a few asking for seven sessions as in 1984, not the five of this year. Interference from computers and illegal telephones seems to be widespread and increasingly a problem on 70MHz. Congratulations to G4RXD/P, a clear winner, and G3WHK, the runner-up and leading fixed station.

G8TFI

Posn	Callsign	Score	QSOs	QTH	Best dx	Km	Sessions
1	G4RXD/P	622	112	IO83XD	GU2FRO	414	3,4,5
2	G3WHK	521	106	IO91VR	G3FNQ	312	1,3,4
3	G3UKV	513	95	IO82RR	GM4CAZ	358	3,4,5
4	G3BPM	510	66	IO80NV	G4BWW/P	302	1,3,4
5	G4MGR	497	80	IO83KH	G4RIS	360	1,3,5
6	G4FOH	458	97	IO92XI	G3BPM	253	3,4,5
7	G4BWW/P	445	67	IO83QO	G3WBN	320	1,3,4

Posn	Callsign	Score	QSOs	QTH	Best dx	Km	Sessions
8	G4LNV	428	86	IO91MK	G4BWW/P	266	3,4,5
9	G4CIZ	381	63	IO91KI	G3JYK	279	3,4,5
10	G4SEU	335	86	IO92FM	G3YJX	310	2,3
11	G4LRT	251	59	IO92KJ	G3BPM	205	3,4
12	G6CW	216	58	IO92KW	G3BPM	257	2,4,5
13	G4EYD	117	41	IO92AJ	G3WHK	170	1,3,4
14	G4AFJ	111	49	IO92HO	G4ZTR/P	223	1,4,5
15	G5UM	99	40	IO92MP	G3WHK	143	1,2,4
16	G2DHV	12	4	JO01BK	G3XBY	156	1,2,3

Many thanks for checklogs from G4ZTR/P, G5DQA and G3VI.

HF SWL Championship 1984

There was a marginal improvement during 1984 in the number of swl logs received for contests organized by the Society. It was especially pleasing to see two vhf licensees taking part. The HF Contests Committee has recently been encouraged by the response from listeners, and hopes that the trend will continue.

The top three in 1984 were the same as in the previous year. Congratulations are due to John Goodrick, BRS44395.

BRS32525

Posn	Station	7MHz SSB	7MHz CW	T&C SSB	RRU CW	21/28MHz SSB	21MHz CW	Total
1	BRS44395	45	55	15	35	35	80	265
2	BRS1066	-	70	-	50	-	65	185
3	BRS32525	55	-	30	-	80	-	165
4	BRS28198	70	-	25	-	25	-	120
5	BRS52868	-	-	-	30	-	55	85
6	BRS20249	-	-	25	-	45	-	70
7	BRS52543	-	-	-	-	65	-	65
8	BRS26407	-	-	-	-	55	-	55
9	G6XMJ	50	-	-	-	-	-	50
	BRS48909	-	-	50	-	-	-	50
11	BRS84508	-	-	35	-	-	-	35
12	GW8NVN	-	-	10	-	-	-	10

28MHz CW Cumulative Contests—errata

The HF Contests Committee advise the following errors in the results published in the May issue:

1. G4OGB was omitted from the published list of single-operator entrants. His checked score for the best three sessions was 327.

2. G3SDC (Leicester Polytechnic) was shown in the wrong section. Their entry should have appeared in the multi-operator and club sections. They will receive a certificate of merit for their entry.

144MHz Trophy & SWL Contest rules

1400-1400gmt, 7-8 September 1985

The following general rules, published in the "Operating Guide" supplement, *Rad Com* January 1985, will apply: 1, 2, 3, 4f, 5a, 6a, 7a, 9, 10a, 11a, 12b, 13-24.

If the concurrent IARU event is also being entered, please complete an extra cover sheet (form 427), and score contacts in accordance with both rules 7a and 7b. Please do not send entries by recorded delivery. If you need confirmation of receipt, please include a stamped addressed postcard.

The Mitchell-Milling Trophy will be awarded to the leading station in the "All Other Stations" section, and the Thorogood Trophy to the leading single-operator station. Certificates will be awarded to the leading stations in each RSGB zone, and entrants should note their zonal code (see page 517 in this issue) on their cover sheet.

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

RSGB UHF/SHF Contest rules

1400-1400gmt, 5-6 October 1985

Bands: 432MHz to 24GHz

This contest coincides with the IARU Region 1 UHF/SHF Contest. Each band will be tabulated individually and no multipliers will be used. Contestants wishing to enter the IARU contest should clearly state this on the summary sheet (form 4422), and the callsign to be used for the tabulation of overall results should be highlighted. Crossband contacts will not count for points.

The following general rules, published in the "Operating Guide" supplement, *Rad Com* January 1985, will apply: 1, 2, 3, 4f, 5a, 6a, 7b, 9, 10a, 11a, 12b, 13-24. All entries and check logs to: VHF Contests Committee, c/o C Sharpe, G2HIF, 20 Harcourt Road, Wantage, Oxon OX12 7DQ.

70MHz Trophy & SWL Contest rules

0900-1600gmt, 22 September 1985

The following general rules, published in the "Operating Guide" supplement, *Rad Com* January 1985, will apply: 1, 2, 3, 4e, 5a, 6a, 7a, 9, 10a, 11a, 12a, 13-24.

The VHF Managers Trophy will be awarded to the leading station overall.

All entries and check logs to: VHF Contests Committee, c/o G M C Stone, G3FZL, 11 Liphook Crescent, Forest Hill, London SE23 3BN.

IARU Region 1 VHF/UHF/SHF Contest rules

1. Eligible entrants. All licensed amateurs in IARU Region 1 can participate in the contests. Multi-band entries from UK groups competing in the IARU Region 1 UHF/SHF Contest, working from a single location and using one callsign on each band, will be accepted for the "all other stations" section of the contest. The contest entry should show which single callsign should be used in the overall tabulation of the results. Contestants must operate within the letter and spirit of the contest and at no greater power than permitted in the ordinary licences of their country. Stations operating under special high power licences do so *hors concours* and cannot be placed in the contest proper.

2. Contest sections. The contest will comprise two sections for each band:

1. Single-operator station, operated by the owner of the licence (no club stations).

2. All other stations.

3. Dates of contests.

VHF contest: the contest will take place during the weekend of 7 and 8 September 1985 on the 144MHz band.

UHF/SHF contest: The contest will take place during the weekend of 5 and 6 October 1985 on all bands from 432MHz to 24GHz.

4. Duration of contest. The contests will commence at 1400gmt on the Saturday, and end at 1400gmt on the Sunday.

5. Contacts. Each station can be worked only once on each band, whether it is fixed, portable or mobile. If a station is worked again during the same contest, only one contact will count for points, but any duplicate contact should be logged without claim for points and clearly marked as duplicate. Contacts made via active repeaters, translators, eme or meteor scatter do not count for points. Any telephony contacts made with stations generating in the cw (A1A) sub-bands shall not count for points.

6. Type of emission. Contacts may be made on A1A, R3E, J3E, or F3E. F2A may be used above 1GHz. Only one transmitter may be used on each band at any time.

7. Contest exchanges. Code number exchanges during each contact shall consist of the RS or RST report, followed by a serial number commencing at 001 for the first contact on each band, and increasing by one for each successive contact on this band. This must immediately be followed by the locator of the sending station (eg 59 003 JO22PB).

8. Scoring. Points will be scored on the basis of 1 point per kilometre. The final claimed score must be shown on the first sheet.

9. Entries. Entries should be sent to the RSGB VHF Contests Committee, c/o the adjudicator for the RSGB contest on the same date. Separate cover sheets (Form 427) should be completed for the RSGB and IARU events, but common log sheets may be used with both radial ring and points per kilometre scoring shown.

10. Awards. The winner of each section will receive a certificate. The entrants compete for the following challenge trophies:

VHF contest: (a) The IARU Region 1 VHF Trophy, for the winner of the single-operator 144MHz section. (b) The PZK Trophy for the winner of the all other stations 144MHz section.

UHF/SHF contest. (a) The Vittoria Alata Cup 1, for the winner of the single-operator 432MHz section. (b) The Vittoria Alata Cup 2, for the winner of the all other stations 432MHz section.

Overall winner: An overall winner of the IARU Region 1 UHF/SHF Contest will be declared. For this competition the scores of entrants will be combined using the following multipliers:

432MHz	×1
1,296MHz	×5
2,320MHz	×10
Higher bands	×20

The entrant with the highest score will be awarded an IARU Region 1 Medal.

IARU Region 1 VHF/UHF/SHF Listeners Contest rules

The IARU Region 1 VHF/UHF/SHF Contest rules should be used, with the following differences:

1. Eligible entrants. All listeners in Region 1 may take part. Licensed amateurs are not eligible to enter.

2. Contest sections. (a) There will be one section in the September 144MHz contest. (b) There will be one section for each band from 432MHz to 24GHz in the October contest.

5. Reporting. Any station may be logged only once on each band, whether it is fixed, portable, or mobile. CQ or test calls will not count for points and should not be logged. Stations heard via active repeaters, translators, eme or meteor scatter do not count for points. The callsign of the station contacted by the station heard may only appear five times, or if there are more than 100 QSOs logged, only once in every 20 logged contacts.

8. Scoring. Points will be scored on the basis of one point per kilometre between the listener and the station heard.

Ropoco 2 1985 rules

For the first time there will be a trophy awarded in this contest, to the entrant with the highest checked score and most accurate log. This trophy is in memory of the late Edwin Hodson, G3XTJ, a past member of the HF Contests Committee and a dedicated amateur whose philosophy was always to strive for accuracy of logs through accuracy in operation, hence the reason for awarding the trophy to the most accurate log, and not necessarily the winner of the contest.

1. The general rules for RSGB HF contests, as published in "Operating Guide" supplement, *Rad Com* January 1985, will apply.

2. Date and time. 0800-1000gmt Sunday 25 August 1985.

3. Sections. Single-operator entries only. All entrants must be paid-up members of the RSGB resident in the British Isles holding a Class A licence.

4. Band and mode. CW in the 3·5MHz band only. Entrants are requested to confine their operations to 3·520-3·570MHz.

5. Exchange. Send RST plus—for the first contact, entrants own postal code; for the second and subsequent contacts, the postal code received in the previous contact. Contacts with European stations will not count.

6. Scoring. Ten points per contact.

7. Documentation. Entrants are requested to use RSGB hf contest log sheets (HFC1) and the cover sheet (HFC2) which must include the signed declaration stating that the rules and spirit of the contest were observed.

8. Name and address for logs. Logs should be sent to A K Gray, G4DJX, 44 Sherwood Avenue, St Albans, Herts AL4 9PQ.

9. Date for entries. Logs to be postmarked not later than Monday 9 September 1985.

10. Awards. Certificates of merit will be awarded to the first, second, and third placed entrants. The Edwin Hodson G3XTJ Memorial Trophy will be awarded to the entrant with the highest checked score and the most accurate log. This trophy will be awarded only **once** in **10** years to the same station.

Salisbury DF Qualifying Event

Date. 4 August 1985
Map. OS Sheet 184 1:50000 series, Salisbury and the Plain
Assembly. 1300bst for start at 1320bst
Location. Western end of Salisbury Racecourse, two miles south of Wilton, ngr 093285.

Competitors requiring tea should notify Mr A Newman, 74 Victoria Road, Wilton, Salisbury, Wilts SP2 0DY, tel 0722 743837, not later than 28 July 1985.

G T Peck Memorial Trophy, 14 April 1985, DF Contest results

Sixteen teams competed, and the weather was good for df; not too hot and no rain. At that time of year the undergrowth is not very thick, and the usual methods of impediment and concealment must be varied; this year electrical methods were used. Station A, G4MDF/P, was located only 400 yards from the start on the same part of Peppard Common. The signal level had been carefully adjusted to be about the same as that from Station B which was 17 miles away. Station B had a good antenna high up in some tall conifers situated in a piece of woodland close to Farnborough. Many competitors underestimated the distance to Station B and then had the opposite problem with Station A, as intended. All competitors found at least one station, although some spent a long time in the vicinity of Station B because of the problems of rhododendrons and mud.

Tea was taken at the Scout Hut, Crays Pond, where the winner and runner-up gave their versions of the events of the afternoon. The competitors also heard that Eric Mollart was making good progress in hospital after his stroke, and it was hoped that it would not be long before he was again taking part in df competitions.

			Time of arrival	
Position	Competitor	Club	Station A	Station B
1	C Plummer	Mid-Thames	1558	1457
2	M Hawkins	Colchester	1616	1512
3	P Lisle	Mid-Thames	1617	1513
4	G Whenham	Coventry	1624	1506
5=	I Butson	Colchester	1625	1527
5=	T Gage	Mid-Thames	1452	1625
7	B Poole	Mid-Thames	1628	1512·5
8	P Tyler	Mid-Thames	1628·5	1525
9	A Chapman	Mid-Thames	1629	1507
10	D Newman	Slade	-	1528
11	A Williams	Braintree	-	1528·5
12	B Bristow	Mid-Thames	-	1555
13	G Foster	Stratford	-	1557·5
14	N O'Dwyer	Mid-Thames	-	1558
15	F Mepham	Mid-Thames	-	1600
16	A Judd	Mid-Thames	-	1616·5

Oxford DF Qualifying Event results

Eighteen teams assembled at the east end of Shotover Plain, Oxford, for the first national df qualifying event of 1985 on 28 April. Another four teams turned up at the west end, no doubt out of force of habit, but luckily co-ordinator and starter Bill Pechey paid them a visit and gently reminded them of the old engineering adage: when all else fails, read the instructions.

Both stations were operated by veterans of the Oxford df scene, Robin Pearce-Boby, G3JLE, and Peter Bradley, G3UJO. Robin, whose aerial activities are not confined to amateur radio, had previously surveyed his site during a sortie from Enstone Airfield, 26km from the start, and put in a good signal. Peter, who is normally to be found on, in or under water, broke with tradition by choosing a site which was not even damp (well, not very) near Fernham, on the southwest corner of the map. He was 30km away from the start, and the signal was weak but readable. Fifteen teams found both transmitters, and another five showed commendable self-restraint and visited only one. Two competitors failed to find either transmitter. B Bristow and C Plummer qualify for the national final. Tea awaited the competitors at Stanton St John Village Hall, and thanks are due to Doreen Pechey, Jean Hudson (who will be G3UJO/xyl by the time these notes appear), and to Jean's son Harry, who supplied most of the delicacies.

The absence of those doyens of Mid-Thames, Messrs Mollart and North, was noted with sadness, and it was generally agreed that df just wasn't the same without them, and good wishes were sent to them.

			Time of arrival	
Posn	Name	Club	Station A	Station B
1	B Bristow	Mid-Thames	1546	1442·5
2	C Plummer	Mid-Thames	1431	1549·5
3	R Brocks	Chelmsford	1557	1440
4	G Whenham	Coventry	1558	1439·5
5	P Tyler	Mid-Thames	1601	1440·5
6	C Wells	S. Manchester	1605	1454·5
7	D Holland	S. Manchester	1608	1444
8	M Hawkins	Oxford	1503	1609
9	D Newman	Slade	1504	1611·5
10	I Butson	Colchester	1456	1612
11	C Merry	Dartford Heath	1451	1616·5
12	A Judd	Mid-Thames	1617	1453
13	G Foster	SONAADARS	1504	1617·5
14	A Williams	Braintree	1509	1624·5
15	N Woodley	Mid-Thames	1630	1513
16	A Chapman	Mid-Thames	—	1446·5
17	B Mepham	Mid-Thames	—	1457·5
18	T Gage	Mid-Thames	1523	—
19	B Poole	Mid-Thames	—	1601·5
20	M Sheridan	R.S.G.B.	1604	—

Cray Valley RS SWL Contest

7-8 September 1985
Rules from Owen Cross, G4DFI, 28 Garden Avenue, Bexleyheath, Kent DA7 4LF.

Salisbury R&ES 144MHz Contest

18 August 1985
Rules from M E Wright, G4RLF, 27 Bulbridge Road, Wilton, Salisbury, Wilts SP2 0LQ.

BYLARA Contest 1985 results

HF PHONE SECTION

Posn	Callsign	Points	Date	Posn	Callsign	Points	Date
1	G4XRJ/A*	181	210285	17	OH5MX	59	230285
2	G4YLO	150	210285	18	DK1HH	56	230285
3	G4EZI	118	230285	19	G4WWX	55	230285
4	ON4AYL	117	230285	19	G4OUZ	55	230285
5	G4VFC	115	210285	21	GM4UXX	53	230285
6	G4OAT	95	230285	22	DF3BN	50	230285
7	GW4SUE	93	230285	23	G0ALI	46	230285
8	DJ0EK	92	230285	24	DK8WV	42	230285
9	G4HKB	86	230285	25	PA3ADR	41	210285
9	G4KWK	86	210285	26	G4STH	40	230285
11	G4GAJ	82	230285	26	G4RIM	40	210285
11	G5CCI	82	210285	26	PA3CIS	40	230285
13	GM4WEW	80	230285	26	G4OAJ	40	230285
14	G4IAQ	77	230285	30	ON4AGO	39	230285
15	DF4ZX*	68	230285	31	DL3LS	30	210285
16	GM3WFJ*	63	210285	32	DL1RA	25	210285

HF CW SECTION

Posn	Callsign	Points	Date
1	G4FNC	51	230285

SWL SECTION

Posn	Callsign	Points	Date
1	G1DAQ*	41	230285

VHF SECTION

Posn	Callsign	Points	Date	Posn	Callsign	Points	Date
1	G4SPX*	143	230285	10	G4UYL*	88	230285
2	GM4YMM	136	230285	11	G6PFY	87	210285
3	G6MML/P	127	230285	12	G4KWK/P	74	230285
4	GM6KAY	121	230285	13	G4YIR	72	230285
5	G1IRX	116	230285	14	GM4UXX	66	230285
6	G4UNA	114	230285	15	G1HMQ	57	210285
7	G4ZCY	97	230285	16	G4KVR	36	210285
8	G6HKM	95	230285	17	GM6NAA	28	210285
9	G4XRJ	91	230285				

Contests Calendar

May-September	10GHz Cumulatives *(Rules in April issue)*
May-September	Microwave Cumulatives *(Rules in April issue)*
1 July	Canada Day *(Rules in June MOTA)*
6, 7 July	VHF NFD *(Rules in April issue)*
13, 14 July	SWL *(Rules in May issue)*
13, 14 July	1985 IARU Radiosport Championship *(Rules in July MOTA)*
13, 14 July	Colombian Independence *(Rules in July MOTA)*
14 July	DF Qualifying Event, Mid-Thames *(Details in June issue)*
21 July	Low Power Field Day *(Rules in June issue)*
27 July	432MHz Low Power *(Rules in June issue)*
28 July	144MHz Low Power *(Rules in June issue)*
4 August	3·5 Hopscotch *(Rules in June issue)*
4 August	DF Qualifying Event, Salisbury *(Details in July issue)*
18 August	1,296/2,320MHz *(Rules in June issue)*
18 August	DF Qualifying Event, Coventry
25 August	ROPOCO 2 *(Rules in July issue)*
25 August	GARTG-RTTY 1985 *(Rules in April* MOTA)
7, 8 September	IARU Region 1 HF Phone FD *(Rules in August issue)*
7, 8 September	144MHz Trophy and IARU *(Rules in July issue)*
8 September	DF Qualifying Event, Slade
2, 10, 18, 26 September	28MHz Phone Cumulative
14/15 September	International ATV *(Rules in April issue)*
22 September	70MHz Trophy *(Rules in July issue)*
29 September	DF National Final, Northampton
5, 6 October	432MHz–24GHz and IARU *(Rules in July issue)*
5, 6 October	GARTG-SSTV 1985 *(Rules in April* MOTA)
8 October	432MHz Cumulative
12 October	GARTG-RTTY 1985 *(Rules in April* MOTA)
12 October	DF Double Night Event, Slade
13 October	21/28MHz Phone *(Rules in May issue)*
16 October	1,296/2,320MHz Cumulative
20 October	21MHz CW *(Rules in May issue)*
24 October	432MHz Cumulative
26 October	DF Treble Night Event, Mid-Thames
27 October	70MHz Fixed
1, 17 November	1,296/2,320MHz Cumulative
2, 3 November	144MHz CW
3 November	WAB CW *(Rules in February* MOTA)
9, 25 November	432MHz Cumulative
9, 10 November	2nd 1·8MHz
11, 19, 27 November; 5, 13 December	28MHz CW Cumulative
1 December	144MHz Fixed
3, 19 December	1,296/2,320MHz Cumulatives
11 December	432MHz Cumulative
15 December	70MHz CW

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, plus basic unchanged information on other affiliated organizations which was last published in the **January 1985** issue. Unchanged details will be published again in **January 1986.**

RSGB affiliated organizations are requested to report all programmes and new items to their regional representatives regularly. Information for inclusion in the **September** issue should reach them by **8 July** and for the **October** issue by **16 August.**

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 B Donn, G3XSN, 7 Thurne Way, Liverpool L25 4SQ. Tel 051-722 3644.

Accrington (NW) Repeater Group—Third Thursday in each month, 8pm. Globe Bowling Club, Willow Lane, Accrington. Sec G6IKK.

Ainsdale (AARC)—8pm. Scout HQ, Marine Drive, Southport. Sec G4TUP, tel 35947.

Barnoldswick (Rolls-Royce ARC)—First Wednesday in each month, 8pm. Sports & Social Club. Sec G4ILG, tel 0282 812288.

Barrow (South Lakeland ARS)—First Tuesday and third Thursday in each month, 8pm. NORWEB Sports & Social Club. 6 July (VHF NFD), 18 July (Talk/demo, "How videos work", G8JAG). Sec G6LKB, tel 0229 54982.

Blackburn (ELARC)—2 July (Official club fox-hunt), 30 July (Informal). 7.30pm. Conservative Club, Cliffe Street, Rishton. PRO G6LXU, tel Great Harwood 887385.

Bolton (B&DARS)—Wednesday, 8pm. Horwich Leisure, Horwich. Chairman, tel Bolton 791918.

Bury (BRS)—2 July (Surplus sale). Tuesdays, 8pm. Mosses Centre, Cecil St, Bury. Sec G6PSM.

Carlisle (C&DARS)—Mondays, 7pm. The Scout Hut, Trinity School, Strand Rd, Carlisle. Sec G4ISS, tel 45182.

Chester (C&DARS)—5, 6, 7 July (Special event station GB4CSB), 9 July (Surplus sale), 16 July (Treasure hunt 7pm, from Rugby Club), 23 July (Talk, "DX trip to the Orkneys"), 30 July (Club on the air). 8pm. Rugby Club, Hare Lane, Vicars Cross, Chester. Contact G4EZO, tel Chester 40055.

Crewe (South Cheshire ARS)—Second and fourth Mondays in each month, 8pm. Victoria Club, Gatefield St, Crewe. PRO Chris Wiseman.

Darwen (DARC)—Second Tuesday in each month, 7.30pm. Albion Hotel, Railway Rd, Darwen. Contact G2AKK.

Eccles (E&DARS)—Tuesdays, 9.30pm. Duke of York Hotel, Church St, Eccles. Sec G8KRG, tel 061-773 7899.

Ellesmere Port (EP&DARS)—Contact G4STZ, tel 051-339 7201.

Fylde (FARS)—2 July (Equipment construction competition), 16 July (Visit to Police HQ, Hutton). 7.45pm. Kite Club, Blackpool Airport. Sec G8GG, tel 725717.

Isle of Man (IoMARS)—Mondays, 8pm. Howstrake Hotel, Harbour Rd, Onchan. Sec GD4GWQ, tel 0624 22295.

Kendal (Westmorland RS)—Second Tuesday in each month, 8pm. Strickland Arms, Sizergh, Nr Kendal. Sec G1IIE, tel 0539 28491.

Liverpool (L&DARS)—Tuesdays, 8pm. Churchill Conservative Club, Church Rd, Wavertree, Liverpool 15. 2 July (Bring & buy sale), 9 July (DF aerials), 11 July (Fox hunt), 23 July (Open night), 30 July (Crime prevention, Merseyside Police). Sec G6XBK, tel 051-427 8557.

Liverpool (Sefton ARC)—Every other Wednesday, 8pm. Liverpool Prison Officers Club, Hornby Place, Walton. PRO G1HDU, tel 051-525 6152.

Liverpool (UARS)—Thursdays, 12.30pm. In Shack at top of the Old Union, 2 Bedford Street North. Contact G1KNM, tel 051-724 2522/3878.

Manchester (UMIST RS)—Meetings most lunchtimes, Wednesday afternoons and every Thursday, 8.30pm. Union Bar. Contact G4SLV, G6HZO or G6HEH, c/o G3CXX, tel 061-236 9114.

Manchester (MUARS)—Informal meetings most lunch times and Wednesday afternoons. Sec G1MUR, tel 061-225 5202.

Manchester (SMRC)—8pm. Sale Moor Community Centre, Norris Road, Sale. Sec G3WFT, tel 061-973 1837.

Manchester (West MRC)—Wednesdays, 8pm. Astley & Tyldesley Miners Welfare, Meanly Road, Gin Pit Village, Astley, Tyldesley. Contact G6YIO.

Oldham (OARC)—Thursdays, 8.30pm. Conservative Club, Ripponden Road, Oldham. Sec G4SPX, tel 061-652 8862.

Ormskirk (O&DARC)—First Thursday in each month, 8pm. Ormskirk Community Centre. Contact G1KDF, tel 44-74868.

Penrith (Eden Valley RS)—Third Thursday in each month, 7.30pm. Kings Arms, Temple Sowerby, Penrith. Sec G1FBD, tel 0768 88260.

Preston (PARS)—4 July (Preparations for VHF NFD and natter), 18 July (Informal). 8pm. Lonsdale Club, Fulwood Hall Lane, Fulwood, Preston. Sec G3ZXC, tel 0772 718175.

Rossendale (RVARC)—Thursdays, 8pm. Bishop Blaize Hotel, A56 in Rawtenstall. Sec G1EIU, tel 0706 214411.

St Helens (St H&DARC)—Thursday evenings. St Helens Information Technology Centre (I.T.E.C.), Waterloo St, St. Helens. Sec G1GNS, tel 092 572 6821.

Skelmersdale (S&DARS)—Thursdays, 8pm. Beacon Park Golf Club. Sec G4ZPY, tel 0704 894299.

Stockport (SRS)—Second and fourth Wednesdays in each month, 8pm. Magnet Inn, Wellington Rd, Stockport. Sec G4FFW, tel 061-224 7880.

Tarporley (Mid-Cheshire ARS)—Wednesdays, 8pm. Cotebrook Village Hall, Sadlers Lane off the A49, Tarporley. Sec G4VOH, tel Winsford 4719.

Thornton Cleveleys (TCARS)—Mondays, 7.30pm. Norbeck 1st Scout Hut, Carr Rd, Bispham. Sec G4WIC, tel 0253 821 827.

Warrington (WARC)—Tuesdays, 7.30pm. Grappenhall Community Centre, Bell House Lane, Warrington. Sec G8HLZ, tel 0925 814740.

Wigan (DVARS)—First and third Thursdays in each month, 8pm. Shevington Conservative Club, Shevington. Sec G4XMG.

Wirral (WARS)—First and third Wednesdays in each month, 8pm. Heswall Parish Church Hall, Heswall. 3 July (Surplus sale), 17 July (Problems night). Sec G4KPY, tel 051-625 7311.

Wirral (W&DARC)—3 July (Annual Bar-B-Que on Heswall Shore from 8pm, till late), 6/7 July (VHF NFD), 10 July ("Raynet", G4EFP and G8RXB), 14 July (DF hunt No4, 2.30pm, Heswall lay-by), 17 July (D&W at The Lighthouse, Wallasey), 24 July (TBA), 27/28 July (432/144MHz low power contest), 31 July (The revenge df hunt for the G8PMF Rose Bowl, Book in by 7.50pm for 8pm start from Heswall lay-by). 8pm. Irby Cricket Club, Mill Hill Rd, Irby. Sec G8TRY, tel 051-630 1393 or 227 1018.

Wirral Raynet—First Thursday in each month, 7.30pm. YMCA, Whetstone Lane, Birkenhead. Net nights on 10/20/30 of each month on S8 from 8pm. Contact G4EFP controller or PRO G6FNF, tel 051-653 4067.

I would like to thank St Helens DARC for their kind hospitality during my visit in April and to wish them well in their new premises. Also my thanks to Fylde ARS for their enthusiastic welcome during my visit in May. Keep up the good work.

RR1

Region 2—RR P R Sheppard, G4EJP, 9 Elvington Crescent, Leconfield, N Humberside HU17 7LX.

Area representatives

Huddersfield	J Clegg, G3FQH
Hull	S A Berry, G4IWR
Leeds North	P Gilson, G3WSZ
Leeds South & Morley	S Thompson, G4RCH
Mexborough & District	M J Valentine
York	K R Cass, G3WVO

Will all club representatives please contact RR2 soonest with details of your club news, events and meetings to offer your activities the maximum publicity.

Goole R&ES, which staged an epic round-Britain trip during the first weekend of May, raised more than £700 for charity, besides activating some of the mainland's remotest squares. Steve Anderson, G6VBU,; Geoff Cowling, G8ERX; Richard Sugden, G8IOH; Ray Thornton, G6KCE; and Dennis Lockwood, G6REL covered 2,274 miles in a new Renault 5 TSE, shown above, made available by the French car manufacturer. It took them just 52·5 h to travel from Goole to Goole via Dunnet Head (the furthest north), Ardnamurchan Point (west), the Lizard (south) and Lowestoft ness (east). In all, 150 other stations were contacted by G8HSG/M—or GM8HSG/M—although 144MHz activity on both fm and ssb was disappointingly low for parts of the journey.

Goole (GR&ES)—Tuesdays, 7.45pm. Goole Junior Chambers, Boothferry Rd, Goole. 6, 7 July (VHF NFD), 9 July (Contest de-brief), 16 July ("The early days", G6KHZ), 23 July (Computing). Details G8VHL or G8IOH.

York (YARS)—Fridays, 7.30pm. United Services Club, 61 Micklegate, York. At the recent home-brew night, G3EMA gained the G4INY Memorial

Trophy with his transceiver. See G3WVO.

The first Humberside Radio Rendezvous, organized by the Scunthorpe ARC, was successfully staged on 28 April. Most visitors agreed that the rendezvous formula provided much more of interest than is found at the usual rally.

A fun-feature was the All-Britain Left-foot CW Contest, devised by G4GZB (Barnum) and assisted by G3RRL (Bailey). The competition to become the first holder of the LFCW Trophy was most intense. Contenders, using the specially-designed left-foot keying device, were invited to send a short sentence with speed and accuracy. A good "foot" ahead of the rest was Keith, G3IGU, who is shown here holding the trophy and being congratulated by Marjorie G4YLM.

Fees and donations enabled the club to hand over the sum of £25 to the Guide Dogs for the Blind Fund. Photo: G3RRL.

REGION 3—RR G Ross, G8MWR, 81 Ringwood Highway, Coventry CV2 2GT. Tel 0203 616941.

Area representatives

N Read, G8CXL	Warwick
I Hopwood, G3CWK	Stratford
M Henley, G3OQO	Rugby
B Jones, G8ASO	Worcester
L Craven, G4EQI	S Birmingham
J K Harvey, G4IVJ	S W Birmingham
S H Jesson, G4CNY	Hereford
D Bushell, G4WAD	Evesham

This listing contains all the information that I currently hold. If your club programme of events does not appear then please chase up the committee. You can now send your information to me via Prestel, (Prestel 203616941).

Ariel Radio Group—Club for BBC personnel only. Contact G3DEF or G3PGG.

Atherstone (AARC)—Second and third Mondays in each month. Tudor Centre, Coleshill Rd, Atherstone. Sec G6BEO, tel (0455) 212051.

Birmingham (Aston RS)—Lunch time Monday

and Friday. This club has been reorganized and now has a permanent shack with two 80ft masts located 135ft above ground. Sec G1KTH, tel 021-359 3611 ext 5115.

Birmingham (Midland ARS)—294a Broad St, Birmingham B1 2DS. Every Monday, construction night. First Tuesday in each month, committee meeting. Second Tuesday, computer night. Third Tuesday, lecture. Fourth Tuesday, Raynet group meetings. Wednesdays, morse and natter night. Thursdays, night on the air. Fridays, RAE class. Weekends, contests. Sec G8BHE, tel 021-422 9787.

Birmingham (Slade RS)—First Friday in each month, 7.45pm. Community Centre, 75 Kingsbury Rd, Erdington, Birmingham. Sec G4FGF, tel 021-770 3474.

Birmingham (South RS)—7.45pm. Hampstead House, Fairfax Rd, West Heath, Birmingham. Sec Tim Scrimshaw, 10 Somerdale Rd, Birmingham B31 2EG.

Birmingham (UoBARS)—Every day, 1pm. Fridays, club night. Tuesdays, RAE classes. 7.30pm. Club room, Second floor, Union Buildings. (Midland Bank entrance and follow signs). Various activities for students and visitors. Sec GW4YEG.

Bridgnorth (Severn RS)—Sec E Churchyard, 11 Greenfields Drive, Bridgnorth.

Bromsgrove (BARS)—8pm. British Legion Club Bromsgrove. Regular morse classes open to all. Sec N Westwood.

Bromsgrove (BARS)—8pm. Avoncroft Arts Centre, Bromsgrove. Club net Wednesdays 144·850MHz. Sec G6EAM, tel Kingswinford (549) 298580.

Burton on Trent (B-on-T & DARS)—Wednesdays, 8pm. Stapenhill Institute, Main St, Stapenhill. Sec G4HBY, tel 0283 62344.

Cannock Chase (CCARS)—Thursdays, 8pm. Bridgetown War Memorial Club, Union St, Bridgetown, Nr Cannock. Sec G8HZP, tel (0922) 416419.

Coventry (CARS)—Fridays, 8pm. Scout HQ, 121 St Nicholas St, Radford, Coventry. 5 July (Treasure hunt and barbeque), 12, 19, 26 July (Open night). Sec G4JDO, tel 73999.

Coventry (CTCARS)—Mondays, 7pm. Room E17 Wynfray Building, Technical College, Coventry.

Droitwich (DARC)—Second and fourth Mondays in each month, 8pm. Scout HQ, Droitwich, 8 July ("Using the oscilloscope", G3LBS). Sec G4HFP, tel (02993) 3818.

Dudley (DARC)—Mondays, 7.45pm. Allied Centre, Greenman Alley, off Tower St, Dudley. Sec G4NRA, tel (0384) 278300.

Evesham (BBB Contest Group)—Private club, contest working only. Sec G4WAD, tel (0386) 6246.

Halesowen (MEB Sports & Social Club RC)—8pm. MEB Social club, Mucklow Hill, Halesowen. 9 July (Space shuttle and Oscar 10 video), 23 July (General meeting). Sec G4RWH, tel 021-747 8784.

Hereford (HARS)—8pm. Old Gaol, Gaol St, Hereford. Sec G3WRQ, tel (0432) 54064.

Keele University (UoKARS)—No details available.

Kidderminster (K&D ARC)—Tuesdays fortnightly, 8pm. Aggborough Community centre, Hoo Rd, Kidderminster. 3 July (Committee meeting), 9 July ("Radio on the Burma Railway", G3BA). Sec G8WDX, tel (0562) 751584.

Lichfield (Lichfield Chad RC)—Mondays, 8.30pm. Naval Club, Burton Old Rd, Lichfield. Sec G4ESK, tel 23919.

Malvern Hills (MHARC)—Second Tuesday in each month, 8pm. Red Lion Inn, St Anne's Rd, Malvern. 9 July (RSRE video show) (Droitwich Rally). Sec G4TXG, tel Malvern 65802.

Much Wenlock (Wenlock ARES)—Second and fourth Mondays in each month, 8pm. Raven Hotel, Much Wenlock. Sec G3ZSL, tel (07462 861332).

North Staffs (NSARC)—8pm. Harold Clowes Community Centre, Dawlish Rd, Bentilee, Stoke-on-Trent. Sec G6MLI, tel 0782 332657.

Redditch (RARC)—8pm. WRVS Centre, Ludlow Rd, Redditch. Sec G3EVT, tel (0789) 762041.

Rugby (RATS)—7.30pm. Cricket Pavilion, "B" entrance. Rugby radio station. 2 July (DF hunt). Sec G4TWH.

Shropshire (Salop ARS)—Thursdays, 8pm. Old Bucks Head, Frankwell, Shrewsbury. Sec G6DQY Perry Willows, Yeaton, Bashchurch, Shrewsbury SY4 2HY.

Solihull (SARS)—Third Tuesday in each month, 7.30pm. Manor House, High St, Solihull. Sec G8AYY, tel 021-783 2996.

Solihull Contest Group—Sec G4PYR, 107 Swallows Meadow, Shirley, Solihull.

Stafford (S&D ARS)—Tuesdays, 8pm. Coach and Horses, Pasturefields, Staffs. Morse classes every Tuesday. Sec G4RWQ, tel (0785) 714963.

Jack Hum, G5UM, (l) congratulating Duncan Walters, G4DFV, one of the winners of the Mansfield ARS construction competition which was judged by G5UM and Brian Povoas, G4FZL, (r). *Photo:* G4SVU.

Stoke on Trent (S-onTARS)—Thursday, 7.30pm. The Cottage, 2A Racecourse Rd, Oakhill, Stoke-on-Trent. Sec G4IMV, tel 0762 613207.

Stourbridge (SARS)—First and third Mondays in each month, 8pm. Robin Woods Centre, School St, off Enville St, Stourbridge. 1 July (Constructors night). Sec G8JTL, tel Lye 4013.

Stratford-upon-Avon (SuA & DARC)—Second and fourth Mondays in each month, 7.30pm. Control tower, Radio station, Bearley, Nr Stratford. 8 July ("RTTY and Amtor", G3WHO), 22 July (Technical topics). Sec G8OVC, tel S on A 750584.

Sutton Coldfield (SCARS)—Second and fourth Mondays in each month, 7.30pm. Public Library, Sainsbury Centre, Sutton Coldfield. Sec G3CNV, tel 021-354 4369.

Tamworth (TARS)—Mondays, 8pm. Rugby Club, Cotton Green, Tamworth. Sec G4SRI, tel 0827 68137.

Telford (T&DARS)—3 July (Planning for VHF NFD). Sec G6XUF, tel 0952 770568.

Tenbury (TARS)—Thursdays, 7.45pm. The Barn, Pool House, Hanley Childe, Tenbury Wells. Sec G6PQX, tel (08854) 274.

Walsall (WARS)—Wednesdays, 8pm. Forest Comprehensive School, Bloxwich. A lot of activities are planned, please join in. Sec GI6HZI, tel 0922 32607.

Warwick (Mid-WARS)—Second and fourth Tuesdays in each month, 8pm. 61 Emscote Rd, Warwick. 9 July (Fox hunt), 23 July (No meeting). Sec G8MFP, tel 0203 542877.

Warwick University (WUARC)—No details since 1977 (Come back all is forgiven!).

Wells Krautkramer (WKARC)—Private club. No details.

West Bromwich (WBARC)—Sundays, 8pm. Hop and Barleycorn, Dartmouth St, West Bromwich. Sec G6ZLW, tel 021-553 0531.

West Midlands Police (ARC)—This is a new club in the area. Sec D Mytton, tel 021-458 3236.

Willenhall (W&DARS)—Wednesdays, 8pm. Cross Keys, Willenhall. Sec G4LWI, tel (0902) 782036.

Wolverhampton (WARS)—Tuesdays, 8pm. Electricity Sports Club, St Mark's Rd, Chapel Ash, Wolverhampton. 2 July (Visit to Wolverhampton Telephone Exchange), 9 July ("Whats so bad about cb?", G8YFA), 16 July ("RTTY and Amtor", G1DIL), 23 July (Discussion group and NOTA), 30 July (Committee meeting).

Worcester (W&DARC)—8pm. Oddfellows Club, New St, Worcester. Informal meetings are held at the Old Pheasant, New Street. 1 July (Natter night), 15 July (Informal meeting). Sec G4RBD, 14 Oakleigh Heath, Hallow, Worcester.

Worcester Moonbounce Society—No regular meetings. Sec P Crosland, tel (0905) 620041.

Wordsley (WRC)—8pm. Vine Inn, Camp Hill, Wordsley. Sec G4VJU.

Wythall (WARC)—Tuesdays, 7.30pm. Community Centre, Silver St, Wythall. Sec G4SMA, tel 021-444 2427.

REGION 4—RR M Shardlow, G3SZJ, 19 Portreath Drive, Darley Abbey DE3 2BJ. Tel Derby (0332) 556875.

Bolsover (BARS)—Wednesdays 7.30pm. The Angel Hotel, Bolsover. Sec N G Herrington c/o G4AGE.

Buxton (BARS)—9 July (TBA), 23 July (Rally group AGM) 8pm. Haddon Hall Hotel, London Road, Buxton. Sec DX G6MIF. tel Buxton 6174.

Buxton (BD&RC)—Information from G6ZHS.

Derby (D&DARS)—Wednesdays. 3 July (Junk sale, 7.30pm) 119 Green Lane, Derby. Sec G4EYM, tel Derby 556875.

Derby (NHARG)—Fridays, 7.45pm. Nunsfield House, Boulton Lane, Alvaston, Derby. 5 July (Final prep VHF NFD). Sec G4PZY, tel Derby 767994.

Eastwood (Notts & Derby Border ARC)—Tuesdays, 7.30pm. Hand in Hart Hotel, Cotmanhay. Sec G4UFC, tel Ilkeston 302990.

Grantham (GRC)—16 July ("Fire" G4VUA), 8pm. Shirley Croft Hotel, Harrowby Rd, Grantham. Sec John Kirton, tel Grantham 65743.

Grimsby (GARS)—11 July (Treasure hunt), 25 July ("Broadcast band" S W Ling), 7.30pm. Cromwell Social Club Cromwell Rd, Grimsby. Sec G4EBK, tel Grimsby 887720.

Heanor (SE Derbyshire ARS)—Tuesdays during term, 7.30pm. South East Derbyshire College, Ilkeston Road, Heanor. Sec G8RZM.

Hinckley (HARES)—Second Wednesday in each month, 7.30pm. John Cleveland College, Butts Lane, Hinckley. Sec G8STX, tel Hinckley 632778.

Leicester (LRS)—Sundays, 10.30am, Mondays 7.30pm. Gilroes Cottage, off Groby Road, Leicester. Sec G4PDZ, tel Leicester 871086.

Leicester (Wigston ARC)—Fridays 7.30pm. United Reform Church, Wigston. Sec G6HAJ, tel Leicester 403107.

Lincoln (LSWC)—Wednesdays, 8pm. City Engineers Club, Waterside South, Lincoln. Sec G4STO, tel Gainsborough 788356.

Loughborough (L Falcon ARC)—Fridays, 8pm. Brush Sports and Social Club, Fennal Street, Loughborough. Sec G4RVW, tel Quorn 412043.

Mansfield (MARS)—First Friday and third Tuesday in each month. Victoria Social Club, Princes Street, Mansfield. Sec G1DZH.

Mansfield (Central Notts VHF Group)—Information from G8UYD, tel Mansfield 652093.

Market Harborough (Welland Vally ARS)—Mondays, 7.15pm. Welland Park Community College, Market Harborough. Sec G3LSL, tel Market Harborough 880746.

Melton Mowbray (MMARS)—Third Friday in each month, St John Ambulance Hall, Asfordby Hill, Melton Mowbray. Sec G3NVK, tel Melton Mowbray 63369.

Newark (N&DARC)—4 July ("Weather satellites", B Dury), 21 July (DF hunt-picnic). 7.30pm. Palace Theatre Appleton Gate, Newark. Sec G4SDZ.

Nottingham (Plessey (Beeston) ARS)—Thursdays 8pm. Plessey Communications, Beeston, Nottingham. Sec G4VFK, tel Nottingham 226321

Nottingham (ARCON)—4 July (VHF NFD prep & forum), 11 July (144MHz fox hunt), 18 July ("Calibration", G4IRX), 25 July (144MHz fox hunt), 1 Aug (Activity night), 7.30pm. Woodthorpe House, Mansfield Road, Nottingham. Sec G4JAE, tel Nottingham 232604

Ollerton (Dukeries ARS)—Sundays, 2pm. The Labour Hall, New Ollerton. Sec Gladys Jones. 102 Newark Road, New Ollerton Nottingham.

Ollerton (Robin Hood ARS)—Fridays, 8pm. White Hart Hotel, Ollerton. Sec G6VGN.

Scunthorpe (S&DARC)—Tuesdays, 8pm. Grange Farm Hobbies Centre, Franklin Cres, Scunthorpe. Sec G4ZGJ, tel Scunthorpe 732268.

Skegness (S&DARS)—First Friday in each month, 7.30pm. White Swan, Burgh Le Marsh, Skegness. Sec G6HYF.

Spalding (SADARS)—12 July (DF hunt) 7.30pm The Ship Albion, Spalding. Sec G4ZGT, tel Spalding 2781.

Stamford (SADARC)—Wednesdays, twice monthly. 13 July (Stamford festival, special event station,) 20 July (Grand family barbeque and junk sale, G3HCQ at Collyweston). Sec G4OSM, tel Stamford 54433.

Workshop (WARS)—Thursdays, 7.30pm. The Unicorn Hotel, Bridge Street, Workshop, Sec G4ZUN, tel Workshop 486614.

REGION 5—RR J S Allen, G3DOT, 77 Rosslyn Crescent, Luton LU3 2AT. Tel 0582 508515 or at work on 0582 21151.

Bedford (B&DARC)—Wednesdays, 7.30pm. Queens Engineering Works Social Club, Hurst Grove, Bedford. Sec G8ATI, tel 0234 854881.

Bedford (Modern School ARC)—Details Sec P A J Worden, c/o G1BYT, BMSARC, Manton Lane, Bedford MK41 7NT.

Cambridge (C&DARC)—5 July (Homemade printed circuit boards), 6, 7 July (VHF NFD), 12 July (Informal evening including operation of the club station), 19 July ("The latest developments in telecommunications", G4HCL), 26 July (Informal evening). 7.15pm. Coleridge Community College, Radegund Road, Cambridge. Sec G4TRO, tel 0223 353664.

Dunstable (DDownsRC)—5 July (Junk sale), 6, 7 July (VHF NFD), 19 July ("A-wash in Norfolk", G0ALB), 27, 28 July (144 & 432MHz Low Power Contest). 8pm. Chews House, Room 3, High St, Dunstable, Beds. Sec G6EES, tel Dunstable 607623.

Kent Process Controls (ARC)—Club in abeyance, awaiting for better premises and more members. Sec G3DOT.

Leighton Buzzard (Leighton Linsdale RC)—First and third Mondays in each month (except during school holidays), 7.30pm. Room A64, Vandyke Community Centre, Vandyke Rd, Leighton Buzzard, Beds. Sec G1ACQ, tel 0525 376741.

Milton Keynes (MK&DRS)—Second Monday in each month, 8pm. Community Centre, Hodge Lea Lane, Hodge Lea, Nr Wolverton, Milton Keynes, Bucks. Sec G3ZPA.

Nene Valley (NVRC)—10 July ("Metre-wave update, vhf awards and 50MHz", G5UM). 8pm Dolben Arms, Finedon, Northamptonshire. Sec G4XEN.

Northampton (NRC)—Thursdays, 8pm. Kingsthorpe Community Centre. Sec G4YJP.

Peterborough (Greater Peterborough RC)—Last Thursday in each month, 7.30pm. Southfields Junior School, Stanground. 18 July (Junk sale). Sec G4NRJ.

Shefford (S&DARS)—4 July (Final preparations for VHF NFD), 11 July (Technical topics), 18 July (DF hunt, by car), 25 July (Barbeque at Topplers Hill). 7.45pm. Church Hall, Shefford, Bedfordshire. Sec G4PSO.

Wisbech (WR&EC)—Alternate Thursdays. Five Bells, Parson Drove, Wisbech. (Congratulations on your control and handling of a GV special event callsign during the VE-Day celebrations (*RR5*).

REGION 6—RR F S G Rose, G2DRT, 84 Cock Lane, High Wycombe, Bucks HA3 7EA. Tel Penn (049481) 4240.

Aylesbury (AVARS)—Sec Mrs C M Clark, G1GQJ, tel Kingston Blount 51461.

High Wycombe (Chiltern ARS)—Second and last Wednesdays in each month. Sec G3NCL, tel High Wycombe 711956.

Maidenhead (M&DARC)—First Thursday and third Tuesday in each month, 7.30pm. Red Cross Hall, The Crescent, Maidenhead, Berks. 4 July (Lecture, to be arranged), 6, 7 July (VHF Field day at Coombe Hill, Berks), 16 July (Lecture and prep for McMichael Rally), 21 July (Participation in McMichael Rally, 7MHz QRP station), 24 July (Visit to earth satellite tracking station, Madley, Nr Hereford), 1 August (Evening out, picnic and /P operation at local beauty spot). Sec G8RYW, tel Maidenhead 28463.

Newbury (NADARS)—9 July (Illustrated talk "From Berkshire to Box 88"), 13 August (Informal get together). Sec G3VOW.

Oxford (O&DARS)—Second and fourth Wednesdays in each month. Civil Service Club, Marston Road, Oxford, G5LO. Sec G4PUU, tel Oxford 52859.

Oxford (RAFARS)—Third Wednesday in each odd numbered month. Civil Service Social Club, Marston Road, Oxford. Net 11.45am. 3,710kHz ssb, last Sunday monthly. Details G6ZH, tel 0491 651259.

Vale of White Horse (ARS)—6 August (AGM, members are requested to make note and attend). Details G3SEK, tel Abingdon 831600 ext 359 (day), Abingdon 31559 (eve), or G4PMK, tel Abingdon 831600 ext 455 (day), Wantage 69440 (eve).

REGION 7—RR R Sykes, G3NFV, 16 The Ridgeway, Leatherhead, Surrey KT22 9AZ. Tel 0372 372587.

Addiscombe (AARC)—Tuesdays (Informal) 9pm. Lion Inn, Pawsons Road, Croydon. Sec G3SJX, tel 01-656 9054.

Ashford (Echelford ARS)—Second Monday and last Thursdays in each month, 8pm. The Hall, St Martins Court, Kingston Crescent, Ashford, Middx. Sec G4VAZ, tel Sunbury 82823.

Bexleyheath (North Kent RS)—First and third Tuesdays in each month, 8pm. The Pop-in-Parlour, Graham Road, Bexleyheath. Sec G6CUE, tel 01-309 7214.

Biggin Hill (BHARC)—23 July (Amateur radio quiz). 8.30pm. St Marks Church Hall, Church Road, Biggin Hill, Sec Ian Mitchell, tel 09598 376.

Coulsdon (CATS)—Second Monday and last Thursdays in each month, 8pm. St Swithins Church Hall, Grovelands Road, Purley, Surrey. 8 July (Quiz versus Wimbledon Club), 25 July (Morse tuition). Sec G6HC, tel 01-684 0610.

Cray Valley (CVRS)—First and third Thursdays in each month, 7.30 for 8pm. Christchurch Centre, Eltham High Street, Eltham SE9. 4 July ("Assorted panics", G3GJW), 18 July (Natter night), 12, 14 July (Special event station GB0DAN). Details G4WYG.

Croydon (SRCC)—First and third Mondays in each month, 8pm. TS Terra Nova, 34 The Waldrons, South Croydon, Surrey. Sec G8IYS, tel 01-657 0454.

Crystal Palace (CP&DRS)—Third Saturday in each month, 8pm. All Saints Parish Room, Upper Norwood, SE19. 20 July ("Operational amplifiers, theory and practice', G3OOU and G8OTG). Sec G3FZL, tel 01-699 6940.

Dorking (D&DRS)—Second and fourth Tuesdays in each month, 8pm. Star and Garter Hotel. Club net Sundays 8.30am. 3,780kHz. Sec G3AEZ, tel 0306 77236.

Farnham VHF Group—Second and fourth Mondays in each month, 8pm. Farnham Central Club, Farnham, Surrey. Contact G4EPX, tel 0734 787298.

Guildford (G&DRS)—Second and fourth Fridays in each month, 8pm. Model Engineers HQ, Stoke Park, Guildford. Sec G4BHQ, tel Guildford 576375.

Guildford (UHF Repeater Group)—First Thursday in each month, 8.45pm. Anchor and Horseshoe, Burpham, Guildford. Details G4EML.

Kingston (K&DARS)—Third Wednesday in each month, 8pm. Alfriston, 3 Berrylands Road, Surbiton. Sec G3ODH, tel Epsom 26005.

New Cross (Clifton ARS)—Fridays, 8pm. Above the New Cross Inn, Clifton Rise, London SE14. Details R Hinton, 42 Sutcliffe Road, Welling, Kent.

Redhill (RATS)—Third Tuesday in each month, 8pm. Constitutional and Conservative Club, Warwick Road, Redhill. 16 July (RSGB slides). Sec G8JXV.

Surbiton (308 ARC)—Last Tuesday in each month, 8pm. The Coach House, Church Hill Road, Surbiton. Details G1EOO.

Sutton (S&CRS)—Third Friday in each month, 8pm. Downs Lawn Tennis Club, Holland Avenue, Cheam, Surrey. 19 July ("Amateur radio, the early days", G2MI). Sec G4BOX.

Thames Ditton (TVARTS)—First Tuesday in each month, 8pm. Thames Ditton Library, Watts Road, Giggs Hill, Thames Ditton. Sec G3ENI.

Wimbledon (W&DRS)—Second and last Fridays in each month, 8pm. St John Ambulance HQ, 124 Kingston Road, Wimbledon, SW19. Sec G3DWW.

REGION 8—RR M Elliott, G4VEC, 20 Haysel, Sittingbourne, Kent ME10 4QE. Tel 0795 70132.

Brighton (B&DRS)—First and third Wednesdays in each month, 8pm. "Seven Furlong Bar", Brighton Racecourse. Sec G4IIL, tel Brighton 607737.

Burgess Hill (Mid-Sussex ARS)—Thursdays (except during school holidays). Marle Place, Burgess Hill. Sec GIFRF, tel 07918 2937.

Canterbury (UoKARS)—Tuesdays, 7.30pm. Radio shack, located beside the "Oast House" on the playing fields beside the Parkwood residences. Details G4SAY.

Canterbury (East Kent ARS)—First and third Thursdays in each month, 7.30pm. Cabin Youth Centre, Kings Road, Herne Bay. Details G6TRM, tel 02273 69454.

Chichester (CARC)—First Tuesday and third Thursday in each month. Fernleigh Centre, 40 North Street, Chichester. Details G4EHG, tel Chichester 789587.

Crawley (CARC)—Fourth Wednesday in each month. Trinity United Reform Church Hall, Ifield, Crawley. Details G4IQM, tel Crawley 882641.

Dartford (DDFC)—Pre-hunt meetings on one Tuesday in the month. Horse & Groom ph, Leyton Cross, Dartford Heath, after 9pm. Details G8DYF, tel Greenhithe 844467.

Darenth Valley (DVRS)—Wednesdays, twice monthly, 8pm. Crockenhill Village Hall, between Swanley and Orpington, Kent. Details Mrs Sheila Hillman, tel Orpington 26951.

Dover (SEKYMCARC)—Wednesdays, 7.45pm. Dover YMCA, Godwynehurst, Leyburne Road, Dover. Details G3VSU, tel 0304 822738.

Eastbourne Electronics (ARS)—7.30pm. Archery Youth Centre, Seaside, Eastbourne. Sundays, RAE and morse classes. Tuesdays, construction and chat night. Also keen contest section. Details GIEJB.

Eastbourne (Southdown ARS)—First Monday in each month, 7.30pm. Chaseley Home, South Cliff, Eastbourne. Club has other activities at their new club rooms at Hailsham on Tuesdays and Fridays. 1 July (Barbeque). Details G4XNL, tel Eastbourne 638653.

Edenbridge (EARS)—Second Wednesday in each month. Scout Hut, High Street, Edenbridge, Kent. Details G8VCH, tel East Grinstead 24748.

Gillingham (BRATS)—Thursdays, 8pm. Parkwood Community Centre, Parkwood Green, Wigmore, Gillingham, Kent. 13 July (GB4PB special event station for the Parkwood bonanza at the Parkwood Community Centre), 20 July (GB2BVF special event station for the Bredhurst village fete). Details G4ZTF, tel Medway 374670.

Gravesend (GRS)—Mondays, 8pm. Windmill Tavern, Shrubbery Road. Details G4BNQ.

Hastings (HERC)—Third Wednesday in each month, 8pm. West Hill Community Centre, also various other activities during the week. 17 July ("Compact Disc"). Details G4NVQ, tel Hastings 420608.

Horsham (HARC)—First Thursday in each month, 8pm. Guide HQ, Denne Road, Horsham. 4 July (Pre-VHF field day natter night). Details G4LKW, tel Horsham 64580.

Kent Repeater Group—The group, by annual subscription, supports two vhf and three uhf repeaters in Kent; GB3KN, GB3KS, GB3NK, GB3EK and GB3CK. Details G4RVV, tel (office hours) Orpington 27050, ext 91.

Lewes (L&DRAC)—First and third Tuesdays in each month. Bridge View Community Centre, Lewes. Details G4PZU, tel Lewes 3239.

Maidstone (MYMCAARC)—Fridays, 8pm. YMCA Sportscentre, Cripple Street, Maidstone. Details G6FZD, tel 0622 50709.

Medway (MARTS)—Fridays, 7.30pm. St Lukes Church Hall, King William Road, Chatham. Details Tony Faram, tel 0634 578647.

Margate (Radio Club of Thanet)—Second and fourth Tuesdays in each month. Grosvenor Club, Grosvenor Place, Margate. Details G4SBD, tel Thanet 33213.

Sussex Repeater Group—This group is responsible for GB3BP, GB3BR, GB3CP, GB3HO, GB3NX, GB3SR and GB3WX. The SRG "Roadshow" is available to local clubs for presentations. Details G8TJQ.

Swale (SARC)—Mondays, 7.30 for 8pm. The Ivy Leaf Club, 52 Dover Street, Sittingbourne, Kent. Details G4NPM, tel Minster 873147.

Tunbridge Wells (West Kent ARS)—Fridays, 8pm. Adult Education Centre Annexe, Quarry Road, Tunbridge Wells. Details G4MXL, tel after 7pm 0892 32877.

Worthing (W&DARC)—Wednesdays, 7.30pm. Lancing Parish Hall, South St, Lancing, West Sussex. 3 July ("Home video", G8VEH). The club has regular nets throughout the week and all callers are welcome. Monday, slow morse on 144MHz; Tuesday, ssb on 3,725kHz, 8pm. Thursday, slow morse on 144MHz. Friday, cw on 3,550kHz, 7.30pm. Sunday, ssb on 7,070kHz, 11am. Sunday, fm on 144MHz, 7.30pm (S21). Sec G4SWH.

The Information given above is the latest, and in some cases the only information received for 18 months or more. Please advise me if any updating is required. *Mike RR8*

REGION 10—RR E J Case, GW4HWR, 2 Abbey Close Tyrhiw, Taffswell, Mid-Glam CF4 7RS. Tel 022 810368.

Area representatives

Cardiff	Cyril Laws, GW6ZHP
Carmarthen	A F Dowling, GW3GUE.
Port Talbot	Reg Bray, GW4ESV.

Abergavenny (A&NHARC, GW4GFL)—Thursdays, 7.30pm. Pen-y-fal Hospital, above Male Ward 2, Abergavenny. Sec GW4XQH, tel 0873 4655.

Aberystwyth (A&DARS)—Second Tuesday in each month. Bay Hotel (on the sea front, opposite the bandstand). Sec GW4JXB, tel 0970 828446.
Barry (RAF St Athen ARC, GW3CKB)—RAF St Athen, Barry, South Glam. Contact D H Rycroft.
Barry (BCoFERS, GW3VKL, GW4BRS, GW6BRC)—Thursdays, 7.45pm. Barry College of Further Education Annexe, Weycock Cross, Barry. Sec GW4GSH.
Blackwood (BARS, GW6GW)—Fridays, 7pm. Oakdale Comprehensive School, Oakdale, Blackwood, Gwent. This club does not meet during the school holidays. Sec GW8UAM.
Bridgend (B&DARS, GW4LNP)—First and third Fridays in each month, 7.30pm. YMCA, Angel St (near recreation centre), Bridgend. Chairman Don Sedgebeer, GW3RVG; sec, Trevor Morgan, GW4SML.
Bristol Channel Repeater Group (GB3BC)—Sec GW6MBU, tel Barry 711146.
Cardiff (CRSGBG, GW5BI)—Second Monday in each month, 7.30pm. Pantmawr Hotel, Tyla Teg, Pantmawr Estate, Whitchurch, Cardiff. July (general discussion and natter night). Sec GW6ZHP, tel Cowbridge 3212.
Cardiff (Highfields ARS, GW4LFO, GW1LFO)—Thursdays, 7pm. Highfields Handicapped Centre, Allensbank Road, Cardiff. Sec GW6ZHM, tel 0222 750315.
Cardiff, (S.Glam IoHEARS, GW3RNW, GW1AAA)—Contact Steve Williams, GW8CUR, 301 Newport Road, Cardiff.
Carmarthen (CARS, GW4YCT)—Second and fourth Fridays in each month, 7.30pm. West Wales Hospital Social Club, The Quay, Carmarthen. Sec Mrs M Meridith, (xyl of GW4XLK), tel 0269 850803.
Chepstow (C&DARS, GW4LWZ)—Tuesdays, 7.30pm. Chepstow Leisure Centre. Club net every Sunday at 8pm 144MHz fm. Sec GW6NJY.
Cwncynon (CARS, GW3FFE)—Sec R Allwood, GW4AUJ, 7 Daniel Street, Cwmbach, Aberdare.
Lougher (LRA&EC, GW4HVJ)—Thursdays fortnightly, 7.45pm. Lougher Scouts Hall, Lougher, Gorseinon. Sec GW8TYS, tel Gorseinon 893392; chairman GW4JPN, tel 0792 863031.
Merthyr (Hoover (Merthyr) GW3RDB)—C/O Engineering Dept, MP9, Hoover Ltd, Pentrebach, Merthyr Tydfil.
Newport (NARS, GW4EZW)—Mondays, 7pm. Brynglas House, Brynglas Road, Newport. Sec GW6ZUQ, tel 02912 6867.
Pembroke (P&DRAC, GW2OP)—Last Friday in each month, 7.30pm. Defensible Barracks, Pembroke Dock. Chairman GW4RGI, QTHR.
Pontypool (PARS, GW3RNH)—Sec GW6JRB.
Port Talbot (British Steel Corp ARS, GW3OEP)—Thursdays, 7.30pm. BSC Sports and Social Club, Port Talbot. New sec GW4IGR, tel 0639 720416.
Powys (PARC, GW4HVN)—Thursdays, 7.30pm. Cricket Pavilion, Montgomery. Sec, GW4DWX, tel Welshpool 2068.
Radio Club (GW4IYD)—LCR Components, Woodfield Works, Tredegar, Gwent.
Rhondda (RARS, GW2FOF)—Thursdays, 7.30pm. National Union of Mineworkers' Club, Tonypandy. Sec GW4BUZ, tel Tonypandy 432542.
Swansea (SARS, GW4CC)—First and third Thursdays in each month, 7.30pm. Lecture Room N, Applied Sciences Building, Swansea University. Sec GW4HSH, tel Swansea 404422.
Swansea (SRACC)—Sec Mr Morgan, 1 Jersey Street, Hafod, Swansea.
Swansea (UCoS RS)—Sec Mr R B Hughes, Electrical Eng Dept, University College, Singleton Park, Swansea.
West Wales Repeater Group (GB3WW)—Contact 7 Crofton Drive, Baglan, Port Talbot.

REGION 11—RR B H Green, GW2FLZ, 1 Clwyd Court, Tan-y-Bryn Road, Colwyn Bay, Clwyd LL28 4AH. Tel 0492 49288.

Area representatives
R H Tyson, GW6HUV, Conway Valley
A Evans, GW4HDR, Rhyl and District
P E W Allely, GW3KJW, Pwllheli

Bangor (Dragon RC, GW4TTA)—First and third Mondays in each month. Bangor Rugby Club. Sec W Williams, tel 713941.
Bangor (University College of North Wales ARS)—Electrical Engineering School, Dean St, Bangor, Gwynedd LL57 1UT.
Colwyn Bay (Clwyd County Raynet Group)—Second Tuesday in each month. Green Lawns Hotel, Bay View Rd, Colwyn Bay, Clwyd. Sec GW4UWI, tel 0492 2149.
Colwyn Bay (Conwy Valley ARC, GW6TM)—Second Tuesday in each month, 8pm. Green Lawns Hotel, Bay View Rd, Colwyn Bay. 11 July ("RTTY", Bob Caldwell, GW4PUX) on ("RTTY with the aid of computers"). Sec GW4VVW, tel 0492 636376.
Deeside (Alyn & Deeside ARS)—Mondays, 8pm. Shotton Social Club, Shotton Lane, Deeside. 1 July (Committee meeting and NFD arrangements), 8 July (DF hunt), 15 July (D&W), 22 July ("Use of computers in radio", G3VQI). Sec GW4RKX, tel 0244 660066.
Deeside (RAF Sealand ARC)—c/o, O/C, Radio Wing, 30MU RAF, Sealand, Deeside, Clwyd CH5 2LS.
Dolgellau (Meirion ARS)—First Thursday in each month. Dolserau Hall Hotel, Dolgellau. 4 July (VHF FD discussion). Sec GW4KEV, Tyddyn Mawr, Arthog, Gwynedd LL39 1LJ.
Holyhead (H&D ARS)—Alternate Mondays, 7.30pm. Foresters Arms, Kingsland, Holyhead. 14 July (Natter night), 28 July (GB3SLN working from the Skerries Lighthouse). Sec Mrs Barbara Anzian, 12 London Rd, Holyhead, tel 0407 50577.
Menai Bridge (David Hughes School RC)—David Hughes, Menai Bridge, Gwynedd LL59 5SS.
Porthmadog (P&DARC)—Third Thursday in each month, 8pm. Harbour Cafe, Ffestiniog Railway, Porthmadog. Beach cum bar-b-que this month, date and place to be decided. Sec GW4WKQ, tel 0758 740445.
Rhyl (R&DARC, GW4ARC)—First and third Mondays in each month, 7.30pm. Mona Hotel, Market St, Rhyl. 1 July (DF hunt), 15 July (Talk on the RSGB, G2AMV). Sec GW1AKT, tel Nantglyn 469.
Wrexham (WARC)—First and third Wednesdays in each month, 7pm. Friends Meeting House, Holt Rd, Wrexham, Clwyd. Sec G4HRH, The Hollies, Sedgeford, Whitchurch, Salop SY13 1EX.

REGION 12—RR M R Hobson, GM8KPH, 17 Well Brae, Pitlochry, Perthshire PH16 5HH. Tel 0796 2140.

Aberdeen (AARS)—5 July (VHF NFD preparations), 6/7 July (VHF NFD), 12 July (Work night), 19 July ("Amateur TV for £20", GM4YRI), 26 July ("This is your Licence", GM8FFX), 2 Aug (Junk sale). 7.30pm. 5 Thistle Lane, Aberdeen. Details GM4GXD, tel Pitcapple 251.
Caithness (CARS)—Second Wednesday in each month, 7.30pm. Loch Watten Hotel, Watten. Details GM1AHC, tel 0847 63638.
Dundee (Kingsway Tech ARC)—Tuesdays, 7.30pm. Annexe to Kingsway Tech. Grayham Street, Dundee. Details GM4WEQ, tel 0382 552362.
Forfar (F&District ARC)—1 July ("Bee Keeping", David Norrie), 6, 7 July (VHF-NFD), 15 July ("J Operator", GM4BAG). Visitors welcome, call S20 on club nights. Details GM4WMN, tel 0575 81222.
Inverness (ARC)—Thursdays, 7.30pm. Cameron Youth Club, Planefield Road, Inverness. Details GM1GFX, tel 0463 242463.
Sarcon 85, is to be held on 21 September (not 2 September as misprinted in last month's "Other events" list) in the College of Education, Gardyne Road, Dundee. Doors open to the public at 10.30am. The opening ceremony will take place at 11am, performed by Mrs J Heathershaw, G4CHH, RSGB President. A full programme of lectures has been organized and will include an RSGB forum/Zone G meeting. Admission will be £1. A dinner has been organized for the evening at the same venue, starting at 7.30pm, for 8pm. Further details from RR12.

REGION 14—RR T G Wylie, GM4FDM, 3 Kings Crescent, Elderslie, Strathclyde PA5 9AB. Tel Johnstone (0505) 22749.

Ayr (AARG)—Second and fourth Fridays in each month, 7.30pm. Community Leisure Centre, 24 Wellington Square, Ayr. Details GM3THI, QTHR, tel 0292 42313.
Dumfries (D&Galloway REC, GM4HAA)—First and third Mondays in each month, 8pm. Cargenholm Hotel, New Abbey Road, Dumfries. Details GM4NNK, QTHR, tel 0387 64957.
Dumfries (Maxwelltown ARK)—Second Wednesday in each month, 8pm. Tam O'Shanter Inn, Queensbury Street, Dumfries. Details GM4NNC, 5 Elder Avenue, Lincluden, Dumfries, DG2 0NL.
Dunoon (D & DARC)—Fridays, 7.30pm. Community Centre, Edward Street, Dunoon. Details GM1KJN, QTHR, tel 03698 4217.
Falkirk (FARC)—First and third Wednesdays in each month, 7.30pm. Grange Centre, Redding Road, Brightons by Falkirk. Details GM4WZY, QTHR, tel 0324 483299.
Glasgow (West of Scotland ARS GM4AGG)—Fridays, 8pm. 154 Ingram Street, Glasgow. Details GM8YBP, QTHR, tel 041-776-2814.
Greenock (G & DARC)—Tuesdays and Fridays, 7pm. 22 Inverkip Street, Greenock. Details GM0ADF, QTHR, tel Greenock 25075.
Helensburgh (HARC)—Thursdays, 7.30pm. Cairndhu House, Rhu Road, Helensburgh. Details GM6JLQ, QTHR, tel Dumbarton 841452.
Irvine (Cunninghame & DARC)—Tuesdays and Thursdays, 7.30pm. The Community House, 1 Bonnyton Row, Girdle Toll, Irvine. Details GM3JOB, QTHR, tel 0294 215728.
Kilmarnock (K & Loudon ARC)—Tuesdays, 7.30pm. Details GM6JIC, QTHR, tel 0563 34383.
Dumbarton (LLARC)—Dumbarton, weekly. (Secretary please inform RR of time and location.) Details GM4LKJ, QTHR.
Motherwell (Mid-Lanark ARS, GM3PXK)—Fridays. Wrangholm Hall Community Centre, Jerviston Street, Motherwell. Details GM4UXX, QTHR, tel 0698 350926.
Stirling (S & DARS)—Second and fourth Wednesdays in each month, 7.30pm. YMCA, 9A Barnton Street, Stirling. Details Pat McKenzie, 14 Bridgend, Dunblane, Perthshire, FK15 9ES. tel 0786 824810.
Stranraer (Wigtownshire ARC GM4RIV)—Thursdays, 7.30pm. Community Centre, Lewis Street, Stranraer. Details GM4BAE, QTHR, tel 0776-2876.
Lochgilphead—A club is presently being formed based in Lochgilphead to be known as the Mid-Argyll ARC. Further details should be available in next month's magazine.
Glasgow—The Boys Brigade in Glasgow has formed an amateur radio club, operating from Battalion Headquarters, Bath Street. Details GM4HYF, QTHR, tel 041-634 4567.

To all secretaries, this is the latest information available, any changes should be notified immediately. *RR14*

REGION 15—RR R Parsons, GI3HXV, 45 Erinvale Avenue, Belfast BT10 0FP. Tel 0232 612322.

Ballyclare (E Antrim ARC, GI4KKK)—Second Tuesday in each month, 8pm. Fairview Primary School, Ballyclare. Sec GI4PRH.
Ballymena (BRC,GI3FFF)—Thursdays 8pm, and Sundays 3pm. 10 Nursery Road, Grace Hill, Ballymena. RAE class Wednesday evenings—GI4OZT. Sec GI4HCN.
Banbridge (Mid-Ulster ARC, GI4BAC)—Second Sunday in each month, 3pm. QTH of GI4BAC. Sec GI4BDL.
Bangor (B & D ARC, GI3XRQ)—First Friday in each month, 8pm. Royal Hotel, Bangor. Sec GI4OCK.
Belfast (City of Belfast YMCA ARC, GI6YM/GI6YMC)—Tuesdays, 7pm, and Saturdays 2.30pm. Club Room, Fourth floor, YMCA, Wellington Place, Belfast.
Belfast (BRSGB Group)—Third Wednesday in each month, 8pm. 90 Belmont Road, Belfast. AR GI4RXS.
Belfast (QUBRC/GI3LLQ/GI8FOB)—Tuesdays, 7.30pm. (Term and vacation). 37 Fitzwilliam Street, Belfast. Operational 3·5-430MHz. Morse and RAE tuition available. Contact GI4WWF or tel (0232) 661111, ext 4006.
Coleraine (North-west ARC, GI4DBB)—First Tuesday in each month, 8pm. Scout Hall, The Crescent, Coleraine. Sec GI4KIG.
Enniskillen (Lough Erne ARC)—Third Monday in each month, 8pm. Railway Hotel, Enniskillen. Sec GI4CZW.

RSGB President Joan Heathershaw, G4CHH, chatting to a past-president of the RSGB (1967) and of the IRTS, Barney Patterson, GI3KYP/EI4BC, when she attended the Lough Erne ARC Mobile Rally on 21 April. *Photo:* Alex McKeown

Larne (L & D ARS, GI4PHA)—First and third Wednesdays in each month, 8pm. 100 Glenarm Road, Larne. RAE class each Thursday by GI4UUC. Programme not finalized. Sec GI4CPP.
Lisburn (Lagan Valley ARS, GI4GTY)—Second Monday in each month, 7.30pm. Rathvarna Teacher's Centre, Pond Park Road, Lisburn. Sec (temporary) GI4PSK.
Londonderry (North West of Ireland ARC, GI3CFH)—First Monday in each month, 7.30pm. Prehen Municipal Boathouse, Victoria Rd, Londonderry. 1 July ("Amateur tv demo"). GB3LY Repeater Group, contact GI2DHB. Sec GI4OUN.
Moneymore (Magherafelt ARC, GI4OMA)—Third Tuesday in each month, 8pm. Manor Hotel, Moneymore. Sec GI3SOO.
Moy (Armagh, Dungannon & DARC, GI4FVN)—Second Tuesday in each month, 8pm. Pony Club, Killyman Street, Moy. Contact GI8RNX.

Some clubs do not meet during July and August. Contact secs for details. *RR15*

REGION 16—RR A Owen, G4HMF, 102 Constable Road, Ipswich, Suffolk IP4 2XA. Tel 0473 51319.

Basildon (Marconi ARS)—First Monday in each month, 8pm. The Shack, GEC Avionics Social Club, Gardiners Way, Basildon. Sec G8PKM, tel Chelmsford 323323.
Braintree (B&DARS)—First and third Wednesdays in each month, 8pm. St Peter's Church Hall, St Peter's Close, Braintree. Sec G6XJC, tel 0376 23813.
Brentwood (International Police Association RC, British Section)—Details G4TRE/G4IPA, 32 La Plata Grove, Brentwood CM14 4LA.
Bury St Edmunds (BStERS)—Third Tuesday in each month, 7.30pm. Guildhall Street, Bury St Edmunds. 16 July (RTTY). Sec John Munro, G3GBB, 29 Angel Hill, Bury St Edmunds.
Canvey Island (SEARS)—Wednesdays, 7.30pm. The Paddocks, Long Road, Canvey Island. Morse class followed by items of general or specific amateur radio interest. Junk sales held on third Wednesday in each month. Details G4FMK, tel 0268 68305.
Chelmsford (CARS)—First Tuesday in each month, 7.30pm. Marconi College, Arbour Lane, Chelmsford. Details G4BYR.
Colchester (CRA)—Second and fourth Thursdays in each month, 7.30pm. Colchester Institute, Sheepen Road, Colchester. 21 July (Anglian Mobile Rally, Stanway School, 10am). Sec Howe, G3FIJ, tel 0206 851189.
Felixstowe (F&DARS)—Second and fourth Mondays in each month, 8pm. Feathers, High Road West, Felixstowe. 8 July (RSGB RR16 visit). Sec G3MJS, tel 272426.
Dengie Hundred (DHARS)—Every second Thursday, 7.30pm. Burnham Sailing Club, The Quay, Burnham-on-Crouch. Details G6ZSJ, tel Maldon 784225.
Great Yarmouth (GYRS)—Thursdays fortnightly, 7.30 for 8pm. STC Sports and Social Club, Beevor Road, South Denes, Great Yarmouth. Details G3NHU, tel 721173.
Harlow (H&DRS)—Tuesdays, 7.30pm. Mark Hall Barn. Details Cilla Mann, G4KVR, c/o Mark Hall Barn, 1st Avenue, Harlow.
Haverhill (H&DRS)—Fridays, 7.30pm. Copse Hall Farm, Bumpstead Road, Haverhill. Details G4MVK, tel Haverhill 61207.
Ipswich (IRC)—Second and last Wednesdays in each month, 8pm. Rose and Crown, Norwich Road, Ipswich. 3 July (Planning for VHF FD), 31 July (DF hunt). Sec G4IFF, tel Ipswich 44047.
Leiston (LARC)—First Tuesday in each month, 7.30pm. Sizewell Sports & Social Club, King George's Avenue, Leiston. Also third Thursday, 5 Main Street, Leiston. 2 July (Open forum), 18 July (Ragchew and planning). Sec G6ORK, tel Leiston 831597.
Loughton (L&DARS)—Alternate Fridays, 8pm. Loughton Hall, Rectory Lane, Loughton. 5-7 July (Club field weekend at Alymers Farm), 19 July (Informal meeting). Details G6FWT, tel 01-508 7190.
Lowestoft (LD&PYEARC)—Details G4KDL.
Martlesham (MARS)—Occasional Wednesdays, 7.30pm. British Telecom's Research Laboratories. Details G3ZNU.
Norwich (Norfolk ARC)—Wednesdays, 7.45pm. Valley Drive Community Centre, Plumstead Road, Norwich. Details G3VNQ, tel Norwich 37709.
Rochford (RDRC)—Second Monday in each month, 7.30pm. Civil Defence Buildings, Rochford. Details G3FGC, 265 Ferry Road, Hullbridge SS5 6NA.
Saffron Walden (SW&DRAS)—Third Wednesday in each month, 8pm. Details G6KDW, tel Saffron Walden 22715.
Southend (S&DARS)—Fridays, 7.30pm. Rocheway Centre, Rocheway, Rochford. Details G3YOA.
Stanford le Hope (SLH&DARC)—Mondays, 8pm. St Joseph's Parish Rooms, Scratton, Stanford-le-Hope. Details G4OVG, tel SLH 642312.
Stowmarket (S&DARS)—Temporarily suspended.
Thurrock (TARC)—First and third Tuesdays in each month, 8pm. Venue not known. Details believed available from G3KMD.
Vange (VARS)—Thursdays, 8pm. Barstable Community Centre, Basildon. Details Mrs D Thompson, tel Basildon 552606.

I know that some of these details may be outdated and would be glad if club secretaries could get in touch. *RR16*

REGION 17—RR T Emery, Wilverley, Old Lyndhurst Road, Cadnam, Southampton SO4 2NL.

Amateur Radio and Computer Club (AMRAC)—A new club presently seeking affiliation to the Society. Next meeting 12 July, The Crown, Bishop's Waltham, Hants. Sec Trevor Tugwell, tel 04895/81032.
Andover (ARAC)—First Tuesday and third Wednesday in each month, 8pm. Wolversdene Club. Club net 145·450MHz Sundays 2pm. Sec G0AMO.
Basingstoke (BARC)—First Monday in each month, 8pm. Forest Ring Community Centre, Sycamore Way, Basingstoke. 1 July (Plans for VHF NFD). Sec G4WIZ, tel Tadley 5158.
Blackmore Vale—Second Tuesday in each month, 7.45pm. Bell and Crown, Zeals (on the A303). Sec M Bailey, tel 0963 70969.
Bournemouth (BRS)—First and third Fridays in each month, 7.30pm. Kinson Community Centre, Kinson, Bournemouth. Sec G4EKE, tel 0202 877945.
Chippenham (C&DARS)—Tuesday evenings. Chippenham Sea Cadet Headquarters. Chairman G3UUV, treasurer G4XTH, sec G4GFJ, tel 02214 4190.
Devizes (D&DARS)—Fridays, 8pm. Football Club Social Club, Nursteed Road, Devizes, Sec G3MDQ.
Eastleigh (Itchen Valley ARS)—5 July (Open evening), 7 July (Bar-b-cue), 19 July (Quiz Night), 7.30pm. Scout Hut, Brickfield Lane, Chandlers Ford, Hants. Sec G6DIA, tel 0703 863039.
Fareham (F&DARS)—3 July ("Amtor and packet radio techniques), 10 July (Natter night), 17 July ("VHF and uhf linear amplifiers", G4XZL, and G8VOI), 24 July ("Amateur tv again" G8VOI), 31 July (Planning for portable operation). 7.30pm. Portchester Community Centre, Portchester. Sec G4ITG, tel Fareham 234904.
Farnborough (F&DARS)—Second and fourth Wednesdays in each month. Railway Enthusiasts Club, Access Road, off Hawley Lane, Farnborough. 10 July ("HF antenna", G5RV), 24 July ("RTTY", G8WMM). PRO G4MBZ, tel Farnborough 837581.
Gosport (Rowners & DARS)—3 July and every alternate Wednesday, 7·30-8pm. Morse tuition followed by meeting at Scout Headquarters off Grange Road, Rowners. Sec G6OTY, tel Locks Heath 2541.
Guernsey (GARS)—Tuesdays and Fridays, 8pm. The Lodge, La Corbinerie, Oberlands, St Martin's. Sec GU4MBS, PO Box 100, Guernsey, tel 0481 57605.
Horndean (H&DARC)—First Monday in each month, 8pm. Merchiston Hall, London Road, Horndean. 1 July ("Working cw", G4OFG). PRO G4BEQ, QTHR.
Jersey (JARS)—Fridays, 8pm. Sundays 10am. Le Hocq Tower, St Clement. Sec GJ4TXB, tel 24328.
Jersey (JAEC)—Club headquarters, Belmont Road, St Helier. Contact GJ4ICD, tel 0534 77067 (day), 0534 26788 (night).
Liphook (Three Counties ARC)—10 July ("Antenna topics", *Practical Wireless*), 24 July ("QRP and home construction", G4RCY). 8pm. The Railway Hotel, Liphook. Sec G3TBT, tel Passfield 368.
Plessey (Christchurch ARS)—First Thursday in each month. Plessey Social Club, Christchurch. Sec G6WQU, tel 0425 72108.
Poole (PARS)—Recent agm results: chairman, G6MXL, treasurer, G3ZPR. 11 August (QRP display at "Hamfest 85"). Sec G4XYX, QTHR.
Portsdown Hill Repeater Group (GB3PH)—For information or to join the group and help support the repeater, contact G4VNM, tel 0329 239702.
Portsmouth (Marconi EARS)—Last Tuesday in each month, 8pm. Broad Oaks Canteen, Portsmouth Airport. Sec G3FWE.
Portsmouth (P&DARS)—Tuesdays, 7.30pm. Portsmouth Community Centre, Malin's Road, Buckland. Sec G3JZV.
Salisbury (SARS)—Tuesdays, 7.30pm. Grosvenor House, Churchfield Road, Salisbury. Sec G4LDR, tel 0980 22809.
Southampton (SARS)—First and third Wednesdays in each month, 7.30pm. Hall of Aviation, R J Mitchell Museum, Albert Road, Southampton. Sec G6CPE, tel Romsey 514811.
Southampton (SUARS)—Mondays during term time, 7.30pm. 65, University Road, Southampton. Sec G6WEX, c/o Student's Union.
Swindon (S&DARC)—Thursdays, 7.30pm. Oakfield School, Marlowe Avenue, Swindon. PRO G4ZAZ, tel 0793 37489.
Trowbridge (T&DARC)—Fourth Tuesday in each month, 8pm. Southwick Village Hall, Trowbridge. Sec G4SPE, tel Trowbridge 4532.
UK FM Southern Repeater Holding Group (GB3SN)—For information, or to join the group and help support the repeater, contact Mrs Jan Steele, tel Fleet 3311.
Waterside (WSWC)—Second and fourth Tuesdays in each month, 7.30pm. Fawley & Blackfield Community Centre, Blackfield, Southampton. Sec G6DLJ.
Weymouth (SDRS)—First Tuesday in each month, 7.30pm. Army Bridging School, Wyke Regis. Sec G6HKD.
Wimborne (FRARS)—Sundays, 7.30pm. Flight Refuelling Social Club, Merley, Wimborne. 7 July (Natter night and VHF NFD recovery), 14 July ("Demonstration of colour tv ob vehicle", G6WIX and G6JAT), 21 July ("Microwaves or tropo scatter", G3YGF), 28 July ("Nick's rambles", G4WHO). Sec G8ZLH, tel 0202 570894.
Winchester (WARC)—Third Saturday in each month. The Log Cabin, Stockbridge Road, Winchester. 20 July ("Home brew", G2DBT). Sec G4FPC, tel 0962 64747.

REGION 18—RR Ian Gibbs, G4GWB, 61 The Gables, Widdrington, Morpeth NE61 5QZ. Tel 0670 790090

Aycliffe & Shildon (ARC)— Tuesdays 8pm. Sunnydale Leisure Centre, Shildon. No set programme for July, Meetings informal. Sec G3LUC, tel 0388 774466.
Berwick (Borders ARS)—First and third Fridays in each month. Tweed View Hotel, Tweed St, Berwick. Sec G1IUK, tel 0289 305465.
Bishop Auckland (RAC)—Monday and Thursday evenings. Travellers Rest, Evenwood, B.Auckland. Sec G0ACY.
Blyth (BARC-G4VKY)—Wednesday evenings. Community Centre, Warwick St, Blyth. HF station operated on club nights. Sec G1JFW, tel 0670 353069.
Consett (Derwentside ARS—G4PFQ)—Monday evenings. Consett Assocn FC Belle Vue Park, Consett. 1 July (Quiz night), 8 July (Raynet), 15 July (Natter night). Sec G1AAJ, tel 0207 520477.
Durham (DARS)—Friday evenings. Rowing Club, Green Lane, Durham. Asst sec G1FBY, tel 0385 63650.
Durham (UOD R&ES—G4DUR)—c/o Mr M Puddephat, Grey College, South Rd, Durham.
Easington (EARS G4APN/G6APN)—Tuesday and Thursday evenings. Easington Workmen's Club, Seaside Lane, Easington, Co Durham. HF station operational on club nights, morse and RAE tuition available on request. Sec G4LOM, tel 0783 815706.
Great Lumley (GLAR&ES G4EUZ)—Wednesday evenings. Community Centre, Great Lumley, Co Durham. Morse classes in progress, RAE tuition will commence shortly. Sec G4OCQ, tel 0385 40827.
Hazelrigg (NER&CC G4YPT)—Monday evenings. Hazelrigg Village Hall. Morse class in progress. Sec G1HDV, tel 0632 2742413.
Hetton-le-Hole (Houghton-le-Spring ARC G3NMD)—Wednesday evenings. Hetton Downs Hotel, Hetton, Co Durham. Morse and computer classes in progress. HF and vhf stations operational on club nights. Sec G4ULJ, tel 0783 841897.
Middlesborough (Post Office ARC G8GPO)—Thursday evenings. Lytton St, Middlesborough. Details G4ZML, tel 0642 590440.
Morpeth (Northumbria ARC G4AAX/G6AAX)—Thursday evening. Old Telephone Exchange, Cresswell Rd, Ellington, Morpeth. 4 July (Business meeting) All other evenings informal, 13 July (Bar-B-Que at G8TQL's all comers welcome). Sec G6IIA, tel 0670 513026.
Prudhoe (Tynedale ARC G4ONQ)—First Monday

in each month. Scout & Guide HQ, Station Bank, Prudhoe, Northumberland. This club is newly relocated at its present address. New members welcomed. Sec G6RRT, tel 0434 602718.
Redcar (East Cleveland ARC G4CRS)—Friday evenings, RAFA Club, Newcommen Tce, Redcar. RAE classes and morse tuition available plus talks demonstrations etc. Club net Sunday evenings on 145·350 MHz. Sec G1GMF, tel 0642 474769.
South Shields (SSARS)—Wednesday evenings. Marine & Tech College Club, South Shields. Sec T Adamson, tel 0632 567305.
Stockton (S & DARC G4XXG)—Wednesday evenings. Billingham Community Centre, Stockton on Tees. Morse classes and RAE tuition for those interested, hf station operational on club nights. Chairman G4YNM.
Sunderland (SARS G4LPK/G6BXJ)—Monday and Thursday evenings, Sundays 11.30am-1pm. The Brewery, Westbourne Rd, Sunderland, Tyne & Wear. Hf and vhf station operational club nights. Sec G4WMW, tel 0783 343295.
Washington (W&DARC)—Sunday evenings. Oval Community Centre, District 12, Washington, Tyne & Wear. Natter nights and computer corner. Sec G6EPS, tel 091 4168648.
Whitley Bay (Tyneside ARS G3ZQM)—Wednesday evenings. The Community Centre, Earsdon, Whitley Bay. Morse tuition for absolute beginners, a properly constituted course of approximately nine lessons, commences mid-July. Sec G4KOT, tel 0632 2340170.

REGION 19—RR R. J. C. Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ. Tel 01-989 6741.
G3AAJ apologises to clubs in this region for missing the deadline for this issue.

REGION 20—RR N. F. O'Brien, G3LP, 26 Southfield Road, Gloucester GL4 9UD. Tel 0452 34890
Bath (B&DARC)—10, 24 July, 8pm. Englishcombe Inn, Englishcombe Lane, Bath. Club station G4TMH regularly operating. details G4UNN, tel Frome 63939.
Bath (Downside School ARS)—Details Physics Department, Downside School, Stratton-on-the-Fosse, Bath, Avon.
Bridgwater (Sedgemoor ARC)—Third Monday in each month, 8pm. Bridgwater Arts Centre, Castle Street, Bridgwater. Details G3TTP, tel 0278 652058.
Bristol (BARC)—Tuesdays, 7.30pm. YMCA, Park Road, Kingswood, Bristol. Details G4YOC, tel Bitton 4116.
Bristol (BRSGBG)—7.30pm. Small Lecture Theatre, Bristol University. 29 July. Details G4SQQ, tel 0272 508451, or G4ROX, tel 0272 513573.
Bristol (First Crockern Scouts SWG)—Details Pete Knowles, 30 Church Path Road, Pill, Bristol BS20 0EE, tel Bristol 8814248.
Bristol (HTVRC)—Details G3TKF, tel Keynsham 3965.
Bristol (North Bristol ARC)—Fridays, 7pm. SHE, 7 Braemar Crescent, Northville, Bristol. Details G4EUV.
Bristol (South Bristol ARC)—3 July ("QRP equipment construction", G4SQQ/G4TSS), 10 July ("Work a G1 on cw night", G4XED), 17 July ("DX tv rx activity evening", Ron Gardner), 24 July ("G1s on hf night," G0ALG), 31 July ("Amateur television", G4ZBL), 7 Aug ("Mendip repeater group", G3VEH). 7.30pm. Whitchurch Folk House, East Dundry Road, Whitchurch. Bristol BS14 0LN. Details G4RZY, tel 0272 834282.
Bristol (UoBARS)—Details Mark Posen, G6DYY, c/o Students Union, Bristol University, Queens Road, Clifton, Bristol BS8 1LN.
Bristol 432MHz Repeater Group (GB3BS)—Details G4MCQ.
Cheltenham (BYLARA)—No information available.
Cheltenham (CARA)—5 July ("HF mobile", G3TSO), 2 Aug (Visit to Madley satellite station).

Sylvia Webber, xyl of the chairman of the Torbay ARS, presenting the club's VHF Transmitting Cup to Brian Evans, G6YXT, at the club's recent annual dinner/dance. *Photo:* G4SBH

7.30pm. Stanton Room, Charlton Kings Library, Cheltenham. Details G4VXE.
Cheltenham (Smiths Industries RS)—11, 25 July, 8pm. Club House, Newlands, Bishops Cleeve Details G8UJG, tel Bishops Cleeve 2175 or Bishops Cleeve 3333 ext 2511.
Gloucester (GARS)—Wednesdays, 7.30pm. St John Ambulance Headquarters, Heathville Road, Gloucester. Details G6AWT.
Mendip Repeater Group—GB3WR, 144MHz repeater GB3UB and GB3US, 432MHz repeaters and GB3UT, 1·3GHz tv repeater. Details and applications for membership from G8GMZ, tel Midsomer Norton 413902.
Portishead (Gordano ARG)—24 July (Operating procedures and techniques, cw phone), 7.30pm. Ship Hotel, Down Road, Portishead. Details G3LJD.
Shepton Mallet (Mid Somerset RC)—14, 28 July. 7.30pm. The Kings Arms, Shepton Mallet. Details G4WZF, tel Chilton-Polden 722946.
Shirehampton (SARC)—Fridays, 7.30pm. Twyford House, High Street, Shirehampton, Bristol. Details G4GTD.
Street (S&DARS)—2 July, 6 Aug, 7.30pm. Strode College, Church Road, Street, Details G4SCD.
South Cotswold (SCARS)—10, 24 July, 7.30pm. Nelson School, Stratford Lodge, Stroud. Details G1DCT.
Stroud (S&DARS)—Tuesdays, 7.30pm. Scout HQ, Parliament Street, Bisley Road, Stroud. Details G3TEV.
Taunton (T&DRC)—Fridays, 7.30pm. Basement, County Hall, The Crescent, Taunton (opposite the Crescent car park). Details G4ZLF.
Thornbury (T&DARC)—First Wednesday in each month, 7.30pm. White Horse Inn, Groves End (A38). Details G8AZT.
Wells (EMI Sports & Social Club RC)—Cedar House, Chamberlain Street, Wells, Somerset BA5 2PJ.
Weston-super-Mare (RAFARS)—Headquarters station of RAFARS. Details Admin Secretary, RAFARS, RAF Locking. Weston-super-Mare. Bristol BS24 7AA.
Weston-super-Mare (WsMARS)—8 July (DF hunt, the hare is G3GMC, start at any point and use S23) 7.30pm commence. Details J H Willis, G1DJW, tel WsM 514429.
Yeovil (Y&DARC)—11 July (Visit by G3LP, regional rep), 18 July ("Take-off angles at Sunspot Minimum", G3MYM), 25 July (Natter night), 1 Aug ("SSB" G3MYM). 7.30pm. Recreation Centre, Chilton Grove, Yeovil. Details Eric Godfrey, G3GC, tel 0935 75533.

Members' Ads

CONDITIONS OF ACCEPTANCE

These subsidized flat-rate advertisements are accepted as a service to members of the RSGB only. They must be submitted on the Members' Ad form printed on the back of a *recent* address label carrier used to mail *Rad Com* to the advertiser: this will automatically provide proof of membership and should not be more than two months old. No acknowledgement of receipt will be sent, and advertisements not clearly worded or punctuated, or which do not comply with the conditions of acceptance, will be returned. No correspondence concerning this service will be entered into.

Trade or business advertisements, even from members, will not be accepted for "Members' Ads" but should be submitted as classified or display advertisements in the usual way. Traders who are members must enclose a signed declaration that the items for sale or wanted are part of, or intended for, their own personal amateur station.

The RSGB reserves the right to refuse advertisements, and accepts no responsibility for errors or omissions, or for the quality of goods offered for sale. Advertisements for citizens band equipment will not be accepted.

Warning. Members are advised that they should, as far as possible, ensure that the equipment they intend to purchase is not subject to a current hire purchase agreement. The "purchase" of goods legally owned by a finance company could result in the "purchaser" losing both the goods and the cash paid.

The current rate is £2 for 40 words or less: advertisements containing more than 40 words will cost an additional £2 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.

The closing date for the **September 1985** issue is **Thursday 11 July**

Post to: MEMBERS' ADS, RSGB, 88 BROOMFIELD ROAD, CHELMSFORD, ESSEX CM1 1SS
Do not post to RSGB HQ or Advertising officer.

FOR SALE

Shack clearance, Tektronix 581A 'scope, complete with leads, adapters, probes and six plug-in units, types L, K, G, D, H, CA dual trace, exc cond and wkg order, will exch for hf rig. Original Collins TCS stn, complete, used regularly, exc cond, offers around £130. Will exch for 2m multimode or w.h.y, comprises tx, rx, mains pu, atu, cables, remote unit mic, h/book. Two more Collins TCS units, one tx, one rx, orig and wkg, £30 ea. Two Collins rxs for spares or renovation, £15 ea. BC348R rx, exc cond with built-in pu, £55. Collectors item, RME 1938 comm rx, original and complete, with orig spkr and few notes, works well, £75. Three Solartron pus, 0-500V Stab and 6·3V ac, ideal for HRO, 1155, or small tx, as brand new, £30 ea. Solartron 20MHz frequency counter, exc cond, £40. Sony b/w reel to reel video recorder, complete set up with recorder, camera, mains unit/charger, leads, spare tapes, spare battery, carrying case and monitor, all Sony exc quality equipment, offers around £250. Exch for gd hf rx or tx/rx, w.h.y. Marconi RF power meter, 0-150 and 0-300W, 75Ω with mains blower unit superb cond, £40. Or will exch any of these items for photographic equipment. G4LBY, QTHR. Tel Mansfield (0623) 29473, evenings before 9pm.
TR2300 cw nicads, all accessories, orig packing, Wood and Douglas 10W pa and preamp, in metal case with RF switching, £100 ono. G4TXK, QTHR. Tel Leeds (0532) 864297.
Ferguson video 3V16, new heads fitted, fully overhauled with slow tracking, £180 ono. *Wanted* Collector requires pre 1940 domestic radios, especially any set with tree or rising sun fret work. Pilot round dial set. Ultra 47. Early radio books,

mags, wholesalers catalogues. 1920-30 valves. G4OOW. Tel Hinckley (0455) 612091, after 7pm.
Transformer/choke set for 807 P-P, fully encapsulated and metal screen (MU), mains HT plus LT, o/p multitapped If, soothing choke 12H 200MA, suitable Cs and pre-drilled chassis included, and four other transformers, £30. Buyer collects. G4MYR, QTHR. Tel 0272 735014.
Yaesu FT902 atu, as new, with manual, £95 ono. B/W 3·5-30, continuous coverage antenna, only used two months, offers. MS1 morse tutor, £70 ono. Yaesu FT707 psu, 20A, offers. GW0ADS, QTHR. Tel 0545 560263.
Drae psu 13·8V, 24A, perfect cond, £85 ono. G4TQJ not QTHR. Tel Tadley (07356) 2594, after 6.30pm.
Trio TR2500, rubber duck, soft leather carrying case/belt clip, as new, in orig packing, £200 ono. P Dove. Tel Etwall (028 373) 2101, after 6pm.
FT101Z Mk3, mic, fan, nine bands etc, used only for rx, £390 ono. Gerard, GI1HRK. Tel Belfast 0232 241289.
FT1G, vgc, including fm board, MH1B8 and three filters, gen cov tx/rx, with five months guarantee, £1150 ono. P/exch with cash, for any Ford or Vauxhall car over W reg. Clive. Tel (0279) 28857.
FT707, FP707, FC707, FTV707-2m, FV707DM, YM35, mic, stand, and fm board, offers around £750. Will consider FT290R down payment. G0AJD, QTHR. Tel Leicester 676228.
Tektronix 543B oscilloscope, gwo, complete with dual trace 33MHz, quad trace 20MHz, and Hi-Gain differential plug ins, together with service manuals, second mainframe (believed wkg but untested), ideal for spares, the lot, £100. Individual prices negotiable. Durst M601 b/w enlarger (110-2·5sq), with two exc Schneider Componon lenses, masking frame etc, offers. Delivery within reasonable distance possible, in return for donation to petrol costs. Ray, G6YOV not QTHR. Tel Aldershot (0252) 25165.
Standard C7800 70cm mobile or base, 1W/10W, vgc, £145. G8YVW, QTHR. Tel 0743 375790.
Hitachi video recorder SV630, £35. Ferrograph tape recorder 1960 vintage, £15. Mullard valve tester, £10. Teleprinter RS232, £15. Plessey SL600 series ssb tx/rx, £20. Marconi TF801B sig gen 12-470MHz, £80. PYE D18T 405 line tv, 50s vintage, £20. Tel 0453 822038.
TS7730 2m fm tx, 25, scanning, memories, mic, mobile mount, 1λ/4 wave magn mount antenna, £180. MC50 desk mic, £20. Hand key Hy-mound HK708, £10. Sinclair Spectrum 48k psu, manual, £80. G4KWA, QTHR. Tel 01-777 9061.
Icom ICO2E 2m fm handheld, complete with nicads, charger, rubber duck, instruction manual, boxed as new, extras include hand mic/spkr, headset, switchbox, car power lead, spare battery box, case, £220. David, G1JFD, QTHR. Tel Wirral 051-625 5473, evenings.
Service manuals, copies for Hallicrafters S20, S27, SX62, £4.50 ea. SX28, £7.50 ea. Marconi CR100, £12. 2207C, £8.50. 2232B, £6.50. Many others, sae enquires. Lots back issues mags, sae list. M Small, 8 Cherry Tree Road, Chinnor, Oxfordshire OX9 4QY.
Trio 9130 with Sota 100W linear built-in psu and preamp, specially converted by Sota for 25W i/p, £500 the pair. Will split. G6MSM. Tel Eastbourne (0323) 840209.
Yaesu FT101 2D Mk3 fm, £475. FR101D, £200. SEM Tranz match 80/10, £65. KW107 supermatch, £80. HQ miniquad, £80. Peter, G4SFG. Tel 021-544 8849, after 5pm.
Icom IC271E 144MHz multimode, 25W o/p, few months old, £540. G3WZT. Tel Horsham (0403) 710565, evenings.
R216 rx with matching psu, 19MHz-157MHz in five ranges, mint cond, £75. Airmec sig gen 1MHz-30MHz, exc cond, £30. Pye hp/fm hi-band bantams with circuit/alignment data, £25. Hi-band AM10B Cambridges, gd cond, £10. Collect/carriage. G3MOE, QTHR.
Valve manuals, copies available. 10 different data manuals, £12. Post, £1.50. Two different valve equivalents manuals, thousands listed, £2.95, £5.95. Post 50p. Back issues various mags, lots of ICs etc. LSAE lists. M Small, 8 Cherrytree Road, Chinnor, Oxfordshire OX9 4QY.
Commodore Pet 32k 12in screen, full size querty keyboard, basic 4·0 complete with manual, £170 ono. Tel Bradford (0274) 637972.
Kenwood Trio TR9130 multimode tx/rx, 25W o/p, gd cond, including 7λ/8 mobile antenna on gutter mount (this rig is £500 new), £350 ono. Hugh Davies, G1BUE. Tel St Albans 32759, evenings or weekends.
Welz AC38M atu, vgc, £40. Welz SP15M meter, £30. Trio TR2300, mint cond, nicads, charger etc, £125. MML 144/30LS amp, mint, as new, £60. G6YYU, QTHR. Wymondham (0953) 604626.
Commodore colour 1701 composite monitor, £125. Addonis 503 desk mic, £25. Tonnas 9-ele 2m, £10. 2-ele 70cm (432), £15. Jaybeam LR1/2M colinear, £5. Global AT1000 rx atu, £15. Superkrunch noise gate, £5. G6VCI, QTHR. Tel Royston (0763) 61102.
Datong RFA wideband preamplifier, 2-200MHz, £20. Datong dc 144/28 2m converter, £25. SEM visa 80m rx, £20. All units in gwc. Please write—M Vasey, 35 Nash Road, Romford, Essex RM6 5JL.
Commodore computer series 3034, upgraded to DOS 4·0 40/80 column green screen, large keyboard complete twin disc drive 3040 and dot-matrix printer 2023, Wordpro 3 and all extras for complete system, exch or sell, w.h.y?. Ron, G3AAJ, QTHR. Tel 01-989 6741.
Dentron GLA1000, as new, £300. ICAT100, mint, £230 FT290R FL2010, MMBTT, nicads, the lot, £300. FT790R, FL7010, MMBTT, nicads charger, the lot, £300. All above, £1030. Grundig satellite 3400 ssb rx, as new, £290. G4VON. Tel 0780 720543, evenings.
Antenna tuner Yaesu FC902 all band, 10-160m, provision for four antennas including open wires, £95. G4VZZ not QTHR. Tel Ashford (Middlesex) 44265.
FDK 2m tx/rx, 1-25W, variable, fm only, ideal mobile rig, complete with accessories, as new, £160. Alan, GW6ZCR, QTHR. Tel Wrexham (0978) 840473, after 5.30pm.
Star 700 five band 100W ssb tx, matching 700A rx, superb base stn, £200. Pye W15U 6-ch boot-mount, complete cw Toneburst, Wood & Douglas preamp, RB2, RB6, RB11, RB14, SU8, £100. Creed 444 teleprinter, £30. G6IAI, QTHR. Tel 0323 898929.
C78, vgc including case, spare nicads and charger but no 0·25 wave, will include 5λ/8 over 5λ/8mag mount, £160 ono. Paul. Tel 0454 317655, after 7pm.
Trio R2000 rx, fitted VC10 converter, YG455C filter, AT230 tuner, HC10 clock, HS6 phones, Telscan antenna, complete rx stn, boxed in mint cond (cost new £910), £675. Tel St Albans (0727) 69452.
MM4001 rtty tx/rx with RCA keyboard, also 12in professional vdu, £225. Microwave Modules 70cm linear preamp 432/30L, 1/3W i/p, 30W o/p. £95. Katsumi electronic keyer EK150, £65. All in exc order. G3OZN, QTHR. Tel Worksop (0909) 474650, after 5.30pm.
Versatower P60, gd cond, £350. Hilomast 30ft pneumatic mast, £100. CD45 rotator, 30m cable, £45. Jaybeam C5, £25. C8, £25. Codar AT5 and psu, £30. Tel Lymm, Cheshire 3796.
PSUs, Belcom liner 2, homemade, 13·8V, 5/8A psu, Morse key and buzzer, 5λ/8, 2m mobile antenna. Philips clock radio with 24hr display. Waltham stereo cassette deck, offers. G6BGW, QTHR. Tel 061-665 1722.
Pye equipment, F9U 5W uhf fm tx/rx, unmodified, £40. TA40 uhf fm tx, wkg on 70cm, £30. PF2 3-ch uhf fm, handheld, £40. PF2 vechicle adapter, £25. All with data. Buyer collects or carriage extra. Tel 0280 812195, after 6pm.
TH7DXX eight months old, as new, £490. T2X Tailtwister rotator, £250. G4XZX, QTHR. Tel 061-788 9351.
Yaesu FRDX400 frequency range from 1·6MHz to 148MHz, 27MHz, wwv, ssb, cw, a.m., fm, spare valves, manual, orig packing, £100. G1CGX, QTHR. Tel Naphill (Bucks) 3626, evenings.
Chimneys PTFE for 4CX250/350 bases, £2.50 pair. B/W video camera/monitor psu, new, £70. Philips V200 video colour camera and accessories, gwo, £150. Prowest colour monitor high res tube RGB/composite in, £50. G8VVG, QTHR. Tel 04022 2146, Saturdays 9am-5pm.
Relays Hi-Gain TO5 transistor can, two pole changeover, new, 26V coil but operate down to 12·5V, (3400Ω), suitable for signal switching up to 500MHz, £5.90 ea. G4KNZ, 2 Beaconsfield Road, Aylesbury, Bucks. Tel 0296 22782.
Trio 7200G 2m fm all repeater and four simplex channels, exc first rig, £75. 5λ/8 car antenna, £7. 5-ele beam, £8. John, GW4LFF. Tel Llantwit Major 4587.
Icom 251E, mint, Jaybeam PBM10/2M, slim Jim, vertical 10-80m plus radial kit, new, dummy load 15W, Welz SP15M, Drae vhf wave meter, Welz SP15M, western antenna switch, 2BXC 2m beam, offers. G6GBP, QTHR. Ashford Kent (0233) 26277.
Antique radios, Marconiphone rx type 82, less valves and horn. Brookmans, two PW 1929. Radio similar to Brookmans, with three valves. G14SVO, QTHR. Tel Bangor (Co Down) 0247 458700.
Computer S100 based, disc, monitor, 64k ram, £200. Heathkit SB303 rx, £100. Wood and Douglas 2m synthesizer package, needs boxing, £75. Drake SSR1, £55. Crofts. Tel Leamington Spa 313308, evenings.
Complete 10fm mobile stn, DNI M40, Nevada 25W amp, mobile whip, cable assembly and gutter mount, all in first class cond (list price £80), £52. David, G4JLU, QTHR. Tel 01-958 9180.
Dymar T100A marine mf/hf ssb tx/rx, 150W o/p, gd order, with manual, £250. Heathkit DX-100U tx, plus ssb adapter, £75. Books, 1921 Wireless telegraphy, *How to make.* GM4CMI, QTHR. Tel 0856 3803.
Robot 400 sstv, fast to slow, slow to fast converter, £300. G4GOZ, QTHR. Tel 0282 8135300.
Microwave Modules MM4001 rtty tx/rx with Ascii keyboard, £175 post paid. Monitor, green screen. GD3ESV, QTHR. Tel 0624 75026.
FT290 Mutek board, listen on i/p, nicads, case, boxed, mint cond, £230. Buyer collects or pays postage. *Wanted* Aircraft band tx/rx 320-ch, will consider glider frequencies. FT208 PA3-DC car adapter. Jeff, G6XRL, QTHR. Tel Poynton (Cheshire) 876192.
B40 rx, all bands full wkg order, £70. Buyer removes. *Wanted* Victorian musical boxes in any cond, or similar items. Brian, G4NXW, QTHR. Tel 0706 224617.
TS130V hf 10W tx/rx, vgc, £330. Antenna azimuth and elevation twin rotator system, very sturdy and ideal for Oscar, complete, £120. G4BBR, QTHR. Tel 0242 527588.
FT209R with FNB4, NC15, spkr, mic, mobile mount, PA3, £300. FT730R, £180. 48-ele MB, £25. GPV7 colinear, £25. HQ1, £50. House move forces sale. G4OBS not QTHR. Tel Wilts (0980) 862489.
Kenwood VFO240, remote vfo for TS530S, as new, unused, £65. G4PG, QTHR. Tel 0245 72881.
TR7850 2m fm, 40W o/p, £185. MM144/3V RF switched preamp, £25. Trio BC1 memory back-up, £5. AVO multimeter, £35. *RadCom* 1973-1984, complete, £12. Buyer collect or arrange carriage. G3DOG, QTHR. Tel 0932 226076.
Icom 251A, cw, desk mic, mint cond and original packing, £350. SMC-HS mobile vertical hf antennas for 28, 21, and 14MHz, also magnetic base, £30. Buyer collects or arrange carriage. G2LL, QTHR. Tel 04243 (Cooden) 4645.
Nortower 30ft three section latice, winch, lines, new, £200. Buyer arrange collection. Western DX33 3-ele beam, unused, £130. G3HCQ, QTHR. Tel 0780 83278.
KW2000A, ac psu, immac, £160. Collins 51J2 rx, 0·5-30·5MHz in thirty bands, wkg well, £120. Hallicrafter HT37 tx, ssb/dsb/cw 100W, 80-10m, exc cond, £80. All with manuals. G4IPI, QTHR. Tel Maldon (Essex) 76572.
Cumana CSX200 disc drive, used little, £120. 2m 7XY Yagi, unused, £25. 2m 5/5 slot Yagi, gd order, £20. 2m 70cm amplifier-tripler 3W i/p, 6+W o/p £15. 2m-10m converter, £15. G8EZE, QTHR. Tel Plymouth (0752) 46489.
KW204 mains transformer, recently new, 160-10m, 150W cw/ssb, some spare valves, mic, handbook, used daily until recently, offers £100 or over. Matching KW202 rx, WS38 Mk3, offers. G4EUW, QTHR. Tel Brightlingsea 020630 3071.
FT101Z with fm, as new, £395 ono. G3SHQ, QTHR. Tel Twyford (Hants) 713003.
Yaesu FT208 handheld tx/rx, with NC8 psu/charger, spkr, mic, and 0·25 wave telescopic antenna, all in exc cond, an outstanding rig, buyer collects, £210. GM4COX. Tel 031-332 5300.
Marconi TF801B/1 sig gen 12-470MHz a.m., vgc, with manual, £110 ono. G8LCD. Tel 01-427 1379 after 6pm.
Trio Kenwood TS930 tx/rx, with gen cov and fitted automatic atu, the ultimate, cost £1515, unmarked and in pristine cond, save £500, handbook and original carton, £995. G4IOF, QTHR. Tel 01-486 3286 (work), 01-722 7040 (home).
TA32JR Mosley 2-ele triband beam, £60. Regret buyer collects (12ft long), or exch for Cushcraft AV5. G3JMO, QTHR. Tel Redcar (0642) 486155.
Wide spaced high power hf variable capacitors, approx 600pF, £10 plus post. Power card 12V/1·5A computer psu module, £7.50 plus post. Bantex 2m 5λ/8 mobile whip, £5. G4AZC, QTHR. Tel 0843 61448 or Prestel.
LAR omni-match antenna tuning unit, £30. Trio JR310 radio rx, amateur radio bands, £90. The LAR omni-match is for listening only. Tel Wood Cloche 378.
FT726R vhf base stn, complete with 2m, 6m, 70cm modules, also satellite module, full duplex, 300Hz cw filter (ceramic), todays value new £1541, this rig is mint, used little, £1050. Carriage extra. Tel 0202 534933 after 6pm.
Trio TW-4000A, 25W fm, 2m and 70cm, complete with SMC258 70cm 2×5λ/8 fold gutter mount antenna, and SMC78F 2m 7λ/8 fold gutter mount

antenna, £395. G3XVN, QTHR. Tel Biggleswade 318882.

Valves unused, 2E26, 6CH6, 6BW6, OB2, 572B, UCH42, PCC89, EL81. Used, 6AQ5, E182CC, N78, EF80, EF91, EBC41, DH77, 12ATY, ECC82, 6BX6, QQVO3-10, EB91, EF85, PCL83, EABC80, DAF96, EF183, EF184. E Searle, G3VMY, 203 Church Road, Earley, Reading, Berks. Tel 0734 663506 evenings.

Tono 350 rtty rx terminal. Diawa CNW518 atu, 80-10 high pwr. Diawa PS300 30A psu. Tel 0294 62955.

Moseley TA33JN beam for spares, all metal work ok, £25. Buyer pays carriage. G3OOQ, QTHR. Tel Stratford upon Avon (0789) 205973 evenings.

German valves, RV12P/2000, eleven, £1 ea. Lot for £10 post paid. Pair new unused RCA 811As, £18. Seven 2m xtals, £1 ea. MK704 twin paddle, new, £8. Several electronics' i.f.s, Eddystone condensers, Oxley temp, trimmers. G5LH, QTHR. Tel 091 2662490.

Trio 9500 70cm 10W multimode, £385. TR9130 2m 10/25W multimode, new Oct 84, £395. Daiwa PS300 30A, £140. FTV707 2m transverter wired for TS430, £135. TR3200 8-ch, £100. All mint with boxes, manuals. AOR240 handheld, accessories, £110. G4TKP, QTHR. Tel Derby 383442.

Very reluctantly must sell K2RIW and psu, built by GJ4ICD, used one contest only, £650 ono. IC471E with PS25 psu, guaranteed, used only twice, £650. Mutek SLNA144S, £25. MM preamp MMA144V, £12. Ken, G8GEA not QTHR. Tel 0342 311475 after 6pm.

Microwave Modules 2m converter MMC144/28, 2m down to 28/30MHz, as new, £20. Post free. G1ILW. Tel 061-231 3025.

Trio 9130 multimode, brand new, boxed, all extras, guaranteed, £450. MM 4m transverter, 2m, i.f., £50. ICB1050 10m, £40. 10/11m vertical, £10. 70cm converter "S" model, 2m, i.f., £25. ATV tv converter, £25. MBM88 element 70cm atv, slight damage, £35. Tel 0923 662567.

Drake C-line, all extras, £550. Standard C58 cw MML 30W, case, nicads, mobile mount, unique base stn mount, £275. HO10 scope, £30. FC102 cw psu, £140. Datong preamp, £10. Datong clipper, £20. Shure 201, £10. Offers. G4JBH, QTHR. Tel Yeovil 23873.

Icom IC25E scanning mic, 5λ/8 whip and gutter mount, mobile fittings, all mint, £160. G3GAD, QTHR.

2m mobile linear, 2W i/p, 45W o/p, £20. G3WET. Tel Aldridge 51551 evenings.

MBA RC AEA morse baudot, Ascii code reader converter tx, £95 ono. *Wanted* Yaesu Y0901 scope monitor. A F Sephton, 16 Bloemfontein Ave, Shepherds Bush, London W12 7BL. Tel 01-749 1454.

FDK multi 750X 2m multimode, 1W/10W, base mobile, dual vfo, up/down scan mic, dc power lead, boxed, as new, no mods with Spectrum variable gain preamp, exc value, £220. G6IAQ, QTHR. Tel 0527 46365.

Reorganisation sale, Icom 251 with Mutek front end, £400. Trio TS120V with AT120 tuning unit, £250. Trio TL120 amplifier, £135. Jaybeam TB3, £145. David Brown. Tel 0604 847658.

"Silent key" Equipment of late G4ZUB, Drake T4XC/R4C, three filters, MS4/psu/spkr, £600. R4C, £280. Yaesu FT221R Mutek VAR/PWR, £350. MMT432/144 transverter, £110. Sem Z-match, £25. Cushcraft 2m/12-ele Yagi, plus 40ft H100, £25. Jaybeam V3 TRP/VERT, £35. All ono. G3GC, QTHR. Tel Yeovil 75533.

Yaesu 101B tx/rx, late model 10/160, with new valves, fan, fm adapter, boxed, manual, leads and mic, checked thro and gd for 10 years. W Smith, G3HHZ, 1 Barton Drive, Paignton, Devon TQ3 3SH.

IRCs, five, £1 plus sae. FT203 handheld, gd cond with slow charger and FBA3 nicads, £140. G6HOH, QTHR.

Pye pocketfone PF2UB, with RB0, RB4, RB14, SU8, SU18, SU20, six batteries, service sheet, 3W, PA, £75. *Wanted* Accommodation for student (industrial year), in Leeds, from mid-August. Mike Tubby, G8TIC not QTHR, 8 Waterford Close, Worcester. Tel 0905 55283.

Atlas RX110 hf amateur bands rx, £70. Petite 32k memory for Pet computer, £20. Vintage radio bits, many coils, capacitors, valves from 20s', £30 or split. G8EUX, QTHR. Tel Towcester (0327) 51716.

Icom IC25IE 2m multimode base stn, mint cond, no mods, £375. Drake SSR1 hf gen cov rx, thirty 1MHz bands, vgc, £85. G4CEC, QTHR. Tel Northampton (0604) 61726.

Trio Kenwood TS830M (same as 830S but with a.m.), brand new, used for one month only, been boxed for 18 months, unwanted gift (stn QRP), £600. No offers please. Ron, G4SIS, QTHR. Tel Billericay (02774) 3224, daytime.

CWR 600 morse master cw/rtty reader, 9in vdu, uprated amateur/commercial and rtty phase reversal switches, instruction booklet, £95. New Millen Transmatch atu/swr meter, high grade American type, £85. G3TJY, QTHR. Tel 0202 622 142.

MMT 432/144R 70cm transverter, with 15dB attenuator, as new, £110. DX302 quartz systhesized comm rx 0·01-30MHz, digital read out, first class cond, boxed, £110. Buyer collects or pays postage. G6YLA, QTHR. Tel Bracknell (0344) 428218.

TS780 2m/70cm, with matching SP71 spkr, immac cond, as new, £750. G6PFX, QTHR. Tel 0432 850704.

Quad 22 control unit (stereo), Quad 2 power amplifier (mono with KT66s), Leak TL12 (copy), with EL 84s, for complete stereo system, £30. Tatty Pye 2m base stn, £5. Buyers collect. Clark, 21 Betony Walk, Haverhill, Suffolk. Tel 0440 63154.

Yaesu FT102 hand mic and extra tech supplement, immac cond, any test, £530 ono. G3KAJ, QTHR. Tel Chorley 71343.

Trio TS120V QRP hf tx/rx, 20W i/p, digital frequency display etc, £275. Matching TL120, 100W linear amplifier, £125. Both items boxed, gd clean cond, complete with mic, leads, workshop manual, postage paid. Graham, G4VOE, QTHR. Tel 061-740 4126.

RTTY complete tx/rx unit, home/portable, requires 13·8V all leads to connect to your tx/rx, tv cassette player, 16k computer based, learning laboratory, plus other software included, built-into professional metal keyboard, £75 ono. G4OAK, QTHR. Tel 09066 5151.

FC757 auto atu, mint cond as new, orig packing, £190. G4UBK, QTHR. Tel Tiptree 816662.

HRO mini valves, psu and coils, much modded, grotty but wkg, ideal young swl or experimenter, £25. Converter 2m-4/6MHz, £5. G4GHG, QTHR. Tel Torquay (0803) 37050.

Vintage stuff, sixties style cw/a.m. stn, with Heathkit DX100U tx, HRO rx, No10 xtal calib, xtal conv 10-15-20, all psu's heavy, but will deliver for petrol cost, offers—£100. G3UFW, QTHR. Tel Romsey (0794) 515884.

2m fm mobile outfit, Icom 255A 25W o/p Addonis mobile mic, 7λ/8 whip and gutter mount, £160. Buyer collects. G4UPB, QTHR. Tel 0582 696211.

Yaesu FT480R, with mobile mount, manual, orig packing, £280. Drae 6A psu, £40. Realistic DX200 comm rx, manual and packing, £80. All ono, consider exch for decent hf rig. GW4VRO, QTHR. Tel Pembroke (0646) 686536, after 6pm.

KW Atlanta 3·5-28MHz, 400W, nearly new, PAs going QRP, £120. Hacker record player, plus matching stereo amp, £12. G3SAO. Tel 061-652 6529.

FRG7 with ssb filter, external digital readout and manual, mint cond, £135. Buyer collects. G3HVA, QTHR. Tel Basingstoke (0256) 780482.

Icom IC251E, SP2/SM5, £390. SX200N scanner, 26-512MHz, £180. FRG7 rx fm mod, digital display, £190. Pye T462 15W, RB0, RB12, £15. Top band tx 5763, £15. Rtty clock, £40. Rtty keyboard, £20. AF oscillator HP 200-C, £10. Marconi tx/rx test set TF982, £15. Creed equipment 75RO, £25. Electronic perforator, £20. 7TR/3 perforator, £10. 6S6M reader, £10. Page winder, £10. Heathkit GDO GD-1V, £15. PFIRX SU20, £4. TV rx AF amplifier with video o/p, £15. Watson, G3WHQ. Tel 01-211 6278, daytime.

Drayton 1rpm reversible main motor, square and round shafts, £30. Garrard A16 autochanger, £10. ZX81 keyboard with connectors, £8. Roller coaster coil 56t×2·5in d, £10. VHF package, Yaesu FT480R, Microwave Modules preamp MMA144V, Tronix 13·5V 6A psu, 5λ/8 whip and mag mount, all immaculate, £360. Carriage extra or collect. SAE for misc parts and valves. *Wanted* FT225RD in gd cond. G3GOT, QTHR. Tel Terling (024533) 229.

HQ1 minibeam, 2m Ringo R, 70cm Ringo R, 70cm 12-ele X Yagi, Electronic developments 70cm, 50W linear, built-in psu, reasonable offers for each item. Buyer collects. G4NUM, QTHR. Tel 0532 686016.

Yaesu FRG7700 plus atu, FRT7700, FRV7700 type D, Datong active antenna, 70cm converter, homebrew, £350. Eddystone rx 940, immac cond, handbook i.f. selectivity xtal filter, £125. Buyer collects. John. Tel Sheffield (0909) 565856.

Pye mono video camera, two video monitors, uhf/vhf tuners with scales, three L/spkrs, AVO8, boxed components wire wound and carbon resistors, Labgear colour bar generators, capacity bridge, EHT unit, offers. Hawes, RS9191. 24 London Road, Kessingland, Suffolk. Tel 0502 740336.

Yaesu 70cm module for FTV107R, complete with 70cm UK repeater xtal fitted, as new, boxed, in use since January (list £270), £210. Carriage included. John, G4WLD. Tel 01-857 8096.

ICS software/interface for CBM64-AMT1, £25. Teletype ASR33, stand, silencer cover, tape punch/reader, built-in RS232 and psu, ready to connect to TU for rtty/amtor, £40 ono. 12 rolls teleprinter paper, £10. G6VS. 71 Heypark, Huyton, Liverpool L36 6HS. Tel 051-480 6603.

Trio 9130 multimode, as new, complete, boxed, £375. 10xele Jaybeam, gd cond, £25. G4YIJ, QTHR. Tel 021-747 3303, after 4.30pm.

Trio TS830S with cw filter, £600. IC740 with fm, cw filter, internal psu, mic, £550. MML144/100S linear with RF sensed preamp, £100. MMT432/144 transverter with repeater shifts, £100. MMT 70MHz/28 transverter, £90. MMT144/28 transverter, £75. MMC50/26 converter, £15. Lunar 144MHz RF sensed preamp, £20. SSB Products 1296MHz GaAsfet preamp, £45. SSB products 144MHz MH with controller, £65. Trio FFC230 external vfo, £30. Ampere APB67A 10/50W RF sensed 430MHz linear, £45. Lunar 430MHz EME preamp 1dB NF, £35. Drake MN2700 hf atu (1KW), £175. ICR71 rx with fm, narrow cw, IC11 remote, £600. G3OSS, QTHR. Tel 01-349 0511, evngs.

AMT-2 Amtor, rtty and cw terminal unit, £145. Roland MB121A 12in Amber monitor, £75. T435 144-432MHz power/swr meter, £25. Lowe FX1 GDO, £15. All as new. Stuart, G4MIB, QTHR. Tel 01-675 0280.

Commodore 64 with 1541 disc, MPS801 printer, cassette and RS232 i.f. basic, pascal and assembler compilers on disc, as new, £450. Stuart, G4MIB, QTHR. Tel 01-675 0280.

Swan Astro 102BX 160-10m, not warc, twin vfo, full disc, cw wide, cw narrow, passband tuning, notch filter, speech processor, operator's handbook, service manual, unique high quality rig, incl psu and delivery, £400. Amtor compatible. GM4SID. Tel 0224 584774.

Elbrex 906 monochrome surveillance video camera, with wall mount, mains psu, zoom lens/pan function, gd cond, £55 ono. 23cm brass PA cavity (single 2C39), £55 ono. 23cm brass/copper interdigital filter, gd, £25. Tel Paul, Crawley (0293) 515201.

Shack clearance, FT290R, new, boxed, £300. FT230R, £200. C58, £200. TR2300, £100. KDK2030, £175. FT102, £565. TS120S, £400. FT77B, £350. All mint cond, ono, with manuals and boxes. GW3XCR, QTHR. Tel 0792 401058.

Rotatable 35ft sectional mast, drive motor, illuminated indicator, guys, 50ft control/coaxial, £60. 9in vdu/video monitor, £9. Collins mech filter FY455Y-60, £15. Collins 25mA meter, new, £3.50. Lambda reg psu 13V ± 28A (cont), £45. 100kHz HC6U xtal, £1.50. G2HCV, QTHR. Tel 01-866 4871.

Ex-Army portable vertical antenna, comprising 10×3ft threaded sections, 14ft whip, and superb base insulator, guys etc, all contained in canvas holdall, £20. 19 set variometer (atu), £10. G3EHG, QTHR. Tel Wolverhampton 700609 evngs/weekends.

Icom IC2E with accessories, mint, £130. FT101Z, fan, handbook, mint, £325. FT200 200W o/p, £190. 10m vertical antenna, new, £8. Rig, £20. Buyer collect or pay postage. G4KDM, QTHR. Tel Huddersfield (0484) 863489, day, 864086 eve.

Yaesu FRG7 hf rx, with timestep DFC and fm detector, handbook included, all in perfect wkg order, £80. G6WJZ, QTHR. Tel 0527 77963.

Drake TR7 cw PS7 (both with fans), incl DR7, AUX7, NB7, three VLF modules, all WARC bands, filters-1800, 500, 300Hz, Shure 444 mic, very clean cond, spares include: plugs, fuses, new pre-driver board, technical and operating manuals, distributor maintained, one owner, £950. G8LT, QTHR. Tel 0327 860321.

TS430S with FM430 and filters, £625. FC102 atu with four-way switching unit, £140. HFSV with radial kit, £60. Alinco ELH710 linear, £40. MC60 desk mic, £30. Welz DP-LOR elevated ground plane (vhf/uhf), £12. G4VET, QTHR. Tel 01-647 1879.

2m tx/rxs, Icom 240, 10W modified to cover 80-ch and FDK quartz 23-ch fm, both exc, £90 ea. Other miscellaneous equipment. G6XRP, QTHR. Tel Radlett 2411 or Luton 423495.

Drake SP75 speech processor, Drake R4B rx with MS4 spkr, Trio SM220 monitor scope, Yaesu FV901DM digital vfo with 40 memories, Trio DFC230 digital vfo, fits 120/130, 830 ranges, all gear very nice condition. *Wanted* Drake RV75. G4HSB, QTHR. Tel 0642 816608 evngs.

Yaesu FT101Z a.m. nine bands, 18 months old, £375. Icom 240 2m fm, with 7λ/8 whip, £95. G4NZE, QTHR. Tel Bedford 63567 after 6pm.

Drake T4XB, R4B, AC4, manuals, spare valves, vgc, £380 ono. Yaesu FL2100B, manuals vgc, £280 ono. Yaesu FR50B gd cond, £55 ono. Daiwa DK210 keyer plus Hi-mound MK704 paddle, as new, £40 ono. Trio TR7730 synth, 2m fm, boxed, £120 ono. Tel Leeds (0532) 659227.

Shack-house clearance, bring along the xyl, another bargain, your price sale of surplus equipment at this QTH, 14-15 September, 10am-5pm, both days. G3YRB, QTHR.

Racal RA117E gen cov hf rx, cased, set of spare valves and manual, £180 ono. Matching tx MA79, spare valves and manual, £150 ono. Matching vswr meter with high vswr ht trip, £15. Marconi sig gen, 10-480MHz, £100 ono. Five 4CX250B, £8 ea. Three bases, £3 ea. Chimney, £2. G4PXW. Tel Maidstone (0622) 51844 after 8pm.

Icom ICR70 rx. Tel 041-638 0329 after 6pm.

QST Jan 59-Dec 67, Apr 70-Dec 74, *CQ* Nov 67-Dec 68, *Ham Radio* Nov 78-June 79, £5 per year plus postage. Ham radio morse keyboard, £12. PW vdu board, Elektor morse decoder board, £5 ea. TW 28-144MHz transverter, £40. Marconi sig gen TF390G/3, 8-145MHz, £20. Hudson FM208 tx/rx, £15. Silver Sentinel 9MHz ssb filter, and carrier xtals, £15. Knightkit valve voltmeter, £20. Several 8MHz xtals for 2m, £1 ea. G3NXT. Tel 0553 828339.

Trio DFC-230 digital vfo for TS120/130 TS830S mic, mobile mount, boxed, £75. Antennas, DCP4, 10-40 vertical, £40. 2m co-linear, £20. 70cm 12XY crossed Yagi, £20. All vgc. G4GGK, QTHR. Tel Rushden (Northants 0933) 314797 or 01-629 3345, daytime.

Trio Kenwood TS130SE, £375. AT130, £75. DFC230, £75. All three complete, £495. Good cond. John, G4SOM. Tel Sheffield (0742) 451702 after 6.30pm.

WW2 no 19 very rare Mk2 1942 Russian version, original cond, wkg order. Mk3 1943 English, complete with psu, headgear, control boxes, atu, spare valves. Sensible offers for these collectors items. Tel Colin, Aldershot 332288.

FV101Z, £50. KR400 rotator, as new, £35. P30 Versatower, £160. G3PSV. Tel 0276 65615 after 7.30pm.

Mirage B1016 2m amplifier, 10W for 160W o/p, 10dB preamp, ssb/fm, facilities for remote keying/control, £110 ono. SSB Electronics (SV1440S(M)) low-noise 2m masthead preamp, with remote feed switch (DCW15) handles, 800W 15dB or 20dB position, £50. G4ISK, QTHR. Tel Crowthorne 771141.

Yaesu FT102 a.m./fm, seven months old with YM38 mic, superb cond, boxed as new, £575. CP5 80-10m vertical, as new, £75. Tony, G0AHB not QTHR. Tel 0992 59481.

HRO psu coils, spare chassis, £50. R107T, vgc, RAF rx, £40. B40 Admiralty gen cov rx, £50. Lafayette HA63A rx, not wkg, £10. Tony Baker, BRS50688. Tel Colchester (0206) 575035.

FT290R case, nicads, charger, whip, exc cond, £220. G3OIS, QTHR. Tel Kelshall (Herts) 378.

Kenwood desk mic MC60 N4 (4 pin), £30. Buyer collects. Exc cond. G4MBP, QTHR. Tel Cheltenham (0242) 527651.

FT107M tx/rx Intel psu, narrow cw filter, digital memory, solid state, with FC107 matching atu, £530 ono. M/Modules transverter 144/432R, £115. Spacemark SRD1 rtty terminal unit (old tones), £40. G3JXG, QTHR. Tel 0482 842386.

Yaesu FT480R, £220. Realistic DX300 hf rx, £90. Kenpro KP100 squeeze key, £40. Jaybeam 10XY, £25. Hygain 18AVT, £60. Philips 2020 video, exc, £120. G4PNP not QTHR. Tel Peacehaven (Sussex 07914) 87243.

NAG 144XL, 2m linear RF o/p, 250W p.e.p., with regulated 13·5V supply built-in, used one hour only, boxed, £300. Sharp front load video recorder, VHS, seven day, seven programme timer, indexing etc, £120. Tel 04868 29757 evngs.

Trio custom special JR599 rx, pre warc 79, 160-10m and cw filter, 2m converter, TX599 tx, 180 p.e.p. 80-10m, vgc, £280. Yaesu FTDX560 80-10m tx/rx, 560W p.e.p. and cw filter, £180. One must go. G4XMK. Tel 08833 4718.

TR2400, practically unused, 144-148MHz, 1·5W, thick leather case, mains charger, £140. SX200N scanner 26·514MHz, with ssb adapter, as new, £230. FR7700M, vgc, £260. FT101 series workshop manual, £17. Tel Hampshire (0730) 892143/893534.

Murphy radio, three band, six valve, £15. AVO electronic test meter, one owner, £25. 12 h/back, valve manuals, £15. Daiwa CNV518 high power tuning unit, eight band, with three range power meter to 2kW, £110 Variable capacitors, two Johnson 500pF W/S, £10 ea. Two 150pF W/S, one three gang (1200pF total), three 500/500, one 350/350, £3 ea. Two new unused meters, 2·5in scale 0/100 linear, marked balance indicator, £10. All postage extra. G3OXV, QTHR. Tel Daventry 702265.

AT230, absolutely as new, £130 ovno. G3BBK not QTHR. 22 Springwood Road, Heathfield, E Sussex. Tel Heathfield 2033.

Storno 70MHz tx/rx, £10. Ascii teleprinter ASR33, £20. AVO8, £75. Hustler 4BTV vertical antenna with 3·5MHz extension, £40. Amtech 300 atu, £40. Prefer buyer collects. G3FXA, QTHR. Tel 0242 35727.

Icom IC730 tx/rx with fm dual vfo memories, VOX preamp processor, new bands, exc cond, £450 ono. GM0BFS. Tel Alloa (0259) 217702 after 5pm or weekends.

FT757, one year old, mint cond, £650 plus carriage. *Wanted* Collins S-line tx, must be mint, complete with handbook. G3DPR, QTHR. Tel Kemble 028577 514.

2m beam, 8-el (5 + 3), 75Ω, £4. Coaxial possible, must collect. Codar rx pre-selector EF183, requires p/p, £6. Sheets for Storno CQM13C12, 69-50, 13C 33C, G2DAF tx articles. G3MBL. 32 Heldhall Road, Bury St Edmunds, Suffolk IP32 7ES. Tel 0284 60984.

Eddystone 840C rx in nice cond, complete with instruction leaflet, offers around £130. Tel Abergavenny 6445 evngs.

Trio TS700S multimode 2m tx/rx, vgc, no mods, dual bander forces reluctant sale, £385. Tel Disley (06632) 4840.

WANTED

Vacuum variable and fixed capacitors, roller coaster type inductors. Transformers. 813 valves bases. Coaxial relays, turns counters, 8875 valves, Bird thruline equipment. W.H.Y? Your price paid. Tel 03306 613 after 7.30pm.

B2 or Mk3, would be interested in any of the suitcase or resistance sets, spares, manuals, in any cond. G4OFO. Tel 01-949 2317.

Heavy duty tower, wind-up tiltover preferred, can collect and dismantle if required. BO9 for Trio TR9000. G4RCG, QTHR. Tel Wakefield (0924) 362144 work, Leeds (0532) 539820.

QSL cards and postcards featuring Concorde or Russian TU144, photocopies accepted. Sundry vintage radios and parts available. Please write. Stuart, G6UTL, 12 Homesteads Rd, Kempshott, Basingstoke RG22 5LP.

Kenwood m'scope SM220, but will consider other with 2-tone test and rtty display. G4CHP, QTHR. Tel 0508470365.

Redifon antenna tuning unit, type 6288R. John, G4AWS, QTHR. Tel 0328 710345.

Accessories for Yaesu FT101ZD, FC901 atu, SP901P spkr, FV901DM vfo or FV101Z vfo, and FL2100Z linear, fan. Mobile hf antenna (G-whip or similar), 4λ/1 Balun. Details M Twigg, 30 Valley Drive, Yarm, Cleveland TS15 9JQ.

Trio 2500 handheld and accessories, would consider similar tx/rx. Details M Twigg, 30 Valley Drive, Yarm, Cleveland TS15 9JQ.

KW204 tx VOX unit, or circuit diagram of VOX unit. I will pay any expenses. G4ZAO, QTHR. Tel Taunton 53904.

Swan 300B tx/rx or similar, gwo, any spares, manual. B2 tx/rx pu, Call book 1984/85. GW3HOJ, 94 Lone Road, Clydach, Swansea SA6 5HX. Tel Swansea (0792) 845284.

40m pressure-mounted xtal, suitable 6L6G tritet osc. John Clarke, TK5FF, 20146 Ocana Corse France.

Trio 120S or 130S in mint cond. G4OSD, QTHR. Tel Scarborough (0723) 863221 (evenings).

Slimline telescopic tilting mast, such as Altron SM30 post hinge, wall bracket 12in or 15in, wall mounted, in gd cond. John G4RGJ, QTHR. Tel Worcester (0905) 421908.

Solarscope CD1014·2 diagram, handbook, copy or loan for copy, any help appreciated. GW3ICF, QTHR. Tel 0222 707384.

Buy or borrow copy circuit and handbook for Telequipt service scope type S51A. G8DZQ, QTHR. Tel 088-65 219.

CBM 2022 or 2023 printer, or other type compatible with PET IEEE 488 i/p. G3TND, QTHR. Tel 027 587 2241.

Ex-WD straight key in gd cond for beginner. AR88D in gwo with spare valves and manual if possible. G1FPV, 56 Daventry Road, Dunchurch, Rugby, Warks CV22 6NS.

Trio 530S, 530SP, 830S, 830SP, cash for any one of these units in exc cond. *For Sale* KW2000B ACPU Zatagi digital frequency meter C·500, 0·50MHz, 500MHz both units as new, offers. Harvey Jackson. Tel Lowick Green, Cumbria 022985 669.

Canadian wireless set No29, any items for this set, particularly connecting leads etc. Suitcase sets of WW2 or post-WW2, any literature etc. Any comms manuals etc relating to post-war occupied Germany. M G Taylor, 8 Government House Road, York YO3 6LU.

TR7A, PS7, RV7, MS7 urgently required. Good price paid for clean unit. Early TR7 model considered. Will collect. G4JBH, QTHR. Tel Yeovil 23873.

Good home offered to TL922 linear. Cash waiting or FL2100Z available in part exch if required. G3PEK, QTHR. Tel 0244 300897.

Palm 4 in gwc, would like RB6 xtals fitted, or pair of Pye PF1, also wkg and fitted with RB6. G4TZJ, QTHR. Tel 01-231 0726.

Electroniques, front-ends, or coils for rx project. Gd prices for gd cond. G3LEZ. Tel 0702 230489.

ATU suitable for ICR70. 144-430 dual crossed Yagi. RS86553, 40 Grafton Road, Harwich, Essex CO12 3BD.

Manual and/or circuit diagram of Solartron solarscope CD1220. Will copy and return. G3XLF, QTHR. Tel 09285 60009.

HF rx vgwo, exch for 26in Ferguson colorstar transistor tv, sliding doors, legs, vgwo, w.h.y?. Codar PR30 vgwo preselector, exch for colinear or 2m atu 70cm or 2m handheld. G1DQE not QTHR. Tel 01-200 3825.

Eddystone s/w components, especially bandspread tank capacitor No1042, bandspread capacitor No1043 with s/m. Reaction condenser No957 with s/m. Plug-in coils, dials, chassis, coilholders, w.h.y?. Kitbuilt sw rxs by HAC or Raymart. G4HHZ, QTHR. Tel 0962 822401 day, 04215 68705 evngs.

Textronix spectrum analyser, plug-in model L20 and manual, or other analyser for use with 545B. G6UGI, QTHR. Tel 0763 43570.

FT225RD, IC257E, G3WBN, QTHR. Tel 01-654 2761.

TH33 jnr hf beam. Yaesu FL2100Z hf linear. G4XJS. Tel St Albans (0727) 62052, after 6pm.

Icom IC451E 70cm multimode tx/rx, must be in vgc. Bob, G1EGL, QTHR. Tel Wymondham (Norfolk 0953) 604019.

Exch TS430S with fm and PS430, still under warranty, for FT902DM with FC902, must be in mint cond for straight exch. GW4NJO, QTHR. Tel 0407 2330.

Collins 312B4 stn control. Drake MN2000 atu. *For Sale* Liner 2 ssb tx/rx, with 2 and 10m tone burst, £75. Or exch for high current 10A psu, such as Drae, Bnos, Daiwa. Tel Mr Skillington (0602) 585055 daytime.

Dip meter, Trio model DM800/1 preferred. W.H.Y? Steve, G4EGY, QTHR. Tel 0602 263142.

Yaesu FT101ZD, or Trio TS530S, or TS530SP and TS120S or TS130S. G3XFB, QTHR. Tel 0902 850033.

FT707, Ten-Tec Argosy or similar hf rig, must be in gd cond with no mods. Cash waiting. G3PVX, QTHR. Tel 01-866 64432 after 7pm.

Coil winder, Europa 4m model, KW1000, instant rom AN1 GR2532, Thruline elements H range from low power to 250H, info on Anadex DP8000, equatorial mount, preferably powered, YO901P, bi-directional IEEE488 interface, AEA MM2/contester. G3AZI, QTHR. Tel 0772 37815.

TL922 linear fm board for FT101ZD. Tel Robbie, Hamilton (0698) 459301 after 6pm.

ALYNTRONICS

AUTHORISED YAESU

AUTHORISED ICOM DEALER

IC 751 — The latest H.F. transceiver from Icom

FT 757GX — the complete H.F. transceiver — with general coverage on receive!

IC 271 — Icom's v.h.f. multimode base station

FT 726R — Yaesu's v.h.f. & u.h.f. multimode base station

Approved stockists for all of the following companies:
ICOM — YAESU — K.D.K. — TONNA — DATONG — MICROWAVE MODULES — WELTZ — SHURE — HANSEN — KENPRO — C.D.E. — DAIWA — TONO — HY-GAIN — A.E.A. — A.K.D. — T.A.L. — I.C.S. — TASCO — G. WHIP — HI-MOUND — S.M.C. ANTENNAS — WESTERN ANTENNAS

Always in stock, a large selection of plugs and sockets. Antenna mounting hardware —R.F. cables (H-100, URM 43, 67 and 76, 300Ω Ribbon) plus 5, 6 and 8 core rotator cable

129 Chillingham Road, Newcastle-upon-Tyne
Tel: 091-276 1002
Mail Orders Welcome
Open Tues-Fri 10 am to 6 pm
Saturday 10 am to 5 pm

BARCLAYCARD VISA

GWM RADIO LTD

All prices include VAT and post

POCKETFONES PF1, Rx and Tx **£22 pair** with circuits, etc, batteries **£5.50 pair.** Rx only **£6,** with battery **£9**—Prismatic **MARCHING COMPASSES,** latest issue type NATO 6605-99-331-2510, calibrated in MILS, Mother of Pearl dial, **£27. Ex-NAVY BINOCULARS,** 7 × 50 with case, **£45. WRIST WATCHES.** A rare opportunity, all black faced and centre seconds and all reconditioned by Ministry. Hamilton, **£20** or Smiths, **£16.** Spare AVO movements with dials for model 8, **£10. Airlite HEAD & MIKE sets** type 62, as new **£12** or used less mike **£6. RABONE CHESTERMAN** type 251 leather cased tape measures, 7 metres/25ft, **£5. Ex-Navy Zenith Deck Watches.** Centre seconds, can be worn or kept in polished wood case, **£45. PORTABLE BATTERY OPERATED GAMMA RADIATION METERS.** Meter Dose-Rate Portable Trainer No 1 in Ministry pack and Serviceable, **£12,** also Meter Contamination No 1 complete with Detector head and headset, **£12. HIGH POWER TANK AERIAL BASES** Nato 5820-99-949-3482 **£3.** Army A43R Mk 11 approx 220 Mc/s no accessories, **£18.** AUDIO AMPLIFIERS STEREO 606 by 'Linear', 6w per channel, wood case, new and boxed, **£19.50.** American weatherproof **TORCHES,** 6 cell, super long range beam, **£6.50. EX-NAVY CLOCKS.** Brass bulkhead mount, bevelled glass 8" dia **£85** or with 'stop' button, **£100. VHF MOBILES W15U,** set only **£35** or with controller, cable etc. **£50. CHARGERS** for Pagers. Output suits PF1 yellow, **2 for £4. NOISE METERS** CHUBB model FSL12, NEW. 0-120dB, **£42. MOTOFONES MF5AM.** LB 3 channel, **£25. PAGERS** PG3U, NEW, **£5. METERS.** A few more 2½" × 2½" 1ma 100ohms calibrated 0-1, 0-5 **2 for £4.** ALSO, Circscale 0·5/0/0·5 ma scaled 25/0/25, **2 for £5.**

40-42 Portland Road, Worthing BN11 1QN. Tel: 0903 34897

W.H. WESTLAKE

CLAWTON, HOLSWORTHY, DEVON. (0409) 253758

1 H100 50 ohm Low Loss COAX **80p per m** 50m less 10% 100m less 20% (post 5p p/m)
2 POPES RG213U 10.3mm low loss Coax N/C PVC **60p per m** (p 6p p/m)
3 PERMANIOD or BICC UR67 10.3mm Low Loss 50 ohm **60p per m** (p 6p p/m)
4 UR76 50 ohm stranded conductor Coax **23p per m** (p 3p p/m)
5 POPES RG58C/U with NC PVC **23p per m** (p 3p p/m)
6 Mini Coax RG174/U 50 ohm **25p per m** (p 1p p/m)
7 UR70 6mm 75 ohm Coax **23p per m** (p 3p p/m)
8 UR57 10.5mm low loss 75 ohm COAX **60p per m** (p 6p p/m)
9 75 ohm Double Screened 8mm 75 ohm Coax **25p per m** (p 4p p/m)
10 Low Loss UHF TV Coax 75 ohm **20p per m** (p 3p p/m)
11 75 ohm Twin Feeder **18p per m** (p 2p p/m)
12 NEW! RG62AU 95Ω 7mm dia Coax **50p per m** (p 5p p/m)
13 BOFA GMP6 Slotted 300 ohm Feeder **25 per m** (p 3p p/m)
14 Strong PVC covered Aerial Wire **6p per m** (p 2½p p/m)
15 14 SWG Copper HD Aerial Wire **20p per m** (p 2½p p/m)
16 500m Mixed equipment Wire on Reels **£5** post £1.40
17 ROTATOR CABLE—6 core and 8 core **35p per m** (P&P 5p/M)
18 GREENPAR 50 ohm N Plugs for H100/UR67/213 **£2.50** each
19 GREENPAR 50 ohm N line Sockets H100/UR67/213 **£2.30** each
20 GREENPAR 50 ohm N Chassis Sockets **£1.80** each
21 GREENPAR 50 ohm N Plugs for UR43/76 **2.50** each

WOOD & DOUGLAS

✻ NEW CATALOGUE
✻ NEW PRODUCTS
✻ NEW PRICES

For those of you who missed the NEC here are details of a few of the new products that we introduced:

70FM3B—The popular 70FM3 500mw to 3 watt 70cms power amplifier has been updated to have rf switched automatic PIN changeover. The board fits a standard miniature diecast box and is sufficiently compact to allow direct connection to your handheld's aerial socket. The module has facilities for line powering and has our standard 'straight through' mode with power supply disconnected.

AF1—A small audio amplifier board consuming very low quiescent current. The unit is intended to complement the CWF1 CW filter where it would act as an audio buffer. The board also boasts an externally activated mute circuit.

144LIN30—The popular 144LIN25B linear has been updated to yield in excess of 30W for 3W drive at 145MHz.

* * *

Details of these and other new products are included in our 1985 catalogue. This will be posted to you on receipt of an A5 stamped self addressed envelope. Kits are usually available by return of post but please allow 28 days for any unforeseen shortages. Place your order by post or by telephone using your credit card. Please include £1.00 to cover order handling and postage.

Our products are kits or assembled kits consisting of circuit board and all components to mount on the board. We do not include external hardware such as boxes, connectors etc.

If your purchase does not work when assembled then apart from being surprised we will offer to service the module for a small charge depending on the complexity of the project. So please remember . . .

ANYONE CAN SELL A KIT . . . REPUTATION SELLS OURS

UNIT 3, YOUNGS INDUSTRIAL ESTATE
ALDERMASTON, READING RG7 4PQ
TEL: (073 56) 71444 TX: 848702

ACCESS BARCLAYCARD VISA

JAYCEE ELECTRONIC

AUTHORISED YAESU

APPROVED TRIO DEALER

JOHN GM30PW
20 Woodside Way, Glenrothes, Fife KY7 5DF
Phone 0592 756962, Telex 727181
Open 5 days—Tues-Sat 9am-5pm
Out of Hours Service (0592) 754918
Quality secondhand equipment in stock
FULL RANGE of TRIO and YAESU goodies.
Jaybeam—Microwave Modules—L.A.R.
RSGB books—Daiwa—Welz—TET—BNOS
Agent—D. GREY (G8TFL), 7 CEMETERY LOANING, BERWICK-ON-TWEED. Tel. (0289) 307116

AMATEUR ELECTRONICS UK

AUTHORISED YAESU

UPPINGTON
G2BAR HAM BAND AERIALS

AUTHORISED YAESU

10-15-20 MONOBAND BEAMS. MADE IN BRISTOL.

Also in stock by—TET, Jaybeam, Yaesu, Tonna, G. Whip, Oscar vertical —Mobile—Multi element, Tri-band arrays—All at current prices.

Send for leaflets

12/14 PENNYWELL ROAD, BRISTOL BS5 0TJ
Telephone: Bristol (0272) 557732

McMichael A.R.S. Home Counties

MOBILE RALLY

Sunday, 21st July, at 11 a.m.
Sefton Park, Bells Hill, Stoke Poges, Slough
Talk-In on S22 & SU8

WATERS & STANTON ELECTRONICS

18-20 MAIN ROAD, HOCKLEY, ESSEX. TEL: SOUTHEND (0702) 206835 · 204965
12 NORTH STREET, HORNCHURCH, ESSEX. TEL: HORNCHURCH (040 24) 44765

MON - SAT 9 AM - 5.30 PM E.C. WEDNESDAY 1 PM
ALL MAIL ORDER ENQUIRIES TO MAIN SHOP AT HOCKLEY

NEW WELZ "PEP" RANGE

At last you can read — PEP — RMS — VSWR

SP220
1·8-200MHz
2/20/200 watts
Remote sensor
£59

SP225
1·8-160Mhz
5/15/150 watts
Twin meters
£99

SP420
140-525MHz
4/20/200 watts
Remote sensor
£69

SP425
140-525MHz
5/15/150 watts
Twin meters
£99

NO COMPROMISE — NO COMPETITION

The new Welz "EPE" range is unique in todays market. Each high precision meter features both RMS & PEP readings plus VSWR. The flat frequency response means wide band operation and the remote sensor makes for operational convenience. Each meter is illuminated and requires 12v DC for operation.

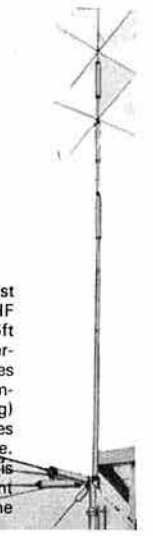
NEW FRG-9600

The new FRG-9600 reaches a new high in wide band surveillance type receivers. From VHF to nearly 1GHz this receiver features the widest frequency range with high sensitivity. Not only does it provide AM and FM—it also has SSB (up to 450MHz). No less than 100 memories and both wide and narrow AM and FM. Frequency steps are 1/5/10/12.5/25/100kHz. 12V dc powered. 240V power supply optional extra. Scanning is included with auto stop on both carrier and audio (to avoid lock up on blank carriers).

£469.00

WE'LL GIVE YOU SPOT CASH For your good unwanted ham gear Tel: (0702) 206835
All our tested trade-ins carry 3 months warranty.

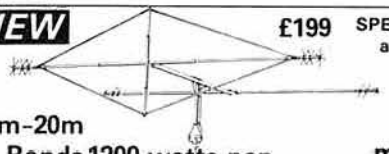
NEW



WELZ CP5 80-10M £149 (40-10M CP4 £109)

The Welz CP5 is Unique. It is the most highly efficient aerial system for the HF bands for the small garden. Less than 16ft high and yet providing automatic operation on all 5 bands 80-10 metres. It comes complete with a rigid radial system comprising 5 loaded radials (approx 6ft long) that can be either spaced 360 degrees around the antenna base or in a fan shape. All hardware is provided and the aerial is ready to be mounted atop a convenient mast. An alternative model is available, the CP4 which covers 10 to 40 metres.

NEW



£199

SPECIAL—We have a few brand new HQ-1's at £169. Please phone

6m-20m
4 Bands 1200 watts pep. **model HQ-1**

There is no substitute for the real thing! That's what purchasers of alternative models tell us. We've been selling this for 12 years and its superb construction and performance protected by World patents leaves the competition standing. Boom length 4.5ft. Element length 12ft, weight 15lbs. This antenna can be operated without an atu and really gets the DX even in the smallest QTH.
Free 24 hr delivery on this item.

KILL TVI-DEAD HP4A £6.95

Over 10,000 in use

The HP4A is a combined braid breaker and in-line UHF tv filter. The most used filter in the UK it copes with interference from HF right up to 2 metres. The unit is widely used by rental companies and is made by one of Japan's largest manufacturers of RF equipment. If its coming down the aerial lead of the TV receiver then the HP4A will stop it dead.

NATIONAL PANASONIC RF-3100 £249

Covering 150kHz to 30mHz in 31 bands plus FM broadcast, this receiver is ideal for the amateur on a budget. Its bright digital display and excellent stability make it a joy to operate whether on SSB, CW or AM. Up to the minute PLL circuitry ensure top performance on today's crowded bands.

SPECIAL: VHF/UHF AIRCRAFT LISTINGS

This unique frequency manual contains a complete list of all the VHF civil aircraft frequencies in use throughout the UK plus all the RAF-USAF and MOD airfield frequencies in both the VHF and UHF bands. No other publication offered at anywhere near this price has offered so much new information. Supplies are limited! **£2.95**

SPECIALS!

Communication Headphones low impedance	**£5.95**
Deluxe G5RV 80-10m dipoles	**£17.95**
SWL Wideband dipole 30-30mHz 50' long	**£8.95**

AOR 2001 RECEIVER

£369 + FREE FREQUENCY LIST

A firm favourite amongst listeners. The AOR 2001 covers 25-550mHz without gaps. It provides AM/FM and WFM reception and has programmable search. 12v DC or 230v AC and specially tweeked by us for best reception.

LOW PRICE 2M AMPLIFIERS

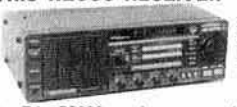
OK we admit it. These aren't exactly power amplifiers but we had to get you to read this ad! We've bought a few beautifully made Welz 2m halfwave whips with BNC plug for 2m h'helds. These give about 5dB of gain over the normal helical and collapse down to a handy size. This makes your 3 watt h'held into a 10watt rig. The price is £24.95. If this is too much then how about our telescopic ⅝th whip for h'helds at £10.95. As its spring we'll send them post free with 7 days money back guarantee. Stocks are limited so its first come first served!

ICOM R70 RECEIVER

£599 + FREE H'phones, dipole antenna prefix maps and SWL book worth £21!

The Icom R70 is the ROLLS ROYCE of receivers. Covering 150kHz to 30mHz it has features far too numerous to list here. Suffice to say no other receiver at anywhere near this price can match its performance. As usual, each one is carefully tested by us before sale to make sure it meets its specification.

TRIO R2000 RECEIVER



£479 + FREE H'phones, dipole antenna prefix maps and SWL book worth £21!

The Trio R2000 receiver covers the entire spectrum from 150kHz to 30mHz with no gaps. Its programmable scanning and memories combine to make this SSB AM/FM receiver a firm favourite. The optional VC10 VHF converter at £128 adds to range 118-174mHz.

YAESU FRG8800 RECEIVER

£539 + FREE H'phones, dipole antenna prefix maps and SWL book worth £21!

Covering 150kHz to 30mHz this latest offering from Yaesu provides a really high performance receiver. Now with built-in memory and optional VHF module (118-174mHz) it can be thoroughly recommended.

SONY ICF7600DX

AM SSB

£178 + FREE AC PSU & Aerial

The Sony ICF7600 is a truly remarkable receiver covering 150kHz to 30mHz SSB/AM plus FM broadcast. Despite its size it gives superb performance even from its built-in telescopic aerial. The LCD readout, built-in clock and memories all go to make what is probably the World's smallest communications receiver.

FDK M750XX TRANSCEIVER 2M SSB/CW/FM

£389

A full 20 watts SSB/CW/FM at less than £400! Ideal as a mobile or base station this rig will give you plenty of DX and its good sensitivity means you'll hear plenty of DX as well. Complete with DC lead and mobile mounting backet.

BEST PRICES ON ALL BRANDS INCLUDING:

3.5-30mHz

WELZ AC36 ATU £85

1.8-160mHz

WELZ SP15M £49

1.8-160mHz

WELZ SP200 £87

TRIO
YAESU
ICOM
WELZ
FDK
DIAMOND
JAYBEAM
TONNA
MICROWAVE
MUTEK
SONY
PANASONIC
MINI PRODUCTS
SAGANT
GLOBAL
BNOS
SAFETY MICS
ROTATORS
DATONG

24 HOUR DELIVERY £6 EXTRA

WE STOCK VIRTUALLY EVERY MAKE OF HAM GEAR

LARGE STOCKS OF GOOD SECOND HAND GEAR

USE YOUR CREDIT CARD FOR SAMEDAY DESPATCH

FDK SYNTHESIZED MONITORS

ATC720 118-138mHz AM £189
RX40 141-180mHz FM £159

Those professional quality synthesized monitors are ideal for a wide range of monitoring purposes. A number of these units have been supplied to government departments, civil and military airfield use, etc. Each receiver incorporates a thumbwheel switch for rock steady frequency selection. The units are powered by self contained, rechargeable batteries and each unit is supplied with AC mains charger and helical whip. The auto supplied with AC mains charger and helical whip. The auto tracking front-end tuning means high sensitivity. Other controls include AF and squelch and each receiver has its own built in speaker with provision for an external aerial.

YAESU FT290

£349 **INCLUDES FREE NICADS & CHARGER**

The FT290 is a legend in its own lifetime. What other rig can offer so much at such a price? Ideal as a portable, fixed or mobile unit the FT290 provides 2½ watts of SSB/CW/FM from 144-146mHz.

FASTEST MAIL ORDER SERVICE — BEST DEALS AROUND — PART EXCHANGE SPECIALISTS

RADIO SHACK FOR EVERYTHING IN AMATEUR RADIO

Performance and Value.
Bearcat® 200FB

SPECIFICATIONS

Frequency range:

66-88 MHz	Low Band
138-144 MHz	Extended VHF Range
144-148 MHz	2-Meter Amateur
148-174 MHz	High Band
406-420 MHz	Extended UHF Range
420-450 MHz	70-cm Amateur
450-470 MHz	UHF Band
470-512 MHz	UHF 'T' Band

Size: 9"W × 3"H × 9½"D

Weight: 3 lbs.

Power Requirements: 12V DC

Audio Output: 800 Milliwatts RMS

Antenna: Telescoping (supplied)

Sensitivity: 1.0µV for 12 dB SINAD

Scan Rate: Selectable, 5 or 15 channels per second

Connectors: External speaker card edge connector (optional accessory Model No. WH-1)

16 channels. Program 16 frequencies for automatic scanning in any combination of bands and frequencies.

Patented Track Tuning. Electra-patented feature allows scanner to peak on each transmission automatically for optimum reception.

2 banks. Activate or lockout groups of channels quickly. Scan channels 1-10, 11-16, or both.

Priority. Lets you sample a designated frequency, on Channel 1, every two seconds to prevent missing important calls.

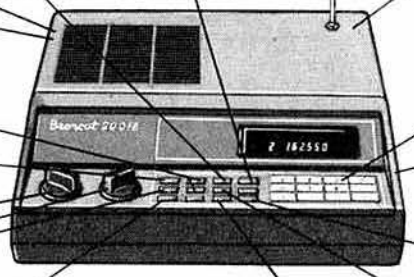
On/Off Volume. Power switch and continuously variable volume.

Automatic squelch control. Factory set for easier operation or manually adjust to block out unwanted noise.

Dual scan speed. Scan at either 5 or 15 channels each second.

▼/Limit key. Sets lower and upper frequency limits for Automatic Search. Also used to "step down" through frequencies in Manual Search.

Automatic lockout. By-pass any channel not of current interest for faster scanning cycle.



Single Antenna. Single telescopic antenna provides optimized reception without the need for long low band antenna.

Crystal-free. Program thousands of frequencies with pushbutton ease . . . and without a single crystal needed.

Decimal display. Bright vacuum fluorescent display shows frequency being received.

One piece keyboard. Sealed keyboard with "key locator" ridges for positive, easy operation.

8 band coverage. Includes Low, High, UHF and UHF-'T' bands, 2-metre and 70-centimetre Amateur ("ham") bands, extended Land-Mobile bands.

Direct channel access. Go directly to any channel, without stepping through other channels.

Automatic search. Seek and find new active frequencies automatically between frequency limits you select.

Patented Selective Scan Delay. Adds a two-second delay on desired channels to prevent missing transmissions when "calls" and "answers" are on the same frequency.

▲/Hold key. Stops searching action to hold on frequency of interest. Also used to "step up" through frequencies in Manual Search.

£199.95 Securicor Delivery £6.90

Access

RADIO SHACK LTD 188 BROADHURST GARDENS, LONDON NW6 3AY

(Just around the corner from West Hampstead Station on the Jubilee Line)

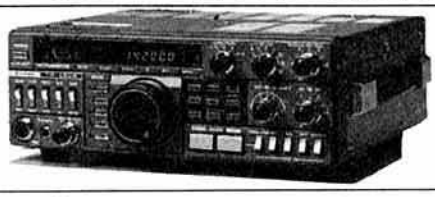
Giro Account No. 588 7151 Telephone 01-624 7174 Telex: 23718

BARCLAYCARD VISA

APPROVED TRIO DEALER

WARD ELECTRONICS

APPROVED TRIO DEALER



TS430S
Deservedly popular HF Transceiver
NOW **£720**

NEW TRIO TS940S £1695

NEW

G3LIV RTTY + AMTOR BBC 'B'
As reviewed in Ham Radio Today
£112.50

G3LIV SSTV PCB and program for BBC 'B'. **£17.50**
G3LIV RTTY TU for BBC 'B' **£75.00**
G3LIV AMTOR add-on for BBC 'B' **£43.00**

Universal RTTY TU. Ideal any computer..... **£45.00**
AFSK pcb, **£2.75** RTTY pcb, **£6.80**

Also NEW SCARAB RTTY kits available.

New AMSTRAD RTTY **£10.50**

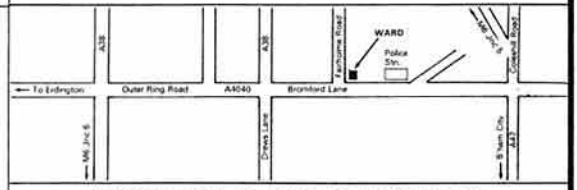
CBM64/VIC Connectors, **£2.50**

TH21E	**£170**	TW4000A	**£522**
TH41E	**£199**	R2000	**£479**
TR2600E	**£275**	TS930S	**£1295**
R600	**£299**	TS830S	**£832**
TS780	**£948**	TS530SP	**£698**
TR9130	**£499**	TS130S	**£633**

AMTOR/RTTY/CW/ASCII
AMT-2
£229.00

All-in-one, neat, performance packed unit. Easily driven from most computers.

CBM64 ROM **£51.75**
Mosoft CBM64 Logbook..... **£7.95**
also Morse Trainer & Typing Trainer
NEW SCARAB CW for CMB64..... **£10.50**
G3WHO BBC Software RTTY Tape... **£7.50**
RTTY ROM, **£20.00** AMTOR ROM, **£27.00**



WARD ELECTRONICS
422 BROMFORD LANE, WARD END
BIRMINGHAM B8 2RX
TEL: 021-328 6070
CLOSED MONDAY

DAIWA ROTATORS AND SWR METERS • HOKUSHIN ANTENNAS • RSGB BOOKS
COMMODORE — BBC — ACORN — TATUNG COMPUTERS • ICS AMTOR
G3LIV, SSTV and RTTY COMPUTER INTERFACES • SCARAB • G3WHO SOFTWARE
NEW ICS low cost RTTY/CW/ASCII system packages **from £109**

Morse Tutor

Learning morse with D70 is fast and painless. And you can "do it anywhere" because D70 is built to travel and the battery lasts for months. Field proven by thousands of users.
Price: £56.35 Inc. VAT

To order simply dial
0532 552461
or write with cheque or postal order to

Dept RC Datong Electronics Ltd., Spence Mills, Mill Lane, Bramley, Leeds LS13 3HE, England

Access/Barclaycard welcome – Fast delivery service
Catalogue and data sheets on any product available free on request. Dial 0532 552461

Bredhurst electronics

BREDHURST ELECTRONICS
HIGH ST, HANDCROSS, W. SX.
(0444) 400786 RH17 6BW

MAIL ORDER AND RETAIL
MON-FRI 9-12.30/1.30-5.00
SAT 10.00-4.00p.m.

THE COMMUNICATIONS CENTRE OF THE SOUTH–

HF TRANSCEIVERS		£	(c&p)
TRIO	TS930S	1350.00	(–)
YAESU	FT980	1850.00	(–)
ICOM	IC751	1299.00	(–)
ICOM	IC745	899.00	(–)
TRIO	TS430S	769.00	(–)
TRIO	TS830S	832.00	(–)
YAESU	FT757GX	829.00	(–)
TRIO	TS530SP	735.00	(–)
TRIO	TS130S	633.00	(–)
YAESU	FT77	479.00	(–)

ANTENNA TUNER UNITS			
ICOM	IC-AT500 Auto	459.00	(–)
ICOM	IC-AT100 auto	329.00	(–)
TAU	Super ATU	349.95	(–)
TRIO	AT250 auto	305.00	(–)
YAESU	FC757 auto	290.00	(–)
YAESU	FC102 High Power	159.00	(–)
TRIO	AT230	157.00	(2.00)
YAESU	FC700	119.00	(1.50)
WELZ	AC38	85.00	(1.50)
YAESU	FRT7700 Short Wave Listening	49.85	(1.00)

HF RECEIVERS			
ICOM	R70	629.00	(–)
ICOM	R71	729.00	(–)
TRIO	R2000	479.00	(–)
TRIO	VC10 VHF Converter for R2000	128.00	(–)
YAESU	FRT7700 antenna tuner	49.85	(–)
TRIO	R600	299.00	(–)
YAESU	FRT8800 Gen Cov Rx	559.00	(–)

VHF RECEIVERS			
JIL	SX200N	299.00	(–)
AOR	AR2001 25–500MHz	378.00	(–)
FDK	ATC720 Handheld Airband	189.00	(–)
FDK	RX40 Handheld 141-179MHz	159.00	(–)

2M FM TRANSCEIVERS		£	(c&p)
TRIO	TM201A 25W Mobile	309.00	(–)
ICOM	IC27E 25W Mobile	379.00	(–)
YAESU	FT270R 25W Mobile	349.00	(–)
TRIO	TR2500 Handheld	270.00	(–)
FDK	Multi 725X 25W Mobile	269.00	(–)
YAESU	FT209RH (FNB3)	275.00	(–)
ICOM	IC2E Handheld	199.00	(–)
ICOM	IC02E Handheld	269.00	(–)

2M MULTIMODE TRANSCEIVERS			
TRIO	TS780 2M and 70cm base	981.00	(–)
YAESU	FT726R 2m fitted (70cm optional) base	869.00	(–)
TRIO	TS711E 2M base station	831.00	(–)
ICOM	IC271E 25W base	729.00	(–)
ICOM	IC290D 25W Mobile	479.00	(–)
TRIO	TR9130 25W Mobile	499.00	(–)
YAESU	FT290R Portable	349.00	(–)

70cm TRANSCEIVERS			
TRIO	TW4000A Mobile 2M/70cm	536.00	(–)
TRIO	TM401A 12W Mobile	340.00	(–)
TRIO	TR3500 Handheld	291.00	(–)
ICOM	IC4E Handheld	259.00	(–)
ICOM	IC04E Handheld	279.00	(–)
TRIO	TS-811E Base	964.00	(–)

MORSE EQUIPMENT			
HK 707	Straight Key	15.95	(1.00)
HK 703	"deluxe" straight key	27.95	(1.20)
HK 802	"deluxe" Brass key	85.00	(2.00)
MK 704	Squeeze paddle	15.95	(1.00)
CW-3	Practice Oscillator	9.50	(0.75)
EK 150	Electronic keyer	105.00	(1.00)
D 70	Datong Morse tutor	56.35	(–)
MMS-1	Morsetalker morse tutor	115.00	(1.00)
GW	Brass Key on slate	35.50	(2.00)
MK	Datong morse keyboard	137.42	(–)

SPEAKERS		£	(c&p)
TRIO	SP230 (TS830, 530)	47.70	(1.50)
TRIO	SP430 (TS430)	39.50	(1.50)
TRIO	SP120 (TS130, 120)	30.70	(1.50)
YAESU	SP102 (FT102)	59.00	(1.50)
TRIO	SP40 Mobile speaker	16.40	(0.75)
YAESU	SP55 Mobile speaker	14.95	(0.75)

ANTENNA BITS			
HI-Q Balun 1:1 5kW pep		11.95	(0.75)
7·1MHz RAL-TRAPS–Epoxy–pair		8.95	(1.50)
Self Amalgamating Tape 10m × 25mm		3.95	(0.75)
T-piece polyprop Dipole centre		1.50	(0.30))
Polyprop Strain Insulators		0.50	(0.10)
Small ceramic Egg Insulators		0.50	(0.10)
Large ceramic Egg Insulators		0.75	(0.10)
75 ohm Twin Feeder-light duty	per metre	0.16	(0.04)
300 ohm Twin Feeder	per metre	0.14	(0.04)
UR67 Low loss coax–50 ohm	per metre	0.65	(0.20)
UR76 50 ohm coax–dia 5mm	per metre	0.25	(0.05)
UR70 70 ohm coax	per metre	0.30	(0.05)
4mm Polyester Guy Rope, strength 400kg	per metre	0.16	(0.04)
50 metres 16 swg hardrawn copper		6.90	(0.75)

WELZ SWR-POWER METER			
SP15M	SWR-Power HF/2M 200W	49.00	(1.00)
SP45M	SWR-Power 2M/70cm 100W	69.00	(1.00)
SP250M	SWR-Power HF 2kW	65.00	(1.00)
SP350M	SWR-Power HF/2M/70cm 200W	79.00	(1.00)

COAXIAL SWITCHES			
SA450	2 Way Diecast SO239 (500MHz)	14.95	(0.75)
SA450N	2 Way Diecast N plug (500MHz)	19.50	(0.75)
CH20A	2 Way Welz 50239 (900MHz)	22.00	(1.00)
CH20N	2 Way Welz N plugs (900MHz)	41.90	(1.00)
DRAE	3 way SO239 sockets	15.40	(0.75)
DRAE	3 way N sockets	19.90	(0.75)

TRIO TL922 LINEAR £1150.00 | **NEW AKD WAVEMETER (VHF) £24.95** | **METEOR 600 FREQUENCY COUNTER £145.00**

GOODS NORMALLY DESPATCHED WITHIN 24 HRS. – PRICES CORRECT AT TIME OF GOING TO PRESS – E&OE

INDEX TO ADVERTISERS

CLASSIFIED ADVERTISEMENTS

Classified advertisements **35p** per word (inc VAT), minimum **£5.60**
Box Number £2.00 extra to wordage or minimum.
Semi-display 1/8 page 2¼" × 3½" (57 × 91mm) **£81.00**
3/32 page 1⅝" × 3½" (42 × 91mm) **£63.00** } + 15% VAT
1/16 page 1" × 3½" (26 × 91mm) **£44.00**

Please write clearly. No responsibility accepted for errors.
Latest date for acceptance—7 weeks before 1st of issue month.
All classified and semi-display advertisements MUST be prepaid.

Copy and remittance to: **M. J. HAWKINS G3ZNI, RSGB Advertisements, PO Box 599, Cobham, Surrey KT11 2QE.**
(Cheques should be made payable to RSGB.)

Members' Ads must be sent to the editor at Chelmsford.

FOR SALE

QSL CARDS printed to your own specification on white or coloured gloss card. Send S.A.E. for sample pack to: The Caswell Press, 11 Barons Way, Woodhatch, Reigate, Surrey.

AMIDON TOROIDAL CORES, ferrite rings for TVI filters, ferrite beads. Send SAE for data and prices. SMC (TMP electronics), Unit 27, Pinfold Works, Pinfold Lane, Buckley, Clwyd.

QSL & LISTENER CARDS. Quality printing on coloured and white gloss card at competitive prices. SAE for samples. S. M. Tatham, "Woodside", Orchard Way, Fontwell, Arundel, West Sussex.

G5RV TYPE AERIALS. Half-size £13.50, Full-size £15.50. New Hard Drawn Copper Aerial Wire, 140ft 14swg £7.90; 50 metres 16 swg £6.90. Enamelled soft copper wire 10 metres 12swg £3.50; 50 metres PVC covered Aerial wire £4.20. Ceramic Egg insulators, 40p. Guy rope, 4mm Polypropylene, 50 metres £3.95; 4mm Nylon 50 metres £6.90. 1Kw 1:1 Baluns £13.00. All items post paid. S.M. Tatham G3RSY, 1, Orchard Way, Fontwell, Arundel, West Sussex.

D.I.Y. QSLs/SWLs (state which!!). 100 mixed designs/colours, £2.50 (c.w.o.). Q/Cards, 87 Derwent Street, Blackhill, Consett DH8 8LT.

PERSONALISED QSL CARDS, 1000 £15.00, 5000 £50.00. Sae for samples. Q/Cards, 89 Derwent Street, Blackhill, Consett DH8 8LT.

50m (165ft) AERIAL WIRE. Strong PVC covered copper only, £4.40 inc postage. W. H. Westlake, Clawton, Holsworthy, Devon.

QSL CARDS. Gloss or tinted cards. SAE for samples to Twrog Press, Penybont, Gelildan, Blaenau Ffestiniog, Gwynedd.

CREED TELEPRINTERS 444(TP15) complete with perforator and reader. Tester working. Available to Raynet members only. £42. Details Mike Watson G8CPH, Ipswich (0473) 831448.

PAG, RTTY TERMINAL UNIT KIT. PLL, AFSK, auto start stop. Complete with PCB, power supplies, case components; £58 plus £2.50 p&p. Details Mike Watson G8CPH, Ipswich (0473) 831448.

"RAYNET" YELLOW REFLECTIVE TABARDS with RAYNET front and rear similar to Police and Ambulance, etc. Also "RAYNET CONTROLLER". 2 sizes. Medium, £7.60; Large, £8.10 inc p&p. Details Mike Watson G8CPH. Ipswich (0473) 831448.

DX QSL CARDS. Display your best cards in our clear plastic hanging wallets. Holds twenty cards. Pack of three, £2.40. Viola Plastics, Dept RC, 36 Croft Road, Hastings, Sussex.

ALL THE FAMOUS MOSLEY ANTENNAE. TA33Jr, Mustang, Atlas, V-3Jr, TD-3Jr Beams, Verticals, etc. Also spares available only direct from us. Send £1 for our Handbook showing all Antennae. Mosley Electronics, 196 Norwich Road, New Costessey, Norwich NR5 0EX.

G4TJB QSL CARDS Personal and standard designs, DIY cards, Log Books, SAE for samples and price list. G.C. Patterson, 16 Peartree Road, Great Barr, Birmingham B43 6HY.

SPECIAL OFFER Personalised QSL Cards £14.25 per 1000. Logbooks £2.30. SAE samples. G6DQS, 10, Springfield Avenue, Honley, Huddersfield.

G2VF D.I.Y. LOOP ANTENNAS. Long, medium, short wave. Details SAE to Rylands, 39 Parkside Avenue, Southampton.

PCBs MANUFACTURED. Prototypes, small/large production runs. P.T.H., screen printing. Component identification, solder masking. U.V. and screen printing equipment supplied. Sundries and laminate supplied. Orbit (G4GQL), 38 Torquay Gardens, Redbridge, Essex. 01-550 3610.

75mm EX-COMPUTER FANS. 230V with anti-vibration mounting brackets. £2.75, p&p £1.25. K. T. C. Communications (G5HX), 18 Cotswolds Drive, Coventry CV3 6EY. Tel (0203) 412397.

"ALPHA GOLD". The single or twin paddle key with a difference! Cavity Wavemeters 144-2500MHz. Now with improved pick-up. 10GHz Wavemeter kits. Large SAE brings information. P. Sergent, Precision Engineer, 6 Gurney Close, Costessey, Norwich. Tel. (0603) 747782.

WAVEGUIDE, FLANGES & DISHES. All standard sizes and alloys (new material only) from stock. Special sizes to order. Call Earth Stations, 01-228 7876, 22 Howie Street, London SW11 4AR.

70cm CO-LINEARS. Unobtrusive, fully enclosed design 5.2dBi, N type socket, £35.00 post paid. SAE for full details to L. Mansfield, 45 Haddon Street, Derby DE2 6NP.

BLACK STAR 600MHz COUNTERS. Super quality. Used in our service dept., made in U.K. Our price £147 post paid, S.A.E. leaflet. 6146B General Electric (fitted by Yaesu) £27 matched pair p.p. AEUK/Holdings, 45 Johnston Street, Blackburn, BB2 1EF. (0254) 59595, Access/B. Card.

FT980. SAVE OVER £400. Selling for client, failed C.W. Absolutely as new. AEUK/Holdings. See above.

BAROGRAPHS showing Sporadic 'E' openings. High quality unit. Standard size charts, £142.00. Particulars—R. Lucking G1IIU, 62 Ember Farm Way, East Molesey, Surrey KT8 0BL. 01-398 3603.

SHORT WAVE LISTENERS Aerial tuning unit model VT30 will tune your antenna precisely and help you hear that DX, precision built in neat attractive case £32.50 post paid. Viola Products, 36 Croft Road, Hastings, Sussex.

G5RV TYPE ANTENNAS with low loss open wire feeder half size £15.00 full size £16.50 post paid. Viola Products, 36 Croft Road, Hastings, Sussex.

QSL CARDS printed at competitive prices. Send SAE for details. Delta Cards, 62 Newark Lane, Ripley, Surrey.

COMPUTER SOFTWARE/HARDWARE

G3WHO BBC SOFTWARE. Full feature AMTOR program now available on Eprom. Works with ordinary T.U. and timer unit (supplied). Split screen, memories, clock, mailbox etc. Phone or SAE for details. RTTY program also available on tape (£7.50), Disk (£9.50) and Eprom (£20). P.J. Harris, 10 Appleby Close, Great Alne, Alcester, Warwickshire B49 6HJ. Tel. 078981 377.

BBC32k: SUPERB SOPHISTICATED PROGRAMS featuring: random letters, numbers, words, mixtures; 100 plain-language tests; abbreviations/ punctuation; output/speed choice; morse keyboard; write, save, replay own texts, £4.95. SAE details, D. Brandon (G4UXD), 1, Woodlands Rd., Chester CH4 8LB.

RTTY and CW TRANSCEIVE with no Tu. Split screen, type ahead, 26 saveable memories, CW ident, auto CR/LF, QSO review and much more. Needs only a very simple interface (kit, pcb, user port connector supplied). For CBM64, BBC-B, VIC20 (needs expansion). Tape, instructions, interface kit £20 inc p&p. Ready-made interfaces available. CW-only version for Spectrum £10. Technical Software (GW3RRI), Fron, Cesarea, Caernarfon LL54 7RF. (0286) 881886.

MORSE TUTOR CBM64, VIC20, BBC-B, Electron, Spectrum, ZX81-16k. Superb program. Learn in stages, absolute beginner to over 40 wpm, random letters, figures, words, plain language. Any amount, any speed. Tape, instructions, comprehensive learning guide £6 inc p&p. GW3RRI, see ad above.

LOCATOR GBM64, VIC20, BBC-B, Electron, Spectrum. QTH or Maidenhead locators or lat/long. Distance, beam and return headings, VHF contest points and totals, long path details, converts between locator and lat/long. Tape, instructions £6 inc p&p. GW3RRI, see ad above.

LOGBOOK CBM64, VIC20 (Needs expansion), BBC-B, Electron, Spectrum. Date, band, mode, callsign and remarks of all your contacts. Superfast callsign search. Easy, fast updating of files. Output to screen or printer. Tape, instructions £6 inc p&p. GW3RRI, see ad above.

AMTOR SUMMER SALE! Return your Dragon G4BMK RTTY or RTTY/CW cartridge with £25.00 for addition of AMTOR. Add £17.25 for clock/PTT module. Upgrade to Mark III RTTY/ASCII program, £5.00. Phone/SAE for software/hardware details including split-screen RTTY for CBM64, VIC20, Atom CW/Transceive for Dragon 32/CBM64. Grosvenor Software (G4BMK), QTHR. (0323) 893378.

SPECTRUM RTTY. Superb G1FTU programme requires no interface £10. SPR 51, PTT and low pass Tx. Filter £13. Programmes and hardware also available for CBM64, VIC20, Dragon, Tandy Color and Acorn Atom. B & J Telecommunications, 9 Queens Walk, Thornbury, Nr. Bristol. Telephone 0454 416381.

SPECTRUM RTTY 48K ONLY. Menu driven, 10 programmable memories, split screen, morse ident, variable baud rate, etc., etc. No terminal unit, just simple filter unit. Cassette with full instructions, circuit & P.C.B. layout £8.50 or S.A.E. for full details. Filter unit built and tested £6.00. J. E. Price, 4 Housman Walk, Kidderminster DY10 3XL.

MORSE READER PROGRAMMES. Off air onto screen. Programmes for Spectrum, ZX81-16K, BBC B, Amstrad 464, Atari 6/800XL. Dragon, Commodore 64, and any VIC 20. Sinclair computers need no interface, others use simple one transistor (BC107) interface. Programmes self tracking 8/30 WPM. All connections to existing sockets. Cassette with full instructions and interface circuit, £6.00. Interface built and tested £2.50. J. E. Price, 4 Housman Walk, Kidderminster DY10 3XL.

BBC MICRO SOFTWARE. RTTY transceive program in ROM which is entered simply by typing "*RTTY". Sophisticated morse teacher, slow morse broadcast software, morse beacon. Written by professional software designers. Send large SAE for detailed technical specifications. GOC Software Limited, "CQ Cottage", Longhill Lane, Audlem, Cheshire CW3 0HU.

SPECTRUM ZX81 RTTY. Program features split-screen, type ahead, auto Tx/ Rx, 26 memories, mailbox, real time, plus many more. Reviewed PW May '85. Ref. Oct '84 for further details of programs, PCB, kits. Send SAE to G4MJC/ G4FDW, 3 Aylesbury Ave, Eastbourne BN23 6AB.

RTTY/AMTOR TERMINAL UNITS. We make one of the best inexpensive units. Over 200 in use all over the world. For details see above. See you at Brighton Rally.

DATASOURCE. ZX-Spectrum BBC-B comprehensive Interactive multi-option Amateur/SWL Software. 700+ Prefixes, Countries, Continents, CQ/ITU Zones, Band Plans H.F. to 23cms. Beacons, OSCAR10, World local-times (Realtime displays). Maidenhead Calculator, Distances/Bearings to Locator, between locators or lat/long, inclusive £6.75 cassette, £7.95 BBC-disk/ZX-microdrive G4PEY QTHR. (0403) 69835.

AMATEUR RADIO INSURANCE SCHEME

"ALL RISKS" INSURANCE for portable/mobile/base station amateur radio and ancillary equipment. A service for RSGB members only. Also public liability and equipment insurance for affiliated clubs and societies. Details and leaflets from Nick Gibson, Amateur Radio Insurance Services Ltd, 19 Quarry Street, Guildford, Surrey. Tel: 0483 33771.

MISCELLANEOUS

COURSE FOR CITY & GUILDS, Radio Amateurs Examination. Pass this important examination and obtain your licence, with an RRC Home Study Course. For details of this and other courses (GCE, Career and professional examinations, etc) write or phone—THE RAPID RESULTS COLLEGE, Dept JT5, Tuition House, London SW19 4DS. Tel: 01-947 7272 (9am–5pm) or use our 24hr Recordacall service 01-946 1102 quoting JT5.

HEATHKIT. UK SPARES & SERVICE centre. Cedar Electronics, Unit 12, Station Drive, Bredon, Tewkesbury, Gloucestershire. Telephone (0684) 73127.

HOLIDAY ACCOMMODATION

GET FAT AT FAIRMOUNT! Enjoy our wonderful meals, beautiful en suite bedrooms, warmth and comfort, in a tranquil setting near historic Cockington village. Family holidays with FREE accommodation for children; dogs most welcome too. Special Spring Breaks, and pensioners reductions. From £15.50 B.B.E.D. Also meet G6GR, licensed 63 years, use the rigs if you are licensed also, and try the new TONO communications-terminal computer. Telephone (0803) 605446, Fairmount House Hotel, Herbert Road, Chelston, Torquay.

SELF-CATERING CHALETS. Explore by day, DX by night. My aerials, your rig. £15-£120 per chalet per week. Green, G0ATS, 'Chylean' Tintagel, Cornwall PL34 0HH. Tel. (0840) 212262.

BOURNEMOUTH "DOLBADARN" PRIVATE HOTEL, 8 Grand Avenue, Southbourne BH6 3SU. Between sea and shops. Residential licence, room radio, call and teamaking facilities. Excellent food. Dinner, Bed and Breakfast from £11.00 daily. Bed and Breakfast from £7.50 daily. (0202) 424826. E. W. & J. W. Batten (G3BKN).

TEIGNMOUTH. ANDREA COURT HOTEL, Second Drive, Landscore Road, Teignmouth TQ14 9JS. Dinner, bed and breakfast from £55.00. Use shack. HF and VHF gear and antennas. Write or telephone for brochure and special discounts. (062 67) 2007. K & S Phillips G8IAW.

SHANKLIN, ISLE OF WIGHT. Small private hotel close all amenities. Superb food and accomodation. Most rooms en suite. Details with pleasure. Gill & Tony Perez (G4SVY), Kenbury Hotel, Clarence Road, Shanklin. (0983) 862085.

SEAFRONT WHITSTABLE KENT. Safe swimming, private seawall patio. High Street walking distance. Share G4LQI HF/VHF aerials. Pet, child OK. One unit suits couple, another sleeps 3. (0227) 266480. If no reply 01-852 3594.

SRI LANKA, MOUNT LAVINIA. Easy reach of beach, restaurants, shopping, city zoo. Transport. Two weeks bed and breakfast (single) US$210, (couple) US$375. Free laundering, no service charges. Write to Mrs Antoinette Perera, Spangles, 84 Templer Road, Mount Lavinia plus £1 or 5 IRCs.

TORQUAY (0803) 607333. Holiday Flats. Special offer on all Autumn holidays for RadCom readers. Example: September 21st, flat for couple, £32.00 weekly. Normally £40.00. G4NOA, Linden House, Ruckamore Road, Chelston, Torquay.

W/DEVON-N/CORNWALL. IO70UQ, 600ft asl. Mobile Home, 6 berth. Mains electric, TV. Your licence, my rigs. £50.00 pw. G4WDI. Ashwater 219.

SOUTH NORWAY. New camp/caravan site with 4 huts. Next to beautiful lake. Very quiet, safe beach, fishing and canoe hire. Also HF antennas. LB4QB, Voje Camping, 3750 Drangedal, Telemark, Norway.

SOUTH DEVON HOLIDAY—Farmborough House, set in own 10 acres near Dartmoor. Opportunities for painting, yoga, etc. Well equipped radio shack (G4YXC). Metal/wood working facilities. Vegetarian, whole food, non-smoking. Further information SAE please. Mrs Sophie Edwards, Farmborough House, Chudleigh, Newton Abbot, Devon TQ13 0DR. Tel: (0626) 853258.

SITUATIONS VACANT

RSGB MAIL-ORDER PRICE LIST

RSGB books

	Non-members' price	Members' price
A Guide to Amateur Radio (19th edn)	£3.91	£3.52
Amateur Radio Awards (2nd edn)	£3.68	£3.31
Amateur Radio Operating Manual (3rd edn)	£6.15	£5.54
Amateur Radio Software	£7.48	£6.73
HF Antennas for All Locations	£7.35	£6.62
How to Pass the Radio Amateurs' Examination	£3.42	£3.08
Microwave Newsletter Technical Collection	£6.83	£6.15
Morse Code for Radio Amateurs	£1.64	£1.48
RSGB Amateur Radio Call Book (1985 edn)	£6.92	£6.23
Radio Amateurs' Examination Manual (10th edn)	£3.84	£3.46
Radio Communication Handbook (5th edn) Vol 2	£8.46	£7.61
Radio Communication Handbook (Vols 1 and 2 combined, paperback)	£11.79	£10.61
Raynet Manual (1984 edn)	£2.78	£2.50
Teleprinter Handbook (2nd edn)	£12.72	£11.45
Television Interference Manual (2nd edn)	£2.31	£2.08
Test Equipment for the Radio Amateur	£6.41	£5.77
VHF/UHF Manual (4th edn)	£10.58	£9.52
World at Their Fingertips (paperback)	£7.75	£6.98

RSGB logbooks

Amateur Radio Logbook	£2.77	£2.49
Mobile Logbook	£1.23	£1.11
Receiving Station Logbook	£2.87	£2.58

RSGB maps, charts and lists

HF Awards List and Countries List	48p	43p
Great Circle DX Map (wall)	£2.43	£2.19
IARU Region 1 Beacon List	40p	36p
Locator Map of Europe (wall)	£1.95	£1.76
Locator Map of Europe (card for desk)	70p	63p
UK Beacon List	40p	36p
UK Repeater List and maps	50p	45p
Western Europe (new) Locator Map (wall)	£3.06	£2.75
World Prefix Map in full colour (wall)	£2.53	£2.28
Meteor Scatter Data	£3.51	£3.16

RSGB members' sundries (members only)

Radio Communication Easibinder	—	£6.71
RSGB badge car sticker	—	49p
RSGB belt (real leather)	—	£7.57
RSGB coffee mug (plastic)	—	£1.83
RSGB hf contest log sheets (100)	—	£3.13
RSGB vhf contest log sheets (100)	—	£3.13
RSGB tie (coffee, maroon, green or blue)	—	£3.18
RSGB callsign cap	—	£4.98
RSGB logo rubber stamp	—	£3.16
RSGB station callsign plaque*	—	£9.50
RSGB teeshirts (med, large, exl)	—	£4.90
Standard callsign lapel badge*	—	£1.96
De-luxe callsign lapel badge*	—	£2.80
Lapel badge (RSGB emblem, pin fitting)	—	59p
Mini lapel badge (RSGB emblem, pin fitting)	—	68p
Members' headed notepaper (50 sheets) quarto	—	£1.20
Members' headed notepaper (50 sheets) octavo	—	75p

**Delivery approximately five weeks*

Miscellaneous

"Amateur radio" (two colours) car sticker	73p	66p
DX Edge (HF propagation prediction aid)	£14.09	£12.68
"I'm on the air with amateur radio" (four colours) car sticker	84p	76p
"I'm monitoring ·5 are you?" (two colours) car sticker	73p	66p
QSL card holders	£1.23	£1.11
Radio Communication back issues *(As available)*	£1.32	£1.19
Radio Communication bound volume, 1982	£15.93	£14.34
Radio Communication bound volume, 1983	£16.90	£15.21
Radio Communication bound volume, 1984	£16.90	£15.21
Smith charts, pad of 25 (Chartwell D7510)	£2.23	£2.01

Other publications

	Non-members' price	Members' price
Active-filter Cookbook (Sams)	£12.71	£11.44
All About Cubical Quad Antennas (RPI)	£5.83	£5.25
Amateur Single Sideband (Ham Radio)	£5.46	£4.91
Amateur Television Handbook (revised) (BATC)	£2.94	£2.65
Amateur Television Handbook Vol 2 (BATC)	£2.77	£2.49
Antenna Anthology (ARRL)	£6.00	£5.40
ARRL Electronics Data Book (ARRL)	£4.47	£4.02
AX25 Amateur Pocket Radio Link-layer Protocol (ARRL)	£4.44	£4.00
Beam Antenna Handbook (RPI)	£6.83	£6.15
Better Short Wave Reception (RPI)	£6.83	£6.15
Care and Feeding of Power Grid Tubes (Varian)	£6.99	£6.29
CMOS Cookbook (Sams)	£13.07	£11.76
Complete DX'er (W9KNI)	£7.77	£6.99
Complete Shortwave Listener's Handbook (Tab)	£12.21	£10.99
Design of VMOS Circuits with experiments (Sams)	£8.50	£7.65
FET Principles, Experiments and Projects (Sams)	£8.04	£7.24
FM and Repeaters for the Radio Amateur (ARRL)	£4.30	£3.87
G-QRP Club Circuit Book	£4.52	£4.07
Guide to Oscar Operation (AMSAT)	£1.78	£1.60
Hints and Kinks for the Radio Amateur (ARRL)	£4.47	£4.02
How to Troubleshoot and Repair AR Equipment	£10.47	£9.42
IC Op-amp Cookbook (Sams)	£11.76	£10.58
International VHF FM Guide	£2.45	£2.21
Newcomer's Guide to Simplex and Repeaters on 2m (UK FM Group)	£1.24	£1.12
**Power Supply Handbook* (Tab)	£10.99	£9.89
Radio Amateurs Antenna Handbook (RPI)	£7.88	£7.08
Radio Amateurs Callbook (1985) (DX listings) (ARC1)	£18.35	£16.52
Radio Amateur Callbook (1985 USA listings) (ARCI)	£18.87	£16.98
Radio Amateurs Handbook (1984) (ARRL)	£6.66	£5.99
Radio Amateurs Handbook (1985) (Softback) (ARRL)	£15.80	£14.22
Radio Amateurs Handbook (1985) (Hardback) (ARRL)	£21.90	£19.71
RTTY Today (UEI) (A modern guide to rtty)	£7.19	£6.47
Radio Frequency Interference (ARRL)	£4.18	£3.76
Satellite Experimenters Handbook (ARRL)	£10.11	£9.10
Satellite Tracking Software for the Radio Amateur (AMSAT-UK)	£4.47	£4.02
**Secrets of Ham Radio DXing* (Tab)	£7.92	£7.13
Semiconductor Data Book (Newnes)	£7.97	£7.17
**Shortwave Listeners' Antenna Handbook*	£10.10	£9.09
Shortwave Propagation Handbook (Cowan)	£7.79	£7.01
Simple Low-cost Wire Antennas (RPI)	£6.83	£6.15
Solid State Design for the Radio Amateur (ARRL)	£7.87	£7.08
Television for Amateurs (BATC)	£2.23	£2.01
Towers International Transistor Selector	£13.95	£12.56
Towers International MOS Power & FET Selector	£10.95	£9.86
Towers Op-Amp Selector	£9.50	£8.55
**UHF-Compendium Parts 1 and 2*	£14.93	£13.44
Understanding Amateur Radio (ARRL)	£4.73	£4.26
Understanding the Oscilloscope	£10.10	£9.09
VHF Propagation Handbook (Nampa)	£3.75	£3.38
Weekend Projects for the Radio Amateur (ARRL)	£4.95	£4.46
World Atlas (RACI)	£3.35	£3.02
World Radio TV Handbook 1985	£19.81	£17.83
**99 Test Equipment Projects You Can Build*	£8.00	£7.20

***Items marked with an asterisk may not be available immediately. Please telephone before ordering to confirm availability.**

RSGB kits

Morseman (*Rad Com* December 1984) Kit 1	£12.78	£11.50
Kit 2	£19.52	£17.57
Kit 3	£36.11	£32.50
CMOS Z80 ic	£8.17	£7.35

MORSE INSTRUCTION AID

RSGB morse course Stage 1 (to 5wpm)	£4.54	£4.09

MAGAZINE SUBSCRIPTIONS

QST (including ARRL membership). One year	£31.53	£28.38
Two years	£60.00	£54.00
Three years	£89.74	£80.77
By air via KLM (to W Europe only) one year	£44.81	£40.33
Ham Radio Magazine (per annum) (incl air delivery)	£25.35	£22.81

NEWSLETTER SUBSCRIPTIONS

Microwave Newsletter, VHF Newsletter, DX Newsletter. For details contact the membership services department at RSGB headquarters.

ORDERING INFORMATION

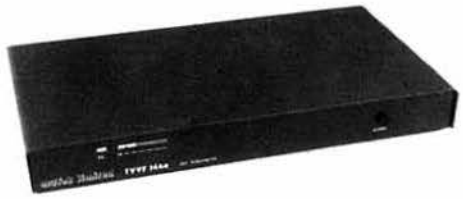
NON-MEMBERS. Use left-hand price columns. Note that members' sundries are only available to members of RSGB.
MEMBERS. Use right-hand price columns. It is essential that you quote your call sign or BRS number so that you can be recognised as a member.
PRICES. These include postage, packing and VAT where applicable. For airmail despatch, please ask for price before ordering. Goods are obtainable, less p & p, at RSGB headquarters between 10am and 4pm, Monday to Friday.
POSTAL TERMS. Cash with order. **Stamps and book tokens cannot be accepted.** Cheques and postal orders should be crossed and made payable to "Radio Society of Great Britain". Our Giro account number is 5335256. Please write your name and address clearly on the order, and allow up to 28 days for delivery.

ORDER FROM: RSGB Publications (Sales), Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JW

(Raynet supplies should be obtained from Mrs J. Balestrini, Merrivale, Willow Walk, Culverstone, Gravesend, Kent)

No gimmicks . . . no frills . . . — JUST PERFORMANCE!

The New muTek TVVF 144a 28Mhz to 144MHz transverter



Anyone who has taken more than a passing interest in the way that Amateur Radio equipment has changed in the past few years, would surely agree that many so-called advances in design have largely been involved in saturating the front panel with as many controls and displays as possible, whilst often ignoring serious engineering deficiences. As experienced operators know, no number of gimmicks will help in working a distant station which is weak or swamped by receiver distortion products—or both! The demands upon receiver performance, in particular on today's crowded 2m band, are severe. It's not just a matter of sensitivity. Low noise figures are nowadays easy to achieve, but the combination of low noise figure with excellent strong signal performance achieved by the TVVF 144a has only been realised as a result of our unique experience in the design and manufacture of very high performance replacement front-ends. The innovative receive signal path circuitry of the TVVF 144a is a result of careful system analysis combined with a great deal of patient development work over several years.

The TVVF 144a won't boil a kettle and take a dog for a walk whilst you're trying to work the dx. If you have a good hf transceiver the TVVF 144a will enable you to hear the weak dx amongst strong locals. In fact, the potential system performance available with a really high performance hf rig is such that we'd not be surprised to see the top vhf dxer's and contest groups pensioning-off their (muTeked!) vhf transceivers and investing in a TVVF 144a. . . .

For the technically minded . . .

On receive, a balanced mosfet pair rf stage is used for its impressive large signal performance when compared with single device stages. This feeds a very carefully terminated HLRM 200g high-level double-balanced mixer which is followed by an IF amplifier consisting of a pair of rf power transistors combined between 90 degree hybrids. The result is a typical 2.2dB noise figure (ensuring that external noise limits system sensitivity with all but the longest of feeder runs), a remarkable +3dBm third order INPUT intercept (and we measure each one to make sure it is!), and a conversion gain adjustable up to about 20dB.

On transmit, the 0.1 to 300mW permissible drive level is filtered, and mixed with the buffered output of a low-noise J-fet local oscillator. After further extensive filtering the 144MHz band signal is finally amplified to provide 10W pep output. A seven element low-pass filter is built-in, which should please your local 70cm users, not to mention the RIS! We have taken a great deal of trouble to ensure that the transmit performance of the TVVF 144a lives-up to its receiver. In this context, it's worth noting that the transverter is quite capable of running up to 25W pep output, but those with access to a good spectrum analyser will quickly realise why we have chosen not to follow the current 25W craze when they compare OUR transmitter intermodulation levels with those of the competition!

muTek originated the idea of employing an alc loop in transverters—we've been intrigued to see our competitors rush to copy the idea. In our 28MHz if transverters, we go one step further. An output is available from the transverter to feed a conventional, negative-going alc signal back to the hf transceiver. This will prevent distortion due to transceiver overdrive, an often unrecognised cause of poor signals from transceiver/transverter combinations.

Interfacing to the HF transceiver is made as straightforward as possible, given the multitude of transverter interface facilities provided by various rig manufacturers. The transverter provides and accepts various forms of switching control, including rf switching.

The rf interface may be accomplished by either a single transmit-receive cable, or by means of separate transmit and receive lines, ensuring full compatibility with the vast majority of modern (and not so modern) HF transceivers.

The TVVF is housed in the same attractive low-profile enclosure as the rest of our transverter family, measuring approximately 315 × 165 × 35mm, and comes with all necessary connectors.

The range

		£
TVHF 230c	Very high performance 2m to 9 hf bands transverter	334.90
TVVF 50a	Very high performance 10m to 6m transverter	239.90
TVVF 50c	Very high performance (again!) 2m to 6m transverter	199.90
TVVF 144a	Ultra-high performance 10m to 2m transverter	239.90
SLNA 144s	2m low-noise rf-switched preamplifier 0·9dB typical noise figure	39.95
SLNA 144u	Unswitched version of the SLNA 144s	22.40
SLNA 144ub	Unboxed version of the SLNA 144u	13.70
SLNA 145sb	Transceiver optimised preamplifier for the FT 290	29.90
SBLA 144e	Masthead-mounting 2m low-noise high dynamic range preamplifier. 250W through-power	89.90
GFBA 144e	Ultra-high performance masthead-mounting GaAsFet 2m preamplifier using advanced noiseless negative feedback for low noise figure and superb dynamic performance. 1000W pep (ssb) through-power. Supplied with ATCS 500 sequencer-controller	149.90
GLNA 432e	Masthead-mounting 430-440MHz high performance GaAsFet preamplifier. 0·9dB typical noise figure, 250W through-power. Supplied with ATCS 500 sequencer-controller	149.90
GLNA 433e	Masthead-mounting 430-440MHz high performance GaAsFet preamplifier. 1dB typical noise figure. Rf switching, 50W through-power	79.90
TLNA 432u	Unswitched bipolar 430-440MHz preamplifier. 1·5dB typical noise figure	29.90
TLNA 432ub	Unboxed version of the TLNA 432u	22.40

		£
BLNA 432ub	Sub-miniature 430-440MHz preamplifier. 1·3dB typical noise figure. Requires external filtering.	13.70
BBBA 500u	20-500MHz high dynamic range broadband preamplifier. Ideal for scanners	34.90
RPCB 144ub	Complete replacement front-end for the FT221 and FT225	79.90
RPCB 251ub	Complete replacement front-end for the IC211 and IC251	84.90
RPCB 271ub	Complete replacement front-end for the IC271 (e and h)	89.90
GDIF 107ub	Gunn diode WBFM back-end processing board	49.65
LBPF 144u	Low-loss 144-148MHz two-pole bandpass filter. 0·3dB typical insertion loss, 120W power handling	22.40
LBPF 432u	Low-loss 430-440MHz two-pole bandpass filter. 0·3dB typical insertion loss, 100W power handling	22.40
XBPF 700ub	Microstripline bandpass tvi filter	2.95
ATCS 500	Sequencer-controller	33.90
VFAT 206	25W 6dB attenuator suitable for use with the TVHF 230c	19.65

Carriage/postage rates

GFBA 144e, SBLA 144e, GLNA 432e, GLNA 433e	2.50
TVHF 230c, TVVF 50a, TVVF 50c	5.00
All other products above	1.50

ALL PRICES INCLUDE 15% VAT E. & O.E.

muTek limited —the rf technology company

Dept. RC, Bradworthy, Holsworthy, Devon EX22 7TU (0409 24) 543)

Access

BARCLAYCARD VISA

YAESU

ALL MODE VHF/UHF RECEIVER

AUTHORISED YAESU

FRG9600

WIDE COVERAGE
Continuous coverage from 60 to 905 MHz. Tuning is via a; seven speed (100Hz-100kHz) spin tuned VFO, keyboard, scan (up/down manual or memory) plus external computer control.

ALL MODE
Demodulates: CW-SSB (USB & LSB), FM (narrow and broadcast including stereo MPX output), AM also TV possibilities. This is complemented by an all mode (communications) squelch plus a wideband F.M. adjustable mute.

SELECTIVITY
Four IF bandwidths provide the optimum selectivity for the telephonic modes usually encountered.

SYNTHESISER STEPS
Seven step sizes offer world wide compatibility whilst the inclusion of auto selected bandwidths coupled with mode and steps allows for simple, rapid, search and scanning.

CLOCK/TIMER
24 hour clock shares readout with display. Programmable as on/off timer with contacts to control a tape recorder etc for which a line output is provided.

SCANNING
Manual scan, using convenient up/down keys (momentarily press for 1 step change —500mS depression for scan), memory scan plus limited band scan (defined by two adjacent memory channels). Scan halts on a carrier or on modulated signal only, with auto resume of scan and time to scan start indication.

DISPLAY
Bright pleasant green fluorescent display providing; 7 digit frequency readout (or time), two colour graphic signal strength, indicator mode, step size, memory channel number, control status (dial-priority etc) at a glance.

MEMORIES
100 channel (10 × 10 groups) containing frequency and mode with '5 year' Lithium back up. Priority channel, checkable every 3 seconds, is available during both scanning (normal or limited) and dial modes.

COMPUTER CONTROL
Optional interface (FIF series—RS232C or specific models) provides frequency and mode selection for 'infinite' memory capability with most home machines. Intercept role using interactive control from AGC output and scan stop information provided.

SPECIFICATIONS

Frequency Coverage
60-905 MHz
(60-460 MHz for SSB)

Frequency Resolution
100 Hz (Digital Readout)

Modes of Reception
AM, CW/SSB (LSB/USB), NBFM, WBFM, TV*, A3E, A1A, G3E, J3E, C3F*. (*NTSC Demodulator Option)

Selectivity (@-3dB)
AM (A3E H3E),
2.4 KHz (N), 6.0 KHz (W).
CW/SSB (A1A J3E);
2.4 KHz
NBFM (G3E) Narrow;
15 KHz
WBFM (G3E) Wideband;
180 KHz.

Tuning Steps
AM-N; 100 Hz/1KHz.
SSB; 100 Hz/1 KHz.
NBFM; 5/10/12.5/25 KHz.
WBFM; 5/10/12.5/25 KHz.

Image Rejection (Typical)
−50 dB (60-460 MHz).
−40 dB (460-905 MHz).

IF Frequencies
45.754, 10.7, 0.455 MHz.

Conversions
Triple: AM, SSB/CW, NBFM.
Double: WBFM.
Single: T.V.

Audio Output
1W into 8 ohms @ 10% T.H.D.

Power Requirements
Operating: 550mA (Max Volume).
Standby: 100mA (Clock etc).
Off: 3μA (Memories).

Sizes (Ex/Inc Projections)
218/245 D, 79/91 H, 18W mm.
Weight 2.19Kg (W/O NTSC Unit).

Printed in Great Britain for the RADIO SOCIETY OF GREAT BRITAIN, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JW
by E T Heron (Print) Ltd, Silver End, Witham, Essex