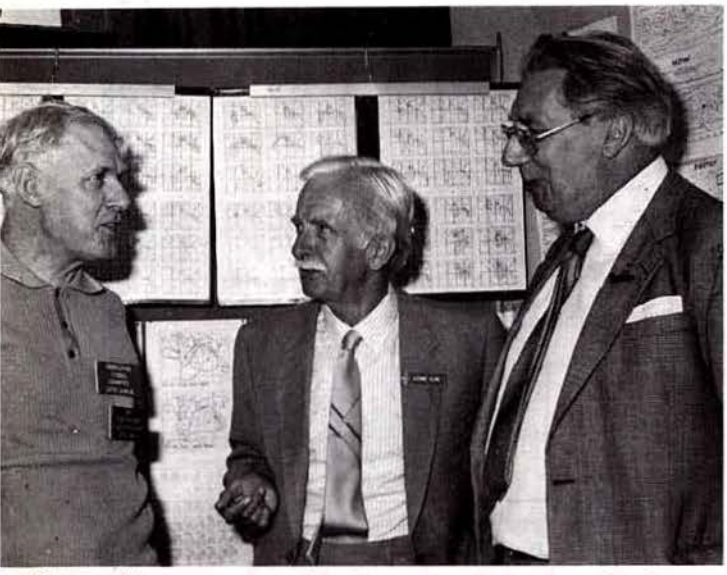
December 1985

RADio COMmunication

THE 1985 RSGB HF CONVENTION

Report on pages 953–4

Members of the RSGB EMC Committee manning their stand. L to r: G5HD, G3UFB, G3AEZ, G4IWS and G8KLH



Three well-known members of the Propagation Studies Committee in earnest discussion. L to r: G2FKZ, G3DME and G3LTP

The WAB stand at the convention manned by G4GEE and G4KSQ

Journal of the Radio Society of Great Britain

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CONTENTS

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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.

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

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hf transceivers

TS940S HF transceiver with general coverage receiver
Top of the range, the TS 940S has every operating feature that the discerning HF operator needs. Amateur bands, 160 through to 10 metres plus a general coverage receiver tuning from 150KHz to 30MHz. Modes of operation are USB, LSB, CW, AM, FSK and FM, included as standard. Forty memory channels, each effectively a separate VFO and simple keyboard frequency entry make operation and ownership of a TRIO TS940S a pleasure.

TS940S . . . £1695.00 inc VAT, carriage £7.00

TS930S HF transceiver with general coverage receiver
Much has been said and written about the TS930S and it now has a place high in the affection of those amateurs fortunate enough to own one. Providing full coverage of the amateur bands from 160 to 10 metres and including a general coverage receiver tuning from 150KHz to 30MHz, the TRIO TS930S is ideal for today's crowded frequencies.

TS930S . . . £1295.00 inc VAT, carriage £7.00.

TS430S HF transceiver with general coverage receiver
A compact transceiver suitable for mobile or portable operation, yet having all the facilities necessary for effective radio communication. The TS430S has, in addition to the amateur bands from 160 to 10 metres, a general coverage receiver. Modes of operation are USB, LSB, CW, AM with FM optional. Owned by many radio amateurs worldwide, the TRIO TS430S is an ideal way to combine amateur radio with short wave listening.

TS430S . . . £720.00 inc VAT, carriage £7.00.

TS830S HF amateur bands transceiver
Needing no description, the TS830S, which uses a pair of 6146B valves in the PA is well known on the amateur bands for its superb signal quality. Having variable bandwidth tuning, IF notch, IF shift and provision for various filters, its receive performance is excellent too.

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handheld transceivers

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TR3600E . . . £292.00 inc VAT, carriage £7.00.

TH21E and TH41E 2 metre and 70 centimetre FM compact transceivers
The TH21E and TH41E are two simple handhelds, each extremely small yet having full repeater facilities including reverse repeater. Power output is one Watt or 150 mulliWatts in the low position and frequency selection is by means of thumbwheel switches. Very small but still convenient to operate, the two transceivers are just right for the amateur who wants to stay in touch.
TH21E . . . £170.00 inc VAT, carriage £7.00.
TH41E . . . £199.00 inc VAT, carriage £7.00.

vhf/uhf all-mode transceivers

TS780 VHF/UHF dual band transceiver
The TS780 is the ultimate base station for the enthusiastic operator who wants both 70 centimetres and the 2 metre band in one transceiver. Modes of operation are USB, LSB, CW and FM. Full repeater facilities, plus two VFOs, IF shift, two priority channels, memory and band scan combine to make the TRIO TS780 the perfect rig.

TS780 . . . £948.00 inc VAT, carriage £7.00.

TR9130 two metre all-mode transceiver
The TR9130 is now a classic rig—so popular that to have one on the second hand shelf is rare. 25 Watts on SSB, FM and CW, green frequency display, six memories, two VFOs and memory scan make the TRIO TR9130 ideal for either mobile or base station operation.

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TS811E £795.00 inc VAT, carriage £7.00. (New low price).

vhf/uhf fm transceivers

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A mobile FM transceiver that also doubles as a piece of shack equipment. Producing 25 Watts and having 21 memories, priority alert, full repeater facilities including reverse repeater, programmable band scan, memory scan and keyboard frequency entry, the TR7930 is ideal for mobile operation using the programmed memories, yet is suitable for shack use with the front panel keyboard.

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general coverage receivers

R600 general coverage receiver

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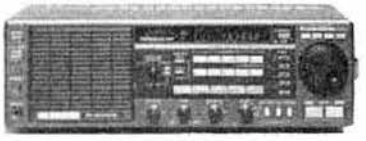
R600 . . . £299.52 inc VAT, carriage £7.00.

R2000 general coverage receiver

The R2000 general coverage receiver from TRIO covers the frequencies from 150KHz to 30MHz. Modes of operation are AM, USB, LSB, CW and FM. For convenience the R2000 has ten memories, each of which holding frequency and mode information. Memory scan and programmable scan between user designated limits are also included. Provision has been made for an optional internal VHF converter covering from 118 to 174MHz. Operating from either mains or 12V DC the TRIO R2000 is an ideal way to listen to the world.



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station accessories

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The carton label, and the **"Passport to Service"** are illustrated, so that you know what you are looking for. Make sure you buy equipment which is made for your market, and carries full service backup.

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A Christmas Message

There were shepherds abiding in the field, keeping watch over the flocks by night. And lo, the angel of the Lord came upon them, and the glory of the Lord shone about them, and they were sore afraid.

And the angel said unto them, "fear not, for behold I bring you good tidings of great joy, which shall be to all people. For unto you is born this day, in the City of David, a Saviour which is Christ the Lord".

And suddenly there was with the angel a multitude of the heavenly host, praising God, and saying:

"Glory to God, glory to God in the highest, and peace on earth, goodwill towards men."

LUKE 2 V 8 to 14

A peaceful Christmas to our friends

LOWE SHOPS

In Glasgow the LOWE ELECTRONICS' shop (the telephone number is 041-945 2626) is managed by SIim GM3SAN. Its address is 4/5 Queen Margaret Road, off Queen Margaret Drive.

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.

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).

For South Wales, the LOWE ELECTRONICS' shop is located in Cardiff. Managed by Carl GW0CAB, the shop is within the premises (on the first floor) of South Wales Carpets, Clifton Street, Cardiff (the telephone number is 0222 464154).

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. The telephone number is 0202 577760.

LOWE ELECTRONICS' London shop is located at 223/225 Field End Road, Eastcote, Middlesex. The shop managed by Andy G4DHQ is easily found, being part of Eastcote tube station buildings (the telephone number is 01-429 3256).

Although not a shop there is on the South Coast a source of good advice and equipment—John G3JYG. His address is Abbotsley, 14 Grovelands Road, Hailsham, E. Sussex. (Telephone 0323 848077).

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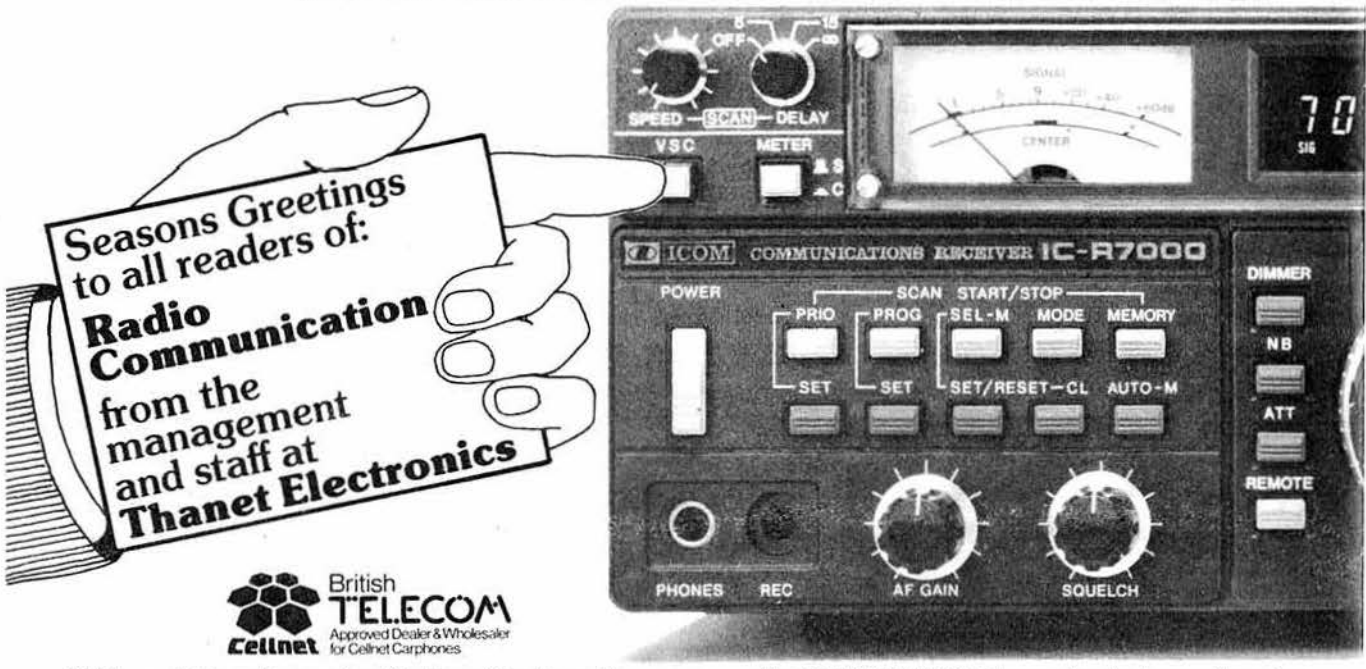

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At this special time of year, when Christmas Greetings will be jamming the airwaves worldwide, Thanet Electronics send this message to you. During 1986 the ICOM range of equipment will continue its upward trend in the design and production of sophisticated amateur radio equipment.

Typical of the innovation one expects from ICOM is the new 'ultimate' receiver the IC-R7000. To whet your appetite, a brief specification is featured here.

You can visit our premises at 95 Mortimer Street, Herne Bay, telephone (0227) 369464 for demonstration, advice & sales of ICOM Amateur equipment. No matter what your requirements, base, mobile or handheld, ICOM have the answer.

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IC-R7000

IVE AT CHRISTMAS THE NEW YEAR

Listed here are just some of the 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.

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Beamrite, Cardiff, 0222-486884.
Booth Holding (Bath) Ltd., Bristol, 02217-2402.
Bredhurst Electronics Ltd., W. Sussex, 0444-400786.
Dressler (UK) Ltd., London (Leyton), 01-558 0854.
D.W. Electronics, Widnes, Cheshire, 051-420 2559.
Hobbytronics, Knutsford, Cheshire, 0565-4040. Until 10pm daily.
Poole Logic, Poole, Dorset, 0202 683093.
Photo Acoustics Ltd., Buckinghamshire, 0908-610625.
Radcomm Electronics, Co. Cork, Ireland, 01035321-632725.
Radio Shack Ltd., London NW6, 01-624 7174.
Ray Withers Comms. Warley, West Midlands, 021-421 8201.
Scotcomms, Edinburgh, 031-657 2430.
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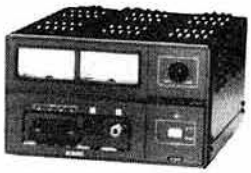

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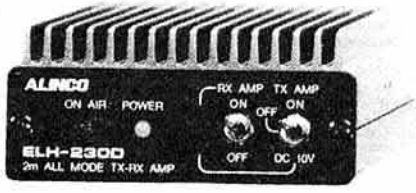

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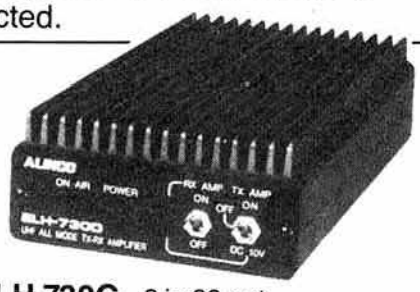

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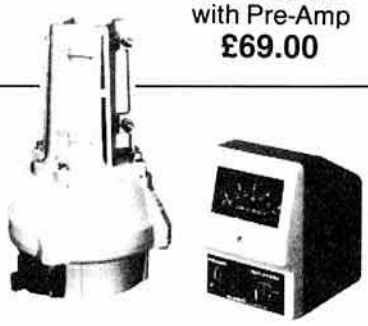

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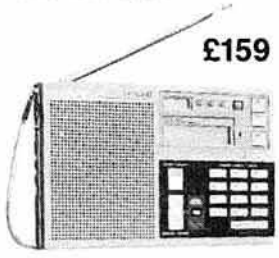

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ICR71	General Coverage Receiver	729.00
IC02E	2m H/Held	269.00
IC2E	2m H/Held	199.00
ML1	2m 10w Linear	79.35
IC4E	70cm H/Held	259.00
IC04E	70cm handheld	279.00
BC35	Base Charger	62.10
HM9	Speaker mic	18.56
IC3	Carry Case	5.50
ICBP3	Std Battery Pack	27.50
BP5	High Power Battery Pack	52.80
CP1	Car Charging Lead	5.50
DC1	12v Adaptor	13.75

MUTEK

SLNA 50	50MHz Switched preamp	44.90
SLNA 144s	144MHz Low noise switched preamp	39.95
SLNA 145sb	Preamp intended for 290	29.90
GLNA 432e	70cm Mast head preamp	149.90
RPCB 144ub	Front end FT221/225	79.90
RPCB 251ub	Front end IC251/211	84.90
BBA 500u	20-500MHz Preamp	34.90
GFBA 144e	2m Mast head preamp	149.90
SBLA 144e	2m Mast head preamp	89.90
RPCB 271ub	Front end for IC271	89.90
TVHF 230c	2M-FM Transverter	334.90
LBPF 144v	Bandpass Filter	22.40
LBPF 432u	Bandpass Filter	22.40
TVVF 50c	6M Converter	199.90
GLNA 433e	70cm Pre-amp	79.90
TVVF 144a	2M Transverter	239.90

MET ANTENNAS

70cms		
432-5B	5 Ele	16.95
432-19T/ATV	19 Ele	35.60
432-17X	17 Ele Crossed	49.17
432-17T	17 Ele Long	39.20
2M		
144-5	5 Ele	19.55
144-7T	7 Ele	24.15
144-8T	8 Ele Long	31.26
144-14T	14 Ele	46.71
144-19T	19 Ele	55.88
144-6X	6 Ele Crossed	39.75
144-GP	Ground Plane	14.41
4M		
70/3	3 Ele	30.12
70/5	5 Ele	45.74

SWR/POWER METERS

WELZ		
SP45	130-470MHz PWR/SWR	69.00
SP10X	1.8-150MHz PWR/SWR	34.00
SP200	1.8-160MHz PWR/SWR	89.00
SP250	1.8-60MHz PWR/SWR	69.00
SP300	1.8-500MHz PWR/SWR	129.00
SP350	1.8-500MHz PWR/SWR	79.00
SP400	130-500MHz PWR/SWR	89.00

DAIWA

CN410M	3.5-150 Mhz mobile cross needle	48.00
CN460M	140-150 Mhz mobile cross needle	52.00
CN520	1.8-60 Mhz mini cross needle	39.00
CN500	1.8-60 Mhz cross needle	19.50
CN620A	1.8-150 Mhz cross pointer. Up to 1KW	2.10
CN630	140-450 Mhz cross pointer. Up to 200W	66.21
CN650	1.2-2.5 Ghz cross pointer. Up to 20W	98.11
CNW419	1.8-30 Mhz 200W tuning unit	129.50
CNW919	2M Power meter and antenna tuning-unit	159.64
CNW518	3-30 Mhz 8 band hi power tuner	233.09
CL680	1.8-30 Mhz 200W general coverage ATU	104.99

ICS

We now have in stock the full range of ICS RTTY/ASCII/AMTOR/CW products and the remarkable ALM-203E. This keypad operated handheld 2M transceiver has a host of features yet costs much the same as limited facility thumbwheel units – just **£209.00.**

TRIO

TS940	HF General Cov	1695.00
TS940S	9 Band TX General Cov RX	1695.00
TS930S	General Cov RX	1295.00
TS830S	160-10m Transceiver 9 Bands	832.75
AT230	All Band ATU/Power Meter	157.99
SP230	External Speaker Unit	47.73
TS530S	160m-10m Transceiver	698.00
TS430S	160m-10m Transceiver	720.00
PS430	Matching Power Supply	138.00
SP430	Matching Speaker	39.50
MB430	Mobile Mounting Bracket	13.17
FM430	FM Board for TS430	45.00
TS130S	8 Band 200W Pep Transceiver	633.06
SP120	Base Station External Speaker	30.74
AT130	100W Antenna Tuner	108.62
MC50	Dual Impedance Desk Microphone	36.19
MC35S	Fist Microphone 50K ohm IMP	17.01
LF30A	HF Low Pass Filter 1kW	24.68
TR7930	2M FM Mobile	329.00
TR9130	2M Multimode	499.00
TW4000A	2M/70cm mobile	522.00
TM201A	2M 25W mobile	296.00
TM401A	7cms FM 12W	316.00
TR2500	2M FM Synthesised Handheld	258.00
TR3500	70cm Handheld	270.00
TR2600	New 2M FM Synthesised Handheld	275.00
ST2	Base Stand	60.36
SC4	Soft Case	15.92
SMC25	Speaker Mike	18.66
PB25	Spare Battery Pack	29.10
MS1	Mobile Stand	37.31
R600	Gen. Cov. Receiver	299.52
R2000	Synthesiser 200KHz-30MHz Receiver	479.47
HC10	Digital Station World Time Clock	78.99
HS5	Deluxe Headphones	26.88
SP40	Mobile External Speaker	16.46
TH21E/41E	2M/70cm Mini-Handhelds	170.00/199.00
TM211E/411E	2M/70cm FM Mobiles	365.00/399.00
TS711E/811E	2M/70cm base stations	768.00/895.00
TR3600	70CM Handheld	292.00

BNOS

POWER SUPPLIES			
6 amp	58.00	25 amp	148.00
12 amp	99.00	40 amp	296.00

LINEARS		
LPM 144-1-100	2m, 1W in, 100W out, preamp	181.00
LPM 144-3-100	2m, 3W in, 100W out, preamp	181.00
LPM 144-10-100	2m, 10W in, 100W out, preamp	157.00
LPM 144-25-160	2m, 25W in, 160W out, preamp	217.00
LPM 144-3-180	2m, 3W in, 180W out, preamp	247.00
LPM 144-10-180	2m, 10W in, 180W out, preamp	247.00
LP 144-3-50	2MN 50W out, preamp	108.00
LP 144-10-50	2M 10W in, preamp	108.00
LPM 432-1-50	70cm, 1W in, 50W out, preamp	235.00
LPM 432-3-50	70cm, 3W in, 50W out, preamp	235.00
LPM 432-10-50	70cm, 10W in, 50W out, preamp	195.00
LPM 432-10-100	70cm, 10W in, 100W out, preamp	335.00

CW/RTTY/TOR

Tono 9000E	Reader/Sender	P.O.A.
Tono 550	Reader	329.00
HI-MOUND MORSE KEYS		
HK702	Straight keyer marble base	30.95
HK703	Straight keyer	29.35
HK704	Straight keyer	19.95
HK705	Straight keyer	15.49
HK706	Straight keyer	16.96
HK708	Straight keyer	14.95
HK802	Straight solid brass	86.30
HK808	Straight keyer	39.95
MK704	Twin paddle keyer	13.50
MK705	Twin paddle keyer marble base	25.65
VIBROPLEX		
Vibroplex Iambic Standard		63.98
Brass Racer		54.59
Vibrokeyer Standard		63.98
Original Vibroplex Standard		70.54
The Presentation		129.62
MISC		
AFR8000	TOR/RTTY/CW Decoder	684.57
AFR2010	TOR/RTTY/CW Decoder	496.80
AFR2000	TOR/RTTY/ASCII Decoder	427.00
AFR1000	Low cost version of above	P.O.A.
Video module for above		85.00
CW module for AFR2000		124.00
Telereader	CWR610E CW/RTTY/ASCII	195.00
STAR		
MASTERKEY	Electronic Iambic keyer	49.95
Junkers	Straight key	45.00
GW Morse Keys		34.99

YAESU

FT690	6m Multimode	269.00
FT980	HF Transceiver	1450.00
SP980	Speaker	78.95
FT77	Mobile HF Transceiver	479.00
FP700	PSU	150.00
FC700	Tuner	105.00
FT77s	10w. version	449.00
FMU77	FM Board for FT77	28.35
FL2050	Linear Amplifier	115.00
FT290	2m M/Mode Port/Transceiver	315.00
FT290	With Mutek front end fitted	345.00
FL2010	Linear Amplifier	69.00
MMB11	Mobile Bracket	30.00
NC11	Charger	11.50
CSC1	Carrying Case	5.00
YHA15	2m Helical	7.65
YHA44D	70cm ½wave	9.95
YM49	Speaker Mike	20.20
MMB15	Mobile Bracket	14.55
FT203R	NEW 2m H/Held/C/W FNB3	195.00
FT209R	NEW 2m H/Held/C/W FNB3	239.00
MMB10	Mobile Bracket	8.80
NC9C	Charger	9.60
NC8	Base/station Charger	64.80
PA3	Car Adaptor/Charger	18.00
FNB2	Spare Battery Pack	27.02
YM24A	Speaker Mike	23.75
FT726R	2m Base Station	775.00
430/726	70cm Module for above	255.00
FRT7700RX	A.T.U.	49.85
MH1B8	Hand 600 8pin mic	15.70
MD1B8	Desk 600 8pin mic	64.80
MF1A3B	Boom mobile mic	18.00
YH77	Lightweight phones	14.95
YH55	Padded phones	15.35
YH1	L/weight Mobile H/set-Boom mic	14.95
SB1	PTT Switch Box 208/708	15.70
SB2	PTT Switch Box 290/790	13.80
SB10	PTT Switch Box 270/2700	14.95
QTR24D	World Time Clock	33.35
FF501DX	Low Pass Filter	29.90
NEW MODELS		
FRG8800	HF Receiver	475.00
FRV8800	Convertor 118-175 for above	80.00
FT703R	70cm H/Held	235.00
FT709R	70cm H/Held	259.00
FT270R	2m 25W F.M.	315.00
FT270RH	2m 45W F.M.	365.00
FT2700R	2m/70cm/25W/25W	499.00
FRG9600	60-905MHz Scanning RX	449.00

ROTATORS

MR750E	Multitorque, round controller	193.00
MR750PE	Round and preset controller	217.64
MR300E	High speed VHF rotator	193.00
MR750U	Additional motor unit	64.64
MR300U	Additional motor unit	64.64
DR7600X	Heavy duty. Preset control	189.37
KS065	Deluxe bearing	27.30
KR500	Elevation rotator (not Daiwa)	144.90

Scanners

AR2002	25-550MHz and 800-1,300GHz	375
FRG9600	60-905MHz Continuous Coverage	449
ICOM R7000	25MHz-2.0GHz The Best Yet!	P.O.A.
Fairmate	8 Band Scanner (55-469MHz)	169

Miscellaneous

DRAE	Wavemeter	27.50
L30	30W Dummy load	8.05
L100	100W Dummy load	35.20
L200	200W Dummy load	42.55
CT300	300W Dummy load	69.00
DRAE	2m Pre-set A.T.U.	14.50
TOKYO HI-POWER		
HC200	10-80 HF Tuner	82.50
HC400	10-160 HF Tuner	176.00
SWITCHES		
Sigma	2 way 'n' Skts	19.95
Welz	2 way SO239	22.95
Welz	2 way 'n' Skts	41.90
Drae	3 way SO239	15.40
Drae	3 way 'n' Skts	19.90

SPECIAL OFFER FOR THE FESTIVE SEASON

The STAR MASTERKEY has proved to be extremely popular with our customers and now, for the Christmas period only, we will be giving one away to every customer who buys a new h.f. transceiver from us. This is a limited period offer but it applies to any h.f. transceiver thay you buy.

Wishing you a Merry Christmas and a happy New Year – **Tony G4CLX**

DEWSBURY ELECTRONICS
176 Lower High Street, Stourbridge
West Midlands
Tel: Stourbridge (0384) 390063/371228

VISA

G4CLX

Allow Ten Days for Delivery
Open Monday thru Saturday.
Instant H.P. subject to status.
Access, Barclaycard and real money.

Access

WATERS & STANTON ELECTRONICS

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 it's coming down the aerial lead of the TV receiver then the HP4A will stop it dead.

HF OCEANIC AIRBAND SUPPLEMENT

Yet another super little publication that has put together a host of information concerned with HF air communications. If you thought that air communications was restricted to the VHF bands then you're wrong! The short wave spectrum is crowded with air communications if you know where to listen! And that's just what this publication tells your. Hear Concorde crossing the Atlantic, the world's airliners talking back to base, the search and rescue helicopters at work etc etc. It's all there at a very reasonable price plus information on general air communications on the HF bands.

£1.95 + 30p P&P

SCANNER OPERATORS' GUIDE TO THE VHF/UHF SPECTRUM NEW!

If you're one of the many new owners of a scanning receiver and are not sure where to listen then this is for you. Only just published and covering the range 27 to 1300mHz it provides details of frequencies that the various services operate on. Fascinating reading for the student of the radio spectrum it will put you at a tremendous advantage to those who just 'fumble about in the dark'. At this price can you afford not to have a copy beside you.

£3.95 + 40p P&P

TRIO

TS940 HF tcvr.	£1694.00
AT940 Int ATU	£194.00
TS430S HF solid state	£719.00
PS403 PSU	£137.00
AT250 Auto ATU	£285.00
AT230 ATU	£285.00
TS830S HF tcvr.	£799.00
TS530S 130S HF tcvr.	£698.00
TS130S Solid state	£629.00
TL922 2kw linear	£1149.00
MICS—All stocked	
TS780 Dual band	£948.00
TR9130 2m all-mode	£498.00
TH21E 2m H'held	£169.90
TH41E 70cm H'held	£199.00
TR2600 2m H'held	£275.00
TM201A Mini-mobile	£295.00
TM401A 70cm version	£315.00
TM211E	£365.00
TS711E 2m base	£765.00
R600 Receiver	£299.00
R2000 Receiver	£479.00
VC10 VHF module	£128.00

ICOM

ICV751 HF tcvr	£1299.00
IC745 HF tcvr	£899.00
IC735 HF tcvr	£839.00
PS35 PSU	£174.00
PS15 PSU	£145.00
PS55 PSU	£168.00
SM6	£40.25
ICR71 Receiver	£699.00
IC271E 2m base	£729.00
IC471E 70cm base	£829.00
Higher power units available	
IC290D All-mode	£479.00
IC27E 2m FM	£379.00
IC47E 70 cm FM	£469.00
IC2E 2m	£199.00
IC02E 2m	£265.00
IC04E 70cm	£275.00
BP3 Ni-cad pack	£27.00
LC3 Case	£5.50
LC11 Case	£6.80

BNOS

25Amp P.S.U.	£149.00
40Amp P.S.U.	£296.00
2M 3/50 no pre-amp	£108.00
2M 10/50W no pre-amp	£108.00
2M 1/100W	£181.00
2M 3/100	£181.00
2M 10/100	£157.00
2M 25/160	£217.00
70cm 3/50	£235.00
70cm 10/50	£195.00
70cm 10/100	£335.00

TONNA

6M 5 EL	£34.30
2M 9 EL	£17.70
2M 9 EL Portable	£20.00
2M 5 EL Crossed	£26.30
2M 9 EL Crossed	£32.00
2M 13 EL Portable	£31.00
2M 17 EL	£37.60
70cm 19 EL	£20.70

NEW FOR 2002 RECEIVER

25-1300MHz £375

The new AOR scanner must now rule supreme over its competition and is without doubt the best available. We have tested this unit thoroughly on air and have nothing but praise for it. Each one is carefully tested by us before despatch (important at 1.3GHz). Order yours today. The Yen is getting stronger.

NOBODY BEATS OUR MAIL ORDER SERVICE

All goods despatched by return. 24 hour Securicor £6. Carriage: Transceivers, receivers, etc, Securicor £6, smaller items £2. Aerials at cost. If in doubt phone for quote.

YAESU

FRG8800 Receiver	£475.00
FRG9600 Scanner	£499.00
PA4C PSU	£12.65
FRT7700 ATU	£49.50
FRV8800 VHF module	£80.00
FT203/FNB3 2m	£195.00
FT209R/FNB3 2m	£239.00
FT270R 2m	£315.00
FT290R All mode	£299.00
FT2700R Dual band	£499.00
FT709/FNB3 70cm	£265.00
FT26R 2m base	£775.00
FTV70CM 70cm module	£275.00
SAT726	£95.00
FT57GX HF tcvr.	£729.00
FC757AT Auto ATU	£255.00
FP757GX Switch mode	£159.00
FT980 HF tvcr.	£1449.00
FP757HD PSU	£175.00
FF501DX L.P.F.	£29.90
FL2100Z 1KW linear	£699.00
YH55 H'phones	£15.25
NC11C Charger	£9.95
YM48	£19.95
YHA15 290 helical	£7.65
QTR24D Clock	£33.00

WELZ

SP200 VSWR HF/VHF	£89.00
SP400 VSWR VHF/UHF	£89.00
SP10X Budget HF/VHF	£34.00
SP220 PEP HF/VHF	£59.00
SP225 Dual meter	£99.00
SP420 PEP VHF/UHF	£69.00
SP425 Dual meter	£99.00
AC38 ATU 10-80m	£85.00
CH20A Coax switch	£22.95
RS485 4 amp PSU	£47.00
RS655 6 amp PSU	£79.00
RS1150 11 amp PSU	£119.00
RS3050 25 amp PSU	£169.00

DIAMOND

CP4 4 band vert.	£119.00
CP5 5 band vert.	£149.00
EL40 40m whip	£44.00
EL80 80m whip	£49.00
M285 5/8th	£11.50
M287 7/8th	£19.95
GLS Gutter mount	£12.45
TRM boot mount	£18.95
RH200B 3db 2m BNC	£24.95
EL770 Dual band	£24.00

FDK

M750XX 2m all-mode	£389.00
M725X 2m FM	£269.00
ATC720 Airband Rx	£189.00
RX40 140-180MHz	£159.00

ADONIS

MM202S Mobile mic.	£32.00
AM303G Base mic.	£39.95
AM503G Base mic.	£52.95
AP1 Amp for ICOM	£12.95
FX1 Goose neck mobile	£48.00

MISC.

Rubbere mag mount	£14.95
AT1000 SWL ATU	£52.95
HP4A High pass filter	£6.95
HK708 Morse key	£16.95
BL40X 1:1 HF Balun	£15.70
Ferrite rings	£0.60
DRAE VHF/UHF W'meter	£27.95
Datong Morse Tutor	£56.35
Mutek Pre-amps	£39.95
Revcone Discone (RX)	£27.50
CDE AR40 Rotator	£115.00
KR400 Rotator	£132.50
KC038 Mast clamps	£12.95
KS065 Bearing	£23.50
KR500 Elevator	£135.00

MICROWAVE M.

MML144/30LS	£82.90
MML144/50S	£92.00
MML144/100S	£149.95
MML144/100HS	£149.95
MML432/30L	£145.00
MML432/50	£129.95
MML432/100	£299.00
MMG144V	£37.90
MMT50/28	£129.95
MMT144/28R	£215.00
MMT432/144R	£199.00
MMC435/600	£29.90
MMC50/28S	£34.90
MMC432/28S	£39.90
MMC432/144S	£39.90
MMK1296/144	£129.95

JAYBEAM

TB3 hf 3 el. beam	£212.75
VR3 3 band vert	£51.75
4Y6m 4 el 6m	£43.70
UGP 2m g. plane	£13.80
LR1/2m 2m col. 4.3db	£32.20
LW5/2m 2m 5 el	£15.55
LW8/2m 2m 8 el	£19.55
LW10 2m 10 el	£25.30
LW16 2m 16 el	£37.95
5XY 2m 5 el xd.	£29.90
8XY 2m 8 el xd.	£38.55
Q4 2m 4 el quad	£31.65
Q6 2m 6 el quad	£41.40
PBM18 70cm 18 el	£34.50
PBM24 70cm 24 el	£46.00
MBM48 70cm 48 el	£37.95
MBM88 70cm 88 el	£51.75

SPECIALS

FT290 2m all mode	£295.00
TS130 8 band 100w	£575.00
TS830 9 band 100w	£799.00
RF3100 Gen cov rx	£219.00
7600 Sony rx	£169.00
SX200n Scanner	£279.00
SX400n Scanner	£499.00
Spectrum plus's	£99.00
Panasonic computers	£159.00

PART EXCHANGE

We urgently need your good unwanted gear. Must be clean and in working order. Just telephone for our cash or Px offer.

NEW WELZ "PEP" RANGE

At last you can read — PEP — RMS — VSWR

SP220
1·8-200MHz
2/20/200 watts
Remote sensor
£59

SP420
140-525MHz
4/20/200 watts
Remote sensor
£69

SP225
1·8-160MHz
5/15/150 watts
Twin meters
£99

SP425
140-525MHz
5/15/150 watts
Twin meters
£99

NO COMPROMISE — NO COMPETITION

The new Welz "PEP" range is unique in today's 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.

COMING SOON

AZDEN PCS 5000

2M FM 25 WATTS

Azden have at last announced the replacement for their PCS4000. It must now be one of the smallest and most sensitive transceivers. We were amazed at its front-end performance. Other features include LCD display, 2 banks of 10 memories, channel lockout, backlighted key board, priority, programmable scan, delay and lock-on etc. etc. Well worth waiting for and at a very competitive price. Sample model covered 140-156MHz but production units should have out of band tx inhibit!

UNBEATABLE VALUE!

FDK M750XX

£389
2M FM/SSB/CW
20 WATTS OUTPUT

The FDK M750XX is a superbly designed 2m all-mode rig that has stood the test of time. Its powerful 20 watt signal will compete with the best of them. If you're in the market for an all-mode rig then you could not do better than look at what the M750XX has to offer. Much lower priced than the competition, it is devoid of all the frills of the higher priced rigs and provides a reliable no-nonsense package for either base or mobile.

VISA

MAIL ORDER & MAIN SHOWROOM: 18-20 MAIN ROAD, HOCKLEY, ESSEX. Tel: Southend (0702) 206835 & 204965
BRANCH: 12 NORTH STREET, HORNCHURCH, ESSEX. Tel: Hornchurch (04024) 44765
HOURS: MON-SAT 9.00 am-5.30 pm. E.C. WED 1.00 pm

ACCESS

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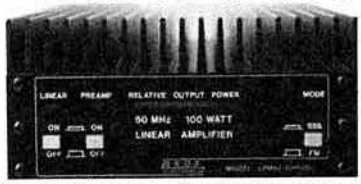
A MERRY CHRISTMAS AND A HAPPY NEW LINEAR

★ LOW-NOISE SWITCHABLE PRE-AMP
★ SWITCHABLE LINEAR AMPLIFIER
★ RF OR HARD-WIRED SWITCHING
★ SWITCHABLE HANG-TIME
★ "BARGRAPH LED" POWER METER
★ CONTINUOUSLY RATED



WITH ONE OF THE NEW VHF LINEAR AMPLIFIERS FROM B.N.O.S. ELECTRONICS

4M

Frequency Range	70 to 72 MHz
Output Power	100W +/– 0.5dB
Power Requirements	13.8V DC, 14A +/– 15%
Pre-amp Gain	12dB Typical
RX Noise Factor	Better than 1.5dB

LPM70-10-100 £172.50

2M

LP144-3-50.....£108
LP144-10-50.....£108

L144-1-100	£156	LPM144-1-100	£181
L144-3-100	£156	LPM144-3-100	£181
L144-10-100	£132	LPM144-10-100	£157
L144-25-160	£192	LPM144-25-160	£217
L144-3-180	£222	LPM144-3-180	£247
L144-10-180	£222	LPM144-10-180	£247

6M

Frequency Range	50 to 54 MHz
Output Power	100W +/– 0.5dB
Power Requirements	13.8V DC, 14A +/– 15%
Pre-amp Gain	12 dB Typical
RX Noise Factor	Better than 1.5dB

LPM50-10-100 £172.50

MAIN STOCKISTS

Amateur Electronics UK	021-327-1497
Amateur Radio Exchange	01-992-5765
Amcomm Services	01-422-9585
ARE Communications	09252-29881
Arrow Electronics	0245-381626
Bredhurst Electronics	0444-400786
Dewsbury Electronics	0384-390063
DW Electronics	051-420-2559

MAIN STOCKISTS

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Photo Acoustics	0908-610625
R & E. S. (Guernsey)	0481-28837
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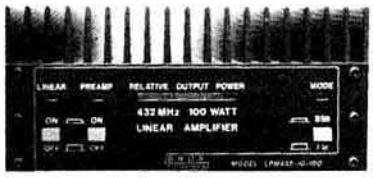

3W IN 100W OUT

FREQUENCY RANGE	430 to 440 MHz
OUTPUT POWER	100W RMS ±0.5dB
INPUT POWER	10W Recommended
POWER REQUIREMENTS	13.8V, 20A
PRE-AMP GAIN	Typically 12dB
PRE-AMP NOISE FACTOR	Better than 1dB

L432-3-100	£295	LPM432-3-100	£335
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12/6A	£58	12/25A	£146
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⅔AA*	0.225	25.0	14.7	1.04	0.99	0.94
AA	0.50	49.5	14.7	1.08	1.02	0.96
AA*	0.50	49.5	14.7	1.14	1.08	1.02
NEW AA (SUPER)	0.60	49.5	14.7	1.18	1.12	1.08
⅔A*	0.45	28.0	17.2	1.18	1.12	1.08
RR*	1.20	42.1	22.6	1.86	1.76	1.66
C	2.20	49.7	25.9	2.85	2.70	2.56
D (SUB)	1.20	60.5	33.5	2.85	2.70	2.56
D	4.00	60.5	33.5	5.06	4.80	4.56
D*	4.00	60.5	33.5	5.10	4.84	4.60
F*	7.00	94.0	33.5	7.36	6.98	6.62
SF*	10.00	91.3	41.7	POA	POA	POA
PP3	0.11	49 x 26.5 x 17.5		4.52	4.29	4.07
PP9	1.2	81 x 52 x 66		POA	POA	POA

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ALM-203E

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ICS are proud to introduce the new ALM-203E 2 metre hand held transceiver from Alinco International.

This push button, keypad operated transceiver is housed in a robust high impact plastic/cast aluminium case, and provides all the most wanted features needed for pleasurable 2 metre operation - but at a price similar to that of comparable thumb wheel operated units. Quality and reliability levels are up to the highest Japanese standards.

INCLUDED IN THE PRICE

- 400mAH NI-CAD Battery Pack. EBP-5N (Giving 3 Watts output).
- AC Battery Charger. EDC-5.
- Belt Clip.
- Antenna and Hand Strap.

FEATURES

- Up to 5 Watts Tx output (with DC/DC converter).
- Battery Save Rx Mode. (only 5mA current drain on standby).
- 10 Memory Channels.
- Programmable Scan Features.
- Built in 'S' Meter.
- Programmable Repeater Offset.
- Repeater Tone Burst.
- Multifunction LCD Display.
- Programmable Call Channel.
- 12.5KHz Channel Spacing.
- 144 - 146MHz Transmit.
- 140 - 160MHz Receive.

OPTIONS

- Leatherette Case.
- DC/DC converter giving 5 Watts output.
- DC Lead.
- Speaker/microphone.
- Mobile Charger Stand (mounts inside car window).
- 30 Watt Amplifier.

COMING SOON

ALR-206E 25 Watt Mobile Transceiver.

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SMC (Stoke)	25th Dec—2nd Jan
SMC (TMP)	28th—31st & 1st-4th Jan
SMC (Scotcomm)	25th Dec-7th Jan
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ADVANCED MICRO CONTROL

Advances in microprocessor circuitry allows selectable synthesizer steps, up/down scanning from the microphone, priority channel operation, and ten memories (with memory scan), all called up with fingertip ease.

LCD DISPLAY

A large Liquid Crystal Display provides readout of the operating frequency. It is highly readable under conditions of bright sunlight and is backed up by a lamp for night-time operation.

PROGRAMMABLE SYNTHESIZER

The optimum synthesizer steps for SSB/CW FM operation are very different. That's why Yaesu gives you the flexibility of two synthesizer steps per mode. 100Hz or 1kHz

FT-290R

Frequency coverage (MHz):
144-146 or 144-148
Modes of operation:
SSB (USB, LSB) CW & FM
Synthesizer steps:
SSB/CW : 100Hz/1kHz
FM : 12.5/25kHz
Sensitivity (better than):
SSB/CW : 0.5μV for 20dB S/N
FM : 0.25μ for 12dB SINAD
Selectivity:
SSB/CW : 2.4kHz @ −6dB
: 4.1kHz @ −60dB
FM : 14kHz @ −6dB
: 25kHz @ −60dB
Repeater split:
600kHz (+ and −)
Tone burst frequency:
1,750Hz

GENERAL

Power Output: 2.5 Watts at 12VDC

Frequency response: 300-2, 700Hz @ −6dB

Carrier Suppression: Better than −40dB

Sideband Suppression: Better than −40dB

FM Deviation: +5kHz (max)

Spurious radiation: Better than −60dB

Intermediate frequencies: 1st IF 10.81MHz
2nd IF 455kHz (FM)

Image rejection: Better than −60dB

Audio output: 1 Watt @ 10% THD

OSCAR 2-10m

The SMC Oscar Two 10 Metre, was a 40 channel 27MHz, FM, CB, transceiver, designed to satisfy the stringent Government specifications of MPT1320. It has now been successfully modified to cater for the equally demanding requirements of the Amateur Radio service worldwide. 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 at a remarkable price!

ONLY £65 inc

FT726R (2) £775 inc VAT

The Yaesu FT726R has been designed and built for the discerning VHF and UHF operator. Up to three modules can be simultaneously installed giving pushbutton band selection. Choose between 6M, 2M, 70cm and 10, 12, 15M.

SSB (with fully adjustable speech processor), FM and CW (optional 600Hz CW filter available) are standard. The CW filter combined with Yaesu's excellent IF shift/width system enables optimum receive performance despite today's crowded bands.

An 8-bit NMOS microprocessor offers a level of control hitherto unsurpassed, dual VFOs-20Hz step tuning, standard repeater shifts including reverse, pushbutton band selection and 25/12·5kHz FM channel tuning knob.

The eleven memory channels store mode as well as frequency and can be scanned for, busy or clear, stop or pause, even on different bands. Programmable limited band scan between memories is provided as well as priority channel checking. All the memories and both VFOs are protected against power failure by a lithium cell.

With the optional 'Plug-in' satellite IF unit installed, full crossband duplex capability is available with independent tuning and mode selection, as well as full metering of both transmit and receive parameters. (Power O/P and signal strength.)

An LED display plus two digit clarifier display are provided with large digits for easy reading at any angle. Standard features also include selectable AGC and Noise Blanker, all mode squelch and RF gain and continuously adjustable transmitter output power.

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per step on SSB, AM & CW, and 12½/25kHz on FM. When changing modes from SSB/CW to FM, your transceiver is automatically set to the nearest standard channel when you start scanning or tuning.

TEN MEMORY CHANNELS

As many as ten frequencies may be stored into memory, for instant recall. The priority feature allows you to check a favourite frequency every few seconds, with automatic halting (FM mode) when the channel is clear or busy, as desired. Memory backup is provided by a built-in lithium cell.

DUAL VFO SYSTEM

These transceivers feature a digitally synthesized dual VFO system which provides tremendous flexibility in day to day operation. For example, one VFO may be set up in the SSB portion of the band, and the other in FM sub-band, for immediate QSY when changing modes.

CONVENIENT FEATURES

Among the many features adding to the convenience of the transceiver is a supplied portable antenna, a high-performance noise blanker, a high/low power switch. A clarifier allows you to follow unstable or Doppler-shifted signals.

FEATURES

Audio output impedance: 8 Ohms

Antenna: SO239 on rear

Dimensions: 58H × 150W × 195D mm
1.3kg (without cells)

Current consumption: 70mA receive
800mA Tx (2.5 W RF FM)

Power requirements:
8 × C size dry cells
8 × C size Nicad cells
External 8·5-15.2VDC
Memory backup: Lithium cell

Microphone: (YM47 supplied)
600 ohms ppt with scan

FT 690R

Frequency coverage (MHz):
50-54

Modes of operation:
USB, CW, AM & FM

Synthesiser steps:
SSB/CW/AM : 100Hz/1kHz.
FM : 10/20kHz

Sensitivity (better than):
SSB/CW/AM : 0·5μV for 20dBS/N
FM : 0·25μV for 12dB SINAD

Selectivity:
SSB/CW : 2·4kHz(−6dB)
: 4·1kHz(−60dB)
AM : 4kHz (−6dB)
: 15kHz (−60dB)
FM : 14kHz (−6dB)
: 25kHz (−60dB)

Repeater shift:
1Mhz (+ & −)

FRG 8800

- 0·15-30MHz
- 118-174 MHz (optional)
- AM, CSB, USB, CW FM-N
- S/SINPO LED display
- 12 channel memory
- Computer interface (opt)
- FM-W (optional)

FRG 8800
£475 inc VAT
FRV 8800
£80 inc VAT

FT757GX
£739 inc VAT

The FT757GX is the latest in a long line of superb HF transceivers from Yaesu. The transceiver covers all the amateur bands with a full 0·5-30MHz continuous coverage receiver. Dual VFOs and eight memories all controlled by three microprocessors allow quick and accurate control of all the main functions.

All modes SSB, CW, AM and FM are included as standard along with a 600Hz CW filter, iambic keyer with dot-dash memory, 25kHz marker, noise blanker, AF speech processor and IF shift/width filters. Top panel switch selectable semi-break in or QSK is available for CW operation.

The Yaesu CAT (computer aided transceiver) system is fitted to enable external control of VFO frequency and memory functions from a personal computer via an interface unit for customised band scanning and control of the memories and VFOs.

The remarkable new heatsink design includes a quiet cooling fan with a new duct-flow cooling system incorporating the heatsink into the body of the radio. This gives forced air circulation allowing 100W PEP continuous output at 100% duty cycle in all modes.

The high performance General Coverage Receiver with Yaesu's unsurpassed IF shift/width system, switchable AGC and 20dB attenuator, combined with the switchable, RF preamp provides the FT757GX with a dynamic range in excess of 100dB in CW narrow.

All the presettable controls and connectors are conveniently located on the transceiver rear panel including VOX gain, anti-trip and delay, AM carrier and SSB processor levels, 25kHz marker switch, ext spkr and Hi Z AF outputs, patch input and external ALC, remote controller I/O port and band data for optional microprocessor automatic ATU.

The optional FC757AT is a fully microprocessor controlled antenna tuner which gives fast, reliable automatic tuning of a broad range of SWRs, with manual override for that particularly 'difficult' aerial. Also included is a dummy load, automatic SWR calculating system and meter and a dual range RF Wattmeter.

FM2033

144 MHz, 12VDC Transceiver. 25W/5W Hi/Lo (both adjustable). Compact 2⅛" × 6⅜" × 7 3/16". 12½ KHz steps (100 KHz fast QSY). Amber LCD 'Sunlight View', Side Lit. Display; 100's of Hz or channel number. Sensitivity <0.2μV for 12dB SINAD. Single knob frequency control "Dial". Endless or non-endless dial options. RIT; 1 KHz steps, V.F.O. + memory. Two 5 slot memories A, B, A + B, A × B. 11th memory instant "call" channel. Memories simplex or duplex channels. Band scanning, programmable limits. Scan halts squelch + centre zero. Pause on scan halt for 3 seconds. Scan/tune/RIT from microphone ±600 KHz split, plus cross memory. Repeater input listen by pressing "dial". Setable; steps, tone, splits, limits. Simple controls for safe mobile operation. C/W mobile mount, mic and handbook.

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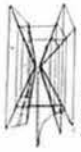

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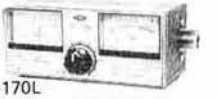

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IC-R70 Icom Gen Cov RX	£499
FRG-7700M Gen Cov RX 1.50Hz-30MHz + Memory	£365
FP-757GX Switch Mode Pwr Supply	£127
FP-700 External P.S.U.	£119
FC-700 Antenna Tuner	£84
FC-757GX Auto A.T.U	£204
FV-707DM Digital V.F.O	£118
FTV-707 Transverter (Main Frame)	£23
144TV 2 Mtr Module	£120
T.A.U. Early T.A.U	£300

VFH/UHF

CPU-2500RK 2 Mtr. FM .25W.	£189
KDK-2025 2 Mtr. FM 25W.	£120
FT-227R 2 Mtr. FM 10W.	£169
FT-730R 70cm FM 10W.	£190
FT720RU 70cm FM 10W.	£185
FDK Palm IV. 2 Mtr 6 Channel Handy	£85
C7800 70cm FM	£250

Scanners

SX200 VHF/UHF. AM/FM.	£215
SMC MS-8400 VHF/UHF. AM/FM + 10 Memories.	£215
Regency-M100 VHF/UHF. AM/FM	£159

Misc.

MMS-1 Morse Talker	£85
MTV-435 TV TX	£140
MMC-435/51 TV Down Converter	£27
Mirage B108 2 Mtr Amp 10W In—80W Out	£110
Mirage B1016 2 Mtr Amp 10W—160W	£129
FT-7010 Linear Amp—70cm	£69
FT-6010 Linear Amp—6 Mtrs	£39.99
ICE 680 Analogue Multitester	£20
FP-4 Yaesu P.S.U.	£39
KP-202 Charger Base Charger	£6
AR-22XL Rotator Light Dury	£69
OSCAR1 CB TX	£55
OSCAR2 10 Mtr FM	£59
KP-100 Squeeze Key	£66

MAIL ORDER SMC or SHOWROOMS see previous pages

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

CHANGING THE SOCIETY

A number of letters and articles have recently appeared in the amateur radio press which are critical of the way in which the Society is run. While some of the ideas expressed have merit, the points made in most cases are based on false premises and reflect little understanding of the way in which an institution such as the RSGB is required to operate by law and in terms of efficient commercial and administrative practice. Much effort has been put into detailed replies to these letters, pointing out their deficiencies.

More recently, similar proposals for radically changing the Society have been circulated in the form of topics for discussion at a possible EGM of the Society, although no call for one has been received at the time of writing. These proposals were sent to clubs and some individuals. A brief initial response from myself on behalf of Council was circulated to affiliated societies and RSGB representatives in a letter of 1 October.

Since this time, a more detailed response entitled "Changing the Society—the RSGB Council replies" has been discussed by Council at its meeting on 26 October. This has, in the interests of economy, been given the same limited circulation as my earlier letter.

May I emphasize that the Society is very much in favour of making changes to the way it operates? Indeed, it has had to become most expert at it in order to cope with the growth in facilities and services it has obtained for members who, as many will know, have nearly doubled in their numbers since 1977. Many of these changes originated from suggestions and requests from members. These we receive in abundance from their letters, talks to clubs, and via Society representatives, as part of the normal communication within the Society, and which we regard as essential indicators of membership requirements. What is a pity about the present situation is the considerable time (and money) that the Society has had to divert from progressing these more positive aspects of amateur radio in order to deal with the output of a vocal minority.

As noted above, the circulation of the above documentation has been deliberately limited in the interests of economy. However, if you wish to receive a copy, please contact Ms H M Norman at RSGB HQ.

Joan Heathershaw, G4CHH
President

A SEASONAL MESSAGE FROM THE SOCIETY'S PRESIDENT

In my message to you in January I said I looked forward to the year ahead with a mixture of excitement and trepidation. In practice, it has been a most stimulating and rewarding experience. On becoming President, one thing which I quickly began to appreciate was the sheer volume of the work done by the Society on behalf of amateur radio, and the dedication of both staff and volunteers.

This year, the task has been one of streamlining and improving efficiency; of balancing continuing improvements against resources. I welcome the progress which has been made in this direction. Against this, I regret the amount of effort and resources that has had to be diverted to deal with problems generated by a minority who wish to radically change our Society. This has restricted progress in at least one area which I believe essential—that of forging close links between the central organization of the Society and affiliated clubs.

During the year, I have had the opportunity of visiting many clubs—nearly 40 to date. I have also met many leading figures from other national societies. As a representative of the RSGB I have been received everywhere with a warmth and kindness that at times was overwhelming. With this level of goodwill there is every chance that we can succeed in our endeavours: without it, we could fail. I was particularly sad to learn of the collapse of the French amateur radio society REF, which reminds us all that strength must be worked for, not presumed.

So it is with great resolve that I look forward to continuing my efforts on behalf of the RSGB in my position of immediate past-President, but for this year, I thank you, the members of the Society, for your valued support, and extend to you my good wishes for the coming festive season.

A very merry Christmas and happy New Year to you all.

Joan Heathershaw, G4CHH

Photo GM4SRL

Amateur Radio News

Mexico earthquake aftermath

As is well known by now, a major earthquake in September caused extensive damage to buildings and structures in Mexico City and to international communications in and out of the city, and radio amateurs all over the world became heavily involved in providing communications facilities during the aftermath. In the UK, Raynet undertook provision of information to distressed relatives of residents in the city, and the following account of Raynet's role was written by the chairman of the Raynet Committee, Geoff Griffiths, G3STG:

On Friday 20 September, Diana Pando, a Mexican girl pupil at a boarding school in Rocester, Staffordshire, was very distressed about the news from Mexico City following early reports of the earthquake there. The teachers at the school were anxious to put her mind at rest and contacted Uttoxeter Police, who consulted their emergency incident book and suggested that Raynet might be able to help.

The county controller of Staffordshire, Martin Harrison, G3USF, was contacted, and although the disaster was outside the UK he decided that radio amateurs in Staffordshire might be able to assist in some way. He contacted John Wiles, G4TVA, and Mike West, G4EJM, and both readily agreed to assist; although one needed to climb his tower during darkness to repair a feeder fault, and the other had just been involved in an accident on the motorway. Both stations were operational by about 1830, with one working into Mexico City and the other into the USA East Coast Emergency Net. Despite considerable operating difficulties, it was possible to inform Miss Pando by 2315 that her parents were safe. Following an approach from BBC Radio Stoke and an interview given to them, UK media rapidly picked up the story and there was extensive coverage of it on national television news.

While this was happening, other amateurs in various parts of the UK were becoming involved and offering their services: many enquiries being received at RSGB headquarters. In the course of the routine 3·5MHz Raynet Controller's Net on the Sunday morning, it became apparent that the Raynet team in Newcastle-under-Lyme were being inundated with calls for assistance, not only from their own area and user services outside their area but also from the general public. This situation had obviously been generated by the media coverage, and it was clear that assistance was required. In addition, Staffordshire Police were asking for a national telephone number to which all callers could be referred in order to relieve the pressure on their enquiries desk. Geoff Griffiths and the zonal co-ordinator, Dave Lankshear, G3TJP, discussed the situation and decided that, despite the international nature of the problems, Raynet could make a vital contribution because of its ready access to large numbers of volunteer amateurs trained in message handling under difficult conditions, and since its membership records were held on the RSGB HQ computer, rapid mobilization was possible.

Following this discussion, several items were immediately put in hand. A list of first-shift operators who could assist in traffic handling was identified, and contact was made with the emergency communications officer of the British Red Cross Society in London, who was well aware of Raynet's capabilities. A formal request for Raynet to operate for Red Cross on a humanitarian basis was then made, with the aim of relieving distress of those with friends and relatives in Mexico. Contact was also made with the Foreign Office, which was very interested in the information coming out of Mexico City via amateur radio, and said that it would be helpful if a system for dealing with enquiries from the general public could be set up. A network of enquiry points was already developing in Staffordshire and South Wales as a result of the publicity generated by the media: in addition to these, Geoff Griffiths and his family manned their telephone on a 24h basis to handle enquiries from the Foreign Office and Red Cross.

A standard form of enquiry rapidly developed, and requests for assistance from members of the public were passed to members of the operating teams. At the same time the press was given information about Raynet and amateur radio. Pressures on the operators were considerable: there were only short windows open to Mexico, where rapidly-tiring operators were coping with exceptionally difficult conditions. In most cases the assistance of emergency networks in the USA and Canada was invaluable. Traffic was generally passed direct on 14MHz, although relays via Germany and Spain were also utilized: traffic was mainly in English, although some required the skills of Spanish-speaking amateurs in the UK. Return traffic came back in a variety of ways on a variety of frequencies, from Spain, Germany, France and Southern Ireland. Occasionally life on the hf bands became impossible, and transatlantic telephone and telex lines were pressed into service.

In Staffordshire, where several hf stations were operating simultaneously on different nets during each window, a centralized reception system for message handling was set up and manned continuously: traffic was then distributed to the

hf stations via a 144MHz link. In the East Midlands several Raynet groups were put on standby: they carried out listening watches for returning traffic, and supplied a stream of relief telephone operators for the "hot lines" in Leicestershire. Calls to the Raynet zonal representatives in the southwest, the West Midlands and the southeast resulted in recognition of the necessity for the identification of a relief team of hf operators: this was done and they did sterling work with outgoing and incoming traffic.

As a result of an item on BBC breakfast television on 26 September there was more national publicity for the Raynet "hot line" telephone number in Melton Mowbray, and for the next 48h the enquiry rate doubled.

By 30 September the Foreign Office's Mexico operation—which had been open on a 24h basis since the beginning of the disaster to deal with enquiries from the general public in respect of British nationals who were missing—decided to close their special telephone lines. At that stage the Raynet team still had a large number of enquiries in hand, and it was unanimously decided to continue operations until as many as possible had been resolved. The team continued to accept new telephone enquiries until 3 October, and the last return traffic was received on 8 October: the entire operation had been continuously manned for a period of some 17 days.

It only remains to say that the British Red Cross Society, the Department of Trade & Industry and the Foreign Office were unfailingly helpful during the operation, and that the reputation of amateur radio has been greatly enhanced by these operations: most importantly, the true "ham" spirit is alive and well.

As a postscript, Raynet was also recently involved in the widely-publicised search for a missing three-year old girl in the Norfolk area, and in the consequences of a recent ambulance strike in Coleraine.

Duplex and crossband

On 18 October 1985, the Department of Trade & Industry issued the following long-awaited press release concerning duplex and crossband working by radio amateurs:

The method by which licensed radio amateurs transmit and receive on different frequencies, known as duplex or crossband working (involving one or two amateur bands) has been clarified after talks between the Department of Trade & Industry and the Radio Society of Great Britain. The following guidelines have been agreed to assist operators:

(a) A licensed UK amateur may receive any other properly-authorized amateur transmissions but may only transmit on frequencies for which he/she is licensed.

(b) Each station must be identified but the identification of the second station should not be retransmitted by the first. Details of the receiving and transmitting frequencies should be given at the beginning and the end of the establishment of communications and at every 15 minutes throughout a long contact.

(c) Class B licensees may use space satellite transponders which transpond from a frequency band in which they are licensed to transmit to any band authorized for the amateur satellite service.

The press release notes that crossband operation between an amateur station and a non-amateur, for example a cb station, is not permitted (see Clause 1(b) of the licence). It also states that Class B licensees may respond on frequencies and modes for which they are licensed to hf morse transmissions from amateur stations. Those Class B licensees who possess a notice of variation permitting them to transmit morse between 1 April 1985 and 31 March 1986 may respond in morse on their Class B frequencies to any authorized amateur hf morse transmissions.

The press release also adds that there are now 27,900 Class A and 27,780 Class B licences in force.

AMATEUR RADIO OBSERVATION SERVICE

It has become apparent that a few self-styled "observers" of this service have been addressing reports and complaints to licensed amateurs, clubs and others as though representing AROS, RSGB or some other organization with responsibility or authority in matters of operation on the amateur bands. The Society wishes to make it quite clear that any letters or written matter from the Amateur Radio Observation Service, whether originating from the co-ordinator (who is sometimes also referred to as the hon organizer) or an observer, goes out under an AROS heading and over the signature and title of the co-ordinator. He is Bob Osborne, G4FJN, whose address is Warren Cottage, Leys Hill, Walford, nr Ross-on-Wye, Herefordshire HR9 5QU. This address appears at the top of all correspondence. Any telephone calls concerning AROS matters would originate from the co-ordinator. The Society's general manager also deals with similar business to that undertaken by the AROS, and his correspondence will always be on Headquarters notepaper and signed by himself or other members of HQ staff.

The Amateur Radio Observation Service is an advisory body, not a disciplinary organization, and carries no particular authority in respect of the licence or of the operation of amateur stations. The duty of the co-ordinator is to receive and analyse reports of contravention of the licence, of operating practices which could cause jeopardy to the amateur service, and of any other spectrum abuse which might be detrimental to communication by all licensed amateurs. Where appropriate the co-ordinator approaches those reported as responsible for any deliberate or unintentional fault in their transmission with any necessary advice and an invitation to comment. All reports received, whether from an observer or from other sources, are treated in confidence: likewise, all communications from the co-ordinator are in confidence and personal to the addressee. However, should an adequately-proven case of serious offences against the terms of the licence come to light, all details will be passed to the authorities for investigation and further action.

Where appropriate, neither the AROS nor the RSGB would hesitate to co-operate fully with the authorities so as to ensure that instances of deliberate spectrum abuse are dealt with effectively.

New uhf record

A tropospheric opening took place on 12 July 1985 between Hawaii and the west coast of the USA. KH6HME, operating from a location 8,300ft asl, worked a station near San Francisco on 430MHz for what is thought to be a new world record. KH6HME also had a contact with N6CA in Los Angeles on 1,296MHz. Both distances are well in excess of 4,000km. The previous record was held by KH6HME and WB6NMT, with a contact which took place between Hawaii and California on 18 July 1979.

9V1ITU on the air

The distinctive callsign 9V1ITU was activated during the recent "Asia Telecom 85" forum and exhibition. This was the first occasion on which the International Telecommunications Union had held activities of this type away from its home base in Geneva, but nonetheless the IARU was delighted to respond to an invitation from the ITU secretary-general to participate. The station was set up in the exhibition area and used Amtor on 14MHz during the exhibition's opening hours. Because of the time and generally poor propagation conditions during the period, most stations contacted were in Australia, Japan and Indonesia; nevertheless, good demonstrations of modern amateur techniques were given to senior officers of attending administrations. The exhibit was supplemented by a passive display of the proposed Japanese satellite, JAS-1, kindly loaned by JARL, and also by a locally-built version of the 9M2CR 430MHz "chopstick" helical antenna. This was promoted as "alternative technology" for developing countries.

9V1ITU was operated by members of both the IARU and the Singapore ARTS. An Icom 751, together with an Apricot/AMT-2 Amtor system and a three-element beam at 60m, made up the station, which performed flawlessly for the five days of the event.

In keeping with the tradition established in Geneva, IARU and SARTS hosted a small reception for vip visitors. The ARRL video tape "Amateur Radio's Newest Frontier" converted to the PAL/625-line system and provided by the RSGB, was played throughout as a backdrop, and the work of Owen Garriott, W5LFL, in STS-9 proved interesting to those attending.

The event was the first time that the IARU, together with IARU Region 3 and a Region 3 society, had worked in this way: it was successful in its intention of bringing up-to-date activities of the amateur and amateur satellite services to the attention of influential members of the ITU and member administrations.

New *RAE Manual*

The new and updated 11th edition of the *Radio Amateur's Examination Manual*, by George Benbow, G3HB, should be available now: it incorporates the amateur radio licensing conditions as at early 1985, and covers changes in the RAE syllabus for 1986-8. These mainly concern Paper 2, section 2 (electrical theory) and the use of transistors for switching. Also included are the decibel and the expression of power in dBW, and the reasons for band planning.

The opportunity has been taken to improve the presentation of information in a number of areas. Virtually all of the manual has been updated and revised, making this edition the most important and up-to-date source of information for the would-be licensed amateur.

Strange but true

The following true story was told to a member of headquarters staff visiting a well-known retailer in the south of England. A not-so-newly-licensed amateur purchased a 144MHz Yagi antenna to replace a chimney-mounted colinear used for local fm operation: a few days later he returned to the dealer demanding his money back, saying that the Yagi was a far worse performer than the colinear. The dealer was rather surprised and asked the amateur how he had installed it. It then emerged that the customer thought that "vertical polarization" meant mounting the antenna with its boom vertical and the array pointing directly upwards. . . .

RMG changes

The following changes within the Repeater Management Group have taken place. Chris Young, G4CCC, has resigned as vice-chairman. He remains as publicity officer and takes back the responsibility for repeaters in the Central Southern and Southwestern areas. Mike Senior, G4EFO, has taken over as vice-chairman. Martin Hobson, GM8KPH, has become a full member of the committee, having responsibility for Repeaters in the north of Scotland.

The full RMG Committee is: chairman, Mike Dennison, G3XDV; vice-chairman (also covering Sussex and London), Mike Senior, G4EFO; minutes secretary (also covering East Midlands), Geoff Dover, G4AFJ; Central, Southern and SW representative, Chris Young, G4CCC; West Midlands and Wales representative, Chris Reed, G8MFP; East Anglia and Northern Home Counties (tv specialist), Graham Shirville, G3VZV; South Scotland and Northern Ireland representative, Colin Dalziel, GM8LBC; North Scotland representative, Martin Hobson, GM8KPH; Northern England representative, Ken Fisher, G6LMR.

Corresponding members: technical librarian, Chris Goadby, G8HVV; rtty specialist, Ian Wade, G3NRW; VHF Committee chairman, Malcolm Appleby, G3ZNU; Microwave Committee chairman Mike Dixon, G3PFR; vhf manager, Keith Fisher, G3WSN.

The RMG would like to make the point that any repeater matters should be sent to the local RMG representative **not** G3XDV or RSGB HQ.

Details of each member's "regional" responsibilities will be given in the next issue of *Repeater Report*, which is sent to each "repeater keeper" and gives details of matters relating to repeater groups.

News from North America

The American Radio Relay League has recently adopted a band plan for the 24MHz band, as follows:

24·89-24·92MHz, cw only;
24·92-24·93MHz, cw/digital;
24·93-24.99MHz, ssb/sstv.

An interesting USA precedent was set recently when it was held that a company using a computer in the course of its normal business may have to pay up to $3,000 in fines for failing to correct radio frequency interference generated by the unit. The US Attorney for the Eastern District of Pennsylvania recently announced that his office is seeking such a penalty in a suit filed against a company called Comp-Art Inc for what he called "unlawful interference to television". The interference had been present for some 18 months, and the Federal Communications Commission had traced it to the computer used by Comp-Art: the company had been told to cure the problem with shielding but it had failed to do so. Shades of the Ambassador problem?

The new Archbishop of Los Angeles, Roger M Mahony, holds the callsign W6QYI.

The Canadian Radio Relay League has asked the Ministry of Communications for access to the 24MHz band. However, the ministry has indicated that access to the band cannot be given to Canadian amateurs until a number of commercial stations with assignments in the 24MHz band have either been moved to other frequencies or are confirmed as being non-operational. There will then have to be amendments to Canadian regulations. The CRRL says that "recent experience shows that enacting such amendments can take years".

Radio Amateurs Old Timers Association

We have been very gratified by the response to our first effort in the publishing line, and feel that stage one of our efforts for you is now completed. Issue No 2 is planned for about March next. There is still much to do to improve communications, and we have not been overwhelmed with offers for local representatives or operators for cw or ssb nets.

Seasons greetings to all our 600 members.

G6CJ

Arrow Electronics Ltd

In the Lowe Electronics advertisement on the inside back cover of the November issue, the name and address of Arrow Electronics Ltd was inadvertently omitted from the list of Trio dealers as a result of a printers' error. We apologise to both companies for any embarrassment this omission may have caused.

Mobile Rallies Calendar

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

1 December
The St Albans (Verulam) Christmas Rally, The City Hall, St Albans. Opens 11am. Talk-in on 144MHz and 432MHz. Entrance 50p. Enquiries to G4JKS, tel 59318.
26 January 1986
Oldham ARC is to hold its first Mobile Rally at Birch Hall Hotel, Rhodes Hill, Lees, Oldham. Open 10.30am (10am for disabled). Talk-in by G4ORC/G1ORC on 144MHz (S22) from 9am. Bring and buy, bar, catering facilities, limited space for car boot sale etc. All enquiries, including trade enquiries to G4ZEP, tel 061-624 7354.
9 February 1986
Bury RS Hamfeast 1986 at Mosses Youth and Community Centre, Cecil St, Bury (only minutes from the M66). Further details as information becomes available.
2 March 1986
Doncaster & District Raynet Group amateur radio rally, Adwick Leisure Centre, Welfare Road, Woodlands, Doncaster. Talk-in on vhf and uhf. Open 11am (disabled 10.30am). Details G8XTU, tel Doncaster 531365 home, or 539446, ext 38 work.
2 March 1986
Welsh Amateur Radio Rally presented by the Barry College of FE Radio Society at Barry Leisure Centre, off Holton Rd, Barry, South Glamorgan. Talk-in on S22. Trade stands, bring and buy (no commission, small display charge), swimming pool, licensed bar. Enquiries to GW4FOM, tel 0222 565656 (evenings).
16 March 1986
Pontefract & DARS Components Fair, 11am-4.30pm, Carleton Community Centre, Pontefract, mid-way between Pontefract and Darrington on the A1.
16 March 1986
South Essex ARS Mobile Rally, Paddocks Community Centre, Canvey Island, Essex. Open 10.30am. Talk-in on S22. Details G4FMK, tel 0268 683805.
23 March 1986
19th White Rose Rally, The University of Leeds. Details G4NDU or Box 73, Leeds LS1 5AR.
11 May 1986
The Swindon Rally at Oakfield School, Marlowe Ave, Swindon, Wilts. Open 10am. Talk-in on S22 and SU8/GB3TD. Morse tests, refreshments, family entertainments, trade stands, exhibits. Details and trade bookings to G8SFM, tel 066689 307.
18 May 1986
The 29th Northern Mobile Rally, Great Yorkshire Showground, Harrogate. Details G3CQQ, tel 0943 602118.
1 June 1986
Spalding and District ARS Rally at Springfields Gardens, Spalding. Opens 10am. Talk-in. Details G4OO, tel 0775 86382.
8 June 1986
Elvaston Castle Mobile Radio Rally, Elvaston Castle Country Park, five miles south-east of Derby on B5010. Talk-in by GB2ECR on 144MHz and 432MHz. Morse tests available. Details from G4PZY, tel 0332 767994 or G4CTZ, tel 0332 799452. Trade enquiries to G4HIJ, tel Ashbourne 43241.
29 June 1986
28th Longleat Amateur Radio Mobile Rally at Longleat Park, Warminster. Preliminary enquiries to G4FRG tel 0272 848140.
13 July 1986
Sussex Mobile Rally, Brighton Racecourse. Opens 10.30am. Talk-in via GB2SMR on 145·550MHz and 3·5MHz. Details from G8JVE or G4UAW, evenings.
27 July 1986
Scarborough ARS Rally at The Spa, Scarborough. Open 11am. Talk-in on 144MHz (S22), and 432MHz (SU8) and RB0-GB3NY. Further details from rally secretary G4UQP.
3 August 1986
Rolls-Royce ARC Mobile Rally, Rolls-Royce Sports and Social Club, Barnoldswick, Skipton. Access from A59 and A56. Open 11am. Morse tests available. Enquiries to G4ILG, tel 0282 813271 ext 337, daytime, or 0282 812288 evenings.
10 August 1986
Hamfest '86 at the Flight Refuelling Sports and Social Club grounds, Merley, Nr Wimborne, Dorset. Details Ashley Hume, G0CDY, 71 Victoria Gardens, Ferndown, Wimborne, Dorset BH22 9JQ, tel 0202 872503.
24 August 1986
Preston ARS 19th Annual Rally at Lancaster University. Details G3DWQ, tel 0772 53810.
7 September 1986
Lincoln Hamfest, Lincolnshire Showground. Further details to be published at a later date.

Special Event Stations

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

1 December, GB4SRS
Stroud ARS will be operating from the Scout Hut, Seley, Stroud on hf 3·5-28MHz and 144-430MHz. Refreshments, food and junk sale. Special QSL cards. Details from G4XWZ, tel Stroud 70267.
4-31 December, GB4SYJ
The Royal Naval Amateur Radio Society will finish off its activity in support of the Silver Jubilee Award by the operating of GB4SJY from Portsmouth. Activity will be on all bands. Details of the award can be obtained from G3HZL, or any RNARS member and QSLs for this period of activity should go to G3JFF.

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.
7 December
RSGB AGM, IEE, Savoy Place, London.
18 January 1985
RSGB Presidential Installation. See *RSGB News Bulletin* for details.
16 March 1986
RSGB National VHF Convention; Sandown Racecourse.

COUNCIL PROCEEDINGS

A brief report on the Council meeting held on 27 June 1985

Present: Mrs J Heathershaw (President, in the chair), Dr E J Allaway, Messrs J T Barnes, R G Barrett, G R Jessop, Dr J N Gannaway, Messrs F D Hall, H M Holmden, W J McClintock, H S Pinchin, D M Pratt, B O'Brien, D S Smith, K E V Willis (members of Council), D A Evans (secretary/general manager), A W Hutchinson (editor), and Mrs R Evans (minutes secretary).

Apologies for absence were received from Messrs Case, Cornish and Dr Evans.

Radio Communication
Council considered at length the proposals arising from the last meeting of the Editorial Board. Among these was the reduction in the length of regular contributed features in order to maintain a balance between all the various interests within the Society by providing more space for technical and other articles.

Mr Willis objected to the proposed reduction in space allocation for *4-2-70*. Mr Hutchinson said that all allocations had always been subject to editorial control and it was his responsibility to decide on measures necessary to keep within the financial guidelines which he received.

The secretary said that the problem was that the Society's magazine had to cater for a wide range of interests to ensure popularity, easy reading and good balance. In the present economic climate there was a need to set an overall spending limit and therefore only a limited amount of space could be devoted to each topic.

Mr Jessop felt that the Society's journal was an important aspect of the Society and that the Editorial Board had achieved better results than any other mechanism in the past.

Secretary's report
Mr Evans commented on the considerable additional workload on HQ staff at the present time associated with the end of the financial year. Both he and the editor were awaiting approval of draft budgets in order to determine priorities in the 1985-6 financial year.

Mr Evans circulated copies of the Book Report covering the first three-quarters of the 1984-5 financial year, and commented on the progress in book production under the new book editor. It was hoped to increase advertising income by including advertisements in future Society books, as one way of off-setting the considerable reduction in advertising revenue from *Radio Communication* in the past two years.

The subject of spectrum abuse was then raised, and the secretary informed Council of various actions and discussions he was having with the DTI and the RIS. Considerable discussion ensued, and it was evident that this subject was of considerable concern to the Society's members and Council, and not least to the DTI/RIS.

Mr Evans said a ministerial announcement was imminent on the subject of Band 1 and 50MHz, and he and the chairman of the Licensing Advisory Committee commented briefly on DTI related matters such as packet radio, charitable events, morse testing and crossband working.

The secretary concluded his report by commenting on recent developments with regard to DataBox and Prestel.

Membership and representation
It was noted that:
(i) 36 additional reduced subscriptions had been granted;
(ii) 12 additional subscriptions had been waived;
(iii) the following had been granted affiliation:
Alfreton & District Amateur Radio Club;
Burnley & District Amateur Radio Club;
Canterbury College of Technology Amateur Radio Club;
Fishguard & District Amateur Radio Society;
Frensham Heights School Amateur Radio Club;
Ham-Club Lundensis, Sweden;
Llanelli Amateur Radio Society;
Moroni ARA (UK);
South Tyneside Amateur Radio Society;
Trafford Amateur Radio Club;
Welwyn Hatfield Amateur Radio Club;
Wigtownshire Amateur Radio Club.

Membership and Representation Committee recommendation
Mr Pinchen said that the committee felt that the Society should present a suitable certificate for service within amateur radio. It was decided that the Society's graphic artist be asked to produce some visuals for Council.

IARU Council
The admission of the Association Gabonaise des Radio Amateurs into the IARU was proposed, seconded and carried unanimously.

Revised hf awards programme
Council had no comments to make with regard to the proposed revised hf awards programme; however, it would be referred to the Finance & Staff Committee for financial consideration.

Finance & Staff Committee recommendations
(i) Mr O'Brien reported that the committee had discussed the Society's attendance at the IARU Region 3 Conference in New Zealand in November. It recommended that the Society's secretary should attend in addition to the chairman of the IARU Committee. The committee felt that the secretary would also then be able to represent the Society at the Wireless Institute of Australia's 75th anniversary celebrations.

After discussion it was agreed that the secretary should attend both events, and that the chairman of the IARU Committee should attend the conference.
(ii) Mr O'Brien reported that after discussing the matter in detail at two meetings, the committee recommended that the member's book discount be increased to 15 per cent. This would apply to sales of all publications and products.

The recommendation was accepted unanimously.

Planning permission for antenna systems
Mr Willis referred to a note he had circulated to Council containing guidance which had been produced by a local authority in Kent. He felt that common standards should be agreed throughout the UK in respect of antennas and breakthrough, or at least that local councils be properly informed.

Mr Evans noted the many difficulties and frustrations which this subject had caused to members, the Society's Planning Panel and staff, local councils and their planning officers.

After discussion, Council agreed that the best course of action seemed to be to pursue any recommendations which the Planning Panel made.

Documentation for 1986 Council elections
Mr Pinchin said that the Membership & Representation Committee fully supported the documentation produced by the Presidential Advisory Group which was based on ideas discussed within the committee.

After some discussion, Mr Hall proposed that the documentation presented be accepted by Council; this was seconded by Mr Smith. With only one vote against, the President declared the motion carried.

Microwave Committee chairman
The President noted that Graham Murchie, G4FSG, had resigned from this post due to pressure of work. After consultations, the Presidential Advisory Group recommended that Dr M Dixon, G3PFR, be appointed chairman.

This appointment was agreed by Council.

Intermediate licence documentation
Referring to a document he had circulated on this subject, Mr Holmden considered the proposed intermediate licence would be a novice licence. Mr Smith argued that if it was nothing more than a novice licence, then should Class B licensees regard themselves as less than novices?

Mr Pratt said that the Licensing Advisory Committee had sought the views of the membership and various committees on a novice licence. The draft proposals for an intermediate licence, which Council had agreed to forward to the DTI, had been drawn up following the collation of these views. If, after discussion, the proposal appeared viable, Council would have an opportunity to vote on the precise form of any formal proposal.

Mr Holmden said he felt the majority of members was against a novice licence.

The President summed up the discussion by saying that the documentation had been sent to the DTI following normal procedure.

A brief report of the Council meeting held on 27 July 1985

Present: Mrs J Heathershaw (President, in the chair), Messrs J T Barnes, R G Barrett, E J Case, Dr D S Evans, Mr G R Jessop, Dr J N Gannaway, Messrs F D Hall, H M Holmden, W J McClintock, H S Pinchin, B O'Brien, D S Smith, K E V Willis (members of Council), D A Evans (secretary/general manager), A W Hutchinson (editor), Ms H M Norman (minutes secretary).

Apologies for absence were received from Dr Allaway and Messrs Cornish and Pratt.

Committee chairmen's reports for 1984-5
Council was satisfied with the work of the committees, but felt that very few of the reports had adhered to the format requested, and consequently the objectives and achievements of many committees proved that much more difficult to assess.

Various alternative ways of producing the reports were discussed, and suggestions made would be considered for future reports.

Recommendations arising from committee minutes
HF Contests Committee
That BERS195 (having again won the Receiving Rose Bowl on his 45th entry in the contest) be awarded a specially-engraved plaque, which the chairman would take to Australia in late September 1985.

This was agreed.

VHF Committee
That a formal liaison be formed with the Midlands VHF Convention, and for this event to become an RSGB event.

After some discussion, it was agreed to support this as a "one-off" venture. Limited financial support to be given if necessary.

Membership and representation
Council noted that:
(i) Reduced subscriptions in respect of a further 77 members had been granted. Mr O'Brien expressed his concern at the large number of applicants who were eligible for this concession.
It was agreed that the Finance & Staff Committee should examine this problem.
(ii) A further seven subscriptions had been waived. It appeared that retired members of over 65 were applying for waived subscriptions. The Finance & Staff Committee would consider this since the original intention was only to benefit those under state pensionable age.
(iii) The following had been granted affiliation:
Clockwork Amateur Radio Contest Group, Hants.
RAF Digby Amateur Radio Club, Lincs.
Sydkustens Radio Amatorer, Sweden
Texas Instruments Amateur Radio Club, Beds.
(iv) The following area representatives had been appointed:
E W Bate, G3LUC, Aycliffe & Shildon;
M Brass, G4YMB, Cleveland;
G G Brooks, GM4NHX, Caithness;
A Everard, G0ARZ, Sunderland;
A R Kiddle, G4HVC, Newark.

Election of 1986 President
Mr Barnes nominated Mr McClintock, the present executive vice-President, and this was seconded by Mr Hall.
There being no further nominations, Mr Barrett proposed the election of Mr McClintock. This was seconded by Mr Smith. On a show of hands, the President declared the resolution carried unanimously.

RSGB trophies
Mr Evans referred to a recent meeting of himself, Mr R Glaisher, G6LX, and Mrs H Claytonsmith, G4JKS, with regard to the future maintenance and presentation of Society trophies and awards. They had agreed to recommend to Council that Mrs Claytonsmith be appointed honorary trophies manager for a three-year trial period from 1 July 1985. Council's approval was further sought on the retention for one year of trophies by the recipient. Mr Evans was optimistic about the viability of these proposals.
Approval of the scheme was proposed by Mr Hall, and seconded by Mr Smith. On a show of hands, the President declared the resolution carried unanimously.

AGM business
Mr Evans referred to problems encountered at the last annual general meeting arising from confusion as to what business could properly be raised during an agm. The new Companies Act 1985 had come into force on 1 July, since when the Society's solicitors had spent a considerable time in interpreting the relevant sections with a view to finalizing a notice for publication in *Radio Communication* in order to advise members of the position. In the course of this work, other areas requiring attention had come to light. Mr Evans read the proposed statement to be published, in conjunction with the 1984 agm minutes, in the September issue of *Radio Communication*, as guidance to members who wished to raise business at the agm.
Mr Barrett proposed publication of this statement in September, subject to any final comment from the solicitors, together with the minutes of the 1984 agm. This was seconded by Mr Jessop. On a show of hands, the President declared the resolution carried unanimously.
The Secretary spoke of the need to bring the Society's Memorandum and Articles of Association into line with the current Companies Act. Mr Jessop proposed that the President's Advisory Group obtain legal advice in this matter.
This motion, seconded by Mr Pinchin, was declared carried unanimously on a show of hands.

City & Guilds RAE Subject Committee
The Education Committee had nominated Mr Hall to serve on this committee, in place of Dr Houghton, who had recently resigned.
Acceptance of this recommendation was proposed by Mr Willis, seconded by Mr Smith and agreed.
This appointment would be until the end of 1985, pending possible changes in the work of the Education Committee.

Slow-morse co-ordinator
Mr Evans reported that five people had expressed an interest in filling this vacancy.
After a short discussion Mr Evans agreed to contact these people and ask them to send details of their qualifications. A small group would then be convened to appoint the next co-ordinator, since no formal mechanism existed to fill this vacancy.

Green Book
A lengthy debate took place on delaying publication of the Green Book to include further changes. The majority of members stressed the need for immediate publication of what they considered to be a consultative document provided for guidance on the Society's organization. It was then proposed by Mr Smith and seconded by Mr Hall that the Green Book be printed without further delay.
On a show of hands, the President declared the resolution carried by a large majority.

A brief report on the Council meeting held on 26 September 1985

Present: Mrs J Heathershaw (President, in the chair), Dr E J Allaway, Messrs J T Barnes, E J Case, P F D Cornish, Dr D S Evans, Mr G R Jessop, Dr J N Gannaway, Messrs F D Hall, H M Holmden, W J McClintock, H S Pinchin, D M Pratt, B O'Brien, D S 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 Barrett.

Honorary treasurer's report
Mr Cornish invited questions and comments on various documents which he had circulated to Council concerning the accounts to 30 June 1985 and the budget for the financial year 1985-6.
Mr O'Brien congratulated Mr Cornish on the information supplied, and expressed his appreciation of his services to the Society. These remarks were endorsed by all those present.
Mr Cornish felt that the Society should focus attention on its book sales, which he considered to be one of the most important aspects of the Society's activities.
Mr Evans said that over the last six months the Society had had to radically change its thinking with regard to membership and publications, and changing market trends needed to be taken into consideration. The current requirement seemed to be for the less technical type of book. A new senior staff member would be joining HQ in October, and his brief included responsibility for marketing, circulation and stock control.
Mr Jessop suggested that the advertisement officer could perhaps assist in the sale of books. Mr Evans replied that it was the decline in advertising, not books, which was accountable for the shortfall in income. Advertising was therefore the commodity to which priority must be given.
A discussion took place on the production and sale of books and on the decline in advertising. It was agreed that priority must be given to increasing revenue from these sources.
It was proposed and resolved that the accounts for the year ended 30 June 1985 be approved and signed on behalf of Council by the President and the honorary treasurer.

Secretary's report
Mr Evans spoke of the current Raynet activity connected with the earthquake in Mexico. Mr G Griffiths, G3STG, chairman of the Society's Raynet Committee, had appeared on "Breakfast TV", explaining the role of Raynet in getting messages to and from Mexico City. It had come over extremely well, demonstrating the best of amateur radio.
The secretary then circulated a leaflet on rf breakthrough which had been produced in-house, a report on the Geneva Intruder Watch meeting, membership statistics, and copies of the new *Amateur Radio Software* book. He then commented on these and other administrative matters.
Mr Evans referred to the agm notice, published in the September issue of *Radio Communication*, giving guidance on procedures for raising formal questions etc. This had been produced only after a considerable amount of detailed and protracted legal work. The notice had resulted in a request from Mr G R Smith, G4AJJ, for a list of RSGB members, upon which further legal advice had been sought. Under the Companies Act the Society was obliged to release such a list of its members' names and addresses on receipt of the appropriate fee. A second request for a list had since been received from Mr I Abel, G3ZHI. Letters giving details of cost and procedure had been sent to Messrs Smith and Abel. The situation had been discussed at a meeting of the Finance & Staff Committee, which had agreed that the Society had a moral duty to try to protect those members who had requested the Secretary of State for Trade & Industry to withhold their details from publication. The 2,000 members concerned had therefore been sent a letter explaining the position. This had generated a number of queries and a considerable number had responded, some giving an alternative address which could be included on a list to be released. Mr Smith had later contacted the Society to confirm that he no longer required the membership list. A decision from Mr Abel was awaited.
He then gave details of the considerable amount of administrative and legal work which had been generated in connection with literature being circulated to clubs and individuals by Messrs G R Smith, G4AJJ; T I Lundegard, G3GJW; and P Crosland, G6JNS seeking support for an EGM. A long discussion took place on this matter during which Mr Jessop asked that the following statement be published in "Council Proceedings".

> "I would like to make a statement with regard to an item appearing in a document headed *The RSGB: a need for reorganization.* It is understood that this document is being circulated in connection with a proposed extraordinary general meeting of the Society.
> The document includes the statement that 'G6JP will confirm that he has not been asked to produce a new edition . . . '. While it is true (but not of a particularly confidential nature) that, in fact, I have not been asked to produce a new edition of the *VHF/UHF Manual* at no time have I given my permission for this information to be published or been aware that this was anyone's intention.
> *(signed): G R Jessop, 26 September 1985"*

Each Council member was asked to state whether he was for or against the resolutions outlined in the document circulated by Messrs Smith, Lundegard and Crosland. Each Council member, with the exception of Mr Holmden, voiced strong objections to all the literature. Mr Holmden abstained, on the grounds that he did not understand the implications of the proposals.
Mr Evans concluded his report by mentioning some of the topics discussed at a meeting with the DTI on the previous day. Mr Pratt, chairman of the Licensing Advisory Committee, explained that the meeting had determined a priority order for the subjects discussed:
1. International greetings messages;
2. Special research permits;
3. The problem of Class A licences being given to disabled persons who had not necessarily taken a morse test;
4. Fees for GB calls;
5. Crossband operation;
6. Revision of the amateur licence.

The Intermediate Licence discussions had been put into abeyance for some 6-9 months at the request of the DTI, pending the outcome of the Class B morse experiment and the future of the morse test.

Recommendations arising from committee minutes
Education Committee
"That a home constructor's competition be held in connection with the RSGB convention NEC 1986 and announced in *Radio Communication* as early as possible."
This was agreed, subject to revision of the rule concerning a resultant article.

HF Committee
"That the Rotab trophy be awarded to Mr D L McLean, G3NOF, for outstanding and consistent dx performance."
This was agreed.

HF Contests Committee
"That the G3XTJ Memorial Trophy and miniatures, provided and paid for by members of the HFCC and friends of the late Edwin Hodson, G3XTJ, should be adopted as an RSGB trophy and

awarded to the entrant in the Ropoco 2 Contest who has the most accurate log."

It was noted that this recommendation conflicted with current Council policy of restricting trophies. However, it was understood that action had already been taken and the recommendation was approved as an exception.

Membership & Representation

"That an ORM be held in Newcastle (Region 18) in 1986."

After some debate, this was agreed.

Membership and representation

Much concern was felt at the number of applications being made for reduced subscriptions, bearing in mind that the facility was to assist those of limited financial means.

Council noted that:

(i) reduced subscriptions had been granted to a further 107 members;

(ii) subscriptions in respect of a further 22 members had been waived

(iii) Affiliation had been granted to:
BBC Transmitting Station, Cumbria;
Binstead Amateur Radio Society, Isle of Wight;
Inmarsat Amateur Radio Club, London;
Harrogate Repeater Group;
Northern Amateur Radio Confederation, Manchester;
Radio Club CAS-EGF, France;
Sheffield Amateur Radio Club;
Stockton & District Amateur Radio Group;
Stantonsbury Campus Amateur Radio Group, Milton Keynes;
Stroud & District Amateur Radio Society;
Wessex Amateur Wireless Club, Bournemouth;
Worcestershire Lions Amateur Radio Group;

(iv) Mr Givens, GM3YOR, Region 13 representative, had tendered his resignation with effect from 31 December 1985;

(v) a nomination of Mr P Goben, G4BW, as area representative for Maltby, had been received and was approved.

Members resolutions for the agm

Council noted that resolutions from Mr Smith, G4AJJ, under cover of his letter dated 16 July, had been rejected following legal advice.

Proposals from Messrs Ross, G8MWR, and Hopwood, G6CWK, were considered. These related to committee membership and advocated election of committee members. After discussion, it was agreed unanimously that the resolutions should not be included on the agenda for the agm but that the Society's committee structure should be examined further when time permitted.

Three resolutions had been received from Mr Holmden:

(1) Candidates statement of address;
(2) Intermediate/novice licence;
(3) Class B representation.

Discussion ensued on (1), which proposed that candidates be permitted to include details other than biographical facts. It was generally agreed that there was a need to explain to the membership the purpose of restricting statements in order that the voters were not misled by promises which were impractical, if not impossible, for the candidate to keep.

A vote was taken on (1) and only one vote was cast in favour. Mr Holmden agreed to withdraw proposals (2) and (3) after discussion.

Awards for 1985

The following were agreed:
Founders Trophy to Mr Geoff Watts;
Calcutta Key to Mr G Voller, G3JUL.

We regret that publication of "Council Proceedings" for the meetings held on 27 June and 27 July has been delayed. This was a result of headquarter's staff time being diverted to legal and other matters concerning the agm as mentioned above.

OBITUARIES

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

Mr B Bond, G3XGP
Bill Bond died on 16 September in the Queen Elizabeth Hospital, Birmingham, where he had worked as head of the Radio Therapy department until January 1983. Towards the end of WW2 he served in the RAF as a medical officer in India. His interests were many, including engineering, photography and amateur radio, and he had articles published in *Radio Communication*.

Mr J F S Carpenter, G8JQ, F8JQ
Mr Carpenter died on 4 April aged 75, in the south of France, where he had settled after leaving Bath. During the war he served in the RN as a radar specialist. Many years before he worked on improvements in tv mechanical scanners.

Mr P F Clarke, G3CQL
Peter Clarke died on 1 September aged 62. Licensed from 1953-7 and subsequently relicensed in 1982, he was an active member of the Southend and District ARS, and he died while on his way to help with communications at a local "fun run". He was active on both hf and vhf.

Mr J W Coveney, G5UL
Mr Coveney died on 27 October 1984. He was a founder member of the RSGB and had held a transmitting licence since the early 'twenties.

Mr J K Gordon, GM1AOO
Jimmy's sudden death on 29 September terminated a very young and active life. An electrical engineer, computer enthusiast, keen sailor and active amateur, his cheery signals will be missed.

Mr B Graham, G8KYV
Bernard Graham died on 18 September. Although not active on the bands, he had a keen interest in the technical aspects of radio and completed many pieces of homebrew equipment.

Mr F Harrison, G6DEW
Frank died on 19 July aged 59. He was very active on 144MHz, often using G6DEW/A from the Scunthorpe ARC, where he was a very active member. Frank was made an honorary life member in 1984 for services to the Scunthorpe ARC.

Mr A J Hawkins, G3PXD
Jim Hawkins, who died on 8 October aged 68, had been a member of the RSGB for over 28 years and during that time encouraged many in the Devizes area to take up an interest in amateur radio.

Mr P Ingram, G3XUI
Phil Ingram, who died recently, received his licence in 1968 at the age of 47. He was active on hf and 144MHz until his recent move to Scunthorpe.

Mr W H F Lamb, GM3EDL (ex D2DL)
Bill Lamb died on 10 October aged 61. He became active during his service with the RAF in Germany and devoted much of his spare time to the home construction of ssb equipment, particularly to the construction and alignment of filters. Latterly his technical interests embraced switched mode power supplies and EMC. Up until his death he was active on all bands and modes, and he and his Xyl Nan, GM4VUL, were office bearers of the Ferranti (Edinburgh) ARC.

Mr E Lawson, G3DLD
Mr Lawson, who passed away this summer, was especially active on the Leeds S22 net and a former chairman of the local RC. He was also active on both 144MHz and 430MHz, having latterly to curtail his activities on hf. He was always willing to give help to those in need, especially the newcomer to radio.

Mr P Osman, G3XMX
Peter Osman died on 29 September. He started operating in 1970 and was a founder member of Carlisle and District ARS. He worked vhf as G8GIX, until recently when he obtained his 'A' licence, and was active until just before his death.

Mr C Owen, GW4LLE
Carey Owen died on 16 April. During the war he served in the Royal Corps of Signals, and was a keen model maker and a great enthusiast of atv, although locally he was best known for his activities on 144MHz. He had been particularly helpful to all morse learners with his regular slow transmissions on Sunday evenings. He never allowed ambition to mock his useful toil.

Mr E Palmer, RS27307
Eric Palmer died in February having been a corporate member of the RSGB since 1965. He always enjoyed reading and was proud of being a member of the Society.

Mr H Peletier, GM0CAI (ex GM1FKI)
Harry Peletier died on 16 September aged 47. An enthusiastic member of the Perth and District ARG, he had only just received his GM0 callsign. He was well known for his operation on 144MHz.

Mr D Rock, G8PR
Don Rock, who died on 9 July, was co-founder, in 1938 of Stourbridge and District ARS. Formerly 2BDO, he was licensed in 1937 and was active on hf and 56MHz. He joined the RAF Civilian Wireless Reserve in 1938 and served throughout the war in the RAF, much of his service with the RAAF in the Middle East. Don was still active until shortly before his death and was particularly interested in propagation and vhf.

Mr G H Stanton, G8QY
Bert Stanton died on 2 October aged 76. First licensed in the mid-'thirties as 2AIC, he was active on 56MHz and the hf bands and soon became fully licensed as G8QY. During WW2 he served as a VI. In post-war years he participated in the 144MHz and 430MHz field days. He was a past-president of the Solihull ARS and transmitted on many 1·8MHz df days, although his main interest of late was dx cw operation on the hf bands.

A E Watts, G6UN, RSGB past-President
Arthur Watts died on 14 September, aged 91. He came to prominence in the RSGB with his design of a membership certificate which was adopted and used for more than 30 years.

He was co-opted to the RSGB Council in 1929, and almost immediately became the "father" of the then recently-formed British Empire Radio Union—a worldwide activity of the Society, of which most of the colonial societies became members thanks to Arthur's encouragement. In 1932 in Madrid he attended the International Telecommunications Conference as an IARU observer.

In 1934 he became President, and held this office for three years. In 1938 he was again elected President for a further three years, and during the period he was involved with the Society's co-operation in the formation of the RAF Civilian Wireless Reserve. In 1938 he attended the Cairo International Telecommunications Conference.

As President he was *persona grata* at the Post, Foreign and Colonial Offices, and his proposed callsigns for the "VP" colonies was welcomed and adopted by the Colonial Office.

During the first world war, after losing a leg as a result of injuries received during the Gallipoli campaign, he served with distinction in the Royal Navy on special duties. During the second world war, at the request of the authorities, he was very much involved in organizing Society members to take part in special receiving duties, and he toured the country and enrolled several hundred members for this service.

He was a liveryman of the Stationers Company, a member of many masonic lodges, and a very notable Society President.

Also:
Mr E T Carter, G4IV, on 13 October
Mr A Czunyi, G3OMF, on 1 July
Mr T Muir, RS40853
Mr H J Newitt, RS87439
Mr J Rogers, G1GXE, on 12 October
Mr R J Sumner, G3DET, on 22 September
Mr F W de Vrijer, PA0XWA, on 6 August
Mr R V E Walsh, GI4RY

Members' Mailbag

IN THE WE SMALL OURS

Sir—While tuning around Our frequency in the band We were delighted to note, not for the first time, the many other non-club multi-operator amateur radio station licences, like Our own, which have been issued not only here, but throughout the English-speaking world.

"We always come up at this time", said a WA2 station. "Our antenna is beamed straight towards you", stated a VK3 station (as if matters could have been otherwise). "We must QRT now", lamented a G4 station.

At one point We were unusually assailed by a JY1 station which insisted upon use of the first person singular. Rather taken aback by this, We naturally assumed that this was due to unfamiliarity with Our language.

We are, Sir, respectfully yours,

J F Hardwick, GM4ALA
J F Hardwick, GM4ALA

According to one well-known authority on English usage, "we" is used in its singular sense only by monarchs, editors and pregnant women . . . or perhaps some amateur radio stations are so complex in this digital age that an assistant needs to be present during operation!

WELL, VERSED

Sir—I read the letter by G3ROZ,
It appeared in September and made me see red!
Comparing our hobby with a thing called cb,
Was quite unforgivable, and very wrong, you see.
Why not compare a poacher to an angler?
One pays for rights, and one's a wangler.
The difference is similar I'm sure you'll agree,
But wait, Mr Dyke, you forgot the morse key!
CBers like ranting, they chew on a bone,
'Cos that's all they can do, they only use 'phone.
Amateurs, however, can have a wide choice,
We can use other modes, instead of the voice.
Now to my last point, I'll make it quite short:
Be very wary of what you have bought.
Beware of what looks like a gift in the hand,
For then it could turn out to be contraband!

Anthony Mayers, GW6ZHY

RADIO AND MEDICINE

Sir—There is one specialized application of cw which I do not think has ever been discussed. Much work is now being done in medical robotics, to provide speech and environment control for people disabled by various forms of paralysis. In making it possible for them to communicate, many current systems operate by, for example, scanning the alphabet and providing the patient with an on-off switch operated by head or finger movements, or with the mouth or tongue, which stops the scan at the required letter—a strikingly cumbersome arrangement. Quite remarkably, I have seen no system which operated with morse. Even an incoordinate patient who can manipulate an on-off switch could almost certainly form slow morse characters. Moreover, commercial equipment exists: a paddle can easily be adapted to be operated by head movements, and alpha-numeric decoders, or decoding programmes for pcs are a familiar technology.

Readers may recall the totally-disabled hero of *Johnny got his Gun*, who finally contrived to communicate in morse. It has a far greater potential as a language interface for the disabled than most of the experimental systems seem to realize—it can be read easily by the deaf and the blind, or from a skin-pressure transducer, and there is virtually no disability, however severe, which does not leave available some means by which it can be sent.

Radio amateurs, many of whom are also experimenters in robotics and computer programming, would do well to bring this resource to the notice of prosthetic engineers. Being used to communicating with it, we can assure them that they may be overestimating the difficulty of learning to do so. One of the striking things I have learned in medicine (I specialize in the biology and medicine of old age) is the speed with which motivated people of 70 or 80 learn this very abstract skill. None of this, perhaps, contributes to the long-running argument over morse as a licence requirement, but it indicates a field of communication where amateur skills might make a very large contribution.

Alex Comfort, MB, BCh, DSc
Adjunct Professor,
Neuropsychiatric Institute, UCLA.

Sir—Reading the appeal of the National Association of Hospital Broadcasting Organizations, for help in your August issue, brought back memories of when I was a young dental surgeon in charge of the dental ward of the Middlesex Hospital in 1922 or thereabouts and 2LO was first beginning to broadcast from Savoy Hill in London.

In conjunction with a fellow radio enthusiast, I thought that at Christmas I would provide my patients with some light entertainment, by letting them hear 2LO using a home-made receiver and headphones, plus having 2LO make a special request announcement for the patients and playing a record for the child patients.

After a great deal of negotiation with the hospital governors and 2LO, an antenna was erected on the hospital roof, a receiver was made to work, and headphones were provided for the patients. The great day arrived, everything was working my end, but not a whisper of 2LO was heard. 2LO phoned to say they had a fault. Then we had a breakdown, and by the time the broadcast was received the children were asleep, but the older patients enjoyed "Dickery, Dickery, Dock!"

I believe that this was the first time that a hospital request was broadcast in England, and wonder if anybody can remember this broadcast.

Carlo Pratelli

A NATIONAL RESOURCE

Sir—Your July issue contained a somewhat brief letter and reply on the subject of payment for use of the radio spectrum. I offer the following as a critical review of the idea that the radio amateurs of this country are a "national resource".

Has the RSGB actively addressed the implications of "spectrum pricing"? While I do not foresee the compulsory fitment of slot-meters to amateur transceivers, or a quarterly bill arriving on our doorsteps from the DTI, we should examine the balance of benefits that British society receives from the amateur radio movement in return for the bands we use. I would also like to suggest a remedy for the imbalance which I believe to exist.

First, the social benefits. Amateur radio undoubtedly provides a hobby ideally suited to the old, the disabled, and other groups where limited mobility and resources can be often well compensated for by the joys of home construction and free communication with like-minded people in the outside world. On the other hand, it is unfortunately true that, along with similar detached pursuits such as home computing, amateur radio can provide an unchallenging but acceptable outlet for those whom one might regard as, in some ways, socially inadequate. There is more truth in the Hancock view of the hobby than many will care to admit.

But there are also the economic deficits. The most obvious and measurable is the imbalance of trade in equipment. Despite the efforts of various small and very inventive accessory manufacturers, the net flow of goods is overwhelmingly inwards, thus detracting from our national wealth. Most seriously, despite the specific pointers towards "self training" stated in the objectives of the amateur movement, it does not generate the vast army of communications engineers and technicians that it should (and indeed does in other countries).

Without doubt the root cause of these negative contributions is the poor image that amateur radio projects to the Great British Public. One could argue that this is symptomatic of the malaise suffered by technology and industry generally, but it is interesting to see how the introduction of such consumer radio products as cb, cordless telephones, and cellular radio has done more to enhance the public image of personal communications in a couple of years than amateur radio has in 50.

So how can we continue to justify the spectrum we use? The answers must lie in an examination of our basic motives, the reasons why we like to "play radio". Only by showing how the hobby can help meet basic human needs can we generate good and understandable reasons for what we do. This should inspire more able people to join our hobby, and show the rest of society how technology can provide active entertainment under our own control, thus stimulating demand for radiocommunication products while at the same time providing the manpower to fulfill the needs of this new market from our home industry.

The role of the RSGB in these matters must be to ensure that the amateur movement is directed towards meeting the needs of society as a whole and not just to fulfill the particular requirements of the existing membership. Only by looking outwards can we hope to justify our use of that precious resource, the radio spectrum.

D W J Holmes, G4FZZ

DISASTER GUIDELINES

Sir—Anyone listening to the activity on all bands to and from Mexico following the terrible earthquake disaster, cannot fail to have been impressed and encouraged by the finest spirit of amateur radio prevailing: a genuine sense of responsibility, a willingness to be of assistance and, on the part of many, a professional and competent handling of difficult and sensitive traffic.

But where do we British stations fit into this? Some took part, I realize. But I confess that I am far from sure what the regulations allow us to do. All such traffic involves third parties, and it would seem that we are only able to participate in emergency traffic when invited to do so by one of the emergency bodies named in the licence itself. Regulations are rarely written for all eventualities, however, and I must confess that if I had been asked by an XE station for help, I should not have hesitated to cut across them.

Are there clear guidelines for such happenings as disasters? What can we do? And if regulations do stand in the way, is it not time that a concerted effort was made to amend them? I for one feel that where we have so much to offer in resources and goodwill, not only for disasters but also for lesser occasions, our hands are tied unnecessarily by red tape.

J P Boot, G4NJH

There are some guidelines in the Radio Regulations for emergency situations: for example, RR347 states that "No provision of these regulations prevent the use by a station in distress of any means of radiocommunication at its disposal to attract attention, make known its condition and location, and obtain assistance". Article 37 makes general provisions for distress and safety communications. Resolution 640-1 also relates to the international use of radiocommunications in the event of natural disasters in frequency bands allocated to the amateur service.

Given that emergency situations involving amateur radio are relatively rare and also that each one is different, the safety of human life is always paramount. The Mexican situation was slightly different insofar as the main bulk of the amateur operation, at least as far as the UK was concerned, was concentrated on relieving distress of those with friends and relatives in Mexico City. Although this involved

third-party traffic, at least in the technical sense, the Department of Trade & Industry said that it would take no action to hinder the passing of such traffic in the particular circumstances relating to the Mexican disaster.

THE 28MHz DESERT

Sir—Why is 28MHz fm so deserted? For the newly-licensed "A" it surely has to be the cheapest and easiest way to gain access to the hf bands. OK, so you won't hear VKs and others of the like, so what!

With my mediocre installation, including 6W output into a λ/4 antenna, I find I can contact stations within a radius of 25 miles under flat conditions, and just now and then, HB0s, SMs and DLs.

Locally, it seems that most activity takes place between 6 and 8pm only; a pity, when one considers the advantages of (*a*) cheap equipment, (*b*) lack of QRM, and (*c*) compact antenna.

In conclusion, to justify the continued use of this allocation by radio amateurs, we should show more than just a passing interest in a grossly under-used band.

T Sherman, G4ZCU

VHF/UHF QSLs

Sir—I read with much amusement the two letters you published in your September issue regarding QSLs on vhf/uhf. Perhaps H Banting, F6GPA, will draw some comfort from my breakdown of responses on 144MHz.

Jersey	100%	England	40%
Guernsey	100%	Eire	33%
France	65%	Switzerland	0%
Spain	60%	Holland	0%
Scotland	50%	Belgium	0%
Wales	45%	Germany	0%

Perhaps as a yl operator who has a reasonable grasp of French I do have an advantage, but, like everyone, I find that it is always the cards I most would like that fail to materialize. Ah well, "C'est la vie". Many thanks to those of whatever nationality who do respond. "The ultimate courtesy in radio!"

Liz Rollings, ex-G1FIQ now G0CLA

PS I wonder how many people are now hastily checking logs and sending cards in order to refute these terrible figures!

144MHz REPEATERS

Sir—I believe it is time to close the 144MHz repeater network. As radio amateurs engaged in experimentation and self-training, surely we have shown that operation via repeaters works as a means of extending the contactable range.

Closure of the network would release 14 channels for fm use at the present spacing. This would decrease the congestion, and motivate those who previously used slim-Jim and colinear type antennas to use beams for extending their range.

The common argument that local terrain necessitates repeater use is, in my view, unfounded. I live in a valley with mountains 500m higher than my QTH only eight miles away, but still manage to work the south coast under normal conditions.

J Rhys Thomas, GW4RWR

AERONAUTICAL MOBILE

Sir—Having recently taken up gliding, and as an occasional hang glider pilot before that, I must take exception to the tone of Mr Miller's letter on the subject. Just because he would never dream of flying anything without a vor, transponder etc, he should not forget the many other aircraft not so equipped where rf could have no possible effect on any instruments fitted.

To deny the use of amateur radio in connection with activities such as hang gliding is clearly unreasonable from the point of view of rfi, which is the only area which need concern the DTI. It goes without saying of course that the equipment would need to be installed so that its use would not distract the pilot from his main purpose, but the same considerations have always applied to any form of mobile operation!

I would urge the Society to make representations on our behalf to get some relaxation on the licence condition relating to aviation.

Phil Marshall, G0BBK

YOUTH AND AMATEUR RADIO

Sir—I was interested to see the July Editorial on the lack of youthful interest in amateur radio. From time to time I have offered it as an activity at my school, and have usually found that interest is both fairly small (perhaps four or five from a school of 670) and for many is short-lived. Since 1977 two boys have obtained licences. I asked around recently the reasons for this lack of interest, so here are a few suggestions. These come mostly from able boys, ie ones who could expect to achieve both O and A level certificates and who therefore would be familiar with the routine of examinations.

I am asked what amateurs talk about. Many of them have seen my station in action, and it's clear that what we do talk about is regarded as banal or arcane. They cannot understand my liking for cw (but then neither can a lot of licensed amateurs) and regard it as quaint, slow and, eventually, uninteresting. I can show them other techniques, but again they see no point unless they have a strong technical interest. Most have not; and if they have, might prefer to go and train professionally in electronics.

The lack of technical interest is partly because the electronics revolution is not romantic; it is part of their lives in the same way as plumbing or heating or cars, and most see no more reason for understanding it than they do for understanding the innards of their car. It might be desirable, but not strongly so as long as there are people around to fix things if they go wrong. Even when interest in building gear is there, it is hampered by the difficulty of getting bits for rf; it's a bit specialized, the number of linear ics is enormous, and as the "Morseman" project has demonstrated, alleged equivalents don't always work. The school has accounts with major suppliers; nevertheless I abandoned one project because I simply could not get the devices specified. Most will probably spend time building an amplifier, and then disappear to play their tapes.

Then there is the impression (pretty accurate, I'd say) that amateur radio is expensive. That rigs are very good value compared with commercial ones around when I began isn't the point; prices are still nearer k£ than £. Herein I think also lies part of the answer to the relative inexperience of new licensees as swls. When I began in 1958 at the age of 15 there was a huge amount of very cheap, and very good, surplus gear which even 15-year-olds didn't have to break the bank for. I bought a 19-Set for 10/- (50p) and listened a lot on 3·5 and 7MHz; you could get damaged ones for 5/- (25p), and one which had fallen into the sea and was literally green around the edges worked perfectly well. No-one would be shy of modifying this gear, and there must have been a huge amount learnt by building in power supplies, Q-multipliers, preselectors and all the other add-on paraphernalia. And it all worked; one of the best dxers of the time was the late G2DC, and as far as I recall he used a T1154/R1155 with, no doubt, a good antenna. I would happily take a pair of wire cutters and my trusty 65W iron to the 19-Set; I doubt if many would even take the covers off a modern rig without some degree of trepidation. There isn't a lot of point in saying to the tyro that he can get 5W of rf on a single frequency for a few pounds; that appeals only to the initiated. You can't get away from the fact that my ten-shillings worth of experience now costs a good deal of cash—and what if the interest evaporates? Don't misunderstand; I'm not saying that amateur radio is better or worse than in the early 'sixties. It's different, though, and the differences have effects on more than just the technicalities.

But all this said, isn't the level of interest I mentioned at the beginning roughly what one might expect? My school was a grammar school of about the same size as the one I now teach in, and there were four who were interested. One of these got me interested (and himself became licensed much later than I as a G4); one was an ex-PO telegraphist who taught me the code; and the last took his exams a couple of years after me and became a G3S. He later went into electronic engineering professionally. It seems to me that it is the enormous surge of interest in the last few years which is unusual, which has perhaps peaked, and which by its nature will show a high "wastage rate".

I think that amateur radio is a marvellous activity, and it has given me a good deal of pleasure. I hope that it will continue to do so for a long time yet, and I shall do my best to encourage all who show an interest. But it will not surprise me if relatively few take it up, because there are so many things in which to be interested, and amateur radio has no particular feature which makes it generally more interesting than anything else. The notion that it (or anything else) could be "the best hobby in the world" strikes me as simply absurd. There must be a limit to the number of amateurs which the British Isles can produce. Maybe it's around 35,000!

Rod Beavon, G3PPR

RIS CHARGES

Sir—I was extremely interested to read your September editorial on the changing role of the DTI's Radio Investigation Service.

I think it would be a good idea if the DTI ceased such absurdities as paying a reported £50,000 per month to maintain a vessel in constant watch on two offshore "pop pirate" radio stations. Perhaps then the new call-out charge to the public of £21 for attending to "domestic and radio reception" problems (not necessarily of the clients making) would be unnecessary.

M R Davies, GW4GNY

HOW TO LEARN MORSE?

Sir—First, determine to enjoy cw rather than view the test as a necessary hurdle along the path to a Class A licence. Second, make a resolution to use cw on the bands, not only for experience under the letter of variation, but also when the test has been passed.

Next, learn the alphabet and numbers and happily spend your free time "dah-ditting" away to yourself reading street signs, car number plates, etc. Not only does this build up your recognition speed but it entertains your family, loved ones, and the strangers who you meet when walking the dog.

Listening to cw must be of most importance. Morse tutors are fine to help improve your skills, but surely nothing can beat listening to good red-blooded cw on the bands? The amateur bands, weather forecasts—it matters not—but listen, and listen again. Don't try to understand everything; let it all wash over you and allow the rhythms to soak into your brain. The time soon comes when you realize that you are actually beginning to understand what people are saying to each other. From then on it's a matter of practice—at least half an hour listening each day—and I mean *each* day—no backsliding.

Get yourself up to 15wpm plain language—*not* groups of five—the extra 3wpm cover you for nerves, an unfamiliar key and the hangover. The sending is straightforward, but get your listening skills established first—you then know what cw *should* sound like. Make an oscillator, send newspaper articles to yourself, tape them and then try to copy them back. Now practice using your letter of variation (assuming you have a Class B licence).

When you have your ticket, spend at least six months using at least 25 per cent cw. Then it's with you for life, I imagine.

It worked for me—perhaps it may work for you. It *had* to work for me—when I was chasing the Class A I couldn't afford an hf black box and knew that I would be starting with an AR88 and an old Heathkit DX40. Within two weeks of receiving the licence I had EA1, UB5, OK3, I5, DM3, KA2, WD4, WB1, WA2, KA8—all with only 50W input and a length of wire.

That of course is part of the fun of cw, you don't need that electricity bill amplifier.

Although I do operate on ssb, cw has remained by favourite mode, and, as a teacher, I find it nice not to have to speak with my mouth.

I suppose that the general message is—get out and enjoy it!

David Jackson, G4HYY

An accurate rf power meter for the hf bands

IAN BRAITHWAITE, G4COL*

A PASTIME which seems to be increasing in popularity is building low-power transmitters for the hf bands. I believe this to be a very healthy trend within the hobby, being both very instructive and great fun. Over the last few years I have built a number of such rigs and, since the legal power limit was not under threat, have been content to obtain a vague indication of output power using both diode detectors and low-power lamps. The idea of how to make a reasonably-accurate power meter took a long time to arrive at but, having done so, the instrument presented here was designed tolerably quickly and has proved quite straightforward to make. I hope others will find it so, and that the ideas will be of interest.

To make the job a worthwhile challenge, I set myself a target accuracy of ± 0·5dB (±12 per cent), and a coverage of all bands from 1·8 to 30MHz. This is accurate enough to be useful, but sufficiently wide that a definitive check on performance could be made with a professional power meter without worrying too deeply about sources of error.

In practice, I believe that the following performance is attainable without undue effort:

Frequency range	1·8 to 50MHz
Full-scale reading	400mW (approx)
Useful range	10dB (10:1)
Accuracy	± 10 per cent of reading
Input vswr	Better than 1·2 (typically better than 1·1 to 30MHz)

From the point of view of the home-constructor, the main virtue of the instrument is that it can be calibrated entirely by a dc meter. All routine setting up can be done from the front panel, and no rf source is involved. When I set up the meter shown in the photographs using only the dc digital panel meter, and then checked it using the equipment shown in Photo 1, I found that at 100mW I was only three to four per cent out up to 30MHz, and within five per cent at 50MHz.

Photo 1. Testing the power meter; signal source (Marconi 2019 signal generator), power amplifier under test and power meter (Marconi 6960)

The power measurement range can, of course, be extended upwards using attenuators, a discussion of which can be found in [1] (an exemplary text). One point which should be made clear is that the instrument has a relatively slow response in that it cannot be used to obtain readings of peak powers on modulated transmissions. It could, however, be used to calibrate a diode detector with a fast response.

28 Oxford Avenue, St. Albans, Herts AL1 5NS.

General notes on power measurements

Power measurement is a large subject, and very accurate measurements are difficult to obtain. In addition to instrument accuracy (involving linearity, frequency response and calibration accuracy), attention must be given to impedance mismatches in cables, connectors and sensing heads. Fortunately the amateur seldom need be concerned with these things since his accuracy requirements are generally modest. As far as a distant receiver is concerned, a few decibels either way is barely perceptible. As far as the transmitter is concerned, however, those same decibels, if lost within the transmitter, can make a big difference to the heat dissipated in, say, the output device. It is therefore in the measurement of efficiency that power measurement becomes more important. This is likely to be most keenly felt by the operator of a portable station who would like to know where his precious battery power is going!

Amateur rf power measurements are usually made using devices such as lamps or thermocouple meters which respond directly to power, or diodes which are used in vswr bridges to indicate forward and reverse power. Again, a good treatment of diode meters is given in [1]. Diodes have a very fast response and can be used to obtain peak power readings. They are, however, rather tricky things, obeying a square law (voltage out to voltage in) at low levels, and becoming linear with respect to voltage at levels of the order of 1V and above. This raises an interesting point about voltage and power sensing. If, for instance, a signal has a harmonic component 20dB down, the voltage sensing diode sees a carrier voltage V, and a harmonic voltage V/10. Depending on the relative phases, it could, at worst, indicate ± 10 per cent in error. Power sensors, on the other hand, will simply give a reading one per cent higher due to the extra power in the harmonic, and are much more reliable if one wants to measure, say, the main output component of a frequency multiplier stage, where there may be a number of harmonic and sub-harmonic signals present. Amplitude modulation will also produce different readings from the two detectors. A power sensor such as that to be described will indicate a 50 per cent increase in power for 100 per cent a.m., relative to the unmodulated carrier (each sideband containing one quarter of the carrier power in the case of single modulating tones).

Power meter—system description

The power sensor employed in the instrument is a humble incandescent lamp bulb. Some measurements made on "6V 0·1A" lamps are given in Table 1 and Fig 1. The resistance of the filament rises quite dramatically with increasing applied power (and therefore temperature). If the lamp's light output were to be used directly to monitor the applied power, the load resistance presented by the lamp would vary far too widely to give a good match to a transmission line carrying rf power. One way round this problem

Table 1. Several samples of "6V 0·1A" lamp bulb with 90mA filament current

Sample number	Filament resistance (Ω)
1	51·1
2	46·3
3	47·1
4	50·7
5	50·2

is to "pad out" the lamp resistance in the arrangement of Fig 2 which uses a lower resistance lamp. This is a reasonable way of detecting rf power above several watts.

The "6V 0·1A" lamp referred to, has the virtue that its filament resistance reaches 50Ω at typically 90mA, which is a current which can be feasibly supplied within a small bench instrument. To check on the match in the hf bands, I measured the lamp's return loss on a network analyzer. The signal level used was very much smaller than the dc power. For the five samples tested, the return loss was better than 30dB up to 32MHz, and better than 25dB at 50MHz. These figures are equivalent to vswrs of better than 1·07 and 1·12 respectively, and were obtained with a matching network for the hf end. Having experimented with the lamp, I developed the system shown diagrammatically in Fig 3. The idea is that the lamp is kept at a constant filament temperature (and therefore resistance) by a feedback loop which monitors the lamp's output energy. An infra-red sensor was chosen so that testing could be done in subdued light without undue disturbance, and only final calibration need be done with the instrument cased. With rf power supplied, the dc power needed by the bulb drops by an amount equal to the rf power put in. Measurement of rf power has now become a dc measurement problem.

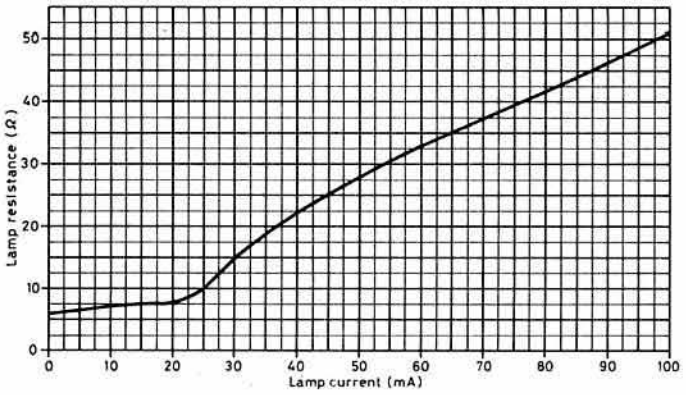


Fig. 1. Graph of resistance v current for a "6V 0·1A" lamp bulb

The system diagram shows how this measurement has been done. A fixed current source supplies current I to the lamp so that the filament resistance is 50Ω. With current I flowing in the lamp, it dissipates the full-scale power which the meter can read. The lamp's light output (where "light" includes infra-red) is kept constant at this level by the photo-transistor feedback loop. The voltage across the lamp, v, is monitored and fed to a multiplier. As rf power is dissipated in the lamp the feedback loop causes a current i to be diverted away from the lamp. This current is monitored by an amplifier measuring the voltage drop across a resistor. Its output, a voltage proportional to i, is then subtracted from a voltage proportional to I (using an inverting op-amp as a summer) to give a voltage proportional to (I – i). When the amount of rf power reaches full-scale, no dc current flows in the lamp, and this signal is zero. This fact is used in setting up the circuitry, as will be seen later. The "(I – i)" signal forms the other input to the multiplier whose output is a voltage proportional to v.(I – i), and represents the dc power being dissipated by the lamp. If we now subtract this from a voltage proportional to the full-scale power, V.I., then the result; V.I – v.(I – i)

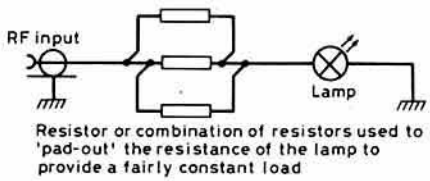


Fig. 2. Power indicator using resistance to "pad out" the lamp resistance

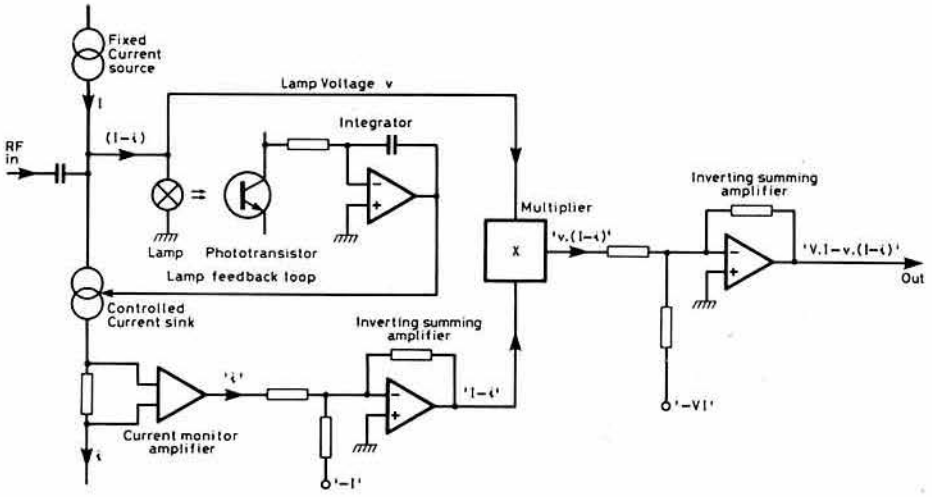


Fig. 3. Power meter system diagram

represents the dc power no longer needed to keep the lamp at its full scale brightness, ie the rf power.

This then, is the general method used. We can now move on to look at the circuits, which use only very ordinary components. The central unit is the multiplier, which needs to be pretty reasonable if large errors are not to be generated. This is also a home-grown design using ordinary components and is, I suspect, a little cheaper than proprietary ic multipliers. Since the prototype's accuracy looked promising, I splashed out on a digital display module for the model in the photographs, and incorporated a peaking indicator. There is no reason why the shack multimeter should not be used instead, but remember that the final accuracy hinges on the dc measurement accuracy. The circuits are described in detail in the following sections.

Circuit description

Power meter circuit

The radio frequency section only consists of a few components. Two sockets are provided, SK101 giving a good match to 50Ω, and SK102 75Ω. The lamp is set to give a good 50Ω match, so two paralleled 51Ω resistors, R101 and R102 are used to increase to 75Ω at SK102. C1 provides ac coupling so that dc on the input does not disturb the readings. About 1in of C101's lead inductance forms L101 which together with C102, improves the input match at the higher frequencies so that the instrument is capable of very respectable input vswr from 1·8 to 50MHz.

The circuit around IC101 and TR101 is a constant current source which feeds current (dc) into the lamp. R104 gives a monitoring point so that the current can be displayed on the front panel meter.

The lamp voltage is monitored via R111 and amplified by high input impedance (×2) amplifier IC102a so that over 9V can appear at the multiplier input 1.

The lamp's light output is monitored by TR102, an infra-red phototransistor, positioned about 7mm from the surface of the bulb. The transistor current is very sensitive to bulb brightness (and therefore position) and R109, a preset coarse adjustment, and R110, a fine adjustment brought out to a panel, are used to set the collector volts to zero when the bulb is passing its dc full scale current only. The feedback loop then adjusts the current so that TR102 collector remains at zero under conditions of rf power being applied to the instrument.

The feedback loop consists of an integrator stage around IC102b, zener D101 (which provides voltage shifting only) or TR104, and current sink TR103. With switch S101 in position 1, the loop keeps TR102 collector at zero volts as described, and this is the position used for making measurements of power. With S101 in position 3, the loop drives the lamp voltage to zero, which means that with no rf input applied, TR103 must be sinking all the current provided by the source TR101. This is also the condition when the instrument is receiving full-scale rf power, and is used to set up the power meter.

The current diverted away from the lamp is monitored across R144 by subtractor IC102c (which has a gain of 2 to match that of IC102a) whose output is a voltage proportional to the sunk current, ie the current now no longer supplied to the lamp because rf power is being applied. IC102d, in effect, now sums this signal with one proportional to the standing dc current in the lamp with no rf power applied, and its output is proportional

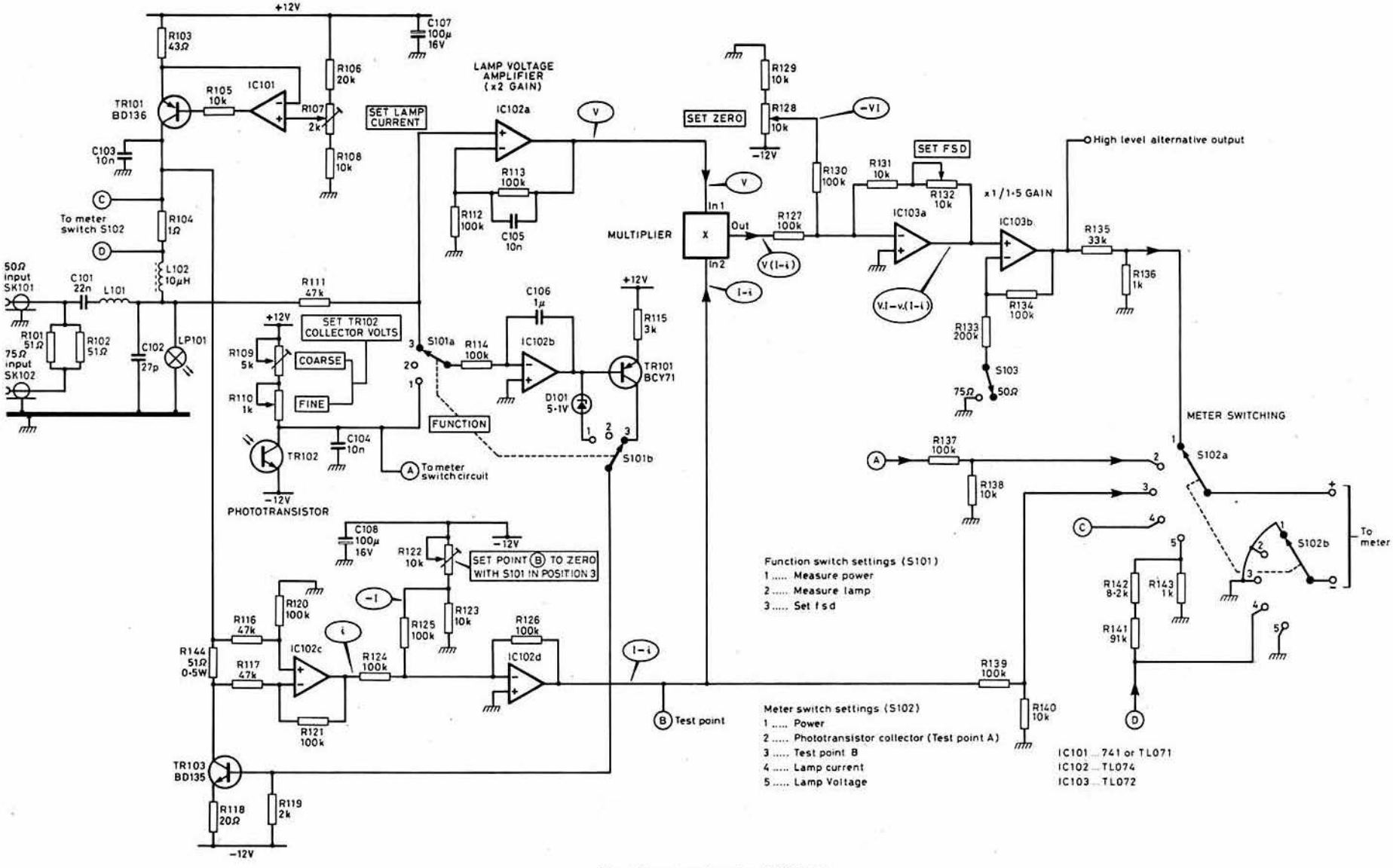


Fig. 4 Power meter circuit diagram

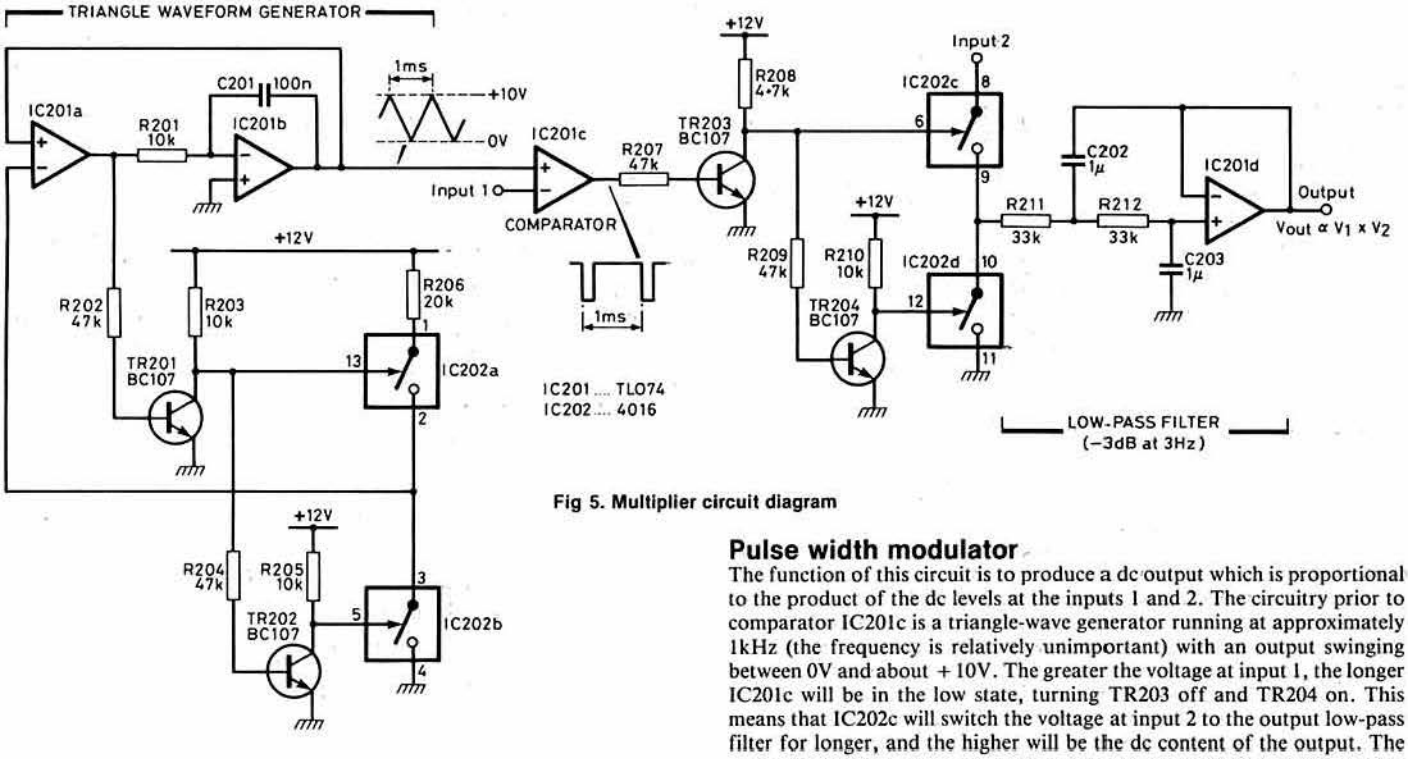


Fig 5. Multiplier circuit diagram

to the dc current still supplied to the lamp. This is fed to input 2 of the multiplier, whose output is in turn proportional to the product of the lamp voltage and the dc still applied to the lamp, ie the lamp's dc dissipation.

If we now subtract from this a signal proportional to the full-scale dc power, the difference must be proportional to the rf power being applied. This is carried out by IC103a, with R128 being used to set the power meter output to zero with no rf input and switch S101 in position 1. R132 sets the correct full-scale power reading with S101 in position 3 (no rf input). The middle position (2) of S101 breaks both lamp feedback loops so that the dc conditions at the lamp can be set up initially. IC103b is an amplifier with a gain of 1/1·5 determined by switch S103 and scales the readings by 1 for the 50Ω input, and 1·5 for the 75Ω input. IC103b output can be taken direct to an external meter, but for the internal meter—with its 200mV full scale—an attenuator (R135, 136) is used. S102 provides meter switching with the functions set out in the table. All voltages to the meter have been brought to the 200mV range by means of the various resistive pot-downs, and since all important functions are monitored, setting-up can be done entirely by the use of the front-panel meter, or external meter if one is used to cut costs.

Pulse width modulator

The function of this circuit is to produce a dc output which is proportional to the product of the dc levels at the inputs 1 and 2. The circuitry prior to comparator IC201c is a triangle-wave generator running at approximately 1kHz (the frequency is relatively unimportant) with an output swinging between 0V and about + 10V. The greater the voltage at input 1, the longer IC201c will be in the low state, turning TR203 off and TR204 on. This means that IC202c will switch the voltage at input 2 to the output low-pass filter for longer, and the higher will be the dc content of the output. The low-pass filter has a low cut-off frequency of around 3Hz and removes the switching frequency components leaving only dc at the output. The waveforms are shown on the circuit. IC202d grounds the filter input during the period when input 1 is below the triangle wave voltage.

The triangle wave generator itself is built around an integrator (IC201b) and a comparator (IC201a). Suppose that the voltage at the inverting input of IC201a is less than that of the non-inverting input. Its output will be positive. TR201 will be on and TR202 off. IC202b clamps the inverting input of IC201 at 0V. The output of IC201b will be a linear negative-going ramp. When the ramp voltage reaches 0V, the comparator changes state, and the reference voltage at its inverting input will be switched by IC202a to around 10V. The integrator output ramps positive until 10V is reached, whereupon the process repeats itself, generating triangle waves of 10V peak-to-peak amplitude at the integrator (IC201b) output. The linearity is very good, and allows a good quality multiplier to be made.

Signal change detector

A multivibrator built around IC301a generates a pulse waveform with a repetition period of around 0·3s which goes high (about 10V) for 3ms or so, during which time the input signal (buffered by IC301b) is sampled. The

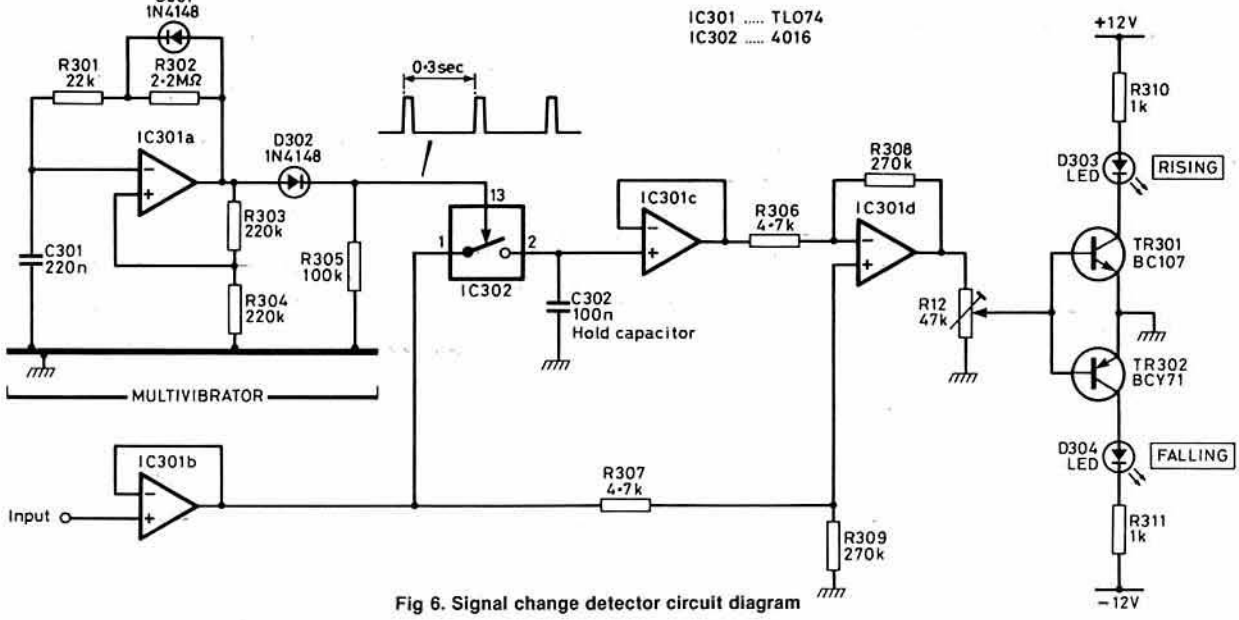


Fig 6. Signal change detector circuit diagram

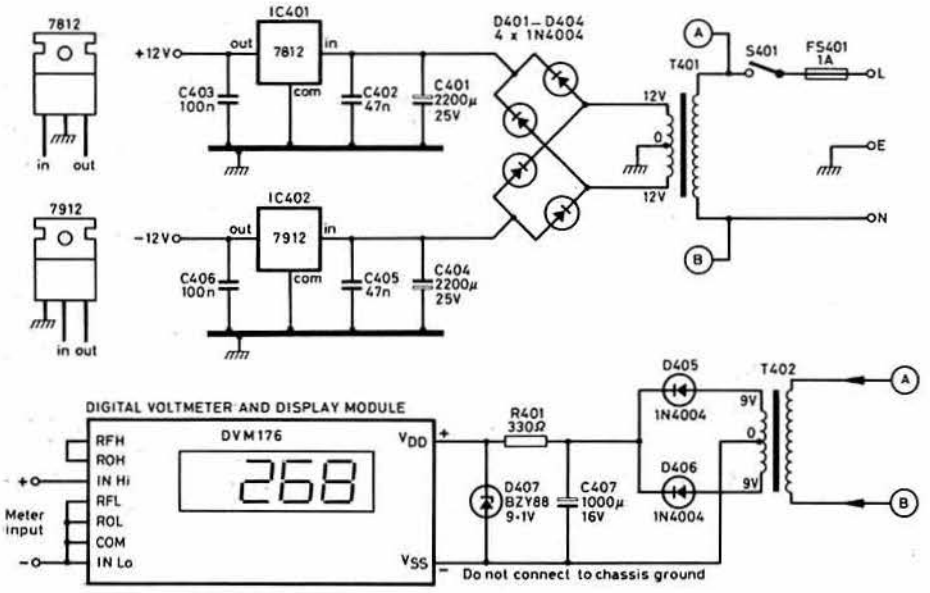


Fig 7. Power supplies and digital display module circuit diagram

instantaneous input voltage is stored on capacitor C302. IC301c provides a high impedance buffer so that the charge on C302 leaks away only slowly. IC301d is a straightforward op-amp subtractor with gain (of the order of 50) which subtracts the stored voltage from the input voltage. Therefore, if the input signal voltage rises in the 0·3s interval between samples, IC301d output will rise. When TR301 base voltage exceeds 0·7V, TR301 will turn on, and the "rising" l.e.d will light. Conversely, if the signal level falls, TR302 and the "falling" l.e.d will be on. R312 sets the sensitivity of the circuit.

In operation, the circuit gives a handy indication of a changing level. As the input level is increased slowly, the rising l.e.d will come on and blink very briefly at 0·3s intervals. When the signal peak is established, both l.e.ds will be off. The sampling interval of 0·3s was found by experiment to give a good indication but, if other rates are required, C301 can be altered in value to suit individual taste.

The input to this circuit can be connected directly to the meter output of the power meter, but a more sensitive position is the high level signal available at the output of IC303b.

COMPONENTS LIST

Power meter (main circuit)

R101, 102	51Ω	D101	5·1V zener
R103	43Ω 0·5W		
R104	1Ω	TR101	BD136
R105, 108, 123, 129, 131, 138	10kΩ	TR102	Infra-red phototransistor (Maplin part YY66W)
R106	20kΩ		
R107	2kΩ lin preset pot		
R109	5kΩ or 4·7kΩ lin preset	TR103	BD135
		TR104	BCY71 (or general purpose pnp)
R110	1kΩ lin panel pot		
R111, 116, 117	47kΩ		
R112, 113, 114, 120, 121, 124, 125, 126, 127, 130, 134, 137, 139, 140	100kΩ	IC101	741 or TL071
		IC102	TL074
		IC103	TL072
R115	3kΩ		
R118	20Ω	L101	Approx 1in lead inductance on C101
R119	2kΩ		
R122	10kΩ preset		
R128, 132	10kΩ lin panel pot	L102	10µH choke
R133	200kΩ		
R135	33kΩ	S101	Two-pole three-way
R136, 143	1kΩ		
R141	91kΩ	S102	Two-pole six-way (rotation stop adjusted to five-way)
R142	8·2kΩ		
R144	51Ω 0·5W		
C101	22nF ceramic disc	S103	Single-pole two-way
C102	27pF ceramic plate		
C103, 104, 105	10nF ceramic disc	LP101	6V 0·1A round MES
C106	1µF polycarbonate		
C107, 108	100µF electrolytic		

Multiplier

R201, 203, 205, 210	10kΩ	C202, 203	1µF polycarbonate
R202, 204, 207, 209	47kΩ	TR201–204	BC107 (or any general purpose silicon npn)
R206	20kΩ		
R208	4·7kΩ		
R211, 212	33kΩ		
		IC201	TL074
C201	100nF polycarbonate	IC202	4016

Signal change detector

R301	22kΩ	D301, 302	1N4148 (or any general purpose silicon diode)
R302	2·2MΩ		
R303, 304	220kΩ		
R305	100kΩ	D303	LED (colour and size to suit taste and front panel design)
R306, 307	4·7kΩ		
R308, 309	270kΩ		
R310, 311	1kΩ		
R312	47kΩ lin preset pot	TR301	BC107 (or general purpose npn)
C301	220nF polycarbonate	TR302	BCY71 (or general purpose pnp)
C302	100nF polycarbonate		
		IC301	TL074
		IC302	4016

Digital meter and power supplies

R401	330Ω 0·5W	IC401	7812 12V regulator (+ve rail)
C401, 404	2,200µF 25V		
C402, 405	47nF ceramic disc 25V	IC402	7912 12V regulator (–ve rail)
C403, 406	100nF ceramic disc 25V		
C407	1,000µF 16V	S401	Mains on-off toggle
T401	12-0-12V 500mA mains		
T402	9-0-9V 50mA mains	FS401	1A
D401-406	IN4004		
D407	BZY88 9·1V zener		

Module DVM176 digital voltmeter and display module (supplier: Cirkit Holdings PLC)

NOTE. Specified working voltages for the capacitors in the power supplies are *minimum* values.

GENERAL NOTES

(1) All resistors used in the project were 0·25W 2% tolerance 100ppm temperature coefficient unless indicated. Resistors with similar ratings would be suitable.
(2) The op-amps may be split differently between packages if required. Pin diagrams for single, dual and quad packages are given in Fig 9.
(3) TL071, TL072 & TL074 can be replaced by TL081, TL082 & TL084.
(4) All components may be obtained from: Maplin Electronic Supplies Ltd, PO Box 3, Rayleigh, Essex SS6 8LR; and Cirkit Holdings, Park Lane, Broxbourne, Herts EN10 7NQ.

Digital meter and power supplies

The power supplies are entirely conventional, with full-wave rectifiers supplying the positive and negative rails. Three-terminal regulators have been used to give good stability. This is necessary since a number of voltages are derived from the rails.

The digital voltmeter and display module could have been powered from a battery, as has been done elsewhere [3]. Be most careful to keep the module supply isolated from that of the power meter, or else the module could be destroyed.

Constructional notes

Several views of my power meter are shown (Photos 2, 3, 4). I have included the photographs partly to appease my vanity (the standard of construction, while mediocre, is a masterpiece compared with my usual efforts), but mainly to illustrate some points which may be useful to other constructors.

All the rf components were mounted on the front panel to give short connections from the input sockets to the lamp. The rest of the circuitry was built on Veroboard. The multiplier and signal change detector were wired on separate boards which then plugged into edge connectors on the mother board. Such division of circuits into virtually self-contained modules can be helpful, but I did it mainly to get everything into the case. Another time I would probably prefer to have everything on one board in a more "slimline" case.

The "set zero", "set fsd" pots were put on the front panel with the other switches (on/off, 50/75Ω, S101 and S102). In the unit shown, S102 was wired with positions 2 and 3 reversed with respect to the circuit diagram and description. Provided that the switch is wired and labelled consistently, however, this is of no consequence. The fine pot for adjusting the photo-transistor collector voltage was put on the rear panel because of space.

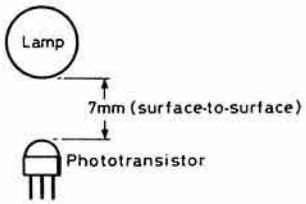


Fig 8. Relative positions of the lamp and phototransistor

The only critical item of construction is the positioning of the lamp relative to the phototransistor. This is shown in the diagram of Fig 8. In my unit, the front panel is not as rigidly secured as it might be, and pushing it closes the gap between the two. In practice, this has not been a problem, but it should be watched.

The use of ic sockets is recommended, since testing and fault-finding are easier if suspect ics are easily removed and swapped around. It would also

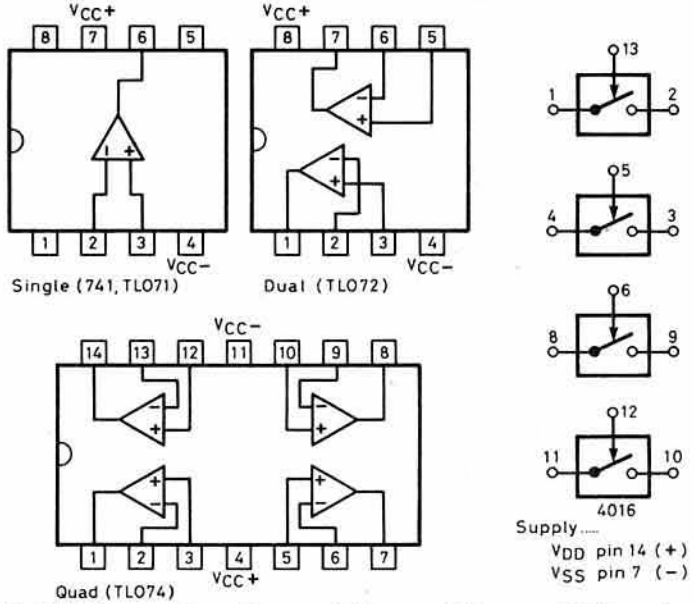
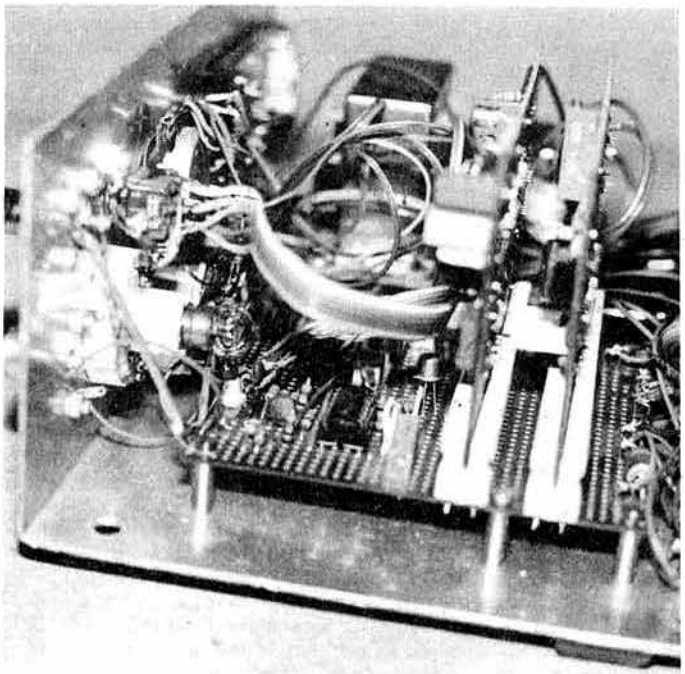
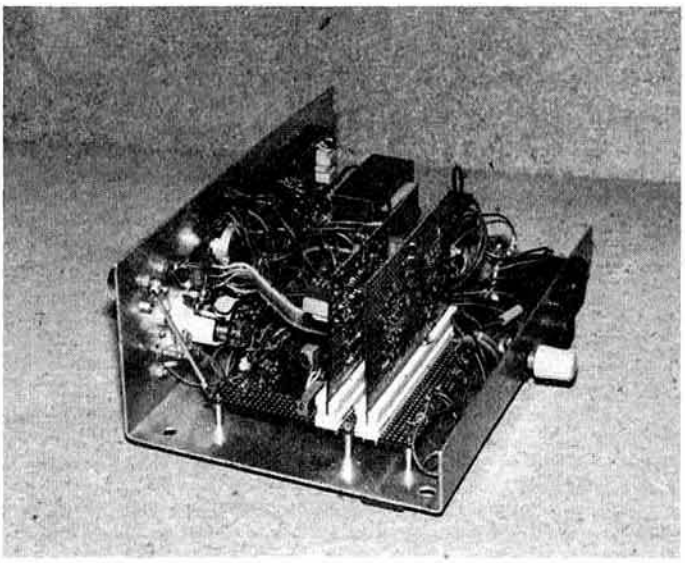
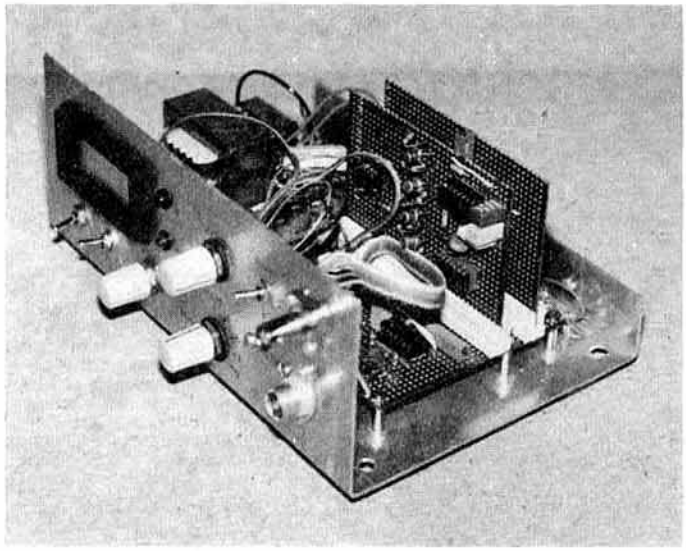


Fig 9. IC pin connections. Please note: V_{CC} + and V_{DD} are + 12V, V_{CC} − is − 12V and V_{SS} is 0V







Photos 2, 3, 4. Three views of the power meter construction

help testing if the multiplier is tested separately, either as a separate board (as shown), or with the inputs connected with wire links which are only completed after testing.

There is little reason why the op-amps cannot be partitioned differently between packages if this aids construction. Fig 9 gives connections for the single, dual and quad packages.

Testing

The optimist will have soldered everything and will switch on expecting everything to work perfectly. The pessimist (or realist) will have socketed all the ics and will anticipate a pall of smoke as soon as power is applied. This section is for the latter, who, having built the unit, will have carefully checked all the connections.

First, check the lamp current source. With the lamp removed from its socket and IC101 installed, measure the current from TR101 collector to ground with an ammeter on a 1A scale. This should be made to vary by adjusting R107 and should be left at around the 90mA mark. Replace the lamp, which should light without being brilliant. (Note that if IC102 is installed, S101 should be in position 2.) With meter switch S102 in position 4 (lamp current), the panel meter should give a reading numerically close to the measured current.

With S101 still in position 2, measure the phototransistor collector voltage with either an external voltmeter or the panel meter (S102 set to position 2). Cutting the light path from the lamp should cause this to vary wildly. Check that the preset R109 can be used to bring the collector voltage to zero. With S101 in position 3, the lamp should be extinguished if IC102 is installed. If S101 is put in position 1, and a torch shone at the phototransistor, the lamp brightness should vary—the more light from the torch, the dimmer will be the lamp. Monitoring test point B with the panel or external meter, the voltage here should vary with the position of the torch (S102 in position 3). A variation should be seen in the lamp voltage reading during the torch test (S102 in position 5). Removing the torch and putting S101 to 2 and S102 to 5, the panel meter reading should agree with an external meter reading the lamp voltage.

The multiplier can be tested in isolation if desired. The input voltages can be supplied from the positive rail via potentiometers. If both input voltages are set to, say, 4V initially, it should be found that if one input is varied the output voltage should vary in the same proportion. Referring to the circuit diagram of the multiplier, a quick functional check on about half the circuit can be made by putting a crystal earpiece from IC101b output to ground, whereupon a tone of around 1kHz should be heard. With several volts applied to both multiplier inputs, this tone should still be heard at IC102 pins 6 and 12, and at pins 9 and 10. There should be very little 1kHz tone at the multiplier output. Once the multiplier appears to perform, connect it to the rest of the power meter.

The crystal earpiece can again be used to test the signal change detector. There should be loud ticks present when monitoring across R305 (see circuit of signal change detector). Applying a varying voltage to the input, the l.e.ds should light according to whether the voltage rises or falls. R312 should be set initially at mid-point, but may need to be adjusted in operation to change the sensitivity, the "correct" setting being a matter of judgement.

Testing of the output stages of the power meter is straightforward. With S101 in position 1, and no rf input, the multiplier output should be in the region of 8V. With S2 in position 1, check that R128 can be used to zero the reading on the panel meter. With S101 in position 3, IC103a should have an output voltage of around 1·3V which should be obtained by adjusting R132. The output of IC103b should be the same in the 50Ω S103 setting, and larger by a factor of 1·5 with S103 set to the 75Ω position.

This concludes the section on testing. If all is well at this point, the instrument may be calibrated. Many of the steps for calibration follow the same route as for functional testing.

Ian Braithwaite was born in 1955. Educated at Clitheroe Grammar School and Manchester University, he obtained an honours degree in physics in 1976. Since then he has been employed as a design engineer with Marconi Instruments, and has been project leader on the 2305 modulation meter. His major interest in amateur radio is the design of equipment and relatively low power operation on the hf bands, particularly 28MHz.

Adjustments and calibration

The adjustment and calibration process can take place in two parts. First, the internal presets are adjusted, and then, with the covers on, setting-up is completed using the panel adjustments, which can then be used for periodic correction. While setting up with the covers off, it is advisable to work at reasonably low light levels and to avoid sunlight, as this will affect the operating point of the phototransistor.

The first job is to set the lamp resistance to 50Ω.

(1) Set switch S101 to position 2 to break the phototransistor feedback loop.

(2) Set the meter switch S102 to positions 4 and 5 to measure the lamp current and voltage, respectively. The lamp current will be scaled so that 1mA gives 1mV at the meter terminals. The lamp voltage is scaled by 100 so that 1V across the lamp is read as 10mV.

(3) Adjust R107 ("set lamp current") for a lamp current of 90mA.

(4) By reading the lamp voltage and then the current, and dividing, calculate the lamp resistance. Adjust R107 until this is as close to 50Ω as patience permits.

Next, set the phototransistor operating point as follows:

(5) Leaving S101 in position 2, set S102 to position 2, to measure the phototransistor collector voltage with the feedback loop broken.

(6) With the panel pot (fine adjustment R110) set to mid-travel, adjust R109 (coarse) for zero volts.

This done, test point B is monitored and the voltage at this point set to zero while TR103 is sinking all the lamp current.

(7) Set S101 to position 3 (set fsd) and S2 to position 3 (test point B). The lamp should be completely extinguished. Adjust internal preset R122 for a zero volts indication on the meter.

At this point, the internal adjustments are completed and the instrument can be cased. The zero point must now be set with no rf input.

(8) Set S101 to position 1 (measure power) and S102 to position 1 (power).

(9) Adjust panel pot R128 for zero reading.

The final stage of calibration is setting the correct full-scale power. During the first operations, the lamp voltage and current were set to give a lamp resistance of 50Ω. The product of the two is the full scale power; eg the lamp current and voltage may be typically 90mA and 4·5V respectively. This gives a full-scale power of 405mW.

(10) Set S101 to position 3 (set fsd) and S102 to position 1 (power).

(11) Adjust R132 (set fsd panel pot) so that the panel meter reads the correct full-scale power calculated above. In the case of the digital panel meter shown, 405mW will give 40·5mV at the meter. If an external meter is used, a convenient scaling should be chosen.

Operation

Operating the instrument should be found very straightforward once the calibration has been done. The calibration should be checked before any critical measurements, especially the phototransistor operating point (test point A). Thermal drift will cause this to vary, but the fine panel control can be used to reset very quickly. Remember to use the correct rf input socket and 50/75Ω switch position if you decide to fit both on your instrument.

Final notes

As with any design, there is plenty of scope for improvement and experiment. For example, some may wish to try a "manual" version (with lamp current controlled by a pot which is used to reset the phototransistor collector voltage when rf is applied) to verify the principle. Other multipliers could be used. Different lamps could be tried (or a combination of lamps). I gave up on thermally compensating the phototransistor (though performance should be found adequate as it stands)—others may succeed. Perhaps lamp reactance could be tuned out for 144MHz use.

In any case I hope that the power meter will help some of you to get the power to the antenna.

Acknowledgement

I wish to acknowledge the use of Marconi Instruments test equipment in testing the power meter.

References

[1] *Solid State Design for the Radio Amateur*, Hayward and DeMaw ARRL.

[2] *Radio Communication Handbook*. RSGB.

[3] "The Antennalab", A L Bailey, G3WPO, *Radio Communication* August 1983. □

DESIGNING EMITTER FOLLOWERS

Bob, G4FHU, works mainly on the hf bands using cw or rtty. Despite taking early retirement last year he finds little enough time to "get on the air" in competition with other hobbies such as computers and piano and the dreaded grass cutting that is the result of moving from London to the country.

Boyhood short wave listening was interrupted by the second world war and post-war service as a radio mechanic in the Royal Signals. Then, after graduation, five years in the electronics industry was followed by 28 in polytechnics running and teaching in degree and HND courses in electrical and electronic engineering.

R H Pearson, BSc (Eng) Hons, CEng, MIEE, G4FHU *

Introduction

Single transistor voltage follower circuits are very widely used and look very simple, but their design is often careless and their performance not what might be expected. Elementary books tend to end before the crucial problems are reached, while advanced texts rarely give clear practical advice.

A simple but effective design sequence is offered here, together with the results of some practical measurements that show what can happen in typical circuits. As a foretaste of these, glance at Fig 11 to see how input resistance can vary and remain negative over most of the amateur radio frequency range; then look at Fig 5 to see how a low frequency waveform can be damaged by a bad choice of bias.

Although the focus is mainly upon bipolar emitter followers, the same methods can be extended easily to the design of field effect source followers. It is assumed that the reader is already familiar with the well-known virtues of such circuits that *can* be obtained if the signal amplitude and frequency are small enough, ie high input resistance, low output resistance, nearly unity voltage gain.

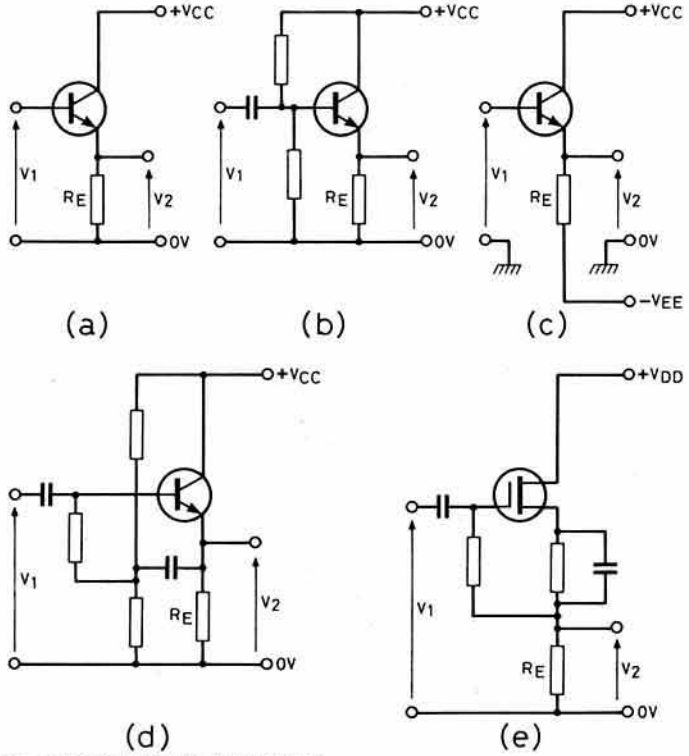


Fig 1. Typical circuit arrangements

Choosing a practical bias circuit

Some of the most useful circuit arrangements are shown in Fig 1; the best and simplest is that in 1(a), but this only works if the direct voltage that happens to be associated with the input signal is nearly enough right to set the desired dc (bias) conditions. To keep the bias indepedent of the signal source, 1(b) is often employed, or when supply rails of both polarities are available the arrangement of 1(c) is very convenient.

To offset the reduction of input resistance by shunt bias resistors, a kind of "bootstrap" circuit is sometimes used, such as in 1(d). For really high input resistance in low frequency applications a fet is preferable, as for example in 1(e).

Choosing the bias levels

In all the circuits mentioned so far, the emitter (or source) resistor R_E is the only "load" at the output side, and in this practically rather limited case the bias levels are easily decided. The essential starting point is to specify the amplitude of the largest signal to be handled and the minimum voltage to be maintained across the transistor. To cover all cases, let us assume that

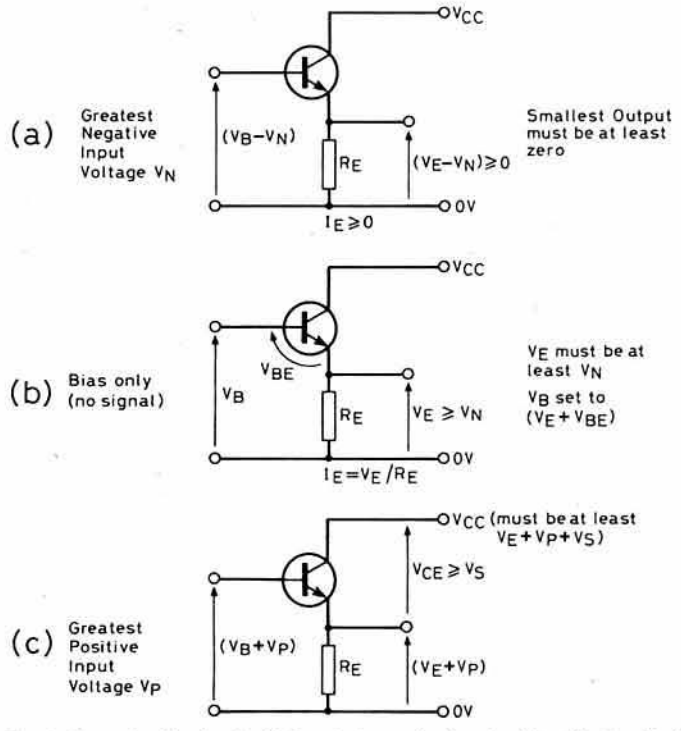


Fig 2. Choosing bias levels. *(a)* Greatest negative input voltage V_N. Smallest output voltage must be at least zero. *(b)* Bias only (no signal). V_E must be at least V_N. V_B set to $(V_E + V_{BE})$. *(c)* Greatest positive input voltage V_P. V_{CC} must be at least $(V_E + V_P + V_S)$

* 13 Mill Drove, Bourne, Lincs PE10 9BX.

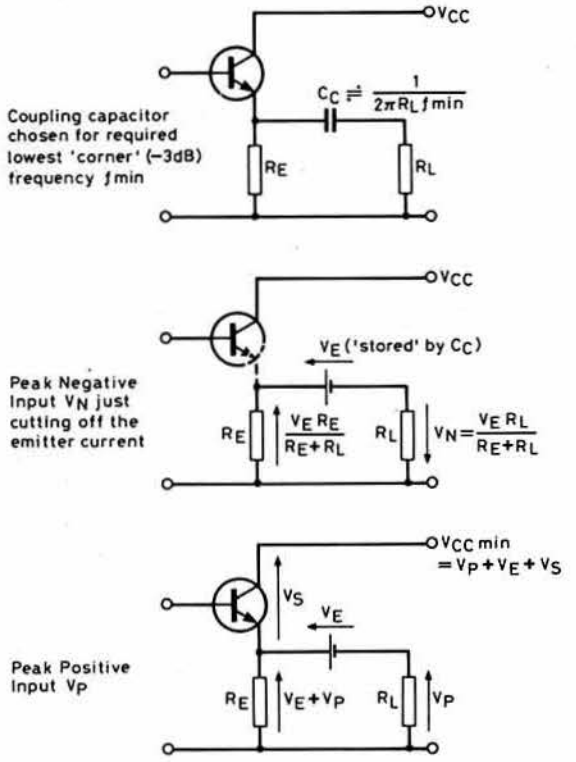


Fig 3. Effects of ac coupling the load. *(a)* Coupling capacitor chosen for required lowest "corner" (−3dB) frequency f_{min}. *(b)* Peak negative input voltage V_N just cutting off the emitter current. *(c)* Peak positive input voltage V_P

the input signal has a positive peak voltage V_P and a (possibly) different negative peak voltage V_N.

The minimum transistor voltage (V_{CEmin} or V_{DSmin}) should be at least about 0·7V to keep a bipolar out of saturation and, for a fet at least a couple of volts will be needed to keep in the pinch-off operating region. Let's call this minimum voltage V_S. Fig 2 shows how these combine with the dc bias levels V_B, V_E, I_E and the supply voltage V_{CC}, and how they relate to extreme conditions.

The best that any transistor can do to follow a big negative peak is to switch off entirely, so the greatest negative peak output swing is equal to V_E, and we must choose V_E safely larger than V_N. For positive peak inputs there must be sufficient supply voltage V_{CC} to allow "headroom", ie $V_{CC} = V_E + V_S + V_P$ is the absolute minimum satisfactory supply voltage. The no-signal emitter current is $I_E = V_E/R_E$, and the corresponding static power dissipation in the transistor is $I_E (V_{CC} - V_E)$. These factors override the predictions that can be made by small signal equivalent circuit analysis (especially those based upon small signal output resistance).

A more common practical circuit that couples the signal but not the bias level to an external load R_L is shown in Fig 3(a), and the ac coupling via a capacitor has a profound effect upon the bias level required. This is summarized in Fig 4, and explained in more detail in Appendix A. The ac-coupled load resistance R_L now becomes more difficult to drive when large signals are present (and "large" may mean only a volt or less in some cases). The crucial factor is the ratio $K = R_E/R_L$, and this is the horizontal axis in Fig 4. Look first at the extremes: if the ratio K is too small, the emitter current has to be enormous; if K is high, the collector supply voltage has to be very much larger than the signal amplitude. Suppose, for example, that an emitter follower is required to drive a diode modulator with the following specification: Power level +6dBm, input resistance 50Ω (this demands a peak signal voltage of 630mV and a peak signal current of 12·6mA). If K is chosen as 4, say, then $V_E = 3·15V$ and $I_E = 15·75mA$. Then, if the minimum transistor voltage is chosen as $V_S = 2V$ the minimum supply voltage will be $V_{CC} = 5·78V$. The emitter resistance R_E is $V_E/I_E = K.R_L = 200Ω$.

If the above procedure is omitted, the resulting waveform distortion can be quite severe. A bad case is illustrated by the photographed waveforms of Fig 5. The two upper waveforms superimposed show an input sinusoid and the corresponding distorted waveform across the 470Ω emitter resistor R_E. The lower waveform is that across the 47Ω load resistor R_L, and the true zero for all plots is marked by the unused 500mV/div cro channel which is one division from the bottom of the screen.

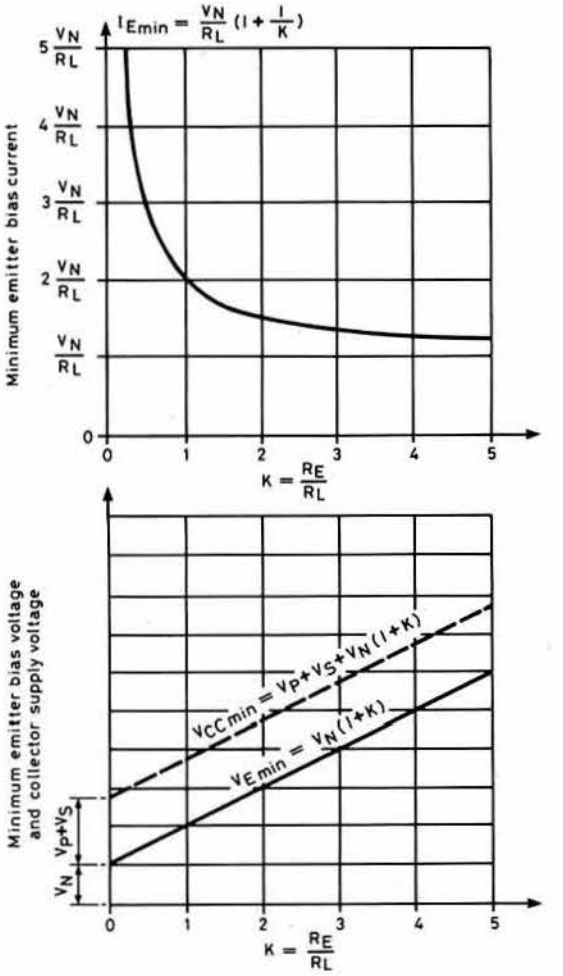


Fig 4. Minimum bias levels for an emitter follower. *(a)* Minimum emitter bias current. *(b)* Minimum emitter bias voltage and supply voltage

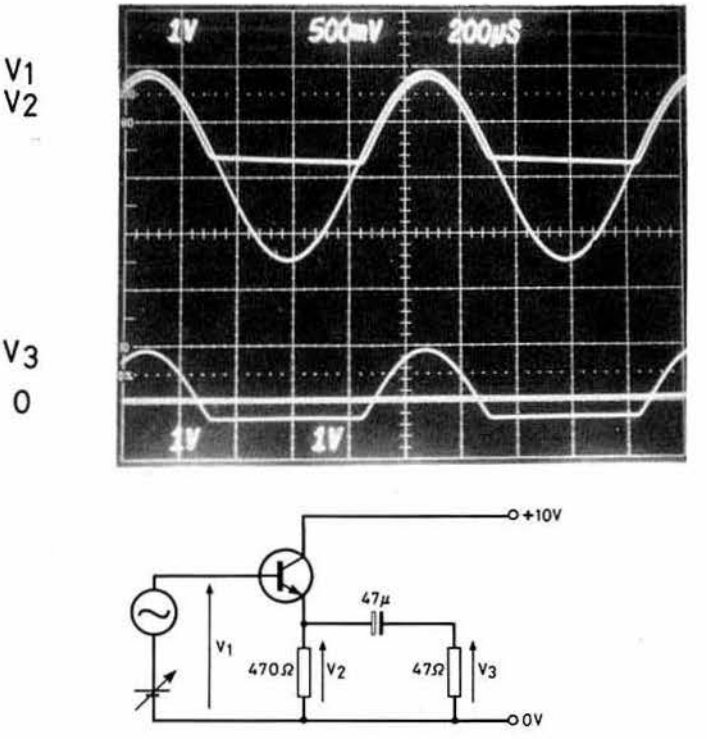
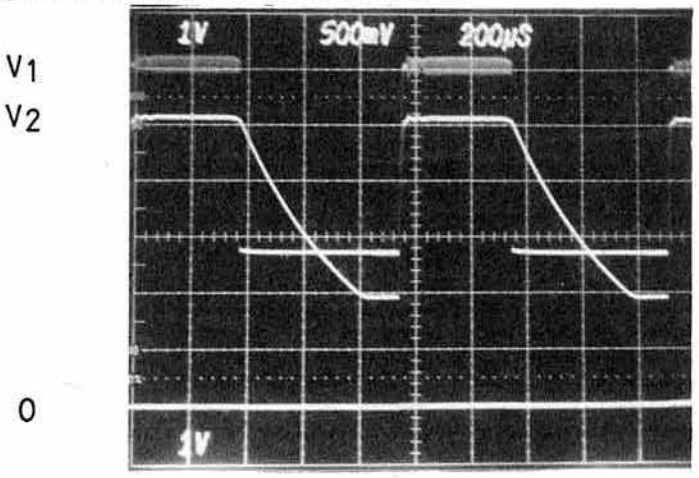


Fig 5. One effect of badly-chosen bias levels. Output is lower waveform

Load capacitance and slewing rate

Followers often have to cope with significant load capacitance. This is most likely to occur when the load is fed via a screened cable and when the load does not terminate the cable in its characteristic impedance. In even the most simple arrangement there will be *some* load capacitance, including that of wiring, pcb tracks and the transistor junctions. So the follower really works into a load that we might simplify to a resistance R_2 in parallel with a capacitance C_2. The design for slewing rate will be no more precise than the estimate of the total load capacitance.

If the time constant C_2R_2 is too large it will prevent the output voltage falling fast enough. A deliberately slowed down example is shown in Fig 6 in which a 1μF capacitor was put across a 470Ω emitter resistor while 1kHz pulses were being handled by an emitter follower.



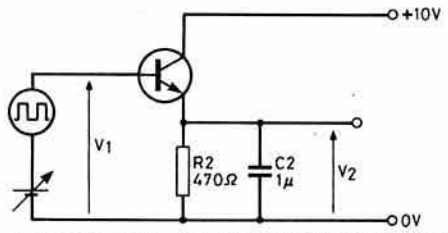


Fig 6. Slewing rate reduced by added load capacitance

There is not likely to be a serious limitation for positive slewing because the load capacitance can be charged rapidly by transistor current, but in the negative-going direction performance is likely to be much worse, and the most important limitation. The greatest rate of change in the negative direction occurs if I_E is suddenly reduced to zero: greatest negative slewing rate = $I_E/C_2 = V_E/(C_2R_2)$. For example, $I_E = 1mA$, $C_2 = 20pF$ gives a slewing rate of 50V/μs. If the load R_L is separate and ac coupled to R_E, $R_2 = R_ER_L/(R_E + R_L)$.

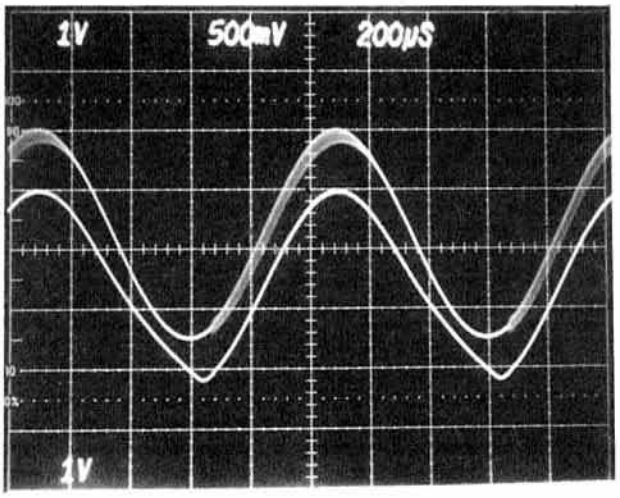


Fig 7. Slewing rate just inadequate, causing distortion of output (lower) waveform

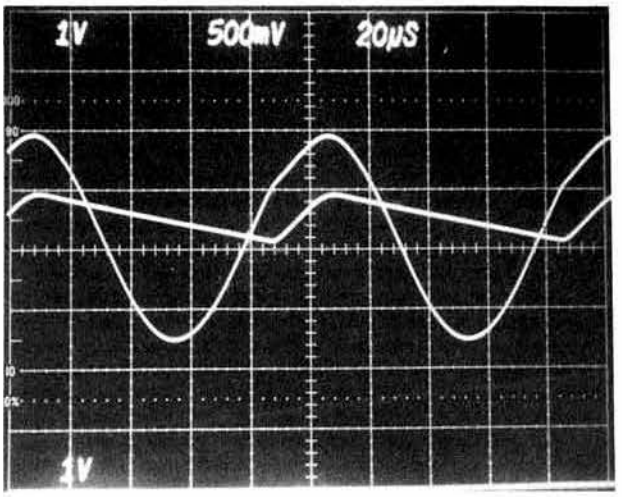


Fig 8. Slewing rate totally inadequate. Output approaching that of a peak detector circuit

For most amateur radio designs we are interested in meeting the slewing rate requirement for an hf sine waveform, and that is given by $2\pi f$ times the peak voltage; eg a 1V peak signal at 10MHz "slews" at a maximum rate of nearly 63V/μs. If the slewing rate is inadequate, the output waveform will distort. In Fig 7 this problem is beginning to show where the emitter (lower) waveform has the characteristic sharpened corner caused by slew-rate limiting. The upper waveform is the input signal. In Fig 8 the problem has become absurdly exaggerated by an increase in frequency, and the output waveform is more typical of an amplitude detector than of a voltage follower!

High frequency input impedance

Predicting when the input resistance will go negative.

One of the best-known oscillator circuits looks exactly like a follower with capacitance added at the output and with an inductor across its input. Such a Colpitts oscillator is shown in Fig 9. Even if no capacitors are deliberately included, unavoidable stray and device capacitances remain. So a follower is always a potential oscillator and it can easily become one.

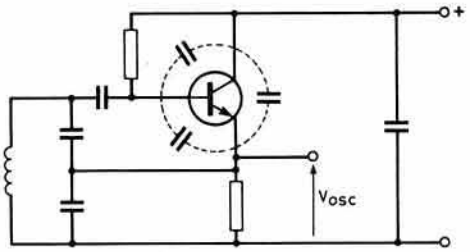


Fig 9. Colpitts oscillator

By happy mischance, during waveform photography for this article a nearby vhf radio emitted sounds of interference, and it was noticed that waveforms (such as Figs 6 and 7) were blurred at the same time as the interference was heard. The emitter follower under test was oscillating at vhf.

Very thorough hf design needs sophisticated software and, more of a problem, a lot of data to feed in to the calculations. So the tendency is to skip it altogether. This is a pity because the simplest of all hf transistor models for calculation can give useful predictions (see Fig 10 and Appendix B). The only transistor data needed are I_E, h_{fe} and either f_{beta} or f_T (or, for a fet, g_m and interelectrode capacitances).

Access to a Hewlett Packard 4192A impedance analyser gave an opportunity to see if simple calculations of hf performance had any value, and the answer is yes (at least up to the 13MHz limit of measurements possible with this instrument). With a BC108 emitter follower and a 2N5459 source follower it was found that the analysis gave approximate but useful predictions in respect of input capacitance and resistance. The gain predictions were sensible but not tested with any precision on this occasion.

Some typical results for effective parallel input resistance R_{in} and capacitance C_{in} are shown in Figs 11 to 14. The curves show the computer predictions and the circles are practically measured values. The main

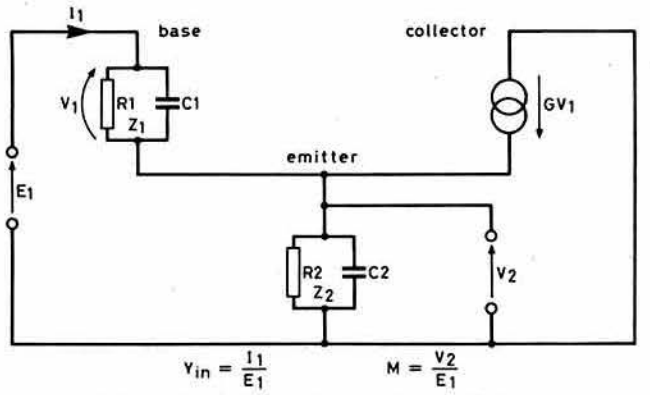


Fig 10. Simplest transistor circuit model for hf

feature, at first sight, is the remarkable variation of R_{in} with frequency. It dashes off to infinity at some critical frequency, reappearing from minus infinity and thereafter approaches zero from the negative side as frequency increases. The algebra suggests, and the calculations confirm, that a rough estimate of the critical frequency can be made as:

$$f_{crit} = \sqrt{f_E f_{beta}} \quad \text{..... see Appendix B ..... (10)}$$

To cope with the negative input resistance and prevent unwanted oscillation, it may be necessary to shunt the input with positive resistance **lower** in magnitude than the offending negative resistance. Since the latter gets smaller as frequency rises, it may also be necessary to "kill" the follower action at vhf by adding some series resistance at the input or a lossy ferrite bead.

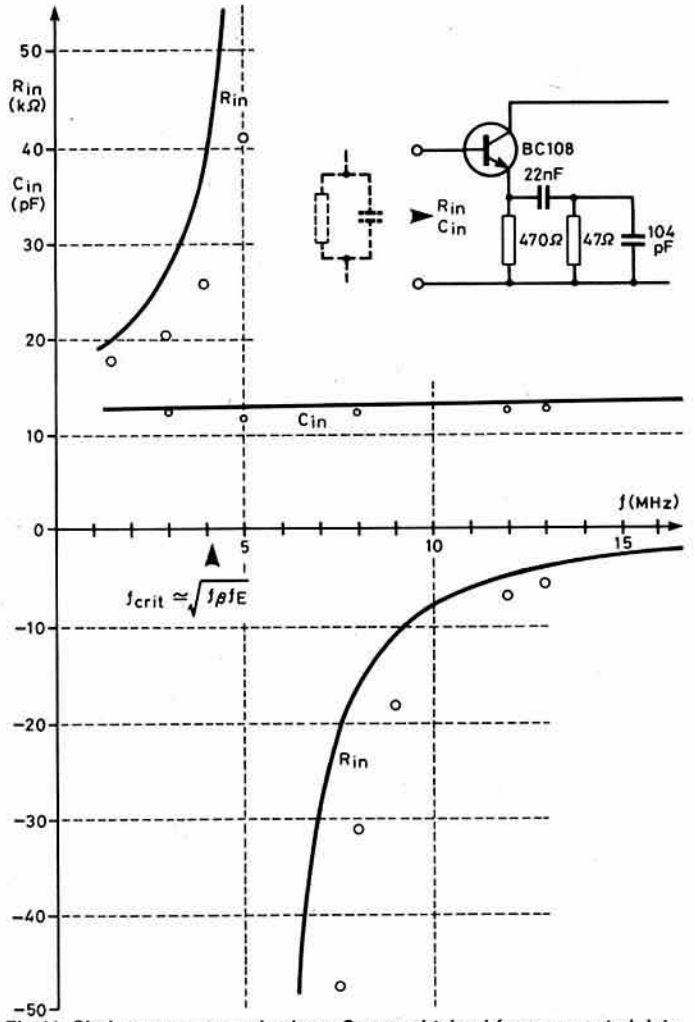


Fig 11. Circles are measured values. Curves obtained from computed data. $f_{crit} = \sqrt{f_{beta}\ f_E}$ is approximate predicted frequency at which R_{in} reverses sign

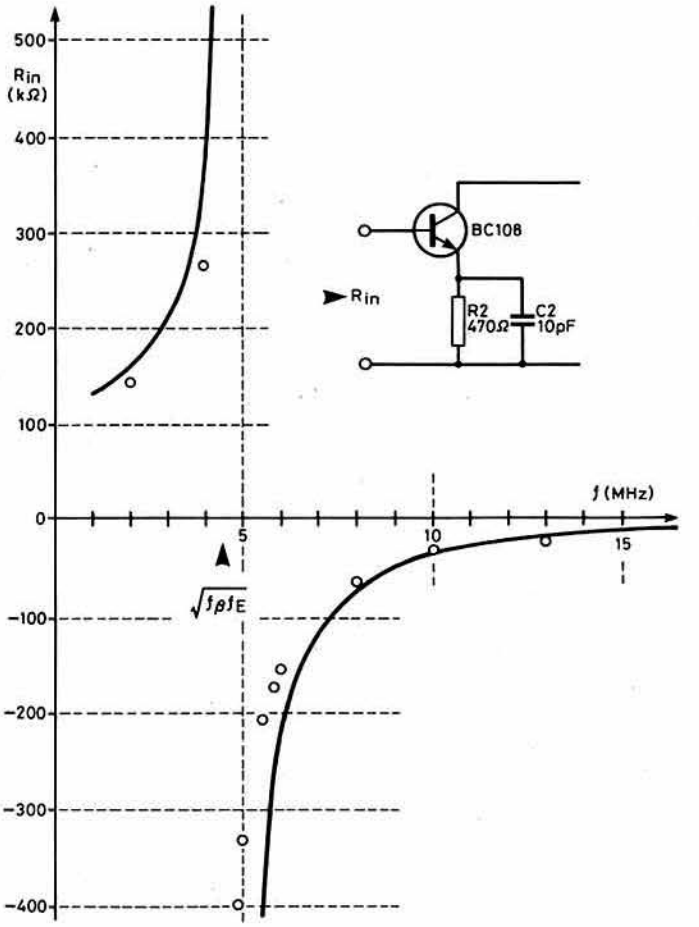


Fig 12. Showing how quite a small capacitance across the load has an important effect upon input resistance

Input capacitance

Follower input capacitance appears to be a well-behaved function of frequency, and one is inclined to dismiss it as of no great importance. This

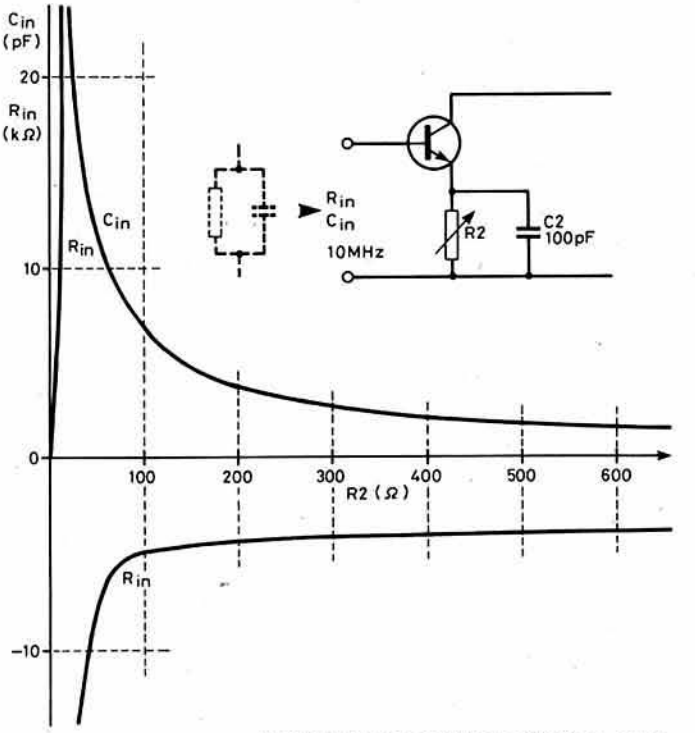


Fig 13. How load resistance affects R_{in} and C_{in}

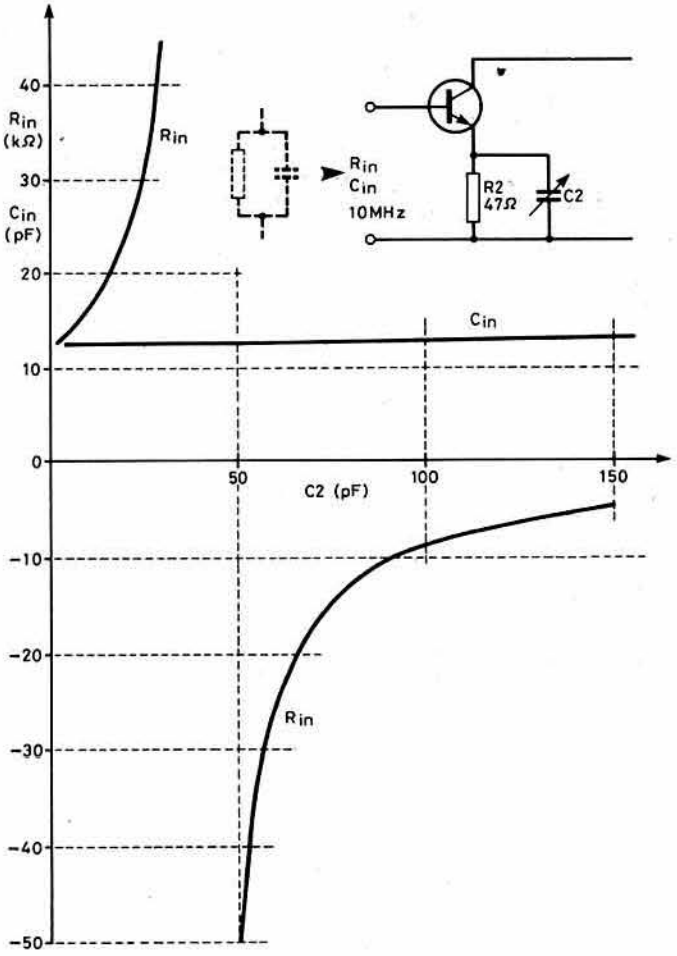
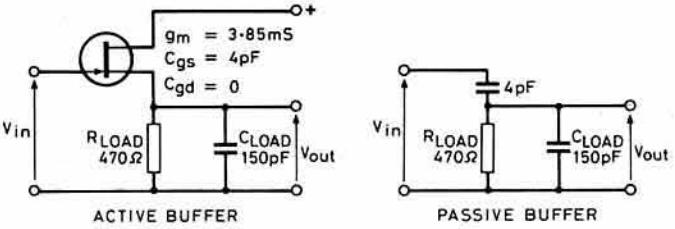


Fig 14. How load capacitance affects R_{in} and C_{in}

could be misleading on those occasions when a follower is a vital buffer in an unusually-sensitive part of the system, such as a master oscillator.

The most interesting feature of a buffer amplifier is the way in which its input impedance is affected by changes in the impedance of its load. To make this clearer for an emitter follower, the load resistance and capacitance were separately varied in computation. Typical results are shown in Figs 13 and 14. Note that: input capacitance is most affected by load resistance changes; input resistance is most affected by load capacitance changes.



R_{LOAD} (Ω)	C_{LOAD} (pF)	f (MHz)	Voltage gain Vout/Vin		Input capacitance (pF)		Input resistance (kΩ)	
			Active	Passive	Active	Passive	Active	Passive
470	150	0·5	0·64	0·006	1·44	3·995	−1600	+13000
470	150	1·0	0·64	0·011	1·49	3·982	−408	+4050
470	150	3·0	0·58	0·021	1·90	3·932	−54·6	+1070
470	150	5·0	0·50	0·024	2·40	3·913	−26·3	+831
470	150	10·0	0·34	0·025	3·21	3·900	−14·4	+730
370	150	10·0	0·33	0·025	3·19	3·904	−15·3	+591
470	50	10·0	0·56	0·063	1·98	3·787	−16·3	+119

Fig 15. Active and passive buffer circuits compared. (The passive buffer is merely the 4pF capacitor!)

Followers as buffer stages

Using these ideas and the computer program provided, an estimate can be made of the buffering action of a follower in its most common role of protecting a sensitive circuit from load changes. Instead of just hoping for the best, one can predict the kind of changes in input resistance and capacitance likely to be caused by changes in load resistance and capacitance, and can ensure that the desired signal levels can be handled.

It is always worth keeping in mind that a passive network, ie using no transistors at all, can offer very effective and predictable performance as a buffer. If the signal input is a lot bigger than is really needed, a simple potential divider can give excellent performance. A typical case is shown in Fig 15 where a humble 4pF capacitor is used as the buffer and its performance compared with that of a source follower. Apart from the reduction in signal level, the passive circuit is an excellent buffer.

It is possible to use the program for such passive circuits by choosing appropriate circuit parameters and by "turning off" the transistor simply by setting its $g_m = G$ to zero. Predictions should be good because they no longer involve the complexity of transistor action.

```
1 R1=1333
2 R2=50
3 C1=239
4 C2=150
5 G=200
100 REM Alter lines 1-5 as required. Units are Ohm, pF, mS
110 REM Emitter or Source Follower---G4FHU Program on RML480Z
120 G1=1/R1
130 G2=1/R2
140 H=6.28318
150 G=G/1000
160 PRINT"f MHz","V Gain","Angle","Cin pF","Rin Ohm"
170 FOR I=1 TO 13
180   READ F
190   W=H*F*1E-6
200   A=G+G1:B=W*C1:C=A+G2:D=W*(C1+C2)
210   P=G1*G2-W*W*C1*C2
220   Q=W*(C1*G2+C2*G1)
230   M=SQR((A*A+B*B)/(C*C+D*D))
240   N=ATN(B/A)-ATN(D/C)
250   Y=SQR((P*P+Q*Q)/(C*C+D*D))
260   J=P*C+Q*D:K=Q*C-P*D:L=C*C+D*D
270   R=L/J
280   S=K/(L*W)
290   N=N*360/H
300   PRINT F,M,N,S,R
310 NEXT I
320 PRINT
330 PRINT"R1=";R1,"R2=";R2,"C1=";C1,"C2=";C2,"gm=";G*1000
340 DATA.01,.02,.05,.1,.2,.5,1,2,5,10,20,50,100
350 REM----------Essential Program ends here----------
1000 RESTORE
1010 INPUT"1 = END       2 = Set up new conditions";X
1020 IF X=1 THEN 1280
1030 IF X=2 THEN 1050
1040 GOTO1000
1050 INPUT"1 = Bipolar    2 = FET";X
1060 IF X=1 THEN 1090
1070 IF X=2 THEN 1230
1080 GOTO1050
1090 INPUT"input the current gain hfe";H1
1100 INPUT"which do you have ?  1 = fT      2 = fbeta";X
1110 IF X=1 THEN 1140
1120 IF X=2 THEN 1170
1130 GOTO 1100
1140 INPUT"fT in MHz";F1
1150 F2=F1/H1
1160 GOTO 1180
1170 INPUT"fbeta in MHz";F2
1180 INPUT"Ie, emitter bias current (mA)";I1
1190 R1=25*H1/I1
1200 C1=1000000/(H*F2*R1)
1210 G=40*I1
1220 GOTO 1260
1230 INPUT"FET gm in mS (mA/V)";G
1240 INPUT"FET Cgs (pF)";C1
1250 R1=1E+9
1260 INPUT"Effective Load R2,C2  (Ohm,pF)";R2,C2
1270 GOTO 100
1280 END
```

Summary

When designing an emitter or source follower, the crucial requirements are that the output signal should move far enough and fast enough and that the input resistance and capacitance are predictable. The methods shown make this possible without much effort and with no need for unusual data.

To minimise the effort required, the complex algebra has been cut off at the point where a computer program is the most effective means of evaluation (that is why, for example, Appendix A ends before explicit

(Continued on page 941)

Technical Topics *by Pat Hawker, G3VA*

IS "HAM INGENUITY"—the junk-box syndrome—a dying art? In the pioneering days experimental amateurs were forced to improvise since component parts suitable for operation above about 1MHz were often not available to buy. Then came several decades in which schoolboy and other budget-limited enthusiasts found it possible to put together effective amateur stations by salvaging parts, valves, power transformers etc from discarded broadcast radio and television sets.

The art of improvisation

The rise and rise of the industrial muscle of the Rising Sun has ushered in an era where, for the past decade, only a small minority of newcomers even contemplate building their own equipment. Old-timers, other than a few QRP enthusiasts, tend to claim (to quote Doug DeMaw, W1FB's introduction to "The fine art of improvisation" *QST* July 1985, pp22-4): "I gave up building ham gear because parts are hard to find and they cost too much"—perhaps simply a more acceptable excuse than to admit that most of us (and I certainly include myself) are simply not capable of designing or constructing modern solidstate transceivers of the complexity and packing density of many current off-the-shelf equipments.

Those who cannot find the wherewithal to buy brand-new equipment now tend to acquire 'seventies secondhand transceivers rather than seek out the cheaper, bulkier "separates" or the once popular kit-built a.m. rigs that can make effective cw rigs and are amenable to home modification. I find, when admitting that I still often use an old Labgear LG300 transmitter, that other amateurs frequently express regret that they ever got rid of this once-popular and extremely rugged rig with its trusty 813 power amplifier, "built like a battleship".

W1FB wrote: "It is conceivable that we might have to spend $15 for a tuning capacitor and a vernier drive, when the circuit with which it will be used contains only $3 worth of small parts. Prices of items such as tuning capacitors, drive mechanisms, cabinets, slug-tuned coils and new meters can discourage even those builders who have a large amateur radio budget . . . What alternatives do we have? The ingenuity of a true experimenter must be summoned from within if speedy solutions to these common problems are to be found. In decades past it was a regularly practiced art among hams to solve design and procurement problems by using materials on hand. Most hams were inveterate experimenters, and it was considered a challenge to come up with new electrical and mechanical ideas—it was a stimulating learning experience to get on the air and talk about circuits and projects. Each of us has the potential to build radio equipment, to find shortcuts to design objectives, and to enjoy using something we built ourselves."

W1FB thus puts into print what has become all too apparent: decline of the art of junk-box ingenuity, the recycling of surplus and salvaged components and the use of low-cost materials for purposes far removed from those for which they were originally intended. The term "you get what you pay for" seems to be steadily replacing the old idea that with lots of ingenuity and a dash of technical know-how, an amateur experimenter could build for a song what would cost him an arm and a leg to buy new. It was an approach that bred some very resourceful people.

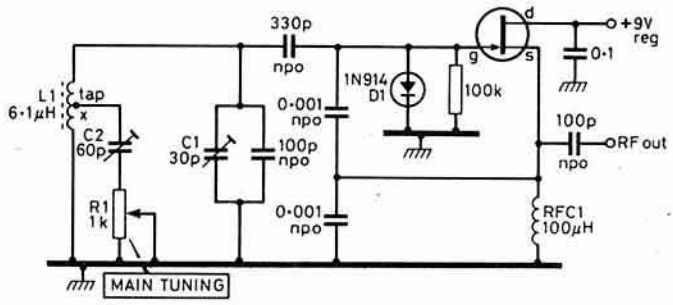


Fig 1. W1FB's "reactance tuning" technique applied to a vfo that uses a 2N4416 or MPF102 fet. C2 sets the frequency spread provided by R1 and eliminates the need for a high-quality tuning capacitor and slow-motion drive. Maximum tuning range is also governed by the position of the tap on L1

Low cost-tuning mechanisms

W1FB in his *QST* article shows a simple method of tuning a vfo that he has devised to eliminate the need for an expensive variable capacitor and tuning drive. Fig 1 shows an example of his "reactance tuning" which has fine control of the frequency using a high-quality potentiometer. He writes:

"I had some reservations about how it might work, but after breadboarding a test circuit I was pleasantly surprised with the results. R1, a high-quality Allen Bradley potentiometer, is located close to C2 and L1 in order to keep the leads from R1 as short and direct as possible.

"Why does this system work? Well, as R1 is adjusted, the presence of the trimmer C2 becomes more prominent. The series combination of C2 and R1 form a capacitive reactance and resistance that cause a frequency shift as R1 is adjusted. The smaller the value of R1, the lower the operating frequency.

"What are the bad features? The tuning is nonlinear in the sense that the frequency is more spread out at the maximum-resistance end of the R1 range (how about using an anti-log law potentiometer?—*G3VA*). Also if a poor quality control is used you might hear a slight scratching noise as the control is adjusted if the vfo is used for a receiver."

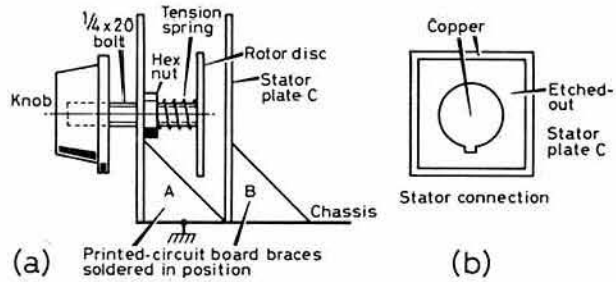


Fig 2. Homemade disc drive described by W1FB. A tension spring ensures good stability of the rotor portion. Side brackets help to keep the unit mechanically rigid. (b) Shows how the stator disc is etched on pcb material

For those who require a multi-turn variable capacitor, W1FB also comes up with a straightforward design for a simple disc tuning capacitor, very reminiscent of the old Eddystone neutralizing capacitors of the 'thirties: Fig 2. He also describes a cylindrical tuning capacitor (Fig 3) that I suspect could also be adapted to provide the mechanism for a permeability-tuned oscillator.

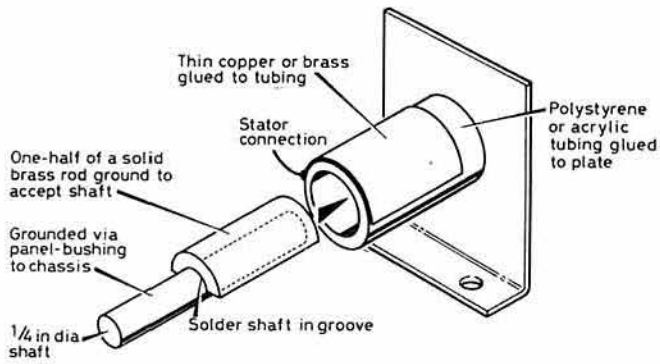


Fig 3. Alternative cylindrical format for a tuning capacitor. The rotor unit is semicircular brass or copper to which a 0·25in diameter tuning rod has been soldered. The station section is plastic tubing to which thin copper or brass sheeting has been glued

Bob Lombardi, WB4EHS, in *Ham Radio* August 1984, pp32-4, discussed how to buy, use and recycle surplus electronic parts, including the surplus pcb boards that tend to be disposed of these days in large quantities. He concluded, perhaps a trifle over-enthusiastically: "It seems strange to

me that homebrewing should be on the decline today. This should be a 'Golden Age' of homebrewing if there ever was one! Just look at what's available! Integrated circuits that perform all manner of digital and analog functions are at our disposal, and most are quite cheap. Using reasonable parts counts, we can build circuits capable of performance that was no more than the stuff of dreams in the 'fifties and 'sixties; in the 'fifties, who would have dreamed of a three-terminal voltage regulator? (How about the once-popular gas-filled voltage-regulator tube?—*G3VA*). We can build things more cheaply today than we could when taking inflation into account."

Incidentally, if you fear homebrewed equipment may have that "old-fashioned" look, take comfort from the fact that a British radio manufacturer (Ross Electronics) is attempting to get the UK back into the portable radio set market by introducing a model designed to have a 'fifties look. Fashions, like sunspots, come and go in cycles!

Ceramic resonator oscillators

The search for variable-frequency oscillators of high stability and low phase noise ("jitter") stretches back over many years. For some 60 years the dominant control element has been the quartz crystal; more recently a number of other control elements have emerged, including cavities, ceramic dielectric resonators, yttrium indium garnet (yig), surface acoustic wave (saw) devices, steel and glass delay lines (eg PAL television delay-line components) etc. The problem comes when one wishes to vary the frequency over an appreciable range.

The variable crystal oscillator (vxo) in which the crystal frequency is "pulled" by external LC components is an excellent system where the change of frequency can be limited to about 0·1 per cent of the crystal frequency (ie about 7kHz at 7MHz, 150kHz at 144MHz etc) but is less satisfactory for applications requiring a tuning range covering an entire amateur band.

The digital pll frequency synthesizer has tended to be hailed as the ultimate answer but, in practice, unless extreme precautions are taken its phase noise remains a significant problem that can limit the performance of a receiver or transmitter. Mixer-type synthesizers can give much-lower phase noise but tend to be much more complex and costly.

In a long article in *Ham Radio* (June 1985, pp18-26), Albert D Helfrick, K2LBA, shows how ceramic filter resonators, combined with mechanical or diode variable capacitors, can form very useful vxo/vco (voltage controlled oscillator) systems. In conjunction with a low-cost 10·7MHz ceramic i.f. filter resonator, as used in many consumer-type vhf/fm broadcast receivers, he reports that a stable tuning range of almost 200kHz is achievable, although compared with an AT-cut crystal vxo the temperature-induced frequency drift tends to be rather high. This represents about two per cent tuning range compared with 0·1 per cent of a quartz crystal.

For a fixed frequency oscillator using a ceramic oscillator the temperature drift could be minimized by using special −4400ppm/°C ceramic capacitors as the feedback elements.

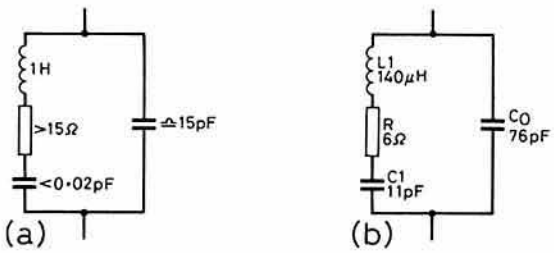


Fig 4. Equivalent circuit of (a) quartz resonator and (b) 4MHz ceramic resonator as described by K2BLA

More generally, a ceramic-resonator vxo/vco can be considered as providing a useful compromise, offering much of the low-phase noise and short-term stability of a crystal oscillator and the wide tuning range of an LC oscillator. The *Q* of a crystal can be as high as 500,000; for a ceramic resonator, although the series resistance is *lower*, the equivalent inductance is much lower and the Q is typically about 600: Fig 4. While this is much lower than for a quartz crystal it is significantly higher than can be achieved with an hf LC circuit which typically is under 60. The ceramic resonator is also much less microphonic than an LC tuned circuit.

Another significant advantage of the ceramic resonator is the ability to pull its frequency, without losing stability, by as much as seven per cent. In practice, with a limited capacitance-diode variation of, say, 200pF, a typical tuning range with a 4MHz resonator would be about three per cent.

K2BLA provides circuit diagrams (Figs 5, 6) of both capacitor- and varactor-tuned ceramic resonator oscillators using a 10MHz resonator

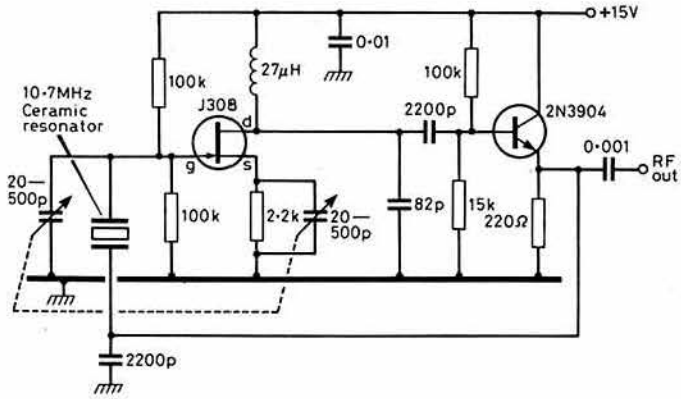


Fig 5. Mechanically-tuned ceramic resonator oscillator

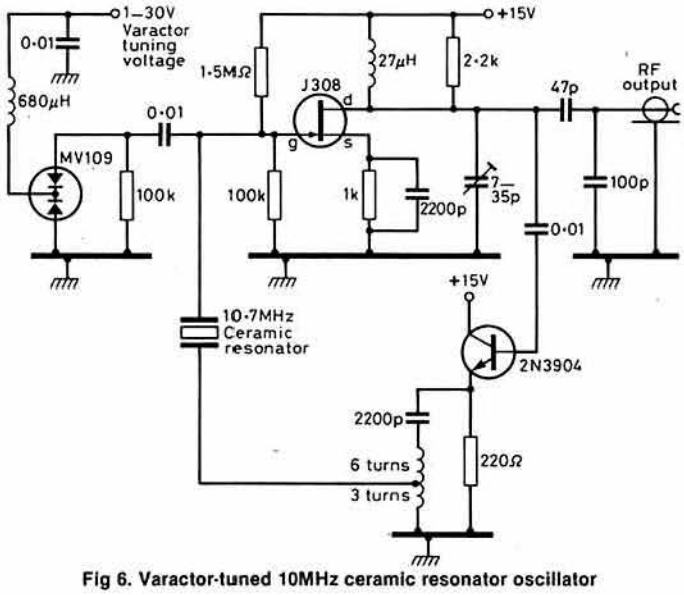


Fig 6. Varactor-tuned 10MHz ceramic resonator oscillator

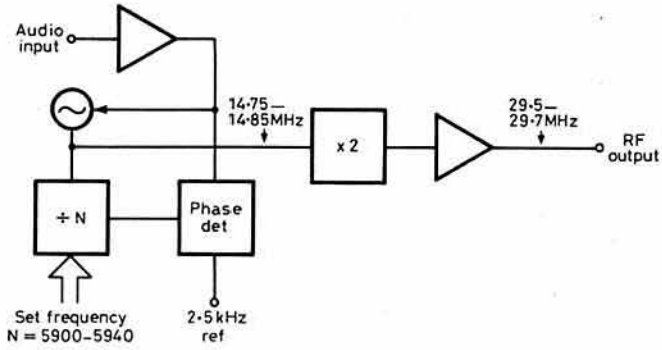


Fig 7. Outline of a 28MHz fm transmitter using a 14MHz ceramic resonator oscillator

capable of covering the entire 10·1 to 10·15MHz band; admittedly this has a temperature variation of approximately 230Hz/°C and is not readily amenable to simple temperature compensation: nevertheless it could provide a very useful performance if kept away from heat sources. He outlines arrangements for a synthesizer for 50MHz based on a phase-locked ceramic resonator vco, and also a simple 28MHz fm transmitter with a phase-locked 14·75 to 14·85MHz vco (Fig 7).

Setting the record straight

No matter how hard one tries, errors *do* creep into print unnoticed! I introduced a stupid error into the circuit diagram of the wartime Danish "telephone directory" transmitter-receiver (*TT* October, Fig 8, p786). As shown, there is no ht applied to the pa anodes, but a "neon" bulb is connected across the tank coil. In reality, there was no "neon" but a small

torch bulb (pilot lamp) connected between the tank coil/rf by-pass capacitor and the 250V line. I think also that the rf bypass capacitor must have been 5nF or so rather than the 5pF shown, but the Danish diagram is a little difficult to read. A pilot bulb connected in this way would not only have put the ht on the anodes but acted as a useful "dc meter" for tuning the pa to dip, and then loading it by adjusting the antenna taps in conjunction with the similar pilot bulb (rf current indicator) in the antenna lead. A reminder, incidentally, that small pilot bulbs, car bulbs, light-emitting diodes etc can still form very useful makeshift dc and rf current indicators, even today when miniature meters are more readily available than in 1943!

John Brown, G3EUR, points out that he inadvertently showed the npn transistor (TR2) in his electronic test load (*TT* May 1985, Fig 4, p358) as "BD136 or equivalent" which unfortunately are pnp devices. It should have read "BD139 or equivalent". A 2N6099 would be suitable.

G3EUR takes the opportunity to add some further notes on his very useful test load. He writes: "I used an auxiliary 12V psu which has a current-limit set at 1·5A which protects the load against being powered when it is not connected to a psu under test. When the collectors of the 2N3055 devices (TR3a, b, c etc) are open (not connected to a psu) then TR2 has an emitter load comprising the bases of the 2N3055s, approximately 0·1Ω in series with 0·7V (the Vbe of the transistors) and a large current could flow in TR2. A current-limited 12V supply would shut down in this case. Alternatively, a resistance of 4·7 to 6·8Ω can be put in the line from "Ext" on Fig 4 to the +12V line. This limits the maximum current in TR2 to about 2A. I found it convenient to switch off one or more of the 2N3055 devices for testing at lower currents (one 2N3055 per 5A maximum) so that only two were used when the maximum load current was 10A or less (Fig 8).

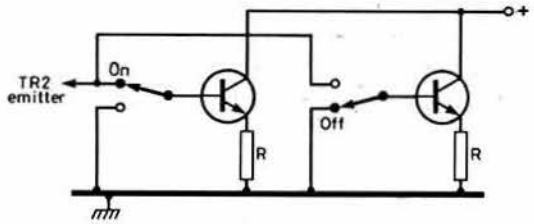


Fig 8. Switching arrangement used by G3EUR in his high-current electronic test load (*TT* May 1985). See text

"To avoid problems, each of the 2N3055 b, c, d devices has a spdt switch in its base, transferring the base from the base of TR3a/emitter TR2 to the negative line, so that there is no current in the collector. Even so, I found the odd 2N3055 with a leakage current of a milliamp or two. When connected to a psu under test, the load current results in a volt-drop across the 0·3Ω resistors, proportional to load current. For 2N3055 devices with gains of 20 or more, the error due to base current is small, five per cent or less."

Maurice Hately, GM3HAT, commented on the diagram (*TT* June, Fig 5, p453) which I reproduced from his conference paper on his "dipoles of delight" as follows: "In order to prevent anyone wasting a lot of time on experiments, may I point out that the first circuit in the diagram does not actually work very well (minimum swr usually 2:1). Actually the monoband capacitor antennas that were described in the paper *(IEE Conference Publication No 245)* contain another component shown in Fig 2 of the paper. Only with this component are the full delights of the monobander achieved (minimum swr about 1·05:1)."

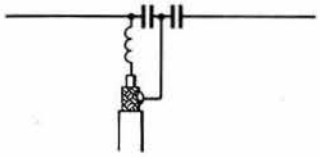


Fig 9. GM3HAT's monoband "dipole of delight" showing improved form with an inductor. Both capacitors and inductor have reactances numerically equal to the cable impedance at the frequency of operation

His Fig 2 is here reproduced as Fig 9, about which he explained: "The tuning problem can be alternatively cured if a series inductor is connected between the coaxial feeder and the capacitive balun. While a half-wave dipole constructed in this way is only a singly resonant device, it is nevertheless attractive in view of the accurately resistive input impedance over a wide bandwidth (some six per cent before the swr exceeds 1·5:1), minimal received interference and preclusion of overtone radiation."

Brian Bower, G3COJ, noted the 7MHz sloping delta loop antenna of SM6CTQ (*TT* September, Fig 4, p708) which adopts the ideas of W1FB and W1SE in their *QST* article of October 1984: "The full-wave delta loop at low height". However, he feels that the dimensions given by SM6CTQ are unduly pessimistic in suggesting that the support mast or tower needs to be 16m high. If the centre of the base of the antenna is spaced out at, say, 5m from the base of the tower, and the wire 2m above the ground, the apex would not reach the top of a 16m mast but would be some 13·5m above ground. However, this is only about 1m less than with the loop in the vertical plane. On the other hand, G3COJ suggests, if the plane of the loop slopes at 45°, then its apex would be at 10·88m, representing a worthwhile saving in mast height. Alternatively, for a given apex height, moving the loop out from the mast and raising it more than 2m above ground would raise the average height of the antenna. "It would be interesting to know whether this height improvement would be cancelled by the loop becoming less vertical", G3COJ writes.

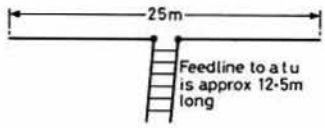


Fig 10. All-band centre-fed doublet antenna as recommended by VK5RG, for use on all hf bands from 1·8 to 28MHz

As *TT* has frequently noted the attractions of a centre-fed doublet antenna using open-wire feeder, it may be appropriate to reproduce from Rob Gurr, VK5RG's "Wire antennas" (*Amateur Radio (VK)* September 1984) an antenna he recommends as a flexible all-band system: Fig 10. He writes:

"This multiband general purpose system has the following radiation properties:

1·8MHz (with feeders tied together and tuned against earth) omnidirectional;

3·5MHz as a shortened dipole, excellent general coverage;

7MHz as an extended dipole, some bidirectional gain at right angles to the wire;

10MHz as shortened two halfwaves in phase, some bidirectional gain (1·8dBd);

14MHz as two extended halfwaves in phase, 3dBd gain;

18, 21 and 28MHz as a general-purpose centre-fed "long wire" with multiple lobes, some providing useful gain (eg 2·5-waves long on 28MHz for gain of 2dBd in each of four lobes at 30° with respect to the wire).

For this type of system one does need a flexible astu with balanced output that can be varied from high to low impedance.

Flash-over and transient suppression

Although the problem of short, sharp voltage spikes ("transients") is usually associated with vulnerable, solidstate devices, it can also affect thermionic equipment. For example, in high-power valve linear amplifiers, transient voltages can develop on any electrode that is not at earth potential. This can include the grid of a cathode-driven triode amplifier, or more commonly the screen grid of a tetrode amplifier, such as those based on the 4CX series. Unless suitable protection is provided, transients arising from flash-over can result in costly damage.

Protection is often provided in the form of a surge arrestor, taking the form of a simple "spark gap" or its rather more sophisticated gas-filled counterpart that ionizes and "fires" when the potential across the gap exceeds the breakdown voltage. The high-power KW-1 amplifier with a 8875 power triode described in *Radio Handbook* (22nd edition) incorporates in its grid circuit a surge arrestor of this type made, for example, by Siemens, Signalite, Reliable Electric etc.

However, John Nelson, G4FRX, of RSGB headquarters, is not convinced that a spark-gap arrangement can be relied upon always to provide adequate protection. He writes:

"There currently seems to be a school of thought among constructors and users of tetrode amplifiers (especially those using the 4CX250B) that advocates the use of spark gaps to provide a measure of protection to the screen grid in the event of flash-over. Having carried out a good deal of work in this area in connection with a forthcoming RSGB publication, I would like to point out some relevant facts and to suggest a much better alternative.

"It is true that flash-over in 4CX-series tetrodes can damage the screen grid, typically resulting in internal short-circuits. However, the real component at risk is the valve base or, more correctly, the built-in screen decoupling capacitor in the SK600 and SK620 series of bases. These are rated at 1kV working and, in my experience, this rating is *not* conservative.

Flash-over is very likely to cause this component to go short-circuit, especially in the case of the SK620 series which are (or should be) generally used at uhf. Given the current cost of these components, one consequence of a flash-over is likely to be deep QSB in the wallet.

"Small spark gaps can indeed be placed between the screen voltage pin (pin 1) and earth, and may give some measure of protection. However, the spark gap has several disadvantages in this application. The inevitable manufacturing tolerances mean that the striking voltage can in some cases be ±75 per cent of nominal, and this voltage also has a marked temperature coefficient. Because the manner in which the spark gap works is statistical in nature, there is a random variation in striking voltage for successive operations; there is also usually some difference between the striking and the sustaining voltage. A discussion of this subject can be found in *Transient Voltage Suppressor Manual* published by General Electric (USA) and available from Jermyn Distribution.

"A much better way to protect the valve and its base is to use a voltage dependent resistor (vdr). For this application, the best form of vdr would seem to be the zinc oxide devices "GE-MOV II", manufactured by General Electric (USA): the current ratings and response times of these components are excellent and they are also not expensive. For a typical 4CX250B amplifier with 350V on its screen grid in Class AB1, the V275LA40B offers excellent protection, with a Vmin of 389V and a Vnom at 1mA of 430V. With this component the maximum voltage appearing at the valve in the event of a flash-over is unlikely to exceed about 650V even under the most severe flash-over conditions, and both valve and base are fully protected.

"These devices will handle enormous current for the relatively short duration of the event. They are about the size of a 1nF 3kV ceramic capacitor and can be connected directly between the screen pin on the valve base and earth, with lead lengths suitably short. I have recently, in the cause of science, deliberately induced a series of flash-overs in a 144MHz amplifier using a pair of 4CX250R valves and am satisfied that the vdr devices function excellently. Even with the aid of a very fast oscilloscope, no excessive voltages can be detected at the screen grid: emphatically not the case when the devices are removed!

"Incidentally, I believe that the vast majority of amplifier designs using this series of valves, which feature a low-value series resistor in the screen-grid feed, are positively inviting disasters in the event of flash-over, but that is another story."

I feel that it is worth adding that these metal oxide varistor transient suppressors, to which attention was drawn in *TT* as long ago as December 1972/February 1973, have many other applications, such as the elimination of mains surges, switch-on transients etc. They were originally developed in Japan by Mashushita who called them zinc oxide non-linear resistors (znr). They act as very high resistors when normal low voltages are applied across them, but once the voltage exceeds a critical value they become virtually conductors, behaving as back-to-back zener diodes and sometimes capable of passing currents of hundreds of amperes for brief periods. Devices are manufactured suitable for direct connection across 110V or 240V ac mains; among many possible applications in power supply units they can simply be connected across the secondary of a power transformer or used to protect the pass-transistor of a series regulator: Fig 11. Another use is to protect transistor output stages in audio output stages.

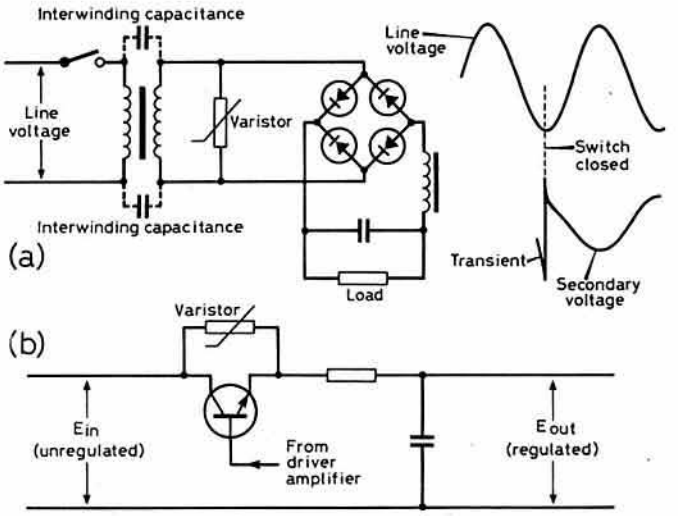


Fig 11. Applications of the metal oxide varistor transient suppressor. (a) Elimination of switching transients on power step-down transformer by connecting varistor directly across secondary winding. (b) Varistor protecting a pass-transistor in a psu from switch-on transients. Varistors can also be used to protect audio output stages etc as well as for G4FRX's application to flash-over protection

Metal oxide varistors should not be confused with another form of protective device, the ptc thermistor which has a very pronounced positive temperature coefficient and can be used to provide current overload protection in applications where very quick action is not required (*TT* March 1981, p236) such as current protection of relays, loudspeakers, meters etc, or in ptc devices with very low initial resistance directly in power supply units intended to deliver up to about 1·9A. A range of ptc thermistors is made by Siemens. They can also be used for temperature stabilization of crystal oscillators.

The frequency-modulation paradox

In the February *TT* (pp114–5), under the heading "FM, nbfm and the spectrum", I wrote: "Communication theory tells us that we can exchange bandwidth for snr and hence transmitter power, which is why, for direct broadcasting from satellite, the video signal will be transmitted as wide-deviation fm in 27MHz channels with 100 to 200W peak output doing the work of an a.m. transmitter of about 10kW or so."

Yet, as readers have pointed out, in the July *TT* I stressed that, in amateur practice, weak signal reception is more effective, and a better snr achieved, by narrowing the bandwidth of the receiver. That is to say, snr of most amateur signals is inversely proportional to noise bandwidth. So why widen the tv signals from 8MHz channels and vestigial sideband transmission to 27MHz fm?

This apparent contradiction has puzzled some readers. Surely, they suggest, it is well-established that ssb and even a.m. packs a greater punch than fm. This curious paradox stems from the fact that, as amateurs, we are more accustomed to *narrow-band fm* than to broadcast-type wide-deviation fm which has a maximum deviation of ±75kHz for an audio baseband (monophonic) of about 15kHz and occupies roughly 2(75 + 15) which is 180kHz with 200kHz or more channelling.

For an fm signal the *modulation index* represents maximum frequency deviation divided by the baseband. Amateur nbfm has a modulation index of around unity (eg ±5kHz deviation, 3kHz baseband) whereas broadcast fm usually has a modulation index of about five.

It is with wide-deviation fm that one can achieve what is usually called "the fm improvement" which, on reasonably strong signals, provides a post-discriminator snr equivalent to that provided by about a 23dB increase of the carrier power of a double-sideband a.m. broadcast signal occupying, say, 30kHz of spectrum. For speech communications (3kHz baseband) a modulation index of five represents a maximum carrier deviation of ±15kHz and a spectrum bandwidth of (for significant sidebands) of 2(3 + 15), ie 36kHz. Taking into account frequency drift of receivers, this implies 50kHz channelling (100kHz in some of the older systems). With a very stable receiver we could reduce i.f. bandwidth to, say, 40kHz, but such transmissions would not be popular on, say, 144MHz! Furthermore, range would not be improved to anything like the extent you might expect from the large "fm improvement". This is because the type of fm detection we use in our receivers falls to pieces on weak signals due to the high "threshold", often anywhere below a carrier-to-noise ratio of around 12–15dB.

Thus the question of overall communications efficiency of different modes of transmission is quite a complex matter, and one must take into account the way the receiver responds to "noise" which, in the main, is random amplitude-modulated transients. The fm improvement stems partly from the fact that the modulation content is conveyed as a frequency

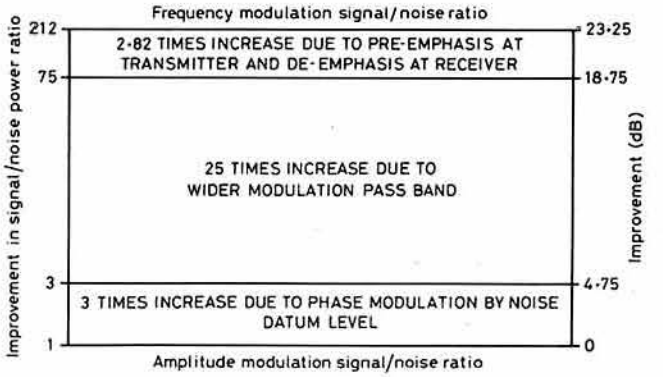


Fig 12. The signal-to-noise ratio improvement of wide-deviation (modulation index 5) over a.m. broadcast signals

deviation, so that a modulation index above unity is akin to distortionless over-modulation of an a.m.-type signal with the sideband power much greater than carrier power.

In the second place, a large reduction in noise output from the receiver on a strong fm signal stems from the fact that most "noise" is an amplitude change and can quite easily be separated from the frequency-modulated carrier by the amplitude limiters that are inherent in an fm receiver. Acting on a broadband signal in which the pulses have not been heightened by the action of a narrow i.f. passband, they can be very much more effective than the type of noise limiters found in communications receivers. As long as the peak carrier of an fm signal exceeds the peak noise, fm reception produces about 4·75dB less aural noise output than a.m.

Fig 12 shows the "fm improvement" in terms of how the snr of an fm receiver output compares with a double-sideband a.m. broadcast system. But it is important to remember that this type of power gain is not obtained with nbfm, although it is feasible on the microwave bands provided that this is not ruled out by licence conditions.

When considering communications applications it is necessary to take into account such matters as spectral efficiency, whether the system is expected to be noise-limited or interference-limited, the form of receiver *demodulation* as well as the transmitted modulation.

Table 1—Comparison of amateur nbfm and ssb parameters

	SSB	NBFM
Bandwidth	3kHz	16kHz
Transceiver complexity	More complex	Less complex
Weak-signal performance	Good	Poor
Threshold effect	No	Yes
Capture effect	No	Yes
Audio quality	Fair	Good

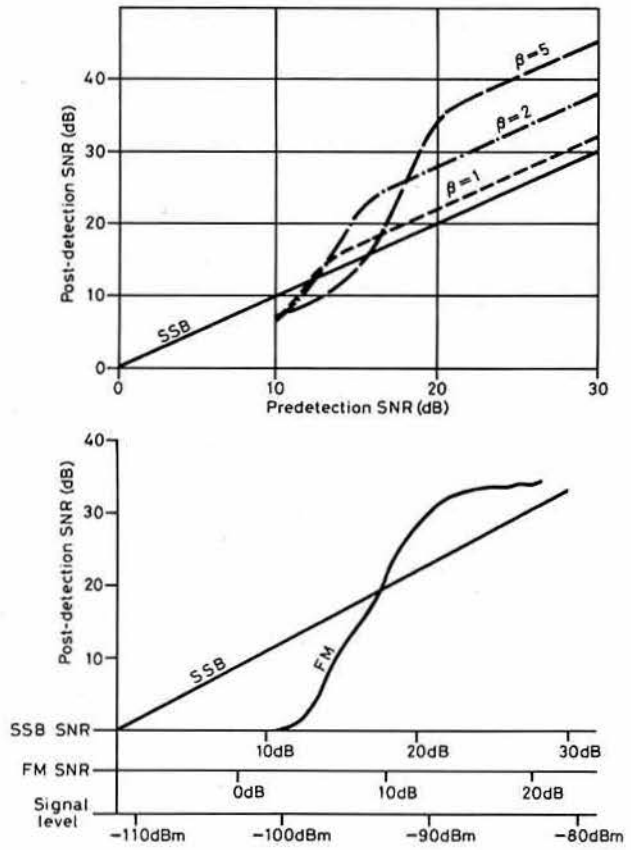


Fig 13. SNR curves for fm with several modulation indexes based on theoretical analysis. The linear ssb curve is shown for comparison. (b) Data measured by KB0CY for 28MHz nbfm on the TS430S multimode transceiver

Some of these matters are touched upon in a recent article by Robert A Witte, KB0CY, "A close look at frequency modulation" *QST* September 1985, pp31-6, from which come Table 1 and Fig 13. KB0CY stresses that in weak signal areas nbfm is appreciably less effective than ssb, and that hf propagation, because of frequency-selective fading, can introduce phase-related distortion on the broader fm signals.

Communications theory

For those who would wish to delve deeper into the complex question of the effectiveness of different modulation/demodulation systems in different conditions, it is worth pointing out that digitally-coded speech or data transmissions can take even more advantage of extra bandwidth than wide-deviation fm. Coded transmissions (remember that the morse code is basically a non-return-to-zero binary digital system) offer the opportunity to overcome a number of the impairments that affect analogue transmission, and also make it possible to have error detection and correction as very powerful weapons against fading and interference. It is interesting to note that consideration is being given to using a 32kb/s digital system (100kHz channels) for such purposes as cordless telephones using what is termed "continuously variable slope delta modulation" (cvsdm) transmitted using a modulation method such as tamed frequency modulation (tfm) or filtered fsk. Amateurs do not seem yet to have seriously tackled digital speech/data systems, though it seems increasingly likely that such techniques will be widely used by professionals on uhf and microwaves. Some interesting ideas and many useful references can be found in a recent special issue of *IEE Proceedings F* devoted to "Land Mobile Radio" (Vol 132, Part F, No 5, August 1985). Digital bit rates of 16kb/s are already being widely used for military "secure" speech/data systems.

All such systems have been developed as a result of the growing awareness of basic communication theory. The elements of this theory stretch back to 1924 when Nyquist first showed that the number of discrete pulses (for example, morse dits) that can be sent over a channel of finite bandwidth is directly proportional to its bandwidth in Hertz and cannot exceed twice this figure. Later R V Hartley (of Hartley oscillator fame) developed this finding to include the effect of the restricted ability of a receiver to estimate the amplitude of transmitted pulses; in an amplitude-limited channel this puts a limitation on the amount of data per second that can be accurately communicated. In 1948 Shannon, of Bell Telephone Laboratories, concluded that in a noisy channel of restricted bandwidth and limited signal amplitude, it is always theoretically possible to communicate information with arbitrarily high accuracy by using signals of sufficiently long duration—a fact that should be known by experience to every cw operator: *slow down* when the going gets tough!

Shannon's work, however, did far more than just confirm what we have, or should have, found out for ourselves. For the first time it became possible to achieve a deeper insight into all possible modes aimed at permitting the transfer of information and to determine the extent to which practical modulation/demodulation systems fall short of the theoretical ideal. Shannon, in other words, was the Einstein of communications! In effect, Shannon showed for the first time that increased bandwidth could, *for a given rate of information exchange*, provide an improved signal-to-noise ratio.

By applying Shannon's theory it can be shown that systems in which the information is "coded" (such as pulse-code-modulation, delta modulation etc, or even morse coded) require more bandwidth but less transmission power than would be required to achieve a similar accuracy for non-coded systems (such as analogue speech) at the same rate of information exchange. That is to say, bandwidth can be exchanged for transmitter power. Thus systems that spread the information over more of the spectrum, such as wide-deviation fm or pcm, can use less power than where the spectrum bandwidth is less than, or equal to, double the baseband as with a.m./dsbsc/ssb. By similar reasoning it can be shown that with suitable forms of demodulation dsbsc would be *more* efficient than ssb—but that is another story.

All communication systems, in accordance with Shannon's theory, can reduce the minimum usable snr either by reducing the information rate or by increasing the bandwidth actually used at a given information rate. This is why, for example, multi-tone teleprinter systems, such as Piccolo, which involves integrating the signalling tones over a period, can provide "clean" copy without Amtor-type error correction even on very weak signals. Conversely, by reducing the overall signalling rate in an extremely narrow bandwidth, cw can be reliably transmitted over the very long eme paths. On shorter paths, very slow cw can be reliably transmitted in the absence of interference, with miniscule power of a few milliwatts.

Those disposable syringes again

In the October *TT* it was emphasized that disposable medical syringes of the type widely used by doctors and dentists can present serious health hazards once they have been used, and that there are more economical means of making open wire spreaders than attempting to buy new syringes.

However, Dick Pascoe, G0BPS, The Anchorage, 3 Limes Road, Folkestone, Kent CT19 4AU, writes to point out that he could supply (to *bona fide* radio amateurs only) "out-of-date" stock that has not been used.

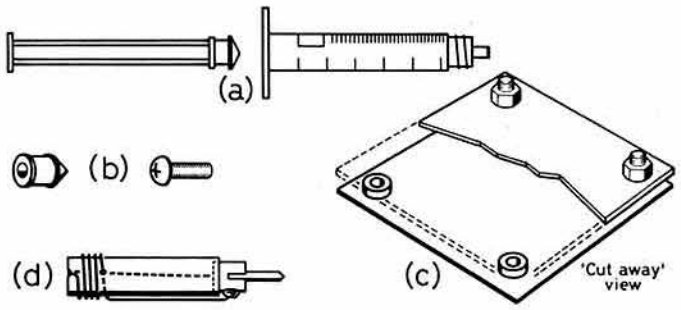


Fig 14. (a) Disposable plastic syringe. (b) Neoprene insert from the end of the plunger and how a No 6 machine screw can be used to make rubber equipment feet. These inserts can also be used to mount a circuit board, transformer etc to chassis as shown in (c). The syringe barrel makes a good coil former. (d) How W5MY fashioned a plug-in coil for a gdo using a piece of the tubing and a phono plug

He believes that it would be possible for him to obtain and supply large quantities of these from about £5 per 100. If you are interested drop him a line, though we still have no information on the rf properties of the plastics or how they stand up to uv radiation etc.

However, by coincidence, I recently came across some suggestions for other uses of these disposable syringes (*QST* January 1985, p40). George B Bean, W5MY, provided an illustration showing details of disposable plastic syringes and wrote: "The neoprene inserts on the end of the plunger can be used as grommets to protect wires going through a hole in a metal chassis if you cut a hole in the tip. They also make excellent rubber feet for equipment or shock mounts for circuit boards, transformers, relays, blowers or other sources of hum and vibration.

"Fig 14 (b) shows one of these inserts. The head of a No 6 screw is just the right size for a snug fit into the insert. These can be fastened to the bottom of a project case to serve as feet. Secure the screw with a lock washer and nut. To use the insert as an insulated shock mount, drill a 0·25in hole in the chassis, then insert the grommet into that hole, add a No 6 machine screw and attach the circuit board or other device. Fig 14 (c) illustrates this technique. You may want to use a nut and lock washer above and below the board for extra security.

"I have also found that the barrel of the syringe makes a nice coil form. If you use a sharp knife to cut off a section of the tube, it will fit nicely over the outside of a phone plug. I have made plug-in coils for my gdo using this method. Fig 14 (d) shows an example of how that is done."

Dr Maurice Sasson, W2JAJ, came up with another use: "Cooling fans can be oiled very easily without removing them from the chassis, or even removing the covers, if they are in an accessible position. I use a 3ml (3cc) syringe and a long metal needle.

"Needles that fit on the hub of a syringe are available in many bore sizes and in lengths from 1 to 6in in increments of 0·5 or 0·75in. The necessary size depends on the physical structure of the equipment. Measure from the area of the motor to a convenient height that allows freedom of operation. These needles are flexible enough to bend slightly for various working angles.

"Filled with a few millilitres of very light machine oil, the needle can be placed right on the motor shaft, keeping the bevel towards the motor and applying gentle pressure on the plunger until an adequate amount of oil has been 'injected'."

I recall that, several years ago, *TT* included a number of items showing how useful hypodermic needles can be as a soldering aid etc. At the time, several readers warned against attempting to acquire needles *after* they have been used. I can only repeat the warning.

Tips and topics

Peter Delaney, G8KZG, commenting on the August *TT* item on the difference between an rccb (residual current circuit breaker) and an mcb (miniature contact breaker) notes that RS Components do in fact market combined rccb/mcb devices, apparently made by GEC, that protect against earth-leakage (trip at 30mA in 30ms) and also provides short-circuit protection (mcb rated at 6, 10, 16, 25 or 32A). But he warns that these are not particularly cheap and are also not intended for fitting into plug tops.

John Haydon, G3BLP, raises the question of whether the action of an rccb when tripping can itself create a transient voltage spike capable of damaging, for example, the psu of an hf transceiver. In his case it appears that the rccb was tripped as the result of a nearby lightning strike, but that damage to his Icom psu resulted not from the lightning emp but from the tripping of the rccb, if I have understood his letter correctly. Certainly the problem of destructive mains transients on a wide range of solidstate equipment (including domestic tv sets) can be a difficult one. Varistor-type transient protectors are claimed to prevent this type of damage, but it is seldom that one comes across consumer-type equipment fitted with such a device. □

DESIGNING EMITTER FOLLOWERS

(Continued from page 935)

expressions for C_{in} and R_{in} are reached). For use once only there is no need to set up any of the program from line 1000 onwards, but for tackling a lot of calculations this extra part will prove worthwhile.

Appendix A

With R_L ac coupled via a capacitor, the greatest possible negative peak voltage output occurs when I_E is suddenly cut off so that the bias voltage V_E stored on the capacitor is shared by resistors R_E and R_L. The output V_N is the partial voltage across R_L which is:

$$V_N = V_E R_L/(R_E+R_L) \quad \text{See Fig 3(b)} \quad (1)$$

Also, when the signal is at the other extreme, ie positive:

$$V_P = V_{CC}-V_S-V_E \quad \text{See Fig 3(c)} \quad (2)$$

The quantities V_N, V_P and R_L are already specified by the design requirements. V_s can be chosen above an unavoidable minimum. It is not obvious from (1) and (2) how we may choose V_{CC}, V_E and R_E, but with some rearrangement:

$$K = R_E/R_L \quad (3)$$
$$V_E = V_N(1+R_E/R_L) = V_N(1+K) \quad (4)$$
$$I_E = V_E/R_E = V_N(1+K)/R_L \quad (5)$$
$$V_{CC} = V_P + V_E + V_S = V_P + V_S + V_N(1+K) \quad (6)$$

These minimum values are plotted in Fig 4, which makes much clearer how one can trade one decision against another by choosing the resistance R_E to set the ratio $K = R_E/R_L$.

Appendix B

Using the circuit model of Fig 10.

Voltage gain

$$M = V_2/E_1 = V_2/(V_1+V_2) = Z_2(I_1+GV_1)/[V_1+(I_1+GV_1)Z_2] \quad (7)$$
$$V_1 = I_1Z_1 \; ; \; Y_1 = (1/R_1)+jwC_1 \; ; \; Y_2 = (1/R_2)+jwC_2 \quad (8)$$
$$M = (Y_1+G)/(Y_1+Y_2+G) = [(G_1+G)+jwC_1]/[(G_1+G_2+G)+jw(C_1+C_2)] \quad (9)$$
$$\text{M magnitude} = \sqrt{[(G_1+G)^2+(wC_1)^2]/[(G_1+G_2+G)^2+w^2(C_1+C_2)^2]} \quad (10)$$

Input admittance

$$Y_{in} = 1/Z_{in} = I_1/E_1 = (E_1-V_2)Y_1/E_1 = Y_1(1-M) \quad (11)$$
$$Y_{in} = (1/R_{in})+jwC_{in} = Y_1Y_2/(Y_1+Y_2+G) \quad (12)$$
$$Y_{in} = [(G_1G_2-w^2C_1C_2)+jw(C_1G_2+C_2G_1)]/[(G_1+G_2+G)+jw(C_1+C_2)] \quad (13)$$

Critical frequency

(at which R_{in} rises to infinity and returns from minus infinity)

$$f_{crit} = 1/[2\pi\sqrt{T_1T_2-(T_1+T_2)T_3}] \quad (14)$$
where $T_1 = C_1R_1$, $T_2 = C_2R_2$, $T_3 = (C_1+C_2)/(G_1+G_2+G)$ (15)
also $f_{beta} = 1/[2\pi T_1]$ and we may define $f_E = 1/[2\pi T_2]$ (16)

The quantity f_E is that at which the emitter circuit impedance falls by 3dB below its dc value. (R_2 is R_E and R_L in parallel and C_2 is the total capacitance across the output.)

If $G >> (G_1+G_2)$ then a useful approximation is:

$$f_{crit} = 1/[2\pi\sqrt{T_1T_2}] = \sqrt{f_E f_{beta}} \quad (17)$$

This rough estimate of f_{crit} seems to hold well if the answer is not too many times larger than f_{beta}, ie if C_2R_2 is a significant time constant.

Appendix C

For the bipolar predictions the parameters $R_1 = h_{ie}$ and $G = g_m$ were established in a separate dc test, and $C_1 = C_{bc}$ was deduced indirectly from a measurement of h_{fe} at 200MHz. In normal design one would not go to that trouble but use estimates as follows:

$$G = g_m = 40\,I_E \ldots\ldots \text{result in ms (milli-Siemens) if } I_E \text{ in mA} \quad (18)$$
$$R_1 = h_{ie} = h_{fe}/g_m \quad (19)$$
$$f_{beta} = f_T/h_{fe} \text{ and } C_1 = C_{bc} = 1/(2\pi R_1 f_{beta}) \quad (20)$$

A fet will have a gate-source resistance that is unknown but very high. In a program it can be set to, say, 1E9 to serve as infinity (some machines insist on the format 1E+9 by the way). The fet values $C_1 = C_{gs}$ and $G = g_m$ will normally be a lot less than the corresponding bipolar figures and the most obvious results are a much higher input resistance, but a much lower frequency at which it becomes negative. The voltage gain is also noticeably lower. □

Microwaves

*by Mike Dixon, G3PFR**

Season's greetings

Already it is almost the end of the year, and the time has come once again to wish the readers of and contributors to this column the appropriate season's greetings. May the coming festive season be a happy and prosperous one for all concerned. Along with these wishes goes the hope that the coming year will bring success in whatever aspirations readers have for their endeavours in their chosen hobby, for despite the gloomy prognostications of some, amateur radio still remains one of the finest hobbies available to the individual.

Perhaps one of the objectives for 1986 might be a resolve to encourage and help others who would aspire to successful microwave operation: there is much space available and techniques are becoming easier and less expensive all the time. The microwave field offers a challenge to ingenuity and operating skills which is not really offered anywhere else in this amazingly diverse hobby, and the challenge grows with the years rather than diminishes!

Go to it with renewed vigour, and may your efforts be amply rewarded!

Operating news

Last month I expressed the hope that there might be some reports of successes resulting from the brief period of improved conditions around 9 to 12 September. Since then I have spent a considerable length of time away in Italy (on business!) and although cut off from amateur radio have had ample opportunity to see (literally) the effects—both in duration and extent—of extensive tropo-lift conditions on uhf television. Apart from the three national television channels in Italy, there exist upwards of 40 private, commercial channels in use in and around the major cities. Many of these are low-powered stations giving what is essentially a "community" coverage. Over the last three weeks in the Rome area the reception conditions have been somewhat chaotic, with the so-called local stations coming in, one on top of another, from ranges of several hundred kilometres and from France and Spain as well! My guess, looking at the broader European weather situation, was that widespread openings must have occurred at vhf, uhf and microwave frequencies.

And so it turned out to be: arriving home to correspondence and typical autumnal weather confirmed that there had, indeed, been some quite remarkable dx worked!

First from Adrian, G8PSF (Enfield), reporting on 1·3GHz activities using 4W to his 1·5m dish, comes the remark: "Those lucky EA QSOs were not for me: it was mostly going overhead at this QTH". Never-the-less, with his 4W to a 1·5m dish, Adrian managed to work F1FYE/P, HB9AMH/P and DL2KAL in the space of 15min on 13 October. He went on to say: "I couldn't operate for too long on the 13th, but I gather—popping in and out of the shack—that a lot of good dx was bagged by the northern lads and the GIs. Well done chaps!" His final report was to the effect that his 3·4GHz project, started some time ago, is proceeding at a snail's pace, although he hopes to be QRV early in 1986.

Ian, G8IFT (Birmingham), reported that on 1·3GHz on 13 October he worked HB9AMH/P (JN37, QRB 877km), F6ECI (JN05, 828km), F1BUU (IN94, 846km) and EA1BLA (IN53, 1,090km). In the first 1,296MHz Cumulative on 16 October, he worked SM6HYG (JO58, 1,094km), all using 150W to 4 × 23 element antennas. Just after the end of the cumulative, Ian worked Karl again, this time on 2·3GHz using a mere 250mW to a single 44-element quad-loop Yagi: Ian had only been QRV for two days, and has so far worked "only eight different stations. GB3NWK has been heard at times also".

Geoff, GJ41CD, said: "What a great opening down here from 10 to 14 October: it all started on the evening of 10 October when EA1BLA was worked on both 432 and 1,296, the latter a 'first'." Friday 11 October yielded various dx calls in HB, OE and F on both 144 and 432MHz, bringing Geoff's 144MHz squares score to 239 and his 432MHz count to 117, although there seemed to be comparatively little activity on 1,296MHz. The following day yielded F1GXB and F6BSJ for two new squares on 1·3GHz, while on 13 October conditions enabled Geoff to work no less than 19 countries on 432MHz and to hear UB5 and UR2 on 144MHz. So what was happening on 1·3GHz? No less than 16 new squares including five West German stations, one East German station (for yet another first, GJ to Y23), four French stations, three Dutch, one Belgian, one Spanish and one British station, bringing Geoff's total of squares worked to 69! One which "got away" was GI4OPH: the two stations worked on 432MHz but failed to make it on 1·3GHz. A phone call from GI4OPH the following day explained why the contact had not worked: his rotator was 180° out! For the record, G4KIY is still in the lead on 1·3GHz with 70 squares confirmed.

Keith, G6NVC (Canvey Island), sent a report of his activities during this year's 10GHz cumulatives, operating in April, May, June and September from a site at Beachy Head. He reported activity as being higher than he had previously experienced, with no less than 13 contacts in the September event. Many of the well-known exponents of 10GHz wideband figure in his contact list which totalled 29 for the four events. His best dx during the cumulative was 105km, but a special journey to Mynydd Prescelli yielded Keith's first contact over 150km—to G8BJG/P and G8CIU/P, both near Okehampton in Devon. Keith reported signals between S7 and S9 resulting from their sked. He was also delighted that Tom, G8DPB, a "white-stick" operator was able to be with him and also worked the path "after waiting for some seven years to make such a contact". All stations were using 15mW to 18in dishes and nominal 100MHz i.fs. Keith added his thanks to Tom "for his endless help and encouragement", and to Chris, G8CIU, "who has been out many times to test my gear by providing signals from different sites". Such is the spirit of amateur radio!

Jack, G5UM (microwave awards manager), sent the following report on recent awards resulting from claims submitted for the microwave bands:Gordon, G8PNN (Morpeth), has attained his 50 Squares worked on 1·3GHz, only the third such award. (Nos 1 and 2 are held, respectively, by G4KIY and G4LRT). Keith, G6DER (Barnsley), after considerable success on 1·3GHz has turned some of his attention to 2·3GHz and has received his Five Squares Award (No 9 in Jack's register). Albert, GIHGJ (Killingworth), a comparatively recent operator on 1·3GHz, has received the 20 squares sticker (No 22). Many thanks for the information, Jack, and welcome back after a short absence "in dock".

From another publication

The most recent issue of *DUBUS* contained several items of interest to microwave operators and constructors. The second part of the article on the dual-band transceiver (mentioned here recently) concentrates on the preamp, mixer, transmit driver, noise-blanker and i.f. preamp, which are the "heart" of the whole design and largely determine the eventual performance. Other articles cover a phasing/combining harness for an array of 8 × 23-element Yagis by F6DZK/F1ETI and a 1·3GHz (GaAsfet) transverter by OE9PMJ. This is claimed to give up to 700mW output for 50mW to 2W (adjustable) input at 144MHz, and exhibiting spurious rejection typically 50dB with an overall noise figure of 3·2dB.

Microwave Committee news

Steve Davies, G4KNZ, has recently resigned from committee membership, having emigrated to New Zealand. Over the past several years Steve has played a significant part in Society activities, not only as an active 10 and 24GHz operator, but also as one of the former joint editors of the *Microwave Newsletter*, as the organizer-in-chief of the committee's exhibition stand, and as the organizer of the microwave component service. Alternative arrangements are being made to support the last two activities, and Steve's efforts will be sadly missed in both areas. I feel sure that you will wish to join me in thanking Steve for his efforts and to wish him well in his new life, literally at the other end of the earth! He has agreed to continue his connections with the committee as a corresponding member, the first that we will have in IARU Region 3. I am sure that Steve has every intention of continuing with his microwave work in New Zealand, and it will be most interesting to have news of the scene in the Antipodes once he has settled into what will be a very different environment from the UK.

At the same time I would like to welcome Sam Jewell, G4DDK, as a new member of the committee. Sam's interest in microwaves has extended over a number of bands and for a number of years, so he will be bringing valuable experience to the committee. Professionally engaged in the telecommunications industry, Sam was largely instrumental in fostering my own interest in microwaves, and I can vouch for the fact that he is a good "teacher" and is the author of several technical items in other publications: he is also an inveterate constructor!

The administrative aspects of microwave beacons were mentioned last month as being handled via RSGB HQ. These aspects will in future be handled by Ms Heather Norman, although correspondence should be addressed, in the first instance, to the general manager. □

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

QRP

*by Rev George Dobbs, G3RJV**

Try QRP in the 1985 Winter Sports

From time to time people have simple little ideas which take off to become minor brainwaves. One such idea occurred when Chris Page, G4BUE, suggested the first G QRP Club Winter Sports. The G QRP Club has always run activity periods during which members are encouraged to make as many two-way QRP contacts as possible at set times on specified bands. This developed into earmarking certain weekends during each year as activity weekends, and to these was added the annual Winter Sports. The period after Christmas, from Boxing Day to New Year's Day, is declared an activity period with set times and frequencies for two-way QRP communication. Many of those who have taken part in the Winter Sports claim it to be the best amateur radio event of the year.

The event is informal. It is not a contest. Participants are asked to use a power not exceeding 5W rf output or 3W dc input, and to call "CQ QRP" or listen for that call. There are no number groups to exchange, although G QRP Club members usually exchange their club membership numbers. The exchanges are never the usual contest type "5NN", but more usually exchanges concerning equipment and antenna types and appropriate seasonal greetings. A pleasant way to spend some of the Christmas holiday period.

Although the event is not designed to be competitive, there is an annual award called the G4DQP Trophy. This is not necessarily given to the station which works the most other QRP stations, but to the person who is thought to have contributed most towards the success of the event. Participants are invited to send logs of the event and comments to A D Taylor, G8PG, 37 Pickerill Road, Greasby, Merseyside L49 3ND.

So if you are an experienced QRP operator, or just want to try using low power, why not join us in the 1985 Winter Sports? The plan for times and frequencies is given below. This is designed so that QRP stations will be able to find each other over the event. More seasoned operators do not stick doggedly to this plan. If a particular band in the plan is not active, move down in frequencies until activity is found. The frequencies are the international QRP calling channels, and these are really a starting point for frequency location, with stations moving higher or lower according to QRM and band occupancy. During the Winter Sports it is sometimes difficult to find space near these frequencies because of the number of QRP stations at work.

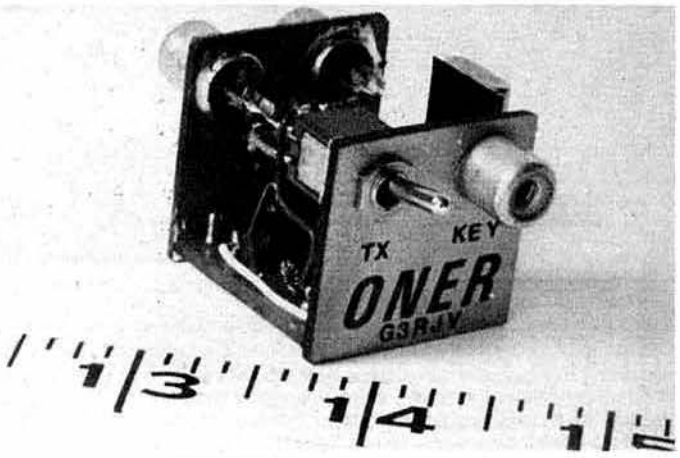
The 1985 (CW) Winter Sports
26 December 1985 to 1 January 1986.
The times (gmt) and cw QRG are:

Time	Frequencies	Time	Frequencies
0900-1100	14,060/21,060/28,060	1700-1900	3,560/7,030
1100-1300	3,560/7,030	1900-2100	14,060
1300-1400	10,106	2100,2300	3,560/7,030
1400-1700	14,060/21,060/28,060		

A new miniature QRP transmitter

Readers of *SPRAT*, the journal of the G QRP Club, and readers of this column have come to know some of the circuits from George Burt, GM3OXX, for simple transmitters for hf band working. The OXO transmitter, a simple and compact vxo-controlled transmitter for any band from 3·5 to 14MHz may well be the most commonly-built low-power transmitter in amateur radio history. If not, the chief rival would be another little circuit by GM3OXX, the STX transmitter. These basic circuits have come to be known as "fun rigs", simple, cheap yet effective projects which the inexperienced amateur constructor can build and have viable contacts when used alongside an existing station receiver. For many radio amateurs these circuits have been their first introduction to home-construction of amateur radio equipment and the satisfaction of making radio contacts with homemade low-power transmitters.

Now GM3OXX has come along with yet another fun rig. The ONER is a complete QRP transmitter built onto a 1in square printed circuit board. The circuit is a variable-frequency crystal oscillator, using the small E-line high-current transistor ZTX651. The oscillator is directly coupled into a vmos power amplifier stage, keyed via a dc switching stage. Although the board is small it is not cramped, and with a suitable low-pass filter and crystal the transmitter can be used on amateur bands from 3·5 to 14MHz, although there is some tailing off in output power above about 10MHz.



The ONER transmitter by GM3OXX

When I visited GM3OXX in the autumn he presented me with a completed ONER board to which I added transmit/receive switching and appropriate sockets and have used it for many excursions on 3,560kHz. The appearance of my completed ONER is shown in the photograph. The little board gives something over 2W of rf out on 3·5MHz, and I have had many good UK and European QSOs. The only problem I have is that the unit is so light and small I have to hold it down on the bench with a blob of Blutack!

The ONER transmitter will be the feature article in the next issue of *SPRAT*, complete with layout and charts of suitable filters. The G QRP Club is also to sell printed circuit boards and complete kits for this little transmitter board. The transmitter is so simple and inexpensive that there is no longer any excuse for not being able to build an item of amateur equipment or try QRP on the hf bands. And the ONER does work. Everytime I have taken it onto 3·5MHz I have worked one or more members of the QRP Club in two-way QRP QSOs. It seems to attract two-way QRP contacts.

The QRP Quarterly

This is the journal of the American QRP ARCI, the main QRP group in the USA. I was sorry to hear that Fred Bonavita, W5QJM, has to tender his resignation as the editor. Under Fred's guidance the *QRP Quarterly* has become a very worthy journal that I eagerly await receiving; full of interesting news and circuitry. Those interested in joining the QRP ARCI should write to the secretary: William K Harding, K4AHK, 10923 Carters Oak Way, Burke, Virginia 22015 USA.

The Hot Water Handbook

Fred Bonavita has recently issued a privately-produced book which will be of interest to the many owners of the Heath HW8 transceiver: *The Hot Water Handbook—HW8 Recipes*, by Fred Bonavita, W5QJM. Like its forerunner, the HW7, the HW8 is a much-modified little rig. Very few seem to exist that do not have one or more modifications. Over the years several major articles have appeared on HW8 modification, the major one being "Converting the HW8 into a Super Contest Machine" by Adrian Weiss, W0RSP. There have also been very many smaller articles on simple modifications for this transceiver in various magazines and journals. What Fred has done here is to gather together as many of these smaller modifications as he could find and put them under one cover. The book contains a total of 34 modifications for the HW8, none of which is outside the scope of the average amateur.

The range of modifications is extensive, and few HW8 owners could fail to profit from reading this little book. The HW8 is now becoming available at reasonable prices on the secondhand market, and this book would soup up even the most battered old HW8. The book is available directly from W5QJM: Fred Bonavita, PO Box 12072, Capitol Station, Austin, Texas 78711, USA. It costs $6 surface mail and $7 by airmail.

Copies of the series of articles on the HW8 by Adrian Weiss, W0RSP, which originally appeared in *CQ* magazine, are still available from the author for $7, proceeds going towards the Milliwatt DXCC programme. This price does not include postage. Adrian Weiss, W0RSP, 833 Duke St #83, Vermillion, SD 57069, USA. □

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EPHEMERIS

Satellite news and views

*by R. O. Phillips, G4IQQ**

Oscar 10

There has been considerable activity associated with the satellite during recent months, so much so that additional changes have been made to the operating schedule at short notice. The schedule published in *Ephemeris* November 1985 was altered to allow a longer off-period; in fact two off-periods were introduced—MA 204 to 239 and MA 020 to 054. During these periods of poor solar illumination, it is essential to maintain very careful control over the state of the batteries and such short notice changes are to be expected. Much of the work in calculating the appropriate transponder schedules is carried out by Ian Ashley, ZL1AOX, in conjunction with Jim Miller, G3RUH. Ian has again stressed the importance of using the absolute minimum power when accessing the satellite.

As always, it is wise to monitor the bulletins on the general beacon of the Mode B transponder (145·810MHz) for the latest developments.

The usual presentation of the visibility for the satellite is indicated in Fig 1. Two quite useful periods of the month are evident, namely the first and third weeks, when the satellite will be in view for much of one of the two daily orbits. The maximum elevation achieved by the satellite in the south of England has now decreased to around 37°, this value being achieved around the 10th and 30th of the month. Reference values for the major orbital parameters are as follows:

Date	Time (gmt)	MA (256)	Argument of perigee	Orbit No
1 Dec	0315	0	65·4	1,859

The rather poor operating conditions for the northern hemisphere will continue for quite some months yet. It will take approximately three months for the argument of perigee to progress around to 90° (that is where the satellite apogee occurs at the most southerly point of around 26° S) at which time visibility will be at its worst in the UK, but very good for ZL1AOX.

Uosat

I will start first this month with Uosat 2 which has been receiving a great amount of attention from the project team at the University of Surrey. The introduction of a regular operating schedule for Uosat 2 has been long awaited, and as a result of the development of a sophisticated set of operating software for the satellite this is now possible. Obviously, if it is necessary to load in the schedule on a daily basis the amount of effort required is very high, particularly with two spacecraft to look after. Also this can lead to the need to be present at the command station at rather unsociable hours. The approach taken with the Uosat 2 operating software has been to develop a program which can be loaded into the on-board computer allowing essentially autonomous operation for a predetermined period of time. Simple or complex schedules may be loaded, and the operating status will be altered by reference to the on-board real-time clock. This arrangement should allow much greater flexibility in the operations of the satellite. There will be a number of additional features, including a bulletin service similar to that on Uosat 1, but with the possibility that several different bulletins could be stored on the satellite at one time and transmitted in sequence.

These developments represent a significant step forward to regular users of the satellite, and will leave the project team time to turn their attention to other activities, including the digital communications experiment (dce) and some work on a fully-automatic attitude-control algorithm.

There has also been further work on Uosat 1 in a number of areas. The programme director, Martin Sweeting, G3YJO, reports that the images produced by the CCD camera are now much improved on earlier results. This may be due to improvement in the performance of the device, or more likely, a better understanding of how to optimize the various parameters of the camera. Martin has also indicated that due to extensive use of home computers to decode telemetry from both satellites, it is proposed to change the Uosat 1 telemetry format to include full checksums to enable error detection to be carried out.

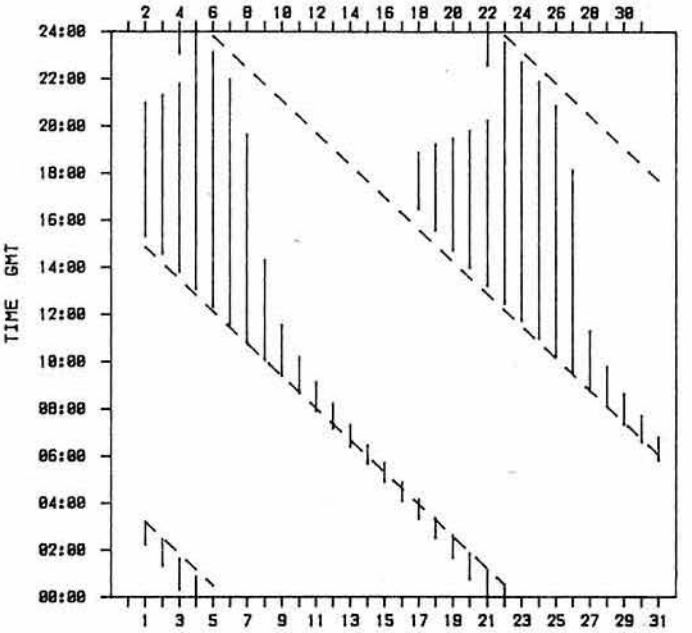

Fig 1 OSCAR 10 VISIBILITY (London area) - DECEMBER 1985

Amsat Phase 4

I mentioned last month some developments in the USA concerning the possibility of an amateur satellite package being carried on the advanced communications technology satellite (acts) currently under consideration by Nasa. Further work by W3GEY and WA2LQQ has identified a number of possibilities that might be carried on the geostationary satellite, which is due for launch in 1988. A Mode L linear transponder (similar to that on Oscar 10) is a strong contender along with a packet radio repeater. As the main purpose of the Nasa mission would be to demonstrate technology at 20/30GHz it would be necessary for Amsat to develop the full communications payload including the antenna(s).

Another possibility to provide an amateur satellite in geostationary orbit is to take advantage of the low-cost piggy-back system being developed by Arianespace. Such an arrangement would place an amateur payload into a geosynchronous transfer orbit, and a propulsion system would be required to circularize the orbit.

(*Note.* A geosynchronous orbit is one where the period of the satellite is exactly the same as that of the earth, ie one revolution every 23h 56min. The altitude for this type of orbit is about 35,800km. For such an orbit the satellite will pass over a particular point on the earth at the same time every day but may not always be visible from that point. In the case that the inclination angle of the geosynchronous orbit is zero, ie it lies in the plane of the equator, the orbit is known as a geostationary satellite orbit (gso). This type of orbit is very popular in commercial satellite systems, since the satellite appears at the same position in the sky and therefore provides continuous coverage within a defined area.)

RS satellites

The news in this area is not so good. It would appear that RS8 is now effectively dead due, not to battery failure, but to problems with the telecommand receiver. The RS5 battery is known to be past its best performance, but looked as though it might survive the further eclipse period in October. RS7 is the healthiest of the three, and both the transponder and the robot continue to give good service.

Turning to the future, work on RS9 and 10 has continued well, though RS9 is a little behind schedule. RS10 construction and testing is complete and final launch integration is underway for an anticipated launch in early 1986.

Other news

News from AMSAT-DL indicates that very good progress has been achieved in the development of the digital transponder to be flown on the Phase 3C satellite. The rudak (regenerative repeater for digital amateur

*Transvaal Cottage, New Barn Road, Swanley, Kent BR8 7PW.

radio communications) concept has now been successfully demonstrated using a prototype system and much of the necessary software has been written. An engineering model of the Mode L transponder has been built by DK5KQ, and there are plans to produce two flight models. It is anticipated that full details of the rudak system will be available well before launch to allow anyone interested in rudak operation to be ready. Finally, following the success of the satellite dxpedition to the Isle of Man earlier this year, Dave Rowan, G4CUO, and friends plan to repeat the event next year. Like this year, the operators of the station will not make contact with stations running excessive power. Dave has said that a number of such stations have sent QSL cards, but these have been returned with a polite note saying that the station concerned had not been operating in accordance with generally accepted standards and therefore no contact would be acknowledged. This would seem to be a very effective way to get the message across to offending stations. If they are not willing to reduce their power to a reasonable level then simply refuse to work them. Thought for the month! □

Computing

*by John Morris, GM4ANB**

BBC morse decode

August's computing contained a program for the BBC to decode cw tapped out on the shift key. Several readers have asked for more information on converting it to read from the analogue input port. The following works with a straight hand-key connected between pins 2 and 10 of the "analogue in" connector. First add a function to the program:

200 DEF FNkeydown
210 IF ADVAL (0) AND 2 THEN = TRUE ELSE = FALSE

Then replace all occurrences of "INKEY(-1)" in the main program by "FNkeydown".

This should also work with a tone decoder connected to pin 10 (pin 2 is earth), so long as the decoder output is low when the tone is present; ie when the key is down. If the decoder output is the other way up the "TRUE" and "FALSE" in line 210 must be reversed.

As always, take care when connecting other equipment to the computer. Inside the BBC, pin 10 is connected to a 6522 VIA chip, with a 10k pull-up to 5V. This is quite a robust device, but under no circumstances should its input be allowed to go negative or to exceed 5V with respect to pin 2.

The somewhat unusual construction of line 210 arises from the lack on the BBC of true Boolean operations; all logical operations operate instead in a bitwise manner. Thus if the key is down "ADVAL (0) AND 2" produces "2", which counts as TRUE on the BBC. However, applying NOT to this gives -3, which also counts as TRUE. Using the TRUE and FALSE keywords as shown circumvents the problem.

BBC cw keyboard

Program 1 is a simple cw keyboard for the BBC. The important procedure is in lines 1000 to 1100. This takes an Ascii character code and sends the corresponding morse character as an audio tone.

It uses two further procedures, which can be modified or re-written to suit other applications. PROCkydwn should take whatever action is necessary to put the transmitter key down, such as writing to an output port. In the listing it switches on a tone from the BBC's sound generator. The volume and tone can be changed by altering the second and third parameters respectively of the SOUND command in line 2000.

PROCkyup should do the reverse, causing the key to go back up. As shown, it flushes the sound queue, so stopping the tone.

To convert from Ascii to cw PROCsend uses a look-up table, "code", which is initialized in lines 20 to 60. Each character is coded by using a binary 1 for a dash and a 0 for a dot, but with the bits ordered backwards. An extra 1 bit at the high order end marks the end of the character. For example, consider the letter "F", di-di-dah-dit. This is first coded in binary as 0010. It is then reversed, giving 0100. An extra 1 is added at the high order end to mark the character length, giving 10100, or decimal 20. The rest of the alphabet and all of the digits are similarly coded in the DATA statements in lines 40 to 60.

To add more characters to the set, encode them as above, and insert the resulting values in the appropriate elements of array "code". To include a stroke, "/", start with the cw, dah-di-di-dah-dit, coded in binary as 10010. Reverse this and add a 1 at the start to give 101001, or decimal 41. Thus adding a line:

35 code(ASC("/")) = 41

will give the desired result. Other characters can be added in the same way, according to personal choice.

PROCsend works by first using the Ascii code to look up the corresponding cw pattern. If the code is zero then a space, consisting of a two dot-length gap is sent. Otherwise bits are successively examined, using the AND operator, to determine whether a dot or a dash should be sent, and then discarded by using DIV to shift the code right one bit. (On computers other than the BBC an equivalent for "cw DIV 2" is "INT(cw/2)".) After each dot or dash the key is put up for a single dot period.

This sequence is repeated until the code reaches 1, indicating that the entire character has been sent. A two-dot key-up delay (line 1090) completes the inter-character gap.

All timings are performed using the computer's internal clock. The length of a dot, in clock ticks, is assumed to be in variable dl. A cw dot is 1·2/wpm seconds long, and the BBC's clock runs at 100Hz, so giving the expression in line 70.

The main program, line 100, waits for characters from the keyboard and passes them to PROCsend. This can be adapted and expanded to suit the application. For example, a cw practice generator could use the random number generator to produce letter groups, while a "live" cw keyboard would echo the characters to the screen, include message stores, and so on.

Program 1

```
  10  DIM code(255)
  20  FOR j=ASC("A") TO ASC("Z"): READ code(j): NEXT
  30  FOR j=ASC("0") TO ASC("9"): READ code(j): NEXT
  40  DATA 6,17,21,9,2,20,11,16,4,30,13,18,7
  50  DATA 5,15,22,27,10,8,3,12,24,14,25,29,19
  60  DATA 63,62,60,56,48,32,33,35,39,47
  70  INPUT "Speed (wpm)";speed: dl=120/speed
 100  REPEAT: PROCsend(GET): UNTIL FALSE
1000 DEF PROCsend(c): LOCAL t,d,cw
1010  cw=code(c): IF cw(2 GOTO 1090
1020  REPEAT
1030    PROCkydwn: t=TIME
1040    IF cw AND 1 THEN d=dl*3 ELSE d=dl
1050    REPEAT UNTIL TIME-t)=d
1060    PROCkyup: t=TIME
1070    REPEAT UNTIL TIME-t)=dl
1080    cw=cw DIV 2: UNTIL cw(=1
1090  t=TIME: REPEAT UNTIL TIME-t)=dl*2
1100  ENDPROC
2000 DEF PROCkydwn: SOUND 1,-8,120,-1: ENDPROC
2010 DEF PROCkyup: SOUND 17,0,0,0: ENDPROC
```

Oddbits

Issue 19 of the SARUG newsletter contains an interesting program for monitoring channel use. The idea is that the audio from the rig is connected to the cassette input to the computer. The program samples the audio input every few seconds, checking to see if a signal is present or not. From this a histogram of channel usage can be built up. With suitable adjustment of the rig's audio and squelch controls and appropriate data processing this can be used to give, for example, usage statistics on a repeater, or a beacon watcher. With a remotely-controllable rig the idea could be extended to monitor several channels at once.

A gremlin has crept into my Microsoft Basic de-tokenizer. In *Rad Com* June 1985, p463, program 2, line 140, the "AND" should read "OR".

Now for the Christmas puzzle. G4ZCU is looking for a way to determine the latitude and longitude of a station, given bearings to it from two other stations in known positions. Having lost my spherical geometry book in the last move, I decided to work this one out from first principles, and rapidly got bogged down in a mass of horrendous simultaneous equations. A program emerged eventually, but it is very messy and definitely not publishable. Does anyone have a neat method? If so, both G4ZCU and I would be most interested in hearing from you!

Finally for 1985, a very merry holiday and a prosperous new year to you all. □

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Data Communications

*by Ian Wade, G3NRW**

Setting the scene

During my visits to radio clubs over the last year or so, many questions have come up again and again; typical samples being:

What are rtty, Amtor and packet radio? Why is the transmit/receive changeover time critical in Amtor? What are mailboxes, digipeaters and gateways? What is a "protocol", and what are the pros and cons of different protocols? How does error correction work? What communications standards exist, and what codes are used? What equipment do I need, and what does it all cost? Can I do it all by software? How do I interface my computer to the radio? What tones do I use? How do I cure computer interference? Where do I find data signals, and how do I tune them in? What organizations exist to help me if I have a problem?

And many more besides. One of the aims of this column is to attempt to answer these questions. There will be tutorial sessions explaining the basic principles, plus practical circuit and software ideas and miscellaneous hints and tips. In addition, I hope there will be plenty of input from yourselves, saying what you are doing, what problems you have, and what you want to find out about. A kind of "Technical Topics" for data communications, if you like.

Much of the material will refer to home computers, and I will assume that you already know the fundamentals. In other words, this column will be concentrating on how to use micros for communications. There just isn't room here for the basics. A couple of conventions to be used throughout. First, the term "data communications" takes up too much room when used repeatedly, so I will use instead the industry abbreviation "dc". Similarly, "packet radio" will be abbreviated to "packet".

Data communications

Data communications can assume many forms, but common to all of them is the sending of binary pulses by radio. These pulses can represent message characters, or they may be computer programs in machine code. The oldest form of dc is cw, but this is usually treated as a special case because not all morse characters are the same length. The more usual case is for all the characters in a dc code to be of the same length. For example, rtty usually uses a five-bit code and Amtor uses a seven-bit code.

In this column I will use the word "data" for all types of dc. In other words, rtty, Amtor and packet are all treated as methods of data communication. A few years ago, when home computers first came on to the amateur scene, some people started to send messages in Ascii, and called them "data" transmissions, to distinguish them from rtty; that is, "data" meant Ascii. Fortunately this somewhat narrow and artificial distinction is rarely seen nowadays, but it is mentioned here in case you come across magazine articles which talk about "data", where they simply mean Ascii.

Radio teleprinter telegraphy (rtty)

RTTY started life many years ago when amateurs connected surplus teleprinters to their transmitters, via "terminal units". The purpose of the terminal unit was to convert the ±80V pulses from the teleprinter keyboard into a form suitable for modulating the transmitter, and in the reverse direction to take the audio output from the receiver and convert it back to ±80V pulses for the printer. Nowadays the micro has largely replaced the teleprinter, and the terminal unit (now often called a "modem") acts as an "interface" between the micro and the radio.

RTTY is an "asynchronous" dc system. That is, the sending of individual characters is not synchronized to any particular event; the interval between characters usually depends on how quickly you can find the keys on the keyboard! So that the receiving station can recognize the beginning and end of individual characters, each character is "framed" with a start and stop bit. These bits are automatically inserted at the transmitting end, and stripped out again at the receiving end.

There are many different rtty codes in use today. For plain language text, traditional teleprinter rtty uses the Baudot code, or a variation of it, and hence this type of rtty is known as "Baudot rtty". This code has five data bits per character. Another popular code is Ascii, in which there are seven or eight data bits per character, depending on whether or not a parity bit is included. This is often referred to as "Ascii rtty".

A micro-based rtty system can be relatively cheap and easy to get going. The cheapest solution is to connect the micro direct to the radio and handle everything in software. This approach works tolerably well when receiving reasonably strong signals, but is very often unusable in noisy or weak-signal conditions, such as are found in the hustle and bustle of the hf bands. Then it becomes necessary to use a terminal unit or modem. Suitable units can be built for £20 or so, and there are also several kits and commercial units available.

Amateur teleprinter over radio (Amtor)

One of the severest shortcomings of rtty is that it is not possible automatically to detect and correct any errors arising from weak signals or interference. Amtor is an error-correcting system which largely overcomes these problems. It works by splitting a message into three-character blocks, and sending one block at a time. After sending each block, the transmitting station waits for an acknowledgement from the receiving station. If a positive acknowledgement is received, indicating that the block arrived intact, the transmitting station then moves on to send the next block. Otherwise it sends the same block again, and if necessary repeats this cycle until the block does eventually get through.

Unlike rtty, Amtor is a "synchronous" system. In other words, the time at which individual characters are sent is closely regulated by a crystal clock. This means that, once the two stations in a QSO are in sync, the receiving end knows exactly when each character is due, thereby reducing the effects of interference and noise. Amtor has proved to be very successful in practice, particularly on the hf bands, and any errors seen at the receiving end are usually due to typing mistakes! Understandably, it is more complicated than rtty, but is still well within the capabilities of a home micro.

Packet radio

Although Amtor works quite well, and is certainly much better than rtty, it too has disadvantages. One problem is that Amtor works at a low, fixed speed, and is therefore unsuited to sending large amounts of information in a reasonable time. Another problem is that its method of detecting errors is not very rigorous. Errors do get through undetected, and so Amtor is not suitable for sending critical information such as binary data files or emergency Raynet messages which must be received intact.

Packet radio largely overcomes these problems. Like Amtor, it breaks down a message into blocks, called "frames", but instead of being fixed at three characters, a frame can be of any reasonable length—typically containing one line of message text. Each frame is sent as a high-speed burst of data, and then, again like Amtor, the transmitting station waits for acknowledgement from the receiving end before sending the next frame.

A major difference between Amtor and packet is that each packet frame contains address routeing information (usually amateur callsigns), so that receiving stations can detect automatically if a particular frame is intended for them; if so, the frame is accepted, but if not, it is discarded. This powerful technique allows several completely independent QSOs to take place on one channel at the same time, and permits automatic routeing of messages through packet repeaters.

There are several different packet systems in use throughout the world today. By far the most popular is AX.25, which is closely based on the CCITT X.25 packet standards, and several kits and black boxes—known as terminal node controllers (tncs)—are available to interface between the micro and the radio. Another popular, though somewhat limited, packet system is the Cambridge system, based on the BBC computer. In this system packet processing is done entirely by software. As no special hardware is needed, this is one of the cheapest and simplest ways of getting your feet wet in packet (provided, of course, you already have a Beeb!).

Packet is the fastest growing area of amateur dc, and is the computer buff's dream. Systems can be relatively simple, particularly if a proprietary tnc is used, but can be expanded into very complex networks of repeaters, gateways, mailboxes, bulletin boards, etc—given enough time and an inexhaustible supply of candles to burn at both ends!

This column

These, then, are the topics I propose to cover in this column, and all of the above was written on the assumption that this is what you want to read about. But is it? If you have any ideas, comments or suggestions, let me know. In particular, let's hear about what is happening in your area. What hardware and software is in use? What new techniques are being tried out? What times and on what frequencies are your local nets? Which way do you think amateur dc should be going, and what should the RSGB and other organizations be doing about it? □

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SWL News

*by Bob Treacher, BRS 32525**

WITH THINGS a little straighter at my new QTH, it is time to catch up with a huge mailbag.

Catching up

Michel Monteil, FE8957, had a ball during good tropo conditions on 31 August and 7/8 September. During the first opening, IT9SBZ (JM68), IS0VCY (JM49) and IC8EGJ (JN60) were heard. During the second, EB6BJ, (JM19), TK4DL/P (JN42), IW6AGV/ISO (JN40), EA5DFY/P (IM98), TK5EP/P (JN41), I5WHC/5 (JN53), EA6QB (JM49), EA6IF (JN20) and TK5BL (JN41) were logged, all from JN15AJ. On the subject of squares, G4XEK/W5MJQ is one of those in favour of keeping the old squares; I think many others hold the same view.

Malcolm Harrington, BRS20249, picked up FW8AF and TZ6FS on 14MHz for two new ones. Henry Driffield also mentioned TZ6FS and many special event GB stations, and bemoaned the fact that all the a.m. signals disappeared a long time ago—he has many memories of dxing in the old days. The 432MHz band gave Dave Whitaker, BRS25429, his first EI, and Dave Burt, BRS85613, had a card from TZ6FS via DL4BC and also telephoned BRS62088 so she could log OH0MA.

The Durban MM net was mentioned a few issues ago. Peter Long, BRS87247, provided further information, having found the net interesting. The full schedule is: 0630, 14,316kHz; 0645, 7,045kHz; 1130, 14,317kHz; and 1200, 21,317kHz.

Colin Watson, BRS46598, reported some good fm dx from IO85, hearing stations in GI and EI during good tropo conditions. Robert Small, BRS8841, asked whether UA1PAU is on Franz Josef. Does anyone know?

January Challenge

It's LF Challenge time again. The aim is to log as many different countries as possible on 7, 3·5 and 1·8MHz in the month of January. Single-band entries will be accepted. Scoring will be the same as before: 7 and 3·5MHz, each European country logged counts one point, each dx country counts three points; 1·8MHz, each European country logged counts five points, each dx country logged counts 15 points.

Only one station from each country can be logged on each band. A multiplier checklist, in prefix order, *must* also accompany each log. Entries to reach me no later than 26 February 1986, giving date, time RS(T), full callsigns of the stations heard and points claimed.

1986 Countries Table

As space will be tight during 1986, I intend to operate the table in the same way as I have for the last few issues, simply listing updated and new scores, with the full table appearing only when space permits. The vhf/uhf list will also operate on the same basis. The All-time list will appear in March, September and December, with updates only when space permits.

Basically, the 1986 table will be in its current form, reflecting the number of countries heard on each of the six main hf bands between 1 January and 31 December 1986. There will be no starting score, and entries should reach me by the *first* deadline quoted each month.

HF news

Leslie Bliss, BRS52822, runs a DX100L and is pleased with its performance hooked into a G2DYM trap dipole with atu. He and Ron Clarke, BRS87725, are to get together, both being DX100L owners. Ron himself has purchased a secondhand Eddystone EB36 with ssb, and has joined an RAE course.

Dave Whitaker met six other swls at the Society's HF Convention, and had "eyeball" QSOs with 6Y5FS, ON5NT and 4X4NJ. VR6JR was new on 3·5MHz, while CE8ABF had confirmed for CE on 1·8MHz.

Douglas Johnstone, BRS54163, had put up a 7MHz sloper and promptly logged VK5MS, JA5BJC and 9K2EC. It must work!

Further afield now to Stan Porter, ORS45992, who was waiting to have an "eyeball" with PA0GMM as he passed through 7Q7 on his way to D68 and FH. The Durban MM net took traffic from the Mauritius to Durban yacht race and was ready to handle the Round-the-World race. It appears that ZD7CW will be involved with reporting positions, wx etc.

A little nearer home, GM3AWW (ex BRS3454) had a candidate for the worst QSL card. It was from UB5.067.2330 who had 599 and 59 reports preprinted on his QSL cards! I hope none of our swls adopt such a worthless practice. An interesting aside on QSLs came from GM3AWW, who made some early resolutions: only send cards when the ones wanted had been received; ignore all requests for "you are my first GM"; and, best of all, ignore all those who send cards stating that their great grandfather was Scottish! However, every swl will get a card 100 per cent.

Mick Hudson, BRS87259, updated his table score and, with CQWW up and coming at the time of writing, he was hoping to significantly increase his entry. Maurice Wilcox, BRS50930, reported interesting confirmations from AL7BL, CE0AA, HH7PV, ZC4MR and 9M6BP.

Welcome again to Ian LePage, BRS40292 (Guernsey), who wrote for the first time this year. He had only spasmodic activity to report, even though a new antenna system feeding his Trio QR666 had been working quite well. He now produces his own QSL cards on a Macintosh computer and has begun to master cw.

Mike Dawson, BRS44083, is a GB2RS addict, listening every Sunday. He listened to the VK/ZL Contest, but conditions were very poor. On the QSL side, C21BD provided Mike's 99th country verification.

Brad Bradbury, BRS1066, was still chasing USSR Oblasts, but heard KH6AT/MM off VQ9 on 1·8MHz cw. Confirmations on that band included HZ1AB, J28EI, OH0BA and TR8JLD.

A long letter from Robert Small, BRS8841, mentioned a change for the better on hf, especially on 7 and 21MHz. VK9NM/LH, OE6BVG/KH6 and DJ9ON/S9 had been heard on 7MHz, while 21MHz had produced FR4ZH, TR8SA, YC9GF and Z21EI. Among a good batch of incoming cards, he mentioned BT0NMN, VK0GC, UW3HY/1, KK9A/PJ7 and WB7DKV/J37.

VHF corner

The Oswestry and DARC has a new award available to swls for hearing stations in Salop and bordering countries; full details from GW6YIY.

Martin Parry, BRS52543, and Dave Whitaker pulled in all the dx during exceptional tropo conditions from 12 to 17 October. As I cannot give their marvellous reports in detail, I have chosen a few from each. On 144MHz (it is clear that I missed probably the best tropo for at least three years!) EA, HB9, DL, F, EI, OE, GM, GW, GI, GJ, GU, LX, ON, OZ and PA0 were all heard. On 432MHz conditions were at least as good; Dave reported GI4OPH, EA1CYE(YD), F1BUU (ZE), F1FEN(CF), HB9AEN/P(DG), DC6HQ/P(EI), DK0NA(FK), OE2CAL(GH) and F6CBC/P(ZD), while Martin logged similar distances, mentioning HB9MIN/P (DH), DK5AI(FL), F6ECI(AF) and F1EZQ(CH). After this opening Martin topped 50 squares all-time on 432MHz, while during the event Dave heard 56 squares in 14 countries on 144MHz and 41/11 on 432MHz. Which of them will get on to 1,296MHz first?

Michel Monteil entered the UHF Region 1 Contest, his first foray on 432MHz this year, operating from a /P site in JN05WO, and some HB9s were heard.

Finale

Thanks to the 24 listeners who contributed to this month's column. Please send news, views and scores for the February issue to reach me by 9 December. □

ALL-TIME COUNTRIES LIST

Starting score 750
(Updates only)

Station	28	21	14	7	3·5	1·8	Total	Mode
BRS8841	256	293	317	238	219	63	1,386	ssb/cw
ORS45992	212	257	272	155	133	16	1,045	ssb
BRS1066	195	210	269	170	120	81	1,045	ssb/cw

1985 HF COUNTRIES TABLE

No starting score
(Updates only)

Station	DXCC	28	21	14	7	3·5	1·8	Total
BRS8841	227	42	128	210	151	152	44	727
BRS52543	195	50	96	158	125	135	61	625
ORS45992	217	63	120	196	110	83	7	579
BRS1066	159	36	84	141	104	79	56	500
BRS87259	155	15	31	135	48	93	14	336
FE8957	—	25	73	60	47	56	0	261
BRS44083	126	22	21	120	21	49	4	237
BRS20249	115	8	36	92	39	49	8	232
BRS40292	—	10	31	53	35	24	3	156

1985 UHF/VHF TABLE

(Updates only)

Station	Loc	70MHz		144MHz		432MHz		
		Squares	DXCC	Squares	DXCC	Squares	DXCC	Total
BRS52543	IO83	22	6	81	22	44	14	189
BRS25429	IO93	0	0	90	21	61	15	187
FE8957	JN15	0	0	66	18	13	3	100

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4-2-70

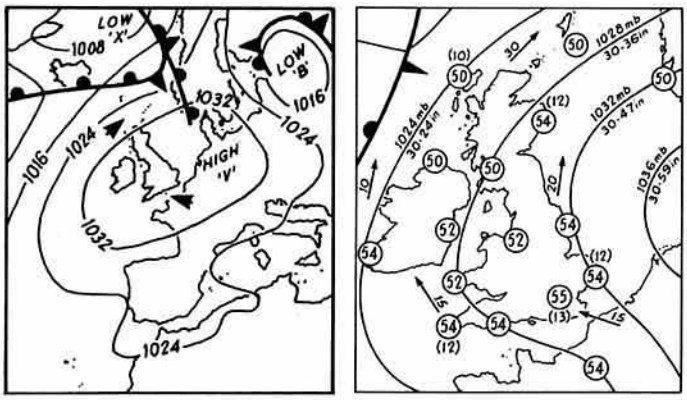
*by Ken Willis, G8VR**

IT SEEMS IMPOSSIBLE that another year is coming to an end, but 1985 will virtually be over by the time most readers receive this issue of *Radio Communication*. Taking a general view, vhf/uhf conditions in the past year have not been exceptional, with few good tropo events, and auroral activity much diminished as the solar cycle goes on its relentless downward path. Perhaps the most significant "happenings" during the year were to be found on 50MHz, with the major transatlantic openings which suggested that when this band becomes more generally available it will provide some nice surprises from time to time.

As if to relent, however, the weather took a definite turn for the better over the weekend of 12/13 October, and at the time this is being compiled (25 October) high pressure such as the stuff tropo is made from still persists over large areas of the country. The two weather maps separated by more than a week, show clearly the high-pressure systems centred on the UK and extending over much of Europe which gave rise to very good conditions on 144, 432 and higher frequency bands. The recent push by the VHF Committee to encourage more activity on 432MHz seems to have had an effect, since it seemed to me that there were more stations than usual taking advantage of the conditions on this band during the good weather. It seemed to start with several stations making their first contacts with HB9 on both 144 and 432MHz, while, on the higher band, operators in Europe were constantly heard asking UK operators if 1,296MHz equipment was available, so no doubt many good dx contacts resulted on that band and even higher.

Although the action seemed to start with openings to northern Spain and Switzerland, things developed as the week progressed and coverage widened to embrace Italy in the south, the Soviet bloc countries to the east and to Scandinavia in the northeast. North–south paths were at times very good, and at my location, where a temporary antenna for 144MHz is simply an indoor dipole at ceiling height, the Angus beacon was at times so strong that it could be copied with just a screwdriver stuck in the receiver antenna socket! Some of the dx worked on 432MHz and higher frequency bands was remarkable, and while at times the north of England seemed to have the best of it, almost everyone in the UK had something choice to be called, so many new squares and countries were ticked off.

On the evening of 16 October, GM0EQM/P, operating on 144MHz from YP square near Dumfries from a site 330m asl, was working shoals of Continentals with 100W to a 17-element. He was a steady S5 on my indoor dipole, so for anyone with a "proper" antenna the signal must have been enormous. He was heard to say that in the opening, up to that time, he had worked 77 squares from the portable site, which says a lot for the advantages of a good take-off. On the following evening G4KUX was heard working into SP6 on 144MHz at a time when things were fairly quiet in Kent. We had to wait a long time for this opening, and by all accounts it was an outstanding one, still going strong more than a week later. (*See late news*)



Weather maps for the October tropospheric event: (l) 13 October; (r) still persisting on 24 October

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Beacons

It is not often that we in the south hear much of the Scandinavian beacons, but as this is being written (afternoon, 24 October) the isobars (see map) are favourably placed for NE–SW propagation, and my indoor dipole is collecting very strong signals from SK4MPI (144·960MHz) in JP70NJ, LA3VHF (144·880MHz) in DS77j and OZ7IGY (144·930MHz) in GP23c, while DL0PR in EO54c is also audible. I have never before heard these beacons except for snatches of SK4MPI via meteor scatter, even at my old QTH with the 16-element Tonna. LA3VHF sends a very long meteor burst series of callsigns between its slow-speed message of call plus locator. At my old location, too, GB3VHF was too close for comfort which made it difficult to hear the weak beacons in close proximity to its frequency. While all this was going on, Brian Row, G6JHR, (Northfleet) was copying Swedish and Danish beacons on 432MHz and working into SM on 1,296MHz.

Chris Tran, GM3WOJ (Rosemarkie), says that the local 50MHz beacon there (GB3RMK) will have its dipole antenna raised to 800ft above ground if DTI approval is forthcoming. The IBA, via Roger, GM3YMK, has given permission for the antenna to be installed at the top of its tv mast at the site, and will also loan some redundant feeder from Band 3 equipment until such time as they need it again. Chris says that this should provide a unique opportunity to study the performance of a really high antenna, despite the one-way effects which it might produce.

GM3WOJ also reports what appears to be an rtty or data transmission close to the Rosemarkie frequency, which is sometimes audible in the UK via sporadic-E.

FX0THF (144·895MHz) the so-called "Paris beacon", has been sending the letter "B" in its format recently. I asked Brian, G3COJ, if he could explain this, and he believes it to be an indication that the beacon is on battery power. However, he says he will check this, but meanwhile points out that the last letter of the QRA locator (AI46h) transmitted by the beacon is in error, and the French vhf manager confirms this.

If GB3LER has not been copied by you lately, it does not indicate a poor receiver nor the absence of auroral conditions, for according to GM4ZET (Shetland) it has been off the air for some six months. There has apparently been some confusion over the whole situation, which has delayed the repairs necessary to restore service, but G3COJ has offered to attempt to unscramble things. Lerwick Radio Club is willing to do what it can to help once it is known just what the problem is. *Stop press.* G3COJ says that GB3LER was back on the air at 1525 on 27 October, thanks to Brian and GM4ZET. He also says the Rosemarkie beacon is really at Mounteagle, although originally intended for Rosemarkie.

The locator controversy

Correspondence continues to arrive from both camps in the matter of "old" *v* Maidenhead locators, the most recent being from Swedish amateurs. Folke Rosvall, SM5AGM, who was one of the originators of Maidenhead, says that it is natural that operators should feel dubious about the new system after having used the old one for so many years. He admits the new locator is longer than the old one, but feels that it is a "price" to be paid to obtain the advantages of the Maidenhead scheme. Incidentally, he says that initially the Americans wanted a system based on 1° by 1° squares, but subsequently agreed to go along with the European proposals.

SM6CPI, writing from Arona, Italy, is firmly in favour of the new system and recommends:

(a) Compare a map with the Maidenhead system with the old map and look for similarities rather than differences.

(b) Compare a QSL card giving both old and new locations and calculate the position of the station concerned to get a "feel" of the logistics involved.

(c) Read the comments by G3FPR in September *Microwaves*.

SM6CPI takes me to task for saying in September *4–2–70* that to avoid the loss of an important contact with an SV station I told him I was in AL and he responded with LA when "we both knew where we were". He says it would have been enough to have said "I am in Zero One", whereupon he would have responded with "One Zero", and we would both have known where we were. I feel that we should now close this topic and accept the fact that the IARU has agreed to the use of a new system. Lobby your vhf manager or committee if you have strong views either way.

Crossband working

It has been a point of contention for a long time that Class B operators were excluded from working crossband, but now the licensing authority has set out its guide lines which permit a licensed amateur to receive any other "properly authorized *amateur* transmissions and transmit only on frequencies for which he or she is licensed". Note the word "amateur". Crossband or any other contact with a non-amateur station (eg cb) is not

permitted. The guide lines include the case of Class B operators using space satellite transponders, and a further interesting point is that Class B operators who have been granted a notice of variation which allows them to transmit morse may respond in morse on any of the frequencies which they are licensed to use. This means, for example, that a station on the hf bands can be worked crossband by any Class B operator provided he uses only those frequencies, power levels, modes etc permitted by his vhf/uhf licence. These developments, resulting from much liaison between the RSGB and the DTI, will surely give a much-needed "shot in the arm" to the 50 and 70MHz bands, especially the latter where activity is by no means high enough these days.

Repeater news

I have recently received correspondence saying that too much space in *4-2-70* is devoted to information about repeaters. It should be noted, however, that I also receive letters saying that it is "the best bit of the column". VHF/UHF activity comes in many forms, and in the limited space available I try to give enthusiasts of every facet of the hobby the opportunity to stand on the soap-box and be heard whenever there is something of interest to be reported. Most months the input received on all fronts far exceeds the space available to include it all, so please bear with me if I sometimes write less about what turns you on.

Alec Jones, GM8HGD, who is hon sec and treasurer of the Grampian Repeater Group, points out that the proposal for GB3NG, attributed in September *4-2-70* to the Speyside Group, is, in fact, a Grampian Group project. Grampian also operates GB3GN (R7), GB3AB (RB14) and GB3PD (RB10), and has drawn up an "application in principle" for a further uhf unit.

Newsletters have been received from Kent RG (No 41), Central Scotland and Borders (No 54) and North Cambs (No 6). North Cambs treasurer Gordon Smith, G6XMU, asks me to remind readers that his group's newsletter is obtainable for "a small donation plus an sae" sent to him QTHR.

The RMG in the shape of Chris Young, G4CCC, says that some of the repeater information contained in this feature is "unknown to the RMG". He asks that groups keep him "in the picture", and adds that the publication *A Guide to Repeater Licensing* is available from RSGB headquarters. Incidentally, Chris has resigned from the post of vice-chairman of RMG to become its publicity officer. He resumes responsibility for repeaters in the Central, Southern and South Western areas.

Proposals dropped due to lack of "follow-up" are Caithness vhf, Sussex Coast rtty, Kidderminster tv, Grimsby tv and Goole tv repeaters. In *4-2-70* November, Scunthorpe, whose proposal went to the DTI in October, was wrongly given the callsign GB3WS—it should be WJ.

GB3UD, the Potteries atv repeater, was due to come on the air on 19 October from a site at Mow Cop, some 1,000ft asl. Stoke-on-Trent ARS has recently taken over the project, and reports will be gratefully received by G6UKP.

The Swansea Repeater Group asks for donations for its proposed 144MHz repeater, planned to be sited at Clase if approval for the project is received. It is hoped to use channel R3. Donations to Peter Alexander, GW4RXO, QTHR.

The proposed RMG open meeting for South Wales has had to be postponed until next year, and the technical conference has also been shelved for the present. Mike Senior, G4EFO, would be pleased to hear from anyone interested in assisting with the technical conference at some future date not yet fixed. RMG has dropped the plans to produce a uhf repeater coverage booklet, since the effort required would mean that other more urgent tasks would have to be delayed.

50MHz

At the time of writing there is no further news to report on the issue of 50MHz licences, but this is understood to be due to the workload of the DTI rather than any of the sinister reasons so loved by the "no news is bad news" brigade. Headquarters is justifiably proud of its role in the decision to make 50MHz available to UK amateurs, and will report via GB2RS news bulletins and other media just as soon as something positive emerges.

Ray Cracknell, G2AHU, who co-ordinates the 50MHz experiment reports, received notification from the Norwegian vhf manager, LA9DL, that a further 17 permits had been issued in Norway for 50MHz operation, bringing the total to 32. LA9DL also reported that between 1 May and 1 September 1985 there had been 220 contacts on meteor scatter involving 32 G stations and seven LAs, almost all being on random frequency as opposed to sked operation. In the same period his most notable auroral contacts were GI3ZSC—LA9DL (9 June), G4BAO—LA9DL and GM3WTA—LA9DL (12 August), with GB3RMK heard 51A on the latter date. Via sporadic-E mode, on 15, 16 and 30 June, and on 28 July, there were, in all, 65 contacts between 33 G stations and five Norwegians.

In an interesting letter from Olof Karlsson, SM6PU (a *very* well-known and respected vhf callsign), he said that in the summer of 1985 there was only one opening between SM and the USA on 50MHz. This was on 8 June at 2054 to 2121gmt, when Olof heard W3ZR/4 and three other unidentified stations, all participating in the ARRL VHF Contest, and all using ssb. He has received confirmation from W3ZR who at the time was working from his home in Cape Coral, near Fort Myers, Florida (EL86XQ—and a success for Maidenhead!). On 2 July, Olof observed no openings on 50MHz, but noted USA signals on 35MHz between 1845 and 2130gmt. While the UK stations were enjoying openings to W2,3 and 4 on 30 July, Olof heard nothing at all. Olof makes an interesting point when he says that in his country 28MHz is not at all a good indicator for 50MHz propagation over the Atlantic, since this summer he heard no W signals at all on that band. He much prefers the 35MHz paging channels.

The 50MHz band offers unusual and challenging opportunities for dx working, and despite those arm-chair theorists who are able to explain it all to their own satisfaction, there is a great deal to be learned about the propagation mechanisms at this frequency. SM6PU, who has been studying the subject for years, says that there undoubtedly is a connection between sporadic-E and the USA–UK paths on this band, and they have nothing to do with auroral-E as has been suggested at times, He would not want to be drawn on whether the paths are due to multi-hop Es, or an Es-Es link, but thinks that when the band opens to the USA there must be sporadic-E clouds on both sides of the Atlantic, and this probably happened on 8 June. Olof has observed that in Sweden, 27/28MHz Es signals from the UK will disappear just as the 35MHz signals from the USA begin to fade out.

Dave Newman, G4GLT (Leics), is another who has been fascinated by 50MHz, and in discussion with G2AHU (himself no stranger to this sort of study since he participated in tep work some years ago), says that Ray felt it worthwhile to try simultaneous transmission on 144 and 50MHz. Sporadic-E openings on 144MHz are only about one-tenth as common as they are on 50MHz (says G4GLT), but if there were to be a very strong Es path between the USA and the UK on 50MHz, then propagation across the Atlantic on 144MHz by this mode might be possible. Dave comments that if a coast-to-coast 144MHz opening can occur in the USA, then why not one across the ocean? He plans to ask USA amateurs about the maximum distance worked via Es in that country. All of which shows how valuable a general allocation on 50MHz will be to serious propagation students.

Ken Bowden, G6UCV (Guildford, Surrey), was able to copy the Rosemarkie beacon several times on 28 October, mostly at strengths just above noise-level, between 2100 and 2200gmt. However, at 2145 the signal jumped to many decibels over S9 with slight frequency shift. Obviously a strong "assist" from a meteor trail with some doppler shift. Ken uses a dipole at 20ft and a homebrew preamp into a Yaesu transverter to 28MHz, equipment which has enabled him to copy the Gibraltar beacon on occasions.

Paul Turner, G4IJE, who has featured in so many "firsts" on 50MHz, particularly using meteor scatter, has moved QTH. Although he has moved only a mile or so, he has lost his superb location bordering on open country and now has to apply for planning permission to erect a mast. He has a 50MHz dipole in the loft at present, and hopes soon to put up the five-element for that band, though it will be at only some 15ft above ground. It will be interesting to see what he can accomplish with these restrictions.

QRP frequencies

John Beech, G8SEQ, who is vhf manager of the G QRP Club, reported to the VHF Committee that frequencies in use by the club on the 144MHz band are 144·130MHz (cw calling), 144·240MHz (ssb calling) and 144·550MHz (cw/fm calling). The VHF Committee does not feel able to include these frequencies in the band plan since there are already major problems in accommodating all the demands being made for specific channels. Indeed, there is probably already some conflict over the 144·550MHz slot since this is being used by packet radio/data operators. However, the frequencies stated are obviously the ones to check when looking for QRP contacts.

Meteor Scatter

Gerald Peck, G4OIG (Northants), found the Orionids shower (17-26 October) "a complete flop, despite the high hopes due to Halley's comet being in the vicinity" (see *4-2-70* July 1985). Recently Gerald had nine skeds, only three of which were completed, and on 20 October when some help from the comet might have been expected all four skeds on that day failed. His successes in the period were with EA3BTZ (AB), SK6SP/7 (IQ) and YU7AU. He also tried on 70MHz with EI2CA, using 25W to a two-element quad, but with no success. To show the value of ms, Gerald has worked 50 squares solely via this mode out of a total of 176, and says it is

"worthwhile, so it seems".

The Geminids should peak on or around 13 December with a ZHR of 55; with a minor shower, the Ursids, close on its heels on 21 December (ZHR 18). Then don't overlook the Quadrantides in January, with 3 January as the peak date and a ZHR of 100.

70MHz

G4SEU and G4VOZ are organizing a novel project to increase activity on 70MHz. The plan is to use a special event callsign, GB4MTR, over a period of 12 months with a different station holding the call each month. By selecting stations in different counties, this would give the opportunity of working over a wide area on the band. They also plan to use the call on 1·8 and 3·5MHz to encourage crossband working, something which is very timely with the recent statement of DTI policy on this form of working. So far the following stations have indicated their readiness to hold the call: G3RSI (Hants), G4ENB (Beds), G4ENA (Glos), G4SEU (Leics) and G4YUZ (Herts). Awards will be made to those working or hearing the call from all its final locations. More details as they become available.

Listening on 70MHz to EI2CA and the resultant pile-up, Gerald, G4OIG, heard someone say " . . . this is a shambles, I heard three stations all calling together, I suppose they couldn't hear one another". It's possible!

Late news of the big tropo event

The excellent tropo conditions which started on 12 October prevailed for over a week, and the event was obviously a major one, ranking among the best such openings ever recorded. Many stations broke their own personal records and worked new squares and countries on both 144 and 432MHz. On 432MHz OH and OH0 were worked, as well as the USSR bloc countries well to the east, but propagation swung during the long event, so almost all of Europe was involved at one time or another. Some station reports, typical of many received, will indicate the widespread nature of this opening.

John Palfrey, G4XEN (Northants), worked several new ones and heard beacons which had previously never surfaced at his location. On 13 October his best contacts were with OK1FAV (JO60) and OE5XDL (JN78). On 15 October, EI8EF (IO54). On 20 October, "some OZs at lunch time" then SM6, SM7 in the afternoon. A "CQ" call was answered by UP2BEA (KO16) on cw at 1,586km. Later that evening, SP2DXL (JO94), SP4DCS/4 (KO03) for first tropo contacts with SP. 24 October, "a massive opening to SM4, SM0, LA, OZ with SK4MPI at S9. 25 October, LA8AK (JO38) in early hours with LA3VHF beacon at S9. 27 October, band open to eastern Europe with Y, SP and OK active. John worked SP1DPA (JO73), SP5BDC and SP5GTI, both in KO02, SP2JYR (JO92). 28 October, John worked two OKs in JO70, and then by next day the band was back to normal. This was all on 144MHz. On 432MHz, using only 10W, John worked into EA, HB9, GI, GM, OZ, D and OK. Beacons heard during the entire opening by G4XEN included LA3VHF, SK7VHF, DL0PR, OZ7IGY, SK4MPI, Y41B and SK1VHF (all on 144MHz), and LA8UHF, SK6UHF, SK4UHF, and DF0AAD, all on 432MHz.

Dave Hewitt, G8ZRE (Chester), used 100W to an 8XY Yagi at 35ft, and over the weekend of 12/13 October "just left the beam pointing at London to work stations from West Germany to Spain". While driving through Chester at 1150gmt on 13 October, GJ6OZB was 55 on his 5/8 whip antenna on 144MHz.

Phillip Murphy, GI4OMK, spent so much time on the air that his "Brownie Points with his xyl reached rock-bottom". He found the opening to be widespread and consistent throughout most of the 24h period, especially over the 12/13 October weekend. He believes that HB9 and OE were worked by GI stations on both 432MHz and 1·3GHz, and that UP1BWR was worked by a GI.

From Wales, Rhys Thomas, GW4RWR (Clwyd), was not able to spend much time but "slipped out on 26 October to a site 530m asl above the Ogmore Vale" where he set up an FT707 and a nine element Tonna on 144MHz. His best dx was SM7IWG (JO77) among seven OZ and nine SM contact in all. He says "surprisingly little" was heard of ON or D. He wonders if the opening was the best since 1983?

Finally, Jonathan Hedgecock, G1EDS (Basingstoke), shared his operation between the home QTH (with bad take-off) and a portable site on Beacon Hill, 850ft asl, where he used 2·5W to an HB9CV. He heard several new ones and worked his best-ever dx in SK0LM in Stockholm (JO89XH). While receiving GM6WQC/P (XS80D) on Beacon Hill, he got up from a sitting position, which raised the antenna some 2ft, whereupon the signal went into the noise!

Altogether an outstanding opening. We waited long enough for it, but most who got among the action will think the wait was well worth it. All that now remains is to collect those treasured QSL cards. □

The Month on The Air

*by John Allaway, G3FKM**

OCTOBER *MOTA* requested information on the VP8HF/VP8 operation which took place from the South Sandwich Is some 21 years ago. This was noted by Ken Randall, who was the operator on *HMS Protector* at the time. It seems that his own copy of the log has been lost and that he doesn't know whether W2GHK's copy still exists. Further investigations will follow! Ken points out that this was the only fully legal operation from the South Sandwich Is, which are outside the Antarctic zone covered by the Antarctic Treaty. The latter is an agreement between all nations to forego territorial claims south of 60°S—the South Sandwich Is extend between 56° and 59°S. He says that the environment is very hostile, nobody lives there and the journey is difficult.

A note of special interest to those working towards the Society's **Commonwealth DX Certificate** (CDXC), **British Commonwealth Radio Transmission Award** (BCRTA), **British Commonwealth Radio Reception Award** (BCRRA) and **Worked British Commonwealth Certificate** (WBC). As has already been announced, these awards are being phased out and replaced by a new series. However, applications will continue to be accepted until 1 January 1988 in order to give time for partially achieved awards to be completed.

Top band

The need for top band band-planning and guidance on operating procedures is rapidly becoming more apparent. This is as a result of considerably increased activity on the band, particularly in Europe. This higher level of activity stems from three sources: almost all European countries now have an allocation on the band; the approaching sunspot minimum has forced many operators down in frequency; and more commercial rigs now include 1·8MHz.

A similar situation exists in North America, to the extent that the July issue of *QST* carried proposals for an ARRL 1·8MHz band plan. However, these proposals are not necessarily most appropriate to the needs of European 1·8MHz operators.

To encourage a European approach to the problem, the RSGB HF Committee is currently preparing a paper to be presented at the next IARU Region 1 Conference in the Netherlands in 1987, and also at the meeting of hf managers in April 1986. In order that this can best reflect the wishes of all 1·8MHz users (dxers and casual alike), readers are invited to send their comments to Martin Atherton, G3ZAY, HF Committee chairman, 41 Enniskillen Road, Cambridge CB4 1SQ, before 1 January 1986. Input from regular users of the band will be particularly appreciated.

Some of the factors which need to be taken into consideration were listed by John Lindholm, W1XX, in August *QST* in a further article on the subject. These included the need to: (i) as far as possible separate cw from phone; (ii) keep ragchewers and dxers apart; (iii) try to preserve the "window" concept; (iv) recognize that during contests one mode will dominate; (v) respect the Japanese allocation area during the relevant times; (vi)—not appropriate under European conditions—leave a clear frequency for W1AW; (vii) take into account the spot frequencies which need to be avoided in Europe; (viii) provide for flexible planning of 1·9 to 2MHz; (ix) make provision for digital communications; (x) recognize a spot frequency for modes such as sstv and fax in those countries which permit them on the band; and, perhaps the most important of all; (xi) have a plan designed as a result of maximum input by users who are prepared to consider the interests of others as well as their own.

The *Long Island DX Bulletin*, commenting on the problem, is asking American 1·8MHz dxers to write to ARRL urging "vigorous action in promoting an FCC rule-change in which 1,800–1,840kHz will be allocated to cw, and 1,840–2,000kHz to ssb".

*10 Knightlow Road, Birmingham B17 8QB.

DX news

Amateurs in the Azores will have new prefixes as from 1 December. The former CT2 will be replaced by CU, and the number following will indicate individual islands and CU0 repeaters. CU1 is Santa Maria, CU2 Sao Miguel, CU3 Terceira, CU4 Graciosa, CU5 Sao Jorge, CU6 Pico, CU7 Faial, CU8 Flores and CU9 Corvo.

Activity from HZ1AB seems to have ceased, but HZ1FM, Ahmed, who has a TS930S and TL922 linear and dipoles, is located in Jeddah and has been worked on 14MHz ssb.

Further to the information published in October *MOTA* about the new Taiwanese stations, the *DX Family News Letter* gives more details. BV2DA and BV2FA were due to appear on the air on 26 September—the former, Feng, is a good cw operator and spends a lot of time on 7,005kHz. BV2FA, Shane, has been on 14MHz ssb. Four or five should have been on at that time, and others are awaiting approval of their equipment. Another test examination may have been held recently. Taiwanese prefixes are: BV1 Yilan Kuelung; BV2 Taipei; BV3 Taoyuan; BV4 Taichung; BV5 Changhua, Chiyi, Yunlin and Nantou; BV6 Tainan; BV7 Kaohsiun and Pingtung; BV8 Taitung and Hualein; BV9 off-shore islands; and BV0 temporary stations.

The new amateur station located at the Council of Europe in Strasbourg was mentioned briefly last month. It seems that the special prefix was taken from the French allocation and officially attributed by ITU to the organization. A news release dated 24 August says that the HQ enjoys extraterritorial status and that application is being made to ARRL for DXCC status for TP21 when it appears on the bands this month.

KH6XX is looking for contacts with Europe on 1,825 or 1,835kHz between 0500 and 0600, and is also on 7,080kHz from 0800. VK3DET and wife are on a holiday trip in the Pacific, and he may be on the air from Tonga as A35TN between 25 November and 3 January. From Nauru, C21FS and C21VG have both been reported on 14MHz ssb between 1100 and 1200gmt. DJ5CQ will be remaining on Lord Howe Is until February or March using the callsign VK9NM/LH. He runs 100W to a groundplane antenna, and is hearing Europe well between 2000 and 2200 on the cw portion of 7MHz (in the 7,002–7,006kHz area).

FT8XA and FT8XB on Kerguelen Is are active fairly regularly near 21,244kHz between 0800 and 1300, and near 14,190kHz at 0700. They also favour 3,795, 7,045 or 7,075kHz after 1600.

4U1UN, the station situated at the UN building in New York, is now supposed to be making a regular appearance on 14,205kHz from 1800 on Saturdays.

From East Malaysia, 9M8EN is now being heard on Fridays from 1600 on 14,220kHz, and there is also a new station, 9M8GH, whose name is Gordon. He has also been on in the same part of 14MHz at about the same time.

TN8EE should be in Libreville until the end of the year. Until then he may be found at the low end of the ssb section of 14MHz in the "French" section of the band. K1CTK/TU2 is with the USA embassy in Abidjan, and is to be found near 14,185kHz almost daily from 2000. N7DF/TT8 has been active on 7 and 14MHz cw, and G3KQL/TT8 will be on cw and ssb 3·5 to 28MHz until he leaves this month.

A new call from Sudan at the time of writing was WA4BWB/ST2, who is doing relief work there for a few months. Chuck, formerly KC7UU/5N, now has the new callsign 5N8AMA. 8Q7ITU is located at Maafushi in the Maldive Is, and the operator is working for the ITU—he should be there for a few more months.

From P29JS's *News Report* comes information about St Helena. ZD7BJ and ZD7XY have lost their beam, but ZD7AL has his quad up again. Jim complains about the very large number of Japanese cb signals on 28MHz —even up to 28,585kHz but with a complete absence of Japanese amateur signals.

In order to celebrate the 75th anniversary of the WIA and also to promote International Youth Year, two local high schools in Port Lincoln, South Australia have organized an expedition to Boston Is (near Port Lincoln) between 8 and 14 December. The callsign will be VI5IYY, and special QSLs are being printed. The students are using home-built gear as well as a variety of other equipment. The Matthew Flinders Award is available for those working VI5IYY, and costs A$5 plus four ircs for postage. It consists of a bannerette of blue taffeta with gold fringe. The address for this (and for QSLs) appears in "QTH Corner".

Japan now has a reciprocal operating agreement with the USA, and discussions are taking place with the Federal Republic of Germany, Finland and Eire. Licences with callsigns in the 7J(1-0) AAA-MZZ series (7J6AAA-CZZ for Kyushu and 7J6DAA-MZZ for Okinawa) will be issued.

VK9XJ is located on Christmas Is and looks specially for UK contacts on 28,595kHz at 1100 daily.

Welcome . . .

. . . to the following amateurs from outside the UK who became members of the Society during September: DH7ACG, EA5ELI, F6HYE, F6KOU, G3OVG (JY), OH5ZAA, PA3AKO, SM6ANW, VK2XBA, VK3BXA and VK3XDJ. Non-licensed new members include R Barrett (EA), G O'Neill (EI) and P Morris (DL).

Contests

0000 14 December to 2400 15 December

All stations limited to 36h operation. Single-operator, phone, cw and mixed categories, as well as multi-operator mixed-mode. W/VE stations give RS/T and state or province. Others give RS/T and serial QSO number (from 001) QSOs on cw count four points, and on phone two. Contacts with USA novices count eight points. The multiplier is the total of USA states, Canadian provinces, DXCC countries (except W and VE), and ITU zones of /MM or /AM stations worked. Stations may be worked once on each mode and no phone QSOs may be made below 28,300kHz. Logs should give date, time, mode, call and exchanges. New multipliers should be marked each time one is worked. Entries of more than 500 QSOs should include a duplicate sheet. Post logs before 17 January to: ARRL, 225 Main St, Newington, Conn, 06111, USA. Entry forms are available from this address (*not* from G3FKM).

Results of the **1985 Bermuda Contest** have been published. UK scores are as follows: **G4BWP** (276,070 points), G4EOF (71,145), G4CNY (13,590), G4OTU (3,840), G4FJT (2,430), G3NT (2,280), G4GFH (1,760), G4SSN (620), GW3JI (450), G3NHF (100) and G4MTC (30). All these receive an award, but of course G4BWP was expected to collect his in Bermuda during "radio week". Winners of the other top prizes were DF9ZP (137,750) VE1NG (117,480) and K2UR (137,020). Top Bermudian was VP9HK with 1,314,135 points.

Results of the **1984 CQ WW DX Contest (Phone)** appeared in the September issue of *CQ Magazine*. UK scores were as follows:

SINGLE-OPERATOR

Callsign	Band	Points	Callsign	Band	Points
G3SNN	(All)	317,505	**G4MTC**	(QRP)	33,108
GM3BCL		259,215	**G3VPW**	21MHz	256,498
G3TXF		113,568	G4NXL		16,008
GM4JFS		108,418	**G3FXB**	14MHz	821,028
G6QQ		47,410	**GM4WEW**		13,828
GM4GPN		46,816	**GM4KHE**	7MHz	12,804
G4UDU		40,392	**G4TXM**		7,426
G3ICG		34,295	**G4UPS**	3·5MHz	10,528
G4IUF		23,725	**G3XWZ/A**	1·8MHz	12,188
G2AJB		14,040	G3XTT		6,118
G3JKY		7,762	G3ZRH		3,230
GM8SQ		3,237	G4OBK		850

MULTI-OPERATOR SINGLE-TRANSMITTER

GU3HFN	—	1,470,840	G4TNB	—	288,920
G3XEP	—	936,144	G4VSZ	—	26,880

MULTI-OPERATOR MULTI-TRANSMITTER

GB4ANT	—	4,737,051

Stations listed in bold type receive certificates. **G3FXB** was listed world fifth on 14MHz, **G4MTC** world 15th in the QRP class.

World SSB Championship Contests

0000 to 2400 11 January, 40m
0000 to 2400 12 January, 75m
0000 18 January to 2400 19 January, 160m
0000 to 2400 25 January, 15m
0000 to 2400 26 January, 20m

All organised by *73 Magazine*. Each is a separate contest. Copies of full rules available from G3FKM (sase please).

Results of the **1985 ARRL International DX Contests** have also appeared in *QST* and UK scores are as follows:

PHONE SECTION

SINGLE-OPERATOR

Callsign	Band	Points	Callsign	Band	Points
GW4BLE	(All)	369,090	G3NT	14MHz	12,516
G2QT		44,460	G4XKR		11,040
GU4WTN	14MHz	107,700	G4HBI		6,136
GI0AIJ		56,541	GM3LYY		5,472
GM3BLC		15,936	G3JKY		2,052

MULTI-OPERATOR SINGLE TRANSMITTER

GW8GT	—	449,820

CW SECTION

SINGLE-OPERATOR

G3MXJ	(All)	747,504	G3XWZ	1·8MHz	4,290
G2QT		142,332	G4OBK		990
G3APN		86,664	G3FXB	3·5MHz	76,497
G4XRX		14,076	G4CNY	7MHz	107,019
G3JKY		1,638	G4MPK		7,560
G8QZ		867	G3WPF	14MHz	114,798
GM3LYY		285,948	G2AJB		2,142
GM8SQ		19,500	G3VMY		1,296
GU4XEA		3,621	G4OTU	21MHz	14,790
GW3JI		155,916	G4XTM		1,176
G3ZFC	1·8MHz	5,865			

MULTI-OPERATOR, SINGLE-TRANSMITTER

G3ASR—	225,420	**G3TBK**—	166,320

Two Society trophies are awarded to winners in this contest. **G3MXJ** wins the **Braaten Trophy** as leading G-station in the cw section, and **GM3LYY** the **Milne Trophy** as leading UK non-G entrant. **G3FXB** was leading European entrant on 3·5MHz.

QTH CORNER

BT1BK	JA1HGY, N Mashita, 8-2-4 Akasaka, Minato, Tokyo, Japan.
BV0CRA	CRA, Box 30-547, Taipei, Taiwan.
H5FXT	VE3FXT, G Collins, Box 89, Lynden, Ont, L0R 1TO, Canada.
HC1MD/8	K8LJG, J Kroll, 3528 Craig Drive, Flint, Mich, 48506, USA.
HC8X	F A Fischer, K8CW, 259 W Cook Rd, Mansfield, Ohio, 44907, USA.
J87DX	J Dorr, K1AR, 30 Champa Rd, Billerica, Mass, 01821, USA.
P48K	L Pentimalli, I8MPO, Pco Comola Ricci 90, I-80122 Naples, Italy.
VI5IYY	IYY Dxpedition, LEPARC, Box 937, Port Lincoln, S Australia 5606.
VK3DWP	via G4BIZ, A Paxton, 124 Highfield Lane, Highfield, Southampton SO2 1NP.
VK9XJ	PO Box 147, Christmas Is, Indian Ocean.
VK9ZB	G Weaver, VK6YL, 23 Corbel St, Shelley, 6155 W Australia.
VP2MU	WA6AHF, R Hughes, 17494 Via Alamitos, San Lorenzo, Cal, 94580, USA.
VP2VCW	T Baxter, N6CW, 4639 Katherine Pl, La Mesa, Cal, 92041, USA.
ZD7CW	C Hargis, N4CHD, 864 Branford Lane, Lilburn, Ga, 30247, USA.
XQ0ZFZ	PO Box 13.312, Santiago 21, Chile.
4U1ITU	(CQ SSB Contest) W4KA, 1044 SE 43rd St, Cape Coral, Fla, 33904, USA.

10MHz TABLE

	All time	1985
G3IGW	101	73
G4UZN	72	52
G4VDX	34	33
5B4DN	32	23
G4OBK	26	9
G4YWG	7	7
G5LP	59	—
G4UYR	33	—
G4RWP	4	—

28MHz TABLE 1985

G3VOF	—116	G40BK	—46
G3XQU	—114	G4NXG/M	—43
G4XAH	—93	GW4TEJ	—35
G4JBR	—90	G4YWG	—30
G4RAB	—75 (ssb)	G2FQR (ssb)	—27
G4MUW	—68 (ssb)	G0AGB	—25
5B4DN	—55	G4FVK	—12
G4DXW	—52	G4RWP	— 5
G4VPD	—49		

ALL-TIME BAND TABLE—CURRENT COUNTRIES No 3

	1·8MHz	3·5MHz	7MHz	14MHz	21MHz	28MHz	Total	
G3KMA	**123**	**227**	**293**	316	**314**	**300**	1,573	
G3GIQ	63	196	249	312	312	294	1,426	
G3MCS	49	203	252	312	312	294	1,422	
G4DYO	58	165	218	307	300	282	1,330	
G3XTT	115	184	219	276	273	244	1,311	
G3UML	29	207	220	314	283	243	1,296	
G3HTA	61	164	223	308	284	244	1,284	
G2DMR	49	161	172	299	293	259	1,233	
G3ALI	2	198	204	297	267	230	1,198	
G4FAM	51	155	222	263	263	241	1,195	
G3RUV	6	148	178	298	291	236	1,157	
G3XQU	39	143	173	284	269	241	1,149	
GW4BLE	24	166	180	271	268	240	1,149	
G4GIR	66	152	178	248	244	240	1,128	
G3NOF	4	84	82	**343**	324	278	1,115	
G3RUR	1	153	184	286	261	225	1,110	
G3TXF	59	161	180	252	245	205	1,102	
G3IGW	99	150	234	225	197	182	1,087	
G4BWP	55	160	174	241	204	234	1,068	
G4LJF	28	162	186	257	218	191	1,042	
G3YMC	74	99	163	234	236	184	990	
GW4OFQ	50	182	164	203	188	135	922	
GM3YOR	61	106	154	200	189	176	886	(all cw)
GM3PPE	45	120	142	181	167	138	793	
G4JBR	54	126	105	131	150	126	702	
G4OBK	92	74	101	155	115	121	658	
Average	52	156	187	262	249	223	1,128	

Next deadline: All time countries—with deletions, to reach G3GIQ by **15 January** please.

Some contributors have been confused by the various table headings which appeared during 1985. Please note—entries are required by **15 January** (for **March**), **15 April** (for **June**), **15 July** (for **September**), and **15 October** (for **December**). The **July** and **January** scores are to **include deleted countries**. The **April** and **October** scores will count **countries currently on the DXCC list only**. Will entrants please make a statement with their submissions confirming their contents?

In the **1985 Bermuda Contest** UK scores were as follows: **G4BWP** (276,070 points), G4EOF (71,145), G4CNY (13,590), G4OTU (3,840), G4FJT (2,430), G3NT (2,280), G4GFH (1,760), G4SSN (620), GW3JI (450), G3NHF (100), and G4MTC (30). G4BWP has already visited Bermuda (during "Radio Week" in October) to collect his certificate! Others who topped their sections and joined him in VP9 were DF9ZP (137,750), VE1MG (117,480), and K2UR (137,020).

Around the bands

A recent summary received from G8KG reads as follows: "The upsurge in solar activity around the middle of the year has not been sustained and by September the provisional monthly sunspot number was down to 3·9 with no spots on 16 days. The monthly mean solar flux of 69 sfu was little above rock bottom. If figures like this continue we are indeed approaching solar minimum conditions and the key question is: For how long? At least one forecast suggests that we shall have to wait another two years for the upturn and six years for the next maximum.

"At this stage of the cycle it is important to remember that quite a small rise in solar activity can produce quite marked improvement in the higher bands. This effect was very marked on the weekend of the CQ WW DX Phone contest in October when a small rise in activity (solar flux 85) coupled with a quiet geomagnetic field gave excellent conditions from 3·5 to 21MHz and some excellent dx at times on 28MHz. It was evident that many people had wrongly assumed that 28MHz would be no good and it was sad to hear good zone and country multipliers vainly calling CQ."

The openings on 28MHz gave two entrants in the 1985 table their chance to reach the 100 mark—congratulations to G3VOF (116) and G3XQU (114)!

Alan, G3XSV, visited Los Angeles a few months ago and while there visited the Queen Mary, which is docked at Long Beach. He met WB6WYX (left) and N6AVC in the radio room. Local clubs take turns to operate W6RO. A three-element beam is mounted in the middle funnel!

The following sent in logs from which the next section was compiled: G2FQR, G3YY, G5s JL, LP, G3s GIQ, GVV, IGW, KSH, PJT, VOF, and YRM, G4EHQ, GW4KGR, G4s LRS, MUW, NXG/M, OBK, RFE, UOL, UYR, UZN, VDX, HAH, XKR, and XRR and RSs 10906 and 84869. Very many thanks to these, most of whom support *MOTA* regularly throughout the year.

Stations listed in italics were using A1A.

1·8MHz 0000 LX9BV, *4U1ITU*. **0200** HB0AON, UZ9FWR. **0300** *FM5WD*, VP2VCN VP9AD. **0400** HH7PV, VE1ASJ, *W1,2,3,0*. **0500** *AA1K*, P44B. **0600** *W1-5,8,9, YV2IF*. **0700** ZL2BT, ZL3GQ. **1700** K7NJ/4X. **2000** *4U1ITU*. **2100** *UA9,UL*, UA0BLF.

3·5MHz 0000 AP2ZR, **0100** VP2MW. **0400** PJ2FR, WB7RFA/V2A, VP2EC, 9Y4NP. **0500** *FG5XC, FM5WU*, HP1XXO, *ZL4IE*. **0600** CN2AO, *K8CW/HC8*, VR6JR, ZLs 1BDQ, 2BT, *3GQ*, 4BO. **0700** HK5ISX, AI6V/VP2M, VR6JR. **1700** AP2SQ. **2100** JA6LDD, 9H3IHQ. **2200** UF7VWG, VK6LK, *VS6DO*, W1-W4. **2300** HS0A.

7MHz. 0100 *DJ9ON/S9*. **0200** D44BC. **0300** *CO2VG*, HC8X, J87A. **0400** VP2s EI, MW. **0500** *CE0ZIG, FM5BW, LU, PY, PZ1AV, W7, XE3AAF, ZLs* (to 0700). **0600** KL7IRT *KH6*, ZL0AGI, *DL0MAR/9G*. **0700** *HC4JB, K8CV/HC8, JA, VK9NM/LH*, VK5BC, VR6JR, 3X0HAB. **1000** *W6KG/ZS6, 4U1ITU*. **1500** JA5BJC, *VK2,3*. **1600** *VK6DU*. **1700** *4S7TP*. **1800** *VK3MR*. **1900** *JA, VK2,3,4,6, ZL1,3*. **2000** *ZS6DM, 6W1CK*. **2100** *JA, VK6HD*. **2200** *FM5WD, TAs 1C, 2MX, VK6HZ, VP2VEQ*. **2300** J5WAD.

10MHz 0000 *TR8DR*. **0600** *VK3UC, VK4JH, 5B4OG*. **0700** *VK3,5,6,7, ZL3,4*. **0800** *VK6ABL*. **1100** *N6AV/4*. **1200** *W1-4*. **1500** *4X4WF*. **1600** *PA0WES/EA8, SV0DV/9, VK3CNF*. **1700** *SV1JA, 5B4DN*. **1800** *KP2J, ZS, 5T5RG*. **1900** *OZ3QN/OY, W1-4, 8*. **2100** *FP5HL, LX1JAQ, TK5EL, VK3IM, ZS*. **2200** *FG5s AM, XC, K0WTM/HC1, N5VV* (N.M.), *ZS5BH*. **2300** *CT2FN*.

14MHz. 0700 FW8AF, JA, OD5ZX, VK, YJ8MC. **0800** *JA, KL7*, YI1BGD, 7J6AAA, DJ9ON/9G, *9L1BW*. **0900** FK8CP, KD0IU/KL7, VE7, VK, ZL. **1000** KC6IN, *P29JS*. **1100** KH0AC, ZL, 3D2DM. **1200** FP8QP, JW5EC, KG6JJH, *VK6*, VP5DG. **1300** AH2AV. **1500** A71AD, VK9VO, VU. **1600** JY5DE *YF2AD*, 9M8GH. **1700** FR4CR, S79CW. **1800** H5FXT, J5WAD, K7ABV, KD7LF (both Mont.), DK9KX/S9, W67, DL0MAR/9G, *9Q5MA*. **1900** FM5WE, K6VPM/PJ5, 3X0HAB, 9M2KY. **2000** D68AM, J37AH, TL8HM, VP5EE, *N3RD/VP9*. **2100** J5WAD, JA, TR8DR, V3DL, V44KAC, VPs 2MU, 5GP, 8ML, 8NY. **2200** *CE0FFD*, TI4KF, *TZ6FE*, ZL4BC.

18MHz 0800 *DL, G, SM, EL0BX/MM* (Nr. 6W). **1200** *ZC4HMS*. **1500** *SM0FSE*.

21MHz 0800 A92E, BY8AA, H5AY, JA, *5B4DN, 9J2BO*, 9U5JB. **0900** AP2AM, *3X0HAB*, P29JS, ZD7JAM, 5X5GK. **1000** D44BC, FT8XA, TA1C, VK9ZB, ZM1ACO. **1100** A4XJW, EL2BA, TZ6FE, YC9VGJ. **1200** *FM5WD*, DK9KX/S9, TR8SA, VP2VCW. **1300** *K8CW/HC8, N3RD/VP9*, 8R1Z. **1400** HC1MD/8, HZ1HZ, *JW0A, V2ACW*, VK6IH, *G4BWP/VP9*, W (to 2200), JF1FVZ/5N25. **1500** TA1A, 3B8CA, 3D6AK, *5T5RG*. **1600** C53EK, OA6DA, *PJ9AR*, V44KK. **1700** A22CL, KP2A/HC8, DK9XX/S9, *DJ9ON/S9*. **1800** *J88AQ, FG5DL/F5*, VP2EZ, VP8UK, ZD7AL, *9Y4NM*. **1900** V44KAC, VP8ML. **2000** FG4CH, KP2AJ, XE1ALU.

24MHz 1700 *LU6EF*.

28MHz 0900 4U1VIC. **1000** A71BJ, FR5DX, TA1C, YC0DPO, 3B8DB. **1100** A4XRS, JY9MG, VK9XJ, DF2RG/4S7, 4X6FK. **1200** H5FXT, ZD7JAM, ZS3IL, 3D6DX. **1300** J28EI, VP9AD, ZD7CW, 7P8CM. **1500** A22BW. **1600** CX, LU, DK9KX/S9, TR8JLD, ZS, 4U1ITU. **1700** OH1RY/C56, CT3DK, LU6AJA, P43A, 4V2C, 3X0HAB. **1800** CX, FM4CY, FY7AN, LU, VP2s MW, MU, VCW, XQ0ZFZ. **1900** LU, PJ2FR.

Thanks to the authors of the following for items extracted: The *Ex-G Radio Club Bulletin* (GI3OEN/W6), *Long Skip* (VE3XN), the *Lynx DX Group Bulletin* (EA2JG/EA3CBQ), *DX'press* (PA0GAM), *CQ Magazine* (W1WY), *DXNL* (DL3RK), *Long Island DX Bulletin* (W2IYX), and *DX News Sheet* (G4DYO).

Please send everything for **February** issue to reach G3FKM no later than **23 January**. □

THE 1985 RSGB HF CONVENTION

by D I FIELD, G3XTT

ALTHOUGH there had been an HF Convention at the Belfry Hotel, near Oxford, in 1982, the 1983 and 1984 conventions were held at the NEC, Birmingham, to coincide with the National RSGB Convention. However, a view had formed that hf enthusiasts deserved an event of their own, so the HF Committee decided to hold this year's convention at the Belfry, which in the intervening years had been extended by the addition of modern conference facilities. It was also decided to emphasize the social side of the event to the exclusion of trade stands, but special interest groups and committees would be encouraged to participate. In addition a lecture programme would be organized for those wanting to go away knowing a bit more about hf amateur radio.

HF Convention day, Sunday 29 September 1985 turned out hot and dry, and well before the doors officially opened at 10am the car park was starting to fill up and the first car boot sale participants had arrived. On the previous day members of the Chiltern ARC and Mid-Thames Raynet had set up the demonstration stations and talk-in facilities respectively, while other amateurs who had arrived to stay overnight had helped to unload display stands and generally lend a hand.

The largest stand was the RSGB bookstall—the one exception to the "no trade stands" decision—manned by David Evans, RSGB general manager, and others, including Bob Locher, W9KNI, who heads the CW Honor Roll and is author of *The Complete DXer*.

The Worked All Britain Group put on their first-ever stand at a major event and were pleased with the interest generated. The BYLARA stand attracted a good number of visitors, both yls and oms. Other special-interest groups with stands at the convention were the Chiltern DX Club (with associate membership now open to dxers throughout the UK), and the 160 metre gang (not a club as such, but a get-together organized by Dave Wilson, G3SZA, the UK's leading exponent of top band dxing) which included six of the UK's nine holders of top band DXCC. In addition to Class A licensees, many Class B amateurs were also present, some there to take the morse test and others out of curiosity to know more about hf. In addition, there was a lunchtime gathering of swls organized by David Whitaker, BRS25429.

For the technically minded, the G-QRP Club demonstrated a range of home-made gear, while for those needing help with alignment and other such problems, G3RZP was present with £50,000 worth of test gear. Several visitors brought their rigs for some expert attention.

CW was well to the fore, with the RNARS running high-speed cw tests, and Gavin Williams, of the DTI, putting 19 candidates through the official morse test with 16 passes. This brought to 444 the number of morse tests Gavin had conducted during conventions and rallies in 1985, and he commented that during the time he has been conducting these tests the level of competence of candidates had been increasing.

Another cw activity which generated much interest was the pile-up tape, imported from the USA and simulating a contest-style pile-up. Sixty-six visitors attempted this, and some very creditable performances resulted (the average score was 30·4 calls read out of 100 on the tape. Top scorer was W9KNI with 54).

Well-known dxers PA0HIP, 4X4NJ and G3CWI/VP8ANT at the convention

Brendan McCartney, G4DYO, editor of *DX News Sheet*, had prepared a dx memory quiz which soon separated the newcomers from the old-timers. The quiz was won by Ghis Penney, ON5NT, who, like the winners of the various other competitive activities, received an RSGB book prize.

Several RSGB committees were represented, notably Propagation Studies, EMC, HF and HF Contests. Of additional interest was a demonstration by Pat Gowen, G3IOR, of the use of personal computers for predicting hf propagation. The program he demonstrated was written by John Branegan, GM4IHJ, for the Sinclair Spectrum. The main feature of the HF Committee stand was the unveiling of the new RSGB hf awards. Visitors could also deposit QSL cards for forwarding to the bureau, and by the end of the day the box was full to overflowing. Who says G stations don't QSL? Peter Miles, G3KDB, the Society's hf awards manager, also had a busy day checking cards for awards purposes.

While all this was going on two lecture streams were also in operation. All were well attended, so it seems that the organizers found the right mix of topics of interest to those attending. Ray Flavell, G3LTP, explained that the next sunspot maximum might be late in coming and disappointing when it does come (is this what we wanted to hear?); Neville Bethune, G3RFS, told us that Navassa Island isn't exactly the tropical island of your dreams; and Ghis Penney, ON5NT, was persuaded to give a dxpedition presentation. In contrast to the hardships endured by the Navassa group, Ghis showed slides of a luxury operation from Burundi, hosted by Jim Bullington, 9U5JB, the USA ambassador. Most of the audience were in agreement as to which kind of operation they would prefer!

The G-QRP Club put on a mammoth two-hour presentation, with contributions from Colin Turner, G3VTT; Chris Page, G4BUE; and Ian Keyser, G3ROO. From the attendance it was clear that QRP operation is still very popular, despite the difficulties faced by low-power operators during the sunspot minimum. This continued enthusiasm has surprised even the G-QRP Club officials themselves, though they are certainly not complaining.

Other lectures included those by Pat Gowan, G3IOR, on the subject of HF propagation and the USSR satellites; Peter Chadwick, G3RZP, talking about atus; and advice from RSGB officials and committee members on contesting, tvi, and planning applications.

The main programme of the day closed with the presentation of hf contest trophies and an open forum. Topics of discussion at the forum included band planning for both 1·8MHz and 28MHz fm, ssb on 10MHz, the QSL Bureau, operation from club premises for single-operator events and, of course, the choice of venue for next year's event.

The convention demonstration stations GB2HF and GB2CAR, operated by the Chiltern ARC were on the air throughout, and netted about 250 QSOs in over 50 countries and call areas. The club's enthusiasm was demonstrated by the fact that the station was manned throughout the previous night, working a host of European countries on top band. Antennas used for these operations included inverted-Vs for 1·8 and 3·5MHz, a G5RV, and a three-element tribander for the higher bands. The Mid-Thames Raynet Group, meanwhile, were kept busy on 28, 144 and 432MHz fm, providing talk-in, which goes to show that hf enthusiasts are prepared to use vhf when in need of assistance!

Even after the formal events of the day, the festivities continued. The Chiltern DX Club had organized a dxers buffet which, as a result of advertising in *DX News Sheet*, had attracted about 50 participants. After a long, hot day it was certainly very pleasant to sit by the hotel swimming pool and relax with fellow dxers and their spouses and to look back on all that had happened. Among the 450 visitors to the convention were dx notables such as PA0HIP, DJ8NK, ON5NT, JY9WR, G3CWI/VP8ANT, A61AA/G3LCS, W9KNI and 4X4NJ, as well as amateurs from G, GM, GW and EI.

The level of attendance this year indicates that the HF Convention should become a regular item in the amateur radio calendar, and the HF Committee hopes to achieve a repeat performance next year. This will probably take place on the same weekend in September, squeezed between the Clipperton Convention in Paris and the FOC dinner, to encourage attendance from any amateurs from outside Europe who may be over for these other events. Look out for details of the exact format and venue, in *Radio Communication*.

THE RSGB HF MANAGER, JOHN ALLAWAY, G3FKM, PRESENTING AWARDS AT THE CONVENTION



L to r: the T E Wilson Cup to G4BUO; the Edgware Trophy to the Three As Contest Group; and the Scottish NFD Trophy to the Glenrothes & D ARS



L to r: GW4HSH receives the Powditch Trophy; representatives of the Gravesend RS receive the NFD Shield; and GW3YDX receives the G3XTJ Memorial Trophy. GW3YDX also received the Somerset Trophy and the Victor Desmond Trophy



L to r: the Houston Fergus Trophy to G4JKS; the Bristol Trophy to the Channel Contest Group; and the L H Thomas Trophy to a member of the Rutherford Appleton Laboratory ARC



L to r: G4OBK receives the G2QT Cup-winners Cup; the Three As Contest Group receives the Gravesend Trophy; and a representative of the Rutherford Appleton Laboratory ARC receives the Col Thomas Rose Bowl

HF f-layer propagation predictions for December 1985

Using the table

For each route, the **bands** appear vertically and the **time** horizontally, as indicated in the left-hand KEY blocks of the top two rows.

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. Additional 50 and 1·8MHz openings are indicated by a plus (+) sign in the 28 and 3·5MHz rows respectively.

KEY TO BANDS	MOSCOW	MALTA	GIBRALTAR
28 MHz .	.....11.....	.....	.....
21 MHz .	....2652....	....3554....	.....333....
14 MHz .	....88882...	....88886...	....68887...
10 MHz .	32.476677..1	453376678322	232186668311
7 MHz .	985644457668	998743347888	898764345887
3.5 MHz .	++532..24+++	+++4....4+++	++++3...2+++

KEY TO TIMES GMT	ICELAND	OSAKA	HONGKONG
000001111122	......21....	.....	....32.....
024680246802	.....6884...	....5.....	....663.....
.....	....477782..	....62121...	...144431...
.....	552.75557753	1..142124243	2...11124354
.....	++++42224+++	.....25+2	.....25+4

BANGKOK	SINGAPORE	NEW DELHI	TEHERAN
.....2.....	....121.....	....11.....	....121.....
....572.....	....5762....	....563.....	....6662....
...15761....	...14667....	...25662....	...455671...
2...24444..1	2...14454.12	42.123452.13	542322455124
3....1125466	2....1125576	731..1125578	8841..125678
.....25+3	.....25+3	5.....25++	++.....25++

COLOMBO	BAHRAIN	CYPRUS	ADEN
....121.....	....211.....	....2321....	....2211....
....5663....	....6562....	....7876....	....6565....
...235671...	1..434671...	22.676786..1	1..422575...
12...2456124	6323113551134	885644468556	7.22..257345
52....125678	973...125688	9973112368899	952....25788
3.....25++	+5.....25++	+++4.....3+++	+4.....25++

SUVA/S	SUVA/L	WELLINGTON/S	WELLINGTON/L
.....	....1.....	.....	.....
.....	....642.....	.....	....11.....
.....243....	111.86654411	....1552....	.11.75322411
....14453...	..2364346652.	....54451...	..1164346421
....321252..	...2311142..	....42124...	...1311141..
.....2...	.....	.....2...	.....

SYDNEY/S	SYDNEY/L	PERTH	HONOLULU
.....1.....	.....	....121.....	.....
....364.....	.....2.....	....6763....	.....
...17766....	....365314..	...246671...	.....
...154453...	54345731	1....14456112	......2142..
....2112521.	....2111441.	1125662	.11.321252..
.....23..	.....2..	.....254.	..242...2...

SEYCHELLES	MAURITIUS	NAIROBI	HARARE
.....111.....	....2221.....	....2222.....	....1123.....
....3565.....	....6566.....	....65671...	....45673...
...222575...	21.222576...	2..322367.1.	23.332357111
5.1...257345	741...257455	8222...37566	8822...26777
811....25788	73.....25789	863....14788	973.....3789
+.....25++	4.....24++	+4.....24++	+4.....4++

CAPETOWN	LAGOS	ASCENSION Is	DAKAR
.....133.....	....14441...	.....3322...	.....3332...
....35675...	....67676...	....37666...	....27666...
31.132346322	34.153236432	243.63234422	234.75225422
8622...14688	89342...3788	898341..1478	789352..2578
873.....1489	8873....1588	88851....269	88972....279
+4.....5+	5+5.....2++	+++2.....3+	+5+4.....4+

LAS PALMAS	8th SHETLAND	FALKLAND Is	R DE JANEIRO
.....2321...	.....11...	.....32...	.....1.....
....27776...	....24556...	....14465...	.....5324...
133.87667421	133.76543211	134.66432211	124.46322211
788575445777	466253211123	5783631..123	7893631..136
9998521125B9	234321.....1	467531.....1	889741....15
++++2....2++	.....	.442.....	+++5.....2

BUENOS AIRES	LIMA	BOGOTA	BARBADOS
.....1...	.....111...	.....11....	.....111...
.....4335...	.....664...	.....664...	.....1634...
123.6642221.	..1...6431..	....116422..	.....66322..
6703641...23	3361.231..11	22515431..11	3361443..122
689741.....2	5886221....1	7786421....2	888642....15
3++5.....	2++5.....	4++5.....	++55.....2

JAMAICA	BERMUDA	NEW YORK	MEXICO
.....1....	.....1....	.....1....	.....1....
.....364...	.....364...	.....153...	.....53...
.....6532..	....26543..	.....5653..	.....1742..
113.4342..11	1.2.24421231	..1.1244333.	..1.22341...
6675421....3	7675421...25	65724211..24	36724212...1
5++5.....	++++2.....3	++++2.....2	.++52.....

MONTREAL	DENVER	LOS ANGELES	VANCOUVER
.....	.....	.....	.....
.....153...	.....2...	.....1...	.....
.....5763..	.....462...	.....162...	.....31..
....1344333.	....1..5421.	....11.4421.	.....1641.
6562421121124	355.41121..1	255.32121...	353.31123211
++++2.....3	2++52.....	.4+52.....	.4+52.....

The provisional mean sunspot number for September 1985 issued by the Sunspot Index Data Centre, Brussels, was 3·9. The maximum daily sunspot number was 10 on 18, 19 September, and the minimum was 0 on 2–10, 12, 23–28 September. The predicted smoothed sunspot numbers for December, January, February and March are, respectively: (classical method) 8, 7, 5 and 4 (SIDC adjusted values) 0(2 to −4), 0(1 to −5), 0(0 to −6).

Contest News

432MHz Low Power Contest 1985 results

This contest was introduced into the calendar last year, and again proved to be a very popular event. The lack of Continental activity and the multiplier scheme favoured stations away from the east coast (for once!). The multiplier system was understood by most entrants; however, a few did not claim for countries worked and this time the adjudicator did not rectify such errors. Scoring was generally accurate, although one station appeared to have scored using a random number generator!

The weather was wet and windy over most of the country, and conditions were generally described as poor. Nevertheless, a number of long-distance contacts were made. The late-night finish was unpopular with a number of entrants who would have preferred a daytime event. This is being considered by the VHF Contests Committee for next year.

Other comments from the logs included: "Noticeable that certain stations needed fans to cool their power amplifers down—must be hot stuff this QRP on 70" (GW4MGR/P), "Only managed to operate for 2·5h as my wife was ill—could not desert her could I?" (G6ICR), "Seven QSOs may seem a ridiculous total for a contest but it was all we heard" (GM6MGS/P).

Congratulations to the winners, G0ALE and G4RNL/P, and the runners up, G4SHC and GW8SJP/P, all of whom will receive certificates of merit.

G4KGC

FIXED STATIONS

Posn	Callsign	Points	QSOs	Mult	Loc	County	Best dx	Km
1	G0ALE	28,098	132	42	01AH	SRY	GI8AYZ/P	535
2	G4SHC	22,661	84	48	83VO	MCH	G1FBH/P	349
3	G4NBS	20,874	81	42	02AF	CBE	GI6ATZ	470
4	G8HHI	18,012	94	38	91OH	HPH	GI8AYZ/P	496
5	G3JXN	15,059	106	37	91UM	LDN	GIHGJ	397
6	G6ZME	10,302	64	32	82SQ	SLP	GI8AYZ/P	305
7	G1OHM	6,583	57	37	92AJ	WMD	PA3DZL	462
8	GILOH	5,992	52	28	92JC	NHM	GW2HIY	271
9	G6ICR	5,725	41	25	83NJ	MSY	G4CQR	330
10	G6AJE	5,490	43	30	92JP	LEC	G1FBH/P	223
11	G3PMX	4,025	35	25	01FT	ESX	GW8SJP/P	259
12	G4FOH	2,992	26	22	92XI	CBE	G6URX	310
13	G1KDF	2,860	27	20	83NN	LNH	G3WOR/P	342
14	G1IBM	2,632	62	18	91UN	LDN	GW8ELR	322
15	G8BBC	2,565	64	19	91WM	LDN	G4RNL/P	219
16	G8ZQB	2,140	32	20	92JN	LEC	GW4ZVQ/P	193
17	G4FVK	1,734	21	18	92VN	CBE	G8TZT/P	227
18	G4LDR	1,296	19	16	91CD	WLT	G8LMW/P	304
19	G4DFI	827	21	15	01BL	LDN	GW8SJP/P	250
20	G4WRW	686	15	14	81SJ	AVN	G4RNL/P	197
21	G4YFN	610	37	10	91MK	BRK	G1FBH/P	103
22	G6DTW	370	26	10	91UH	SRY	G4NBS	104
23	G8GFF	144	10	8	91VK	LDN	G4FRE/P	108

ALL OTHER STATIONS

Posn	Callsign	Points	QSOs	Mult	Loc	County	Best dx	Km
1	G4RNL/P	62,814	190	57	93AD	SFD	ON6OO	502
2	GW8SJP/P	34,160	122	40	82JJ	PWS	G6TRM	319
3	G8TFI/P	28,440	112	42	82LB	HWR	PA3DZL	525
4	G4NUT/P	26,671	136	45	91NV	BKS	GI8AYZ/P	444
5	GW4MGR/P	21,630	85	42	83JA	CWD	GM3ZME/P	349
6	G4FRE/P	19,760	75	38	02KD	SFK	G1HGJ	357
7	G0BSA/P	17,836	117	36	91FN	OFE	G1LJT	336
8	GW4ZVQ/P	15,960	50	38	83BF	GDD	G4CQR	364
9	GW5RS/P	15,660	81	36	82KA	PWS	G4SWX	302
10	G8ZK/P	14,898	90	39	92MT	LEC	GI8AYZ/P	375
11	G3WOR/P	12,600	116	28	90TV	SXW	GW4ZVQ/P	352
12	G8TZT/P	12,060	60	30	84TD	YSN	G1FBH/P	407
13	G3WOI/P	11,550	94	33	91GI	BRK	GI8AYZ/P	462
14	G4WIK/P	10,848	84	34	91BJ	WLT	G6PYY/P	333
15	G1FBH/P	8,352	82	24	00BT	SXE	G4SHC	348
16	G6PYY/P	8,216	40	26	94DJ	YSN	G4CQR	390
17	G4OJO/P	7,840	87	28	91MA	HPH	G8TZT/P	360
18	G4DDL/P	6,237	45	27	80ST	DOR	G8LMW/P	354
19	GI8AYZ/P	5,904	22	24	74CO	DWN	G60ALE	535
20	G5LK/P	5,325	75	25	91UD	SRY	G4SHC	302
21	G0AWP/P	4,972	44	22	93RS	HBS	G4CQR	304
22	G4VUA/P	4,600	51	20	92QW	LCN	GW2HIY	275
23	G6SPS/P	4,485	50	23	01HS	ESX	GW4ZVQ/P	344
24	G4WWD/P	4,266	96	18	91PC	SRY	G4SHC	296
25	G1DRC/P	4,209	46	23	93FI	YSS	G1FBH/P	304
26	G3NAT/P	4,201	41	22	80AP	DOR	G3LMW/P	360
27	G0BRA/P	3,840	48	24	92GB	OFE	G6ICR	176
28	G4YGW/P	3,401	25	19	94GU	TWR	G4CQR	433
29	G8WIM/P	1,425	50	15	91UI	SRY	GW4ZVQ/P	320
30	G8LNC/P	1,274	25	14	90JO	IOW	G6WZO	356
31	G6CSY/P	729	28	13	01BH	KNT	G0BRA/P	132
32	G6OKU/P	689	21	13	93FG	DYS	G4NBS	157
33	GM6MGS/P	205	7	5	87WB	GRN	G4RNL/P	436

G8JAY was disqualified (Rule 12).

Checklogs received with thanks from G4ZNM and BRS32525.

Ropoco 2 1985 results

Once again almost 50 entrants took part in Ropoco 2. There was a close struggle for the XTJ Memorial Trophy, and average scores were up on last year. First winner of the XTJ Memorial Trophy is Ron Stone, GW3YDX, who had an immaculate log of 63 QSOs.

In general the standard of logs was good, although six stations had unmarked duplicates and there are still those who insist upon changing what they have received into a recognisable post-code. With 144 stations appearing in the logs it is a shame that no more than one third could make the effort to send in a log.

The adjudicator thanks all those who entered the contest and those who sent in check logs.

G4DJX

Posn	Callsign	QSOs	Score	Posn	Callsign	QSOs	Score
1	G5LP*	75	744	25	G3MUO	46	454
2	G4OBK*	71	700	26	G3MA	47	438
3	G4NUT/A*	69	684	27	G3TVW	45	434
4	G0CMM	68	677	28	G4FNC	46	421
	G3NOM	69	677	29	G3KKQ/P	42	414
6	G3JKS	68	674	30	G4CIB	39	387
7	G4BUO	66	657	31	G3HKO	38	357
8	GW3YDX†	63	630	32	G3BPM	38	355
9	G3NKS	62	620	33	G3CQR	36	351
10	G3KHZ	65	614	34	G4JHI	47	341
11	G3GC	56	557	35	G3GHY	45	338
12	G3RXP	55	544	36	G3LQI	35	337
13	G4KGG	53	530	37	G4KWI	43	330
14	G4UPS	57	527	38	G4CLR	42	314
15	G4OTU	54	520	39	GW3JI	44	307
	G3JJZ	52	520	40	G3MCX	31	304
17	G3JJG	52	514	41	G4PUR	31	291
18	G4UMS	52	510	42	G3SB	28	274
	G4HFT	51	510	43	G4ODV	28	271
20	G4EBK	52	507	44	GM4OSS	26	244
21	G4BOU	51	487	45	G4NFX	21	200
22	G2HLU	47	467	46	G3GMM	16	154
23	G4UML	59	464	47	G4PVB	7	47
24	G4OGB	47	457				

*Certificate winner.
†XTJ Memorial Trophy winner.

144MHz Low Power Contest Results

This year's contest was again very popular, but the weather was very poor with high winds and driving rain reported from all corners of the country. The number of entries was up on last year, but the standard was generally poor with most entrants failing to read the rules; many did not submit separate county and country checklogs, and others lost thousands of points by not claiming for all the countries they worked. As stated quite explicitly in the rules, all new countries count (ie GU, GJ, GW etc) towards the final multiplier. Points were lost for incorrect callsigns, mistakes costing dearly with the multiplier system in use.

The multiplier system was appreciated by most, even though in a low power contest it seems to discourage entries from the east and southeast of England. Over 20 complaints were received about the requirement to use the Maidenhead locator system which, being less accurate and one digit longer, seems to have little going for it in a European contest, with the Dutch already —and possibly the Germans in 1986—reverting to the European locator system; should we follow suit? Your views please.

Many thanks to all entrants, but please send multiplier checklogs next year. Congratulations to G6XVW and GW8KQW/P, and to runners-up.

G8TFI

FIXED STATIONS

Posn	Callsign	Points	QSOs	Mult	County	Best dx	Km
1	G6XVV	95,568	219	66	YSW	F1DDA/P	817
2	G4SHC	65,436	186	58	MCH	G6HIE/P	467
3	G4NBS	58,563	176	57	CBE	GM6LNM	515
4	G8BBC	44,044	214	52	LDN	GI1JUS/P	534
5	G6LOH	43,044	156	51	NHN	GM6LNM	484
6	G4PIQ	42,504	148	46	ESX	F1DDA/P	588
7	G4MVR	36,566	167	47	LDN	GI4OPH	506
8	G6ZME	35,190	187	46	SLP	GM3ZME/P	409
9	G6HKM	32,130	141	42	ESX	GI1JUS/P	541
10	G4NVA	30,316	110	53	CHS	GM4ZUK/P	426
11	G4HLX	21,472	113	44	OFE	GI4OPH	416
12	G3YDY	21,402	112	41	ESX	GI1JUS/P	550
13	G8ZRE	21,168	98	42	CHS	GM3IDS	329
14	G4DFI	18,463	99	37	LDN	GI1JUS/P	538
15	G1BRS	17,908	120	37	DOR	G8NTD	345
16	G3BZU	17,045	125	35	HPH	G6PYY/P	382
17	G1OHM	16,605	106	41	WMD	GI4TAJ/P	376
18	GW3POM	15,334	75	34	GNM	ON7HP	543
19	GM4IDS	14,730	61	30	FFE	G8LNC/P	600
20	G1GLJ	13,718	69	38	WLT	GM4ZUK/P	657
21	G4FVK	12,540	66	38	CBE	GI4TAJ/P	440
22	G4TDL	12,441	117	33	BRK	ON1BSE	354
23	G6IAT	12,028	108	31	BFD	GI4OPH	450
24	G4OVG	11,840	84	32	ESX	GM1GXJ/P	477
25	G1IBM	11,674	171	26	LDN	ON4BG	313
26	G1GNZ	10,710	61	34	LNH	GM4ZUK/P	371
27	G6NUM	10,656	64	32	NOT	GI4TAJ/P	380
28	G4WRW	10,430	70	35	AVN	GM1GXJ/P	387
29	G1JGJ	8,738	49	34	LCH	G1FBH/P	198
30	G4TVI	8,448	99	24	ESX	PE1HVD	302
31	G1GWS	8,160	49	34	CHS	G1FKN/A	341
32	GW0ACH	6,938	55	26	GNM	G4CDC	307
33	G1GTG	6,810	61	30	NOT	GM1GXJ/P	281
34	G4VEL	6,768	53	24	NOR	F1ERF	376
35	G0BYF	6,468	71	28	WMD	G1FBH/P	231
36	G0CHI	5,856	53	25	SXW	IO83VO	331
37	G6OKU	5,852	41	28	DYS	GI4TAJ/P	340
38	G1DWQ	5,642	49	26	DOR	G6XVV	296
39	G8YGD	5,198	90	23	HPH	G8NTD/P	290
40	G8GFF	5,122	51	26	LDN	GW4MGR/P	264
41	G0BAI	3,074	60	30	LEC	—	—
42	G6MXL	3,045	32	21	DOR	G4CDA/P	268
43	G1JVQ	2,032	25	16	SXE	G8JAG	421
44	G1FUU	1,938	20	17	SFK	GW4MGR/P	282
45	G1AMX	1,736	20	14	NLD	GW6WKP/P	370
46	G4WCJ	1,600	22	14	DOR	G8VLL	308
47	G2DHV	378	22	9	LDN	G4CDA/P	240
48	G6PFN	280	12	10	LEC	GW4MGR/P	150

Many thanks for checklogs from G4ZNM, G8XTV, G0AMG and G4XML. G4INL, G8JAY, G4VXE and GW4TTU were disqualified (Rule 12).

ALL OTHER STATIONS

1	GW8KQW/P	213,180	386	66	PWS	DJ7CL	722
2	G4CDA/P	211,935	442	71	SFD	DA1UM/A	659
3	GW4MGR/P	183,050	347	70	CWD	F1DDA/P	894
4	G8LNC/P	162,288	338	69	IOW	GM3ZME/P	670
5	GW6GS/P	148,070	335	65	PWS	DL8GP	771
6	G4NUT/P	118,080	335	64	BKS	F1DDA/P	696
7	GW6WKP/P	105,774	241	60	GNW	PE1LCL	—
8	GM4RZW/P	97,254	206	54	SCD	G4VPM	551
9	GI4TAJ/P	83,616	139	48	ATM	G6ECM	608

Posn	Callsign	Points	QSOs	Mult	County	Best dx	Km
10	G1FBH/P	81,000	266	54	SXE	GI4TAJ/P	602
11	G4WAR/P	76,500	257	58	LEC	DB8KJ	547
12	GW8GIZ/P	76,320	212	60	CWD	GM4ZUK/P	445
13	G4DDN/P	71,709	197	60	DOR	GM4ZUK/P	695
14	G3WOI/P	70,235	265	55	BRK	GM3ZME/P	569
15	G4WET/P	67,536	244	63	HWR	GM4ZUK/P	560
16	GW3SSK/P	66,330	190	55	GNM	GM4ZFS/P	571
17	GW4ALG/P	64,670	207	58	GWT	PE1JYB	549
18	G8WPD/P	62,911	239	53	DYS	EI5KK/P	479
19	G8ZK/P	62,832	221	56	LEC	EI8EF	517
20	GM1GXJ/P	61,557	115	51	DGL	F6FLB	587
21	G3VRE/P	57,085	266	49	WLT	DB8KJ	561
22	GW6ZCR/P	54,850	209	50	CWD	ON6BE	591
23	G4FPV/P	49,650	219	50	HWR	DJ9UX	658
24	GW8HGN/P	48,450	126	57	GDD	GM6KXS	449
25	G4WWD/P	42,294	251	42	SRY	GI6ATZ	518
26	G4YGW/P	41,689	129	47	TWR	G3NAT/P	468
27	G4WFS/P	40,782	221	42	NHN	DJ0PQ	595
28	GW4ZUL/P	40,467	189	41	GWT	PA0PDV	455
29	G4SJK/P	37,800	180	45	GLR	GM4ZFS/P	554
30	GI1JUS/P	33,501	73	39	ATM	G4RKV	608
31	G1FKN/A	32,893	177	37	SXE	GM6LNM	625
32	G5LK/P	32,250	183	43	SRY	G6PYY/P	373
33	G8PRH/P	30,444	130	44	MCH	GM4ZUK/P	386
34	G3NAT/P	30,229	134	44	DOR	G4YGW/P	470
35	GI8AYZ/P	30,217	63	41	DWN	G4RKV	584
36	G3SRT/P	29,700	148	46	SLP	GM4ZUK/P	502
37	G0BRA/P	28,908	166	44	OXE	GM3IDS	472
38	G4MPN/P	28,434	144	42	LEC	GI4TAJ/P	405
39	G4WZA/P	26,488	142	43	SLP	—	—
40	G4GXP/P	26,281	153	41	SLP	PA0XPQ	456
41	G1DVU/P	26,145	183	35	SXE	DJ7CL	489
42	GW3LRS/P	24,320	130	40	PWS	GI4TAJ/P	368
43	G4XPE/P	23,600	138	40	DYS	G4LXS	364
44	G4MDP/P	21,488	150	35	SXW	GM1GXT/P	496
45	G1ARL/P	20,596	170	38	BKS	GM4BPY/P	478
46	G4WIK/P	20,140	137	39	WLT	GI8AYZ/P	442
47	G4PFQ/A	19,503	133	33	DHM	G8JAY	330
48	G4UXA/P	19,005	163	35	HFD	GI4OPH	443
49	G4GIY/P	17,720	53	40	NOR	GI1JUS/P	478
50	G6CSY/P	16,472	104	29	KNT	G4ZVA	416
51	G4ORC/P	16,243	104	37	YSW	G1FBH/P	341
52	G2VJ/P	16,092	75	36	DVN	GI4TAJ/P	418
53	G1DWI/P	15,776	110	35	YSS	GM3WOJ	491
54	G1CPP/P	14,048	115	32	SFD	GI1JUS/P	353
55	G4OJO/P	11,010	100	30	HPH	G6PYY/P	378
56	G0BKL/A	10,800	83	30	ESX	GM4RZW	508
57	GM4ZUK/P	10,741	37	26	GRN	G4DDN/P	695
58	G6PYY/P	10,276	54	28	YSN	G1FBH/P	470
59	G0BYL/P	8,289	60	27	DVN	—	—
60	G0ASA/P	4,408	26	19	CNL	G4SHC	430
61	G3CZU/P	4,011	75	21	SRY	G8WPD/P	272
62	G8WIM/P	3,417	109	17	SRY	G6XWA/P	281
63	G4SSD/P	1,032	26	12	DVN	G4CDA/P	270

3·5MHz Hopscotch Contest 1985 results

An experiment that worked! All comments received confirm that the QSY rule gives an interesting new twist to contesting and provides a lot of enjoyment as well as a new test of operating skills.

The general format met with wide support, so Hopscotch will be repeated next year. The many specific suggestions about rules are much appreciated by the adjudicator and will be carefully considered before next year's rules are finalized.

Being a new event the level of support was gratifying and yet again confirms the popularity of short, sharp contests: 37 logs were received and participation will greatly increase next year when word gets around!

Congratulations to certificate winners G3FXB, G4OBK, and GW3NJW as first non-G.

G3SXW

Posn	Callsign	QSOs	Points	Posn	Callsign	QSOs	Points
1	G3FXB*	80	800	20	G3KDB	47	470
2	G4OBK*	77	759	21	G3IGU	48	468
3	G3WVG	74	738	22	G3JNB	58	463
4	G3SJJ	74	735	23	G4XBF	58	432
5	G4BUO	72	720	24	GW3JI	43	427
6	G3SYA	72	719	25	G3SXW	41	409
7	G3JJG	70	696	26	GW4HDB	41	398
8	G4OTU	71	695	27	G4OYC	44	390
9	G4FAM	70	676	28	G4HZV	40	389
10	G5LP	82	671	29	G3BPM	41	378
11	GW3NJW*	65	640	30	GM3UM	37	370
12	G3MCK	60	600	31	G3KZJ	35	337
13	G8DV	60	587	32	GW4KVJ	31	305
14	G4KRS	54	530	33	G4WYG	40	285
15	G3CCZ	53	529	34	G3SB	28	275
16	G2VJ	52	507	35	GW4ALG	27	268
17	G2HLU	52	499	36	G2FNK	29	253
18	G3TXF	50	493	37	G4PVB	7	70
19	G4KGK	49	490				

70MHz Trophy and SWL Contest September 1985

Overall, conditions were about average for this contest and contestants found the pace leisurely with excellent operating standards. Some, however, experienced very bad weather. EI2VWP/P had their 12 over 12 Yagi and tent destroyed by overnight gales before the contest and urge that the contest be moved back towards mid-summer.

Activity was high at first but dropped significantly when most stations had been worked. G4ZYA/P analysed his log and found that 50 per cent of all contacts were made in the first hour, 75 per cent by the end of the second hour and 90 per cent by the end of the third hour. From other comments it would seem that this was a common experience. To overcome the problem G4ZYA/P suggests that one alternative would be to allow two contacts with any one station, one on phone and one on CW, with a restriction of a gap of (say) four or five in serial numbers between contacts and different modes. This would probably be very difficult to administer but is nevertheless food for thought for next year. Many more stations were operating than entered the contest and regretfully there was only one listener entry.

Congratulations go to the overall winner, GM4LIP/P, who receives the VHF Managers Trophy; to the runner up in the "all other stations" section, E12VWP/P; to G4ZAP, the leading Fixed station; and G4ZFR the runner up, all of whom receive certificates. The only swl entry was BRS28198, of Rye, Sussex and he also receives a certificate.

G2DHV, G3VNQ and G3YKP are thanked for check logs.

G3FZL

FIXED STATIONS

Posn	Callsign	Score	QSOs	QTH	Best dx	Km
1	G4ZAP	584	85	IO93DC	EI9BG	466
2	G4RFR	535	68	IO90AS	GM4LIP/P	608
3	G3RSI	523	76	IO91OF	GM4LIP/P	605
4	G3UKV	438	66	IO82RR	GM4LIP/P	399
5	G4ASR	341	54	IO81MX	GM4LIP/P	455
6	G3VIP	302	34	IO93XN	GM4LIP/P	455
7	G4FOH	225	31	IO92XI	GM4LIP/P	542
8	G2FNK	174	22	IO80SQ	GM4SIV/P	467
9	G4JEC	170	24	IO91WJ	GM4SIV/P	481
10	G4YTL	164	26	IO91JU	GM4LIP/P	530
11	G3IKR	153	27	IO82XF	GM4LIP/P	465
12	G4LRT	117	13	IO92KJ	GM4LIP/P	486
13	G3JDM	81	13	IO82WS	G4BVY/P	300

ALL OTHER SECTION

Posn	Callsign/P	Score	QSOs	QTH	Best dx	Km
1	GM4LIP	883	50	IO65WP	G4FRE	634
2	EI2VWP	777	61	IO62US	G4FRE	549
3	G3SYA	750	82	IO84SA	G4BVY/P	429
4	G4BVY	731	67	IO80EF	GM4LIP/P	625
5	GM4SIV	724	59	IO74MO	G4FRE	507
6	GW4MGR	542	60	IO72QT	G4FRE	411
7	G3PWK	509	73	JO02BH	GM4LIP/P	550
8	G4ZYA	504	71	IO90LX	GM4LIP/P	619
9	G3UAX	452	74	IO91GI	GM4LIP/P	567
10	GW4VIX	436	60	IO81IJ	GM4LIP/P	509
11	G3BPM	390	50	IO80NV	GM4LIP/P	571
12	GW3VLT	388	50	IO81JP	GM4LIP/P	484
13	G3GWP	358	66	IO92LJ	GM4SIV/P	354
14	G3ZOI	245	39	IO91KF	GM4LIP/P	592

1,296/2,320MHz Contest results

This event was marred by bad weather and poor conditions, which resulted in lower scores than in 1984. Probably as a result, Continental activity appeared to be at a very low level. The timing of the contest was adjusted to give stations a chance of operating during the "down lift," but there was no evidence of any lift at the start of the event. Perhaps the dx stations are not active early in the morning in the absence of a 24h contest. Opinion was equally divided on the desirability of the early start.

A special appeal must be made for entrants to read the rules of a contest. In this event, three logs had to be rescored using the points/km system, and two groups did not submit 4422 summary sheets for multiband entries. In view of the special nature of this event, no penalties were incurred, but prospective entrants are urged again to read the rules carefully to avoid adding to the workload of the adjudicator.

Certificates will be awarded to the winner and runner-up in each section where appropriate, and to the overall winners.

G4JLG

FIXED SECTION OVERALL RESULTS

Posn	Callsign	Square	Total points	Band position 1,296MHz	Band position 2,320MHz
1	G4CBW	IO83	1,983	2	1
2	G8JHL	IO83	1,035	5	2
3	G4TAW/G6CSY	JO01	785	11	3
4	G8PNN	IO95	420	6	—
5	G1HGJ	IO95	303	9	—
6	G4PEC	IO95	244	12	—
7	G8BKE	JO01	164	16	5
9	G4EAT	JO01	123	17	6
9	G6LOM	IO92	110	15	—

ALL OTHER STATIONS SECTION OVERALL RESULTS

Posn	Entrant/Callsign	Square	Total points	Band position 1,296MHz	Band position 2,320MHz
1	Addiscombe & Tatsfield ARC	JO01	2,000	1	1
2	PACT	IO93	1,065	2	2
3	University of Surrey ARC	IO91	374	3	—
4	G6YLO/M	JO01	344	6	3
5	G8XCY/P	JO00	213	5	—

1,296MHz FIXED SECTION

Posn	Callsign	Points	QSOs	QTH	Power dbW	Best dx	Km
1	G4CQR	7,857	52	JO0IBB	+20	G3JYP	391
2	G4CBW	7,721	44	IO83UB	+22	G8XCY/P	314
3	G4MGR	6,465	28	IO83KH	+20	G4ALE/P	344
4	G8ZQB	3,783	32	IO92JN	+16	G8PNN	298
5	G8JHL	3,564	21	IO83UM	+23	G4ALE/P	319
6	G8PNN	3,299	17	IO95EF	+17	G4ALE/P	457
7	G4NBS	3,267	26	JO02AF	+0	G8PNN	351
8	G4ZTR	2,986	33	JO01FS	+20	GJ4ICD	336
9	G1HGJ	2,383	14	IO95FA	+10	G4ALE/P	434
10	G6ETA	2,243	23	IO93FI	+3	G4NVA/P	283
11	G6CSY	2,139	29	JO01BI	+0	G4MGR	310
12	G4PEC	1,920	11	IO95GA	+15	G4ALE/P	432
13	G8CHW	1,882	26	IO91TQ	+1	G4NVA/P	198
14	G3WIM	972	14	IO91VH	+0	G4NVA/P	244
15	G6LOH	866	8	IO92JC	+3	G4ALE/P	164
16	G8BKE	619	12	JO01KT	+17	G4CQR	92
17	G4EAT	332	9	JO01FQ	−3	G6YLO/M	64

2,320MHz FIXED SECTION

Posn	Callsign	Points	QSOs	QTH	Power dbW	Best dx	Km
1	G4CBW	2,353	15	IO83UB	+16	GOALE/P	284
2	G8JHL	1,366	8	IO83UM	+6	GOALE/P	319
3	G4TAW	1,206	9	JO0IBI	+1	G8JHL	291
4	G8LMW	990	8	IO92JP	+7	GOALE/P	199
5	G8BKE	200	5	JO0IIT	+0	G6YLO/M	62
6	G4EAT	190	6	JO0FQ	−3	G6YLO/M	64

1,296MHz ALL OTHER STATIONS SECTION

Posn	Callsign	Points	QSOs	QTH	Power dbW	Best dx	Km
1	G4ALE/P	13,545	81	JO01KJ	+26	GI4OPH	551
2	G4NVA/P	8,055	48	IO93FI	+12	G8XCY/P	317
3	G3IGQ/P	5,063	57	IO91XG	+16	PA0RDY	361
4	G6AJE/A	4,502	34	IO92JP	+15	G8XCY/P	237
5	G8XCY/P	2,886	15	JO00DR	+3	F6BDN/P	719
6	G6YLO/M	2,445	23	JO01OI	+0	G4CBW	298

2,320MHz ALL OTHER STATIONS SECTION

Posn	Callsign	Points	QSOs	QTH	Power dbW	Best dx	Km
1	GOALE/P	2,514	14	JO01KJ	+15	G8JHL	320
2	G4NVA/P	1,156	9	IO93FI	−7	GOALE/P	272
3	G6YLO/M	409	7	JO01OI	−2	G0BPU	85

Chelmsford/Colchester DF Qualifying Event

Eighteen teams assembled at Tiptree Heath on 19 May for the start. The two signals were clearly heard and gave bearings nearly 180° apart. Without the benefit of green leafcover, both stations had resorted to long antennas and blackthorn, the natural equivalent to barbed wire.

Station A, G3KPJ/P, was hidden in the aptly-named Wilderness six miles southeast of the start. Here Arthur had arranged some 250m of wire, which

Contests Calendar

1 December	144MHz Fixed and AFS *(Rules in October issue)*
3, 19 December	1,296/2,320MHz Cumulatives
7, 8 December	EA DX *(Rules in November* MOTA)
7, 8 December	TOPS Activity *(Rules in November* MOTA)
11 December	432MHz Cumulative
14, 15 December	ARRL 10m *(Rules in December* MOTA)
15 December	70MHz CW *(Rules in November issue)*
1986	
1 Jan–31 Dec	UBA SWL *(Rules in December* SWL News)
6–30 January	CW Cumulatives *(Rules in November issue)*
11, 12, 18, 19, 25, 26 January	World SSB *(Rules in December* MOTA)
12 January	Affiliated Societies *(Rules in November issue)*
26 January	70MHz Cumulative
1, 2 February	7MHz SSB
1, 2, 22, 23 Feb	7MHz *(Rules in October issue)*
2 February	144MHz CW
8, 9 February	First 1·8MHz
9 February	70MHz Cumulative
16 February	432MHz Fixed
22, 23 February	7MHz CW
23 February	70MHz Cumulative
1, 2 March	144/423MHz and SWL
8, 9 March	Commonwealth *(Rules in September 1985 issue)*
9 March	70MHz Cumulative
15 March	Town & County
23 March	70MHz Cumulative
6 April	432MHz CW
6 April	Ropoco 1
20 April	70MHz and SWL
20 April	Low Power Fixed
May-Sept	Microwave Cumulatives
May-Sept	10GHz Cumulatives
3, 4 May	432MHz–24GHz
17, 18 May	144MHz and SWL
18 May	Region Round-up
31 May	1,296MHz Trophy
1 June	432MHz Trophy and SWL
7, 8 June	HF NFD
28, 29 June	Summer 1·8MHz
5, 6 July	VHF NFD and SWL
12, 13 July	HF SWL
20 July	Low Power FD
26 July	144MHz Low Power and SWL
27 July	432MHz Low Power and SWL
3 August	Hopscotch
24 August	1,296/2,320MHz
31 August	Ropoco 2
6, 7 September	144MHz Trophy and SWL
6, 7 September	IARU Region 1 SSB FD
21 September	70MHz Trophy and SWL
4, 5 October	432MHz–24GHz
7 October	432MHz Cumulative
12 October	21/28MHz SSB
15 October	1,296/2,320MHz Cumulative
19 October	21MHz CW
23 October	432MHz Cumulative
26 October	70MHz Fixed
31 October	1,296/2,320MHz Cumulative
1, 2 November	144MHz CW
8 November	432MHz Cumulative
8, 9 November	Second 1·8MHz
16 November	1,296/2,320MHz Cumulative
24 November	432MHz Cumulative
2 December	1,296/2,320MHz Cumulative
7 December	144MHz Fixed and AFS
10 December	432MHz Cumulative
14 December	70MHz CW
18 December	1,296/2,320MHz Cumulative

led from bushes near the road, under power lines, across a swamp and two streams.

For Station B, G4HKC/P, Ian had an even longer antenna strung along a hedge 11 miles northeast of the start, near Highwoods in Colchester. Several teams found this area very confusing, especially the new housing development which was not shown on the map.

Posn	Name	Club	A	B
1	C Merry	Dartford Heath	1436	1538
2	M Hawkins	Chelmsford	1540	1443
3	C Plummer	Mid-Thames	1544	1441
4	W Pechey	Mid-Thames	1548	1445
5	R De La Rue	Colchester	1550	1454
6	B Bristow	Mid-Thames	1608	1457
7	A Williams	Braintree	1609	1501
8	T Gage	Mid-Thames	1611	1446
9	P Lisle	Mid-Thames	1619	1520
10	F Mepham	Mid-Thames	1620	1517
11	G Foster	Stratford	1621	1521·5
12	R Emeny	Colchester	1628	1522
13	F Pearson	Colchester	—	1521
14	G Smith	Southend	1545	—
15	D Newman	Slade	—	1558
16	P Cranmer	Colchester	—	1558·5
17	P Larbalestier	Colchester	—	1559

One competitor failed to find either transmitter.
C Merry and W Pechey qualify for the National Final.

Salisbury DF Qualifying Event

Nineteen teams assembled at Salisbury Race Course on 4 August for the start of Salisbury's "aquatic" DF qualifying event.

Station A, G4RLF/P, eight miles west of the start, was "floating" among tangled undergrowth in Chilmark Woods, with the only public approach from the far side, a half-mile quagmire.

Station B, G3YWT/P, 10 miles east, was situated in a camper van on the edge of Mean Woods. Intentions were to use it as a decoy at the far end of a 3λ/4 antenna, used by the hidden transmitter, but the roles were reversed due to heavy rain—the soaked equipment being transferred to the van!

Thanks to all the drenched outstation operators, and to Sir Evan Nepean, G5YN, who again managed the event. The Salisbury R and ES appreciate the great support given by the many competitors from all over the country—particularly under such atrocious weather conditions.

Posn	Name	Club	A	B
1	G Whenham	Coventry	1527	1430
2	C Plummer	Mid-Thames	1529	1429
3	I Butson	Colchester	1530	1432
4	T Gage	Mid-Thames	1423	1531
5	B Bristow	Mid-Thames	1422	1532
	C Wells	S Manchester	1422·5	1532
7	W Pechey	Mid-Thames	1533	1429
8	F Mepham	Mid-Thames	1423	1537
9	P Yeates	Salisbury	1447·5	1552
10	S Holly	Salisbury	1448	1604
11	C Merry	Dartford Heath	1447	1605
12	D Newman	Slade	1518	1623
13	R Goodearl	Mid-Thames	—	1431
14	W North	Mid-Thames	1434	—
15	A Judd	Oxford	1437	—
16	N Woodley	Mid-Thames	—	1442

Three competitors failed to find either transmitter.
George Whenham and Ian Butson qualify for the National Final.

1984 IARU Region 1 VHF/UHF/SHF Contest results

The following tables have been extracted from the full results of this contest. A copy of the complete results booklet is available on request by sending an sae to: J H Quarmby, G3XDY, 12 Chestnut Close, Rushmere St Andrew, Ipswich IP5 7ED.

144MHz SINGLE OPERATOR

Posn	Callsign	QSOs	Points	Posn	Callsign	QSOs	Points
1	F6HMQ/P	987	554,770	321	G1DOX	120	24,010
2	GJ4ICD	1,037	412,010	324	G4RYV	104	23,815
3	F6GYT/P	916	330,402	369	G6YYP	105	19,696
9	G4AFF/A	586	217,164	468	GM4SGB	54	13,328
14	GM4YXI	665	183,322	474	G6NUZ	71	12,968
24	G4NDG/P	452	154,116	517	G6CSY	59	10,546
165	G4AGQ	163	45,392	529	G2DHV	70	9,700
218	G4YTL	126	35,283	531	G8UDV	40	9,503
262	G1CVS	119	29,905	679	GM4WLL	32	2,201
295	G6HXU	110	26,454	684	G8NMQ	17	2,018

721 entries

144MHz MULTI OPERATOR

1	F6CJG/P	947	547,542	92	GW2OP/P	574	157,845
2	F6KAW/P	1,509	532,909	96	GM8TSI/P	550	155,332
3	F6CTT/P	1,514	521,507	97	G3ISO/P	484	154,286
11	G4LIP/P	1,173	372,034	98	G2XV/P	556	153,382
16	GW4NXO/P	923	328,273	104	G3WRS/P	559	149,309
19	GW8SJP/P	984	314,464	126	G8ZKE/P	566	135,935
21	G4VWH/P	688	308,290	141	G3ULT/P	416	127,665
23	G1HHH/P	831	298,623	144	G1FKN/P	388	125,638
29	G3ZIG/P	900	277,720	146	G3UKC	385	123,488
32	G4ZDA/A	780	258,870	157	G4ARE/P	409	118,587
37	G4APA/P	790	246,580	162	G2ASF/P	530	116,325
40	G6EKR/P	730	239,200	182	GW4RNM/P	325	109,297
52	G4DZO/P	538	210,070	188	GW4CZZ/P	544	107,322
53	GD4GNH	690	208,733	200	G3UHF/P	487	102,634
55	G4SIV	587	199,711	208	G3IGQ/P	374	98,896
57	GW4MGR/P	795	197,780	249	G4GTT	415	87,577
62	GM4CCC/P	631	188,379	252	G4YRU/P	467	85,800
64	G3VEF/P	622	184,804	279	G8OMR	300	76,738
65	G4WET/P	708	184,263	308	G6GRG/P	345	67,792
68	G4SSS/P	523	181,676	323	GM6MGS/P	203	64,491
69	GW6BK/P	734	179,407	325	G4KVI/P	346	63,781
78	G4CDA/P	743	171,680	367	G1CDO	281	55,160
81	G4HRC/P	526	170,068	417	G8VYK	181	43,275
85	G4NUT	621	166,750	482	G6AMW	118	29,538
87	G4NVA/P	601	161,446	487	G4VBG	126	28,998
88	G8MBI/P	633	161,116				

556 entries

144MHz SWL

Posn	Station	QSOs	Points	Posn	Station	QSOs	Points
1	Y2-14512/P	377	119,398	5	BRS31976	217	45,819
2	Y2-96992	263	84,761	12	BRS32525	103	16,374
3	Y2-6481/P	193	63,294				

16 entries

432MHz SINGLE OPERATOR

Posn	Callsign	QSOs	Points	Posn	Callsign	QSOs	Points
1	DL8DAU	325	70,244	207	G4RLF/P	22	3,689
2	I4LCK/4	171	54,269	210	G4VXE	34	3,664
3	DJ9BV/P	201	51,544	229	G1JHC	27	3,022
31	G4CQR	145	24,492	256	G8VPE	11	2,166
119	G1DOX	83	9,555	287	G3JXN	9	1,791
151	G4FOH	35	7,151	319	G4LRT	4	857
155	G6YQJ	45	6,718				

347 entries

432MHz MULTI OPERATOR

1	DK0BN/P	536	119,516	53	G8OHM/P	223	30,154
2	DG4FAO/P	532	118,703	61	G8ZHP	136	25,287
3	DC3VW/P	449	115,885	63	G1EME/P	173	24,763
6	G4PUB/P	359	99,815	74	G4SSS/P	93	20,211
11	GW8FUO/P	311	77,223	80	G6TW/P	147	18,159
22	G4LOJ/P	192	50,878	89	GM8TSI/P	57	14,792
37	G4HRC/P	160	39,770	101	G4XVW/P	94	12,037
38	GW4MGR/P	224	39,071	156	GM6MGS/P	23	3,316

169 entries

1·3GHz SINGLE OPERATOR

1	DJ3ZU	125	23,995	23	G4CBW	44	6,571
2	DJ5BV	111	19,767	37	G4CQR	31	4,324
3	DF9IC/P	103	18,169	41	G8ACE	26	4,010
9	G4KIY	50	8,573	71	G8CZZ	24	2,253
20	G3JXN	47	6,770	94	G4LRT	12	1,214

137 entries

1·3GHz MULTI OPERATOR

1	DL0HC/P	166	30,779	26	G4XUM/P	49	7,105
2	G4ALE/P	87	18,685	35	G4OHM/P	45	5,156
3	GW4BVY/P	79	17,315	38	G4KPX/P	37	3,684
9	G4ANT/P	58	12,346	41	G4WET/P	29	3,406
11	G4VIX/P	61	11,962	57	GM8MJV/P	9	1,863
18	GW4PKO/P	53	9,289	68	G4HGU/P	7	1,140
23	G4SIV	46	7,880				

79 entries

2·3GHz SINGLE OPERATOR

1	PA0EZ	37	5,011	19	G3JXN	13	1,162
2	DC9XO	24	4,489	32	G8CZZ	6	387
3	ON5GF	13	2,750	37	G4LRT	3	246
9	G4FRE	13	2,008				

48 entries

2·3GHz MULTI OPERATOR

1	G4GLN/P	32	5,303	5	GW4NXO/P	15	3,118
2	DK0NA	21	3,795	11	G3OHM/P	14	1,985
3	PE0MAR/P	27	3,422	24	G4NNA/A	9	622
4	G3ZIG/P	15	3,157				

30 entries

3·4GHz SINGLE OPERATOR

1	PA0EZ	10	1,238	9	G4LRT	1	49
2	DF0HO/A	7	946	10	G4FRE	1	13
3	DC8UG	5	470				

10 entries

3·4GHz MULTI OPERATOR

1	DK0NA	5	562	7	G3OHM/P	2	132
2	PA0JRS/A	5	493	8	G3TQF/P	2	83
3	DK0BC	5	460	11	G4PZZ/P	1	27

13 entries

5·7GHz SINGLE OPERATOR

1	DJ5AP/P	3	356
2	DF0HO/A	2	348
3	I1MMS/1	2	344

8 entries

5·7GHz MULTI OPERATOR

1	IW1ALW/1	2	240
2	DK0HT/P	2	162
3	DK0NA	4	153

11 entries

10GHz SINGLE OPERATOR

1	I4BER/4	17	2,389
2	HB9MDP/P	12	1,673
3	HB9MIN/P	11	1,254

39 entries

10GHz MULTI OPERATOR

1	IW5AGV/4	14	2,345	11	GW4TXG/P	3	249
2	IN3CCD/3	11	1,170	12	G4FHQ/P	4	246
3	DJ7FJ/P	11	772	18	G8DPB/P	2	104

23 entries

24GHz SINGLE OPERATOR

1	DJ4YJ/P	2	288
2	DL9GBJ/P	3	228
3	HB9MIN/P	3	158

8 entries

24GHz MULTI OPERATOR

1	DJ7FJ/P	7	608
2	HB9AMH/P	1	11
	DK0BC	1	11

3 entries

OVERALL UHF SINGLE OPERATOR

1	PA0EZ	332	205,795	138	G8CZZ	30	15,135
2	DJ3ZU	125	119,975	194	G4LRT	20	10,367
3	DC9XO	101	113,702	208	G1DOX	83	9,555
28	G3JXN	69	47,261	249	G4FOH	35	7,151
29	G4CQR	176	46,112	253	G6YQJ	45	6,718
35	G4KIY	50	42,865	315	G4RLF	22	3,689
51	G4CBW	44	32,855	317	G4VXE	34	3,664
94	G4FRE	14	20,340	334	G1JHC	27	3,022
96	G8ACE	26	20,050	359	G8VPE	11	2,166

440 entries

OVERALL UHF MULTI OPERATOR

1	G4PUB/P	478	246,270	59	G1EME/P	202	41,793
2	GW4NXO/P	408	199,958	86	G4SSS/P	100	25,911
3	PA0GUS/P	391	184,923	90	G4KPX/A	46	24,640
8	G4LOJ/P	266	144,718	93	GM8TSI/P	66	24,107
21	G4HRC/P	223	101,660	129	G4XVW/P	94	12,037
25	GW4MGR/P	277	85,516	172	G4FHQ/P	4	4,920
29	G8OHM/P	284	78,424	185	GM6MGS/P	23	3,316
36	G8ZHP	182	64,687	194	G3TQF/P	2	1,660
43	G6TW/P	196	53,684				

200 entries

Club News

The following is the latest information received by RRs from RSGB affiliated societies, clubs and groups in time for inclusion in this issue. Basic unchanged information on other affiliated organizations will be published 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 **February** issue should reach them by **6 December** and for the **March** issue by **11 January.**

Club programmes are given in order of date, subject, time and place of 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.

Blackburn (E Lancs RC)—3 December (AGM), 31 December (No meeting). 7.30pm. The Conservative Club, Cliffe St, Rishton. PRO G6LXU, tel Gt Harwood 887385.

Bury (BRS)—10 December (AGM). 8pm. Mosses Community Centre, Cecil St, Bury. PRO G4TBT, tel Burnley 24254. Please note The Hamfeast will take place Sunday, 9 February 1986.

Chester (C&DARS)—3 December (Committee meeting), 10 December (Construction contest), 17 December (Christmas buffet, tickets in advance from G4EZO). 8pm. The Chester Rugby Union Football Club, Hare Lane, Vicars Cross, Chester. Details G4EZO, tel 40055.

Crewe (SCARS)—9 December (Christmas social evening), 13 January ("Mass spectonomy of gases", G8DTT). 8pm. The Victoria Club, Gatefield St, Crewe. Details G6IGW, tel 60062.

Ellesmere Port (EPARC)—16 December (Visit by Bert Donn, RR1). Details G4STZ, tel 051-339 7201.

Fylde (FARS)—3 December (Equipment construction competition plus agenda items for the agm), 17 December (Hot-pot supper). 7.45pm. The Kite Club, Blackpool Airport. Sec G8GG, tel 725717.

Liverpool (L&DARS)—3 December ("Fire prevention", G3LIU), 10 December (TBA), 17 December (Bring your own bottle and blonde), 24, 31 December (No Meetings). 8pm. The Churchill Conservative Club, Church Rd, Wavertree, Liverpool 15. Sec G1EXJ, tel 051-728 8811.

Manchester (SMRC)—6 December ("Other thoughts on propagation", G3HZM), 13 December (RSGB video tape lecture), 27 December (No meeting), 3 January (Mini lecture contest). 8pm. Sale Moor Community Centre, Norris Rd, Sale. Sec G3WFT, tel 061-973 1837.

Morecambe (MBARS)—2 December (Morse class, G3PER and G4NEN), 9 December (Visit to police workshops, Hutton), 16 December (Hot-pot supper at club premises, xyls cordially invited), 23, 30 December (No meetings). 7.30pm. Canteen of The Luneside Engineering Co, Mill Lane, Halton, Nr. Lancaster. Contact G3PER, tel Heysham 52659.

Penrith (PARS)—19 December (Buffet dance). The Ullswater School, Penrith. Contact G4XPO.

Preston (PARS)—5 December (Talk by Jim Carroll, G3KCC), 19 December (TBA). 8pm. The Lonsdale Club, Fulwood Hall Lane, Fulwood, Preston. Sec G3ZXC, tel 0772 718175.

Skelmersdale (S&DARC)—5 December (Technical tips, members' contribution), 12 December (Activity night, atv/sstv), 19 December (Christmas quiz and social), 26 December (No meeting). 7.45pm. Beacon Park Centre, Skelmersdale. Contact G4ZPY, tel Ormskirk 894299.

Thornton Cleveleys (TCARS)—2 December (Auction of equipment and components), 9 December (Club on air/informal evening), 16 December (Christmas social evening), 23, 30 December (No meetings). 7.45pm. 1st Norbreck Scout HQ, Carr Lane, Bispham, Blackpool. Details G4BFH, tel 0253 853554.

Warrington (WARC)—3 December ("HF synthesizers", G3OGQ). 7.30pm. Grappenhall Community Centre, Bell House Lane, Warrington.

Wirral (WARS)—4 December (Christmas party), 18 December (No meeting). 8pm. Heswall Parish Church Hall, Heswall. Sec G4KPY, tel 051-625 7311.

I wish to thank Penrith ARS and the North Cheshire RC for their hospitality during my recent visits and to South Cheshire ARS for their kind invitation to their Christmas social evening for my wife Julie and myself.

Apologies to the Carlisle and District ARS for not getting through on 21 October because of the fatal pile-up on the M6, but I hope to see you in 1986.

Would club secs please forward their club programmes for 1986. Finally, to all our members, a very merry Christmas and a happy and prosperous New Year. *RR1*

REGION 2—RR P R Sheppard G4EJP, 9 Elvington Crescent, Leconfield, N Humberside HU17 7LX. Tel 0401 50397.

Goole (GR&ES, G8HSG)—3 December (Natter night), 10 December (Mini df), 17 December (Christmas function), 29 December (Treasure hunt, Sunday). Junior Chambers, Boothferry Rd, Goole. Details G6REL.

Halifax (H&DARS, G2UG)—17 December (Visit by RR2, G4EJP). 7.30pm. The Running Man, Pellon Lane, Halifax. Details G1GZE, tel 0422 202306.

Halifax (Northern Heights ARS, G2SU)—4 December (Alignment evening, Alan Robinson), 18 December (Social evening). 8.15pm. Bradshaw Tavern, Bradshaw, Halifax. Details G3UI, tel 0422 60574.

Hornsea (HARC, G4EKT)— 4 December ("Workings of the Society," RR2, G4EJP) 11 December (Quiz with a twist, G4IGY and G4YTV), 18 December (Christmas party, The Mill), 25 December (Closed). The Mill, Atwick Rd, Hornsea. Details G4NJP, tel Bridlington 673635.

Hull (H&DARS, G3AMW)—6 December (Film show), 13 December (Visit from SMC), 20 December (Christmas party), 27 December (No meeting). The Clubroom, Walton St, Hull. Details G4PEP, tel 0482 77249.

Maltby (MARS, G4SKM)—6 December (Computer night—bring your own), 13 December (Christmas junk sale), 20 December (Social gathering), 27 December (No meeting). Church Buildings, Church Lane, Maltby. Details G3ZHI, tel 0709 814911.

Pontefract (P&DARS, G3FYQ)—5 December ("Bridges," G4ISU), 19 December (Christmas party), 26 December (No meeting). Details G0AAO, tel 0977 43101. The G4PRE silent key sale raised £350. Many thanks to all concerned.

Spen Valley (SVARS, G3SVC)—5 December ("Homebrewing—a variation," G4YDI), 19 December (Christmas gathering). 8pm. Old Bank Working Mens Club, Mirfield. Details G4PHR, 0924 499397.

Todmorden (T&DARS)—2 December (Seasonal social), 16 December (Informal chat night). The Queen Hotel. Details G6MDB, tel 070681 2494.

Wakefield (W&DARS G3WRS)—10 December (Christmas social evening), 24 December (No meeting). 8pm. Ossett Community Centre. Details G8PBE, tel 0924 378727.

Wakefield (NWRC, G4NOK)—5 December (Natter night), 12 December (On the air), 19 December ("Demonstrating atv", G3SPX), 20 December (Christmas dinner dance, Swallow Hotel), 26 December (Closed). White Horse PH, East Ardsley. Details G4RCH, tel 0532 536633.

White Rose (WRARS, G3XEP)—4 December (White Rose junk sale), 6 December (Annual dinner dance, Moor Allerton Golf Club), 11 December (AFS briefing), 18 December (Natter night), 25 December (Shack open). Moortown RUFC, Moss Valley, Kings Lane, Leeds. Details G6NIZ.

York (YARS, G3HWW)—13 December (Christmas party, in the clubroom). United Services Club, 61 Micklegate, York. Details G3WVO.

Two newly affiliated clubs are: Harrogate Repeater Group, GB3HG. Further details from Mr A Cameron, tel 0423 871954; Sheffield (SARC). Details from G3PHO, tel 0742 681216.

RR2 wishes all members a happy and prosperous Christmas and New Year. Club secs please make a new years resolution to pass your publicity to RR2 on time for inclusion in this column. *RR2.*

REGION 3—RR G Ross, G8MWR, 81 Ringwood Highway, Coventry CV2 2GT. Tel 0203 616941.

Atherstone (AARC)—9 December (Social night). Sixth Form College, Long St, Atherstone. Sec G6YQU, tel Chapel End 393518.

Birmingham (B South RS)—11 December (Christmas party). 7.45pm. Hampstead House, Fairfax Rd, West Heath, Birmingham. Sec Tim Scrimshaw, tel 021-476 8312.

Bromsgrove (B&DARC)—25 December (Christmas QSO party, 11am). 8pm. Avonscroft Arts Centre, Bromsgrove. Sec G4NYH, tel 73847.

Halesowen (MEB RC)—10 December (Christmas social meeting). 8pm. MEB Social Club, Mucklow Hill, Halesowen. Sec G4RWH, tel 021-747 8784.

Hereford (HARS)—6 December (Practical evening), 20 December (Annual quiz). 8pm. Civil Defence HQ, Goal St, Hereford. Sec G3WRQ, tel 0432 54064.

Rugby (RATS)—3 December (Leicester Repeater Group), 17 December (Christmas meeting), 31 December , (On air party). 7.30pm. Cricket Pavilion, "B" Entrance. Sec G4TWH.

Stourbridge (SARS)—2 December (Night on the air), 16 December (Test equipment). 8pm. Robins Wood Centre, School St, off Enville St, Stourbridge. Sec Mr Williamson, tel 392006.

Stratford upon Avon (SuA ARC)—9 December ("Telemetry systems", G8TWH), 23 December (Christmas party). 7.30pm. Baptist Church, Payton St, Stratford upon Avon. Sec G8OVC, tel 750584.

Telford (TARS)—4 December (Natter night and committee), 11 December (GDO construction), 18 December (Club project), 20 December (Christmas social at the Station Inn). 8pm. Dawley Bank Community Centre, Dawley, Telford. Sec G6XUF, tel 0952 770568.

Mid Warwicks (MWARS)—10 December (Christmas meeting). 8pm. St John HQ, 61 Emscote Rd, Warwick. Sec G6VHI.

Wolverhampton (WARS)—3 December (Surplus sale), 10 December (Committee meeting), 17 December (Social evening), 24 December (No meeting). 8pm. Electricity Sports Club, St Marks Rd, Chapel Ash, Wolverhampton. Sec K Jenkinson, tel 0902 24870.

Worcester (WARC)—2 December ("Resonance", G3LBS), 18 December (Informal meeting). 8pm. Oddfellows Club, New St, Worcester. Sec G4RBD.

REGION 4—RR M Shardlow, G3SZJ, 19 Portreath Drive, Darley Abbey DE3 2BJ. Tel Derby (0332) 556875.

Bolsover (BARS)—4 December (Committee meeting), 11 December (Natter night), 18 December (Christmas video), 25 December (No meeting). 7.30pm. The Black Bull, Bolsover. Sec G1GNC.

Derby (DADARS)—4 December (Junk Sale), 11 December (Construction contest), 18 December (Christmas party), 25 December (No meeting), 1 January (New Year junk sale). 7.30pm. 119 Green Lane, Derby. Sec G4EYM, tel 556875.

Lincoln (LSWC)—1 December (Committee meeting), 4 December (CW), 11 December (Christmas buffet), 18 December (CW), 25 December (No meeting). 8pm. City Engineers Club, Waterside South, Lincoln. Sec G4STO.

Mansfield (MARS)—6 December (Buffet/disco), 17 December (Club projects evening). Victoria Social Club, Princes St, Mansfield, Sec G1DZH, tel 652812.

Melton Mowbray (MMARS)—20 December ("Data Communications", G3STG and G1LSH). St Johns Ambulance Hall, Ashfordby Hill, Melton-Mowbray. Sec G3NVK, tel Melton 63369.

Newark (NADARC)—5 December ("Worked all Britain Award", G4FQO). 7.30pm. Worthington Simpson Sports Pavillion, Hawton Lane, Newark. Sec G4SDZ, tel 702076.

Nottingham (ARCON)—5 December (Night on the air), 12 December ("Early days of pmr," G2DWZ), 19 December (Christmas party), 26 December (No meeting). 7.30pm. Sherwood Community Centre, Mansfield Rd, Nottingham. Sec G4JAE, tel 232604.

Spalding (SADARS)—13 December (Annual Christmas social and junk sale). The Ship Albion, Albion St, Spalding. Sec G4ZGT, tel 2781.

Worksop (WARS)—10 December ("Ham holiday in Scotland", G3XXN), 20 December (Christmas disco at Worksop Miners Welfare). 7.30pm. The Old Matkins, Gateford Rd, Sec G4ZUN, tel Worksop 486614.
Eastwood (Notts & Derby Border ARC)—3 December (Film show), 10 or 17 December (Christmas "Nosh"). 7.30pm. Marlpool United Reform Church, Chapel St, Marlpool Heanor. Sec G4UFC, tel Ilkeston 302990.

REGION 5—RR J S Allen, G3DOT, 77 Rosslyn Crescent, Luton LU3 2AT. Tel 0582 508515 or at work on 0582 21151.
Daventry (DARC)—A new club which meets first Thursday of each month at Dun Cow PH, Daventry. Sec G1JDZ. Every Wednesday a workshop of cw classes, hf operating and morse instruction is held at the Raynet Control Centre.
Dunstable (D Downs RC)—6 December (Constructors' contest), 13 December (TV show, "A backwards look at '85"). 21 December (Christmas party, members only). Chews House, Room 3, High St, Dunstable, Beds. Sec G6EES, tel 607623.
Nene Valley (NVRC)—4 December (TBA), 11 December (Natter night), 18 December (Christmas buffet). Dolben Arms, Finedon, Northants. Sec G4XEN.
Peterborough Radio & Electronics Society—Chairman, G4NOG, and secretary, G6TAV. Would one of these gentlemen please get in touch with me with further details of this well-known society.
Peterborough (GPARC)—12 December (Social). Venue to be decided. Sec G4NRJ.
Shefford (S&DARS)—5 December (Junk sale), 12 December (Constructors' contest), 19 December (Chairman's social evening and presentation of awards). Church Hall, Shefford, Beds. Sec G4PSO.

May I wish all clubs and societies a happy Christmas, and please give me a lovely present —your club secretaries to get their club programmes to me on time! *RR5*

REGION 6—RR F S G Rose, G2DRT, 84 Cock Lane, High Wycombe, Bucks HA3 7EA. Tel Penn (049481) 4240.
Berkshire Downs Repeater Group—This is a non-profit making group of amateurs who provide the services of the repeaters GB3RD (144MHz), G3BK (430MHz) and GB3RU (1·3GHz). Any information regarding these, or contributions to the running costs, will be gratefully received by the sec G4CCC.
Reading (RADARC)—10 December (AGM), 17 December (Christmas social), 24 December (Informal meeting in the bar downstaris). Sec G4CCC, New sec after agm.

REGION 7—RR R Sykes, G3NFV, 16 The Ridgeway, Leatherhead, Surrey KT22 9AZ. Tel 0372 372587.
Ashford (Echelford ARS)—9 December (Meet at the "North Star", Staines), 26 December (No meeting). 8pm. The Hall, St Martins Court, Kingston Crescent, Ashford, Middx. Sec G4VAZ, tel Sunbury 82832.
Bexleyheath (North Kent RS)—3 December (Public Health Officer, G4BWV), 17 December (Christmas party with raffle). 8pm. The Pop-in-Parlour, Graham Rd, Bexleyheath. Sec G6CUE, tel 01-309 7214.
Biggin Hill (BHARC)—17 December (Junk sale). 8.30pm. St Marks Church Hall, Church Rd, Biggin Hill. Sec G0AMP, tel 0689 57848.
Coulsdon (CATS)—9 December (AGM). 8pm. St Swithins Church Hall, Grovelands Rd, Purley, Surrey. Sec G6HC, tel 01-684 0610.
Cray Valley (CVRS)—5 December (Slide show, G8KKI), 19 December (Natter night and club station on air). 8pm. NB new venue. Details G3TAA.
Crystal Palace (CP&DRS)—21 December (Christmas social). 8pm. All Saints Parish Room, Upper Norwood SE19. Sec G3FZL, tel 01-699 6940.
Dorking (D&DRS)—10 December (Informal meeting). 8pm. Star and Garter Hotel. Sec G3AEZ, tel 0306 77236.
Guildford (G&DRS)—6 December ("Entertainment", G3IEE), 20 December (Christmas party). 8pm. Model Engineers HQ, Stoke Park, Guildford. Sec G4KXA.
New Cross (Clifton ARS)—6 December (High power amplifiers), 20 December (Christmas party). 8pm. NB new venue, Telegraph Hill Community Centre, Kitto Rd SE14. Sec R Hinton, 42 Sutcliffe Rd, Welling, Kent.
Redhill (RATS)—17 December (Constructional contest). 8pm. Constitutional and Conservative Club, Warwick Rd, Redhill. Sec G8JXV.
Sutton and Cheam (S&CRS)—20 December (Christmas get together). 8pm. Downs Lawn Tennis Club, Holland Ave, Cheam, Surrey. Sec G4BOX.
Thames Ditton (TVARTS)—3 December ("QRP", G4BUE). 8pm. Thames Ditton Library, Watts Rd, Giggs Hill, Thames Ditton. Sec G3ENI.

May I wish all members in Region 7 a very happy Christmas and prosperous New Year. *RR7*

REGION 8—RR M Elliott, G4VEC, 20 Haysel, Sittingbourne, Kent ME10 4QE. Tel 0795 70132.
Burgess Hill (Mid-Sussex ARS)—12 December (Christmas social). 7.30pm. Marle Place, Burgess Hill. Details G1FRF, tel 07918 2937.
Canterbury (East Kent ARS)—5 December (Talk by the DTI, RIS Dept), 19 December (Cheese and wine, bring a bottle). 7.30pm. Cabin Youth Centre, Kings Rd, Herne Bay. Details G4RIS.
Chichester (CARC)—3 December (Club meeting in long room), 19 December (Annual Christmas social evening and presentation of the Marcuse Trophy, in Green room). 7.30pm. Fernleigh Centre, 40 North St, Chichester. Details G4EHG, tel 789587.
Crawley (CARC)—11 December (Christmas supper). Trinity United Reform Church Hall, Ifield, Crawley. Details G4IQM, tel 882641.
Dartford (DDFC)—3 December (Pre-hunt meeting), 8 December (Club hunt), 17 December (Ext general meeting). Pre-hunt meetings, after 9pm: Horse and Groom PH, Leyton Cross, Dartford Heath. Details G3DYF, tel Greenhithe 844467.
Eastbourne (Southdown ARS)—2 December ("The proposed atv repeater for East Sussex"). 7.30pm. Chaseley Home, South Cliff, Eastbourne. Activities Tuesdays and Fridays at Hailsham Clubrooms. Details G4XNL, tel 638653.
Gillingham (BRATS)—12 December (Judging of construction competition). 8pm. Parkwood Community Centre, Parkwood Green, Wigmore, Gillingham. Details G4ZTF, tel Medway 474670.
Hastings (HERC)—18 December (Christmas social). Ashdown Farm Community Centre. Details G4NVQ, tel 420608.
Maidstone (MYMCAARS)—6 December (Construction contest), 13 December (RAE tuition, Balcony room), 20 December (Social evening), 7.30pm. YMCA Sports Centre, Melrose Close, Cripple St, Maidstone. Details G4AXD, tel 29462.
Swale (SARC)—Results of agm: chairman, G4PVE; secretary, G4NPM; treasurer, G1JQH. Meetings on Mondays, 7.30pm for 8pm. Ivy Leaf Club, 52 Dover St, Sittingbourne. Details G4NPM, tel Minster 873147.
Tunbridge Wells (West Kent ARS)—6 December (Annual dinner). Star and Eagle PH, Goudhurst. Tickets £6. Meetings on Fridays, 8pm. Adult Education Annex, Quarry Rd, Tunbridge Wells. Details G4KIU, tel 33586.

REGION 9—RR A H Hammett, Rosehill, Ladock, Truro, Cornwall TR2 4PQ. Tel 0726-882 758.
Axminster (Axe Vale ARC)—6 December (Annual dinner), 3 January (Constructors evening and members' slides). 7.30pm. Cavalier PH, West St, Axminster. Sec B Newland, G3VW.
Cornwall (Cornish ARC)—5 December (Films and Christmas party), 9 December (Computer section, activity evening and basic basics), 2 January ("Beetling around Africa", G3WKP), 13 January (Computer section, subject to be announced), 20 January (Constructors workshop). 7.30pm. Church Hall, Treleigh, Old Redruth Bypass. Sec Stella O'Donnell.
Exmouth (EARC)—meetings 4, 18 December, 7.30pm at the Scout Hut, Marpool Hill, Exmouth. Sec G8SBU.
Plymouth (PARC)—2 December ("PCB testing", G4KXQ), 16 December (Club quiz and Christmas social). 7.30pm. Plymouth Albion RFC, Beacon Park, Peverell, Plymouth. Sec G4SCA.
Newton Abbott (Torbay ARS)—21 December (Club Christmas party). 7.30pm. Sec G1EUA.

REGION 10—RR E J Case, GW4HWR, 2 Abbey Close Tyrhiw, Taffswell, Mid-Glam CF4 7RS. Tel 022 810368.
Abergavenny and Nevill Hall (A&HARC)— 13 December (Annual club dinner). 7.30pm. Pen-y-Fal Hospital, (above male ward 2). Sec GW4XQH, tel 0873 4655. Regular morse classes are held every week on club nights. Beginners welcome.
Cardiff (CRSGBG)—9 December (Informal). 7.30pm. Pantmawr Hotel, Tyla Teg, Pantmawr Estate, Whitchurch, Cardiff. Sec GW0CUM, tel Cowbridge 3212.
Pembroke (P&DARC)—Last Friday of each month, 7.30pm at The Defensible Barracks, Pembroke Dock. NB new sec GW6EHC, tel 0646 686532. There are also mid-monthly meetings on Sunday afternoon.
Swansea (SARS)—5 December (AGM, followed by a buffet in College House). 7.30pm. Lecture Room N, Applied Science Building, Swansea University. Sec GW4HSH, tel 0792 404422.

REGION 11—RR B H Green, GW2FLZ, 1 Clwyd Court, Tan-y-Bryn Road, Colwyn Bay, Clwyd LL28 4AH. Tel 0492 49288.
Colwyn Bay (Conwy Valley ARC, GW6TM)—12 December (Talk by the Crime Prevention Officer, North Wales Police). 8pm. Green Lawns Hotel, Bay View Rd, Colwyn Bay. Sec GW4VVW, tel 0492 636376.
Deeside (Alyn & Deeside ARS)—2 December (Committee meeting), 9 December (TBA), 16 December (Christmas party). 8pm. Shotton Social Club, Shotton Lane, Deeside. Sec G C Cook, GW4RKX, tel 0244 660066.
Dolgellau (Meirion ARS)—5 December (Christmas dinner). Dolserau Hall Hotel, Dolgellau. Sec W K Judge, GW4KEV, Tyddyn Mawr, Arthog, Gwynedd LL39 1LJ.
Porthmadog (P&DARC)—11 December (Christmas dinner), National Milk Bar, Porthmadog. Club Meetings, third Thursday monthly, 8pm at Harbour Cafe, Ffestiniog Railway, Porthmadog. Sec GW4WKQ, tel 0758 740445.
Rhyl (R&DARC, GW4ARC)—2 December (Activity night), 16 December (Night out by ticket, information tba), 7.30pm. Rhyl Scout HQ, Vale Rd, Rhyl. Sec B N Jones, GW8OYT, 6 Rhodfa Maes Hir, Rhyl, Clwyd.
Wrexham (WARC)—11 December (Christmas celebration). 7pm. Friends Meeting House, Holt Rd, Wrexham, Clwyd. Sec G4HRH, tel 0948 5161.

Greetings to all clubs and members for a merry Christmas and prosperous New Year. *RR11*

REGION 12—RR M R Hobson, GM8KPH, 17 Well Brae, Pitlochry, Perthshire PH16 5HH. Tel 0796 2140.
Aberdeen (ARS)—6 December (Junk sale), 20, 28 December (Shell films), 31 January, 21 March (RSGB films). 7.30pm. The Club Rooms, 35 Thistle Lane, Aberdeen. Details GM4GXD, tel 0847 63638.
Forfar (F&DARC)—Club meets at 46 High St, Kirriemuir. Details GM3ZXE, tel 082-85 312.
Inverness (AIRC)—Club meets at Cameron Youth Club, Planefield Rd, Inverness. Details GM1GFX, tel 0463 242463. NB club sec, GM4UMA, has moved to 10 Ruilick, Beauly, Inverness-shire IV4 7EY.
Kirkwall—Members in Orkney have resumed their informal meetings on first Wednesday monthly at Lynnfiel Hotel, Kirkwall. Details GM3IBU, or tel 3273, office hours.
Perth (P&DARC)—Club meets at Perty City Sports and Social Club, Leonard St, Perth, on several evenings weekly. Sec GM6OFO, tel 0738 28621.
Elgin (Moray Firth ARS)—First Wednesday monthly, 7.30pm, at Spey Bay Hotel, Spey Bay, nr Fochabers. Other Wednesdays meetings are in the Society Room, Moray College of FE. Details GM4IZY or tel Elgin 41549.

Apologies to those who missed last month's "Club News". Unfortunately, I missed the deadline due to suffering from an excess of Sarcon.

Mike Clark, GM6OFO, has been appointed the representative for Amsat in the North of Scotland and is running the Amsat net on 144·280MHz, Sundays at 7pm. Mike can be contacted on 0738 28621.

1985 has been an eventful year in the region, with the convention undoubtedly the highlight. To those clubs and groups whom I visited, I would like to extend my thanks for the warm hospitality I received; to those I didn't manage to visit, my apologies and I hope to see you in the coming year. Would secs please remember to send details of their club programmes well in time for the deadline stated at the beginning of Club News as I still have to complete the column after I receive your contributions.

To those letters which remain unanswered, I am sorry, I'll try to do better next year. From Janet and myself, have a very merry Christmas and prosperous New Year. *RR12*

RSGB President opens new club premises of the West of Scotland ARC on 20 September

Some of the audience

Joan Heathershaw receives a crystal vase from Ian McGarvie, WOSARC chairman, after the ceremony

REGION 13—RR A Givens, GM3YOR, 41 Veronica Crescent, Kirkcaldy, Fife KY1 2LH. Tel Kirkcaldy (0592) 200335.

Due to work commitments I have decided to resign as Region 13 Representative as from the end of the year. I would like to thank all in the region for their support over the years and also take this opportunity to wish my successor good luck in this demanding position. I would also like to wish all in Region 13 compliments of the season. *RR13*

REGION 15—R R Parsons, GI3HXV, 45 Erinvale Avenue, Belfast BT10 0FP. Tel 0232 612322.

Ballyclare (E Antrim ARC) (GI4KKK)—10 December (Computer evening). 8pm. Fairview Primary School, Ballyclare. Sec GI4PRH.

Ballymena (BRC, GI3FFF)—5 December (Film night), 20 December (Christmas party). 8pm. 70 Nursery Rd, Gracehill, Ballymena. Sec GI4HCN.

Bangor (B&DARS, GI3XRQ)—6 December (RSGB videos). 8pm. Royal Hotel, Bangor. Sec GI4OCK.

Belfast (RSGB Group)—18 December (Annual Christmas talk, GI5SJ). 8pm. 90 Belmont Rd, Belfast. AR GI6ATZ.

Enniskillen (Louth Erne ARC)—16 December ("Raynet", GI4NKD). 8pm. Railway Hotel, Enniskillen. Sec GI4CZW.

Larne (L&DARS, GI4PHA)—4 December (RSGB video). 8pm. 100 Glenarm Rd, Larne. Sec GI4CPP.

Lisburn (Lagan Valley ARS, GI4GTY)—9 December ("WAB Awards", GI4IND). 8pm. Rathvarna Teacher's Centre, Pond Park Rd, Lisburn. Sec GI4TCS.

Londonderry (North West of Ireland ARC, GI3CFH)—2 December (Bring and buy sale). 8pm. Prehen Municipal Boathouse, Victoria Rd, Londonderry. Sec GI4OUN.

I would like to wish all members in the Region a very Happy Christmas and a prosperous New Year. Thanks to those club secretaries who sent details in 1985. *RR15*

REGION 16—RR A Owen, G4HMF, 102 Constable Road, Ipswich, Suffolk IP4 2XA. Tel 0473 51319

Braintree (B&DARS)—2 December (Video evening), 16 December (Christmas Party). 8pm. Community Centre, Victoria Rd, Braintree. Details G6THE, tel 0376 25587.

Bury St Edmunds (Bst.EARS)—17 December (Christmas quiz). 7.30pm. The Guildhall, Guildhall St, Bury St Edmunds. Details John Munro, G3GBB, 29 Angel Hill, Bury St Edmunds.

Chelmsford (CARS)—3 December ("New developments in mobile radio", G8MKX), 7 January (Annual film and video show). 7.30pm. Marconi College, Arbour Lane, Chelmsford. Sec A C Mead, G4KQE, 6 Abraham Drive, Silver End, Witham, Essex CM8 3SP.

Colchester (CRA)—12 December (Films and videos). 7.30pm. Colchester Institute, Sheepen Rd, Colchester CO3 3LL. Details G4FIJ, tel 0206 851189.

Great Yarmouth (GYRS)—5 December (Informal), 2 January (Informal). 7.30 for 8pm. STC Sports and Social Club, Beevor Rd South, Denes, Gt Yarmouth. Details G3NHU, tel 0493 721173.

Ipswich (IRC)—11 December ("What's in the bag?", G4HMF). 8pm. Rose & Crown PH, Norwich Rd, Ipswich. Details G4IFF, tel 0473 44047.

Leiston (LARC)—3 December ("Computers and amateur radio", G4INP), 19 December (Social evening). 7.30 for 8pm. Sizewell Sports and Social Club, King George's Ave, Leiston, or 5 Main Rd. Details G60RK, tel 831597.

Norwich (Norfolk ARC)—4 December (Visit to Norfolk Constabulary), 11 December (Technical topics), 18 December ("Early radio", G3PTB). 8pm. Valley Drive Community Centre, 97 Plumstead Rd, Norwich. Details G4WTR, tel 610874.

Stanford-le-Hope (SLH&DARC)—2 December ("Naval Communications", G4ZPS), 7 December (Natter night), 23 December (Christmas party), 30 December (Programme planning). 8pm. St Joseph's Parish Rooms, Scratton Rd, Stanford-le-Hope. Sec G4OVG, tel 0375 642312.

REGION 17—RR T Emery, Wilverley, Old Lyndhurst Road, Cadnam, Southampton SO4 2NL.

Andover (ARAC)—3 December (AGM). 8pm. Wolversdene Club. Sec G0AMO, tel 51539.

Basingstoke (BARC)—2 December ("First aid", G1EWO), 14 December (Christmas social), 6 January ("1·3GHz operation", G3NNG). Forest Ring Community Centre, Sycamore Way, Basingstoke. Sec G4WIZ, tel Tadley 5185.

Blackmore Vale (BVARS)—10 December (Christmas entertainment evening). 7.45pm. The Bell and Crown, Zeals (on the A303). Sec G1GRS, tel 0963 70969.

Eastleigh (Itchen Valley ARS)—6 December (Christmas social), 20 December (Natter night). The Scout Hut, Brickfield Lane, Chandlers Ford, Hants. Sec G6DIA, tel 0703 863039.

Fareham (F&DARS)—4 December ("Video and electronics", G4XJT), 11 December (Natter night), 18 December ("The GDO and its use", G4ITF). 7.30pm. Portchester Community Centre, Portchester, Hants. Sec G4ITG, tel Fareham 234904.

Farnborough (F&DARS)—11 December (Christmas social). Railway Enthusiasts' Club, Access Rd, off Hawley Lane, Farnborough. PRO G4MBZ, tel 837581.

Liphook (Three Counties ARC)—7 December (Christmas party), 11 December (Quiz night). 8pm. The Railway Hotel, Liphook. NB change of secretary, G0BTU, tel Petersfield 66489.

New Forest Repeater Group (GB3NF)—For information or to join the group and help support the repeater, please contact G4DLJ, tel 0703 891975.

Plessey (Christchurch ARS)—Chairman G6WQU; treasurer, G8RXA; secretary, G1PFX. Second Thursday each month. Plessey Social Club, Grange Rd, Christchurch, Dorset BH23 4JE, tel 0202 486344.

Portsdown Hill Repeater Group (GB3PH)—For information or to join the group and help support the repeater, please contact Steve Frost, G4VNM, tel 0329 239702.

Salisbury (SRES)—3 December (Surplus equipment sale), 17 December ("The Grand Canyon", G4LDR/WZ, W3, W6). 7.30pm. Grosvenor House, Churchfield Rd, Salisbury. Sec G4LDR, tel 0980 22809.

South Hants International Telegraphy Society—This society incorporates the Portsmouth and District RS and now meets at the Community Centre, Malins Rd, Portsmouth, Thursdays 7.30pm. Morse classes for aspirants to full membership on Mondays. Sec G3JZV.

Swindon (S&DARC)—5, 19 December (Natter nights), 12 December (TBA). 7.30pm. Oakfield School, Marlowe Ave, Swindon. Sec G4YQZ.

UK FM Southern Repeater Holding Group (GB3SN)—For information or to join the group and help support the repeater, please contact Mrs Jan Steele, tel Fleet 3311.

Waterside (WSWC)—10 December ("Time step weather reception", G6DLJ). 7.30pm. Fawley and Blackfield Community Centre, Blackfield, Southampton. Sec G1KMY.

Winchester (WARC)—21 December (Christmas party). 8pm. The Log Cabin, Stockbridge Rd, Winchester. Sec G4FPC, tel 0962 64747.

May I take this opportunity of wishing all members and their families a very happy Christmas and a prosperous New Year. *RR17*

REGION 18—RR Ian Gibbs, G4GWB, 61 The Gables, Widdrington, Morpeth NE61 5QZ. Tel 0670 790090.

Bishop Auckland (BARAC)—2 December (Committee meeting). Travellers Rest PH, Evenwood. Sec G0ACY. RAE and cw tuition Thursday evenings.

Consett (Derwentside ARS, G4PFQ)—2 December ("Amtor and sstv", G3LIV), 9 December (Natter night), 16 December ("Conception and inception of GB3TY", G3UVU, G8SFA and G8VDM), 23 December (Christmas party). Consett Assocation FB Club, Belle Vue Park, Consett. Sec G1AAJ, tel 0207 520477.

Redcar (East Cleveland ARS, G4CRS)—6 December (Monthly business meeting), 13 December ("Direction finding", G1GMF), 20 December (Social evening), 27 December (No meeting). RAFA Club, Newcomen Tce, Redcar. Sec G1GMF, tel 0642 474769.

South Shields (South Tyneside ARS, G3DDI)—Monday evenings, Marine and Technical College Club, South Shields. Morse tuition available on request. NB new club sec, G4XWR, tel 0632 543955.

Sunderland (SARS, G4LPK, G6BXJ)—2 December ("Video-world at your fingertips"/"World of amateur radio"). Sec G4WMW, tel 0783 343295.

Whitley Bay (Tyneside ARS, G3ZQM)—4 December (Natter night), 11 December (Activity evening), 18 December (Discussion, "The year ahead"), 25 December (Closed). Community Centre, Earsden. Sec G4KOT, tel 091 2340170.

REGION 19—RR R J C Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ. Tel 01-989 6741.

Cheshunt (CDARC) —4 December (Natter night), 6 December (Christmas dinner), 11 December (Video evening), 18 December (Social evening), 25 December (No meeting). 7.45pm for 8pm. The Church Rooms, Church Lane, Wormley, Herts. Sec G4OAA. Details G3OJI, tel Ware 4316.

Chiswick (ABCARC)—17 December ("The 50MHz band", G1ARQ/A). 7.30pm. Chiswick Town Hall, High Rd, Chiswick, London W4. Sec G3GEH, tel 01-992 3778.

Edgware (E&DRS)—12 December (Junk sale), 26 December (No meeting). 8pm. 145 Orange Hill Rd, Burnt Oak, Edgware. Details G4SYI, tel 958 9868.

Harrow (RSH)—6 December (Activity night, 3·5MHz), 13 December (Alarms), 20 December (Grand Christmas activity night, all bands), 27 December (At home). 8.15pm. Roxteth Room, Harrow Arts Centre, High Rd, Harrow Weald, Middlesex, tel Rickmansworth 779942.

London (Civil Service ARS)—2 December ("The G4UBB 4 dip method for optimizing end fed wires and counterpoise grounding"). Nets Tuesdays, 7.30pm on 144·575MHz, followed at 8pm on 3·720MHz or 1·960MHz. Details Bob Treacher, tel 01-212 8823, or G6IMM, tel 01-698 4437. CSARS

membership details from Bruce Oelman, tel 01-212 0149 (day).

St Albans (Verulam)—1 December (Rally), 10 December (Informal), 17 December (AGM/social), 24 December (No meeting). RARA HQ, New Kent Rd, St Albans, Sec Hilary, tel 59318.
All members should make a note of the Christmas Rally on 1 December. G3JKS will need a lot of help with this new venture.

Welwyn Hatfield (WHARC)—2 December (AGM), 16 December (Informal and workshop night). 8pm. Knightsfield Scout HQ, Welwyn Garden City. No further details of QTH. Nets on S15 at 8pm on Mondays. Sec G0AII, tel Welwyn Garden City 326138.

Wanstead (ELGRSGB)—This group of RSGB held an egm on 20 October after the secretary had posted details to over 42 members in the area. Only seven persons turned up at Wanstead House for the egm. It was therefore decided that the East London Group of the RSGB be disbanded. All information can be obtained from G3AAJ or past sec G0CEU, tel 01-801 1415. This group has been in existence since 1945. *RR19*

REGION 20—RR N F O'Brien, G3LP, 26 Southfield Road, Gloucester GL4 9UD.

Bristol (BRSGBG)—16 December (Christmas party). Details G4SQQ, tel 0272 508451, or G4ROX, tel 0272 513573.

Bristol (North Bristol ARC)—1 December (Two metre fixed station contest), 6 December (Natter night and committee meeting), 13, 20 December (TBA), 27 December (Christmas party). 7.30pm. Details G4EUV.

Bristol (South Bristol ARC)—4 December (Lecture, TBA), 11 December ("HF activity evening", G0AWX), 18 December ("Christmas families evening", G4YZR), 25 December (No meeting). 7.30pm. Whitchurch Folk House, East Dundry Rd, Whitchurch, Bristol BS14 0LN.

Cheltenham (CARA)—6 December (AGM). 7.30pm. Stanton Room, Charlton Kings Library, Cheltenham. Details G4VXE, tel 0242 36723.

Cirencester (CADARC)—5, 19 December (Natter nights). 7.30pm. Phoenix Centre, Beeches Rd, Cirencester. Details G3TSO, tel 0285 75 532.

Gloucester (GARS)—4 December ("The Shroud of Turin", Dr M Clift), 11 December (Natter night), 18 December ("Leta's Buffet", Leta Woodcock, G4RHK), 25 December (No meeting). 7.30pm. St John Ambulance HQ, Heathville Rd, Gloucester. Details G6AWT.

Portishead (Gordano ARG)—No meeting this month. Club details G3LJD.

Street (S&DARS)—6 December (Skittles evening at Victoria Club). 7.30pm. Details G4SCD, tel 0458 45145.

Stroud (SARS)—11 December (Natter night). 8pm. Nelson School, Stratford Lodge, Stroud. Details G1DCT, tel Nailsworth 2773.

Weston-super-Mare (WsMARS)—9 December (Constructors Night). 7.30pm. Rugby Club (off Drove Rd), Weston-super-Mare. Details G1DJW, tel Weston 514429.

Yeovil (Y&DARC)—5 December (Video—"Visit to China"), 12 December (Slides and Video—"An introduction to thick film hybrid circuits", G3ETA), 19 December ("The affiliated societies' contests, history and operating", G3GC), 26 December (Natter night), 2 January ("Tuned circuits", G3MYM). 7.30pm. Recreation Centre, Chilton Grove, Yeovil. Details G3GC, tel 0935 75533.

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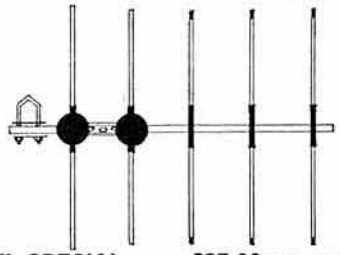

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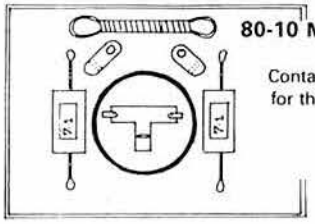

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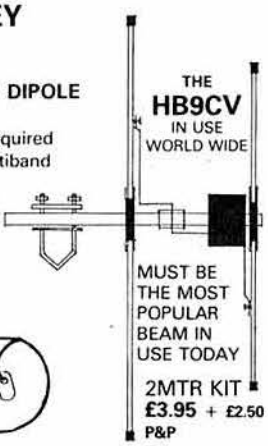

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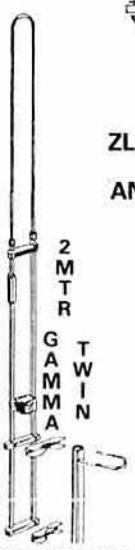

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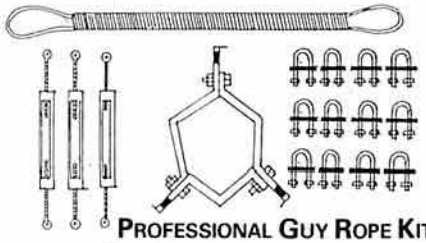

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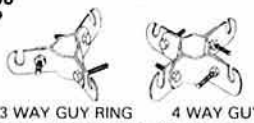

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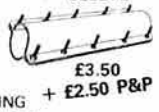

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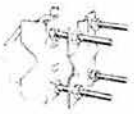

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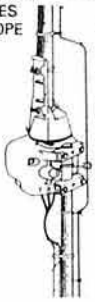

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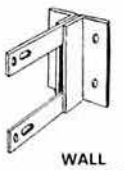

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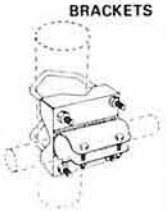

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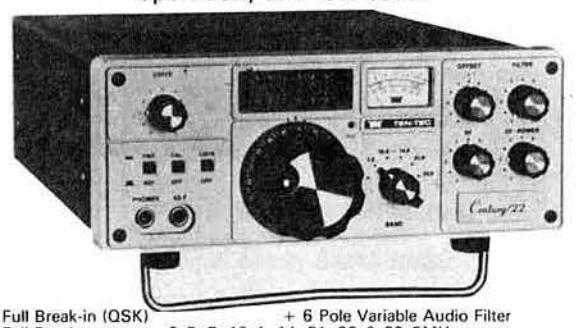

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DATASOURCE, BBC-B, SPECTRUM. Multioption Amateur/SWL programmes. Worldwide prefixes, times, bandplans, locators. Inclusive £6.75 cassette. £7.95 BBC-disc includes duplicate checker. R. Wilmot 1 Retreat Cottages, Church Lane, Broadbridge Heath, Horsham. Sussex. Tel. 69835.
AMT-2 DRIVER SOFTWARE for Dragon 64 £39. Standalone AMTOR/RTTY/ASCII/CW ROM software Dragon 32/64 and TRS80 Color £59. Dragon logbook/filing program for tape/disk £9.95. Grosvenor Software (G4BMK) 2 Beacon Close, Seaford, Sussex (0323) 893378
CBM64 CW TRANSCEIVE as used by RNARS for Morse proficiency transmissions. Tape £10 Disk £12 RTTY + CW Transceive on disk £22. RTTY for VIC20, Atom. SAE for details. G4BMK see above.
RTTY MORSE RADIO SOFTWARE. RTTY/Morse Reader For 48K Spectrum. The ultimate RX program, features include: 45.5 Baud RTTY reception—full character set supported. Morse reception—auto speed control (5-35wpm), punctuation and wordspace. Also includes 40 page text memory, and copy facility for printer. No extra hardware required, simple connection to radio via computer Ear socket. Price £6.00. Morse Tx/Rx Program for 48K Spectrum. Allows full transceive operation, includes comprehensive morse tutor. No extra hardware required. Price £7.50. Morse Rx Program for 16K Spectrum and 1K ZX81. Spectrum version includes comprehensive morse tutor. Price £5.20. All above Programs 100% Machine Code. Please add £1.00 to price if outside U.K. P. Anderson, Wellands, Pilton, Shepton Mallet, Somerset.
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.
AMPROM. THE ULTIMATE amateur radio communications ROM for the BBC Micro. SAE for details. CTP Software, 107A Shacklewell Lane, London E8 2EB.
AMSTRAD CPC 464/664/128 SOFTWARE. RTTY Transceive program for the CPC 464/664/128. Features include—Split screen operation, ten programmable user memories, large type-ahead buffer, all control from the keyboard. Requires standard T.U. Price £12.36. Morse Tutor. 4 to 30wpm. Random or prepared text, large internal library. Now with Receive option to test your sending. Only £6.90. Locator program-input Universal locator or Lat/Long. Output Beam heading and direction and VHF points on RSGB system. Printout option. £5.75. Prices include Post and VAT and are for cassette versions, for disc please add £4.60 Send large SAE for hardware & software catalogue to—PNP Communications, 62 Lawes Avenue, Newhaven, E. Sussex BN9 9SB. or Telephone (0273) 514465.
"MICROCOM 16" CW/RTTY (Tx. and Rx.) with Morse Tutor for the Commodore 16. Also available "Microcom +4", "Microcom 64", and "Microcom 128". S.a.e. to Moray Micro Computing, Enzie Slackhead, Buckie, Moray. AB5 2BR for full details.

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.

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.
LANZAROTE—Canary Islands. Enjoy autumn and winter sunshine on this fascinating island. Beautiful new detached villas and apartment. Peaceful location near beaches, elegantly furnished, pool, maid service. Rental only or flight inclusive. M. Probert GW4HXO. (0437) 721 491.
FLYING FROM GATWICK? Stay with G4MGU. Mill Lodge Guest House. 4 minutes from airport. Transport available. Telephone (0293) 771170.
TORQUAY HOLIDAY FLATS, low winter rates. G4NOA, G4NOD. Linden House, Ruckamore Road, Chelston. Torquay. (0803) 607333.
ANDORRA. As a change from working DX, why not be DX in this duty-free Principality high in the Pyrenees. Mediterranean sunshine. Heights of 9000ft. accessible by car. Small, friendly, English-run hotel. Home cooking. AA. RAC. Recommended by G4WAD and G6JNS. Brochure: Terry & Jo Dixon, Hotel Belvedere, Encamp, Andorra. Tel. 010-33078 31263.
IN IBIZA your holiday flat. Comfortable, tranquil, reasonable prices in summer and winter. Information: DL7AEA. Tel. 003471 34 11 38, PO Box 73, San Antonio, Ibiza, Spain.

VALVES VALVES VALVES

The following valves in matched pairs 6JS6/C, 6KD6, 6JB6/A, 6LQ6, 6HF5, 6146A, 6146B. **YES** the 6JS6/C is Japanese and works in the FT101. Most amateur radio valves including difficult to obtain types **EX STOCK.** Quotations without obligation. If we don't stock your type we may be able to import for you, PLEASE ENQUIRE, REMEMBER over 200 types **EX STOCK.** Sae for list. 'Phone for assistance re types suitable for your equipment. USA and Jap manufacture of popular types available.

DON'T DELAY 'PHONE TODAY 045 75 6114, G4AZM
Wilson, Peel Cottage, Lees Road, Mossley, Tameside, Manchester

Filter Design

A vacancy has arisen for an engineer to be trained on the finer points of Filter Design and Analysis. The major part of the job will be related to Filters for the radio-telecommunications industry, involving 'Front End' Filters, Synthesiser Filters, IF Filters (crystal & LC) for normal and SSB modes and also Discriminators. Applications range from components for Cellular Radio, to special devices for radio-direction-finding and monopulse radar.

The company is one of the largest manufacturers of filters for radio-telecommunications in Europe — producing over 2000 units per week. Excellent CAD facilities already exist (based on HP217 system) for network synthesis, design and analysis.

The job will involve responsibility for the design and engineering of individual types of filter from the initial paper-study to pilot production. No formal experience of network design is necessary but an interest in, and aptitude for R.F. Engineering would be an advantage.

It is unlikely that salary will be a limiting factor as the possibility exists for 'tailoring' the job in terms of technical and personnel responsibility according to the background and experience of the candidate. The salary will probably be in the range of £8,000 to £12,000.

An excellent set of 'large Company' terms and conditions apply, including generous removal expenses.

Write with full c.v. to Confidential Reply Service Ref AKF 167, Austin Knight Advertising UK Limited, 22 Prospect Place, Welwyn, Herts AL6 9EN.

Applications are forwarded to the client concerned, therefore companies in which you are not interested should be listed in a covering letter to the Confidential Reply Supervisor.

Austin Knight Advertising

INDEX TO ADVERTISERS

BEWARE!

(Erratum)

In our advertisement that was printed on the inside back cover of the November issue of RADIO COMMUNICATION, the name and address of the following Approved Trio Dealer was omitted in error at the printers after proof correction.

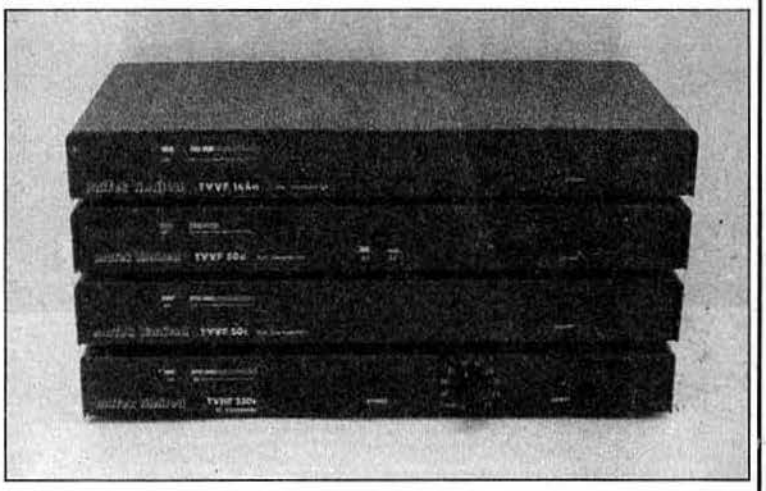
Arrow Electronics Ltd
5 The Street
Hatfield Peverel
Chelmsford
Essex CM8 3YL
Tel. (0245) 381673

Our regrets to Arrow Electronics Ltd for this omission which was completely outside our control.

If any readers have not yet seen the advertisement referred to above, we would commend it as good reading!

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

Goodbye to second-rate performance from transverters



A transverter is a black (or in muTek's case, brown!) box which can be connected between an existing transceiver and a suitable antenna to extend the frequency coverage of the transceiver. If properly designed it will provide all of the facilities available from your transceiver in a new band: all for very much less than the cost of an economy monoband transceiver. In the past, transverters had a bad reputation: they generated spurious products, and the strong signal performance of the complete transceiver/transverter combination was often rather questionable. With muTek's growing range of high-performance transverters, this need not be so.

In its simplest possible form a transverter could be simply a mixer and local oscillator, however, this would not produce very much power on transmit, whilst most of that generated would not be on the wanted frequency! On receive, the sensitivity would not be adequate and the system would be extremely vulnerable to spurious responses. Other system components such as filters and amplifiers are required in order to make an effective unit. The design of a transverter to the standards of those in the muTek range requires considerable care in the integration of these components into a complete system.

How do we do it?

We start the design of any product by using computer analysis to optimise the system. As an example, the receive converter can be designed from a knowledge of the expected level of external noise (from sources such as the Galaxy and thermal radiation) and the sensitivity of the following receiver. By balancing the amount of gain with the noise performance of each sage, we are able to extract the maximum possible performance from our advanced circuit designs. Don't forget that we've had the chance to develop these as a result of our many years experience of front-end manufacture. There's no magic involved, but we genuinely can design transverters which will give you a system limited by the performance of the very best hf transceivers!

Of course, if you already own a 144MHz transceiver, and want to experience the hf bands or the joy of six, then we also make transverters which can open the door to these pleasures. The same 'back to basics' approach has gone into these products, and we're able to say fairly confidently that there ain't nothin' like 'em nowhere! In particular the TVHF 230c, used with a modern multimode transceiver, will give better subjective receiver performance on the hf bands than many hf transceivers!

Christmas time again . . .

This is the sixth time I've sat down to write my Christmas message. It's been a strange year with gains in some directions negated by losses in others. It's been the year in which we've launched some of our most exciting new products, which have been extraordinarily well received by customers and pundits alike. Yet it's also been the year in which we've had to use the legal process for the first time to extract a debt from a UK amateur radio retailer.

On a personal level, Jane has been very ill, and I'd like to take this opportunity to thank those of you who've offered sympathy, prayers, and best wishes for her recovery.

From all of us at Bradworthy, I'd like to convey our best wishes for a joyful Christmas and a peaceful 1986.

Chris Bartram G4DGU

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
TLNA432ub	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 (040 924) 543

Access VISA

RSGB News Bulletin

FOR MEMBERS ONLY

RSGB Headquarters: Alma House, Cranborne Road, Potters Bar, Hertfordshire EN6 3JW.

No. 24 (December 1985) 18 November 1985

The installation of Mr W J McClintock, G3VPK, as the

52nd PRESIDENT
of the
RADIO SOCIETY OF GREAT BRITAIN
will take place during a

SOCIAL EVENING

at the
Furze Hill Restaurant, Margaretting, near Chelmsford
on
Saturday 18 January 1986
The ceremony will begin at 7.30pm when guests assemble

ADMISSION BY TICKET ONLY, price £4.00

Applications for tickets should be addressed to Ms H Norman, RSGB, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JW: they must be received by 8 January 1986. Cheques must be made payable to RSGB.

Launch of STS-61A Shuttle mission on 30 October took us somewhat by surprise (took some other organisations by surprise too....) - seems as though the usual NASA sources were thinking of mission 61-B! Special GB2RS broadcasts from Headquarters twice a day gave information on the mission, although master transmitter controller at HQ went up in smoke & flames just prior to first transmission with catastrophic failure in its PSU. Despite frantic efforts we couldn't get parts to fix it until the day after the Shuttle landed....quick lash-up got 3.5 and 7 MHz transmitters on air but no 144 MHz GB2RS transmissions this time, so sincere apologies to those in VHF range of HQ with 144 MHz receivers only. Condx on 3.5 MHz not exactly brilliant inter-UK at 7pm this time of year either.... Using callsign DPØSL, Shuttle came up on 145.575 MHz in auto-record mode on second day of mission, listening for transmissions on 435 MHz uplink frequencies - signals gave the S-meter on the Headquarters FT726 a thorough pasting & were reported as fully quieting on handhelds up and down the country. Several mobiles also found transmissions from spacecraft astonishingly loud. Propagation experiment carried out by astronaut Ockels, PE1LFO, during orbit 32 and his three-letter groups all solid copy.

Lots of two-way voice operation planned by the three astronauts with amateur licences but in the event there seems to have been only two short sessions - one on the Thursday of the mission, one on the Sunday, both lasting for about an hour. Operation on both was by Dr Ernst Messerschmidt - Reinhard Furrer didn't get on the air at all and Wubbo Ockels could only manage to do his propagation experiment. Sheer pressure of work on Spacelab experiments got in way of amateur operation & we understand that the three were "....totally and completely shattered" by the time they landed. Congratulations to well-known Irish VHF operator Albert, EI6AS, one of the lucky ones to manage a two-way with DPØSL.

STS-61A landed safely at Edwards Air Force Base on schedule. The tapes of the uplinks will be being processed as you read this, so those whose callsigns feature will be receiving QSL cards at some point - we're hoping GB3RS is one of them!

Next Shuttle mission with amateur radio content looks like being STS-61E, with provisional blast-off date of 6 March 1986 (should we now start quoting these as StarDates....?). Dr Ron Parise, WA4SIR, apparently intending to take packet radio with him to the Final Frontier: a special version of the TAPR TNC-2 is apparently being "....rapidly put together" for the flight (tnx G3IOR). More info when available. Chances of operation during mission 61-K in September 1986 also look good - Dr Owen Garriott, W5LFL, who was first to operate from a Shuttle during mission 51-F last year, is scheduled for duty.

Still in space, the MARCE experiment (a.k.a. Get-Away Special - see page 838 of October 1984 RadCom) will fly again on mission 61-C, due for launch on 18 December 1985 at 1200 GMT. Direct downlink frequency is 435.033 MHz and two formats to be used are similar to those on earlier attempt. There's a possibility of a relay through AO-10 apparently - QRG 145.972 MHz - although no info available as we went to press. Looks to us as though not too much reception likely in the UK but WA4NZD will be operating at following METs: 11hr 45min, 1 day 7hr 55min & 2 days 6hr 40min, for 8 hours after start of each given time. Planned Keps are: epoch 85354.99372106, drag 2.5e-04, inc 28.6741, RAAN 97.3085, ecc 0.0008376, arg of perigee 297.4619, MA 70.2603, MM 15.78856556, orbit no 9. Headline News on Potters Bar 59312 & Databox on Potters Bar 52242 will carry latest info - STD code 0707.

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The eruption of the Nevado del Ruiz volcano, which virtually destroyed the town of Armero in Colombia, came hard on the heels of the earthquake disaster in Mexico in which amateur radio was involved (see last month's Bulletin & this month's Amateur Radio News). At 1630 on 14 November, International Red Cross again called on RAYNET to monitor the situation: G4TVA and G4SCA, who had considerable experience during the Mexican situation, were immediately asked to scan the bands for information. As we went to press RAYNET had been able to pass information to the Colombian Ambassador on which parts of the country had been affected and had also given details to the Foreign Office: an urgent request for antibiotics, general medical supplies, linen, blankets, plastic containers and field hospitals had also been passed to the British Red Cross Society.

Still time to buy some RSGB books for Xmas at huge savings: don't forget that, subject to availability, these special prices are valid for orders from members received between 1 November and 31 December 1985. Just cut out the list and leave it near someone who's itching to buy you something..... Radio Data Reference Book £6.61 (normally £7.76): Amateur Radio Operating Manual £4.69 (normally £5.54): New Locator Map of Western Europe £2.32 (normally £2.75): Teleprinter Handbook £6.52 (normally £11.45): ARRL 1985 Handbook £9.99 (normally £14.22).

Some tricky last-minute artwork snags delayed publication of the 11th edition of the Society's RAE Manual:- however, it should be available as of the time you read this (editorial fingers firmly crossed....).

We have a number of other new items looking for good homes. A new book called "Towards the Radio Amateur's Examination" by John Bowyer, G4KGS, is now available - it costs £3.88 by post to members, or £3.36 over-the-counter. A pack of two ferrite rings (Neosid 28-041-31 type) suitable for breakthrough suppression is available for £2.30 by post to members. Finally, Morseman kits 1 and 2 are back in stock - prices to members are £11.50 and £17.57 respectively.

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RSGB Microwave Committee would greatly appreciate knowing who has applied to DTI for 24 GHz permits allowing use of frequencies other than 24.00-24.05 GHz and which of these applicants have now received permits. Info as soon as possible please to Chairman Mike Dixon, G3PFR QTHR.

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Members will know that we share the 430 MHz band with the MoD's MOULD system - a £9m project begun in 1981 in order to upgrade the UK's Home Defence communications system. Pye Telecom is now embarking on the second stage of the project - a £5m contract involving enlargement and enhancement of the present system. Equipment has now been installed and commissioned at more than 100 sites.

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There's a mistake on page 849 of the November RadCom - we referred to Mr J A Towle as being the new QSL sub-manager for the G4SAA-SZZ callsign series but this should have read the G8SAA-SZZ series. Sub-manager for G4SAA-SZZ continues to be Mr A Bell, G4MHQ - sincere apologies all round. Just to spell it out, the sub-managers for the groups we mentioned previously are as follows:

G4JAA-JZZ - J A Towle, G4PJZ
G4SAA-SZZ - A Bell, G4MHQ
G8SAA-SZZ - J A Towle, G4PJZ

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We're still looking for feedback from members on their feelings about the Class B Morse experiment - comments, bouquets & brickbats to the Secretary (Morse) at RSGB HQ.

FOR SALE.....

KATSUMI MK1024 electronic keyer, 4x256 bit memory, storage facility, relay or solid state switching, 2 months old, £130 or exch for 18AVT/WB 5-band vertical trap antenna & radial kit in vgc. Richard G4WBG, QTHR, tel: 0783-287396

TS830S HF TCVR in ex cond, £625. R1000 gen/cov RX with FM discriminator fitted, as new, £200. Both with original packing etc. GM3WCS, QTHR, tel: 0383 726456.

ICOM ICR70 RX complete with FM option, mint cond, bargain at £375 incl carriage in UK. G3DPR, QTHR, tel: Kemble (028577) 514.

MM4001 RTTY TCVR with RCA ASCII keyboard, £150. G4NWB, QTHR.

SHIMIZU SS1055 with full set xtals & FM fitted, £250. Mr Spencer, RS85743, tel: Sapcote 3320.

IC745 HF GEN/COV TCVR with FM, new Sept. Daiwa CNW419 200W atu/swr/pwr meter. FP707 20A psu. 100W dummy load 1kW LPF, rms/pep pwr meter. Mint cond, boxed etc, no split, £1180 incl Securicor. GW4RLP, QTHR, tel: 0286-5322 evenings.

FC102 ATU with remote switching unit, warranty, mint, currently £191 sell £145, or part-exch SME Tranzmatch, multi-antennas no longer required. Taxan VDU, 12" green screen, as new, unused six months, £48. John, G4WLD, tel: 01-857 8096.

AR2001 VHF RX 25-500MHz with mains psu 12V,1 owner from new, ex cond, original packing, £230. G8ASJ, tel: Worcester 820822.

YAESU FRDX400 HF RX, 2m/6m convertor fitted, CW, handbook, spare valves, vgc, £125. G0CCQ, tel: Worcester 56208 evenings.

RACAL RA117 RX with manual, £150. Pye SSB170 HF SSB tcvr, xtal for 160m, £75. SSTV terminal unit complete with psu, £45. G3VGW, QTHR, tel: Derby 810760 (home) or 0602-415161 (work).

KW2000B, psu, manual, Yaesu desk mic, £210. IC202, nicads, homebrew 10W pa, 10XY, £150. Misc bits: 3M dry photocopier & paper, £35; Several Si diodes 200v 100A+; also similar hockey-puck thyristors suit big psu, £2.50. G4KAF, tel: 061-483 6536.

REDIFON GR377DF Marine SSB/MF radiotelephone, DTI approved for compulsory fitting, in full working cond, may be used as maritime mobile or converted to 80/160 metre bands, £295 ono. G4SEV, tel: 03744 5916, (proceeds to 1474 Sqdn ATC Wickford)

BBC 'B', fitted LVL, DFS, Econet, £275. BBC and Video Genie (TRS80) software/hardware, SAE for lists. Digitalker with 274 words (S100 Bus), £50. 12" B&W monitor, £40. RAMS, PROMS, digital ICs, enquire. TE318 teleprinter, FREE! G4CVZ, QTHR, tel: 051-220 5470.

WAVE ANALYSER, Airmech type 853, 30kHz-30MHz, perfect. RF bridge 15kHz-5MHz, working. 13.8V psu 12.5A, working. Transformers: pri-230V, sec-6kV at 0.126 kVA; pri-250V, sec-2kV at 0.040kVA. Offers to G4XOX, tel: Chelmsford 324555.

TELETYPE ASR33 110 baud ASCII, with stand, castors vgc, £25, buyer collects. SB303 RX 3.5-30MHz, solid state with 500Hz CW filter, vgc, £95. G4HUV, tel: 0829-40301 evenings.

EDDYSTONE EC10 MkII RX, 550kHz-30MHz & MM 144MHz converter complete with instruction manual, £75. WANTED: TS520S CW filter YG3395C. G3CGQ, tel: 0582 29915.

COSSOR 1035 oscilloscope, reasonable order, manual and some spare valves, buyer collects. Any offers? Chris, G6YAH, QTHR, tel: Reigate (07372) 41510.

TS430S with built-in calibrator, PS430, AT250, purchased this year, reason for sale - blind operator needs to purchase radio with speech synthesiser, £900 ono the lot. GW0AIK, tel: 0407 840523.

ICOM 701 HF TCVR, 100W o/p, all solid state, six bands, matching psu, manual, desk mic, very little use from new, ideal easy-to-use first HF rig, £450. G8VPE, tel: Great Yarmouth 728194.

FREE TO GOOD HOME, Creed 7B, condx looks OK, yours if you can carry it! G4RQN, QTHR, tel: Kings Lynn (0553) 771389.

YAESU 901DM HF TCVR, FM, vox, speech processor, Curtis keyer, 12V dc psu built-in, mint, boxed, £550. Kenwood AT200 atu, £100. G4ZPA, QTHR, tel: 0705-370576.

SHACK CLEARANCE - Icom PS20 systems psu/speaker, 20A, running TCVR & linear, £90. MM144/100S under warranty, £120. MET 144/19T, 19-ele Yagi, £34. KR400RC & Hirschmann 250 adapted for elevation, satellite operation?, £105, will split. G6PBG, QTHR, tel: 0293-510491 evenings.

FT101ZD, mint cond, fitted FM, fan, mic, manual, also FC902 atu, £550 the two or consider split. Buyer collects. G4PJU, QTHR, tel: Bradford (0274) 637972.

FT290R 2m multimode portable, nicads, charger, carrying case, £225 or exch for FRG7700 RX or TS120V TCVR. Buyer to collect or pay carriage. G3BMO, NOT QTHR, tel: York (0904) 54579.

SOMMERKAMP 788DX, 100W, all mode AM/FM/SSB, 26-30MHz scanning TCVR, vgc, £300 ono. G4ODM, QTHR tel: 0256-26050.

TRIO TX599 custom special TX and JR599 custom special RX, needs re-alignment, both with manuals and original packing, £150 each, G4BRG, QTHR, tel: 01-529 3803.

ICOM IC24G 2m FM TCVR, free colinear if collected by buyer, £115 ono. G4LZM, tel: 0602-584152 or 0602-200074

FT101ZD, series 3, fan, mic, vgc, manual, £450. 18AVT/WB vertical, dismantled, manual, £100. Buyer collects. G4SKS, QTHR, tel: 0723-367658.

ICOM IC751, fitted both SSB filters, £925. PSU15 with CF fan, £95. IC AT500, £310. RC10, £18. SM6 mic fitted Heil element, £41. Daiwa CN62A swr/pwr meter, £42. All mint. Discount total buy. Prefer buyer inspects/collects. G4CHP, QTHR, tel: 0508 470365.

PYE POCKETFONES PF1 TX, £10; PF1 RX, £6.50; PF2UB, £35. All working but no xtals. Mr Griffiths, RS53786, tel: 051-653 0010.

SOMMERKAMP FR100B RX, gwo; matching FL200B TX, requires attention, manuals, £100 ono the pair. Vintage Lister D4 stationary petrol engine coupled to 12/24Vdc coach alternator, heavy!, £75 ono. Buyers inspect/collect. G4LZF, QTHR, tel: Luton (0582) 596760.

YAESU 70MHz (4m) tranverter module, £75. Moseley rotary dipole, 10/15/20 metres, £25. Transformer, new, 10A continuous, 240V in, 17.5V out, ideal psu £10. Twin-meter swr bridge, £12. Nigel, G4NRR, QTHR, tel: 021-744 8672.

P60 MOBILE VERSATOWER on trailer, good cond, ideal for club or contest group, no planning permission required, £550, part exch possible, WHY?. Nigel, G4NRR, QTHR, tel: 021-744 8672.

FT901DM with WARC kit, £500. FV901DM, £95. FC901, £65. SP901P, £45. Buyer collects. Workshop manuals £20. AR22 rotator, £25. All as new. G3AAG, Hampshire, tel: 0730-892143 or 893534.

FT102 with FM/AM & SP102, boxed, manuals, as new, exch for FT757. Also SK610 base & chimney with 4CX350A, offers or exch WHY? Creed teleprinter With tape reader & punch, £10. WANTED: 4-1000s. Dave, G4WBB, tel: Rotherham 67471.

IC271E, fitted Mutek front-end, superb Icom 2m multimode, £575. Densai base mic, unwanted gift, used once, £45. Bremi SA-7A psu, £15. FREE: Adonis AP-1 mic pre-amp with IC271E, use any mic. G6IAT, QTHR, tel: Luton 23750.

1985 DX/US CALLBOOKS, £11 each. RadCom, Jan 1962 to July 1972 in seven binders, £6 each. Remainder 1972, £3. 1973-84 inclusive, £6 per year. Some earlier copies, details SAE. UHF-BNC adaptor, £1.50. All plus postage. G3IZJ, QTHR, tel: 0252-548561.

AOR 2001 Scanning RX with psu, as new and boxed, £275.00. G1JXZ, QTHR, tel: Aylesbury 81624.

MACINTOSH 512K with 10" image writer & additional disk-drive plus various extras, £1,495. NO OFFERS. G4IQL, tel: 01-653 3456.

LINER 2, fitted pre-amp with mic & processor, £75. 16 ele H/B heavy duty 2 metre beam as G2BCX. G4EOD, QTHR, tel: 0733-261681.

COLOUR GRAPHIC PRINTER CGP-115, four colours, spare paper, docs, psu and lead, suitable for Dragon & Tandy, £50. Frequency meter, US Army type BC-221-M, 125kHz-20MHz, offers. Tom Higgs, G4TUA, NOT QTHR, tel: 061-226 9428.

NEW SPARES, Philips N 1500 series. Breaking N 1700 all parts except heads. What do you need?
WANTED: Tektronix 141 or similar broadcast spec PAL colour test generator/SPG. Real money waiting, could buy you new HF station! G3ROZ, QTHR, Bedfordshire.

MML 144/100-S LINEAR, new unused, £120. Daiwa psu PS200D, 9-15V 20A, almost new, £100. GW0ABG, Clwyd tel: 0978-757449.

YAESU FT203R plus FNB3 nicads, soft case, rubber duck, NC9 charger, PA3 DC adaptor, YH2 headset/mic MMB21 mobile mount, all boxed, mint, £200. G3CDC, NOT QTHR, tel: 0529-306987.

CODAR CR70A general coverage RX, guaranteed perfect, 2 hours use from new, could become collectors item otherwise cheap RX for any shack, £50 ono. Ideal for beginner's Christmas present. WANTED: FL50B TX, must be working. G4XFL, tel: Dudley 56574.

ICOM IC740 HF, fitted FM, £750. FM board IC740, £20. Tasco 11TE-5 4.5" reflector telescope, professional outfit, £320. 350pF wide-spaced variable condensers, £12 each. Altai Vernier dials £7 each. All new unused, boxed, mint. GW1IEF, QTHR tel: Pencader 303.

FR50B, FL50B with new spare 6JS6C pa valve and 12BY7A driver, cct diagrams and manuals for both, £100, buyer collects or pays carriage. G3LGX, QTHR tel: 0329-42482.

FT901DM, mint condx, all options, £495. MMT 28/144 2m transverter, mint, £75. 18AVT/WB minus 15m trap spares or repair, offers. WANTED: MMT 144/432 2m to 70cm transverter with repeater shift. G4GZS, tel: Rugby 815506.

YAESU VHF CONVERTER FRV-7700 type A, 118-150MHz, unused, £35. Catronics FM 2m amplifier, 10w in - 35w out with cct and new spare power transistor, £20. G8TUL, tel: Nelson 68548.

FT290R, Mutek, case, £220. JR310, £45. 7 metre telescopic alimast with base, £25. MM 144/28 converter, £6. MM 70/28 converter, £6. MJF cw filter, £6. Mag-mount, £5. Gutter-mount, £5. 144MHz 5/8 whip, £5. QQV0640A, £4 each. QQV0320A, £2. QQV0310, £1 each. G4DSC, QTHR, tel: 0765-2230.

YAESU FT730R, 11 months old, FM, 10w output, mint condx, mic & mobile accessories, £185. G6MAQ, tel: 0302-859451.

TILT-OVER TOWER, 60', 3 section, with winches, £250, buyer collects. G3BWY, NOT QTHR, Tunbridge Wells, tel: 089 275 555.

TS430S, fitted FM unit & 6kHz AM filter, also AT-250 automatic atu, both as new, perfect, £725 (list £1,089). FP707 psu for above, £85. Prefer not to sell separately. MC42S hand-mic with up/down switching, £15. G2KF, tel: 06373-78741.

TS830S fitted with cw filter, MC50, £600. TR9130, not used mobile, £360. AT230, £125. SP230, £35. All ex condx with own package. 100 metres UR67, £40 + £5 p&p. Dragon 32k, vgc, £60, NO OFFERS. G4LTM, QTHR, tel: 061-351 1152.

SPECTRUM ANALYSER Polarad 0-60GHz, perfect condx, manual and ccts, (just bought Hewlett-Packard), £550. Philips FM stereo generator, PM6456, £125. National VP811A1 FM sweep generator 75-110MHz, £95 Rank TV IF sweep generator, £45. Philips V100 camera, new, £120. G3PCN, tel: 01-866 3300.

TR2300 portable/mobile 2m FM plus 10w power amp, reverse repeater, mobile bracket, £120 ono. Palm IV, 6 channel 70cm FM hand-held, RB2, RB4, RB6, SU8, RB10, RB14, also spare SU20, £100 ono. G3WWT, NOT QTHR, tel: Staines (0784) 58583.

YAESU FT230R, 2m hand-held, tone-burst, repeater shift, little used, absolutely mint, boxed with manuals, plus PA3 car adaptor/charger, fitted FNB-3, £190 ono. Still looking for Sphinx TX and

PYRAMID linear. G4GVM, NOT QTHR, tel: Langport (0458) 252848.

KW600 LINEAR AMP, recently overhauled, ex condx, £160. KW2000 CAT, £25. G4NBF, tel: 0732-822724.

YAESU FT290R, pre-amp, soft case, strap, manual, original packing, nicads, charger, all as new, £230. Speaker for FT101, £10. Protective front cover, £5. WANTED: General coverage RX, RA17/117, Trio R100 etc, WHY? G4FYY, NOT QTHR, tel: Crawley 514788.

WINCH, hand operated, 2 speed with ratchet, suit heavy duty mast, never been used, plus 18 metres stainless steel winch rope, £30 or exch for SWL atu VT30 or WHY? M.Marsden, 205 Moss Lane, Burscough, Ormskirk, Lancs, LL40 4AS, tel: 0704-892088.

AMT2, RTTY/CW/ASCII/AMTOR terminal unit, near new, £150 ono. Software for Commodore 64, £25. G3HRY, QTHR, tel: 0908-616519.

YAESU FT7 with mobile mount, mic, handbook, best offer. 1" CRT ICP1, TT21, QQV0320A, 832A, 829B, £4. Airlite headset, boom mic, £4. 72 assorted xtals, £4. 100kHz xtal B7G, £2. RF & microammeters £2. GW3EJR, QTHR, tel: 0239-612331.

DATONG D70 Morse tutor, £35. Lowe TX40, 10m FM rig £35. Lloytron communications RX 1.5-30MHz, airband 2m band, £40. Ray, GOCGQ, NOT QTHR, tel: Wilmslow (0625) 529716.

COMPUTER TABLES, 2off, made for computer use, make good shack tables, £15 each. Many other items from shack clearence, send SAE for computerised list, buyer collects or pays carriage. G6YLA, QTHR, tel: 0344-428218.

PSU TRANSFORMER, large, 240v in - approx 40v out at 50A, very robust and heavy. Ideal psu or welding transformer, £35 ono. G6UED, QTHR, tel: 021-353 7280.

FOR COLLECTORS: D104 microphone; S G Brown headphones, pat.29833-10; BBC Yearbook 1946; RSGB Radio Handbook, 2nd edition; ARRL Handbook, 26th edition 1946; £5 each or £20 the lot, offers considered. G2FCA, tel: Newport Pagnell (0908) 613523.

FREE.... five Creed 54's and one 6S6M reader to good home. HELP! - Have you any old ARRL Handbooks or whatever? Any age up to 1970 please. G4ILR, QTHR, tel: Cromer 761612.

HRO CW, handbook, 10 off tuning coils, psu, gc, £40 ono. Telequipment 542R scope, gc, £30 ono. G4NTM, QTHR, tel: Thetford 4927.

TS830S, HF TCVR, ex condx, £600 ono. AT230 atu, £80 ono. Alex Stewart, GM4IKB, 49 Glenmuir Cresc, Logan, tel: 0290-21378.

AR2001, 25-550MHz VHF/UHF general coverage scanning RX, boxed with manual, £250. Tandy TRS-80 model III computer, 48k RAM, twin 5.25" disc drives, model IV line printer, fully working system, many extras, £750 ono. G4LDB, QTHR, tel: Southampton (0703) 733626.

TONNA 16 ele, £18. MBM48/70, £15. ASR33 with pedestal and heavy duty auto-transformer, needs attn, £10. Akai 4000DS reel-reel tape, £50. ST5 RTTY unit, £20. WANTED: telescopic mast, anything in gc considered. Mark, tel: 01-847 3122.

YAESU FT208R, 2m handheld, repeater shift, scanning clear/busy, charger, nicad rechargeable battery, antenna, ear plug, hardly used, £155. G6WQK, QTHR, tel: Egham 33114.

VERTICAL HF ANTENNA, 10/20m, £30. 2m halo, £3. 70cm HB9CV, £3. 70cm 5/8 mobile colinear, £4. Duplexer 145/435MHz, £3. Tandy power/mod/swr meter £15. Microwave Modules 10m pre-amp (receive), £10. 2m switched pre-amp, £10. G6LPT, QTHR, tel: 01-959 4849.

ICOM R70 RX, £400. 'Wireless - The Modern Magic Carpet' by Ralph Stranger, c 1931, £6. PW radio programs for Spectrum, £2. G6LPT, QTHR, tel: 01-959 4849.

YAESU FL2100Z, incl spare 572B valve, £500. Trio TR7500, 80 ch, 2m FM mobile rig, repeater shift, £175. Vibroplex standard paddle key, £35. Shure 444 mic, £30. Tiger atu, 80-10m, commercially made £30. Paker 2m atu, £15. Halicrafters HA-1 valve electronic keyer with psu, handbook, 4-65 wpm, sidetone speaker, £30. High power variable 100pF condensers (2x50), £5.50 each. High power 10W traps (1kW) 80-10m, £15. Carriage at cost. G3KNA, tel: 0543-481202.

AVO 8 Mk.III, vgc, £40. Yaesu FTDX560, HF TCVR, vgc, £100. G4AYG, QTHR.

TR9000 2m MULTIMODE, recently serviced by Lowes of Matlock, £285. BNOS 6A psu, £34. Welz SP-400 swr/power meter, 130-500MHz, 150W, £47. Datong Morse Tutor, £37. All ex condx. Carriage at cost. GW0DGO, tel: 0792-581436, evenings.

HEATHKIT SCANALYSER SB620, displays spectrum of RX IF, can also be used with signal generator as spectrum analyser, £55. Sharp MZ80K, 48k memory, basic & pascal languages, mint condx, £230. G1CBE, tel: 0602-259775.

JAYBEAM PBM10/2m, used 3 months, as new, £25. 70m RG8U, 50 ohm, 30p/metre. Splendid Olympia portable typewriter, hardly used, £35. G4UUN, QTHR tel: 061-320 0830.

JAYBEAM 48 ele, 70cm multibeam, £25. Signal generators, HF & VHF, £15 each. Microwave Modules GAsFET converter, 144/28HP, £28. 2m/70cm mobile whip, £10. J-beam 2m phasing harness, £5. 2m colinear, 6dB, £5. Deliver 20 miles Royston. G6VCI, QTHR, tel: 0763-61102.

YAMAHA B55 ELECTONE ORGAN, as new with tutor books cost £850+, exch for radio gear or part exch for small car. G4PAD, QTHR Essex, tel: 0375-671238.

ICOM ICR70 RX, with FM option, mint condx, with atu, £400 plus carriage. Trio TR7800, as new, £150 Trio DM-800 dip meter, £20. Trio scope, CS-1352, portable, carrying case, probes, as new, £150. G8TFC, QTHR, tel: 0385-852072.

FT102 HAND MIC, boxed, immac condx, FC902 atu, together £650. G4IXP, NOT QTHR, tel: Frome (0373) 66981.

ICOM 271E, 25w multimode base stn with Mutek front end, vgc, £550. G0BQP, NOT QTHR, tel: 0642-590416.

ICOM 211E, £300. Robot 400 SSTV, £300. Belcom LA106 linear, £100. G4IBN, QTHR, tel: Knottingley 88300.

SWEDISH BRASS MORSE KEY, in original wooden box, used very little, £25. G4RFS, QTHR, tel: 0483 65982.

TEN-TEC ARGONAUT 509 QRP HF TCVR, SSB/CW, 80-10m, 5w, full break-in on CW, boxed, superb rig with psu, £230. G3ZZD, QTHR, tel: 01-348 9780 after 7pm

TS830S, little used, £550. MC50 mic, £40. SEM Transmatch atu, 160-10m, £40. J-beam TB3, HF tri-band antenna with rotator, £160. Buyer to check and collect. Jim, GM4SRY, QTHR, tel: 07646-3313.

TS830S, MC35C, set spare valves, £500. DX51 5 band antenna, £25. G3NWG, tel: Chelmsford 83520.

ATLAS 215X solid state TCVR, 1.8-21MHz, SSB/CW, excellent rig for mobile complete with mobile mount, fully re-aligned, £275. G4KIU, tel: 0892-33586.

YR901 RTTY Morse encoder/decoder, YVM1 monitor, YK1 QWERTY keyboard, £208 ono. AMT-1 plus CW TCVR and BBC micro software EPROM (0.5,1.0 or later). Prefer buyer inspects & collects. GM4DPC, QTHR, tel: Boarhills 210.

YAESU FRG7000 RX, G2DYM trap dipole, balun matching unit for above, £200 ono, despatch incl. Jon Kempster, BRS45205, tel: 01-341 9053.

FT101B with G3LLL DBM fitted, new driver & PA's, YC601 digital display, LF-30A lowpass filter, homebrew atu with 30w dummy load, vertical antenna 10-40m, £400, consider exch for 2m multimode stn. Chris, GM1POU, NOT QTHR, tel: Falkirk 26210.

FT290R, Mutek pre-amp, nicads, charger, case, rubber duck, handbooks, plus MML 144/30 linear, plus homebrew regulated psu, £250 NO OFFERS. G0AQT, QTHR, tel: 0923-38613.

RTTY STATION comprising Creed 7E, ST5, TU & scope, £50. Pair PF1 TX/RX with nicads, RB, £10. KP202 2m handheld, 6 ch, nicads, charger, £50. ICOM 22A 2m Mobile, 12 ch, £90. G4ISN, NOT QTHR, tel: 0509-267309, evenings & weekends.

10XY 2m, 2" alloy pole, wall brackets, Emotator 502CXX, controller, £80. KLM 2m linear, 160w, £90. Datong Morse keyboard, £70. G8OBH, QTHR, tel: Sandwich 612420.

TRIO TS520, plus Shure 444 mic, vgc, £250 ono. G4CLV, QTHR, tel: Hailsham (0323) 841879.

KW2000, 1.8-30MHz, AC psu/speaker, mic, slight fault, £99. 18AVT/WB, 80-10m vertical antenna, gc, £49. RAE course, 6 books, immac condx, £15. GEC scope, 50KC, gc, with manual, £20. G4SYI, QTHR, tel: 01-958 9868, after 5pm.

FT250 HF TCVR, psu, recently aligned, suit beginner, going solid-state, £175 ono. G0CWP, tel: 0524-824579.

TS180S, extra SSB & CW filters, WARC bands, £390. AT180 atu, £75. PS30, 20A psu, £75. SP180, speaker £30. R600, £230. TR7800, £140. Selling all, going maritime mobile. All ex condx c/w boxes, manuals. G3UZI, QTHR, tel: Horsham 66327.

TS120V, superb condx, boxed, £250 ono. 8271 DNFS, offers. UDM DDFS, new; UDM sideways ROM board, new offers or swap swr bridge, WHY? Amstrad CPC464, some software, £150 or swap for 2m rig or WHY? G4SFI, tel: Thetford 616611, after 6pm.

NASCOM-2, cased with Ball monitor, card frame & additional IO & protyping boards, £150 ono. Two 8" disk drives & psu, £45 ono. DEC LA30 printer, £35. G3GAF, QTHR, 01-458 2616.

FM ADAPTER FOR FT101 not ZD, squelch, tone-burst & repeater shift, £50. Speech clipper for FT101, £10 G1PLN, tel: Alsager 6149.

KD2030 FM TCVR, 5/25w, gc, £150. Also 150w mains stabilising transformer, fully cased, £10. Buyer to arrange delivery. G4LUF, NOT QTHR, tel: Gara Bridge (Devon) 442, evenings or weekends only.

TONO 9000E, RTTY/CW/ASCII terminal unit, £350. Monitor, 9", black, £25. Trio SM220 monitorscope, £125. Daiwa PS300, 9-15v 30A psu, £100. FTV707 2m transverter, £50. Middleton, 49 Wolseley Road, Stafford, ST16 3XW.

TR9130 2m multimode, 25w, accessories, manual, complete in original packing, never used mobile, absolutely mint condx, £320. HAG 7 ele long Yagi, £12. 5 ele Yagi, £6. PSU, £8. G4RVD, QTHR Walton on Thames. tel: 0932-241467.

COMMODORE PET 2001 computer, vdu, ideal IEEE controller, £150. Prestel/Videotex GEC decoder, full keyboard, £25. 40' Versatower, £250. Odd G-Whip coils, £3 each. New 2102-2 RAM chips, 20p each. MTV435 TV TX, £105. MML 144/40, 2m linear, 40w, £25. G8AYN, tel: 045 55-57790.

G-WHIP MULTIMOBILE, 10/15/20/40 + 160m coils Extendamast LF whip, operate 4 bands without leaving the vehicle, £40. WANTED: very cheap 2m FM rig, under £50, channelised will do but must be in gwo. G4OBK, QTHR, tel: Chorley 74451.

FT790R, 70cm, complete with carrying case, nicads, charger & mobile mount, used few times only, cost £300+ last year, accept £180 ovno. G3YNI, QTHR, tel: 027875-333.

FT101 TCVR, 10-160m, with fan, £175. AR88D, with manual, £40. Digital read-out add-on, £20. G-Whip HF mobile antenna, 10-80m with instructions, £9. 5/8 2m mobile antenna, £3. Dot-matrix printer Anadex DP-8000, parallel & serial inputs, with manual, £70. LF oscillator (heavy!), £5. Rotator, £5. 22" Philips colour TV, with AYR Teletext infra-red remote control add-on, £75. G3TCK, tel: Codsall (09074) 2634.

RACAL RA117E, £150. Racal RA17L, £100. Telequipment D53 D/B scope, £50. PW Severn, QRP TCVR, nicely made, £30. All vgc with handbooks. G3MBN, QTHR, tel: 0225-810621.

2M LINEAR, BNOS 110-100, hardly used, £95. 10m FM rig, Lowe TX40C, as new, £30 ono. G4ILO, NOT QTHR, tel: Colchester 210878.

IC215E with IC5M5 base mic, boxed, £375. FT209RH, MH12 speaker/mic, mobile mount, unused, £230. WANTED: FT726. G4GZS, tel: Rugby 815506.

YAESU FR101 digital AM/FM, SSB/CW filters 2 & 6MHz mint, £295. Lowe SRX30 digital RX, £125. CWR610 Telereader, £125. LAR RX atu, £25. Uaesu FT290R, nicads, 30w linear, £285. Mutek scanning RX pre-amp, £15. Commodore 2031, £125. G3RCQ, tel: Hornchurch 55733, 6-9pm.

FT290R, case, nicads, charger, MM 144/30LS, Mutek SLNA 144S pre-amp, swr meter, £375 the lot, NO split, NO offers. WANTED: IC251E. G1ECY, QTHR, tel: 01-890 9733.

TL120 100w linear for 120/130V, £120. VFO120, £25. DFC230 fequency controller with scanning mic, £50. SP120, £20. MB100 mobile bracket, £10. G-Whip multimobile with 40/80m coils and telescopic whips £35. All mint, boxes etc. G4WBW, tel: Kidsgrove 6656.

SWR/POWER METER SP15M, used very little indeed hence boxed in brand new condx, £37. 6A 0-19v psu, fully protected, £27. 53 Practical Wireless, Feb 1978 to May 1985. 24 Wireless World, March 1978 to April 1981. G1EOJ, QTHR, tel: 0253-45431.

TRIO R2000, vgc, £320. Pocket scanner, VHF FM, 140-160MHz, xtal channels, nicad, charger, £30. Lots of bits & pieces, components, coax etc, for callers. Lockwood, G3XLL, QTHR, tel: Mellis 596.

FT901DM SERVICE MANUAL, £6 or exch for FT101ZD service manual. BN86 balun, 1:1, 3-30MHz, 50 ohm, 1kW, £15. K40 speech processor hand-mic, unused, new, £20. Postage extra. GM4KKW, QTHR, tel: 0575-73455.

YAESU FRG-7 communications RX, gc, £100. Ian tel: Yateley (Hants) 878446.

MOSLEY TA33JR 3 ele beam, 20/15/10m, new radiator traps, gc, £65. Army A14 transistor TCVR, 2-8MHz, atu, £55. Army A13 transistor TCVR, 2-8MHz, atu, plus 20w transistor RF amp, nicads, charger, offers? BC221M frequency meter, £20. G3JFC, tel: 0474-872743.

SIGNAL GENERATOR, Marconi TF390G, 16-150MHz, believed early 40's model, in working order, with calibration charts and manual, offers? G3TEL, QTHR tel: Wantage 4019, evenings & weekends.

ICOM IC260A 2m FM/SSB mobile, 143.8-148.2MHz with sensible microprocessor control functions, easy to drive, ideal for new G1, £225. Roger, G6HQK, NOT QTHR, tel: Wolverhampton 69285.

TRIO 2300 in mint condx, first £100 secures, NO OFFERS. G3XFN, QTHR, tel: 021-353 3364.

PYE WESTMINSTERS W15AM, mid-band, boot mount, less mic, speaker, control units, with xtals, clean condx, tested, £35 ono each. G6HXB, QTHR, tel: 01-574 2957, evenings.

ICOM IC210 2m base FM TCVR, exceptional condx and performance, £160, consider swap for mint FRG-7 with FRT7700 of Trio 1000. Exch mint Olympus OM10 body, Kiron 80/200mm zoom. Eumig 31XL sound camera for 2m WHY? G1OLA, tel: 020630-4544.

FURTHER SALE THROUGH ILL HEALTH: Versatower 30m tilt-over, electric motor for hoist, all winches, brake control together with 2m, 6m, HQ1 Mini-beam antennas, new this year. Rotator, heavy duty Daiwa DR7600R, round controller, H100 coax. Purchaser removes. JIL SX400 scanning RX, converter RF1030, 100kHz-30MHz. ACB antenna control box. SX232 computer terminal interface. Two mains adaptors. Complete set-up BBC 'B' computer. Daiwa PS80M. All new this year, sensible offers please gentlemen! G4MVW, QTHR, tel: 0202-36306.

R1000, £185. Avo meter EM272, £50. UCI Weltz atu, £50. Datong antenna, £35. Hygain 14AVQ + 80m, £50. IC2AT c/w charger, £150. Millen gdo, £30. Transam Tuscan computer, £400. Vangaurd 432MHz converter, £25. 430MHz pre-amp, £15. 2m colinear, £25. 18AVT 10-80m vertical, £70. G8AWB, NOT QTHR, tel: 0935-813097, weekends only.

TRIO TR590S RX with matching speaker. G4CLZ, NOT QTHR, tel: Barnsley 766377.

NRD515 c/w all filters, NRD515 memory unit, NVA515 speaker, £750. G4USC, QTHR, tel: 0603-484952.

MIRAGE B1016 2m solid-state amplifier, almost as new, 160W+ output, £125. SSB Products gasfet masthead pre-amp, MGF1400, with DCW15 sequential controller, 1kW thro', £70. GI4OMK, 19 Cairnshill Park, Belfast, BT8 4RG.

REALLY MUST DISPOSE OF: Heil SS2 speaker, new. Peto Scott Trophy 8, antique. BC348, 10-80m. KW Vanguard, 10-80m. RSGB & SW Mags, 1947-date. Any offers considered, however low! Delivered London. G2HMV, tel: 01-764 4747, mornings.

HEATHKIT HM101, gc, manual; also video cassettes for Philips 1500 series recorder, offers. WANTED: Syncronome master clock, need not be working but prefer complete. G4LSA, QTHR, tel: 0785-74388.

UHF SWR METER CN650, £75. Partly built psu containing capacitors & bridge rectifier, £15. J-Beam antennas: 5Y2M, 75 ohm, £5; 8Y2M, 50 ohm, £10. Elizabethan reel-reel tape recorder, £10. G2FCA tel: Newport Pagnell (0908) 613523.

YAESU CPU2500R, 2m FM mobile, 25/3W, band scan & memory scan, keyboard, mic, instruction manual, boxed, very little use, £150, buyer collects. G6WVY, QTHR, tel: 0703-812444.

FT101ZD Mk3, fitted FM, fan, mic, manual, original packing, recently serviced by KW, vgc, £450. Brian, G4XWI, QTHR, tel: Gravesend 66479.

YAESU FC902 ATU, all band 10-160m, 3 switched antenna sockets and terminals for end-fed wire, gc, £65. Doug, GOCTE, tel: 01-688 4563, evenings.

FC102 ATU, slight mods, £110. FT707S, 10W with H/B manual, vfo, £300. FT101ZD Mk2, complete, 10MHz fitted, £350. FV101Z vfo, £70. FRG-7, fitted SSB filter, £90. FT227R, low gain RX, £90. Carriage extra. Collect 101ZD?. G4IOT, QTHR, tel: Folkestone 76063.

HEATHKIT AF SIG/GEN, £30. RF sig/gen, £30. Oscilloscope, £50. Phihong psu 13.8V 7A, £35. Uher 4000 Report IC portable tape recorder, £120. Olympus K microscope, £100. AKG D160E mic, £20. All as new & ono. G6KGU, tel: 0565-54650, evenings & weekends.

FRG7700 COMMUNICATIONS RX with 12 ch memory, £200. Vince, G8LLB, QTHR, tel: 01-531 0716.

ICOM IC745, new, unused, FM & marker units fitted, £720, save yourself £230! GD4YON, tel: 0624-422342 evenings.

QTH BUNGALOW 3 d/bed, 1/kitchen, gas c/heating, 1/lounge, 1/garage, detached gardens 3 sides, space boat caravan, P30 tower, rotator, "Bowtie" minibeam 80m dipole, details on request, £44,950. Near shops, bus. P30, beam, rotator sold separate, £200. G3JNY, QTHR, Leeds 863058.

KW202 COMMUNICATION RX, 1.8-30MHz, c/w speaker, manual, cct diagram & some spare valves, £100, buyer inspects and collects. G3OPA, QTHR, tel: 01-508 6700.

FT207R with YM24, NC2 adapter, manual, case, £115. G1CDC, tel: 0233-26169.

TRIO TR9000 MULTIMODE, £325. BO9 base plinth, £35. SP120 speaker, £25. MML/144P, 100W linear, £95. Datong Morse tutor, £45. Tonna 9 ele beam, £15. £500 ovno complete. All unmarked, boxed, excellent working order. G1MLQ, tel: 0602-270038.

WAVEMETER CLASS D, c/w phones, £5. STC wavemeter model RS02, with case, coils, charts, collectors item? £10. Buyer collects or pays carriage. Manuals for Pye AM25B & W15FM, £1 each. WANTED: MMT70/28 or similar. G4SDZ, QTHR, tel: 0636-702076

YAESU FT101Z, 1 year old, 9 bands, YD148 base mic, £375. Dressler D200C, 120W, VHF valve linear, int psu, £170. MMT144/28, £50. MET 2x7 ele, £10 each. MET 2m 2-way pwr splitter, £15. G1JOU, QTHR, tel: 0322-75275.

TRANSFORMER, 1000-0-1000V, rated 600W. These are high quality, oil filled units and are ideal for high power linears, eg 4CX250B, 813, size 6x7x7, £17.50. Also HT transformer, min 2.5kW. Dave, G8PDW, QTHR, 01-570 9595.

YAESU FL50 TX, FR50 RX, 10-80m, mic, Z-match, swr meter, trap wire dipole, £160 ono. Arthur, G4VZJ, tel: 0299-270536, after 6pm.

TRIO TR2400 FM hand portable, c/w spare nicads, remote mic & car charger, £165. Can supply new 7/8 mobile whip & gutter-mount as negotiated extra ir required. G0DBX, tel: 0507-604419, evenings.

MM1000 ASCII-MORSE CONVERTER, brand new, never used, c/w DB25 connector & instructions, permits comprehensive Morse to be sent from any parallel ASCII keyboard, £35. GM3HBT, QTHR, tel: Larkhall 883306, after 6pm.

SMC MS8400 VHF/UHF SCANNER, 6 months guarantee, ex condx, £150 ono. G6ZAM, QTHR, tel: Ashford (Middx) 57276.

VALVES, new, boxed: three 829B RCA, £10 each; two 6BQ6GTB (6CU6), £3 each; three 6C4WA, £1 each; two 6J6WA, £1 each; one 12BY7A, £3; Sylvania & GE makes. WANTED: FC707 atu. G2ATK, QTHR, tel: Pershore 553735, anytime.

HF5 VERTICAL ANTENNA, c/w radials, 80-10m, gc, £65 ono. G4WXH, QTHR, tel 0480-53543.

SHACK CLEARANCE: Creed 444, £25. Scarab MPTU-1, £40. MMT144/28, £40. Kenpro KR-400RC rotator, £80. Welz SP-15M & AC38M, £60. Part-built ST5 terminal unit, £20. G4ODK, tel: Basildon 418058, evenings & weekends.

QTH BRIGG SOUTH HUMBERSIDE: Georgian style 3 bed detached house & garage, c/h, dbl/glaz, cav/roof insulation, a desirable residence with permission for 30' tower, only £35,750. G4ZMH, QTHR, tel: 0652-54917.

FT290R with Mutek, £200. DX-40u & VF-1u, £50. 100W 2m valve linear, £40. Universal side-tone, no connection to TX, £10. Bargain, PS, DX-40u AM & CW buyer collects. G4YFO, QTHR, tel: 01-272 1702.

ROTATOR, Alinco heavy duty with control unit & 6-core cable, £39. Doug, GOCTE, tel: 01-688 4563, after 7pm.

R2000 COMMUNICATION RX with CW xtal filter & dc power lead, as new, manual & box, £325. G4OWV, tel: 01-450 2227 or 0493-663195.

DUE TO MOVE, have Trio TS130V with 1.8kHz & 500Hz narrow filters fitted, mint with box & handbook. Will swap for ICR70 with FM or R2000 RX, must be mint. G4WBW, tel: Kidsgrove 6656, after 6pm or weekends.

ATLAS 215X HF rig, 160/80/40/20/15m, base/mobile, solid state, £250 ono, will exch for Atlas 210X. G3XMA, QTHR, tel: 0203-410208.

TRIO TM401A, excellent piece of kit, 5/12W, mobile bracket, speaker, purchase of new dual-bander forces sale, £220. Alan, G4VZU, tel: 0602-271824.

PYE F412 UHF BASE, suit repeater group, xtalled & aligned on 430MHz, £110. G4LUL, QTHR, tel: 0457-65185, after 7pm.

ICOM 271E, as new, very little use, boxed with instruction manual & all paperwork, exch for Yaesu 575GX in same condx. G4YVT, QTHR, tel: St Helens 20370.

REALISTIC DX400 HF RX, with VHF/BC, mint, original packing & instructions, £100 plus carriage. Albol SB3M 3MHz scope, as new with cover, manual & lead, size requires buyer collect, £80. John, G6IBC, QTHR, tel: 01-790 8163, after 5pm or weekends.

SPECTRUM, 48k with ZX printer, £100 ono. Some books & programs incl Morse transceive. Postage by arrangement. G3DNX, QTHR, tel: 061-480 9994.

MICROWAVE MODULES 28 to 70cm tvtr, satellite model as new, boxed, manual, cct etc, £120. J-Beam 8XY crossed Yagi with circ phasing harness, new, £30. G3RFN, QTHR, tel: Leyland (0772) 421885.

HOKUSHIN HF5R 5-band antenna, ass'bly instructions £80 ono, buyer arranges collection. Jim, G0BGU, tel: Southport (0704) 211207.

TET HB23M HF 2 ele minibeam, 20/15/10m, ele length 17', 10 months old, £100. G4SSX, QTHR, tel: Ruislip 30627.

CLEAR OUT: moving house hence urgent need for shake-down. Much equipment, eg, TEK 547. 12 mostly post war domestic RX, Bush, Marconi, Pye etc, many other components. SAE. G4XMK, QTHR Surrey, tel: 08833-4718.

MARCONI TF1101 LF oscillator, 20Hz-200kHz, £45. Airmec oscillator, 50kHz-100MHz, high output, £50. Solatron SB scope, CD1012, 25MHz, £40. Ajax yacht radio, 6 marine HF band xtals, 12V, £20, could convert 160/80m. G4ULR, QTHR, tel: 0603-51656.

YAESU FT902D 9 bands, all modes, FM etc, plus SEM Transmatch & 4 new spare valves (2 driver, 2 pa), £550 collected or pay carriage. G8GTP, tel: 061-761 2952.

FT290R tcvr, MMT70/144 tvtr, 4M4Y antenna, rotator £350. WANTED: Top-band TX or tcvr. GW4BZI, QTHR, tel: Chester (0244) 675794.

FT790 with charger, nicads, £250. MMT144/28R 2m tvtr, 25W out, £150. BC221, £20. Pair brackets wall mounting, for 2" mast, £20, buyer collect. Piper 70cm 10W linear, £30. G3NOH, QTHR, tel: 01-997 4756.

HF BEAM, 3-band, 3 ele, new, boxed, £100. Mullard CR bridge, £5. Creed 7BRP teleprinter, £7.50. Pye Bantams, 2 AM, 1 FM, £12 each. Some 2m xtals, £1 each. Absorption wavemeter 20-300MHz, £5. Muirhead FAX machine, £10. G3BYG, QTHR, tel: 043871-6389.

PRINTER, model 75, 230V 50Hz, one working, one for spares, £15. G3MED, tel: Watford 28678.

Neighbour's music centre hyper-sensitive so MML144/100S linear, 100W + pre-amp, never installed, £125 ono. Trio PS30 psu, 20A, £75 ono. Teletype 35RO, cheap! Peter, G8ZKZ, QTHR, tel: 0708-69770, evenings.

RADIOSPARES 50W auto-transformer, tapped mains to 115V, £5. TR1186 small modulator unit with EF92, EL91, pair 6C4's, details for FM, new, £4. FT101B cct diagram with new coil T107 5MHz trap, £3. Multi-screened cable, 57', 12 coded wires, approx 20 gauge, PVC covered, 9/16" dia, £5. Meters: 500uA, round 1.5" dia, £3; Weston edge 2.5" F3 100uA +/- centre 0, £4; RF thermo-couples, 6A, 2-5/8" dia, £3; 500mA, £3. G3MBL, NOT QTHR, tel: Bury St Edmunds (0284) 60984.

TRIO R600 gen/coverage RX, 1 year old, original packing, £200. G0CJQ, tel: Huntingdon (0480) 72947

TRIO TS820S, due to overseas travel must part with rig, built-in 600Hz CW filter, gc, recently serviced by Lowe, £425, prefer buyer to collect. G4DEE, NOT QTHR, 0706-31850.

KW202, gwo, calibrated, Q multiplier, handbook, any test, £80. KW108 monitor, solid-state, 32W pep = 2.4cm trace, like new, £65. Datong D70, perfect, £38. Datong D75, like ASP but manual, spotless, £38. Superb, new, w/spaced 390pF v/capacitor, 9.5" long, 0.25" spindle, £14. 800pF, easy remove plates to preferred, £8. Kokasai MF455-15CK xtals, £18. Datong AHF, tuners gone 0.5secs, £40. Sharp cassette rec/play auto-stop, steel grey, 600 ohm in, hi-z out, leads, hardly used, £20. Massive 2pl 5W cer sw with bank of 10kV fixed C, £15. Cirkit 1-30V 1.5A stabilised, protected psu, 1A meter, nicely cased, £20. Twin-ganged single drive r/coaster, £5. Heath variable psu, 0-400V also 1-100V neg, 6.3/12.6 4/2A was £175 new, £50. Twin meters, handbook. G3RHM, QTHR, tel: 01-423 0306.

STANDARD C58 2m portable multimode TCVR with

matching linear, c/w nicads, charger, helical antenna, soft case, etc, £210. G1EKY, QTHR, tel: 061-339 9116.

IC260E 2m multimode with manual, gwo, £175. WANTED: FV901DM, YO901, FC902, SP901P, good price waiting. GM4XEQ, tel: Ayr (0292) 268055.

YAESU FT901DM HF TCVR, first class condx, £450. Yaesu FTV901R tvtr, fitted 2m/70cm modules, £380. GOABM, QTHR, tel: 0892-41785, evenings & weekends.

NAG 144XL, 144MHz amplifier, 250W output plus spare valves, £295 ono. Philips N1700 for spares, £10. Colour TV, 20", good picture, £50. G4RRA, NOT QTHR, tel: Aldershot 331617.

IC701 plus psu, £475. WANTED: Good 160m DF RX, homebrew OK. D.Skye, G3PLR, NOT QTHR, tel: Harpenden (05827) 66410.

FREE... Ringo Ranger antenna, coax feeder & switch when you purchase my little used Icom IC251E, 144MHz, all mode TCVR, c/w instruction manuals & original packing for £365 ono. G4PEV, QTHR, tel: Oxshott (037284) 3201.

MARINE RADIOS VHF & HF SS6000 handheld, six ship/coastguard channels, £125. Speaker/mic, £14. Decca HF TCVR, 6 ch, built-in atu feeds unloaded whip/wire, covers 160/80m, 30W/12V psu, manual, £60. Nigel, G4PJJ, tel: 045275-542.

GEM QUAD, 2 ele tri-band beam, £140 ono. GW4SOC, QTHR, tel: 0633-275574, after 6pm.

YAESU FT203 2m handheld, speaker/mic, charger, car adaptor/charger, mobile mount, mint condition, all boxed, lack of time hence, £180 ono. G6TLP, tel: 0206-224308, evenings only.

RACAL RA-17 RX, rack-mount, no case, original manual, £100. Marconi sig/gen, 35kHz-19MHz, AM/FM/CW, massive, solid, in NATO steel transit box, film scale, £30. G3OGK, QTHR, tel: Andover (0264) 781752.

QTH: 3 bed, 2 rec, kitchen etc, semi-detatched, house, mature 100' rear garden with tilt-over mast & planning permission, space for 2 cars, £57,000. G3SVE, QTHR, tel: 01-953 1212, day, 01-953 2960, evening.

PROFESSIONAL METAL DETECTOR, Fieldmaster FX77 Mk2, list price £350+, also AOR AR2001, superb scanning RX, both virtually as new. Will swap for HF TCVR. Letters or call. G0DKW, QTHR as G1LWT.

DAIWA DRY500X round rotator with preset control box, new condx. GM4CUB, tel: 0292-262496.

FT290R, unmodified, £180. Tokyo hi-power HL35V linear, 35W, £35. Drae 6A psu, £20. J-Beam 5 ele Yagi, £5. Complete 2m stn for £235 ono. Martin, G1LHK, tel: 01-590 5490.

SWAP NIKON FE2 CAMERA BODY, unused, boxed, value £210, for modern gen/cov RX. G1IRS, tel:01-394 0249, after 7pm.

FT790R, 70cm multimode, rarely used so as new, 2 sets nicads, charger; linear amp 1W in, 20W out, £275 the lot. Khee, G1MUR, QTHR, tel: 061-225 5202 evenings.

SPECTRUM PLUS COMPUTER with ZX LPRINTS interface and Brother M1009 printer, £200. John, RS48510, tel: 0276-62252 extn 349, weekday office hours or 0276-685108, evenings & weekends.

FT290R, as new condx, nicads, charger, mobile mount, manual etc, £250. G3PYP, QTHR, tel: 0225-708816, after 6pm.

ICOM IC730 with CW filter, tvtr board, £420. Standard C8900, 2m FM, £165. All mint, boxed plus manuals. KW107 Supermatch, 1kW, £85. Techtronix scope, model 567, £45. G4FPU, QTHR, tel: 0707-320741.

YAESU FC757 automatic atu, mint, £190 + carriage. Good 10m multimode and 10m 400W linear, open to reasonable offers or exch with cash adjustment for 2m multimode, VHF/UHF scanner or other good equip. G4VIO, QTHR, tel: 0388-763501.

HYGAIN 12AVQ vertical antenna, 10/15/20m in vgc, £40, useful for general work or before going on to beam. Yaesu SP901 speaker, mint, £25. Athawes, G4RUZ, Porch House, Coniston Cold, Skipton, North Yorks, tel: Gargrave (075678) 685.

YAESU FL2100Z linear, £450. FV901DM vfo, £110. SP901P, £75. NC8 charger, £30. All excel working condx. Doug, G3KCT, QTHR tel: 0763-44550.

FRG7 COMMUNICATIONS RX, pristine condx, original packing with manual, £130. Datong Morse tutor, as new, £35. G0DCS, NOT QTHR, tel: 0582-576107.

GRUNDIG GDO with 8 coils, 400kHz-300MHz, model TR300, unwanted gift, £20. G4HBD, QTHR, tel: 0202-767583.

RTTY MM4001 TCVR with ASCII keyboard and instructions, vgc, £75 only. GD3ESV, QTHR.

24' MAST, 2 sections, can raise to 40' with pole, ideal for HF, £50. G1NFK, tel: Broadstone 695123.

RGB MONITOR TV, Ferguson MC01, boxed, as new with cable for BBC micro, £200 ono. MA20 Spectrum RGB adaptor, £20. Sony CDP101, compact disc player with 4 discs, as new, full remote control, £290. G4IAC, QTHR, tel: 05645-78218, anytime.

YAESU FP707 psu, £95. FP107E psu, FC707 atu, £85. YP150 wattmeter/dummy load, £65. FT757 tech supplement, £4. XF31A SSB filter, 3180kHz with carrier xtals, £10. Eddystone 730/4 gen/cov RX, £70. Cassette t/recorder, £5. WANTED: Atlas urgent G3MXO, tel: 021-788 0518.

MM 1296MHz tvtr, as new, £160. MM 1296 pre-amp, bi-polar, £15. J-Beam D15 antenna, £20. LMW mast-head pre-amp, £30. Carriage extra. Andy Emmerson, G8PTH, tel: Northampton 844130, anytime.

KW2000A with psu & handbook, recently re-valved, £155. AR88D, S-meter & handbook, new valves, gwo, £50. WANTED: good 888A or EA12. G3TYB, Kent, tel: 0795-25977.

HQ1 MINI-BEAM with 4 spare spokes, £70. RO250 rotator, complete, suit HQ1 or VHF beam, £30. SEM electronic keyer unit & paddles, £25. Buyer collects or pays carriage. Ron, G4YYH, QTHR, tel: 0209-718021, evenings & weekends.

THE MOST POPULAR HANDHELD in the world! IC2E, mint condx, 10W amp, charger etc, £150 ono. Also Pye Westminster with integral W&D synthesiser, £85 ono G8FMC, QTHR, tel: Tring 4948.

SWAN 100MX HF TCVR, 5-band, SSB/CW, 100W pep, incl hand-mic & mobile mount, gc, £275. Matching 20A psu available. G4NMA, QTHR, tel: Walkern (043886) 505, evenings & weekends.

TRIO 830S, new, £650. Trio R2000, new, fitted 118MHz, 174MHz cvtr, £400. G4BXR, QTHR, tel: 0908-566266, after 6pm.

MATCHING PAIR of Trio FM TCVRs: TR8400, 70cm, 10W, & TR7730, 2m, 25W. Perfect working order, original packing & accessories, £340 pair or £175 each. G4OHB, QTHR, tel: 021-449 3530.

YAESU FT707, FP707PS, vgc, £425. MML144/100S linear, as new. Illness forces sale. GW4TGF, QTHR, tel: Swansea 403526.

PO TELEPRINTER, c/w silence hood, £20. Reason for disposal - XYL nagging! & moving to new QTH. Buyer collects. G8SXJ, QTHR, tel: 01-868 5930.

YAESU FT102 HF TCVR, absolutely mint, original packing & manuals, £595. Elbex monochrome video camera, pan/zoom functions, £58. Optional 9" video monitor with camera controls, £60. WANTED: Wraase or Robot SSTV, in mint condx. Paul, G4XHF, tel: 0293-515201.

PSU's: 5A/13.8V, overvolt protected, £20; 8A/5-25V homebrew, £30; 25A/13.5V homebrew with fan, £45; 50A/13.5V s/mod computer supply with fan, £45. AR88D RX, scruffy but works ok, £35. FM TCVR, 2m, 6 ch, valve, works ok, £25. ZX81 computer, housed with 16k RAM, psu, Maplin keyboard, cass/player, books, spares, £30. External rig S-meter, £10. J-Beam vertical HF, 3-band antenna, new, £30. G1NTY, tel: Tiptree (Essex) 815978.

TRIO TS780, VHF/UHF dual-band base stn, cost £948, offers around £750. Trio 9130, 2m, all mode mobile with mount, cost £499, offers around £410. Trio SM220 monitorscope, fitted BS8 panadaptor, cost £304, offers around £240. All above as new. Muirhead M100M, modern, professional, gen/cov RX, solid state, digital readout, weight 50lb, buyer must collect, £650. Hansen FS603M pep watt/pwr meter, £30. Daiwa AF606K, audio filter, £40. G6SFD, QTHR, tel: Dronfield 413413, evenings & weekends.

ROTRONICS wafadrives for Spectrum Computer, 16/48k with RS232 & Centronics interface plus free word processor program & 8 wafa's, £70 ono. Philips 1702 video recorder, serviced & working, vgc, plus 4 off 3 hr tapes, manual, £60 ono. G1HIC, tel: 01-670 3185, evenings.

NEW EQUIPMENT: high quality Japanese 8 ohm, 4" ext speakers, sound superior to most in-built speakers £5.75 incl p&p. Ceramic mics, ideal for DX, very crisp audio, suits FT101-101E plus most rigs with 50k ohm mic, £4.50 incl p&p. G4WOS, QTHR, tel: 0304-611627.

SIG/GEN, £100. 50MHz counter, £50. 500MHz pre-scaler, £30. MM 432MHz tripler, £35. Barlow Wadley RX, £25. 2m, 10W power amp, £15. Cased 2m lo-pass filter, £10. 2kW swr bridge, £10. Lawrence G8AWB, tel: 0935-813097, weekends only.

ATTRACTIVE DETACHED BUNGALOW, 5 mins from sea, hilltop location so good DX. Sun-lounge, lounge, breakfast room, 3-beds, bathrm, sep WC, c/heating, indoor shack, large garage & workbench, est 107' garden, trap dipole, rotary 2m beam, £27,950. G3NHU, tel: 0493-721173.

2m SHACK CLEARANCE, Yaesu FT290R, Mutek front-end, nicads, flexible whip, case. 9 ele XY, 9 ele X Tonnas, harness for cross plane. Oscar 7/8 mobile antenna, mag & bumper mounts, URM67 coax, headset & switch-box, £320 ono. Ian, G6ZNT, QTHR, tel: 0993-75337.

FT101Z, 6-band, little use, original packing, £350 Vesatower P40, ex condx, no rust, post mounted, £250. TS700, very little use, £200. AR40 rotator, ex condx, £25. Scopex 4D10A, dual-trace, as new, £60. TH3JR, £50. G4AI, tel: Penzance 763238.

LETTER QUALITY PRINTER, £60. Dot-matrix printer, £130. Tektronix S61A scope, £150. Sig/gen, 4-12GHz £25. Intel 8086, 8087, £30. Part exch above for G3LLL FT101 clipper, BBC B, QL, Sony ICF7600DX or Black Star 600MHz counter. G4DRK, tel: 07842-51409 after 8pm.

SCOPE 10-12U, £30. VTVM IM28U, £15. C/R bridge C-3U, £15. All Heathkit. Datong ASP, £40. RX, ex WD type PCR, £10. Mains PU ex AM type 234A, for R1155 & R1392. Multimeter model 44A, £15. Buyer collects large items. G4RHI, NOT QTHR, (E Devon), tel: 0297-32572.

TRIO R600RX, as new, purchased by owner from Lowe Electronics Ltd, boxed with manual etc, £255 ono. D Mathews, tel: 01-876 7868.

WANTED.....

MARCONI TF2370 or similar high quality spectrum analyser. Synthesised sig.gen. or radio telephone test set. Proper price paid for professional equipment. G3RBP, QTHR, tel: 0283 75-796 evenings or 0335-42445 daytime.

AUDIO TRANSFORMER "T2" for Eddystone 730/4, will collect and pay locally otherwise pay p&p. Ken, G4BUX, tel: 061-427 1811 evenings or 061-427 1343 daytime.

MFJ CW filter CWF-2. WW2 Army No.11 set. G2ATM, QTHR, tel: 0602-202592.

FT290R with Mutek front-end, nicads, charger, etc. G1DAF, tel: Blackpool (0253) 404566.

SERVICE MANUAL for Standard C828M 2m TX to buy or borrow for copying. Also need Pye Westminster W15U mounting cradle. G4YZG, QTHR.

MANUAL & CCT DIAGRAM for Yaesu FTDX400 TCVR, photostat copy acceptable, or borrow to copy. GM0CSZ, 68 Mosside Drive, Portlethen, Aberdeen, AB1 4QY, tel: 0224-780519 evenings or weekends.

TRIO 2200 or similar basic 2m FM, limited channels ok. G4ZXN, QTHR, tel: Coventry 451051.

FTV901R, must have 2m & 70cm modules and if poss. 6m or 4m module. Colin, G4ZFJ, QTHR, tel: Southend on Sea 68742.

AEA-CK2 electronic keyer. G3LWI, tel: 0734-476205.

ATU for IC740 HF TCVR. Contact G2DWQ, QTHR.

PLESSEY MODULE 11 for PR1551 RX. Bird Thruline equipment. Good coaxial relay. 8875 valves. Bases for 4CX250B. Rotator CDE type. Turns counter. Your disused tcvr suitable for repair. GM3WTA, tel: 03306-613 after 7.30pm.

PANADAPTOR BOARD for Yaesu YO-901 monitorscope. Also 12kHz filter for FT901/2 FM board. MET 14 ele 2m beam. Power splitter, 2m, 2 way MET or TONNA. Nigel, G4NRR, tel: 021-744 8672.

EPSON MX-80 printer or any other with Centronics parallel serial RS232C. Startrite or Lurem universal machine. Reversible anchor winch. Data base II for Osborne 1. G3AAG, tel: 0730-892143.

HIGH POWER VALVE LINEAR for 2m and 70cm. Masthead pre-amps for either band also required. No rubbish or silly prices please. Cash waiting. G6IAT, QTHR, tel: Luton 23750.

ATU - YAESU FC102, must be in first class order. Would consider other all-band type with meters & dummy load built-in. Must have capability to tune long wires. FC102 or TAU prefered. Paul Godolphin, G4XTA, QTHR, tel: 09313-359.

ENTHUSIAST seeks spares for Greeves motorcycle rebuild. Sports twin specifically but any Greeves parts will find good home with Riders' Association Please search your loft, garage & cupboards. Also Greeves literature, handbooks, spares lists etc. All letters answered. G3PJB, QTHR.

DATONG MORSE TUTOR, must be mint. Also Eddystone EC10, late model. Dave, G8XZA, tel: 0527-26050 after 6pm.

PLEASE HELP ME! I need an ICOM IC451E to keep my IC251 company or an HF rig with 70cm transverter. I have a MM 2m-70cm transverter for sale, £110. Julian Tether, G6LOH, Culworth, OX17 2AX, tel: 0295-768152.

KW107 or KW109 and/or KW EZEE-match atu needed to complete line-up. Good prices paid for good units. Trio AT230 for exch or sale later. Offers. Keith, G4NPY, QTHR, tel: 05436-76101, daytime or 05436-5737 evenings, reverse charge.

YAESU FT-ONE TCVR. Printer paper. Valves type 6SJ6C, 572B, 6146B. Hustler mobile coils, 20/40/80 metres. Datong auto notch-filter. SSB Voyager. G4HYO, tel:(Bracknell, Berks) 0344 48-3696, after December 5th.

YAESU 726R, exch beautiful Winchester 101 trap Winchoke Custom 12-bore shotgun, 30" barrels, over under SST, extra choke tubes covering skeet to extra full, complete with cartridges, cleaning equipment, cartridge bag and sleeve, hardly used. G3XIU, QTHR, tel: 0946-813406, evenings.

OLD HEATHKIT RA-1 RX's and AT5 Codar TX's wanted for spare parts and/or extensive modification and rebuilding. Send details, with price, of your dead dying or still working sets to:- Mr Marris, G2BZQ, 35 Kingswood House, Farnham Road, Berks, SL2 1DA.

"METAL TECHNIQUES FOR CRAFTSMEN" by Oppi Untracht, published by Robert Hall c1969. Good price paid. G8DPS, QTHR, 01-399 8787, evenings.

CW STEREOCODE PROCESSOR, see Sept 1975 article by G6CJ & G3TOK. I understand a kit was subsequently marketed. Working unit preferred. Also looking for 28MHz CW rig & 50, 70, 144, 432 & WX band converters. G3PAI, QTHR.

ANXIOUS RETURN ON-AIR after 30 years absence. Still require OB2, 6CH8, 6CL6, 6DE7, 12AX7 and some 3.5MHz CW xtals. Please check your dusty shelves. G3ICB, QTHR, tel: 0635-64345.

KW1000 LINEAR AMPLIFIER, top price paid regardless of condx. G3LZN, QTHR Lapworth Warwickshire, tel: 05643-2014.

WHITEHALL CONTROL HEAD required, the type with the white buttons across the front and also the standard Whitehall head. Control cables would be an advantage. Also would be grateful of any info. G1DRR, QTHR, tel: 0302-835280.

DETAILS OF FM CONVERSION for FT107M, will pay any expenses but would also consider ready built module. Also YC7B, digital frequency display for FT7B and 2m, 6m & 70cm modules for FTV107R. G4ULM, QTHR, tel: 0480-219940.

ZL SPECIAL or similar compact 2m directional antenna of good structural & electrical quality. GM6KKP, QTHR, tel: Dundee 644663.

DRAKE 2B OR 2C, vgc, with manual, no mods. Write or phone. G4VLT, QTHR, tel: Sunderland 76191 extn 111 between 9am-5pm.

DRAKE R4C, serial number over 17000 only, must be in ex condx. Also Drake RV75 vfo and CW75 keyer needed. Peter, G4HSB, QTHR, tel: 0642-816608, evenings or 0642-242546, daytime.

COLLINS KWM380, must be gc. Alpha linear or Henry linear TH6-TH7 conversion kit. Corsair Mkll tcvr. Cash waiting! Only 1st class condx items wanted. FOR SALE: TH3 beam antenna. G4OWC, tel: Derby 557705.

BEG OR BORROW cct and mod info for Collins TCS12 TX. Also want rotator DR7500X, DR7600X or similar. Have KW107 for sale. Colin, G3DPX, 3 Hillside, Sidbury, Sidmouth, Devon, EX10 0QZ.

VALVES FOR HRO, 6D6, 6C6, 6B7, 42. D Pickard, 9 Linden Road, Elland, West Yorks, tel: 0422-73062.

EDDYSTONE 358X RX, in any condx, good, damaged or incomplete. Mr Yellowlees, tel: Knutsford 51442.

DETAILS OF FITTING CIRKIT FILTERS, stock number 40-07455 to FRC7700M. Willing to buy or hire a copy. Will pay costs & postage. BRS50930, 16 Happy Valley, Hartlepool, Cleveland, TS24 9RF.

BENCHER PADDLE, black or chrome base, must be in good condx, good price paid. G4YMT, QTHR, tel: 021-440 7946.

Y0901 MONITOR SCOPE, in good working order, will collect. G4WGO, QTHR, tel: 02670-305.

FT101ZD MK3, in mint condx, will inspect & collect within 50 miles of Leicester. Please write or phone. G3LYU, QTHR, tel: 0533-876459, after 6pm.

FT101B OPERATOR'S MANUAL and papers on mods, will take details and return if required. Ray, G1EUO, QTHR, tel: 01-980 1112 between 8am-4.30pm.

ICOM IC202, any model. Also IC402. Sensible price paid for right rig. Martin, G6ETA, QTHR, tel: Chestfield (Kent) 3262, after 6pm.

MJF INDOOR ACTIVE ANTENNA, model number MJF1020 & MJF 108. 24 hour LCD clock. Also scanner, cheap, 25-600MHz. Wood, tel: Clochan 378.

AUDIO FILTERS, 500-3000Hz, photocopy and any info for construction with op-amp 741. All expenses paid by London cheque. Advise Ian Millar, SH3AP, Los Arcos 10, La Nucia, Alicante, Spain. Also book design of active filter HM Berlin.

MURPHY TYPE 618 TX (AP100333) & power unit (AP100336). Marconi Elettra RX, similar to Eddystone 840. Aerial plug, AM type 161 (10H/184). Type 889A or 966A power units with plugs & cables. G4FUY, QTHR, tel: Reading 733633.

FT208 OR SIMILAR 2m handheld. Will exch for FT708, mobile bracket, 70cm HB9CV, 1/2 wave whip & 1/2 wave helical antenna. G1DXM, QTHR, tel: 0229-56816 after 6pm.

NEEDED, small Elstone green painted mains transformer, output transformer, filament transformer and LFC. Also to complete 20 year project: UX6 moulded valve holder, max dia 1.125". G4IMT, QTHR, tel: Bath 891254.

BUY OR BORROW workshop service handbook for Yaesu FT225RD. Also interested in memory unit for FT225RD. Peter, G8ZKZ, QTHR, tel: Romford 69770, evenings or weekends.

TRIO TS430S, TCVR. G0CJO, tel: 0480-72947.

EXCHANGE WANTED: 2m base rig. I have Icom 290H, 25W multimode and Standard C7800, 70cm, 10W FM mobile to exch with cash for good base rig. G0BLR, QTHR as G6YKE, tel: Wilmslow 535644.

PANDA EXPLORER, any condx, can collect. Also ARRL handbooks around 1950's please. Chris, G4ILR, QTHR tel: Cromer 761612.

WILL SWAP: RadCom, March 1982 to date for 'Television' magazine, similar period. GM6ANZ, QTHR, tel: 03552-36412.

YAESU FT790R, 70cm multimode, good condx required. Similar rigs up to 5W o/p also considered. Please write with details. G1CHA, QTHR, tel: 021-350 1473

OLD TIMER, fed-up with thumb-wheels has Standard 110E, 2m handheld, c/w case, 12V adaptor, extra antenna, but with slight intermittent RX fault. Wishes to exch for nice robust Icom 215 or IC202S in gwo. G2CWY, QTHR.

YAESU FT101ZD or Trio 530S and 120S. G3XFB, QTHR, tel: 0902-850033.

YAESU FV102DM external vfo for Yaesu FT102. G4XSX, QTHR, tel: 0432-50864, after 6pm.

BIRD 43 ele 500C, 500D or 1000CD HQ180, must be immac. Bird coax switches Y0901. SELLING: Bird 43, IC255E, TS2300, TR7930, MML432/50, offers. Alan, G4HMF, QTHR, tel: Ipswich (0473) 51319.

HF ANTENNA tri-bander, A3 Cushcraft or TB3 or similar. Also rotator for above, CD45 or equiv, both to be in first class condx & gwo. Lionel, G4PVV, QTHR, tel: Leamington Spa 881507.

MAINS TRANSFORMER for Telequipment oscilloscope model D33. RS30534, tel: Winterbourne (0454) 772222, evenings.

CONDITIONS OF ACCEPTANCE

These subsidised 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 RadCom to the advertiser: this will automatically provide proof of membership and should not be more than 2 months old. No acknowledgement of receipt will be sent and advertisements not clearly worded, or which do not comply with the conditions of acceptance, will be rejected. No correspondence concerning this service will be entered into.

Trade or business advertisements, even from members, will not be accepted for "Members' Ads", these 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. Refunds will be sent for any advertisement which are rejected for any reason.

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.

RATES: The current rate for Members' Ads is £2.30 (incl VAT) for 40 words or less. An additional cost of £2.30 is incurred for every additional 40 words or less. Each advertisement must be accompanied by the correct remittance, either as a cheque or postal order made payable to 'Radio Society of Great Britain'. When writing out advertisements, please ensure that you do not enter more than one word in each 'box' on the form. It is advisable to read some of the advertisements contained on these pages and familiarise yourself with the house style. Equipment type numbers, telephone numbers and certain abbreviations will count as one word. It may be necessary to edit certain advertisements in order for them to comply with the conditions of acceptance.

The following abbreviations are in common use for Members' Ads:-

TX - Transmitter RX - Receiver
TCVR - Tranceiver
TVTR - Transverter CVTR - Converter
gen/cov - general coverage
sig/gen - signal generator
vgc - very good condition
gc - good condition
ex - excellent condx - condition
c/w - complete with

Post to: MEMBERS' ADS, RSGB, LAMBDA HOUSE, CRANBORNE ROAD, POTTERS BAR, HERTFORDSHIRE, EN6 3JW.
DO NOT POST TO THE ADVERTISING OFFICER

Turn your junk-box into cash with a Members' Ad....!

MICROWAVE MODULES LTD

MERRY CHRISTMAS

Seasons Greetings to all Our Customers and Retailers with Best Wishes for a Prosperous and Peaceful New Year.

Perhaps Santa Claus can give you some help in selecting your Christmas presents, or maybe you would like to choose from our products listed below. In either case we're sure that any of our retailers would be pleased to gift wrap it for you.

SANTA CLAUS' SELECTION FROM THE FAIRY GROTTO:

LINEAR AMPLIFIERS:	MML 144/30-LS	- 2m 30 watt linear/preamp, 1 or 3w input, switchable	82.90
	MML 144/50-S	2m 50 watt linear/preamp, 10w input switchable	92.00
	MML 144/100-S	- 2m 100 watt linear/preamp, 10w input switchable	149.95
	MML 144/100-HS	- 2m 100 watt linear/preamp, 25w input, switchable	149.95
	MML 144/100-LS	- 2m 100 watt linear/preamp, 1 or 3w input, switchable	169.95
	MML 144/200-S	- 2m 200 watt linear/preamp, 3, 10, 25w input, switchable	299.00
	MML 432/50	- 70cm 50 watt linear/preamp, 10w input	129.95
	MML 432/100	- 70cm 100 watt linear, 10w input	299.00
TRANSVERTERS	MMT 144/28	2m Linear transverter, 10m input, 10w output	129.95
	MMT144/28-R	- 2m linear transverter, 10m input, 25w output	215.00
	MMT 1296/144	- 23cm linear transverter, 2m input, 2w output	235.00
RECEIVE CONVERTERS	MMC50/28-S	- 6m to 10m down converter	34.90
	MMC144/28	- 2m to 10m down converter	32.90
	MMC144/28HP	- 2m to 10m high performance down converter	47.90
	MMC432/28-S	- 70cm to 10m down converter	39.90
	MMC432/144-S	- 70cm to 2m down converter	39.90
	MMK1296/144	- 23cm to 2m down converter, GaAsFET preamp	129.95
	MMK1691/137-5	- 1691 MHz Metostat converter	145.00
RECEIVE PREAMPS	MMG144V	- 2m RF switched GaAsFET preamp. 100w capacity	37.90
	MMG1296	- 23cm GaAsFET low noise preamp	75.00
	MMG1691	- 1691 MHz Meteosat GaAsFET preamp	113.00
MICROPROCESSOR CONTROLLED PRODUCTS	MM2001	- RTTY to TV converter	189.00
	MM4001KB	- RTTY transceiver with keyboard	299.00
	MMS1	- THE MORSETALKER - Speaking Morse Tutor	115.00
	MMS2	- Advanced Morse Trainer	169.00
FREQUENCY COUNTER	MMD050/500	- 500 MHz digital frequency meter	89.00
	MMD1500P	- 1500 MHz+ 10 prescaler	95.75
AMATEUR TELEVISION	MMC435/600	- 70cm ATV converter, UHF Output	29.90
	MTV435	- 70cm ATV 20 watt transmitter	179.95

PRICES INCLUDE VAT BUT NOT POST & PACKAGE

PRICES CORRECT AS AT 31 DEC. 1985

MICROWAVE MODULES! THE CONNOISSEURS CHOICE.

Access 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.

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).

South Midlands Communications Ltd.
Rumbridge Street
Totton
Hants SO4 4DP

YAESU MUSENS ONLY AUTHORISED DISTRIBUTORS

AMATEUR ELECTRONICS AE LIMITED
510-512 Alum Rock Road
Alum Rock
Birmingham B8 3HX

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