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RadCom

Journal of The Radio Society of Great Britain
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Volume 76 No 6 ♦ **June 2000**

The Voice of Amateur Radio

RSGB

The biggest aurora for years!

Reviewed in this edition:

- Propagation Prediction Software
- 23cm Transverter
- Cushcraft R8

FIRST IN Amateur Radio

Waters & Stanton PLC

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Yaesu Stand
Icom Stand
Kenwood Stand
Radio Today Stand
RSGB Stand
Essex Repeater Group

Plus New 2000 sq ft Showroom

It's the day when we go mad and sell at silly prices. And you will be the first to see our new showroom - almost 2000 sq ft! Plus we get rid of all the old service department skeletons, returned catalogue items, end of lines, and many bits and pieces never advertised. Ask anybody who has been and they will tell you what a great day it is.

YAESU Choice of the World's top DX'ers

FT-100

160 - 70cm All Mode

£799 Plus £7.50 Carr.

SAVE £450

Coax Switch CS-600 £12.95

Plus £2.00 Carr.

FREE CALCULATOR

For all visitors to our Open Day

YAESU **FT-840** 160- 10m

£599 Plus £7.50 Carr.

A firm favourite, this 100W radio is an ideal rig for those on a budget. Impossible to fault, it just goes on and on!

24-Month FREE Warranty on Yaesu

YAESU **FT-1000MP AC**

160- 10m All Mode

SAVE

19.4% APR Available

£1795 Plus £7.50 Carr.

If you are looking for the rig with every feature including dual receive - then look no further!

It has stood the test of time and used by the worlds top DXers and DXepeditions. Its excellent receiver combined with its superior transmitted signal makes this a natural choice for the HF enthusiasts.

ICOM **IC-746**

160m - 2m All-mode

£1349 Plus £7.50 Carr.

Your chance to purchase one of the most popular "all-band, all-mode" transceivers at a very competitive price and also get, the lovely IC-2100H mobile transceiver which has switched 12.5 & 25kHz filters. The IC-746 offers 100 Watts output on all bands and has a receiver performance to match.

ICOM **IC-756PRO** 1.8 - 52MHz 100W

Phone Plus £7.50 Carr.

You've read the rave reviews, and you have seen our recommendation on the web site. This radio with its amazing receiver and digital filtering, also includes auto ATU and real-time spectrum scope. A great DX rig.

YAESU **FT- 920AF**

HF 160m-6m-100w

SAVE

£1099 Plus £7.50 Carr.

Includes full DSP and internal ATU. High tech receiver with dual tuning controls. Uses many of the FT1000 MP features but at a more attractive price. Full break-in on CW and includes a data port for TNC.

ICOM **IC-706IIG** 160 - 70cm All Mode

£999 Plus £7.50 Carr.

Still a firm favourite with mobile operators and those who want a compact all-mode, all-band station. Phone for latest leaflet.

YAESU **FT-847** SAVE

160m - 70cm All Mode

£1329 with switch mode power supply

PRICE MATCH

£1249 Plus £7.50 Carr.

The FT-847 has firmly established itself as a true all-band, all-mode transceiver. Loved by the VHF & UHF operators, and superb for satellite operation, it also offers great HF performance. We have sold more than any other dealer, which says a lot about our reputation and our price. Phone for free leaflet today. And remember, our stock is genuine UK, not modified overseas models!!

KENWOOD **TS-570DG**

160 - 10m All Mode

£825 Plus £7.50 Carr.

19.4% APR Available

Probably the most underestimated transceiver on the market. Don't be fooled by the low price, the TS-570 has one of the best receivers around. One of the best buys if you want top HF performance on a budget.

We Will Match or BEAT Competitor's Prices

On genuine UK Stock

wsplc.com Go

ADI AT-600
Dual Bander Airband Rx

£199 Plus £6.00 Carr.

* 2m & 70cm Handheld
* 5W Output on 13.8V DC
* Full CTCSS & 12.5/25kHz Steps
* 110 Alphanumeric Memories
* 29 Programmable Functions
* DTMF Keypad & AM Airband
* Ni-cads & AC charger

KENWOOD TM-700DE
2m / 70cm Data Mobile

£429 Plus £7.50 Carr.

SAVE

Just arriving, this new model has built-in TNC, port for GPS, Data connector for SSTV, RTTY etc., CTCSS/DCS, Switchable TX/RX deviation, Dual receive, Wide receive option, Detachable head unit, 50 Watts on 2m, 35 Watts on 70cm, 200 memories, Alpha tag memo capability and a lot more. And who has the best price? - look no further!

HOKA Software
The Secret's Out!

We are now the UK distributors. As used by governments, it can decode just about any form of data transmission on HF and VHF. Simply connect between PC and RX audio. Can be loaded on any number of PCS. This is a very advanced programme.

£349.95 Plus £6.00 Carr.

C-150 2m Handy

£99.95 Plus £6.00 Carr.

* 2m Handheld
* 5W Output on 13.8V DC
* 1750Hz Tone Included
* 25 / 12.5kHz Steps
* 20 Memory Channels
* Wideband Receive
* Uses 6 x AA cells (not inc.)

£269 Plus £6.00 Carr.

YAESU VX-5R

* 6m / 2m / 70cm Handheld
* 5W Output on 13.8V DC
* CTCSS Encode / Decode
* 25 / 12.5kHz Steps
* Auto Repeater Shift
* AM Airband Receive
* Lithium Cells & Charger

YAESU FT-50R

£199 Plus £6.00 Carr.

* 2m / 70cm Handheld
* 5W Output on 13.8V DC
* CTCSS Encode / 1750Hz tone
* 25 / 12.5kHz Steps
* 30 Memory Channels
* AM Airband Receive
* Ni-cad Cells & Charger

SAVE C-408 70cm Handy

£69.95 Plus £6.00 Carr. Previously £89.95

* CTCSS
* Repeater Shift
* Digital Display
* 12.5 / 25kHz Step
* 20 Memories
* 230mW Output
* Uses 2 x AA

NEW

Optoelectronics
CD-100 MULTICOUNTER

Reads Frequency & Codes

£79.95 Plus £6.00 Carr.

Range: 10MHz -1GHz
Memory: 100 Channels
Decode:
CTCSS, DCS, DTMF, LTR.
Power: Internal ni-cad battery
Charger included

KENWOOD TH-D7E

£259 Plus £6.00 Carr.

* 2m & 70cm Handheld
* 6W Output on 13.8V DC
* CTCSS & 1750Hz Tone
* Built-in Packet Modem
* 200 Alphanumeric Memories
* DTMF Keypad & AM Airband
* Ni-cads & AC charger

YAESU FT-90R Can you believe the size?
2m/70cm Dual Band

SAVE

£309 Plus £7.50 Carr.

The tiny dimensions of the FT-90R from Yaesu, are hard to believe. Yet it produces 50W on 2m and 35W on 70cm. Auto repeater shift on UK channels and switched 12.5 / 25kHz deviation, make this a number one choice.

ADI AR-147
AM Airband Receive

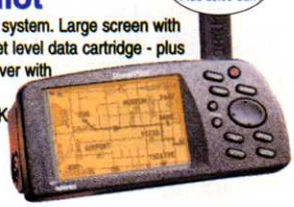
£199 Plus £6.00 Carr.

* 2m 50 Watt Mobile Airband Receive
* Full CTCSS Encode / Decode
* 81 Memories 25 / 12.5kHz Steps
* Keypad microphone & Mounting Kit

GARMIN In-Car GPS Street Pilot

£419 Plus £6.00 Carr.

The complete car navigational system. Large screen with UK mapping and optional street level data cartridge - plus lots more! Designed for the driver with easy routing and special data screen for car use. Optional UK CD **£69.95**, memory storage card 8Mb **£64.95. With CD & card £539.**



GARMIN In-Car GPS-III Plus

£349 Plus £8.00 Carr.

Detailed maps of UK and Europe plus street data upload feature via PC. Great value. Sits easily on the dash board and gives extremely comprehensive data including GB national Grid. Powered by AA cells or external 13.8V.

ICOM IC-2800H
In Full Colour!

£310 Plus £7.50 Carr.

* 2m & 70cm Mobile
* Colour TV Screen
* Full CTCSS and 1750Hz Tone
* 50W 2m 35W 70cm

Includes FREE Remote head cable.

ICOM IC-207H

£245 Plus £7.50 Carr.

* 2m / 70cm
* 50W / 35W
* 180 Memories and 7 Tuning Steps
* Detachable Head Unit / Clear Display
* Microphone, Mounting Bracket etc.

KENWOOD TM-G707E

£239 Plus £7.50 Carr.

* 2m and 70cm
* 50W and 35W
* Full CTCSS
* 180 Alphanumeric Memories
* Detachable Head with Amber Display

YAESU FT-8100R

£349 Plus £7.50 Carr.

* 2m and 70cm
* 50W and 35W
* Wideband RX AM & FM 208 Memories
* 7 Tuning Steps DTMF Remote Front panel
* Very compact, supplied with all hardware.

KENWOOD TM-V7E

£299 Plus £7.50 Carr.

* 2m / 70cm Mobile
* 50W 2m, 35W 70cm
* Clear LCD Readout
* CTCSS & DTMF
* 8 Frequency Steps & 280 Memories
* Includes Microphone & Mounting Bracket

E & OE

Waters & Stanton

FREE MFJ Catalogue - Just Phone!

Beware of grey imports. All MFJ products should have serial numbers and UK Warranty cards issued by us.

MFJ

FREE CATALOGUE

Every Model Stocked

MFJ-969 300W ATU

£169.95 Plus £7.50 Carr.

160 - 6m Wire, Coax or Balanced

Includes VSWR / Power Meter, Ant. Selector, PEP feature, Roller Coaster Tuning

MFJ-949E 300W ATU

£139.95 Plus £6.00 Carr.

160 - 10m Wire, Coax or Balanced

Includes VSWR / Power Meter, Ant. Selector, PEP feature, Built-in Dummy Load

MFJ-948 300W ATU

£119.95 Plus £6.00 Carr.

160 - 10m Wire, Coax or Balanced

Includes VSWR / Power Meter, Ant. Selector, PEP feature, Built-in Balun, 12v Illumination

MFJ-901B 300W ATU

£75.95 Plus £6.00 Carr.

160 - 10m Wire, Coax or Balanced

MFJ-962D 1.5kW ATU

£239.95 Plus £7.50 Carr.

160 - 10m Wire, Coax or Balanced

Includes VSWR / Power Meter, Ant. Selector, PEP feature, Roller Coaster Tuning, T-Network

MFJ-986 3kW ATU

£289.95 Plus £7.50 Carr.

160 - 10m Wire, Coax or Balanced

Includes VSWR / Power Meter, Ant. Selector, PEP feature, Roller Coaster Tuning, Differential Tuning.

MFJ-989C 3kW ATU

£299.95 Plus £7.50 Carr.

160 - 10m Wire, Coax or Balanced

Includes VSWR / Power Meter, Ant. Selector, PEP feature, Roller Coaster Tuning, T-Network

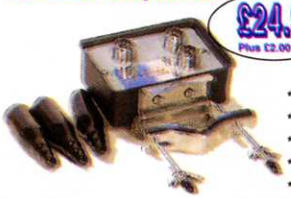
MFJ-912 Ladder Feed Balun

£39.95 Plus £6.00 Carr.

Connect between ladder feeder and coax and enjoy very low loss and all-band operation (when used with manual atu).

WD- 25 Duplexer

£24.95 Plus £2.00 Carr.



This duplexer may be used both indoors or outdoors. It is supplied with mast mounting clamps and weatherproof shrouds for the coaxial plugs. The mast bracket can easily be removed, allowing the unit to be used for indoor use.

- 1.3 - 35MHz 500W
- 50 - 225MHz 300W
- 350 - 540MHz 300W
- Insertion loss 0.2dB
- VSWR <1.2
- SO-239 Sockets
- Wall or mast mounting
- Mast size 58mm
- 98 x 35 x 70mm

MFJ-269 Analyser

As Reviewed by RadCom

£299.95 Plus £6.00 Carr.

160m - 70cm Amazing Value

Imagine being able to plug into your antenna or feed line and make meaningful adjustments on site. Or be creative and turn hours into minutes and ideas into antennas! Read what RadCom says and make your own mind up. One of the best investments you will ever make!

MFJ-418 CW Tutor

£69.95 Plus £6.00 Carr.

The easy way to learn CW. Sends real QSOs or random characters. Clear LCD display

WATSON W-40SMV

Switch-Mode Power Supply

£149.95 Plus £7.50 Carr.

NEW

Specification

Output Voltage: 3 - 15V DC or 13 . 8V fixed
Output Current: 0 - 40 Amps
Dimensions: 220 x 110 x 300m
Weight: 3.5Kg Approx
Max.Continuous Current: 40A
Current rating: 60A

A 40Amp Power House Weighs just 3.5 Kg

The new Watson 40 Amp power supply features a light weight design using the latest switch-mode techniques with digital display of both current and voltage.

MFJ-259B Antenna Analyzer

£229.95 Plus £6.00 Carr.

This battery powered analyzer will check the resonance and impedance of your antenna system in seconds. Make adjustments and watch the changes. Saves hours of work.

MFJ-1026 Noise Phaser

£159.95 Plus £6.00 Carr.

Reduces local electrical noise by up to 3 S points

Simply insert between antenna and transceiver. Using a small "sniffer" antenna, just phase out the local noise to uncover the signals. Offered on our usual 10-day approval.

LINEAR AMP UK Amplifiers

£895 Plus £7.50 Carr.

UK Ranger 811H (illustrated)
* 1.8 - 30 MHz. 800 watts output
* Drive: - 10-100W * Built in Power Supply

UK Discovery-Two Amplifier £1395 Plus £7.50 Carr.
* 144 - 146MHz *400 - 1KW Output
* Drive:-10-25W *Built-in Power Supply

UK Explorer 1200 Amplifier £1595 Plus £7.50 Carr.
* 1.8-30MHz x 100W-1300W Output
* Drive:-10-120W *Built-in Power Supply

British made Amplifiers with a Pedigree

GREAT VALUE

Cushcraft

5 Band Compact Beam

NEW MA5B Mini - Beam

£289.95 Plus £7.50 Carr.

Regular HF Beams from Cushcraft

A3S	3 el 10,15,20m	£389.95
A3WS	3 el. 12 & 17m	£299.95
A4S	4 el. 10,15,20m	£469.95
X7	7 el. 10,15,20m	£549.95
Ten-3	3 el. 10m	£139.95
XM520	5 el. 20m	£529.95

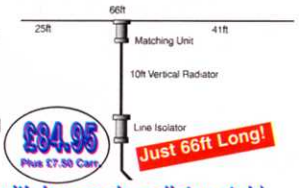
Full Cushcraft range stocked - Check our Web Catalogue

Carolina Windoms

CW-80 Special

Just 66ft long yet covers 80m - 10m. It will out perform a G5RV and give lower angle of radiation because of the 10ft vertical section which is forced to radiate. It will handle 1.5kW

Carolina Windom 80 Special



£84.95 Plus £7.50 Carr.

Just 66ft Long!

Other Models (all with low angle radiator stub)

CW-160	160 - 10m 171ft long	£109.95
CWS-160	160 - 10m 133ft long	£99.95
CW-80	80 - 10m 133ft long	£84.95
CW-40	40 - 10m 66ft long	£79.95
CW-20	20 - 10m 34ft long	£77.95

Plus £7.50 Carr.

PacComm TNCs from USA

Tiny-2 1200bps	£139.95
PicoPacket 1200bps	£139.95
Spirit-2 9600bps	£199.95

Plus £6.00 Carr.

The lovely little PicoPacket even permits APRS with your mobile transceiver. Phone for leaflet.

Power Supplies

£99.95 Plus £6.00 Carr.

SEC-1223
13.8V PSU
23 Amps - 3.2lbs!
Back In Stock

Lighter than an IC-706 and about the same size! The **SEC-1223** switch mode power supply delivers 23 Amps at 13.8V Thermo fan cooled, it measures just 57 x 177 x 190mm. Will power all 100W rigs and can be changed for 115V AC

WATSON

UK's top selling power supplies.

£89.95 Plus £7.50 Carr.

Watson power supplies guarantee the very best performance and value for money. Tried and tested, they have been submitted for independent laboratory testing for safety and electrical performance.

W-3A	3 Amp fixed supply.	£22.95
W-5A	5 Amp fixed supply	£29.95
W-10AM	10 Amp variable supply	£59.95
W-25AM	25 Amp variable supply	£89.95
W-30AM	30 Amp variable supply	£119.95

Plus £8.00Carr. Plus £7.50 Carr.

Compact 10 Amp Switch Mode PSU

£49.95 Plus £6.00 Carr.

The W-10SM is small enough to fit in a brief case. Measuring just 230 x 100 x 65mm, it's ideal for 50 Watt mobile's etc. Over voltage and current protection.

Number ONE in Amateur Radio — Waters & Stanton

Order Details on inside Front Cover

Diamond GSV-4000

Switch Mode PSU 40 Amps!

Just arrived! This lightweight switch mode power supply will punch out 40 amps with ease! Hour after hour. Voltage and current metering with over current and over voltage protection. Variable voltage. Full details on our web site, wsplc.com. Weighs just 3.5kg.

Low carriage charges for web orders

RF Metering

Avair AV-600 1.8 - 525MHz 400W

VSWR and power meter. Reads RMS and PEP. The ideal all-band VSWR meter. Reads up to 400W (3 ranges)

WATSON VSWR / Power Meters.

Measure VSWR and RMS or PEP power. Large easy to read meter. 3 ranges: 5W, 20W and 200W.

W-220	1.8 - 200MHz	£49.95
W-420	118 - 530MHz	£49.95
W-620	1.8 - 525MHz	£89.95

WATSON 144/ 430MHz Dual Band Yagi.

Amazing Performer

Superbly Built

.142-146,428-442MHz
.Single feed
.SO-239, 50 Ohms
.100W max power
.VSWR 1.1 -1.5:1
.Gain 10 dBi 2m
.Gain 13 dBi 70cm
.Boom length 114cm
.5 elements 2m
.9 elements 70cm
.Gamma match
.Weight 2.3kg

Extremely well engineered 2m/70cm dual band Yagi. Can be mounted either vertically or horizontally. Each band has separate gamma match but single coaxial feed.

WATSON Watson Frequency Counters

High quality units supplied with antennas, ni-cad packs and AC chargers. They are very sensitive and may be used for near-field checking.

Hunter - 10MHz - 3GHz £59.95

FC-130 - 1MHz - 3GHz, switched gates, 16 segments and signal strength meter £79.95

Super Hunter - 10Hz to 3GHZ and with signal strength meter. £149.95

Plus £6.00 Carr.

Antenna Rotators

AR-300XL Lightweight

Ideal for VHF and UHF systems of small to medium size. Includes control box, motor and brackets. Support mast sizes can be up to 50mm.

YS-130 Medium Weight VHF

Made in Japan, this rotator will support medium sized VHF arrays. The diecast motor housing will fit masts up to 40mm diameter. Includes motor, control box and brackets.

New Create RC5-1 Rotator

We are pleased to be able to offer one of the most popular rotators from Japan. The RC5-1 will handle 3-4 element HF beams. It has a torque of 6kg (rotation) and 80kg braking. Uses 7-core cable.

Yaesu Rotators for HF Systems

G-450C	Smaller Tri-band Yagis etc.	£379.00
G-650C	Larger Tri-banders etc.	£499.00
G-1000C	4 element HF Yagis (cw with 25m cable)	£559.00
G-2800SDX	Really large HF Yagis	£1229.00
G-550	Elevation Rotator	£309.00
G-5500	Az/El Rotator Plus £7.50 Carr.	£569.00

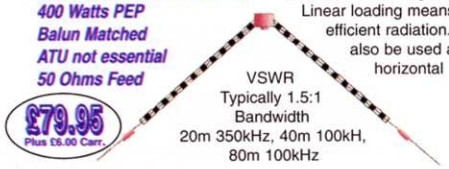
We have extensive stocks of tower mounts, bearings and rotator cables. Phone if you need advice. Leaflets available.

80/40/20m Dipole 50ft Long!

G3OJV 80-Plus-2 Space Saver

Approx 50ft long (Horizontal)
400 Watts PEP
Balun Matched
ATU not essential
50 Ohms Feed

Ideal for the small garden. Linear loading means efficient radiation. Can also be used as horizontal

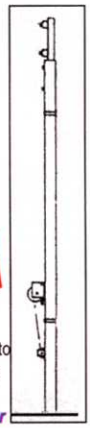


No soldering, just assemble the elements, check the dimensions and fine tune as per instructions. Unlike the G5RV, it self-resonates with low VSWR on all three bands. A unique design that offers LF operation from your back garden.

SGC SG-230 Smartuner

1.8 - 30MHz Wire ATU

The SGC - 230 is a remote auto ATU that tunes any length of wire in the range 1.8 - 30MHz. Requires a 12V feed of 1 Amp. It is totally weatherproof. Just connect a coax cable back to the transceiver and the SGC-230 will tune instantly RF is applied. The ideal long wire system. Rated at 200Watts.



Telescopic Masts

Much Stronger than Alloy Poles! NEW

We are now able to supply a range of telescopic tiltover masts, galvanised to BS729. Heights available from 7.6m to 12m extended. Models for wall mounting or post mounting are included. The post mounted versions tilt-over and are supplied with a socket for mounting in concrete. ***Phone or write for full information and drawings***

VHF/UHF Antennas

Base Station Fibre Glass

WVA-100	2m/70cm 2/4.5dB 1.09m	£29.95
W-30	2m/70cm 3/6dB 1.15m	£39.95
W-50	2m/70cm 4.5/7.2dB 1.8m	£49.95
W-300	2m/70m 6.5/9dB 3.1m	£59.95
W-2000	6m/2m/70cm 2.5m	£69.95

Plus £7.50 Carr.

Mobile Antennas PL-259 bases

W-285	2m 5/8th foldover base 1.33m	£14.95
W-770HB	2m/70cm 1.1m 3/5.5dB	£24.95
W-7900	2m/70cm 5/7.6dB 1.5m	£32.95
W-627	6m/2m/70cm 1.62m	£34.95

Plus £6.00 Carr.

W-77LS	2m/70cm 0.39m low profile	£14.95

Plus £2.00 Carr.

Mounts

W-3HM	Hatch / Boot Mount	£14.95
W-3CK	5m low loss cable kit	£18.95
W-ECH	5m RG-58 standard cable	£12.95
WMM-7	Magnetic mount	£11.95
WAM-2	BNC window mount	£12.95

Plus £2.00 Carr.

Diamond GSV-3000

30 Amps PSU

Typical Diamond engineering gives you a superbly built power supply with variable output from 1 to 15V. Dual meters and weigng 9kg. Full dcetails on web.

Cushcraft

R8 8-Band Antenna
40m to 6m 1500 Watts

A Great Vertical

NEW

The R8 is a robust vertical designed to take full US power limits. It has a very broad bandwidth, effectively working to the edges at 2:1 VSWR. Only two traps are used, so reducing the losses. At around 30ft tall, it is designed to give high performance, even on the lowest bands. A true DX-ers antenna in a very small space. Uses very short rigid base radials similar to R-6000.

TEN-TEC 1340/1320

CW TRANSCEIVER KITS

40/20m

* 3W RF output
* VFO tuning any 50KHz
* Full break-in keying (QSK)
* 4-pole crystal IF Filter (3dB at 1KHz)
* Rx sidetone
* RIT adjustment
* Supply 12V at 800mA (Tx)
* 69 x 152 x 152mm
* Case and all hardware included
* Absolutely nothing else to buy
* 50 page step-by-step manual with circuits

Build yourself a new transceiver over the weekend. Everything you need, including case and all controls.

Heil Headsets In Stock

Hear the Difference!

A choice of normal or DX inserts when ordering

	Proset	HM-10
Pro Headsets (Dual ear)		£119.95
Pro 54 or 55 (Single ear)		£109.95
Pro Micro (Dual ear)		£99.95
HM-10 Hand Mic		£69.95
HM-10 Dual		£109.95

Plus £6.00 Carr.

CC-1 Adaptor cables Y,I,K	£23.95
FS-1 Foor switch	£29.95
TB-1 Table stand	£22.95
HS-1 PTT switch	.£26.95
AD-1 Adaptors Y,I,K	.£14.95

Plus £2.00 Carr.

WATSON HF Whips

160 - 6m
250 Watts

NEW

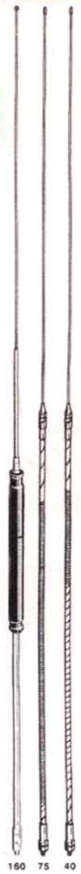
Interchangeable Single Band Whips

From £18.95

* High Effciency
* Low Profile
* Robust Build
* Fully Tuneable
* CW & SSB Bands
* 2 Section Design
* Easy Boot Stowage
* 3/8th Stud Base
* Approx 7ft Long

WHF-6	6 metre whip	£18.95
WHF-10	10 metre whip	£18.95
WHF-12	12 metre whip	£18.95
WHF-15	15 metre whip	£18.95
WHF-17	17 metre whip	£18.95
WHF-20	20 metre whip	£18.95
WHF-30	30 metre whip	£18.95
WHF-40	40 metre whip	£18.95
WHF-80	80 metre whip	£19.95
WHF-160	160 metre whip	£49.95

Plus £6.00 Carr.



READ THIS ADVERTISEMENT *it could save you serious money!*

Icom Specials

IC-746

Super Low Price!

So the FT-847 came along and slowed things down a little. Now the dust has settled, people are beginning to realise just how good the Icom really is. HF+2+6 with a nice big clear LCD display panel.

ML&S SPECIAL OFFER PRICE £1099 RRP £1699

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Front Cover:

Nick White, an amateur astronomer and professional photographer from Oxfordshire, went out on the night of 6 April to photograph the stars. What he discovered to be in progress was the biggest aurora for years. He used a Hasselblad camera with 50mm lens, 400ASA film, and an exposure of 30 seconds at f4 to capture this colourful image. Copies of this, and other photos of the aurora, are available from the photographer at: 9 Churchill Crescent, Thame, Oxon OX9 3JN. G3FPK chronicles the event in his 'VHF' column.

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Contents

News and Reports

8 The RadCom Leader
By Don Beattie, G3OZF, President.

9 RadCom News
Year's Reprieve for 73kHz Band ♦ EMC Contacts ♦ Mandatory Band Planning - 'no change' ♦ Arctic Crossing ♦ Twinned Radio Clubs ♦ Windermere Steamboat Event ♦ Plans for Scottish Islands ♦ Desert Trek ♦ A52JS ♦ ZT and ZU Arrive ♦ Continuous Novice Classes ♦ Baltic Millennium Rally ♦ Enhanced Yearbook Entries ♦ Postage Rises ♦ Barry Show Success ♦ W&S Open Day

12 A New Structure for The Society
RSGB General Manager Peter Kirby, G0TWW, details some of the changes that are about to take place as a result of an overhaul in the way that the Society is organised.

21 The Best Gear Ever!
Results of the December 1999 readers' survey. Some things old, some things new...

23 The Best Way to Buy!
Results of the December 1999 'snapshot' survey of how readers bought their latest bit of gear.

Technical Features

14 A Compact, Modern HF Linear LEAD FEATURE
Part one, by Bruce Edwards, G3WCE. The idea of building an HF linear appeals to a lot of people, but some designs are difficult to reproduce due to the non-availability of certain components. Here is a design for a legal limit amplifier that uses readily-available parts.

38 In Practice
Ian White, G3SEK, answers readers' letters: Antennas in Suburbia ♦ Voltage Reference

53 Technical Topics
QRP: Saviour of Home Brew? ♦ Receivers - The Professional Touch ♦ More on Solar Power Charging ♦ G7IXH's Fast Huff & Puff Stabiliser

Down To Earth - Amateur Radio From The Ground Up

41 Newcomers' News
Compiled by Steve Hartley, G0FUW.

42 An Introduction to Baluns
Why shouldn't you connect a length of coax directly to a dipole antenna, but connect via a balun instead? Tony Plant, G3NXC, explains, and also why some baluns transform impedance and others don't.

44 The Voices
Part one, by Gordon L Adams, G3LEQ. The Cold War game of cat and mouse, where cross-border broadcasts were regularly jammed by 'the other side' and where frighteningly high power transmitters were used.

Reviews

24 Propagation Prediction Software
Gwyn Williams, G4FKH, examines and compares four of the popular packages available for the PC.

30 High-Performance 23cm Transverter
The Microwave Committee Components Service produces a modular 23cm transverter kit. Simon Lewis, GM4PLM, describes the modules and the various options.

47 Cushcraft R8 40-6m Vertical Antenna
Norman Fitch, G3FPK, describes Cushcraft's new 8-band vertical and his experience in putting it together.

Regulars

37 Book Choice
46 Product News
61 Members' Ads
62 Club News
63 Silent Keys
64 Congratulations
64 Rallies & Events
64 GB Calls
69 Contest, Tim Kirby
73 HF, Don Field
74 HF Propagation, Gwyn Williams
77 VHF/UHF, Norman Fitch
79 Helplines
80 EMC, Dave Lauder
82 RSGB Shop
85 Data, Andy Talbot
87 IARU, Tim Hughes
90 ATV,
91 SWL, Bob Treacher
95 The Last Word

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The RadCom Leader

A New Structure for the Society

ON PAGE 12 of this edition of *RadCom* you will find an article by Peter Kirby, in his capacity as Secretary to Council, concerning discussions that have begun on the proposed modernisation of the Society's management and representational structure.

At its April meeting, Council agreed on a possible way forward and we are now seeking comments and observations from the membership. I know many of you have felt for some time that the current Society structure is unwieldy. The size and structure of Council do not now best fit the task it has to do, and the committee structure has grown as new interests and modes of operation have been introduced into the hobby.

It is your Council's belief that there is room for much improvement. A new structure is required that will be more closely in tune with the membership and its needs.

Some of the objectives that Council has identified in making any changes are to:

- strengthen the links to - and the representation of - our members
- speed Society decision-making
- bring the best available expertise into play on key issues
- improve the focus of Committee operation
- further clarify the role of each Council member
- use the most modern communication tools available to support the work of the Society

...and so to stimulate and develop amateur radio in the United Kingdom.

Please take time to read the article on page 12. I am looking for constructive input to the development of any new structure, and this is your opportunity to comment as an individual on the thinking so far. Later in the year you will receive the final form of the proposals and the formal resolutions that will be discussed at the AGM. At that time you will be able to cast your vote for or against the changes.

Don Beattie, G3OZF, President

RadCom NEWS

EMC Contacts

THE RSGB EMC Committee has appointed an EMC Membership Services' Administrator, to take responsibilityfor routine contacts with members.

Those with an EMC problem should first contact their local coordinator (or, failing that, any other coordinator) by telephone or e-mail. Members needing to contact the Committee directly should e-mail the new administrator (emc.committee@rsgb.org.uk), write to him c/o RSGB HQ, or telephone HQ to obtain a current telephone number.

The telephone numbers of coordinators are published in the *RSGB Yearbook* and changes appear in *RadCom*.

The present EMC Membership Services' Administrator is Charles Elliott, G4UJW (QTHR).

The background information relating to this new arrangement may be found in the February *RadCom*, pp11/12.

RA agrees to RSGB request for time extension

Year's Reprieve for 73kHz Band

CONTINUED use of the 73kHz band has been temporarily assured, following a meeting on 4 May between the RSGB and the Radiocommunications Agency. This UK-only amateur band was first allocated early in 1998, whilst international negotiations for the pan-European 136kHz band were taking place. The band was originally due to be withdrawn on 31 December 1999 but was later extended to 30 June 2000.

Notable experiments were being carried out to increase the understanding of LF techniques and propagation. In April, the 100m-high mast at Puckeridge, Hertfordshire, formerly used as a Decca navigation beacon, was used to transmit up to 100 watts ERP on both the 73 and 136kHz bands. This was followed by a similar operation from the Decca site at Lurgan in Northern Ireland.

The 100m Puckeridge mast.

Dave, G3YXM, operating from the Puckeridge site. Note the life-sustaining box of chocolate biscuits.

Because such experiments were ongoing, the RSGB requested a continuation of the allocation,which has been agreed initially for a further year, to 30 June 2001. The RA has not ruled out discussions on an extension beyond that date.

Mandatory Band Planning - 'no change'

IN THE NOVEMBER 1999 issue of *RadCom*, members' views were solicited regarding the suggestion that the IARU HF band plans should be enforced by some form of incorporation into BR68, the Amateur Radio Licence 'Terms, Provisions and Limitations' booklet. The Society also wrote to many national societies who might have a special interest in the protection of the CW segments of our HF bands.

The overall response to the request was statistically insignificant, implying that this subject is not seen to be a burning issue at the moment. The majority of those responding expressed concern that the CW segments should be safeguarded. The national societies were, in general, happy with the *status quo*.

Council has taken note of the views expressed, and has also noted that the major problem seems not to be the encroachment of SSB, but the encroachment of digital modes into the CW segments.

Council's decision is therefore that, at present, there is no case for asking the Radiocommunications Agency to include the HF bands by specific reference in BR68. The position will be kept under review, particularly as WRC 2003 approaches, where the future of CW as a requirement for HF-band access is likely to be decided.

In the meantime, the Society will be discussing with POCM the practicalities of mailing a copy of the IARU band plans with every amateur licence issued.

● Users of the ARRL web site recently were illegally diverted to a rogue site in Canada. The ARRL site itself was not hacked, and their web server was not compromised. ARRL President, Jim Haynie, W5JBP, stated that the League intended to pursue the matter by all available means and to prosecute the person or persons responsible to the fullest extent of the law.

Arctic Crossing

DAVID HEMPLEMAN-ADAMS is trying to recapture the spirit and courage of the French balloonist Andrée, who perished with his team while trying to cross the Arctic by balloon in 1897. No-one has succeeded in making the polar crossing yet.

The Britannic Challenge hopes to create several world firsts - the crossing itself, reaching the Pole, landing a balloon on the ice pack, and surviving alone in a wicker basket for up to seven days in temperatures of -60ºC. If all has gone to plan, David will have already taken off from Spitzbergen in Norway by the time you read this.

The communications instrumentation has been provided at short notice by Icom (UK) Ltd, to furnish the vital link between the balloon and its communications base in Birmingham.

The project is more difficult than recent around-the-world attempts because of the need for cold-climate skills and extreme weather patterns which have hitherto kept Man away.

Intrepid balloonist David Hempleman-Adams.

Twinned Radio Clubs

BACK IN THE mists of time Mike, G3MHF, proposed to the committees of the Rouen-based Radio Club de Normandie (RCN) and the Southdown Amateur Radio Society (SARS) in Eastbourne (to which he belonged), that the two societies should be twinned. By exchanging information and ideas, Mike foresaw a deeper development of the kind of international friendship for which the radio amateur is renowned. The RCN Secretary, F9NZ, confirmed the approval of his club.

Since then, regular contact has been maintained between the two societies. Each year, one society entertains the other for "a weekend of bonhomie", when host families entertain guest families, culminating with a group luncheon and a visit to an establishment of technical, scientific or historical interest. This group exchange is facilitated by the Newhaven-to-Dieppe ferry, because the two societies are only some 90km apart.

Members of RCN and SARS who attended the group luncheon at the White Hart Inn, Lewes, East Sussex, in September 1999.

Up to 1999, 33 official twinning visits had been made, a total of 260 French and 241 English people having made the return trip. This year marks the 25th Anniversary of the clubs' activities.

Windermere Steamboat Event

OVER THE WEEKEND of 10/11 June, a Special Event Station staffed by local amateurs will be operating from the Windermere Steamboat Museum in the Lake District. Using the call GB0DBP – 'Dolly's Birthday Party' – the station will be on the air contacting radio amateurs throughout the world.

Little old lady passing by: the steam launch *Dolly*, 150 years on. (Photo: John Hinde)

The steam launch *Dolly* has her 150th birthday this year, and it will be celebrated at the museum on Wednesday 21 June, with GB0DBP returning to assist in the celebrations. *Dolly* is listed in the *Guinness Book of Records* as being the oldest mechanically-powered boat in the world. She was salvaged after 67 years on the bed of Lake Ullswater, is still driven by her original machinery and none of her hull timbers has had to be replaced. More details on the event are available from Roy Walker, G0TAK, (QTHR).

Plans for Scottish Islands

JO, GM0WPQ, IAN, GM0TGE, and possibly a few others, have plans to activate islands in the SC group this summer between July and the beginning of September. In particular, they are looking at: Tanera Mor (Summer Isles - SC10); Neave (SC03); Eilean nan Ron (SC04); Rabbit Island (SC05); Handa (SC07); Isle of Ewe (SC11). They are also considering: Pentland Skerries (SC01); Oldany (SC08).

Desert Trek

GORDON SMITH, G7UHP, from Sutton Coldfield, is preparing to take part in the challenge of a lifetime as he limbers up ready to spend 10 days trekking through one of the planet's harshest landscapes, the Namib desert in SW Africa The desert is normally closed to outsiders, making the trek particularly interesting.

The trek is due to take place in June to raise funds and to highlight the work of the Mines Advisory Group (MAG). Gordon says "This is a daunting challenge, as I have never done anything like it before. I am training hard to be sure that I am in good shape. My first and biggest challenge is to raise £2000 to support the work of the MAG".

Joining Gordon and some 70 others will be Trevor Bayliss, inventor of the clockwork radio, actress Amanda Redman and Paul Burrell, former butler to Diana, Princess of Wales.

A52JS

NO, IT'S NOT a pirate, it's none other than Jim Smith, VK9NS, who is currently operating from Bhutan with his brand-new callsign. Jim was operating quite independently of the multi-national DXpedition which was on the air from 3 - 12 May.

ZT and ZU Arrive

SOUTH AFRICA has approved a full HF-access licence plus what it calls 'a practical-based student licence', both requiring a 5WPM code test. The new Class A3 ticket, with a distinctive ZT call sign prefix, provides full licence privileges at up to 100W output.

The new entry-level Class B licence, aimed at school-aged youth, requires completing what is called a 'modular syllabus', essentially a construction project that results in a completed station. Licensees will be assigned ZU-prefix callsigns and will be able to operate at up to 25W output on selected band segments.

The 12WPM Morse code requirement remains in place for the Class A1 full licence, which carries the ZS prefix, privileges on all bands and a maximum output of 400W.

With this move, South Africa joins the United Kingdom, Sweden, Gibraltar and the United States as countries that have lowered the Morse code requirement for full HF access to 5WPM. A reduced Morse code requirement is currently under consideration in Canada, India, and Germany.

Continuous Novice Classes

PROSPECTIVE NOVICES in the Preston area may like to know that the Preston Amateur Radio Society is running a Novice course. This is a unique course in that there are no defined start and end dates. Just go along and join in at 1900 local time any Thursday evening. This is a tried and tested system, all the Novice entrants to the March exam having passed.

Morse classes are also held on Thursdays at 2000 local time, and anyone interested is encouraged to go along. The venue for both classes is the Lonsdale Club, Fulwood Hall Lane, Fulwood, Preston, Lancashire. The Novice Instructor is Eric Eastwood, G1WCQ, who can be contacted on 01772 686708.

Baltic Millennium Rally

TO CELEBRATE the year 2000, a Baltic Millennium Rally is underway. The objective is a complete circumnavigation of the Baltic Sea, visiting major marinas and ports in Germany, Poland, Lithuania, Latvia, Estonia, Russia (St Petersburg), Finland, Sweden and Denmark. The goodwill voyage will take about 4 months to complete, which will allow for sightseeing in the ports of call.

There are about 45 yachts taking part, all scheduled to arrive and depart in small squadrons so as not to cause congestion in the harbours and marinas.

Tony, G3LAA, is among the participants, sailing the smallest boat in the fleet. The vessel is fitted with an Alinco DX-70 and he is operating as G3LAA/MM until late August on all HF bands, mainly CW, whenever circumstances permit.

G3LAA's QSL card for the Baltic Millennium Rally.

One of the twin backstays is used as the antenna. Because it is not practical on such a small boat to use a manual tuner, an EDX-2, purpose-built for the Alinco, is to be used as the automatic coupler. An effective earth system is essential for any GRP-constructed boat, so an earth 'shoe' is bolted on the outside of the hull about 1m below the water line. Tony is not operating from the cosy confines of a radio room aboard a merchant vessel, but is much more likely to be heeled-over at some uncomfortable angle, with the Morse key mounted on the chart table.

On the return voyage, through the Gota Canal from Stockholm to Gothenburg, Tony will be calling- in at the delightful Danish island of Anholt, where he plans to operate as OZ/G3LAA/P using a kite antenna. Anholt is IOTA EU-088, and Tony expects to be there around mid-August.

W & S Open Day

YES, IT'S THAT time of year again! The 10th Annual Waters & Stanton Open Day is to be held on Sunday 28 May at their Main Road premises in Hockley, Essex.

As usual, the event will feature free parking, free entry, free food and drink, and a free raffle. This year's Open Day includes the official opening of the new radio showroom, which is part of an enlarged shop now offering 140sq m of floor space.

A marquee will cover the shop car park to make room for representatives from Icom, Yaesu, Kenwood, *Radio Today* and the RSGB. The Essex Repeater Group will provide the talk-in. Mark's auction will take place in the afternoon, another regular feature of the Open Day. It will be Bank Holiday weekend, so why not make a day of it and see the first day of the Southend Air Show, just five miles away?

Enhanced Yearbook Entries

SOME PEOPLE are surprised to find that their address is not published in the *RSGB Yearbook*. If you *want* your full address published, make sure that POCM (formerly SSL) knows this. You can write to it at: Radio Licensing Centre, POCM, PO Box 885, Bristol, BS99 5LG. This is not something that can be done at RSGB HQ.

This year, we are once again offering to *add* a maximum of 252 characters to the existing entry - whether your particulars are withheld or not. This may include your forename, locator, telephone number, local packet BBS, e-mail address, favourite band, or whatever you think may help someone looking up your call. If you have withheld your full details, you may be prepared to add just your post town, county or locator. All members are encouraged to request a Special Entry, especially if their full addresses do not appear. There is no need to write if there is no change to the entry used last year.

A Special Entry normally costs £5 but, as a service to members only, anyone sending in details before the **deadline of 1 July** will not be charged. Please send details by post to: *Yearbook* Editor, RSGB, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE, or by fax to 01707 645105, or by e-mail to publications@rsgb.org.uk Entries *cannot* be accepted by telephone.

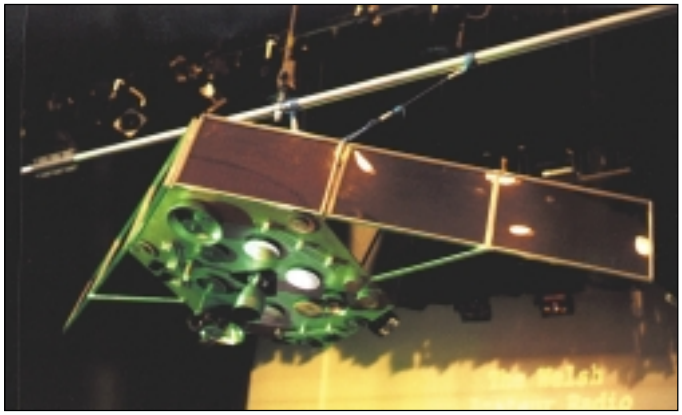
Barry Show Success

BARRY AMATEUR Radio Society's 'Rally and Exhibition 2000' was held in March and was soon heralded as 'a rally with a difference' by those who went to sample its wares. It was held to coincide with the DTI's *National Science, Technology & Engineering Week*, and it encompassed these three disciplines to great effect.

Their HF transceiver was linked to a computer, both for rig control and for running the *DX4WIN* logging software, as well as for Internet linking to DX clusters around the world.

Kenwood UK was also involved, showing its latest TM-D700E Data Communicator. To add to the impact, some members were out mobile with APRS, and the TM-D700E enabled the positions of the vehicles to be shown at street level on maps displayed on giant screens for all to watch.

10GHz ATV was also on show, as were half-size models of the Phase 3D satellite and thee other amateur satellites, painstakingly made by Ken Eaton, GW1FKY, and involving some 9 months of dedicated work specially for the rally.


Phase 3D: half-size and 'in orbit' above the rally crowds. It was made specially for the rally by Ken Eaton, GW1FKY.

Postage Rises

HAVE YOU remembered to send your QSL Bureau Sub-Manager some small-denomination stamps to cover the increased postage costs of the envelopes he has for you? If you haven't, the consequences could be irritating and expensive.

● The Amateur Radio Society of Kenya (ARSK) has just set up a web site at www.qsl.net/arsk It contains much useful information on licensing issues together with things of immediate interest to prospective visitors to the country.

A New Structure for the Society

By Peter Kirby, G0TWW, General Manager

IN 'THE RADCOM Leader' in this issue, the President asks for input from all Society members to the thinking of Council about the future management and governance of the Society. In this article you will find more details of Council's plans, and information on how to make your views known.

The President has already outlined some of the objectives Council has in mind in proposing changes to the structure of the Society to:

- strengthen the links to - and the representation of - our members
- speed Society decision-making
- bring the best available expertise into play on key issues
- improve the focus of Committee operation
- further clarify the role of each Council member
- use the most modern communication tools

….and so to stimulate and develop amateur radio in the UK

To achieve these objectives, Council is considering the following structural changes to the Society.

1. A larger number of regionally-elected representatives than at present, responsible for direction of the Society's activities in the Regions (we are using the word 'Region' here, to differentiate from the existing 'Zones').
2. The creation of a smaller 'Executive Board', primarily comprising nationally elected Council members, responsible for the policy and direction of the Society.
3. Regionally-elected representatives and members of the Executive Board to form the 'National Council', meeting twice a year to provide direction to the Society, based on members' interests and wishes and to provide guidance to the Executive Board on policy issues.

Currently, Council consists of seven members, each elected by members in the relevant Zone, and eight nationally-elected members, together with the President and the Immediate Past President (a total of seventeen members). Council, meeting typically six times a year, combines the role of policy setting and the more operational management of the Society's activities. The proposed changes described in the following paragraphs separate these activities to some degree.

A Modern, Geographic Representational Structure, and Improvements to the Management of Society Affairs at the Local Level

THE CHANGES HERE involve an increase in the number of Zones (to be called Regions), with RSGB membership in each Region electing, as at present, a Regional Council member.

Currently the United Kingdom is separated into seven Zones. These Zones are each represented at Council by a Zonal Council member, elected by the members from within that Zone. These seven Zonal Council members are assisted by RSGB Liaison Officers (RLOs) spread across the Zones. Council is conscious that the current Zones are simply too large for Council members effectively to represent the membership.

A good example of this is the current Zone D, which stretches from Milton Keynes to Lands End. Under the new proposals, the Zones would be increased in number from 7 to 12 and be renamed 'Regions'.

These new Regions would be:

Northern Ireland
North Wales
South Wales
Scotland East and the Highlands
Scotland West and the Islands
North West England
North East England
The Midland Counties
South East and East Anglia
South West and the Channel Isles
South of England
London (inner M25)

Regional Council members would together form the Regional Council. They would each be assisted by up to four RLOs They would, as a team, be responsible for all Society activities within their respective Region. This would include club liaison, schools liaison, attendance at local rallies and events and - most importantly - membership recruitment and public relations at the local level.

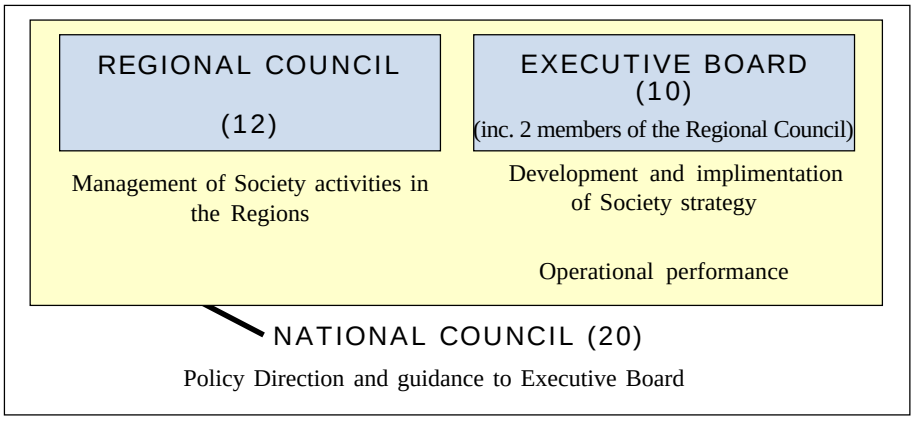
The Regional Council is expected to meet three or four times a year (including the two occasions when there is also a National Council meeting – see below). Meetings will, however, be kept to a minimum. Much more use will be made of modern communication techniques such as e-mail, reflectors and teleconferencing. This will cut down the need for costly and time-consuming face-to-face meetings.

Scotland, Wales and England will all benefit from this new arrangement and will have increased representation in the direction and policy of the Society. Representation in Northern Ireland will remain as at present, with one elected member.

A More Streamlined Executive Structure

THE SECOND PART of the proposed restructuring is at the executive level.

At the present time, eight ordinary Coun-



A schematic representation of the three committees.

cil members are elected by the full membership nationally. They have no regional responsibilities, but are expected to play a broader part in the management of the Society.

Under the new proposals there would continue to be eight nationally-elected members. They, together with two members from the Regional Council, would form the *Executive Board*. This Board, meeting some four times each year, would shape and implement Society policy and strategy, and monitor its operational performance. They would be guided by input from the National Council.

We plan that the eight nationally-elected members would each have an area of responsibility. These could include, for example, Spectrum, Licensing and Education, Membership, Technical, Contesting and International Affairs. Their roles would be clearly defined and they would take a lead in the management of the portfolio they hold. This would enable the Society to co-ordinate the work of the Committees better and handle the inevitable areas of shared or overlapping interest. Longer term this could lead to a simplification of the Committee structure.

In addition, Executive Board and Regional Council members will together form the *National Council*, meeting twice a year. The National Council would be responsible for policy-making input to the Executive Board.

The costs of operating this new structure are broadly comparable with the existing arrangements. However, Council believes that the increased level of Regional representation will pay dividends in greater membership input on key policy issues.

Other Changes Being Proposed

THE TENURE OF Council members has also been considered by Council. Currently, Council members can serve for two consecutive three year periods (if re-elected), and must then have a one year break in service, but they can stand again thereafter. Council believes that the break in service should be increased to three years, with the objective of encouraging more new blood onto Council.

The role and appointment of President has also been considered by Council. It is proposed that the National Council should elect the President, who would stand for two years. At present a President is elected by Council for a one year period, but with the facility to serve for up to five years. Many Presidents have said that they felt one year was too restrictive and that the Society would be better served by allowing a President to hold office for two years.

Exactly how the Society makes the transition from the existing structure into the new one is still under consideration, but it is clear that the changes require the approval of the membership at a General Meeting. Council therefore plans to review the proposals again in July, taking account of input received as a result of this article, and then to frame a series of changes to the Memorandum, Articles and Bylaws of the Society for consideration at the December 2000 AGM. Changes agreed at that meeting will then take effect for elections to Council to be held in late 2001.

These new arrangements are in the early stages of being formulated and no firm decisions have yet been made. Council would be interested in your comments. If you would wish to enter into the debate or put forward ideas, please write to the General Manager at HQ, or e-mail gm.dept@rsgb.org.uk

Your responses should reach HQ not later than 14 July 2000. ♦

Lead Feature

A Compact, Modern HF Linear

*By Bruce Edwards, G3WCE**

AN HF LINEAR amplifier is a piece of equipment that many amateurs express a desire to build. Unfortunately, of those started, many are never completed. Some turn up as unfinished projects at rallies and car boot sales, and there are probably many more that are stored and largely forgotten, but which could be made to work.

Given a suitable design, the major part of the work is mechanical (what used to be called 'chassis bashing'), and metalwork with nothing more than basic hand tools can become tedious (although to past generations of radio amateurs this was the norm). Some quite wonderful (and some quite awful!) metalwork has been produced with just a hand-operated drill and a few files. Another obstacle is the availability of components, but most parts for a linear can be bought (either new or second hand, at rallies) or made (eg chokes and PA coils).

It is the intention of this feature to provide encouragement and practical information to potential constructors, as well as a design for an amplifier, although it is not likely that many would want to copy it down to the last nut and bolt. This amplifier is the fourth that I have built in recent years. It is a circuit that has evolved, with many improvements made since the original took shape.

REQUIREMENTS

THE FORM THAT a modern linear will take is largely dictated by how it will be used, ie with a modern solid-state transceiver. This will produce up to 100W of output and will expect to 'see' a load of 50Ω. The amount of power available means that high gain is not necessary (or indeed desirable, as power would have to be 'lost'). What is needed is an amplifier with a gain of 10dB or less and a relatively low drive impedance. The obvious choice is a valve in grounded grid. This has the added advantage (over grid-driven valves) that variable bias and stabilised screen supplies are not required, stability is excellent, and neutralisation is not required. So, the first choice is an easy one.

It has been found that harmonic output from linear amplifiers can be considerably reduced by using an extra inductance, so that the output network takes the form of a pi-L (the output capacitor of the PI-network combines with the input capacitor of the L network, resulting in just one capacitor being used). However, extra band switching is required and, with the extra inductance, more space needed, making an amplifier as compact as this rather more difficult to construct.

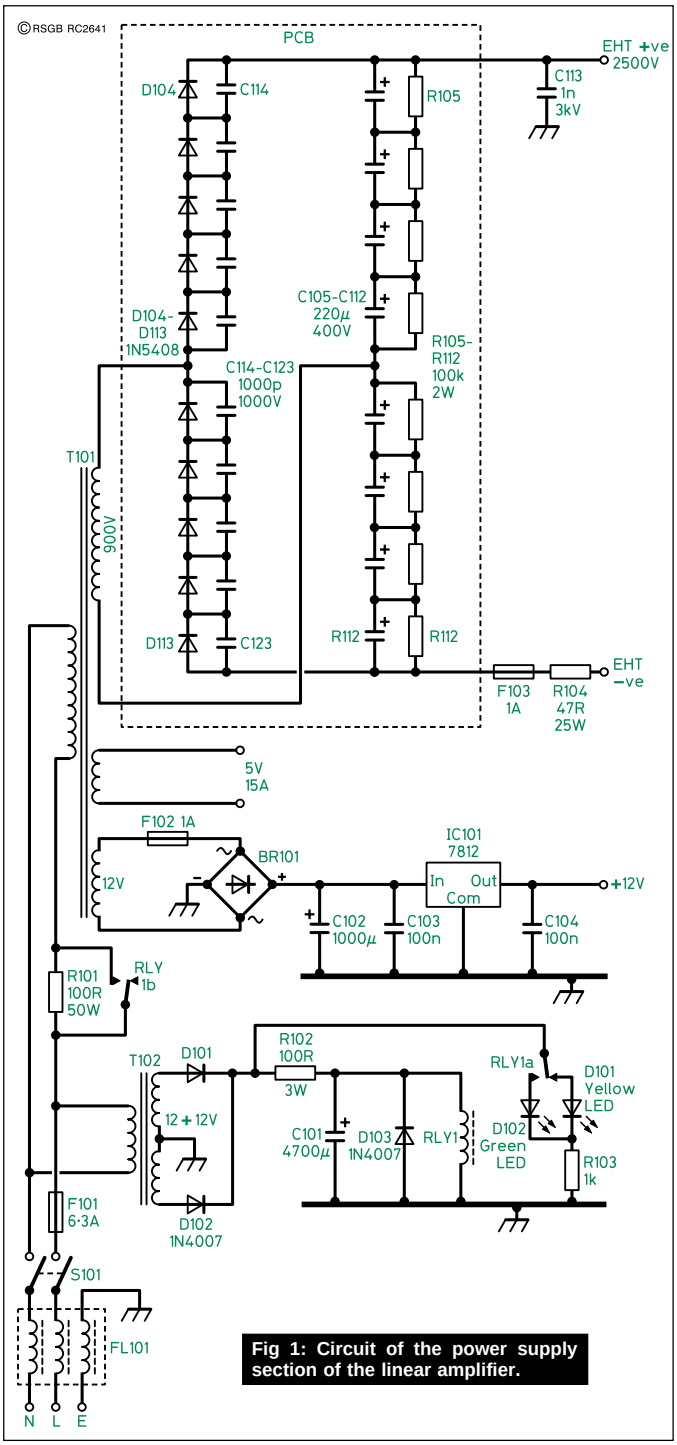


Fig 1: Circuit of the power supply section of the linear amplifier.

Features Required:

1) Full legal output, preferably with some in reserve (see 'choice of valve').

2) Self contained. Everything - amplifier, power supply, all switching, etc, in one case.

3) Compact. A linear amplifier can easily fill a case the size of an AR88 and, in the past, frequently has. Most of the space would have been taken up by the power supply, which could consist of several iron cored transformers, with large electrolytic capacitors and possibly valve rectifiers. With one toroidal transformer to supply all the voltages, the EHT power supply for a legal limit amplifier can be built into a cube of around 16.5cm (6.5in), with the low voltage rectifiers and smoothing capacitors placed in any suitable space (probably beneath the chassis, away from intense RF fields). For those now wondering where to get a suitable transformer, the answer is simple – have one specially wound. This is not as expensive as it may sound. If you go direct to a manufacturer, the price will be similar to - or even lower than - a similarly rated 'off the shelf' item from a retailer (it appears that the retailers' mark-up is often more than the manufacturers' surcharge for a 'one-off'). The transformer used in this amplifier cost £50 + VAT.

4) 'No tune' 50Ω input, for modern transceivers. Older designs for linear amplifiers often used multi-band (switched) pi networks for input as well as output, which resulted in two band-switches and two sets of tuning and loading controls. I consider this to be unacceptable today (although that's just an opinion), as we can easily do better. For the input it is possible to use several low Q, pre-tuned networks to cover all bands 1.8-28MHz. This design uses seven to cover nine bands.

5) Single - knob band switching.

*232 Earlham Road, Norwich NR2 3RH.

POWER SUPPLY COMPONENTS

Resistors

R101	100R 50W wire-wound, chassis mounting
R102	100R 3W wire-wound
R103	1k 0.6W metal film
R104	47R 25W wire-wound
R105-112	100k 2W metal film

Capacitors

C101	4700µF 16V electrolytic
C102	1000µF 25V electrolytic
C103	100nF 25V ceramic disc
C104	100nF 25V ceramic disc
C105-112	220µF 400V electrolytic (Maplin AU55K)
C113	1nF* 3kV* ceramic (Linear Amp UK)
C114-C123	1nF 1000V ceramic (Maplin JL03D)

Semiconductors

D101-103	IN4007
D104-113	IN5408
LED 101, 102	5mm standard yellow and green
BR101	100V 6A bridge rectifier

Miscellaneous

RLY1	12V DPDT (8-pin plug-in type) + socket (Maplin JG58N and JG54J)
T101	Toroidal mains transformer Pri: 240V Sec 1: 900V Sec 2: 5V @ 15A Sec 3: 12V @ 2A
T102	Mains transformer. Pri: 2 x 120V Sec: 2 x 12V @ 200mA (Electrovalue BR512)
F101	6.3A 1¼in quick blow + panel mounting holder
F102	1A 20mm quick blow + chassis mounting holder
F103	1A 1¼in quick blow + chassis mounting holder
S101	DPDT (with in-built neon)
FL101	Filtered mains input connector (Maplin CT80B)

T101 supplied by Tiger Toroids, 1 The Maltings, Victoria Road, Diss, IP22 3JE. Tel: 01379 650580.

* indicates minimum value

The obvious way to change bands is to use two switches, one in the output network, and one below chassis selecting the required input network. But, as a grounded grid linear has relatively low gain, it is possible to switch everything using one multi-wafer switch, without feedback problems. It is necessary to place a screen between input and output wafers, but that is all that is required. The switch is placed above chassis, with the rear wafers switching the output network and the front wafers connected to a PCB carrying the input networks. This is placed beneath the chassis, directly underneath the switch. Coaxial cable connects the wipers to the cathode circuit and the input relay.

CHOICE OF VALVE(S)

THE FIRST LINEAR I built used a pair of 813s. As linear MkII was built from the remains of linear Mk1, the same valves were used. I bought them second hand for £5 each. Since then they have been experimented with, over-run and generally abused, yet show no sign of falling output. The one disadvantage of the 813 that I have found is that it is not entirely happy on 10 and 15m. It is a large valve, with long internal leads that no doubt cause fairly high stray reactances at higher frequencies. The dip in anode current at resonance becomes slightly asymmetric on 20m, 'bouncy' on 15m, and turns into a peak on 10m, all of which indicates internal feedback. The other disadvantage of this valve is the well-known one of high output capacitance (14pF). This affects performance on 10 and 15m by increasing the minimum possible capacitance of the pi network tuning capacitor. For correct operation, the network needs to have a loaded Q (Q_L) of around 12. This value is dependant on the ratio of inductance to capacitance. If the capacitance is too high, the inductance will need to be lower. This results in a higher-than-optimum Q_L and a reduction in efficiency. In spite of these shortcomings, I believe that the 813 would be an excellent choice of valve for those whose main interest is operation below 21MHz.

My next linear (MkIII) used a pair of 4CX250Bs in grounded grid. An unusual choice, maybe, but these valves have been used on HF before. For example, a design was published in *RadCom* in the early 1970s (this was for a passive grid amplifier). My grounded grid design gives impeccable performance on all bands 160-10m, but a question mark hangs over it in that it produces very high grid current (400-500mA at full output) and it is not known what effect this will have on valve life (no manufacturers figures have been published for operation in this mode). While continuing to experiment with this amplifier (the valves are still going strong) I built amplifier MkIV. I decided on a single 3-500Z for this one, as it is a proven valve with a good reputation, and one which will produce in excess of the legal maximum output while operating within manufacturers ratings of 400mA anode current, 500W dissipation, and 110mA grid current. With 2500V on the anode and 400mA of current, the input is 1000W, so 500-550W output is a realistic expectation, which meets the power requirement No 1. The main disadvantage of this valve is its cost, around £170.

PROTECTION

IN VIEW OF the cost of the valve, I decided to take some steps to protect it and prevent early failure, so a soft start feature was included in the power supply. This prevents full mains voltage being applied immediately at switch-on. The delay is about one second, which gives the valve filament a chance to start heating, so increasing its resistance and preventing a large inrush of current to a cold filament. The soft start also makes life easier for the EHT rectifiers and capacitor bank, by allowing partial charging to take place before full voltage is applied.

RF SECTION COMPONENTS

Resistors

R201	1R 25W wire-wound, chassis mounting
R202	5k6 0.6W metal film
R203	5.6R 7W wire-wound
R204	4k7 0.6W metal film
R205	47k 0.6W metal film
R206	22k 3W wire-wound

Capacitors

C201	1nF* 3kV* (Linear Amp UK)
C202-206	10nF 500V disc ceramic
C207	2nF* 10kV* (Linear Amp UK)
C208	250pF wide spaced variable (Nevada TC250)
C209	300pF 7.5kV door knob type (Linear Amp UK)
C210	3-gang 500pF broadcast type variable
C211	500pF 200V* ceramic or silver mica

Semiconductors

D201-202	1N5338B 5.1V 5W Zener (Maplin AY65V)
D203-206	1N4007

Miscellaneous

S1A-S1D	4-pole 9-way ceramic wafer switch (see text)
S201	See text
M1	100µA (Maplin RW92A)
M2	50µA (Maplin FM98G)
RFC201, 203	See text
RFC202	4 turns of 1.25mm diameter wire, 10mm dia, 20mm long, in parallel with 10R 3W (non-wire wound) resistor
RFC204	Bilifar, on ferrite rod (see text)
L201,202	See text
V201	3-500Z + anode heat sink and ceramic base

* indicates minimum value

Anode current and dissipation are in the hands of the operator. Occasional, short-lived excesses are unlikely to cause damage, but should be avoided whenever possible. Excess grid current is another matter, as this could easily damage the valve. A 'trip' was included which shuts down the amplifier when maximum current is reached and which must be reset before operation can continue.

SAFETY

IT SHOULD BE made clear that a piece of equipment such as this employs voltages that are potentially lethal.

In this amplifier, the *most* dangerous voltages are above chassis, while the adjustments are below. This goes some way to alleviating the problem, provided care is taken at all times (never forget that mains voltage is present below the chassis). When making adjustments, arrange things so that it is not possible for any part of your body to come into contact with anything above chassis, and keep one hand behind your back or in a pocket.

Do not carry out any work above the chassis of

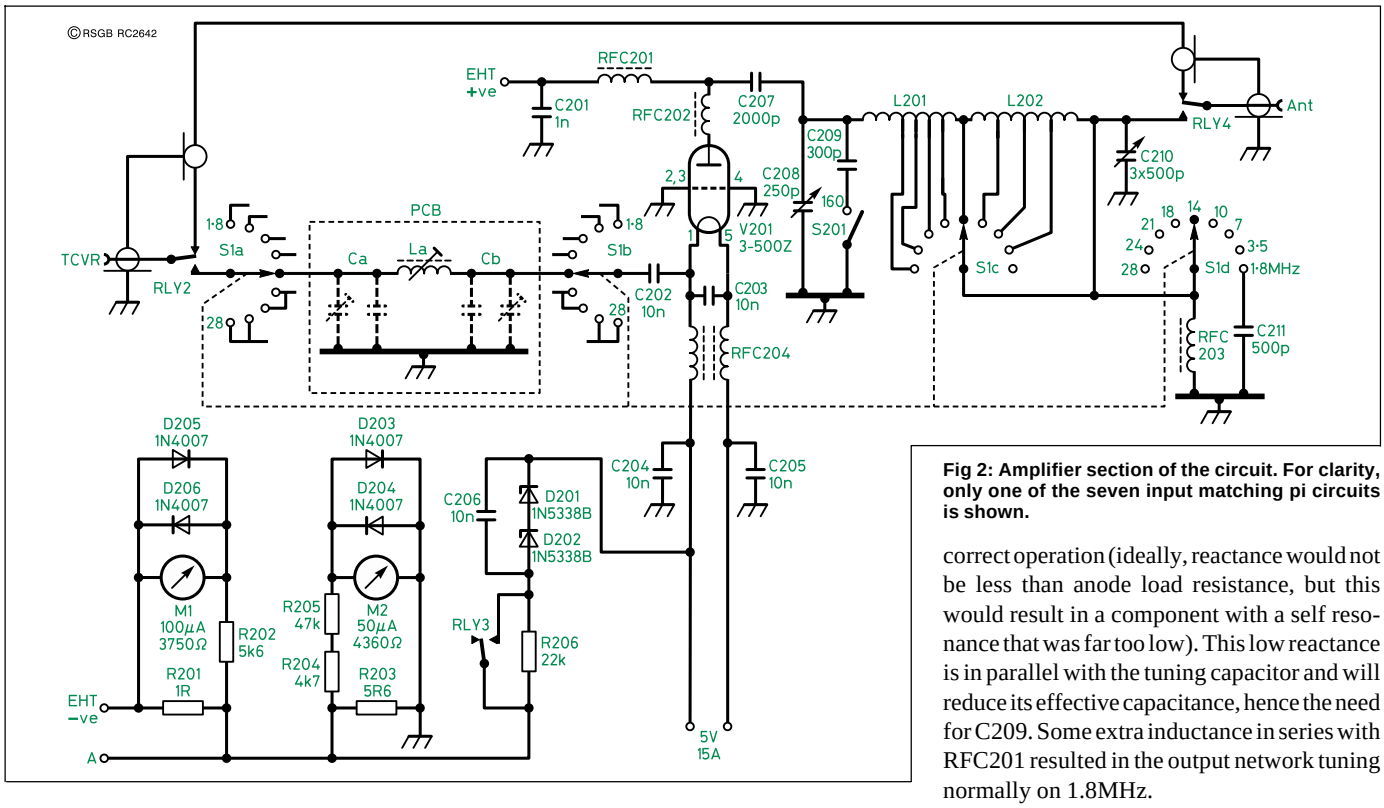


Fig 2: Amplifier section of the circuit. For clarity, only one of the seven input matching pi circuits is shown.

the amplifier without first making sure that it is disconnected from the mains and that its electrolytic capacitors are discharged.

CIRCUIT DESCRIPTION

THE CIRCUIT of the linear can be broken-down into several sections.

POWER SUPPLY & SOFT START

As can be seen in **Fig 1**, S101 is the front panel-mounted mains switch. When it is closed, mains is applied to T102 and T101 via R101, which limits the inrush of current. C101 charges via R102. As the charge builds up, the drop across R102 decreases. After about 1 second, the voltage across RLY1 is sufficient for the relay to close, bypassing R101 and applying full mains to T101. The EHT supply of approx 2500V is provided by a voltage doubler, fed from a 900V secondary on T101. The multiplication factor is actually 2.8 x 900V, because the capacitors charge to the peak value. The capacitors each have a bleed resistor in parallel. Modern rectifier diodes don't require voltage equalising resistors, so these have been omitted. A 1A fuse, F103, is placed in the negative return. The purpose of R104 is to limit current in the event of the valve flashing over. The doubler, consisting of D104-D113, C105-C112 and R105-R112, is built on a printed circuit board. The output must be via EHT cable on the positive side, and from the negative side as far as F103, as an open circuit fuse will result in the negative side rising to a high potential above chassis.

A 5V 15A secondary winding provides the supply for the valve filament, and a 12V winding provides 12V DC after rectification and smoothing, the voltage being set by IC101.

RF SECTION & DC FEED

Moving on to **Fig 2**, RFC201 is the EHT feed choke to the valve. This is a critical component in that it must not show any resonances at or close to any frequency the amplifier is to be used. If it does, failure is likely to be rapid and spectacular. In the past, HT chokes have been complex affairs, with windings in several segments. This one is much simpler, with a single winding. I first came across it in the feature by Don Pinnock, G3HVA, in *RadCom* May/June 1997. It is apparently due to Peter Rodmell of Linear Amp UK. The winding details are; 112 turns, 0.56mm enamelled copper wire on 20mm former. I used paxolin tube, but teflon or ceramic would be equally suitable. Although this choke will work on all 9 bands, it is something of a compromise. The inductance is approx 60µH, which is quite low (presumably the designer wanted to make sure that the first self-resonance was out of harm's way, above 30MHz). This low inductance results in a reactance of under 700Ω at 1.8MHz, which is too low for correct operation (ideally, reactance would not be less than anode load resistance, but this would result in a component with a self resonance that was far too low). This low reactance is in parallel with the tuning capacitor and will reduce its effective capacitance, hence the need for C209. Some extra inductance in series with RFC201 resulted in the output network tuning normally on 1.8MHz.

Fortunately, home built equipment can be tailored to the needs of the constructor. Many may not want 1.8MHz operation, in which case C209, C211, S201 and S1D can be dispensed with. For those who may occasionally want 1.8MHz operation, the circuit can be left as is. The serious LF band DXer could replace RFC201 with a component of higher inductance, such as a choke intended for a 1.8-28MHz valve transmitter (check its resonant frequency with a GDO first, you may still be able to operate one or two WARC bands).

The valve grid is connected to pins 2, 3 and 4. All three should be connected to chassis with the shortest possible leads, so for this purpose three solder tags are screwed to the chassis next to the relevant tags on the valve base. The filament supply to the valve is via RFC204, as is the EHT negative return. This is not connected directly to chassis, but via R203. Grid current passes through this resistor, so can be monitored by measuring the voltage across it. The value of 5.6Ω was chosen because when the maximum permissible grid current flows, the voltage produced will be more than enough to trigger a thyristor. Meter M2 reads grid current, and the values of R204 and R205 chosen to give a full-scale deflection of 500mA.

EHT (and therefore anode) current flows through R201, and R202 was chosen so that M1 reads 1A FSD. Both meters are protected by back-to-back diodes across them.

In the past it was common for anode current meters to be in the anode circuit, which places them at a very high potential with respect to chassis. With old fashioned bakelite meters this was bad enough, but using modern plastic meters with

Band (MHz)	Ca Calculated value (pF)	Ca Actual values (pF)	Cb Calculated value (pF)	Cb Actual values (pF)
1.8	1368	1200 + 180	1173	1000 + 120
3.5	711	560 + 150	581	560
7.0	368	220 + 150	300	270
10.1	257	220 + 33	210	180
14	182	150 + 65pF trimmer	149	68 + 65pF trimmer
21	122	68 + 65pF trimmer	100	22 + 65pF trimmer
28	92	68 + 65pF trimmer	75	65pF trimmer

Table 1: Input network capacitance data.

Band (MHz)	Reqd L (µH)	L x 0.8 (µH)	Winding data for 10mm former with dust core
1.8	7.07	5.66	0.375mm ECW 28.5 turns
3.5	3.68	2.94	0.71mm ECW 24.5 turns
7.0	1.92	1.54	0.71mm ECW 13.5 turns
10.1	1.33	1.06	0.71mm ECW 10.5 turns
14	0.965	0.77	0.71mm ECW 8.5 turns
21	0.64	0.51	0.71mm ECW 6.5 turns
28	0.48	0.38	0.71mm ECW 5.5 turns

(ECW = Enamel Coated Wire)

Table 2: Input network data for 'La'.

Band (MHz)	L (µH)	Turns on T68.2 core	Wire
1.8	7.07	35	0.45mm ECW
3.5	3.68	25	0.56mm ECW
7.0	1.92	18	0.56mm ECW
10.1	1.33	15	0.56mm ECW
14	0.965	13	0.56mm ECW
21	0.64	11	0.56mm ECW
28	0.48	9	0.56mm ECW

(ECW = Enamel Coated Wire)

Table 3: Input network. 'La' wound on toroidal core.

removable faces like this would be bordering on the suicidal.

The valve is cut off by R206 when not transmitting. When it is required to transmit, this is bypassed by RLY3.

Zener diodes D201 and D202 are included to provide some bias in order to reduce standing current, and therefore dissipation. They are mounted in contact with the chassis, with a generous amount of heatsink compound.

SIGNAL PATH

Drive is applied to the filament (cathode) which is kept 'floating' at RF by RFC204. Unfortunately, the drive impedance varies through the cycle, which would result in a changing load being seen by the transceiver, which could result in distortion being generated at the PA To overcome this, the 'flywheel effect' of a tuned circuit can be used. The driving impedance is around 150Ω, so needs to be transformed to 50Ω. A pi network will perform both functions and, if the Q is kept low, will cover the whole band, even the bands at HF, if a slightly raised SWR is acceptable. One network covers 28 and 24MHz, one covers 21 and 18MHz, and the remaining bands have one each. The networks are on a printed circuit board which is mounted underneath the band switch, with input and output leads passing through the chassis. The three highest frequency networks have trimmers as well as a variable inductance. The coaxial cable from the band switch to the valve is mismatched at the valve end, so an allowance has been made for this in the value of capacitance at the network outputs. **Table 1** gives the design and actual values, whilst **Table 2** give the values and the coil winding data.

It will be seen that each capacitance consists of one or two capacitors, a capacitor and a trimmer, or just a trimmer. **Fig 3** shows the PCB and component placement. The coil formers are 10mm diameter, with dust cores. Until recently they were available from Maplin. They are virtually identical to the older Aladdin F804 formers which can be found at rallies and car boot sales. The actual number of turns is calculated to give 0.8 times the required inductance without the core, so that plenty of adjustment is possible.

It is possible to use toroidal cores, but instead of wiring directly into the board, PCB pins should be used so that the inductors can be easily removed and the number of turns changed. **Table 3** gives the calculated turns. Start with at least 10% more, and remove as required for a good match. ♦

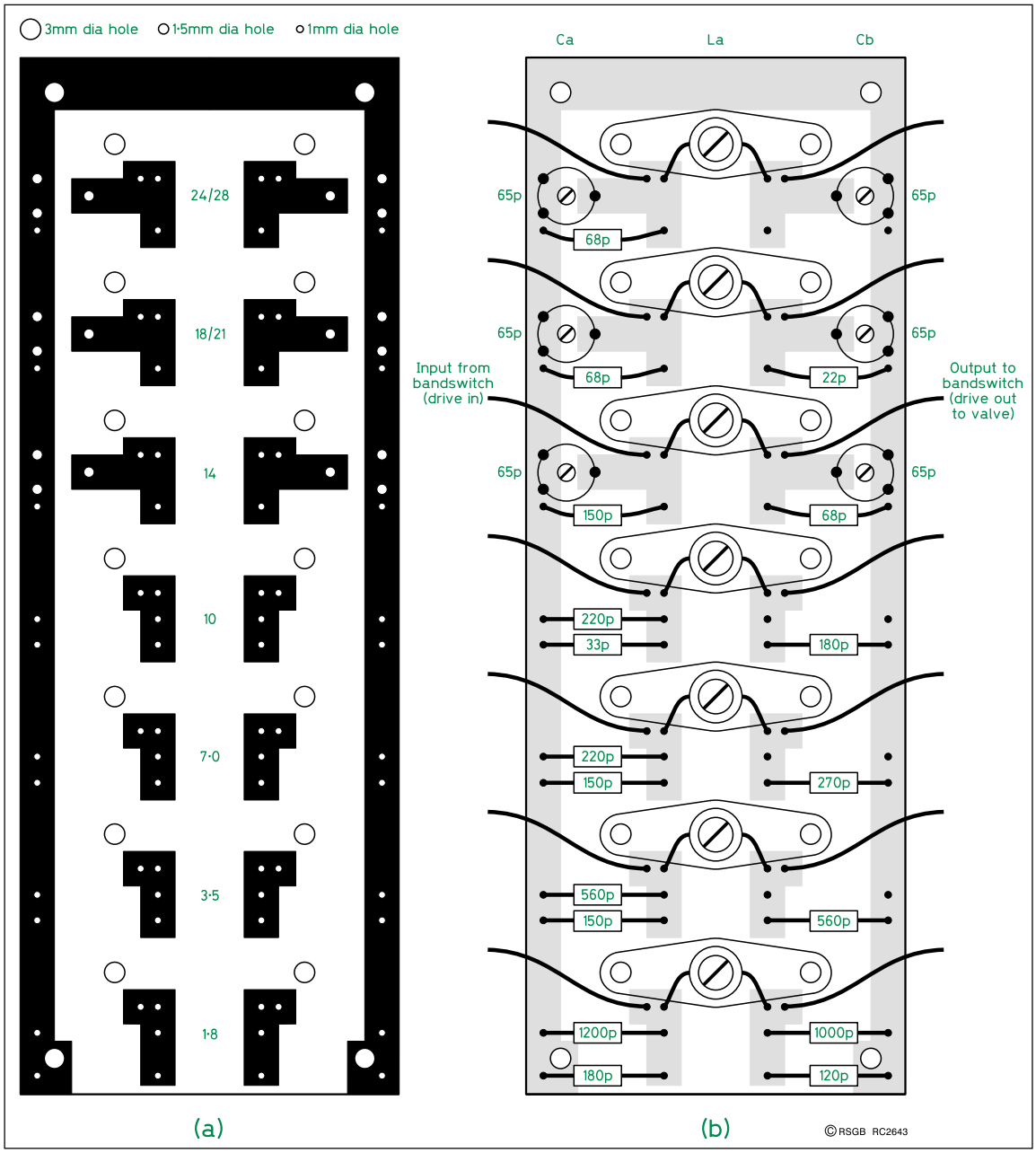


Fig 3: PCB and component placement of the input matching pi circuits.

To be continued...

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ICOM SM6	BASE MICROPHONE	45.00
KENWOOD PS5	POWER SUPPLY WITH CLOCK	25.00
NEC	EXTENSION SPEAKER + CLOCK	39.00
OUTBACKER	80-10M MOBILE HF ANTENNA	99.00
PALSTAR AT1500	1.5kW ATU	239.00
STAR MASTER KEYER	DEWSBURY KEYER	45.00
SYMEK TNC 2H+RF DECK	9.6K TNC + 10W RADIO	179.00
ACTIVE CW AUDIO FILTER		25.00
IAMBIC PADDLE KEY		35.00
AMT 2	AMTOR DECODER	35.00
DRAE	3 WAY ANTENNA SWITCH	12.00
TONO Q-550	TERMINAL UNIT	125.00
TRIO VB2200GX	10W AMP FOR 2200	35.00
TRIO MC50	BASE MIC	50.00
TRIO VFO 520	EXTERNAL VFO UNIT	59.00
YAESU FC102+FAS14R	ANTENNA TUNER + REMOTE SWITCH	199.00

NEW ITEMS ARRIVING DAILY - CALL!

CUSHCRAFT

VERTICALS

R6000	...6, 10, 12, 15, 17, 20m	£299.95
R7000	....10,12,15,17,20,30,40m	£369.95
NEW R8	.7 - 50MHz (8.7mtrs high)	£399.95

HF MULTIBAND BEAMS

MA5B	..New Mini Beam	£289.95
X7	.....10,15,20m 7 el.Yagi	£499.95
A3S	.....10,15,20m 3 el.Yagi	£389.95
A3WS	..12, 17m 3 el. Yagi	£299.95

p&p £10 on each item * £12 p&p on each item

HF ROTARY DIPOLES

D3W	....12,17,30m Dipole	£199.95
D40	.....40m Dipole ~~£229.95~~	£199.95

6 METRE ANTENNAS

A505S	.6m 5 el.Yagi 10.5 dBi	£149.95
A506S	.6m 6 el.Yagi 10.5 dBi	£249.95
ARX6	....6m Ringo ranger 7.3m 5.5 dBi	£199.95
AR6	.....6m Ringo 3.1m 3 dBi	£59.95

p&p £8 on each item

DAIWA
SWR/Power Meters

DAIWA CN-801

1.8-200MHz
Power Rating
20/200/2kW
1kW (144MHz)
£109.95
£6 P&P

DAIWA CN-101L

1.8-150MHz
Power Rating
15/150/1.5kW
1kW (144MHz)
£59.95
£6 P&P

DAIWA CN-103LN

Power Rating
20/200W
(140-525MHz)
£64.95
£6 P&P

ALINCO DJ-SR1

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- 39 CTCSS codes/ch
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- Monitor (open squelch) key
- Selectable pwr output

PALSTAR

GET ON 6 MTRS FOR THE SUMMER!

PALSTAR KH-6 now only ~~£129~~ £69
£8 p&p

LIMITED OFFER

- 50 - 54MHz
- 4W RF out (12V)
  2W RF out (9V)
- UK Repeater offsets
- Intelligent Power Save circuit
- CTCSS Encode/Decode
- Scan functions
- Memory recall
- C/w 8 cell AA battery case
  (batteries not inc)

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KH6/BC	Empty Battery Case	£8.95
KH6/DA	Slide on DC Adaptor	£7.95
KH6/HF	Flexi Hi-Gain Antenna	£12.95
KH6/NP	NiCad Battery Pack	£29.95
KH6/CP	Cigar Adaptor PWR Lead	£8.95

ZX YAGI

Mono Band Yagis

AS USED BY VP6BR PITCAIRN ISLANDS & OTHER MAJOR DXPEDITIONS

A range of high spec beams using a solid gamma match system capable of handling 3000 Watts! The aluminium is made of special strong material (2004 Titanan + 6061 T6).

BAND	ELEMENTS	BOOM(M)	GAIN(DB)	PRICE
10MHz	2	2.35	6.3	£165.00
10MHz	3	8.55	9.1	£184.50
14MHz	2	1.7	6.3	£146.40
14MHz	3	6.2	9.1	£197.95
14MHz	4	9.4	11.4	£255.95
18MHz	2	1.45	6.3	£123.95
18MHz	3	4.9	9.1	£156.95
18MHz	4	7.5	11.4	£189.95
21MHz	3	4.15	9.1	£115.95
21MHz	4	6.4	11.4	£182.00
24MHz	2	1.1	6.3	£99.25
24MHz	3	3.5	9.1	£123.95
24MHz	4	5.5	11.4	£156.95
28MHz	3	3	9.1	£115.95
28MHz	4	5	11.4	£149.00
28MHz	5	7.5	12.1	£181.50
28MHz	5DX	8.0	12.7	£215.00
50MHz	2	0.60	6.2	£48.95
50MHz	3	1.75	9.1	£81.95
50MHz	4	2.75	11.4	£99.00
50MHz	5	4.35	12.1	£114.95
50MHz	6	6.40	12.5	£147.85

£12 P&P ON ALL ANTENNAS ABOVE

Mini Beam 2000

A small beam with low profile elements 2 metre boom plus 5 mtr elements.
- Covers 14, 21, 28MHz
- Gain approx 6 dBi

£199.95 £12

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Lightweight and easy to erect, supplied with wire radials

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10/15/20 mtrs, 3.9 mtrs long, 500W
£59.95 £12 P&P

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WORLD FAMOUS VERTICALS

Using space-age TITANIUM ALLOY for ultra light weight but immense strength these Verticals have been the choice of many major DXpeditions such as *9M0C, K7K, VK9CR, 3B7RF* etc.

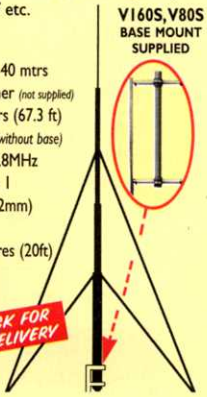
V160S, V80S BASE MOUNT SUPPLIED

V80S

BANDS....160, 80, 40 mtrs with tuner *(not supplied)*
HEIGHT...20.5 mtrs (67.3 ft)
WEIGHT..10.5kg *(without base)*
VSWR...3.5 to 3.8MHz < 1.8 to 1
GUYING..Kevlar (2mm)
POWER....5kW
SHIPPING..6.1 metres (20ft)

£399.00 + delivery

BOTH IN STOCK FOR IMMEDIATE DELIVERY



V160S

BANDS.....160, 80, 40 mtrs with tuner *(not supplied)*
HEIGHT.....26.7 mtrs (87.6 ft)
WEIGHT.....13kg *(without base)*
VSWR.....1.815 to 1.9MHz < 2 to 1
GUYING.....Kevlar (2mm)
POWER.....5kW
SHIPPING.....6.1 metres (20ft) LENGTH

£575.00 + delivery

HEIL Pro set

THE DX'ERS CHOICE FOR OUTSTANDING AUDIO

PRO SET 4
For contesters & DX'ers who want to cut through the pile ups. Using hc4 insert.
£119.95 £5 P&P

PRO SET 5
A fuller range insert for rag chewers who want quality with clarity. Hc5 insert.
£119.95 £5 P&P

AD-K	Kenwood Adaptor Cable	£14.95
AD-I	Icom Adaptor Cable	£14.95
AD-Y	Yaesu Adaptor Cable	£14.95

Palstar Tuners

AT300LCN *180W Tuner* — £139.95 £8 P&P
1.8 - 30MHz X needle mtr w/balun

AT300 *150W Tuner* — £99.95 £8 P&P
1.8 - 30MHz W/Balun

Palstar Power Supplies

PS50 *50A 13.8V Supply* — £169.95 £8 P&P
13.8V DC 40-50 Amp w/meters

PS30M *30A Variable Voltage* — £99.00 £8 P&P
13.8V Variable with meters

PS15 *15A 13.8V Supply* — £59.95 £8 P&P
13.8V Bench Supply

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SIVA R-H100 — Semi airspaced double screened low loss 50 Ω cable

LOSS PER 10 MTRS FREQ	LOSS
28MHz	0.20dB
50MHz	0.25dB
100MHz	0.35dB
400MHz	0.82dB

100 METRE DRUM QUANTITY PRICE ~~£85~~ **£59** £10 p&p

SIVA RG-213U — Popular low loss 50 Ω cable

LOSS PER 10 MTRS FREQ	LOSS
28MHz	0.36dB
50MHz	0.45dB
100MHz	0.67dB
400MHz	1.47dB

100 METRE DRUM QUANTITY PRICE ~~£73~~ **£45** £10 p&p

SIVA RG-58CU — Popular lightweight coax cable

LOSS PER 10 MTRS FREQ	LOSS
28MHz	0.78dB
50MHz	0.97dB
100MHz	1.4dB
400MHz	3.0dB

100 METRE DRUM QUANTITY PRICE ~~£36~~ **£18** £10 p&p

SIVA MINI RG-8 — Low loss small diameter cable

LOSS PER 10 MTRS FREQ	LOSS
28MHz	0.69dB
50MHz	0.86dB
100MHz	1.28dB
400MHz	2.82dB

100 METRE DRUM QUANTITY PRICE ~~£45~~ **£29** £10 p&p

SPECIAL PROMOTION

OUTBACKER Antennas

OUTBACKER - rugged commercial grade mobile antennas from Australia. Now on **SPECIALPROMOTION** for the ***summer mobile season!***

	was	now
OUTBACKER OB8 6ft long 80 - 10 mtrs 100W	~~£169~~	£159
OUTBACKER OB8S 6ft long (split in 2) 80 - 10 mtrs	~~£199.50~~	£169
OUTBACKER Perth Plus 6ft long 80 - 10 mtrs + 6mtrs/2mtrs	~~£249~~	£179
OUTBACKER Outrunner 9ft long 160 - 10 mtrs 150W	~~£199.95~~	£169
HEAVY DUTY SPRING BASE		£59.95

Post & packing for the UK is £8 per antenna - *other countries please ask.*

SPECIAL OFFER

The ORIGINAL SG-230 HF SmartTuner ~~£329~~ **£279** £8 p&p
- 1.6 - 30MHz
- Tunes antennas from 8ft to 300ft
- Fully weatherproof

YAESU Rotators

G1000C HEAVY DUTY C/W Control Box & 25 Cable ..£559*

G650C MEDIUM DUTY C/W Control Box & 25 Cable...£499*

G450C LIGHT DUTY C/W Control Box & 25 Cable ..£379*

*£10 p&p on all Yaesu rotators

YAESU FT-1000MP

LATEST STOCK

AC VERSION THE DX'ERS CHOICE

~~£2199~~ **£1999** £8 p&p

ICOM IC-756 PRO

NEW! ICOM'S LATEST SUPER RIG

~~£2459~~ **£2099** £8 p&p

YAESU FT-847

70cm - Top Band All Mode

~~£1599~~ **£1349** £8 p&p

KENWOOD TS-570 DGE

BRILLIANT 100W HF

~~£849~~ **£799** £8 p&p

ICOM IC-746

100W 160M - 2M

~~£1495~~ **£1395** £8 p&p

YAESU FT-90

NEW! Micro-sized Twinbander Wide RX inc AM Airband

~~£399~~ **£369** £8 p&p

KENWOOD TM-D700E

NEW! Dual Band DATA Mobile Radio

ITS GOT THE LOT!

~~£499~~ **£469** £8 p&p

YAESU FT-2600M

NEW! Heavy duty 2 metre mobile - 60W output!

~~£269~~ **£249** £8 p&p

ICOM IC-718

NEW! HF Radio

- 100W
- Built-in keyer
- VOX • IF Shift

£CALL £8 p&p

KENWOOD THD7E

LATEST MARK II VERSION!

Dual Band Handie Up to 6W Output

- Upgraded software • KISS mode
- Built-in 1200/9K6 packet TNC
- 200 memories
- CTCSS encode/decode
- Computer & GPS port

~~£310.95~~ **£249** £8 p&p

YAESU VX-5R

50-144-430MHz Wide Band Receiver Ultra Rugged Construction

~~£359~~ **£299** £8 p&p

ICOM T81E

6M - 23cm HANDIE
- Ultra Wide RX
- Alphanumeric Display

~~£419~~ **£369** £8 p&p

AKD HF3 S

SHORTWAVE RECEIVER

30kHz-30MHz

£159.95 £8 p&p

YAESU FRG-100

Covers 50kHz - 30MHz FM Option + LOTS MORE!

~~£429~~ **£399** £8 p&p

Yaesu Quadra VL1000

THE VERY BEST 1.2KW HF AMPLIFIER

~~£4,590~~ **£3,599** £8 p&p

FAIRHAVEN RD500 VX

NEW! LATEST SUPER RECEIVER COVERING 20kHz-30MHz

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ICOM IC R8500

Covers 100kHz - 2GHz and LOTS OF FEATURES INCLUDING COMPUTER CONTROL

~~£1,599~~ **CALL** £8 p&p

MAYCOM AR108

DEDICATED AIRBAND SCANNER
- 108kHz - 180MHz
- 99 memories

OPTIONAL CHARGER £8.95

£69.95 £8 p&p

AOR AR5000

10kH - 2.6GHz All mode top class receiver & scanner

~~£1445~~ **£1395** £8 p&p

AOR AR3000A

100kH - 2036MHz - Classic receiver as used by Government, Military etc

~~£799~~ **£749** £8 p&p

ALINCO DJ-X10

MULTI MODE WIDEBAND SCANNER
- 100kHz - 200MHz
- 1200 memories

£295 £8 p&p

ICOM IC-R2

- 500kHz -1310MHz
- AM/FM/WFM
- 400 memories • 10dB Attenuation
- Auto Squelch
- Tone Squelch

~~£149.99~~ **£139.90** £6 p&p

YAESU VR500

MULTI MODE WIDEBAND SCANNER
- 100kHz - 1300MHz
- All Modes
- Packed with features!

£299 £8 p&p

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YAESU
Choice of the World's top DX'ers

With a Price Right for You

FT-840 HF Simplicity with Performance

1.8 - 30MHz, SSB/CW/AM 100 Watts. An HF base station at an amazingly low price. All the essential features to give you world-wide contacts with ease. The choice of many DX operators as a back-up rig; for others as their only rig.

FT-100 HF Mobility and Portability

1.8 - 440MHz, SSB/CW/FM/AM Offering 100 Watts from 1.8 - 54MHz, 50W on 2m and 20W on 70cms, and easily installed in a car or camper van. And if space is a problem at home, it is more than capable of becoming a base station.

FT-920 HF DX Operation at its Best

1.8 - 54MHz, SSB/CW/AM 100 Watts. Dual tuneable VFOs gives you easy DX split working and the voice recorder saves your vocal chords. The built-in ATU means full output power right up to band edges. DX operation at its best.

FT-1000MP The HF Contester's Machine

1.8 - 30MHz, SSB/CW/FM/AM 100 Watts. Contest operators and DXpeditions regard this as the "industry standard." Two independent receiver sections give the ultimate flexibility whilst menu options allow you to tailor it just the way you want.

FT-847 The Complete HF - UHF Station

1.8 - 440MHz, SSB/CW/FM AM The only base station of its kind, it offers "all-band" and "all-mode" operation (even 4m!) from one very compact package. Praised by HF and VHF enthusiasts alike, it offers the most versatile package ever produced. HF operators will applaud the inclusion of DSP filtering whilst VHF/UHF users will love the ultra sensitive front end and dedicated satellite features that permit unprecedented ease of operation and tracking.

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The Best Gear Ever!

IN DECEMBER 1999 we invited *RadCom* readers to tell us what they thought about all the commercial items of amateur radio equipment they had ever owned. All the Equipment Surveys have now been analysed, the survey producing some interesting results with vintage equipment sometimes scoring higher marks than modern items.

Thanks to everyone who took part.

1 Kenwood-Trio TS-850S

Pos	Manufacturer	Model	Description
1	Kenwood-Trio	TS-850S	HF base station
2	Standard	C510E	Dual-band FM handie
3	Standard	CPB510	Dual-band power amp
4	Drake	R-4C	HF receiver
5	Yaesu	FT-1000D	HF base station
6	Yaesu	FT-847	HF-70cm midi
7	Yaesu	FT-736R	VHF/UHF base station
8	Yaesu	FT-920	HF-6m base station
9	Drake	T-4XB	HF transmitter
10	Kenwood-Trio	TS-950SDX	HF base station

2 Standard C510E

4 Drake R-4C

3 Standard CPB510

5 Yaesu FT-1000D

6 Yaesu FT-847

7 Yaesu FT-736R

8 Yaesu FT-920

9 Drake T-4XB

10 Kenwood-Trio TS-950SDX

Continued...

Pos	Manufacturer	Model	Description
11	Kenwood-Trio	TS-870	HF base station
12	Yaesu	FT-102	HF base station
13	National	HRO	Receiver
14	Yaesu	FT-1000MP	HF base station
15	Kenwood-Trio	TS-930S	HF base station
16	Icom	IC-706 Mk2G	HF-70cm mobile
17	Codar	AT-5	160/80m transmitter
18	Paccomm	Tiny-2	TNC
19	Icom	IC-737A	HF midi
20	Hora	C-408	70cm handie
21	Yaesu	FT-208R	2m FM handie
22	Kenwood-Trio	TS-140S	HF midi
23	Kenwood-Trio	TS-430S	HF midi
24	Alinco	DX-70TH	HF-6m mobile
25	Kenwood-Trio	TS-940S	HF base station
26	Yaesu	FT-901	HF base station
27	Icom	IC-706 Mk2	HF-2m mobile
28	Yaesu	FT-290R Mk1	2m multimode
29	Yaesu	FT-757GX2	HF midi
30	Kenwood-Trio	TS-830S	HF base station
31	Yaesu	FT-840	HF midi
32	Kenwood-Trio	TS-570D	HF midi
33	Icom	IC-746	HF-2m base station
34	Icom	IC-735	HF midi
35	Yaesu	FT-726R	VHF/UHF base station
36	Yaesu	VX-1R	Dual-band FM handie
37	Tonna	2m 16-ele	Long Yagi antenna
38	Yaesu	FT-8100R	Dual-band FM mobile
39	Yaesu	FT-101 series	HF base station
40	Yaesu	FT-8000R	Dual-band FM mobile

11 Kenwood-Trio TS-870

12 Yaesu FT-102

13 National HRO

14 Yaesu FT-1000MP

15 Kenwood-Trio TS-930S

31 Yaesu FT-840

32 Kenwood-Trio TS-570D

33 Icom IC-746

34 Icom IC-735

35 Yaesu FT-726R

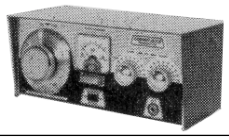
16 Icom IC-706 Mk2G

21 Yaesu FT-208R

26 Yaesu FT-901

36 Yaesu VX-1R

17 Codar AT-5



22 Kenwood-Trio TS-140S

27 Icom IC-706 Mk2

37 Tonna 2m 16-ele

18 Paccomm Tiny-2

23 Kenwood-Trio TS-430S

28 Yaesu FT-290R Mk1

38 Yaesu FT-8100R

19 Icom IC-737A

24 Alinco DX-70TH

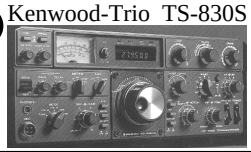
29 Yaesu FT-757GX2

39 Yaesu FT-101 series

20 Hora C-408

25 Kenwood-Trio TS-940S

30 Kenwood-Trio TS-830S



40 Yaesu FT-8000R

There were a large number of items of equipment for which only one response was received. Whilst every response was included in the initial calculations, it became clear that the results would have been devalued if items of equipment that only elicited one response were included in the final table. Consequently, the decision was taken to exclude such items and limit the results listings to the Top 40.

The Best Way to Buy!

IN THE December 1999 edition of *RadCom* we invited readers to provide us with a 'snapshot' of their purchasing habits, by telling us how they obtained their most recent item of amateur radio equipment. All the survey forms have been processed, and now we are pleased to bring you the results.

The pattern of responses meant that it became logical to produce the results in the form of the following approval rating 'league tables'.

Rally Buyers' Top 5

Posn.	Company
1	Rigs of Distinction
2	Martin Lynch & Sons
3	Waters & Stanton PLC
4	Radio World (West Midlands)
=5	Jaycee
=5	Barenco

Shop Buyers' Top 10

Posn.	Company
1	Unicom
2	Jaycee
=3	Waters & Stanton PLC
=3	Martin Lynch & Sons
5	Nevada
6	Lowe Electronics
7	Reg Ward
8	Haydon Communications
9	Radio World (West Midlands)
10	Multicomm 2000

Miscellaneous Top 5

Posn.	Method
1	Entel (mail order only service)
=2	Other (various) mail order
=2	Friend/acquaintance
4	Private/small ads
5	Rally Bring & Buy

Associated with the survey was a free prize draw for a Cushcraft MA5B HF beam antenna. The prize draw took place on 7 February, the winner (as reported in the March edition of *RadCom*) being Ken Greenough, G0WBM, from Derbyshire. Ken had the following words to say:

> *"I write to thank the RSGB and the sponsors, Waters and Stanton PLC, for the Cushcraft MA5B HF beam which I was delighted to win in the recent purchasing survey draw. I was surprised (and pleased, of course) to receive the phone call from RSGB HQ, telling me I was the winner. I now look forward to the spring weather, to enable me to erect the beam, and I am eagerly awaiting the hoped-for improvement against my present vertical."*
>
> ***Ken Greenough, G0WBM***

Propagation Prediction Software

*By Gwyn Williams, G4FKH, Vice President; RSGB PSC **

TO UNDERSTAND the workings of propagation prediction programs better, it is necessary to appreciate a little of what makes the ionosphere work. This review will not discuss every aspect of propagation, rather only those phenomena necessary to understand the programs.

The ionosphere is the area above our heads that reflects the radio signals sent up to it. Overall, the efficiency of this reflector varies in a cycle lasting approximately 11 years (the sunspot cycle). There are several phenomena upon the sun which vary in cycles, but for our purposes we will only consider a few of these; sunspots, flares and coronal holes. Sunspots have been studied for quite some time, but it is flares that produce the plasma (ionized gases) that build up the ionosphere. The exact interaction between flares and sunspots is a matter for ongoing studies. Let it be sufficient to say that, generally, when you have a lot of one, you will have a roughly correlated number of the other.

As sunspot cycles build, the ionisation of the ionosphere correspondingly builds and is able to reflect increasingly higher frequencies. A limit is only reached when the frequencies exceed the point at which the ionosphere can support reflection, called the maximum usable frequency (MUF). One method used to measure the amount of ionization that the sun produces is the taking of daily Solar Flux (SF) readings. Of course, the build-up in cycles also produces negative effects. Flaring and coronal holes both produce mass ejections which in-turn ionize our ionosphere, increasing the ability of the D layer to absorb radio signals. A method used to measure the amount of ionospheric disturbance is the measurement of planetary A and K indices (Ap and Kp). High Ap levels depress MUFs, a factor which should always be considered. Many other effects are observed when Ap/Kp indices are elevated, such as aurorae.

Generally speaking, these programs can be of great use to those of us who are not wholly conversant with the general behaviour of a particular path in which we have an interest. Because computer propagation prediction is not an exact science, personal knowledge nearly always proves more beneficial in individual circuit analysis. However, newcomers or less experienced HF enthusiasts should be able to make good use of these programs and thereby increase their enjoyment from using this part of the frequency spectrum.

**21 Borda Close, Chelmsford, CM1 4JY.*

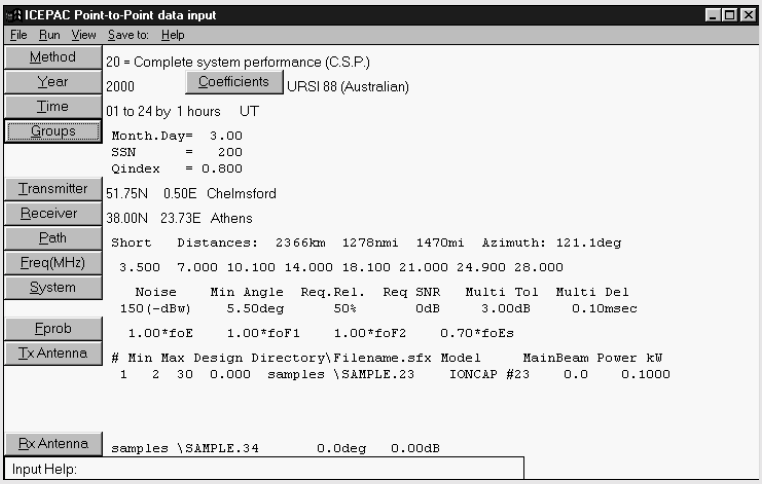
WHAT THE PROGRAMS DO

WITH PROPAGATION programs it is possible to predict the best time(s) to be on the air for your favourite destination(s). It is the way in which this is done and the parameters used in doing it that determines the effectiveness of the output. These programs carry a caveat which states that 50% of the time they will produce higher frequencies than actual and 50% of the time lower. Looking at this cynically, that leaves 0% of the time when they will be accurate. We will attempt to improve upon 0%. The main feature that these programs calculate is the MUF, with some of them producing estimates for signal-to-noise ratio, percentage probability, etc. We will concentrate upon the MUF, because if this is vastly inaccurate the program either vastly overestimates or underestimates the predictions. Programs of this type use a point-to-point analysis method.

ICEPAC

THIS IS PART of a freeware package obtainable from http://elbert.its.bldrdoc.gov/hf.htm All the required parameters are entered via the input screen (shown below). This program and input screen have been described to me as difficult to use, but it can be made to work. To get this program working I would suggest that the inputs which are not readily known be copied from what is shown here. Clicking the mouse on 'Method' shows a whole range of available outputs, for general use '-20' is fine. There are only two 'Coefficients', URSI or CCIR; and either should be fine. The year, time, groups, transmitter and receiver should all be self-explanatory and manipulated to suit. The program works-out path information, frequencies are changed to suit, however care should be taken with the 'System' parameters; if in doubt, copy the ones used here. Leaving 'Fprop' alone, choose the Tx and Rx antennas from the list provided when the appropriate button is pressed. Clicking the 'Run' drop down menu enables the various internal procedures to be run. To view these internal procedure outputs, click 'View' and choose the appropriate category.

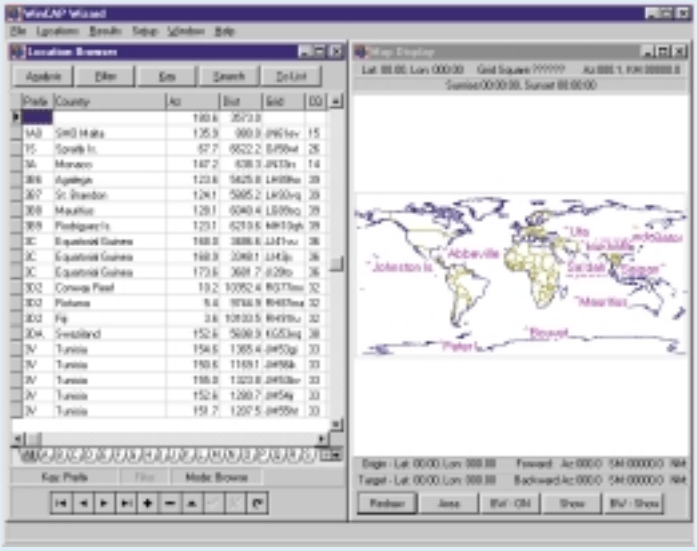
This package includes a full user's manual and a technical manual (disk copies), but sometimes they were confusing. With time and patience, the various bits of this software can be pieced together and sense made of the outputs. This product has an extremely comprehensive array of output data and some quite spectacular graphs. This program is built around the 'ITU Recommendation 533' program, which was designed to give median results, but more about what this means later.



***Icepac* does not have a 'K' index input; it produces median results that only work for quiet days (magnetically). The input screen is shown here. The results are an averaged output when the 'A' and 'K' indexes are at very low levels, therefore the 'K' index requirement is considered superfluous. Not really the tool that will give amateurs reliable short-term predictions, or when the geomagnetic field is known to be unstable.**

WINCAP WIZARD 2

THIS IS available from http://www.wtrt.net/~ku5s, for a price of US $57.00. The start-up screen shown here is split into two separate parts. Destinations can either be chosen from a location list or from the map display. The basic prediction engine for this model is the same as for *Icepac*, the main difference being that the producers have included an input for 'K' indexes. Because of this the producers of this software have needed to make some changes to the internal equations/algorithms which necessarily result in the output of this model being different from the previous.



***WinCAP Wizard-2* has the same basic prediction engine as *Icepac*, however the input screen (shown here) is superior and 'K' index input has been added. Generally the difference between these two programs is that *WW-2* has a better windows interface and easier to understand outputs. However, these points do not substantially add to the accuracy of the model.**

Along the top of the initial screen can be seen six pull-down menu selections. The 'Setup' selection is where all the local information is input, ie home call, lat./long, etc. This menu selection is also where SSN, date and 'K' index information is input. When the input data has been satisfactorily input, it is only necessary to select the destination to predict for. Following this it is only necessary to click 'Analysis', which tells the software to perform all the necessary calculations.

Depending upon which of the reports has been selected; it is then displayed on the screen. I have the graphs of MUF/SNR and Dynamic Band Graph's displayed first, which gives an immediate indication of conditions. Other output includes the reports of: best band summary, all band summary, band summary plus and dynamic band summary. The types of default reports and/or graphs are selected from the 'Setup' pull-down option. However they are all available by selecting the 'Results' pull-down menu selection.

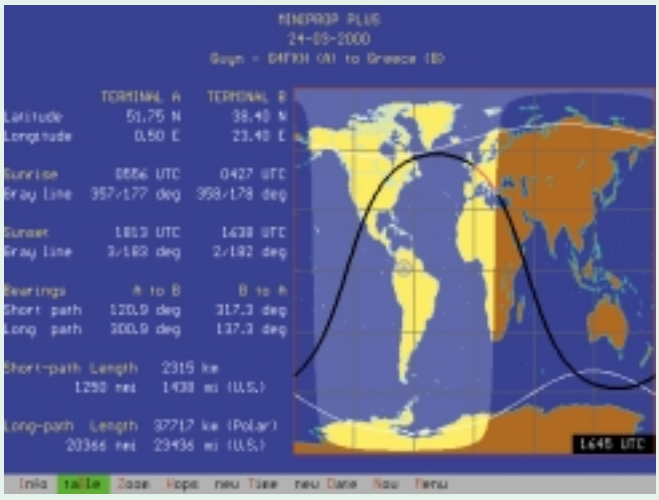
The package is accompanied with a comprehensive help system available from the initial screen; however, no written manual was provided or available on disk. As I much prefer to read about the various features, I merely printed out all the individual sections of the help feature and thereby compiled my own manual. Personally, I prefer *Wincap Wizard 2* to *Icepac*, which is essentially the same software. However, should automation be an overriding factor, *Icepac* is better.

MINIPROP PLUS

Miniprop Plus is available from the author, Sheldon C Shallon. Sheldon's e-mail address is: w6el@arrl.net

This product is quite different from the others, in as much as it has a DOS instead of a Windows® interface. Readers will no doubt be aware that obtaining copies of DOS screen dumps is not as easy as with Windows-based programs, which is why I was unable to produce an initial input screen. Nevertheless, I have heard some glowing remarks about this package. As with all DOS-based programs, it can be started from a shortcut or via Windows Explorer. The initial screen is a 'Master Menu', from which all the basic inputs are performed. The screen capture shown here is a copy of an output screen that contains self-explanatory information. The map in particular has an abundance of information. I found the grey-line and auroral information particularly useful. The red part of the great circle path is the circuit that has been used for the predictions. All other output options and an opportunity to access the main menu are displayed along the bottom of this display.

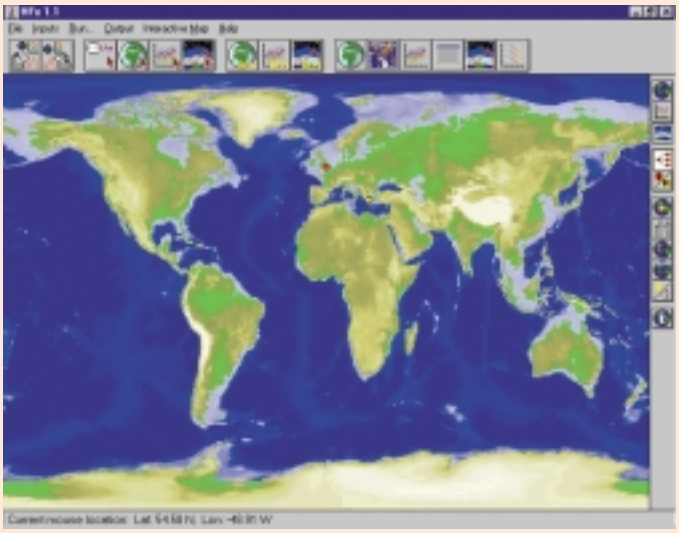
A disk manual is supplied with this package. Written with a basic text editor, no illustrations are provided, but I was able to utilize the manual to assimilate all the information required in order to manipulate it successfully. I found that this software prediction model had a tendency to overestimate low frequency predictions.



***MiniProp* is an older program, based on DOS. This captured output screen contains self-explanatory information. This product has given an excellent account of itself. It is quite intuitive to use and gives some nice graphical outputs. There is very little that would not recommend this program from studying the comparison graphs. The only serious shortcomings are the lack of textual output data and its tendency to overestimate low frequency openings.**

HFx

THIS PACKAGE CARRIES a price tag of US $129.00 and is available from www@psrv.com/hfx Much more expensive than the rest, you do get more for your money. For a full review of this package, see [1]. All the various inputs and outputs can be controlled from here. As with all such packages, the first information to enter should be the local information (as with *WinCAP Wizard 2*). There is then a choice of the way in which destinations are registered. For frequently-used destinations a file with all the relevant information can be built up. Each time a parameter needs to be changed, this is registered by selecting the icon showing a month, ie the third one from the top left. The icons down the side can be used to input the various destination information or to display such features as the current location of the Sun, the great circle path, the day-night terminator line and the approximate placement of the auroral ovals. All in all, quite a sophisticated set of displays. Once the circuit parameters are entered, one or all of the 'Run' icons are selected. The program then displays the results of the particular analysis selected. If they are selected in turn, the results are displayed by selecting the icons to their right. The output displays are extensive, allowing complete circuit analysis, right down to displaying the hop mode geometry. A table giving details of, SNR, Mode MUF, take-off angle, expected RF field (dB) and availability is also accessible. Another useful graph is the Temporal MUF graph, which depicts the MUF, FOT (Frequency of Optimum Transmission) and HPF (Highest Possible Frequency).



HFx **initial screen. The package closely follows the 'RAL' measured data on the comparison graphs. It has an excellent Windows front-end, which makes the input of data intuitive. There is also a comprehensive set of output data that incorporates all the ITU recommendations providing reliable statistics. The output data can be used to provide an extrapolation of S-Meter readings.**

This package comes with a comprehensive, colour-illustrated manual. The sections of the manual cover not only computer requirements, but also a section on the interface, a basic tutorial, a comprehensive section covering Ionospheric Propagation, and a glossary of technical terms.

ANALYSIS

DETAILED HERE is a new concept in scientifically evaluating the worth (or otherwise) of propagation programs such as those described. I have read recently in the amateur press some remarks which lead me to conclude that these programs are not well understood, neither the input requirements nor the output data. It is not an easy task to amass or understand this information, nor is it impossible. For example, the use of a 3-element beam (instead of an antenna type used by the majority, a dipole) can add perhaps three or four S-points to a received signal. If such an antenna is used at both ends of a circuit, the total increase can be as much as six to eight S-points. This is one of the reasons why some amateurs analyzing some paths do not agree with the predictions from these programs. In other words, there's a lot of work required to gain a basic understanding, plus a willingness to perform a thorough investigation! I have also heard about Ionosondes and Ionograms. In fact the analysis method described utilizes the information, freely available on the WWW, which emanates from Ionosondes.

Basically there are two types of ionosonde in common use (although there are other types); Vertical and Oblique. They are commonly called 'sounders'. The vertical sounder sends radio frequency energy that is steadily varied in frequency vertically into the ionosphere. A receiver is sited quite close by. An oblique sounder sends radio frequency energy varied in the same way at oblique angles into the ionosphere. In this case a receiver is sited some distance away, typically 3,000km. The information obtained from these sounders includes **foF2** – the critical frequency of the ionosphere's F2 layer, and **h'F2** – minimum vertical height of the same F2 layer (to name but two of the obtainable parameters).

In recent years the ITU has assembled a number of these oblique-sounding stations around Europe and the old USSR. The Rutherford Appleton Laboratory (RAL) participated in the project, titled COST 251. As part of their participation, RAL receives all the output data and uses it to construct a contoured map of the area, **Fig 1**. Two varieties are available, depicting the foF2 or MUF(3000) F2(MHz) (the maximum usable frequency at 3000km). It is the latter that is used in this exercise. The contours represent MUFs. The maps have latitude and longitude at the side and bottom respectively, so it is easy to mark the location of stations. In this way I used two destinations to build up my analysis table; Ufa (just East of Moscow) and Athens. Both are approximately 3000km from my QTH. I chose thirty separate date/time combinations and downloaded the appropriate maps (URL: www.rcru.rl.ac.uk/iono/maps.htm). After marking the lat/long, the mid-point is found and the MUF at this point is noted. It is the MUF at the mid-point of these single hop circuits, ie the point-to-point MUF. In this way an actual measured database of MUFs

	Icepac	Wincap Wizard 2	Miniprop Plus	HFx
Specifications				
Price	Freeware	US $57	US $65	US $129
Availability	★★★★★	★★★★★	★☆☆☆☆	★★★★★
Minimum PC	Pentium	Pentium	486	386 >
Disk space reqd.	20MB+	4MB	450KB	6MB
Operating system	Windows	Windows	DOS	Windows
Features				
A/K index	×	✓	✓	✓
SF or SSN	×	✓	✓	✓
CCIR or URSI	✓	×	×	×
Antenna choice	✓	✓	×	✓
Prior understanding of inputs reqd.	★★★★★	★★☆☆☆	★★☆☆☆	★★☆☆☆
Map facilities	☆☆☆☆☆	★★☆☆☆	★★★★☆	★★★★★
Graphics	★★★★☆	★★★☆☆	★★☆☆☆	★★★★★
Textual output	★★★★☆	★★★★☆	★★★☆☆	★★★★★
Circuit storage	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★★★☆
Short Path	✓	✓	✓	✓
Long Path	✓	✓	✓	✓
Printing	★★★★★	★☆☆☆☆	★★☆☆☆	★☆☆☆☆
Accuracy	★☆☆☆☆	★★☆☆☆	★★★★☆	★★★★★
Ease of use	★☆☆☆☆	★★★☆☆	★★★☆☆	★★★★★
Understandable output	★☆☆☆☆	★★★☆☆	★★★☆☆	★★★★☆
Flexibility	★★★☆☆	★★☆☆☆	★☆☆☆☆	★★★★★

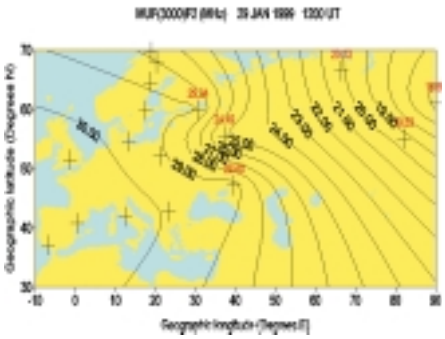


Fig 1: Contoured map, constructed from measurements collated by the Rutherford Appleton Laboratory.

for these circuits can be assembled. There is no argument with these data, because they are measured and not subject to the relative ambiguity as happens with individual measurements. Once the RAL standard data has been compiled, it is a case of running each of the programs in turn for each of the destinations, utilizing the appropriate figures. I have a database of all ionospheric parameters and for this exercise, used the 90-day average solar flux, and the actual day's 'K' index.

Coincidentally, the graphs shown in **Fig 2** start around solar minimum and end fairly recently. The first twenty data points are at times when the 'K' indices varied considerably, explaining the marked inaccuracies at these times. It seems that no program outshines the others at such periods, but a couple of the programs produced quite reasonable results.

CONCLUSIONS & SUGGESTIONS

GENERALLY THESE programs give a good indication of what is likely to happen. However, the wise man would be sceptical during times of magnetic storming. The prediction programs that are available to me include more than these four, but I find they all have roughly the same input requirements. Before setting out to do predictions you will need several data. These include: 90-day average SF (for longer-term predictions) or the last 7 days averaged SF (for short-term predictions), the current or yesterdays Ap/Kp, and latitude/longitude for both ends of the path. For some programs the types of antenna in use and, of course, the date/time of the required predictions. Most programs will give a graph of the MUF for the whole day. Be wary of low frequency path openings during local daylight, as these are vastly over-rated by some programs.

Used with care these programs, especially *HFx* and *MiniProp*, are able to supply meaningful information, including an illustration of when the various areas of interest are most likely to be contactable.

REFERENCE

[1] 'HFx Propagation Prediction Software', *RadCom*, October 1999. ♦

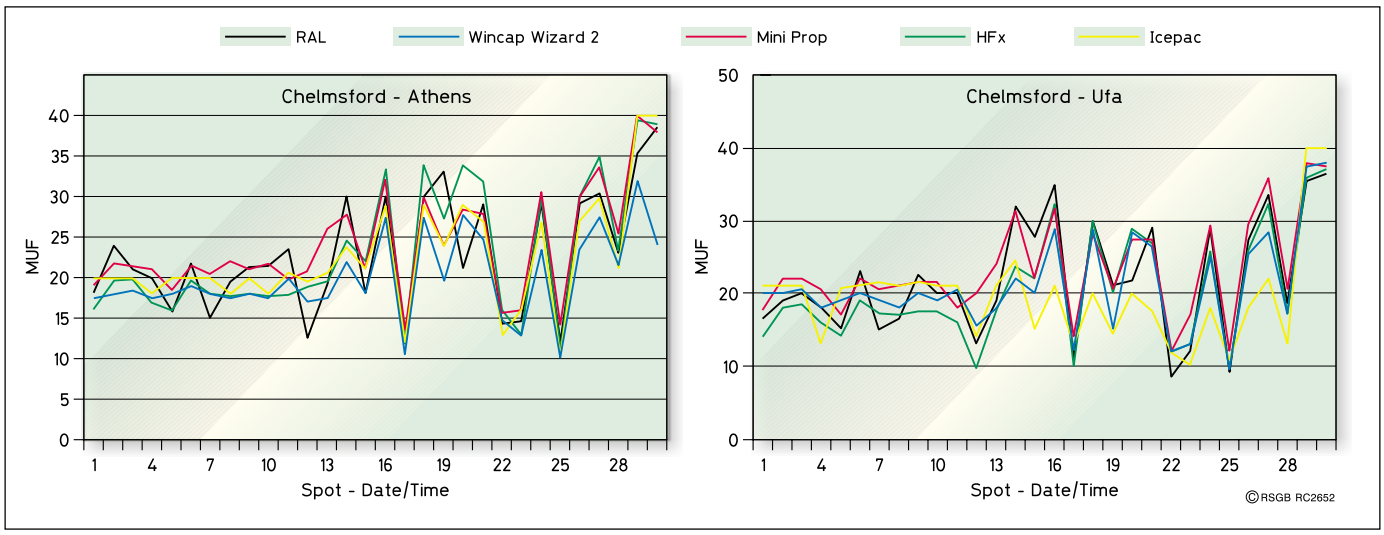


Fig 2: How the various packages predicted propagation would be, compared to the measurements published by RAL.

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High-Performance 23cm Transverter

*Reviewed by Simon Lewis, GM4PLM**

THE 23CM BAND is an excellent band for newcomers to microwaves to cut their teeth on. Far enough away from the VHF/UHF spectrum, it requires the use of full-blown microwave technologies, but is still low enough in frequency to allow a little leniency for construction tolerances. All-in-all it is a perfect frequency for newcomers quickly to become familiar with microwave techniques.

A few years ago microwave frequencies were strictly the domain of the technically equipped and knowledgeable amateur, but with the introduction of modern microwave technology, equipment has now become compact, easy to construct and requires little in the way of exotic test equipment to align. The 23cm band also offers an excellent area to introduce newcomers to the wonders of microwave propagation and so the transverter described here makes an excellent choice for a newcomer to microwaving.

This transverter design is a flexible and easily built unit, suitable for newcomers, but it is also a high performance one and suitable for more established microwavers involved in both terrestrial and EME modes.

Charlie Suckling, G3WDG [1], the well-known UK microwave designer designed all the modules described here. Charlie's philosophy is that his equipment should be easy to build and align, reproducible and give excellent performance. I have to say, having built many of his designs over the years, that he lives by his word. I have *never* built a WDG design that didn't work first time and to the specified performance! Kits for all modules are also available, making the design an even better introduction to newcomers, as the modules are all well-documented and reproducible. Charlie has spent a lot of time testing this design (as with all his releases) to make sure it will work perfectly the first time, so long as you can follow a few basic instructions and handle a soldering iron competently. All the modules are available as complete units from the RSGB's Microwave Components Service, but more about the kits and ordering arrangements later.

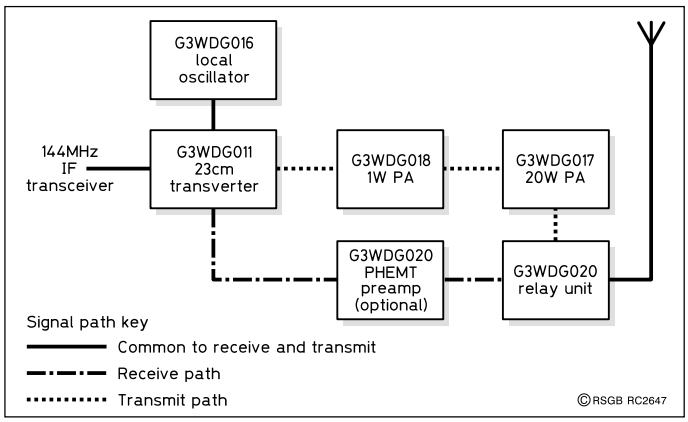


Fig 1: Block diagram of the complete transverter.

TRANSVERTER SYSTEM

IF THE TRANSVERTER system is built as described here, the end result will be a complete 144MHz - 1296MHz high performance system with excellent receive characteristics and a transmitter output of around 20 watts. This would make an excellent system for newcomers or established amateurs alike. It is powered from 12 volts, so would also make a great portable rig with a useful output power. The receiver performance is so good that a preamp is not really required for general terrestrial use. An optional preamp is described, and this, combined with a larger transmit amplifier, would make the transverter EME capable.

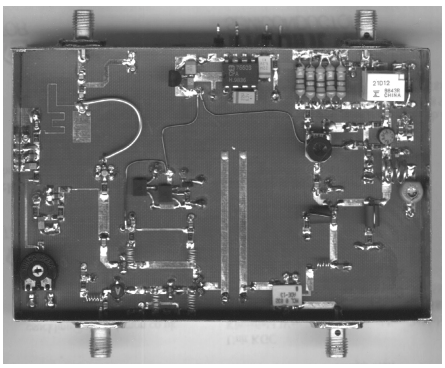
The transverter is modular in construction, each capable of being built and tested individually. It can be of great benefit to a newcomer, who may have not constructed any microwave equipment before, to build parts of the transverter and prove them before final assembly. Each of these modules, with the exception of the amplifier, are built in small tin-plate boxes. This is typical microwave construction, giving complete screening and mechanical stability to the PTFE PCB material used at these frequencies. Power is supplied via feed-through capacitors and RF connections made using specialised connectors suitable for microwave use. This type of construction is quick and easy, and a little effort taken to ensure your construction conforms to this means a much better chance of success with the final product. These techniques are tried, tested and in regular use on the microwave bands today. **Fig 1** shows a block diagram of the complete transverter.

TRANSVERTER MODULE

THE G3WDG011 is a single-board low power transverter, with an on-board transceiver interface. As shown in **Fig 2**, it uses single mixers for both transmit and receive, with PIN diodes to route the signals to and from the mixer between receive and transmit. An attenuator is included on the board, which can handle up to 3W from the 144MHz transceiver. An FT-290R is therefore highly suitable for this task. The mixer is a surface mount high-performance double balanced mixer. The recommended local oscillator is the G3WDG016 Surface Mount LO. The mixer needs about 10-20mW of drive for best receive operation. A coupled line filter printed on the board provides image rejection and, as supplied, the filter is tuned to 1296MHz. A cutting point for operation in the satellite band is shown.

The receive preamp uses a HEMT in the first stage, feeding a MODAMP to provide a total of about 30dB gain. The HEMT circuit is based on DJ9BV's design, which has perhaps the best performance of any 1.3GHz preamp design around, and is very stable. No sign of any instability has been seen in the prototypes, even with the lid off the box!

The unit contains all DC and RF switching and will interface to a Yaesu FT-290R or Icom IC-202 directly. The 144MHz input/output port of the mixer is switched using a PIN diode to either a BFR91 tuned IF preamp (a standard G3WDG design), or a transmit attenuator. A small potentiometer on the main board adjusts the output level from the attenuator, to set the correct output level from the transceiver. The RF input port is switched between the output of the IF preamp (on receive) and the attenuator (on transmit) using a small relay. The use of a relay here prevents the generation of spurii at nine times the 144MHz IF, which is a problem if PIN diodes are used.



Transmit/receive switching is accomplished using two P-channel MOSFETs to supply the PIN diode RF switches and the various active devices. On transmit the RF preamp stages are disabled, to prevent the possibility of RF feedback causing oscillations around the PA/RF changeover relay loop. The transverter has been tested with a

* *181 Kent Drive, Helensburgh, G84 9RX*

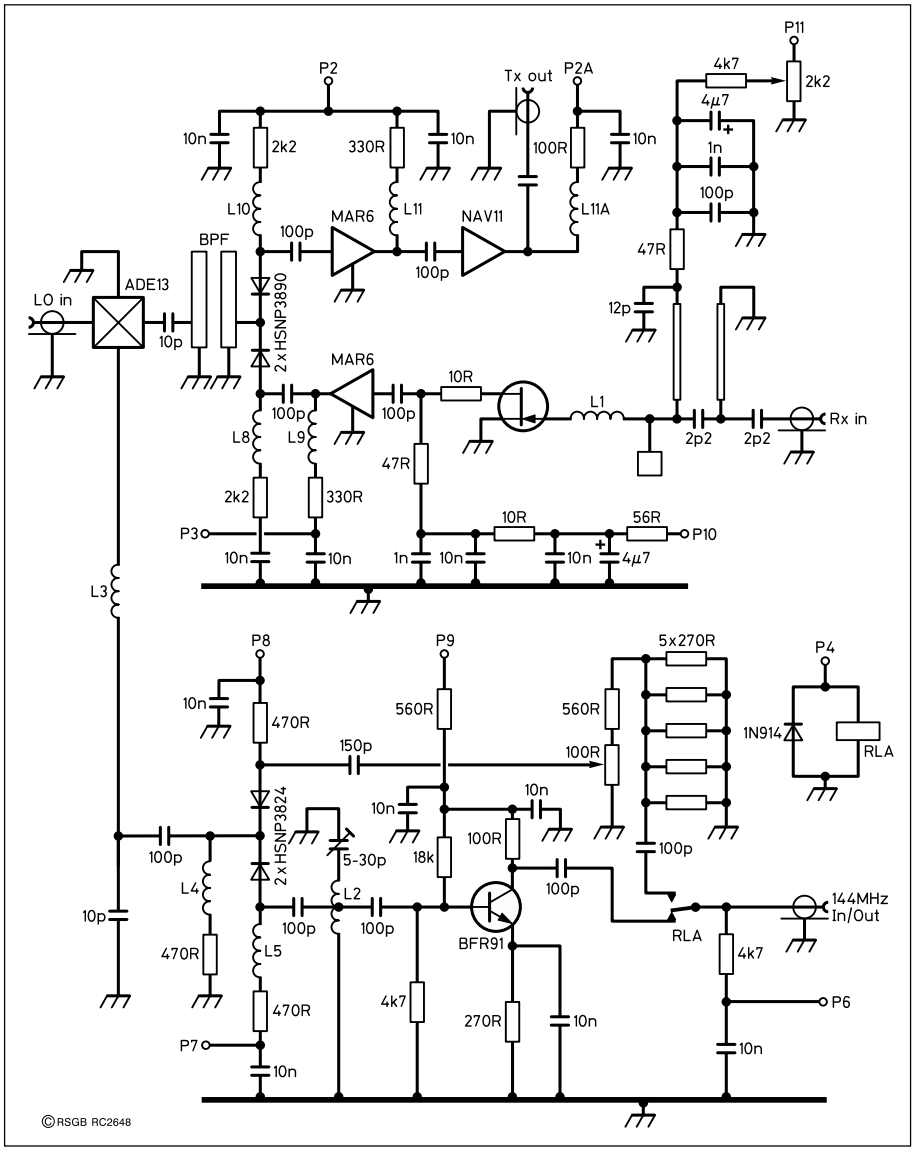


Fig 2: Circuit of the 1.3GHz RF section.

20W PA and a good antenna changeover relay and no problems were encountered.

SURFACE MOUNT OSCILLATOR

THE G3WDG016 SMTLO is a development on the G4DDK series of oscillators. This successful range of oscillators is starting to be dogged by component availability problems, so Charlie developed the original designs into this latest unit. The G3WDG016 utilises easily available surface mount components that replace some of the hard-to-get parts and so provides a continued range of useful oscillator sources. The design is fairly simple, comprising a Butler oscillator and transistor multiplier stages, and uses printed PCB filters tuned by ceramic trimmer capacitors, which have successfully replaced the expensive and now scarce film trimmers used in the original G4DDK design. The G3WDG016 SMTLO is very different from the typical American-designed LOs, as it is physically much smaller due to the lack of U-shaped printed filters. This makes for a neat and compact design, which performs to the required high standard for a narrowband source oscillator.

1W PA

THE G3WDG018 is a small 1W PA, based on a Mitsubishi M67715 amplifier module. These modules contain a hybrid transistor amplifier with integrated matching. They offer 50-ohm input/output operating impedance so only require simple printed 50-ohm lines to the connectors. These can be seen in the photograph of the board. The module is powered from 8V, via a 1A 3-pin regulator IC. The board also includes a small transistor switch which removes bias voltage to the unit when in receive. This reduces heating in the module during receive periods, which was a problem in previous designs. A 12V signal is applied to the enable line in transmit. The remainder of the components on the fibreglass PCB are simply used for decoupling and bypassing supply lines. The module gives around 25dB gain and an output of around 2W for 10mW drive.

20W PA

THE WDG017 MODULE is designed around the same family of Mitsubishi modules as the 1W PA. The circuit is shown in **Fig 3**. For the 20W PA, an M57762 module is used. It is powered from 13.8V DC and uses the same transistor bias enable line as in the 1W design. The 3-pin IC regulator is used for regulating the bias supply, with the remainder of the components on the fibreglass PCB used for decoupling and bypassing supply lines The design gives around 20W for 1W drive from the G3WDG018 module, **Fig 4** illustrating the actual performance. A small computer style fan is used for cooling.

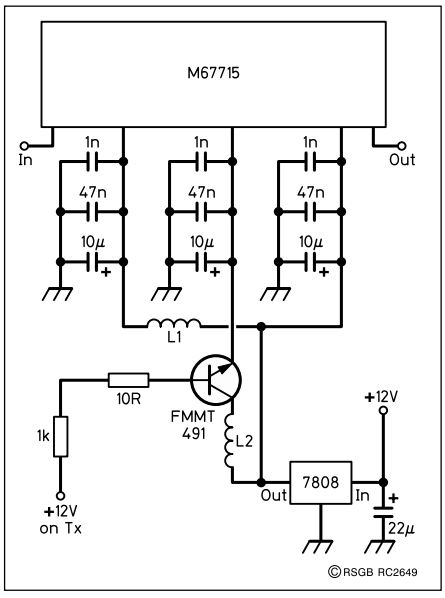


Fig 3: Circuit of the 1W Power Amplifier.

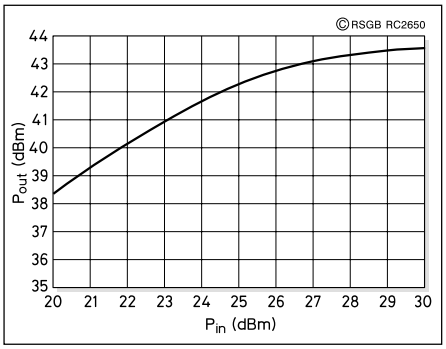
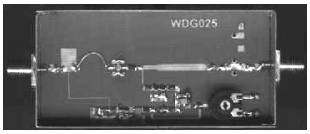


Fig 4: Performance of the 20W PA.

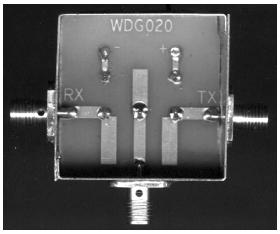
PHEMT PREAMP

THE G3WDG026 IS an optional preamplifier. For terrestrial use it is not a requirement, as the receive front end of the transverter is already a high performer. For EME use, or in applications where feeder losses are high, the preamp can improve performance. It uses an FHX035 PHEMT (High Electron Mobility Transistor), is based on the designs by Rainer, DJ9BV, and offers good gain with an excellent low noise figure. The photo shows the G3WDG025, 13cm version, but is physically the same except for the size of the input tuning inductor. The PTFE board is fairly simple in design and carries a small, negative bias generator supply on the ground plane side.



RELAY UNIT

THE G3WDG020 IS the simplest module in the transverter. A small fibreglass board carries a small, low cost relay capable of handling the 20W power output. Small tuning tabs are located on the PCB to tune out power reflections, increasing the relay's isolation factor and allowing the use of an inexpensive relay in a performance role.



WHAT IS A TRANSVERTER?

A TRANSMIT/RECEIVE converter (transverter for short) is a method where one frequency (in this case 144MHz) is added to another, known as the Local Oscillator, to move the transmitter onto another frequency. In this case 144MHz + 1152MHz = 1296MHz. In the opposite direction, 1296MHz - 1152MHz = 144MHz, and this is used in the receive process. A 'mixer' is used to 'add and subtract' these frequencies, a surface mounted microwave packaged device being used in the G3WDG011.

Mixers require filtering before and after adding or subtracting, depending on which way the mixer is being used, but the mixer always gives both sum and differences of the two inputs, so 144MHz and 1152MHz will give the required 1296MHz inputs and outputs, but unwanted mixing products at other frequencies too. Printed PCB strip line filters in the G3WDG011 remove these unwanted products, leaving a clean transmitted signal and a high performance receiver to match.

CONCLUSIONS

THE WDG 23CM transverter system is an excellent high performance unit that is designed to be reproducible, even by newcomers taking their first steps into the world of microwaves and microwave construction. It is not an absolute beginners kit, but if you can follow basic instructions to the letter and solder proficiently then there is no reason why a working unit cannot be completed, even if you have not built any microwave equipment previously.

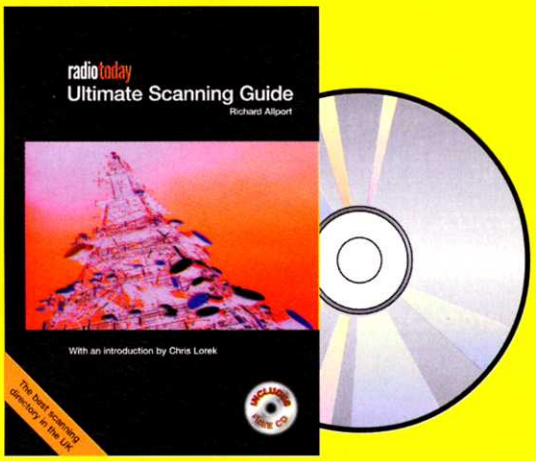
The use of modular construction improves faultfinding and diagnostics if things do go wrong. It also allows some flexibility in the design, allowing the user to select only the modules required. Hundreds of WDG modules have been built in Europe and the UK and they have been a huge success, so all credit to G3WDG's hard work. The 23cm transverter offers a proven design and the ability to purchase a complete kit of parts for the project. It's an excellent way in which to become active on the microwave bands for the first time and to rediscover where 'real amateur radio' disappeared! Come join us, you won't be disappointed.

Prices for the modules described here can be obtained from the Microwave Committee Components Service online catalogue [2].

REFERENCES

[1] Charlie, G3WDG's, Development Homepage: http://www.g3wdg.free-online.co.uk
[2] http://www.emn.org.uk/mcs.htm ♦

NEW



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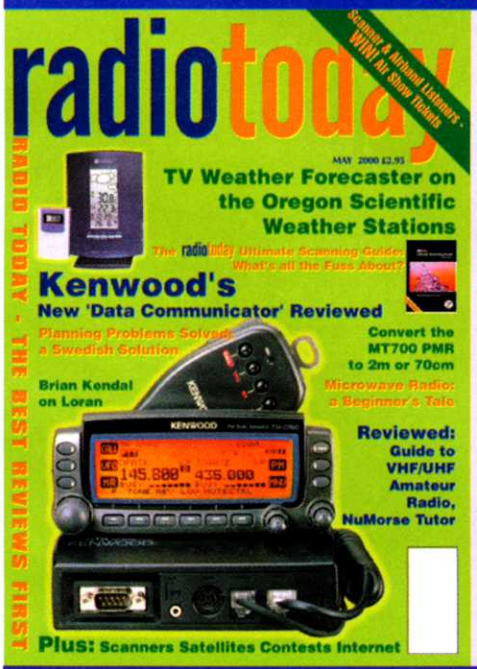

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MICROCONTROLLER PROJECTS WITH BASIC STAMPS

by Al Williams, WD5GNR

Described by RSGB Staff

BASIC STAMP chips have taken the dedicated microcontroller out of the province of experts, enabling anyone with a little knowledge of BASIC programming to produce a microcontroller-based device. This book will teach you what you need to know about solving problems with microprocessors in general and the Basic Stamp in particular. There are explanations of the principles needed to design software and hardware for the Basic Stamp, and a Basic Stamp emulator that will permit you to experiment without even buying a chip. Reflecting the author's amateur radio 'roots', a Morse keyer and Morse ID generator are included amongst the example projects.

The book also contains advice on interfacing with a PC, plus chapters on analogue IO, serial IO, keypads, motors and LCDs.

A CD ROM is included that contains the source code for each chapter of the book, Basic Stamp manuals, application notes and the Basic Stamp emulator software.

Published by R&D Books
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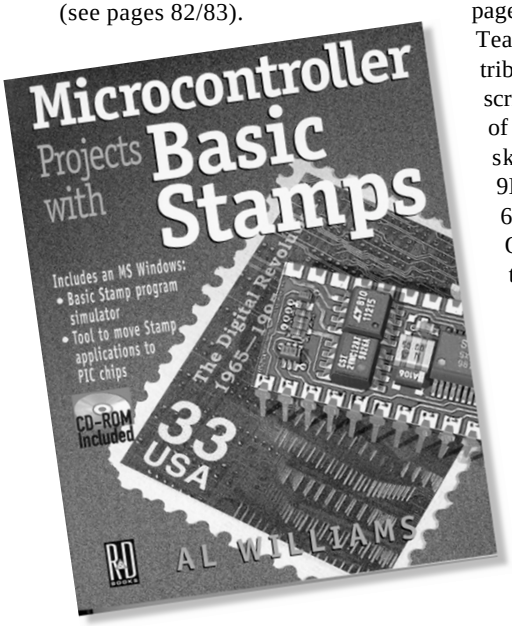
(see pages 82/83).

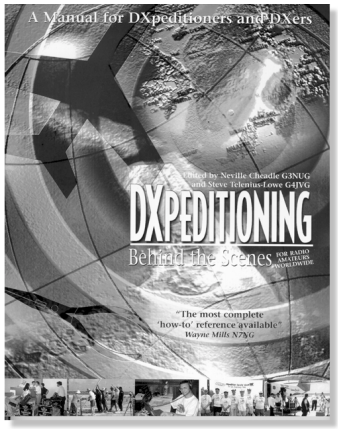


DXPEDITIONING BEHIND THE SCENES

Edited by Neville Cheadle, G3NUG, and Steve Telenius-Lowe, G4JVG.

Described by RSGB Staff

THE OPERATORS of the 1998 9M0C Spratly Island DXpedition learned so much from the operation that they decided to share their experiences with the worldwide DXing community by producing this new book.



DXpeditioning Behind the Scenes is a wide-ranging book. Not only does it cover every aspect of DXpeditioning from the DXpeditioners point of view, it contains a great deal of information that would be of interest to all DXers. From sponsorship to logistics; from propagation to licensing; it's all there; there's even a page on how to tie knots. Team members have contributed chapters that describe their specialist areas of knowledge and skills, skills that helped the 9M0C operation make 65,000 QSOs in 12 days. Operating standards for the DX hunter are also discussed at length.

All the royalties from *DXpeditioning Behind the Scenes* will go to the newly-formed 'Five Star DXers Association', which will help fund a major DXpedition to the central Pacific in March 2001.

Published by RadioActive Publications
ISBN 0-952 8462-1-7
182 pages, 236mm x 186mm
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(see pages 82/83).

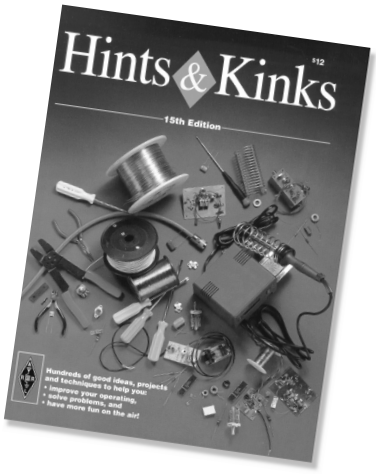
HINTS & KINKS, VOLUME 15

Edited by Larry Wolfgang, WR1B

Described by RSGB Staff

'HINTS & KINKS', the ever-popular monthly column in *QST*, contains a wealth of ideas for the radio amateur - broadly equivalent to 'Technical Topics' in *RadCom*. This latest compilation of 'Hints & Kinks' covers the years 1997 - 1999. However, unlike its predecessor volume, this one also contains related items from two other regular *QST* columns, 'The Doctor is IN' and 'The New Ham Companion', giving the book a wider appeal.

Chapters include: Equipment Tips and Modifications, Batteries and Generators, Mobile Stations,



Portable Stations, Construction and Maintenance, Test Gear, Antenna Systems, Operating, Around the Shack, and Interference.

All-in-all, *Hints & Kinks, Volume 15* contains literally hundreds of useful circuit and construction ideas, and is every bit as likely to be of use to someone who is less experienced as it is to a seasoned veteran.

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inpractice

by **Ian White,** G3SEK*

http://www.ifwtech.com/g3sek E-mail: g3sek@ifwtech.com

ANTENNAS IN SUBURBIA

HOW CAN I fit a multi-band HF antenna into my small suburban plot of land?

RSGB RECEIVES MANY pleas for help of this kind. While the Society can't give too much individual detailed advice, and neither can *In Practice*, here are a few ideas that will help. **Fig 1** is a typical small suburban plot, with both a front and a back garden but with the house set closer to the front. Fig 1 also shows a typical attempt to fit a multi-band HF antenna into the available space. What's good is that somebody has already learned the first lesson:

- Don't insist on any particular length of wire; just put up as much as you reasonably can, and centre-feed it with open wire through a balanced ATU.

Too many amateurs - especially beginners - are fixated on certain 'magic' lengths of wire, such as 102ft for a G5RV, or 51ft for a 'half-size G5RV' with loading coils for 80m. This may indeed be a viable approach if 51ft is all you have space for, but it can also lead to silly situations where people who already have limited space put up *even shorter* antennas than they could actually fit in. Just put up what you can, feed it with open wire, and away you go. With a balanced ATU, almost any length can be made to work on all bands, or at least down to the frequency where the total length is about 0.2 wavelengths. *In Practice* for August and September 1999 gave several ideas for handling difficult feed impedances. Don't worry about the radiation patterns on different bands; the main point is to be on the air!

Unfortunately the example in Fig 1 doesn't succeed quite so well with lesson 2:

- Get the wire as high as you reasonably can - and especially at the centre. Worry less about the ends, because they don't contribute much to radiation.

Fig 1 does not make good use of the available supports A, B, C and D. The poles A and B are the best assets, because they take advantage of the height of the house, but in Fig 1 they are rather wasted in supporting the end of the wire. This also leaves the feedpoint F unsupported and sagging, which is exactly the opposite of what you should be aiming for. For cramped sites like this, where you can't afford the space to put back-guys on the support poles, the wires are often quite slack, so an unsupported feedpoint can easily be dragged down several feet by the weight of the feeder.

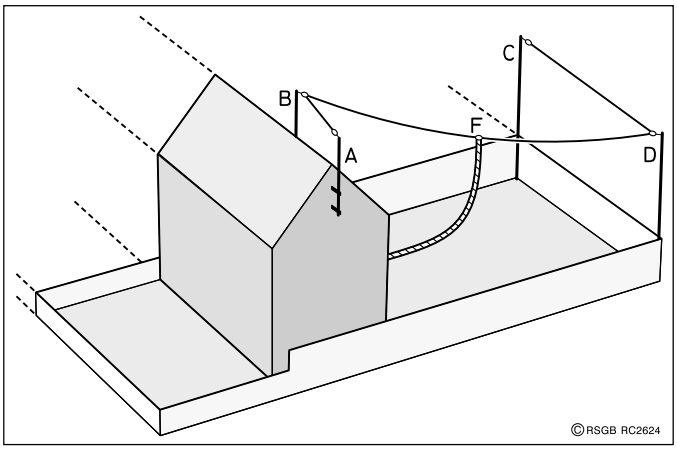

Fig 1: Typical small suburban plot with problems in erecting a multi-band HF antenna.

But the most obvious problem with Fig1 is that it only uses half the property - the front garden is completely wasted! Of course there are limitations on the use you can make of a front garden, especially if the fronts of neighbouring properties are relatively open, but don't assume that it's a complete no-go area. A 'stealth' wire running down from pole A to the corner of the front garden transforms the whole situation - see **Fig 2**. Now the feedpoint F can be directly supported on pole B, and the central length A-F-C is high and in the clear. Moving the next support along from D to C means that the whole antenna in Fig 2 is much less severely Z-folded than in Fig 1. The potential benefits of adding that extra wire A-X are so great that it's worth trying really hard to do it. The most important requirement is safety. The open end X is a high-voltage point, so it needs to be well above head height, but at the end of the wire you can change over discreetly to nylon fishing line with no need for an extra insulator. The combination of thin black-insulated wire and almost transparent fishing line is very hard to spot. Even though the rest of the antenna is fairly conspicuous, that doesn't ruin your chances of adding extra wire using 'stealth' techniques - in fact, it rather improves them! The possibilities for anchoring the line at the front corner of the plot depend very much on your situation. For example, you could plant a young tree (which will of course need a stake to help it grow straight), or erect a trellis. It's amazing what can be done with a little imagination... and also a little nerve.

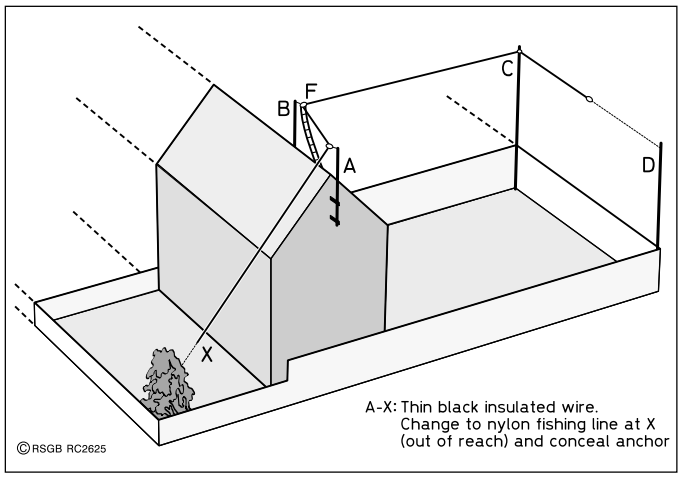

Fig 2: A 'stealth' wire into the front garden can transform the situation.

The exact dimensions for the antenna will depend on the individual plot and the supports available. In Fig 2 you'd probably need to start from wherever you could position point X. Then work upwards and determine first how much wire you could fit into the length X-A-F. Then you'd need an equal length of wire in the opposite leg, so you may or may not need the whole of the length F-C-D. As most people already know, it's also possible to drop the ends of wires directly down to save a little more space. With such highly asymmetrical layouts as Fig 1 or Fig 2, you should expect some problems with common-mode radiation from the feedline, which could bring EMC problems unless you choose the feeder length and/or the ATU configuration appropriately - see the September 1999 column.

Finally, it should go without saying that you must never run antenna wires anywhere near overhead power lines, for reasons of both safety and EMC. Likewise you shouldn't run antenna wires close to overhead telephone lines, because that too is inviting EMC problems. Even so, I hope this example has given you some ideas how to get out better on HF from a typical small British plot.

VOLTAGE REFERENCE

WHERE CAN I find an accurate DC voltage reference to check my digital multimeter?

THESE DAYS, almost all radio amateurs own a digital voltmeter (DVM) that is capable of reading low voltages with millivolt precision, but how accurate is it really? What's the difference between precision and accuracy?

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How much accuracy do we really need?

Precision is related to the number of digits that the meter can display. A typical low-cost DVM reads from 0000 to 1999, with various range multipliers, and this is described as '3½-digit' precision - **Fig 3**. The '3' refers to the number of fully variable digits, and the '½' refers to the first digit that can only be either 1 or blank. A few DVMs have a first digit that can range from 0 to 3, and this is called a '¾' digit. Higher-priced DVMs may have more trailing digits, eg a 4½-digit instrument reads up to 19999, but how useful is the last digit? Almost all low-cost DVMs have a built-in error of ±1 on the last digit, so a difference of 1 between two successive readings could in truth be anywhere between 0 and 2. This means that the last digit is of limited value. For example, if you want to see the 1mV difference between 1.000V and 1.001V, you need a 4½-digit DVM set to its 2V range.

Accuracy is not the same as precision. Accuracy is about how your voltmeter readings relate to the 'International Standard Volt'. This is not so much about the number of available digits, but about the meter's internal voltage standard, the accuracy of various range multiplier resistors, and the settings of the fine adjustment pots that most meters will have. For example, if we could 'borrow the International Standard Volt', and measured it using a DVM with 1% accuracy, the display might read anywhere between 0.990V and 1.010V, depending on how accurately that particular instrument had been manufactured and calibrated. The ±1 error on the last digit affects both accuracy and precision, so a typical 3½-digit instrument could actually read between 0.989V and 1.011V.

Does accuracy matter? Not much, in most cases. The older generation of moving-coil multimeters have an accuracy of about ±5% for the cheaper models, improving to ±1-2% for high-quality instruments such as the AVO range. In practice, accuracy as poor as 5% is often quite adequate for a wide range of electronic applications. Even low-cost DVMs now have a quoted accuracy of typically 1% on the DC voltage ranges, so now we usually have much better accuracy than we need. However, there are cases where accurate voltage measurement really does matter - for example, advanced types of rechargeable cells require 'intelligent' management that is based on the true absolute terminal voltage. To achieve this, modern charger/controllers use highly accurate IC voltage references.

Can we make a voltage reference for use in the shack? Yes, very easily indeed using these modern ICs. We're looking for two things:

1. Accurately known voltage output, without any external adjustments. We need better than 1% initial accuracy, to make the whole exercise worthwhile, but for practical amateur purposes we don't need it to be *much* better than that. Also, we can rely on the manufacturer's datasheet for a statement of accuracy - we don't need a calibration certificate to certify traceability to the International Standard Volt.

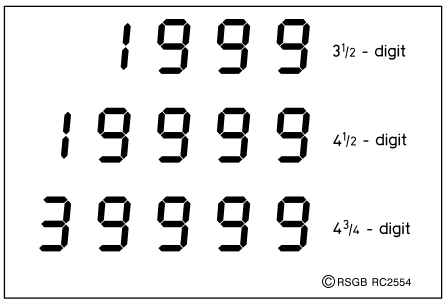

Fig 3: Typical digital voltmeter (DVM) and digital multimeter (DMM) display formats.

2. Repeatability - we may not use this voltage reference more than a few times a year, but we want the voltage to be accurately repeatable when we do. We don't have a temperature-controlled lab, so the standard must have good temperature compensation.

When we start to look at the IC catalogues, the need for high initial accuracy without any external adjustments eliminates the vast majority of voltage reference or regulator ICs. Fortunately, Maxim have recently introduced a range of fixed voltage reference ICs that fit the bill perfectly. They are individually laser trimmed to give a high initial accuracy, and have excellent temperature compensation. For example, the MAX6190 has an output of 1.25V and comes in three grades, with initial accuracies from ±0.48% (C grade, 6mV) down to ±0.16% (A grade, 2mV) - and those are guaranteed *maximum* errors. The voltages are specified at 25°C, but the temperature compensation is so good that errors due to practical temperature variations are down at the 10-100 microvolt level. There are other ICs in the same Maxim range with different output voltages between 1.2V and 10V [1], but the MAX6190 is particularly suitable for checking 3½- and 4½-digit DVMs with a full-scale reading of 2V.

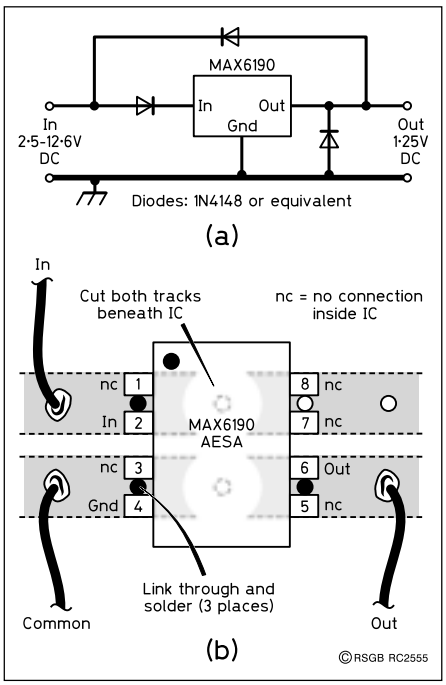

Fig 4: Circuit and IC mounting details for the MAX6190 voltage reference.

The MAX6190 comes in an 8-pin SO SMD package, but fortunately the pin layout allows it to be used with standard 0.1in Veroboard (**Fig 4**). Only pins 2, 4 and 6 are active, and the others are insulated, so it doesn't matter that the through links come out between two pins - you can solder to them both. The MAX6190 is a series regulator, but unusually it will both source and sink currents up to 500 microamps. Unlike the 78xx regulators that you may be more accustomed to, the MAX6190 is internally compensated and needs no bypass capacitors or load resistor, so the circuit couldn't be simpler. The additional diodes shown in Fig 4 are to give some protection against incorrect voltages applied at the input or output. The absolute maximum input voltage to the IC itself is 12.6V, but any input voltage down to 2.5V will give the correct regulated output. Lower voltages dissipate less power in the IC itself, and thus place fewer demands on the internal temperature compensation.

Best of all, Maxim Distribution are generously offering the MAX6190AESA (or nearest available equivalent) as a free sample - even to individual radio amateurs! If you want one, use the Maxim web site [1] or ring 0800 585048. Even the C grade (MAX6190CESA) will have better accuracy than most of us need.

Having built the voltage standard, it couldn't be easier to check the accuracy of your DVM - just switch to the 2V range, and touch the probes to the output of the MAX6190. What to do about the result is rather more complicated, because it depends on the adjustments provided inside the DVM itself. For this you probably need a circuit diagram, because there may be several pots for adjustment of DC, AC and resistance ranges, and the last thing you should do is start twiddling at random! If you are checking a pure voltmeter, possibly based on a digital panel module (DPM), the adjustment should be very straightforward because there is probably only one pot in the module, and that's the voltage reference.

REFERENCE

[1] Details are on the Maxim web site - follow the link from the *In Practice* site. ♦

If you have new questions, or any comments to add to this month's column, I'd be very pleased to hear from you by mail or E-mail. But please remember that I can only answer questions through this column, so they need to be on topics of general interest.

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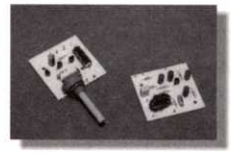

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Newcomers' News

News and Comment from and for Amateur Radio's Newcomers. Compiled by Steve Hartley, G0FUW *

CONSTRUCTION topics seem to generate a great deal of interest amongst readers and I have received many requests for the information quoted in recent columns. This is particularly pleasing when one correspondent actually questioned if anyone builds anything these days. It would appear that they do!

INTERNATIONAL NEWCOMERS

TED ALLEYNE, 5Z4NU, is the Honorary Secretary of the Amateur Radio Society of Kenya and he has made me aware of some developments in his part of the world which will hopefully bring newcomers into the hobby.

The Society recently helped the Starehe Boys Centre and School in Nairobi to set up a radio club and the response has been incredible. So far, 7 staff and 50 boys have signed up to sit their Novice RAE in May, a significant increase in the 3 or 4 applications per year in the past!

The school is mainly funded through charity and has no spare resources for amateur radio equipment etc, so the Society has loaned them a receiver, magazines and books. When some of the boys obtain their own licences, it is hoped to extend the loan to include a small HF transceiver. The RSGB has already donated some RAE manuals and it is understood that the STELAR scheme is also providing some help.

It all sounds extremely encouraging, Ted! We wish you well and look forward to working some of the young Kenyan operators in the not-too-distant future.

NOVICE PROGRESS

IT IS ALWAYS good to hear of newcomers making use of the Novice training scheme as a stepping stone into the hobby, especially when they are as young and enthusiastic as James Campbell, 2M1HHV.

Along with three others, James, who is 14, attended a Novice course last year at the Helensburgh Amateur Radio Club run by Barrie Spink, GM0KZX. Barrie has been putting them through their paces this year in readiness for the May RAE. James and his dad Alan have consecutive Novice callsigns and they are both aiming to take the 5WPM Morse test to get similar MM5 calls. Good luck, guys.

MORE EXAM REPORTS

DAVID PRATT e-mailed to let me know that the results of the March RAE have been published. I was under the impression that the Examiners' Reports available through the internet were put on the City & Guilds website by the examining body, but David has put me straight - they are all his own work. Credit where it's due!

Early indications are that there was another high pass rate (over 90%), so once again congratulations go to all the students and instructors involved. I haven't studied the Examiners' Report yet, but you can access it at www.kippax.demon.co.uk/c-and-g Copies can also be obtained by sending a SASE to RSGB headquarters marked with the report(s) required.

James Campbell, 2M1HHV, operating a WW2 BC312 receiver (see 'Novice Progress').

NOVICE CONSTRUCTION

LOTS OF INTEREST has been shown in the MW receiver by David Berry, G4DDW, pictured in the April column. Copies of the construction details have been despatched to those who sent me a SASE. I hope they prove useful.

The demise of the ZN414 chip caused many to rethink their Novice projects, as the 'official' course receiver could no longer be built. As I reported a few months ago the chip now has a replacement available, the MK484, which is available from Kanga Kits. David Buddery, G3OEP, is still a fan of the original circuit, although he does not favour the use of 'chocolate block' connector strip for construction. David reports good results using the 'blob board' technique and a 2N3049 transistor for the AF amplifier.

PW CONTEST

EVERY YEAR in June, *Practical Wireless* magazine runs a low power contest on 2 metres, but this year is the first time that Novices have been permitted to enter in their own right. Neill Taylor, G4HLX, who co-ordinates the contest, has specifically asked me to mention the event because there will now be a Novice trophy for the highest-placed Novice station.

I have taken part in the contest many times and always find it a very friendly affair. As all stations are limited to 3W PEP, it provides an ideal opportunity for Novices to try their hand at contesting. The contest takes place on Sunday 18 June between 0900 and 1600 UTC and full details can be found in the June edition of *Practical Wireless* or on Neill's website http://home.neill.org/contest

SLOW MORSE

ALEX ALLAN, G3ZBE, has written in response to Alan Oatey's comments about 'unsporting' behaviour during the RSGB Slow Morse contest last year. Alex is defending the more experienced operators who enter the contest, as he points out that if you are a keen high-speed CW enthusiast, there would be little kudos in winning the Slow Morse contest. He believes that many of those who take part are actually trying to help out the less experienced, but find it difficult to slow down, particularly when using electronic keyers. His best advice is to keep sending QRS and hope that the faster operators will get the message.

A number of Slow Morse cumulative contests took place in April. Did you give it a go? Let me know whether newcomers were made welcome or whether the speed merchants really did take over. Full details of future contests can be found in the October 1999 edition of *RadCom*. ♦

Spread The Word!

Send your news and colour photos to: Steve Hartley, G0FUW, QTHR.

e-mail: newcomers.radcom@rsgb.org.uk

* *5 Sydenham Buildings, Lower Bristol Road, Bath, BA2 3BS.*

Down To Earth

An Introduction to Baluns

By Anthony B Plant, MBE, BSc, CEng, MIEE, G3NXC *

THE PRIME purpose of a balun (a contraction of BALanced-to-UNbalanced) is to allow an unbalanced source to drive a balanced load, or vice versa. Some types of balun will also yield an impedance transformation, but this should be regarded as a secondary function.

BALANCED SYSTEM

BEFORE GETTING into the details of baluns it is necessary to understand just what is meant by a balanced load, and why feeding such a load from an unbalanced source can create problems. **Fig 1** shows a typical balanced load. The arrangement is symmetrical about the centre line. Each point on the left hand side is mirrored by an equivalent point on the right hand side, where the currents and voltages are equal in amplitude but opposite in phase.

In the dipole itself, the currents in the two legs create fields which add together to generate the usual 'figure of eight' radiation pattern. The fields generated by each half of the feeder, though, cancel out each other so that there is no radiation from it.

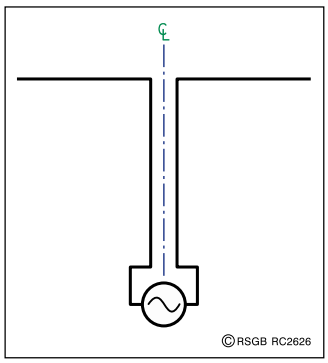

Fig 1: The standard dipole is electrically symmetrical about the centre line.

FEEDING VIA COAX

NOW CONSIDER the same dipole fed through a length of coaxial cable from a typical transmitter, as shown in **Fig 2(a)**. The current flowing in the inner conductor of the cable has only one destination, the left hand leg of the dipole. That flowing in the outer of the cable, though, has two destinations - the right hand leg of the dipole and back down the outside of the cable to ground.

* 178 Clay Lane, Yardley, Birmingham B26 1DY.

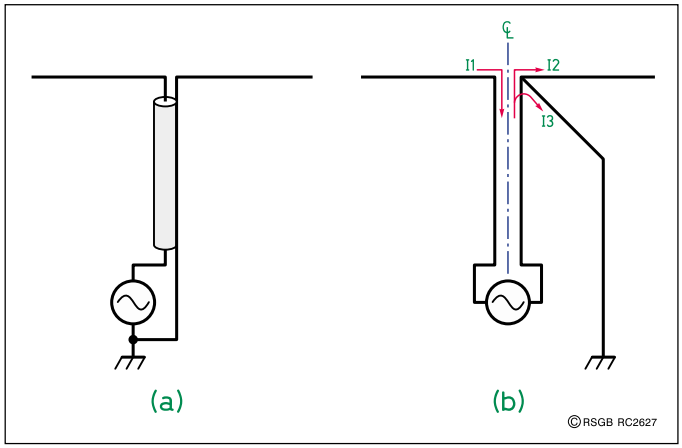

Fig 2: If coax is used to feed a dipole this generates a current path to earth, effectively resulting in a top-fed vertical antenna.

Fig 2(b) shows a somewhat simplified representation of the various current paths, with I3 being that flowing back down the outside of the coaxial cable. The result of having a path for I3 is that a top-fed vertical antenna is, in effect, put in parallel with the right hand leg of the dipole. This vertical antenna will, of course, radiate.

The amplitude of I3 is dependent upon the length of cable being used. If it is an odd multiple of a ¼-wave, the feed impedance of the effective vertical antenna is very high so I3 is low. Under these conditions the unbalancing effect on the dipole is insignificant. If, though, the cable is a multiple of a ½-wave, the feed impedance is low and I3 is, therefore, high. As would be expected, the unbalancing effect is also high.

POTENTIAL PROBLEMS

HAVING explained the situation, the obvious question to be answered is: does it really matter? In order to answer this question we need to consider two separate aspects: firstly the effect on the antenna's ability to radiate and, secondly, what might be called the system effects - such matters as EMC, VSWR measurement and so on.

Feeding a normal wire dipole via coax causes some change to the radiation pattern, but this may not be particularly significant. There can, in fact, be some benefit in that radiation from the vertical antenna represented by the outer of the coax fills in, to some extent, the nulls off the ends of the dipole. Should the dipole be part of an array, a Yagi beam for instance, then the effects of feeding directly via coax can be quite significant. The forward gain will be reduced, as will the front-to-back ratio, and some side lobes will also appear. Similar problems will also occur with other forms of array based on balanced radiators, such as the cubical quad.

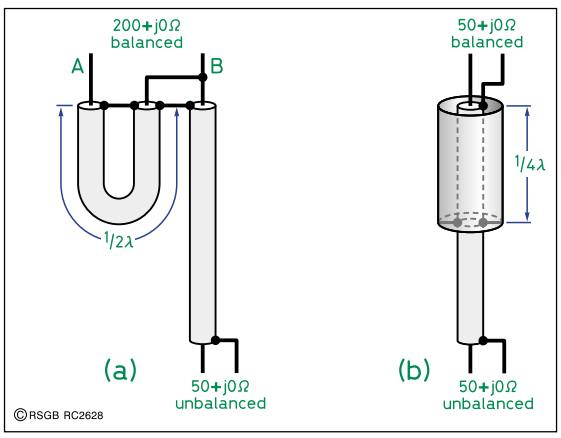

Fig 3: Narrowband baluns can be made quite simply. A ½-wave of coax, connected as (a) generates a 180° phase shift. A ¼-wave sleeve (b), effectively decouples the last part of the coax.

Of the system effects, EMC is probably the one of greatest concern. In normal installations the coax will enter the shack and be in close proximity to house wiring. Radio frequency energy radiated from the outer of the coax is highly likely to find its way into all the surrounding wiring and cause breakthrough problems.

Under normal circumstances the VSWR on a transmission line is dependent only upon the load impedance and the characteristic impedance of the line. Changing the line length should not cause the VSWR, as indicated by the usual VSWR meter, to change. Sometimes, though, it is found that the VSWR reading *does* change quite significantly with line length. This variation of reading is indicating that there is something odd about the set-up. Feeding a balanced load via coax represents one of the possible oddities.

Fig 2(b) shows that the actual load is made up of the dipole plus a top fed vertical antenna. Also, as mentioned previously, the level of I3 is dependent upon the line length. In effect, then, the load impedance at the antenna terminals varies with line length. With VSWR being dependent upon this load impedance, varying the line length will cause the VSWR meter reading to change. It is also possible that I3 flowing back down the outer of the coax will affect the operation of the VSWR meter, thus causing an additional source of confusion.

So, having established that feeding a balanced load via coax causes the radiation pattern of the antenna to change, the EMC threat to increase and the measurement of VSWR to become somewhat unpredictable, the next question is: can anything be done to improve the situation? Fortunately the answer is yes, and one of the solutions is to use a balun.

NARROWBAND BALUNS

THERE ARE many types of balun, each having its advantages

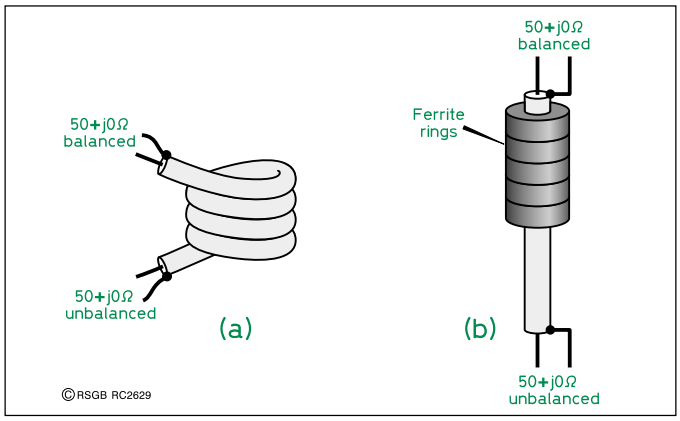

Fig 4: Two simple current-mode baluns. Both use inductance to reduce the current on the coax outer.

and disadvantages. Let's look first at some narrowband arrangements - these being suitable for single band antennas.

Fig 3(a) shows a very simple arrangement using an additional half wave length of coax. One feature of a half wave line is that the voltage at the output is equal in amplitude to that at the input, but with the phase reversed. With the arrangement shown, the voltages at A and B are equal in amplitude but of opposite phase. The voltage between A and B is twice that of the input. As a result, the load impedance for a 50Ω input impedance must be 200Ω. It should be noted that the antenna is not connected to the outer of the coax. If the inner of the coax does not have a DC path to earth then there can be problems with static build-up, particularly when there are electrical storms in the locality.

If a 1:1 impedance transformation is required then the arrangement shown in **Fig 3(b)** will suit the need. This uses a quarter wave sleeve effectively to decouple the last section of the coax. Note that the top end of the sleeve needs to be well insulated and the bottom end connected to the outer of the coax.

Although these two baluns have the virtue of simplicity, they are only really suitable for the higher frequencies owing to the lengths of line needed to make them.

BROADBAND BALUNS

THESE CAN BE one of two basic types: those which force the currents in the two halves of the antenna to be equal in amplitude but of opposite phase, and those which force the voltages to have this relationship. If the antenna is truly balanced, both achieve the same effect. One problem with wire antennas at the lower frequencies is that it is difficult, for many reasons, to achieve a fully balanced arrangement. The current balun ensures that in such cases, the currents in both conductors of the feeder are equal in amplitude.

Fig 4 shows two simple types of current-mode balun, both of which provide a 1:1 impedance ratio. These work on the principle of providing an impedance to restrict the flow of an out-of-balance current. In the case of **Fig 4(a)** this is achieved by coiling up the coax near to the feed point of the antenna. The coil has no effect on the normal signal flowing up the coax but looks like an inductance to any current trying to return via the outer. The same effect is achieved in **Fig 4(b)** by threading ferrite rings over the coax.

One difficulty with the arrangement shown in **Fig 4(a)** is that it can be difficult to make it work effectively over a wide frequency range - say 3.5 to 30MHz. Providing sufficient turns to cope with 3.5MHz is likely to result in the interwinding capacitance being too high for effective operation at 30MHz. The situation can be improved by winding the turns on a ferrite rod ring.

A current-mode balun can also be constructed by using a bifilar winding on a toroid or ferrite rod, as shown in **Fig 5**. It must be understood that these bifilar windings act like transmission lines, which can limit the performance of the arrangements in some circumstances and yield rather erratic results. Ruthroff [1] advocated the addition of a third winding to the simple bifilar winding of **Fig 5(a)** to yield the arrangement shown in **Fig 6(a)**. Although this third winding overcomes some of the problems of the two winding arrangement, it has the effect of turning the balun into a voltage-mode device. Windings 1-3 and W3 act like an auto-transformer, so that the voltage at point A is half that of the input. The voltage at point B will also be half that of the input, but with a phase reversal. This arrangement tends to be regarded as the 'standard' for 1:1 impedance ratio baluns.

The simplest form of voltage-mode balun, albeit with a 4:1 impedance step-up, uses the same basic arrangement as Fig 5(a), but with the windings connected in a different way, as shown in **Fig 6(b)**. Construction is as for the examples in **Fig 5(b)** and **Fig 5(c)**.

There are two, often conflicting, criteria associated with the design of voltage-mode baluns. Firstly, the inductive reactance of the windings should be high; and secondly, the leakage reactance should be low - compared with the load impedance in each case. The first usually determines the low frequency limit of operation whilst the second determines the high frequency limit.

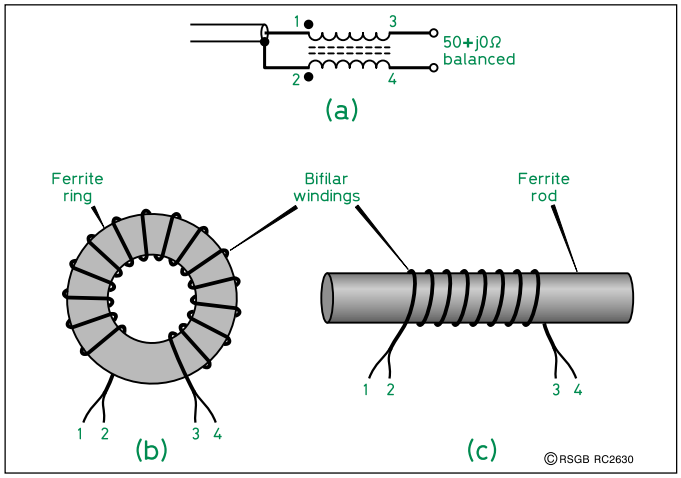

Fig 5: A bifilar winding on a ferrite core, either a toroid or a rod, yields a simple current-mode balun. Note that the dots indicate the winding starts.

CONCLUSIONS

THIS HAS BEEN a fairly brief introduction into the subject and has (quite deliberately!) begged the question of which design is 'best'. The reason for this omission is that the use of baluns tends to result in compromises having to be made: what works well in one application may be a total failure in others. The sensible approach is to try a few different ideas and select the one which gives the best performance in your particular set-up. Fortunately, the components used are reasonably inexpensive and can easily be re-cycled for the different arrangements.

For those wanting to have a go, [2-7] list articles and books containing more details of the different arrangements. You might be bemused by the fact that some authors will be enthusiastic about a particular arrangement whilst others regard it with horror. Take due note of any objections to the various designs, but do not let these put you off trying them.

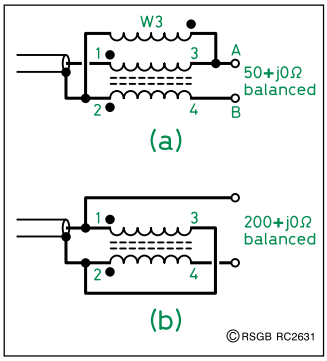

Fig 6: Adding a third winding, W3, to the simple current-mode balun yields a 1:1 voltage-mode balun, (a). Connecting the two bifilar windings in a different way gives a 4:1 impedance step-up design, (b).

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[2] Ian White, G3SEK, 'Balance to Unbalance Transformers', *Radio Communication*, December 1989 (highly recommended reading).
[3] *Radio Communications Handbook* (RSGB).
[4] *ARRL Handbook* (ARRL).
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[6] *Backyard Antennas* (RSGB).
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[8] *Reflections Transmission Lines and Antennas* (ARRL). ♦

The Voices

By Gordon L Adams, G3LEQ *

IT WAS 1952 when I heard the first of the voices. I was then living in Tunbridge Wells, close to Ashdown Forest. My parents had given me, for my birthday, a new mains-powered Philips radio set with Long, Medium and Short wave bands. VHF FM services from the new BBC mast at Wrotham did not become available on an experimental basis until the following year. In any case, as a fourteen year old, I could not afford the necessary Chapman FM tuner which was announced in *Wireless World*. I found that by far the strongest signal on the medium wave was coming from the station up on Ashdown Forest, near Crowborough. Its strident interval signal 'boom, boom, boom, boooom' was so loud that I could hear the splice in the continuous loop playback tape! I found out that this spine tingling 'V' for victory drum solo was recorded for the BBC by Jimmy Blades, who later became Professor of Timpani and Percussion at the Royal Academy of Music.

Reception of the BBC European Service was clearly too easy, so I turned my attention to the more exotic short wave bands. It was not long before I found an unusual broadcasting station operating around 6.5MHz. It appeared on the air every evening with programmes in some Eastern European languages, and was being jammed by 'buzz saw' jammers, which I soon discovered were transmitters radiating the sound of their associated diesel generators. Every so often the broadcasting station would disappear and re-emerge on a nearby frequency. The jammers would then descend upon it again, one at a time, until three or four almost wiped the broadcast out, and the frequency jump took place once more. My new radio set was not at fault, I was in fact listening to a game of radio 'cat and mouse' being played out as part of the Cold War.

* 2 Ash Grove, Knutsford, Cheshire WA16 8BB.

Aspidistra, which first broadcast on 8 November 1942. Built by RCA, the transmitter cost £111,801 4s 10d. It was housed in a subterranean building in an enormous hole that had been dug by Canadian servicemen. It is no coincidence that the front panel and the control room bear a remarkable similarity to old Odeon cinemas, because the same designer was responsible for both!

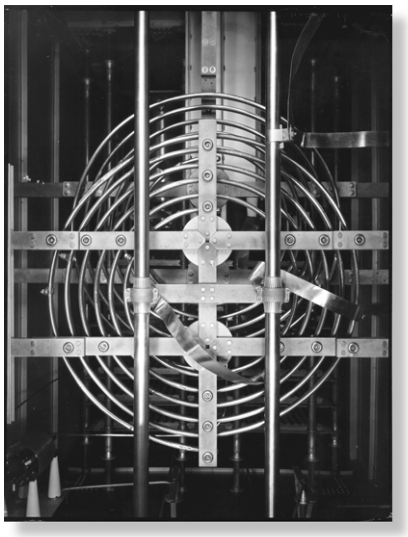
FREQUENCY-AGILE SNEGS

THIS WAS HOW my interest in short wave radio was first stimulated – not, I am sorry to say, by hearing the voices of radio amateurs on 7MHz. I was reminded of this teenage experience only a few weeks ago, when details of one of the ex-Russian jamming transmitters were given on GB2RS. Since the end of the Cold War in 1989, many of their old valve-based jamming transmitters have been pressed into service for broadcasting regional versions of stations such as *Radio Rossii*. A jamming transmitter specification requires that it shall be able to change frequency quickly, and it may also need to operate over quite a wide range of the HF spectrum, say from 5MHz to 26MHz. As every RAE candidate should know, high-efficiency class C RF amplifiers generate significant harmonics anyway. These were built in Eastern Europe under names such as PKV, PDSV, Komintern, Sneg, Shtorm and Purga.

PSYCHOLOGICAL WARFARE OR PSYOPS

THE SITUATION in the West was a little different. The Cold War is generally said to have started in 1948, at the time of the Russian blockade of Berlin. During this period the BBC was broadcasting to the World, but sticking to its dictum of "Nation shall speak peace unto nation". The Voice of America was set up in February 1942, just 79 days after the Japanese had bombed Pearl Harbour. However, in 1951, during the McCarthy anti-communist hearings - otherwise known as "The Campaign of Truth" - President Eisenhower had created a Psychological Strategy Board. The brief for the PSB was to advise on the conduct of American propaganda. In 1953 the United States Information Agency (USIA) was formed and the VOA was soon putting out some 850 hours of broadcasting per week. Unfortunately, the VOA charter required that it should maintain accuracy and objectivity - even if the broadcast truth might hurt.

In the beleaguered city of Berlin, which was divided into four sectors by the allies after the war, the situation was one of serious political intrigue. In 1946 the Americans had set up a wire distribution 'radio' system called *Radio in Americanischen Sektor* or RIAS for short. This was CIA funded, later more discreetly through the USIA; and by 1952 it had a real 20 kilowatt radio outlet on 6005kHz, which reached most of East and West Germany. When the East Berlin uprising took place in June 1953, RIAS was accused of rabble-rousing by the East Berlin authorities. It is still on the same frequency today, but using 100kW and broadcasting mainly classical music and cultural items from Berlin under the aegis of Deutschland Radio. Ironically, its programmes now go out in parallel with the 750kW long wave transmitter in Oranienburg, which used to be the Voice of the GDR in Eastern Germany. Nowadays, the latter has throttled back to 500kW on 177kHz, but still operates within 6kHz of a 2 Megawatt commercial station in Saarlouis called Europe No.1! Both of these transmissions have been 'shoe-horned' in be-



Some of Aspidistra's massive output coils.

tween the regular 9kHz broadcasting channels. In fact, this small 30kHz portion of the long-wave band currently accommodates some 16 Megawatts-worth of European broadcast transmitters.

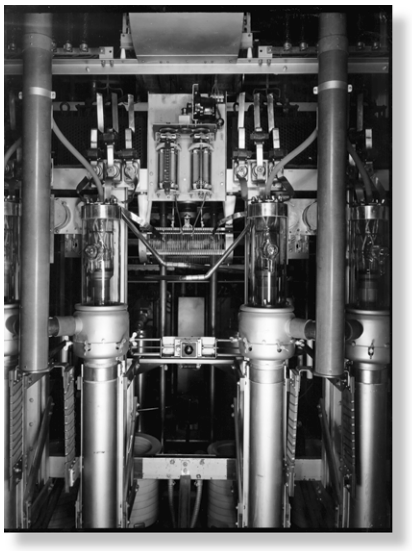
WOT NO IFRB?

IN 1953 THE Americans also bent the rules a little by setting up a 1000kW transmitter near Munich on the same frequency (171kHz) as the 500kW Moscow 'home service'. The Russians reacted by putting three of their most powerful jammers on the frequency, thus disrupting their own programmes as well. The VOA transmitter power was then doubled to 2 Megawatts. As an ultimate technical dodge, the Americans turned their transmitter into a DSB sender by removing much of the carrier power, increasing the output to 2.5 Megawatts, and synchronising it precisely to the Moscow carrier. The hope was that the Moscow transmitter might effectively re-insert some carrier at the receiving end! 'Luxembourg Effect' was immediately reported, with the VOA modulation becoming superimposed on some of the European broadcasting stations at the low frequency end of the medium wave band! It makes you wonder what the IFRB (International Frequency Registration Board) must have been thinking.

This lunacy was followed by negotiations between East and West. As a result, the Americans only turned their 'Big Voice' on when the Russians became frosty and increased their jamming activities.

THE MEGAWATT ARMADA

BACK IN Tunbridge Wells I had joined the West Kent Amateur Radio Society and attended a visit with them to the BBC Receiving Station in Tatsfield, Surrey. I was most impressed and noted the vast schedule charts stretching around the walls, with different colours representing the languages used by their External Services. Between 2am and 4am the colours became just grey. "Ah" explained one of their engineers, "whilst you are tucked up in bed the British and American Voices switch all of their



One of Aspidistra's 200kW RF cubicles, with RCA 898 valves clearly visible.

short wave transmitters over to the Russian language - which gives the Russian bear a little bit more to think about than scratching his fleas!" Funnily enough, I learned subsequently that one of the five famous Russian spies, Donald Maclean, lived in Tatsfield.

In reality, Ashdown Forest is not a forest at all. Apparently all the trees, except a few pines, were cut down to build sailing ships to do battle with the Spanish armada. On one of my cycling trips to Crowborough, I noted armed guards at the gates of the transmitting station and no signs proclaiming the BBC anywhere. The underground 600kW medium wave transmitter there had been installed in 1941, under the technical leadership of Harold Robin, who lived in Tunbridge Wells for many years and might best be described as the Chief Radio Engineer for the Foreign Office DWS. Codenamed 'ASP' for Aspidistra, it was initially the most powerful broadcast transmitter in the World. The BBC was somewhat put out by this development and managed to get a leviathan of its own authorised by the Government. This was to comprise four 200kW Marconi transmitters, each in a separate blast-proof building, with a combiner in a fifth building, allowing the monster combination of 800kW to be operated on both the long-wave and medium-wave bands. It was built at Ottringham, near RAF Patrington, on the North side of the River Humber. Unfortunately, just at the peak of the Cold War, this unique station was closed down on 15 February 1953, for what were stated to be "economic reasons". How strange that the government was to find an immediate use for Ottringham's frequency in the then designated British Zone of Germany!

GERMANY CALLING!

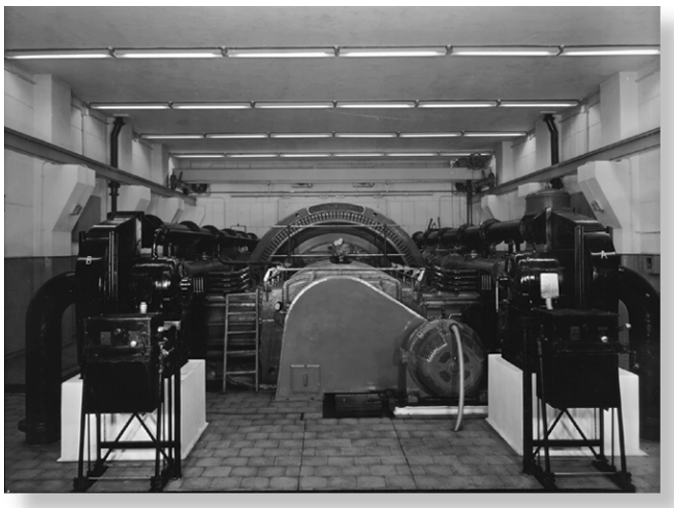
DURING THE WAR the Germans installed a 120kW Telefunken transmitter at Norden-Osterloog, some 80 miles from Bremen, to broadcast the voice of Lord Haw Haw to the UK. This 'snuggled up' close to the frequency of 877kHz, then used by the BBC Home Service transmitter at Brookmans Park - not far from the current RSGB HQ at Potters Bar.

Ironically, the BBC leased the Norden installation from the Allied Control Commission immediately after the war ended, to carry its European Service. In February 1953 Norden took over Ottringham's vacated 1295kHz channel. A similar arrangement was made to employ the 100kW Austrian transmitter at Graz-Dobl on 1025kHz.

ALBANIAN SUBTERFUGE?

ON 22 OCTOBER 1950 Aspidistra at Crowborough started to use 647kHz, except between 17.00 and 23.00 hours when the Third Programme was going out from Daventry on this channel. It was later stated in a press release to the newspapers that the Albanians had announced plans for a massive increase in the power of their 15kW station sharing this frequency. Needless to say the Albanians could not afford to do any such thing, but the Third Programme (later to become Network Three and now Radio Three) was hived off to VHF, where listeners were told that reception would be much better. Crowborough, however, continued on the frequency, employing it during the evening hours as well, to carry Britain's 'Voice' to Europe. Indeed, the site had a second harmonic outlet at 1295kHz, allowing expeditious use of one vertical radiator! Amateur radio may not be political, but government sponsored broadcasting certainly is! ♦

In the next part of 'The Voices', Gordon Adams will explain why certain transmitters were sited in particular locations. He will also deal with the mayhem caused on the short wave bands by RFE, RL and their accompanying jammers, plus the epidemic of 'Voices' that were to break out a few years later in Cuba and Florida.



For more than 20 years Aspidistra was run from locally-generated electricity by this 3000HP Crossley Premier Diesel, housed in the lower storey of the underground building.

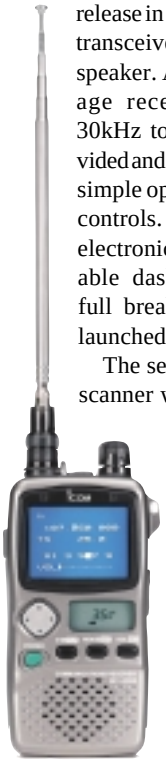
Aspidistra illustrations supplied by Pat Hawker, G3VA, are 1942 photographs from the collection of the Latre Harold Robin, CBE, who died in 1999, aged 87 years.

product news

NEW ICOM PRODUCTS

TWO NEW ICOM products have been announced recently, due for release in the UK later this year. The IC-718 is an 'entry-level' 100W transceiver. Unusually for a transceiver, it has a forward-facing speaker. A general-coverage receiver, covering 30kHz to 30MHz is provided and the IC-718 boasts simple operation with few controls. It has a built-in electronic keyer with variable dash-dot ratio and full break-in on CW. It is expected that the IC-718 will be launched in July.

The second Icom launch will be that of the IC-R3, a handheld scanner with a built-in 2-inch TFT colour LCD display. Its frequency range is 495kHz to 2.45GHz. The unique display doubles as the control display and as a normal TV display, allowing the viewing of commercial TV pictures as well as amateur fast-scan TV. A bandscope display is also available, and the display can be turned off to conserve battery power. It will scan at a rate of 30 channels per second, and is provided with a CTCSS tone-scan function for use with amateur repeaters. The IC-R3 is expected on the UK market towards the end of the year.



Icom (UK) Ltd, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 01227 741741. Fax: 01227 741742. E-mail: info@icomuk.co.uk Web site: www.icomuk.co.uk/

PROSCAN RECEIVER DOWN IN PRICE

WITH THOUSANDS of these legendary weather satellite receivers in service world-wide, Timestep has decided to bring the price down. This professionally-designed polar orbiter receiver has all 6 APT satellite frequencies fitted. In tests it has outperformed every other receiver suitable for weather satellites. As with any weather satellite receiver, you need an interface and software to get images into your computer. Timestep's *i* or *LC* interfaces, with their *i* software, will simply plug into the serial port of a PC or notebook and produce stunning full colour images. The *i* interface costs £249 and the *LC* £149. The PROscan receiver has been reduced from £399 to £249 (carriage extra on all items).

Timestep, PO Box 2001, Newmarket, Suffolk CB8 8XB. Tel: 01440 820040. Fax: 01440 820281. E-mail: information@timestep.com Web site: www.timestep.com

MAPLIN CATALOGUE

THE APRIL TO AUGUST edition of the Maplin catalogue is now available. It has been re-designed, but all the familiar categories still remain. The CD-ROM version has a comprehensive search facility that aids product browsing. Pictures, technical specifications, an order form and datasheet library are also included.

Maplin Electronics, PO Box 777, Rayleigh, Essex SS6 8LU. Tel: 01702 554155. Web site: www.maplin.co.uk

WIND-UP TORCH

HOT ON THE HEELS of the wind-up radio, a wind-up torch has been produced by Freeplay Energy, the company established to develop the concept of self-powered radio technology. The new Freeplay 20/20 is two flashlights in one.

The first is battery-powered, featuring a 1A Xenon-filled bulb powered by a Nickel Metal Hydride (NMH) rechargeable battery, which provides 45 minutes' operation when fully-charged. The second, standby torch, operates in wind-up mode, using a unique cluster of high-technology *white* LEDs. These LEDs are claimed to be unbreakable and to last 90 years.

The retail price is around £39.95.

Freeplay Market development Ltd, 3rd floor, 56/58 Conduit Street, London W1R 9FD. Tel: 020 7851 2600. Fax: 020 7851 2700. E-mail: catherinemiller@freeplaygroup.com Web site: www.freeplay.net

40A SWITCHED-MODE PSU

NEW FROM Waters & Stanton PLC comes a _+switched-mode 40A power supply, the Watson W-40SMV. It has a continuously-variable output from 3 - 15V, and a fixed 13.8V output activated by a switch on the underside of the case. It will deliver 40A continuously, and will appeal to radio amateurs who want to run 100W transceiver with several other devices.

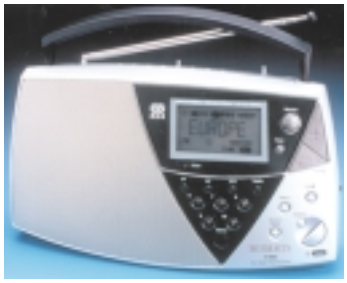
The W-40SMV weighs-in at just 3.5kg and measures 220 x 110 x 300mm. It requires a 240V supply, has a quiet rear-facing cooling fan, and has full over-voltage and over-current protection. It should be available from early June.

The price is £149.95, including VAT.

Waters & Stanton PLC, 22 Main Road, Hockley, Essex SS5 4QS. Tel: 01702 206835. Fax 01702 205843. E-mail: info@wsplc.demon.co.uk Web site: www.wsplc.co.uk

NEW ROBERTS RADIO

THE ROBERTS R9906 is the only portable radio to feature a scrolling text panel. Digital transmitting stations can produce up to 64 characters on the screen, giving comrehensive information on the programmes. Having very contemporary good looks, this radio continues the Roberts tradition of exceptional sound quality. Once plugged in, the radio scans and locates the stronger stations and the station names appear on the screen.

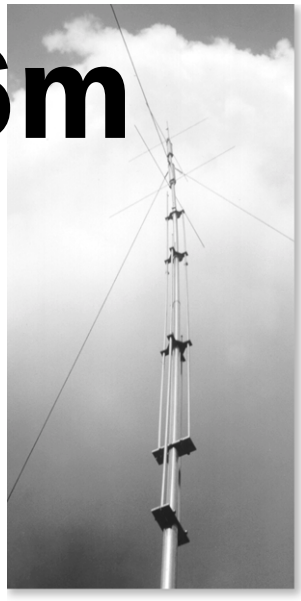


The R9906 retails for £60.

Note: Product News is compiled from press releases sent in by the manufacturers and distributors concerned. Details are published in good faith, but *RadCom* cannot be held responsible for false or exaggerated claims made in the source material.

Cushcraft R8 40-6m Vertical Antenna

*Reviewed by Norman Fitch, G3FPK**



Looking skyward up the completed and guyed R8.

IN AUGUST 1980 I received an HF transceiver for review. I did not have an antenna for any of the bands, so I put up a 'temporary' vertical made from half the driven element of an ageing Mosley TA-33jr tri-band beam. For better performance I installed three quarter-wave radials for each of the 10, 15 and 20m bands. These were a nuisance, often being tripped over, and frequently chewed up by foxes and squirrels! As the antenna was rather corroded after 20 years of 'temporary' use, I reckoned it was about time to upgrade to a proper vertical. After perusing the adverts in *RadCom* I decided on the new Cushcraft R8, as it covered all bands from 6m to 40m. The maker's specification is shown in **Table 1**.

DESCRIPTION

THE CUSHCRAFT R8 is the latest model in the company's vertical multiband antenna range. As with the R7000 previously reviewed [1], it is a bottom end-fed design, loaded and trapped to achieve half-wave resonance on all eight bands from 40m to 6m. The attraction of this concept is that it does not require ground radials, but as the feed end is at high impedance a robust matching unit is necessary to match the system to a 50Ω coaxial feed.

While the R7000 has three traps, the R8 has only two; one for the 30m band, the other for 17/20m. Stubs achieve resonance on the 6m, 10m, 12m and 15m bands and there are two 'X-hat' assemblies towards the top of the antenna to provide some capacitive top loading on the lower bands. There are seven thin 125cm radials at the bottom of the R8, the overall length is 8.7m (28.5ft) and it weighs 10.5kg (23lb).

ACQUISITION

I ARRANGED WITH Messrs Waters and Stanton to collect the R8 at the recent Pickett's Lock exhibition. The box measured 280 x 16 x 14cm and weighed 12.3kg, which is why I went by car.

PARTS CHECKING

IT TOOK ME 95 minutes to unpack the box and check all the parts. The 14-page manual has a master parts list of the 220 items, ranging from the main tubes to small washers. All the small hardware, such as nuts and bolts, clamps, brackets, insulators, etc, were packed in three double-sealed plastic bags. The only item missing was one 3/8in long 8-32 screw. There is a mistake in this list regarding stub SD, which is 3/8in diameter and not 1/4in, but the assembly diagram on page 8 correctly refers to 3/8in. I laid out the major parts on the ground, the longest item being 193cm.

ASSEMBLY

THE ASSEMBLY manual describes twelve steps to build the complete antenna, each including a table identifying the necessary parts and exploded diagrams showing how to fit them together. I used two pairs of stepladders so that assembly could be carried out at a convenient height, taking care not to drop any small items on the lawn.

Step 2 covers the installation of the seven 125cm radials, but these are best left to be fitted later as they did rather get in the way. Step 6 is the assembly of the 6m and 10m stubs. There is a 6m tune chart with dimensions for 50.25, 50.80 and 51.50MHz, but no equivalent chart for 10m. Step 10 covers the assembly of the very top of the R8 and, although the 23mm swaged tube BF is not listed in the table, the adjacent Figure M clearly shows how to fit it. There is a 40m tune chart with dimensions for 7.025, 7.05 and 7.10MHz. The total assembly time was five hours.

INSTALLATION

CUSHCRAFT'S LITERATURE recommends installing the R8 120ft (about 36m) from any surrounding metal and that its base be at least 10ft (3m) above ground. Mine is 14m from the rear brick wall of the house and fixed to a length of aluminium scaffold tube concreted into a base and projecting 2.3m over the lawn.

The 'wind survival' is specified as 80mph, but, wearing my structural engineer's hard hat, I do not recognise this term - does it mean that an 81mph gust would result in exceeding the safe working stress in bending of the material? In the October 1987 hurricane, gusts of over 90mph were recorded on Riddlesdown, so I decided to guy the R8 for peace of mind.

I recruited a few neighbours and local radio amateur friends to assist with the erection of the R8. I fixed a temporary length of horizontal scaffold tube at the bottom of the base pole, so we could walk the antenna up to a vertical position with the three people on the guys keeping it stable. While someone was hugging the R8 to the pole, I fixed the base plate loosely to the pole, then pushed the assembly up to the top of it, finally tightening the U-bolts.

The guys are 6mm polypropylene ropes, fitted above the top of the lower trap using Post Office splices [2] and are fixed to galvanised cleats at the top of oak fence posts. At this point, the heavens opened, neighbours rushed back home and the G3s dived into the house for refreshments.

Some time later the seven 125cm radials were re-fitted and all the bolts on the radial rings tightened up. The radials are well above head height so do not present a hazard. I used RG-213U coaxial cable, running down the base mast and then underground to the house end. Markers were set in the lawn to indicate where it is.

Band	6, 10, 12, 15, 17, 20, 30, 40m
Gain	3dBi
VSWR 2:1 bandwidth	40m (150kHz)
	30m (>50kHz)
	20m (>350kHz)
	17m (>100kHz)
	15m (>450kHz)
	12m (>100kHz)
	10m (>1500kHz)
	6m (>1500kHz)
VSWR at resonance (typical)	1.3:1
Power rating	1500W (CW)
Vertical radiation angle	16°
Horizontal radiation	360°
Height	28.5ft maximum (8.7m)
Wind survival	80mph (130kph)
Weight	23lb (10.5kg)

Table 1: Manufacturers' specifications.

MEASUREMENTS

MY HF STATION comprises an Icom IC-756 transceiver running about 100W and an MFJ-969 Deluxe Versa Tuner II. Initially I used the SWR meter function in the transceiver to check the 2:1 VSWR bandwidths and minimum VSWR values on each band. This method proved unsatisfactory, because the automatic antenna matching circuitry kicks-in when the VSWR exceeds 1.5:1.

**40 Eskdale Gardens, Purley, Surrey, CR8 1EZ.*.

Next I used a simple external VSWR bridge, which gave more meaningful results and showed that Cushcraft's specifications were well achieved on all bands from 30m to 12m. It was slightly out on 40m with resonance at 7.025MHz, indicating a slight shortening of the projection of 18.5in for tube BH at the very top of the R8 is necessary. On 10m and particularly 6m there were problems, so a more thorough analysis was undertaken using an MFJ-259B HF/VHF SWR Analyser [3] [4].

On 10m the minimum VSWR of 1.5:1 was found at 28.12MHz. Referring to page 8 in the assembly manual, the projection of rod SE is given as 10in, so it seems that this would need to be decreased to tune the system for minimum VSWR towards the middle of the band. Even so, the VSWR reached 2:1 at 28.50MHz, which seems to indicate that the specified 2:1 bandwidth of >1500kHz would not be met in any case.

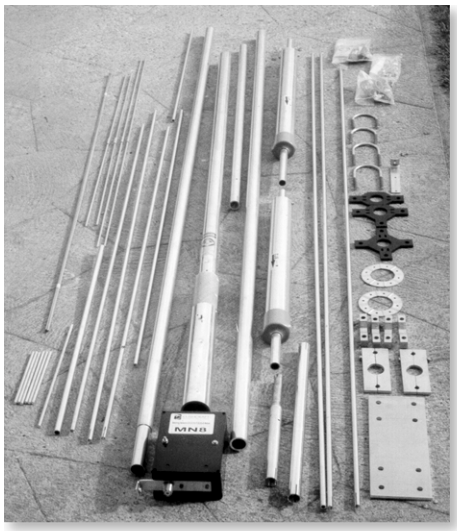
For 6m there is a Tune Chart and I selected the recommended 4.5in (11.4cm) projection for rod SB, which is supposed to result in a minimum VSWR at 50.250MHz. In fact the analyser revealed resonance at 49.63MHz with a 2:1 VSWR, so a shortening of the projection is obviously required for my installation. The Tune Chart indicates a 1in decrease in projection at the bottom end of the band should result in a 550kHz increase in the resonant frequency. Applying this logic, the correct projection ought to be around 3.35in (8.5cm). As the rods SE and SB are up to 6m above ground, I could not make any adjustments, since this would require the R8 to be taken down. The results of these measurements are shown in **Table 2**.

Feed point and radials of the assembled antenna.

PRACTICAL RESULTS

MOST OF MY operation is around breakfast time and the system was first used then on 20m on 27 March, when VK3BCY gave an S7 report in average conditions. Next morning on 17m I exchanged 55/54 reports with VK6QG/M. On 29 March FO5QS was a consistent S5 on 20m, working friends in France, and 3D2BA in Fiji was up to S6 on the 31st. Best DX the same day was on 17m with ZL2AAA, with whom 55/51 reports were exchanged, his signal exhibiting pronounced polar flutter.

The big aurora on the night of 6/7 April depressed HF band conditions for a day or two, but in pretty average conditions I am able to work VKs on 20m. It's usually a question though of 'getting in', as most seem to be in lengthy multi-way QSOs with UK friends.



All the components of the R8, laid-out on the patio.

On 6m a couple of very weak Argentine stations were copied on CW in the afternoon of 5 April. Local stations with beams were giving them good S reports. In the RSGB SSB/CW contest on the 16th I worked a couple of near locals on 6m SSB and heard GD0EMG (IO74QD) at reasonable strength: 437km on 6m tropo can't be bad!

The 15m band has been quite lively, with plenty of DX heard when conditions were 'up', and there has been a lot of short skip on 10m as well as periods when the Ws have been pounding in. I worked a couple of 4Xs in their contest on 16 April, receiving S9 reports. Daytime conditions on 40m bring in lots of local British Isles and European stations at good strength, but I would like to dig around for some real DX when I have more time. 30m is relatively quiet, but with some DX stations around. I have not used this band before and thought it was supposed to be CW and digimodes only, but there were several French stations on SSB and some Gs as well.

CONCLUSIONS

CUSHCRAFT STATE in their general catalogue "The Electrical Specifications for all Cushcraft Antennas are derived from numerical analysis and measured data taken on our test range. Performance may vary due to the random variables associated with a specific application or installation", which seems fair enough.

I am impressed with the high quality of the materials used in the R8 - high strength Dural tubing and stainless steel fittings - and the attention to detail that is often lacking in cheaper products. I would certainly put this antenna at the Rolls Royce end of the market. The assembly instructions are very explicit and it would be difficult to make any mistakes when putting it together. We radio amateurs are always prejudiced about our antennas and I think the R8 looks quite elegant. So I was rather surprised when the ladies agreed - praise indeed!

The only disappointment is the unresolved resonance problem on 6m, which has been taken up with Cushcraft. I have to say that I am impressed with their after-sales technical support and have no doubt that the matter will eventually be resolved satisfactorily. In any case, the MFJ-969 deals with the problem perfectly and tunes the entire system to the 6m operating frequency.

Sincere thanks to neighbours Peter Frost, John Foan, Sheena and David James, and to Ted Honeywood, G3GKF, and Mike Roach, G3TWJ, for their invaluable assistance in installing the R8. Also to Waters and Stanton for the loan of the MFJ-259B, a brilliant piece of test gear that no shack or club should be without.

The R8 is available from Waters and Stanton PLC, 22 Main Road, Hockley, Essex, SS5 4QS; tel: 01702 206835; e-mail: info@wsplc.demon.co.uk. Their web site is: www.wsplc.co.uk The list price is £399.

REFERENCES

[1] 'Cushcraft R7000 HF Antenna', by Peter Hart, G3SJX, *RadCom* January 1997 pp52-53.
[2] *Radio Communication Handbook*, 6th edition, p12.102.
[3] 'MFJ-269 HF/VHF/UHF SWR Analyser', by Ian White, G3SEK, *RadCom* May 2000 pp34-5.
[4] 'SWR Analysers', *In Practice* by Ian White, G3SEK, *RadCom* May 2000. ♦

Band	MHz	VSWR	Min @ MHz
40m	7.00/7.10	1.35:1/2.60:1	1.10:1 @ 7.025
30m	10.10/10.15	1.25:1/1.80:1	1.10:1 @ 10.08
20m	14.00/14.35	1.90:1/1.70:1	1.40:1 @ 14.26
17m	18.068/18.168	1.40:1/1.30:1	1.20:1 @ 18.48
15m	21.00/21.45	1.15:1/1.30:1	1.10:1 @ 21.20
12m	24.89/24.99	1.40:1/1.30:1	Res. at 24.99
10m	28.00/29.00	1.60:1/3.00:1	1.50:1 @ 28.12
	>29.00		>3.0:1
6m*	50.00/52.00	2.90:1/4.40:1	2.00:1 49.63

* See text

Table 2: R8 Measured results.

Suppliers' Comments

"We always recommend that an antenna like the R8 be assembled at an accessible height, so that any fine tuning can be made before final positioning. Cushcraft do not recommend guying the R8, so any guys should be positioned to avoid affecting the tuning."

Jeff Stanton, Waters & Stanton PLC

ICOM

IC-718

IC-718 HF Transceiver

The Most Practical Rig You Could Ever Own!

Icom are pleased to announce the IC-718 HF transceiver. Aimed as an entry-level product, the IC-718 continues all the traditions of top quality engineering that you expect from Icom. Conveniently sized and easy to operate, the IC-718 utilises all the latest RF and digital technology and is designed to be one of the most practical rigs ever.

Forward Facing Speaker

The IC-718 offers an excellent overall specification coupled with ease of use. The first thing that strikes you about the IC-718 is the loudspeaker mounted on the front panel of the transceiver, facing the operator, making the audio more clearly heard.

Superior Performance

The IC-718 features a 100 watt transmitter for SSB and CW and 40 watts output on AM. A general coverage receiver is also built-in covering 30kHz -29.999 MHz across most modes. A newly designed PLL circuit has been adopted to improve signal/noise ratio characteristics. This, combined with a 4-element system mixer ensures truly superior performance.

Easy to operate

For ease of use, the IC-718 is equipped with a minimum number of switches and controls. The 10-key pad on the front panel allows you to directly enter an operating frequency or access a memory channel. All popular operating modes are offered; USB, LSB, CW, RTTY (FSK) and AM. In addition there is a level adjustable noise blanker, a variety of scanning functions, a hand microphone and electronic keyer as standard.

Auto-tuning

The auto-tuning-steps function speeds up tuning but only activates when the dial is turned quickly. The band stacking register ensures that you always return to the last used frequency when changing bands.

Interference Buster!

To reject interference, the IC-718 has an IF shift function that shifts the centre frequency of the IF passband electronically to reduce nearby interference. A microphone compressor ensures really punchy audio, getting your signal through in difficult operating conditions. The compression level is easily adjustable from the front panel making a big difference when propagation conditions are poor.

Maximum Response

RF gain control is combined with the squelch control. The RF gain adjusts minimum response receiver gain and improves reception on the noisier bands. An electronic keyer with a variable dot/dash ratio control is built-in. The CW pitch is variable from 300-900Hz and the keyer speed goes up to 60 wpm! Full break-in capability is available with an adjustable delay. Also, the IC-718 has a total of 101 memory channels to store operating frequencies and modes.

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The Icom IC-746

For those of you into Six, have you considered the Icom IC-746 HF, 2M & 6M base? It offers 100 Watts on all of its bands, all mode and has that very important Auto ATU, left out by its closest competitor. A big mistake we think. Seems that Icom started the 'excellent value for money' pricing earlier this year and fortunately, targeted this excellent transceiver in its cost cutting exercise. It wasn't that long ago we were charging only £1695. Today the same radio from ML&S costs a mere £1099. Who said Ham Radio isn't cheap in the U.K.?

Looking for a new career?

Since the big three slashed prices to its dealers our retail and mail order is literally run off its feet. So much so, that we are desperate for more staff. If you think you could offer the very high level of service to a demanding customer base give me a call. You need to be articulate and able to communicate clearly with any one of our 30,000 strong customer base (yes really!) and of course, that is growing all the time.

And finally - that new Radio from Kenwood U.K?

By the time you read this, Kenwood will have announced their new 'toy' at Dayton. Once again, the Japanese Kenwood representatives chose ML&S to do a spot of fact finding on their recent trip to Europe. It is always a pleasure to assist in telling them that Ham Radio isn't dead and they have plenty of loyal customers just waiting for their new masterpiece. But could I draw them on the new HF-23cm radio? Could I hell. They just grinned in their amicable style and pretended they didn't understand a word and I was, in fact, a Martian. Perhaps next time I should point out there is only one 'A' in Martin.

Martin G4HKS

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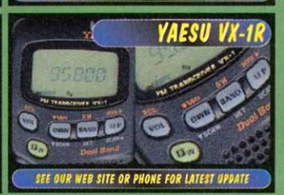

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- Weight 12kg

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technical topics

by **Pat Hawker**, G3VA*

QRP: SAVIOUR OF HOME BREW?

A NEW YEAR editorial in *QST* announced a number of format and editorial changes in the ARRL journal - the doyen magazine devoted entirely to amateur radio - although one notes that nothing is said about the severe competition that our hobby now faces from the exploding use of the Internet. The Managing Editor, Steve Ford, WB8IMY, admits that many amateurs - both newcomers and old-timers - now seek to balance their amateur interest with many other activities and concerns, while young amateurs fresh from college find it difficult to keep up with the hobby as they struggle to establish their careers under the weight of enormous tuition debt (yes, this as true of the USA as the UK!). Large numbers of middle-age hams are raising children and working long hours at demanding jobs; senior (retired) amateurs are "intellectually and physically active, embracing a variety of interests, of which amateur radio is but one."

But it is claimed that readers have requested more coverage of low-power (QRP) operating "one of the fastest-growing aspects of our hobby. . . hamming with 5W or less has become an attractive option. For many hams it is the *only* option." While I have my doubts whether QRP operation is really growing apace, and may find it difficult to appeal to the new generation of '5WPM' operators, there is little doubt that it remains perhaps the last bastion of home construction from original ideas, published articles and kits - and indeed provides a real incentive for the 5WPM licensees to get cracking and polish up their Morse.

QST clearly intends to put its pages where its mouth is. Not only has it introduced a regular QRP column, but the March 2000 issue contains two constructional articles on QRP transmitters. The first is an updated version of the 'Tuna Tin 2', first described in the 1970s by the late Doug DeMaw, W1CER/W1FB. This is a 350mW, two-transistor (both now type 2N2222A or equivalent NPN devices) 7MHz CW transmitter, built in a tuna fish tin or any other 185 or 200g food container, either round, or a rectangular sardine-type tin. A straightforward crystal oscillator and amplifier (one could hardly call it a 'power amplifier'): see **Fig 1**.

The second article 'A simple 10-metre QRP transmitter' by Lew Smith, N7KSB, is intended to take advantage of the present high values of solar flux. With some 4 watts output (when powered from a 24V supply) it should be capable of providing useful contacts with stations many thousands of miles away when used with a reasonable antenna. It specifies a 28010kHz fundamental crystal, which can be 'pulled' upwards without significantly degrading stability over a range of about 17kHz, by means of a home-built 'compression-type' 2-60pF air-dielectric variable capacitor (C3) which it is claimed gives better resolution and tuning range than can be obtained from a conventional air-dielectric variable capacitor. A bent piece of 0.016in-thick brass becomes the equivalent of a capacitor's

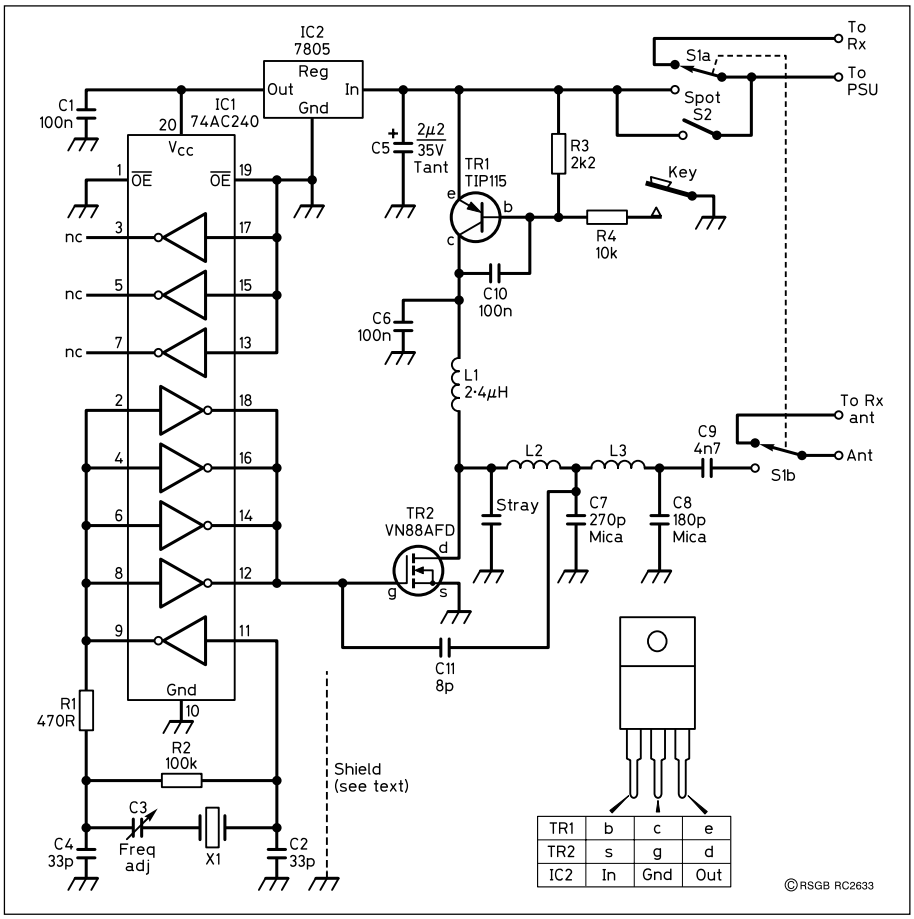

Fig 2: Circuit diagram of the 'Simple 10-metre QRP Transmitter'. C9: 4.7nF 2kV ceramic. C3: see text. L1: 2.4µH 1.5A RFC. L2: 11t, No.18 enam, ¼in ID, ½in long. L3: 10t, No.18 enam, 9/16in long (*QST*, March 2000).

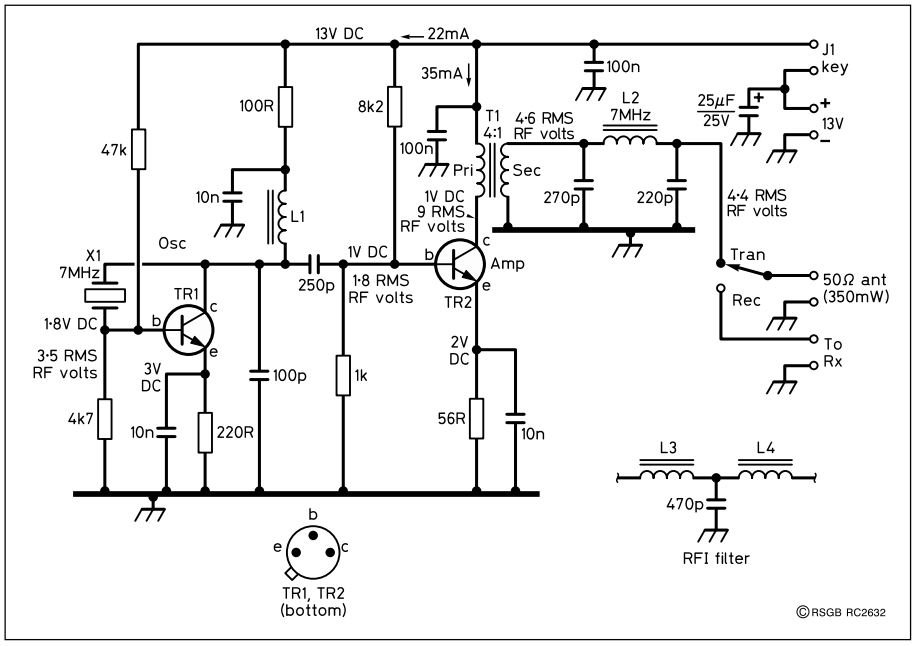

Fig 1: Circuit diagram of the 'Tuna Tin 2' 7MHz QRP transmitter, originally described by the late Doug DeMaw, with an RF output of about 350mW. L1: 22µH moulded inductor. L2: 19t of No.26 wire on T-37-2 toroidal core. L3, L4: 21t of No.24 wire on a T-37-6 toroidal core. T1: 4:1 broadband transformer, 16t of No.26 wire on primary, 8t on secondary, on FT-37-43 toroidal core. (*QST*, March 2000).

*37 Dovercourt Road, London SE22 8SS.

rotor plate. A bit of copper foil mounted on a section of PCB material acts as the capacitor's stator (consult the original article for illustrated details). The output capacitor C9 should be a 4.7nF, 1kV disk-ceramic, since the rather large antenna current may destroy physically smaller capacitors (especially monolithic ceramic capacitors). Use mica capacitors for C7 and C8. A 2in wide, 0.016in-thick brass strip is used as a ground plane, with small pieces of PCB epoxied to the ground plane to act as solder lands for several components. It is pointed out that this constructional approach results in much lower stray inductance, better heat sinking, reduced construction time and, perhaps, better appearance than possible with standard PCB construction.

Fig 2 shows the circuit diagram. The design could be adapted for other, lower-frequency bands, although the tuning range would be much reduced. Points of interest include the use of a 74AC240N chip (octal 3-state inverting buffer) as crystal oscillator and buffer, driving a VN88AFD MOSFET amplifier with a TIP115 PNP Darlington power transistor as a keying device. The chip is fed from a 5V 7805 IC regulator. A simple 24V PSU is shown in **Fig 3**. It can be used with a 13.8V supply, but the RF output will be much reduced.

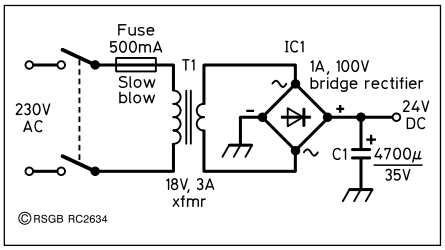

Fig 3: 24V DC PSU for the 'Simple 10-metre QRP Transmitter'.

The MOSFET amplifier operates as a symmetrical square-wave current source, resulting in low even-order harmonics. With a 24V supply, the second order harmonic measured -58dBc. With a keyed amplifier and continuously-running oscillator there is always a problem of backwave. C11 aids measurably in reducing the backwave: without C11 backwave is about 40dB down, with C11 8pF this is suppressed another 13dB to some 53dB down.

RECEIVERS - THE PROFESSIONAL TOUCH

RECENT *TT* ITEMS (December 1999 and February 2000) have taken a critical look at the way in which our communication receivers could be improved, specifically in terms of strong signal performance and in being more user friendly, by providing convenient, ergonomically-designed controls that do not require frequent reference to user manuals, etc. In particular the charge was made by DK4SX that top-of-the-range amateur radio transceivers have tended to be governed more by marketing strategies which dictate features that are of little practical value (but look impressive in sales brochures, etc) than by taking advantage of improved RF performance and better audio performance which are now possible, and which have been implemented in at least some professional models. Admittedly, these sell at many times the prices set for equipment aimed at the amateur market.

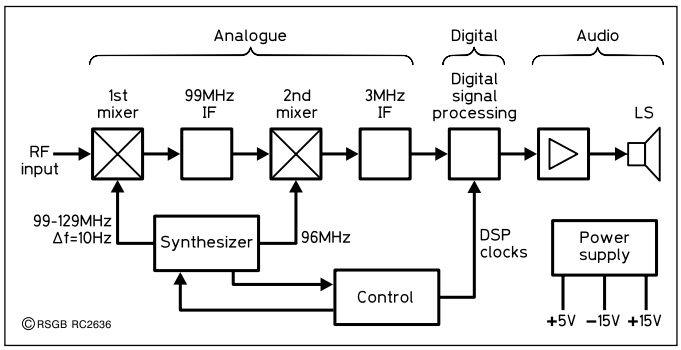

Fig 4: Block diagram of the mid-1980s Collins HF-2050 receiver which became the first production model of a general-purpose communications receiver to incorporate digital signal processing and filtering.

DK4SX underlined his belief that some 20-year old amateur radio models such as the Collins KWM-380 still outperform the more recent Far Eastern models, not only in ergonomics but also in RF performance. He urged *QEX* readers to look critically at the manufacturers' specifications as given in advertisements, brochures, etc. "In case of any doubts, the amateur should not hesitate to look into professional 'specs' for comparisons. You will quickly learn that good performance has always been a good reason for exposure, and that bad performance will be glossed over."

It may seem a little unfair to compare the high-cost receivers developed for professional use - often costing many thousands of pounds - to those intended to meet (just) amateur budgets, but it is worth remembering that it is not uncommon for these receivers eventually to reach the surplus market. In the February comments it was noted that G8MOB's favourite receivers remain the Racal RA17L and their later solid state RA1772, both of which are available on the second-hand market. It is also interesting to note that John Wilson, G3PCY, in discussing the professional Collins HF-2050 (*SWM*, March 2000), writes: "My favourite [professional receiver] without hesitation is the RA1792, which knocks spots off everything else I have tried [so far]. But if anyone offers you a Collins HF-2050, take it."

The HF-2050 was discussed in some detail in *TT* (May 1985 see also *Technical Topics Scrapbook, 1985-89).* Earlier, *TT* October 1984 had reported that Rockwell-Collins were shortly to supply the Canadian Department of Defence with just over 1000 of these receivers under a $6.5-million contract. The HF-2050 thus became the first production-model HF receiver to use digital signal processing and filtering in the entire IF strip, incorporating four or five signal processing microprocessors, resulting in a 1000% drop in time-delay distortion as compared with using mechanical or crystal IF filters.

A detailed report on the HF-2050 was presented by D T Anderson (*IEE Conference Publication No 245*, pp89-93) from which **Fig 4** and **Fig 5** were reproduced. Note that the DSP filtering is carried out at 0kHz and is thus the equivalent of audio filtering in a superhet or direct-conversion receiver. G3PCY notes the relatively large space taken up by the DSP components, compared with more recent designs which make use of application-specific chips such as the Texas Instrument TS-320 and its successor the Motorola 56000-series. But G3PCY comments: "RF and audio performance [of the HF-2050] is outstanding. The DSP worked so well that I am (almost) converted from my disappointment at other receivers in this area." Here again it seems that a pioneering digital design can still offer advantages over some more recent amateur and professional DSP designs.

G3PCY is also impressed by the comprehensive front-end protection [against light-

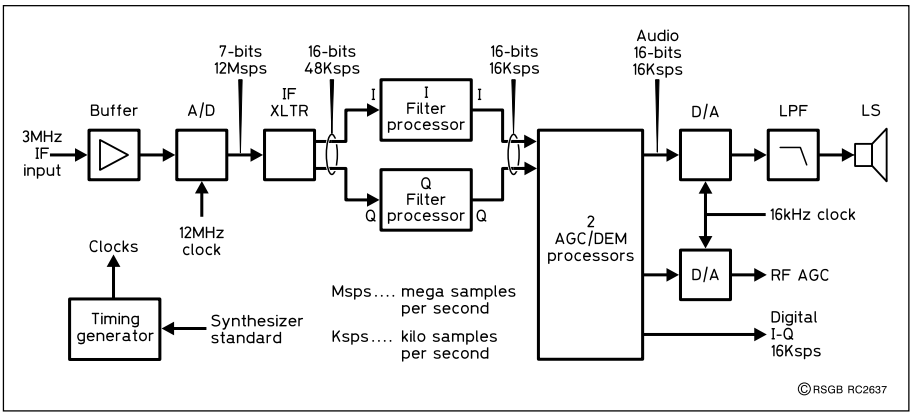

Fig 5: Block diagram of the digital signal processor incorporated in the Collins HF-2050 receiver.

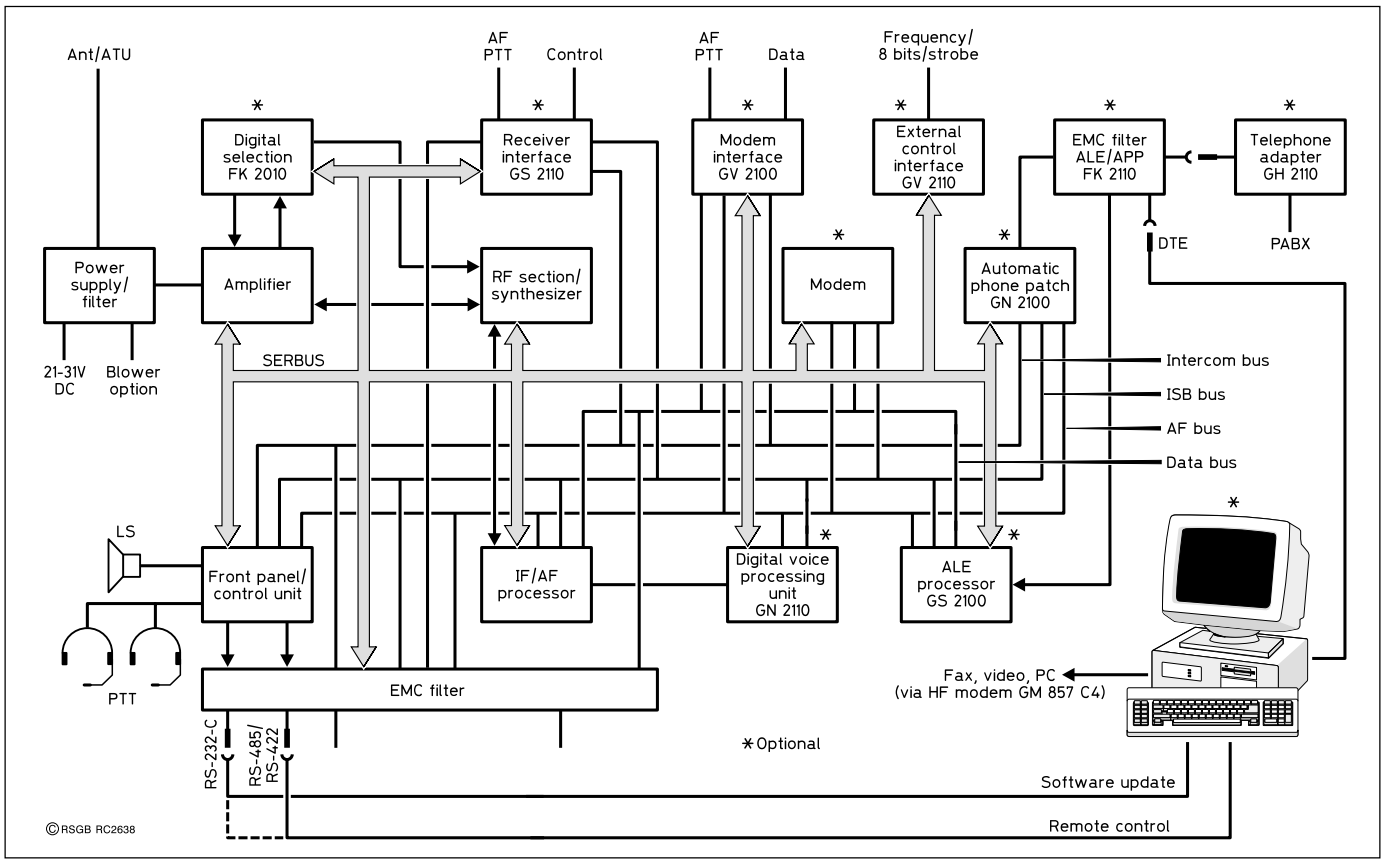

Fig 6: Block diagram of the Rohde & Schwarz XK-2100XK-2100 professional 100-watt HF transceiver of the late 1990s, based on six exchangeable standard modules as well as a large number of optional modules internally controlled via the RS SERBUS. Software updates can be conveniently performed from a PC via the RS-232 interface.

ning or nuclear explosions] which starts out with a small neon tube wired across the antenna input socket, a technique first seen in the wartime BC-348 valve receiver [to protect against an adjacent transmitter - G3VA]. He adds: "Didn't the American manufacturers produce some superb engineering in that 1940-45 period? Made our own R-1155 look like a throwback to the dark ages!"

The HF-2050, like many professional receivers since about the 1970s, used a keypad to select frequencies but also included a tuning knob, although G3PCY admits that the HF-2050 is not for the user who wants a general search receiver: "For the user who wants to 'tune around' I would say look elsewhere."

Of professional receivers generally, G3PCY comments: "They may not have the range of sometimes questionable 'features' seen in the latest offerings in the hobby market, but professional receivers will usually get on frequency faster, stay on frequency longer and produce higher quality audio from difficult signals."

This brings us round in a circle to Dr Ulrich Rohde (Synergy Microwave Corporation, New Jersey, DJ2LR and HB9AWE) whose 1981 article 'Receivers for the year 2000' formed the lynch pin for the January *TT* item. As I pointed out, his perspicuous forecasts were made shortly before the era of digital signal processing in communication receivers. This did not of course imply that Dr Rohde's ideas were no longer valid or had been overtaken by DSP in which, in practice, he is one of the world's leading designers of professional HF communications receivers.

Dr Rohde saw the January item and as a result sent along not only some useful comments on DSP but also a CD-ROM copy of a paper 'Digital HF Radio Communication Techniques', which he delivered at the 1999 USKA Hamfest together with a brochure on the very advanced Rohde & Schwarz XK-2100 professional HF 100W transceiver which has been in production since about 1996. I have been able to get a print-out of the CD-ROM text, although my local library computer could not cope with the diagrams and have now ruled that they will not accept CD-ROMs in view of the limited memory of their computers!

Fig 6 shows the block outline of the XK-2100, which contains six exchangeable standard modules as well as some ten optional modules. I feel this is worth reproducing, since it shows how digital techniques have changed the way in which receiver block diagrams are presented, although this does not mean that the traditional analogue RF front ends are any less important. The IP3 intercept point is greater than 30dBm (two 0dBM interfering signals >30kHz); blocking, 3dB signal attenuation on a wanted 2mV EMF signal from an interfering signal of 5V EMF spaced 30kHz away). Noise figure without preamplifier, 17dB; with preamplifier, 9dB. On transmit, intermodulation products with two-tone modulation and 26.5V supply voltage better than -32dB (typically better than -36dB). But clearly, apart from price, professional and military communications is increasingly diverging from amateur radio practices.

Dr Rohde introduces his 1999 presentation as follows: "Until recently, HF radios have been designed and built in the traditional analog way. A typical HF transceiver used a first IF of 75MHz and second IF of 9MHz. Selectivity was obtained by LC or crystal filters in the IF section and active filters in the AF section. These radios have been used for point-to-point operation where infrequent changes of operating frequency was required. . . with constant output power.

"In order to meet communication goals for 2000 and beyond, particularly in the military arena, modern HF equipment has to be adaptive, frequency-agile and capable of supporting secure digital voice communications. They must operate on point-to-point or networked basis. Adaptivity is needed, both to control transmitter power to a level no greater than required for the radio link, and to select frequencies which provide good propagation with a minimum of interference.

"In the event of deliberate jamming or rapid change of propagation conditions, fre-

quency agility is desirable. . . avoiding a jammer requires a repetitive fast change of frequency called frequency hopping. . . recent Army, Air Force and Navy requirements have focussed in on hop rates in the range of several hundred to several thousand hops per second. . . modern HF transceivers must be equipped with powerful signal processing techniques which provide several levels of redundancy and/or error correction capabilities. . . to allow recovery of desired signals even in the presence of large amounts of natural noise or deliberate jamming. Finally, military HF radios must be designed to support secure voice and data. . . the US military has settled on the encryption of digitised voice using linear predictive coding (LPC). Present military standards have settled on LPC-10, a linear predictive coding/decoding algorithm which compresses 3kHz to a data stream clocked out at 2.4kb/s."

It is perhaps worth pointing out that a recent official British report has criticised the radios used in Kosovo as unreliable and not providing secure communications, although it is perhaps apposite to recall that it proved a grave error of the Germans to use cryptographic systems that they believed to be completely secure. Military history in general shows that encryption can give a strong sense of mistaken security and that, even with modern crypto systems, it is wise to remember that what man has put together with computers, man can usually take apart with computers!

In his letter, Dr Rohde refers to my comments on the unsatisfactory nature of AGC in some lower-cost receivers using DSP technology. He writes: "Since you referred to unsatisfactory AGC, readers may like to read the comments I made on an unrelated project. Linear phase filters are not the solution for signals where information is in the amplitude of the carrier. I do have some strong concern about the IF filter selectivity. The IF filters should really be done using DSP. The book by Anatol I Zverev, *Handbook of Filter Synthesis* should be used as a basis to design DSP filters, particularly, I would recommend the analog equivalent of linear phase filters with an equiripple error. Because of the Gibbs phenomenon I would recommend the use of Butterworth-Bessel class of filters. When using only a few-stage filter, their shape factor is not attractive, however, DSP can add a sufficient number of stages to make-up for this. For more insight into this critical subject, I recommend reading Chapter 7, 'Filter Characteristics in the Time Domain', page 380. This approach would allow moving the filters into the DSP and by using different decimation factors, the number crunching can be kept to a minimum. I assume that the power consumption and price of DSP ICs will continue to improve and I would urge all participants to do as much in DSP as possible, even at today's price and clock rates."

In his letter, Dr Rohde also mentions that he has compared both the ICOM IC-781 and the IC-756PRO [Reviewed by Peter Hart, G3SJX in the March 2000 *RadCom*]. He writes: "When listening to the radios on the same high-fidelity loudspeaker, the 781 definitely sounds 'rounder' or has a fuller audio response. I guess most manufacturers forgot how to build decent audio amplifiers. The rest of the '756 is quite impressive. My major complaint about all Japanese radios is that the AGC starts too late (5-7µV) and the actual S-meter reading starts too late. By realigning the gain distribution in my '781, S1 is now 0.2µV and the AGC starts at that level."

Dr Dick Biddulph, M0CGN (ex-G8DPS), agrees with the February *TT* comments on the multiplicity of "bells and whistles" on recent Japanese transceivers. He finds their presence "amazing, especially as no one I know actually uses most of them. Who needs or uses 100 memories? When I got my 'A' licence early last year, I bought a rig although I still have a mind to make one. I opted for a FT101ZD with a valve PA and a minimum of controls (18 knobs, 7 switches and 9 buttons). I see that the IC-756PRO has 61 buttons and 8 knobs; also 51 bandwidths! I chose a valve PA because I was sure to mistreat it with my long wire antenna (the 'station manager' has forbidden a mast!).

"I believe a radio amateur *should* be able to build an HF or VHF transceiver at least as good as a factory-built one, *but* it will never be as neat or as small. But what it will have is just the 'bells and whistles' that the builder wants!"

MORE ON SOLAR POWER CHARGING

TT ITEMS ON charging batteries from solar cells appeared in the June and October 1999 issues, but it seems worthwhile adding some general notes based on 'Solar-Power Tips' by J C Smith, K0HPS (*QST*, March 2000, p61), who has been using solar panels large and small for several years. He stresses that when you connect a solar module to a battery and check the system voltage, this will usually approximate the battery voltage. Most good solar modules in full sunlight are rated 17.5V and have open-circuit voltages of around 22V. Fortunately, when connected to a reasonably sized battery (say 2Ah or more) it will usually take a long time for the battery voltage to reach harmful levels. Check the specifications of the battery and the radio, but up to 15V is usually fine and sometimes necessary.

K0HPS points out that if you are using the system concurrently to power your equipment, you will probably never measure a voltage as high as 15V "but if you do, just disconnect the solar module for a while."

"Where modules are fitted with a diode, you can leave that in place and not worry about discharging at night. Where there is no diode, disconnect the modules when there is no sun on them. Remember, however, that they do work, at reduced current, even on cloudy days.

"Car batteries are not good storage devices for solar systems. They are designed to deliver large amount of current for short periods and then recharge immediately. For solar systems use a 'deep discharge' (deep-cycle) battery which is designed to deliver a relatively small current for a long period and to be discharged somewhat before being recharged. Neither type of battery will last long in the wrong environment."

K0HPS suggests that if you want a 14V system, a reasonable battery pair would be an 8V (rated at 180A) plus a 6V (165A) (US Trojan T-500 and T-800): "Keep the ampere-hour ratings equal, if possible, so you don't cook the smaller battery while the larger one is still charging. Keep an eye on the electrolyte levels in these mismatched systems and select your solar modules for high voltage ratings so they are likely to charge the 14V battery under most (cloudy) conditions.

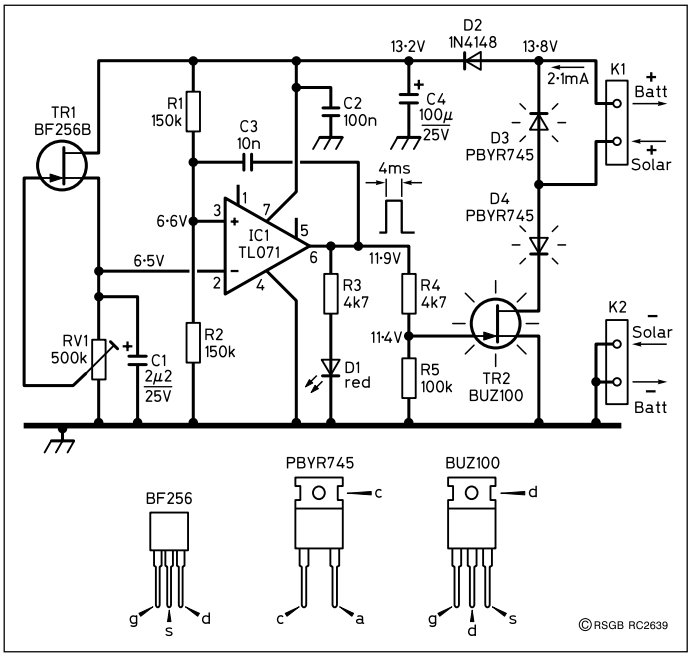

Fig 7: Circuit diagram of the solar panel charging regulator with reverse-current protection (*Elektor Electronics*, 3/2000).

"Solar module output voltage varies with temperature, as do battery characteristics. A typical temperature coefficient would be around -0.38%/°C from a 25°C nominal cell temperature. On a very hot day, your 18V module could struggle to charge a 12V battery (in strong sunlight module temperature might reach some 65°C). Remember you need about 15V for a good charge, more to equalize, and there are diode and cabling losses to consider (significant in a 12V system). What about using 16V modules on a 14V system? Forget it, that voltage won't even do a good job on a 12V system under all conditions.

"Good solar modules are generally made up of 36 cells in a 12-cell series/parallel combination; they put out between 17.5 and 19V. There are also 30-cell modules that put out between 15 and 16V. These were designed for use without a controller. If an appropriately sized battery is used with these 16V systems, it usually won't overcharge, but no guarantees: On a cold, bright day the module voltage output can be high and the battery capacity low. That combination makes an overcharge likely. On the other hand, the module voltage on a hot day will probably be insufficient to charge the battery well.

"Some amorphous thin-film modules don't appear to have 'cells' at all. Just look at the 'operating' or 'rated' voltages to see how much electrical pressure you have available. If you measure module voltage, do so under load. Open-circuit voltages don't tell you much and are almost always over 20V."

Pete Norman, G0PKS, draws attention to a detailed constructional article 'Solar charging regulator for panels up to 53 watts' by H-Tronic of Germany in *Elektor Electronics*, 3/2000 pp12-14. This uses a comparator circuit to switch between charging/non-charging states, with short-circuit and reverse-polarity protection: **Fig 7.** The regulator limits the terminal charge voltage of a 12V battery to 2.30V per cell (equivalent to 13.8V for a 12V battery). The author points out that the terminal voltage of a 12V solar panel is significantly higher than its nominal rated voltage when it is illuminated by strong sunlight, so without a regulator it is not possible to avoid exceeding the fully-charge (terminal charge) voltage of the battery using only a single reverse-polarity-protection diode: "If the voltage applied to the battery is too high, it produces gas, which reduces the life of the battery and can also be dangerous, since the gas is explosive." The article includes a compact PCB layout diagram, etc. It also strongly advises that suitable fuses should be included in both the battery and the solar cell array circuits, since a vehicle battery can deliver currents of more than 100A in the event of a short-circuit.

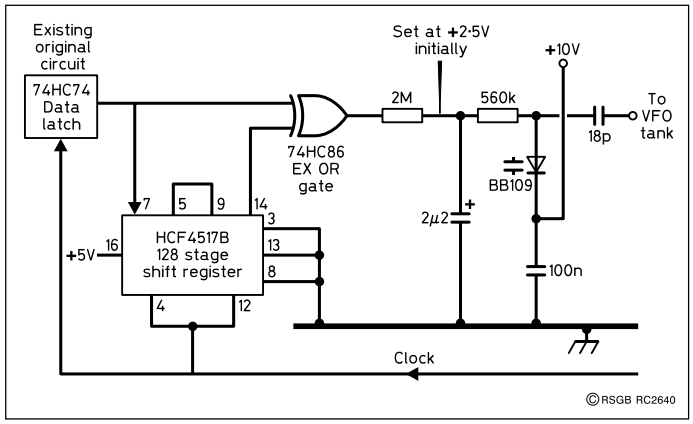

Fig 8: Modifying a huff & puff stabiliser into a G7IXH 'fast stabiliser', capable of holding a good 30MHz LC VFO virtually in lock.

G7IXH's FAST HUFF & PUFF STABILISER

PETER LAWTON, G7IXH was sorry to read in the December *TT* of the death of the innovative Klaus Spargaarten, PA0KSB. He writes: "I have spent many happy hours pondering over his stabiliser designs and trying to improve on them, and I am glad to see that other huff & puff aficionados have been doing the same thing.

"You may recall the circuit diagram of my 'fast' version which was published in *TT*, December, 1997 (Fig 11) and which was subsequently endorsed by PA0KSB himself (*TT*, February 1998). My detailed article appeared in *QEX* about a year or two ago. I am convinced that the 'fast' type leaves the rest standing (pun intended). The design as published in *QEX* has no problem permanently stabilising a 30MHz VFO immediately at switch-on and produces a very clean signal.

"It is very easy to modify an existing huff & puff stabiliser to the fast type: see **Fig 8**. The integrator is a simple RC type and the values are starting values. It may be possible to use the existing integrator. The clock rate has to be speeded up by 127 times to keep the same frequency 'step' as before.

"I have never been able to accept any of the explanations that I have seen for the way in which the huff & puff actually works - so I have made up my own. It is all a matter of probability. For example, in the 'fast' stabiliser shown in Fig 8, on every cycle of the clock (ie the divided-down VFO), the EX OR gate is presented with two samples of the state of the crystal oscillator square wave: a current sample, and one taken the previous 'delay time' as delivered from the shift register. If the two samples are the same, the output of the EX OR will be low and this is arranged to drive the VFO up in frequency. If the two samples differ, the output of the EX OR will be high and this drives the VFO down in frequency. But why should this produce lock?

"Let's take a look at the probabilities of each of these events. If the delay time happens to be *n* periods of the crystal (where *n* is an integer), there is a 100% probability of the two samples being the same, and the VFO shifting up. If the delay time is (*n* - ½) crystal periods, there is a 100% probability of the two samples being different and the VFO going down. The probabilities change linearly between these two delay times, one increasing as the other decreases.

"There is thus a statistical tendency for the circuit to make the 'correct' decision, ie to adjust the VFO away from the step limits on each side and towards the equal probability point, which is when the delay time equals (*n* - ¼) crystal periods.

"It seems likely that all types of huff & puff stabilisers work by comparing a current sample with a previous one, since its seems logically impossible for a device to make an informed decision on which way to move the VFO on the basis of just one instant's information.

"So why do I believe this fast stabiliser to be the best so far? It is because it allows more frequent sampling. In the other versions, the sample interval and the delay time (not obviously apparent, but it must be there) are equal. In the 'fast' version, the sample interval can be decreased without changing the delay time simply by increasing the number of shift registers in the delay line. I use 257 stages in the 30MHz design and sample frequencies of kHz rather than tens of Hz. A FIFO chip would allow thousands of delay stages, but that is a project for the future! More frequent sampling enables a higher correction rate to be applied to the VFO, thus not only allowing compensation for greater drift but also ensures that drift is detected and corrected before it becomes fatal. A higher correction rate also means you need less integrator voltage change, so decreasing the likelihood of saturation. With drift present, the VFO tends to set towards one limit of its allowed range, where the probability of a correct decision is almost unity.

"Two further comments: Any huff & puff stabilizer has only a *statistical tendency* to move the VFO in the right direction at decision time, getting better as the step limits are approached. The inevitable 'mistakes' may explain why a stabiliser that can move a VFO at say 40Hz/s might cope over a long period only with a drift of perhaps 20Hz/s. Finally, if an otherwise well-designed stabiliser ever has to be reset, it is probably due to the crystal signal mark/space ratio. Asymmetry in the crystal signal will tend to saturate the stabiliser as the VFO is swept across the band." ♦

5 WATTS OUTPUT AS STANDARD!

ALINCO DJ-195

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- Alphanumeric display
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- 40 memory channels
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- *THEFT ALARM!* Emits a tone when disconnected from power
- S Meter with easy to read display
- Direct frequency input
- Audio dialer
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FOR DJ-V5

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FOR DJ-195 & DJ-V5

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ALINCO DR-605E *Dual Band Mobile*

CROSS BAND FULL DUPLEX
READY FOR 9600 BPS PACKET

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The DR-605E is a no-nonsense twin-band mobile transceiver that delivers power and performance with user-friendly features. The command keys are simply laid out to enable intuitive operation.

- Ready for 9600 bps packet
- Extended RX capability
  136 - 174MHz
  420 - 470MHz
- 50W (2m) - 35W (70cms)
- 100 memory channels (+ CALL Channels)
- Cross band full duplex
- Tone search function
- Cable cloning function
- Channel indication mode
- CTCSS encoder fitted

ALINCO DR-610E *Dual Band Mobile*

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New! CHANNEL SCOPE FEATURE

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- Channel Scope
- Full duplex
- CTCSS encoder
- AM Airband RX
- Optional extended receive inc airband
  - VHF 108 - 174MHz
  - UHF 420 - 470MHz

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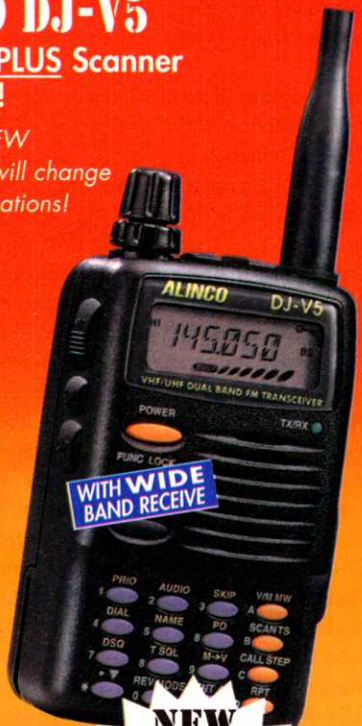
A Dual Band Transceiver PLUS Scanner for the price of a scanner!

ALINCO introduces an exciting NEW VHF/UHF handie transceiver that will change the way you think about communications!



- Full VHF + UHF Amateur Band coverage
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  (3 output settings: 0.5W, 1W, 5W)
- 200 memory channels plus two call channels
- 4 scan modes

  BAND SCAN - Scans entire band in VFO mode

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- Clean, clear Alinco audio
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- Ten auto dial memories
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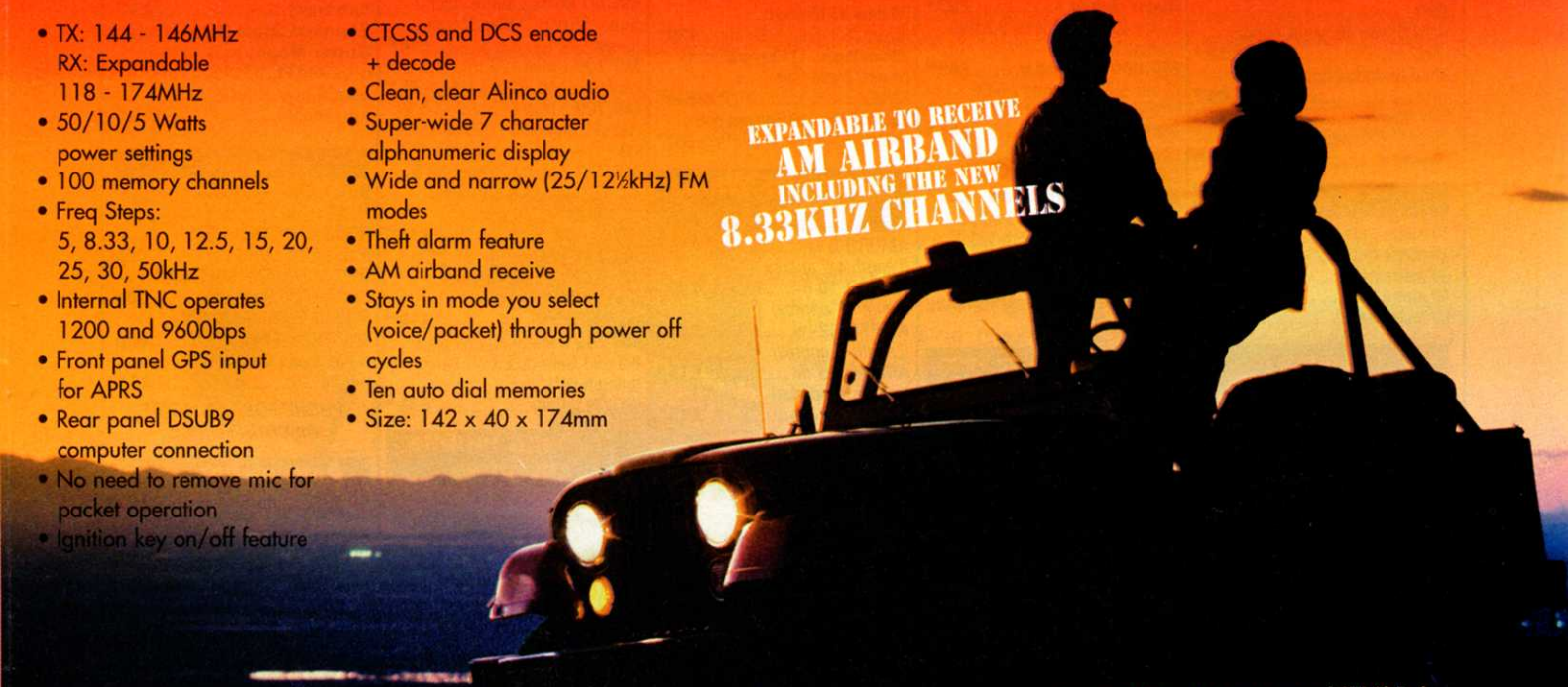
EXPANDABLE TO RECEIVE AM AIRBAND INCLUDING THE NEW 8.33KHZ CHANNELS



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(without ground planes)

70 cms (Length 26") **£19.95**
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Best Quality Antenna Wire

The Following Supplied in 50 metre lengths

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(2 mts 3dBd) (70cms 6dBd) (Length 39")
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(2 mts 4.5dBd) (70cms 7.5dBd) (Length 62")
SQBM200* Dual-Bander .**£49.95**
(2 mts 4.5dBd) (70cms 7.5dBd) (Length 62")
BM500 Dual - Bander
Super Gainer **£49.95**
(2 mts 6.8dBd) (70cms 9.2dBd) (Length100")
SQBM500 Dual - Bander Super Gainer **£59.95**
(2 mts 6.8dBd) (70cms 9.2dBd) (Length100")
SM1000 Tri-Bander **£49.95**
(2 mts 5.2dBi) (6 mts 2.6dBi) (70cms 7dBi) (Length 62")
BM1000 Tri-Bander **£59.95**
(2 mts 6.2dBd) (6 mts 3.0dBd) (70cms 8.4dBd) (Length 100")
SQBM1000* Tri-Bander ... **£69.95**
(2 mts 6.2dBd) (6 mts 3.0dBd) (70cms 8.4dBd) (Length 100")
***SQBM1000/200/100/500** *are Stainless Steel, Chromed and Poly Coated. Full 2 year Warranty on these Antennas.*

2 metre vertical co-linear base antenna

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1½" Diameter 2 metres long .. **£16.00**
1¾" Diameter 2 metres long .. **£20.00**
2" Diameter 2 metres long **£24.00**

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MGR-6 6mm (maximum load 140 kgs) **£29.95**

70cms vertical co-linear base antennas

BM33 2 X 5/8 wave Length 39" 7.0 dBd Gain **£34.95**
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MSS-2 Freq RX 0-2000 Mhz, TX 2 mtr 4.0 dBd Gain, TX 70cms 6.0 dBd Gain, Length 62" **£49.95**
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(Boom 72") (Gain 7.5dBd) **£49.95**
6 metre 5 Element
(Boom 142") (Gain 9.5dBd) **£69.95**
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(Boom 110") (Gain 6.0 dBd) **£79.95**
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(Boom 76") (Gain 12.5dBd) **£39.95**
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(with 3/8 base fitting)

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MR 214 2 Metre ¼ wave (⅜ fitting) **£3.99**
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MR 258 2 Metre ⅝ wave 3.2 dBd Gain (⅜ fitting) (Length 58") **£12.95**
MR 650 2 Metre ⅝ wave open coil (3.2 dBd Gain) (Length 52") **£9.95**
MR 775 70 cms ⅝ wave 3.0 dBd Gain (Length 19") (SO239 fitting) .. **£14.95**
MR 775 70 cms ⅝ wave 3.0 dBb Gain (Length 19") (⅜ fitting) **£12.95**
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MR 776 70 cms ⅝ over ⅝ wave 6.0 dBd Gain (Length 27") (⅜ fitting) **£16.95**
MR 444 4 Metre loaded 1/4 wave (Length 24") (⅜ fitting) **£12.95**
MR 444 4 Metre loaded ¼ wave (Length 24") (SO239 fitting) **£15.95**
MR 641 6 Metre loaded ¼ wave (Length 56") (⅜ fitting) **£13.95**
MR 644 6 Metre loaded ¼ wave (Length 40") (⅜ fitting) **£12.95**
MR 644 6 Metre loaded ¼ wave (Length 40") (SO239 fitting) **£13.95**

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(Boom 60") (Gain 12dBd) **£39.95**
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70 cms 12 Element
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MR 777 2 Metre 70 cms 2.8 & 4.8 dBd Gain (¼ & ⅝ wave) (Length 60") (SO239 fitting) **£18.95**
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ICOM IC-735 tcvr with AT-150 ATU, PS-15 PSU, CT-17 computer interface and IC-SM6 mic, all vgc, with mans, £500 ono. 01608 662 609 (Moreton-in-Marsh). E-mail: beedee@beeb.net

PSION organiser. Series 5, as new, boxed, mans, PC connect kit, £200. Psion series 3, as above spec, £100. 01954 212 989 (Cambridge) E-mail: dhill@tesco.net

TRIO TS-830S HF tcvr with h/book, CW filter fitted, collect or plus carriage, £220. GM3UNJ, QTHR. 01333 421 272 (Leven, Fife).

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YAESU FT-757GX for sale, one owner, both mans, full tx coverage, buyer welcome to try, nice cond, £395 ono. Chris. 0121 608 5101 (Birmingham). E-mail: chris@deakinc.freeserve.co.uk

YAESU FT-76 UHF FM handie tcvr plus extras, £120. Callseeker 2000 CD-ROM, £10. Both items post paid. Mike, G7NDP. 01704 892 088 (Ormskirk).

A FB tcvr, Icom IC-725, gen cov rcvr, 10 - 100W HF, vgc, with mic and man, £325 plus carriage. G4GCU. 01642 471 484 (Redcar).

ADVANCE dual beam oscilloscope, £60. Daiwa medium duty rotator + 60ft control cable, little used, £150. Two Storno ex-PMR rigs, one with W&D synth for 2m, £40 the pair. FT-209 h/held + original packing, £40. W&D 25W 2m linear, £25. Tonna 2m 9-ele, £15. 2m 7/8 wave, offers. BC-221AK signal generator, £50. Taylor model 85A meter + instr man, £35. Speech recorder (Maplin), £10. QRP 80/40 amp, £10. Crystal marker, £10. Geoff, G3YLC, not QTHR. 01908 543 643 (nr Milton Keynes)

ALTRON 30ft wall-mounted tilt-over mast with rotator and 10/15/20m mini beam, dry stored 2 years, £325. 01702 230 133 (Southend-on-Sea).

ALTRON galvanised telescopic tilt-over 60ft mast, c/w Yaesu C600 rotator & control, rotatable 40/20/15/10m-band dipole, £275 the lot. Dismantle/collect. 01749 860 576 (Shepton Mallet).

ALUMINIUM scaffold tubes, 15ft lengths, £10 per tube, buyer collects. Les, G4TEP, QTHR. Please phone between 5.30 and 7.30pm. 020 8953 4576 (Borehamwood).

AMPLIFIERS. BNOS LMP 144-10-100, 432-3-50, £100 each. Mirage dualband 144-440, £55. Alinco 144-30W, £35. Mizuho PL-7S 40m, £55. Amplifiers as new. FT-767GX, auto ATU, CW filters, gen cov, boxed, exc cond, £425. FT-726R, 2/70/HF/satellite, as new, £450. TS-940SAT, auto ATU, voice synth, boxed, mint, £700. SM-220 monitor scope + pan adaptor, as new, £195. FC-707AT, as new, £75. SP-20 speaker, £55. FTS-8 CTCSS, £30. Brand new. TR-2200 2m portable. DRAE 24A PSU, £70. Standard C-7800 70cm mobile, as new, £100. 1Hz-3GHz frequency hunter, controls AOR/Icom scanners, brand new, £100, list price £150. Yaesu headphones, £10. SX-200 1.8-160MHz SWR/Pwr, £40. SX-40 VHF/UHF, £45. FTV-107 2m module, £35. PK-232MBX, £140. Outbacker 2-6-HF mobile antenna, £95. FTV-144 module, brand new, £45. FM-1100 4m synthesised, £100. Daiwa VHF ATU, £30. IC-R72, 100kHz-30MHz, £295. Front panels, TS-940, FT-736R, IC-575, IC-728, 50MHz/50W amplifier, £45. Wanted, SP-21 speaker. 01953 884 305 or 07970 214 039 (Norfolk).

BUTTERNUT HF5 + counterpoise, 5 band vertical, 4 months old, cost £389, boxed, bargain, £150. Kenwood TM-231E 2m FM 50W mobile, as new, £125. Kenwood TM-221E 2m FM 50W mobile with base unit, mint cond, £99. Kenwood TM-733E dual-band, boxed, as new, detachable front panel, £200. Icom IC-229E 2m 50W mobile, boxed, as new, £75. Alinco DR-599 dualband top end FM mobile, mint, boxed, as new, £125. Kenwood TM-732 dual-band 50/35W FM mobile, boxed, as new, £135. Icom IC-2100H 50W, 2m, FM mobile, 4 weeks old, boxed, mint, £120. Realistic DX-394 shortwave rcvr, hardly used, boxed, mint, £49. Manson 30A PSU, mint, £40. Des, 01234 216 932 (Bedford).

CALCOMP 5753 AO plotter, gwo, c/w mans and drivers, £150. A3 inkjet printer, good order, £15. 01386 793 175 (Inkberrow). E-mail: dgrb@aol.com

COLLINS 2050DSP HF, £1650. Harris RF-590A, £1650, Watkins Johnson 8716 HF, £1400. All vgc, c/w mans. Collins HF-8064 preselector, man, £750. 01323 487 919 (Eastbourne). E-mail: collector@pavilion.co.uk

CUSHCRAFT A50-55 6m 5-ele Yagi, £95. Also Adapt-a-mast by Tennamast, £100. G0SRX, QTHR. 01202 873 895 (Ferndown).

DEECOMM roller-coaster high power T-match ATU, £95. Kenwood TS-530S HF plus WARC tcvr, £215. Yaesu FT-790R 70cm multimode tcvr, £150. Rexon RL-402 FM 70cm h/held, 5W, £60. Spectrum RP-6S 6m pre-amp, £15. G3JFC. 01529 413 547 (Sleaford).

DIAMOND CP-5 vertical, used once. 4CX1500Bs and 4CX300A valves. Reasonable offers accepted. Gwyn Williams, G4FKH. 01245 284 710 (Chelmsford). E-mail: gwyn@g4fkh.demon.co.uk

DRAKE L7 linear, 160-10m, 2 x 3-500Z brand new valves, good performance, reliable 1kW out, £800. 01223 263 137 (Cambridge). E-mail: bob_g3pjt@compuserve.com

DRESSLER D-200, spare valve, FWO, £300. Technics V-500 stereo integrated amplifier, remote control, stereo speakers, man, £50. Commodore PC-20111, FWO, discs, mans, no monitor, £25. Panasonic S-VHS video tape recorder (needs new power supply, otherwise FWO) - for spares, £15. SX-200 scanner, man, FWO, £50. Rexon R-102 2m h/held FWO, charger, complete, man, £50. Bleeper control and pre-amp control boxes, £10. 01296 682 556 (Leighton Buzzard).

DX-394 Realistic SW rcvr, £80, carriage included. Comet 6.2dB 6m base aerial, vgc, buyer collects, £25. 01455 449 602 (Hinckley).

FOR sale KW Ten-Tec Argonaut 515, c/w PW and h/mic, rcvr ok, tx needs repair. Any offer? 01264 352 619 (Andover).

FOR sale, Yaesu FT-101ZD tcvr, WARC bands, FM board fitted, £225 ono. Dave. 01942 211 397 (Wigan).

FOR sale: MFJ-1798 10-band vertical antenna, partly assembled, unused, £170 ono. 01708 228 896 (Upminster). E-mail: lionel.g0gzs@btinternet.com

FT-411 2m h/held, speaker/mic, various whips, numerous adapters and cable connectors, charger, car adapter, £50. Altron 20ft wall-mounted tilt-over mast, 3in diameter, 4ft fibreglass stub-mast 1¾in diameter, £50 ono. G0EJZ. 01474 822 685 (Gravesend).

FT-8000 VHF/UHF tcvr, boxed with man, £200. Yaesu FT-1000MP/AC, boxed with man, £1300. Yaesu MD-100 desk mic, £60. MFJ-989C 3kW roller coaster ATU, £200. Hanson FS-5S SWR/Pwr meter, 1000W 1.8 - 150MHz, £50. Heil headset (headphones + mic), £50. Cushcraft X7 (Big Thunder) 7-ele HF beam, £300. Yaesu G-1000SDX rotator, c/w controller, £300. Strumech Versatower 60ft tower, e/winch, £750. All items are under 18 months old (genuine sale). Moving QTH. GW4YJI. 01639 710 147 (West Glamorgan).

FT-8100R VHF/UHF, extended receive, mint, £230 ono. FT-290, tatty but gwo, £90 ono. MFJ-784B DSP filter, boxed, £70 ono. Alinco DJ-95EY VHF/UHF h/held, with speaker mic, soft case, dry cell case, DC lead, £170 ono. No reasonable offers refused. 01159 404 535 (Nottingham). E-mail: drboris@agilfillan.freeserve.co.uk

GEC BRT-400, ex-Reuters with mans, gwo, £75. Sommerkamp FT-250 HF tcvr, matching transformer, speaker, mans, gwo, £90. MFJ-784B DSP filter, boxed, as new, £90. Buyer collects first two items if possible, please. G0TLS. 01793 613 857 (Swindon).

HUNTER 6m amp, very little use, buyer to collect, £600. Alex, GM0HNX, QTHR. 01890 830 294 (Coldstream).

ICOM IC-706 Mk2, boxed, man, bracket, £575. FT-290 Mk2, linear, case, never mobile, £275, both excellent. 01252 876 277 (Camberley, Surrey).

ICOM IC-706MkIIG, latest model, 18 months Icom UK warranty, brand new and boxed, man, mic, £699. 01489 789 960 (Gosport).

ICOM IC-735, c/w filter, boxed, with mans, immac cond, £250 ono. CDE AR-40 and Sky King 2303 rotators, with mans, £10 each. KW E-Zee match, £5. IC-100 auto ATU, £40 (with cables for IC-735). Collection of old valves - list on application. Buyer collects or pays p&p. 01642 872 762 (Stockton-on-Tees).

ICOM IC-740 HF tcvr, not used much, £350. 01582 766 410 (Harpenden). E-mail: dave_skye@hotmail.com

ICOM IC-T7E 2m/70cm h/held FM tcvr, £135. Spkr/mic, £15. Desk holder/stand, £10. Mobile dual-band antenna, £10. AOR AR-2700 h/held scanner, £120. All boxed, with mans, very little used. M0ALP, QTHR. 01625 511 991 (Macclesfield).

INDEX QRP Plus, exc cond, £360 ono. MFJ-901B ATU, £30. Kenwood MC-85 mic, £70 ono, exc cond. Lake TUA1 QRP SWR meter, £25. 300W mobile HF amp, £55 ono. Radio Shack 3A PSU, £20. MFJ-564 twin paddle, £40. Sandpiper 80 - 10m vertical, £80. All items exc cond. Steve. 01691 650 722 (Oswestry). E-mail: m0ccn@lineone.net

JAYBEAM TB-2, 2-ele HF tri-band beam, £100. CR-100 rcvr, working, £50.. Julian, G0LXX, obo South Notts ARC. 0115 974 4655 (Nottingham). E-mail: julian@diamond.co.uk

KENWOOD 830S HF tcvr, also Kenwood 120 VFO remote, boxed, man, £350. Kenwood 940S HF tcvr with internal ATU, boxed, man, £500. Will deliver within 100 miles. Please phone after 8pm. 01384 485 965 (Brierley Hill).

KENWOOD TH-28E 2m h/held, as new, £100, or exchange HF/WHY? Vectronics VC-300M 300W mobile ATU, 1.8-30MHz, £40, or exchange HF/WHY? 01239 654 880 (Cardigan).

KENWOOD TH-48E 70cm h/held tcvr, with 2m receive, carrying case, charger, man, mint cond, £85. Homebrew 2m converter, 28-30MHz output, £5. h/held 40-channel FM CB tcvr, LCD channel indicator, switchable 1 or 4 watts output, with man, UK spec 27/81, unused and boxed, £35. 01945 589 707 (Wisbech).

KENWOOD TS-130 100W HF + WARC tcvr, compact, 12V, digital readout, exc cond, £250 ono. G3TCO, QTHR. 0117 968 1068 (Bristol). E-mail: a.w.preece@bristol.ac.uk

KENWOOD TS-520SE, remote VFO, matching speaker, £250. 25-30ft aluminium mast + pegs + guys in original wooden case, heavy, £80. Marconi TF-801A signal generator, 10-300MHz, £45. 01745 851 564 (Prestatyn).

KENWOOD TS-530S and VFO-240, £225 + carr. Yaesu FL-2000 linear amp, £225 + carr. Mike, G4AHJ, QTHR. 01484 604 789 (Huddersfield). E-mail: mike@g4ahj.fsnet.co.uk

KENWOOD TS-830M tcvr, 160m - 10m inc WARC, c/w AT-230 ATU and SP-230 speaker, h/book and service man. All in vgc, in original boxes, £400. 023 9236 7102 (Gosport). E-mail: g3ull@aol.com

KENWOOD TS-940S in mint cond, internal ATU, MC-60 mic, SP-230 speaker, man, boxed, £675. Kenwood TS-830S, mint cond, MC-35S mic, SP-230 speaker, man, workshop man, boxed, £399. Hunter HF linear amplifier, 3-500ZG PA, brand new, not used, soft start, with spec sheet from Linear Amp UK, £625. Buyer collects or pays carriage. 01708 373 366 (Hornchurch). E-mail; martin.foster@itn.co.uk

MARCONI 2386 100kHz-26GHz spectrum analyser, £6k. EIP 578 frequency counter, 10Hz-26GHz, £2.5k. HP 8511A frequency converter, 45MHz - 26GHz, £4k. Pakratt PK-232MBX, £100. 0124 326 5220 after 6pm (Bognor). E-mail: h-t.volz@virgin.net

MFJ -1278B DSP multimode data controller, MFJ-1289M, software, mans, leads, £120. Daiwa PS-30XMII 30A PSU, £55. Star SR-700A 17-valve rcvr, £70. Hallicrafters S-

108 rcvr, £80. MFJ-422B El-keyer on Bencher BY-1 paddle, £60. Hy-Gain TH-3JR 3-ele beam (traps need attention), £75. 2x12ft + 1x8ft heavy duty lattice tower sections, £65. 4CX250B, new, £12. 01362 688 506 (Norfolk).

MFJ Versatuner III, 1.5kW antenna tuner model MFJ-962C, exc cond, £175. Roland, G4GNW. 01702 710 000 (Leigh on Sea).

MICROWAVE Modules 144MHz 30W linear amplifier (MML 144/30-LS), mint cond, little used, £60. G3YYZ, QTHR. 01255 880 893 (Harwich).

MORSE key Hi-mound deluxe HK-804, pristine cond, collectors item, asking price £50, buyer pays carriage. 01776 702 876 (Stranraer). E-mail: gd.maxwell@cwcom.net

MOSLEY classic 3-ele tri-band trapmaster CL-33, c/w rotor & controller (110V AC), £150. G4EDK. 01305 268 532 (Dorchester). E-mail: ballal@virgin.net

MOVING sale - everything must go! Ten-Tec Corsair2 + PSU, Heath SB-221, FT-200 + PSU, 45ft Tennamast and full size 20m 3-ele Yagi, c/w rotator + 100m control cable and coax, Cushcraft 3-ele 10m Yagi, Jaybeam TB-2 tribander, Create 80-10m vertical, 486 100MHz PC, IBM 286 PC, Scopex d/b scope. All above in two. First offer on all or any of the above accepted. Buyer brings cash and collects. For the mast, bring two strong friends and a low-loader! Anything unsold will be 'skipped'! 020 8449 7135. (Barnet). E-mail: g3hjf@btinternet.com

PSU in instrument case, 1kV 250mA and 240V 150mA. Offers to G4CK, QTHR, buyer collects. 01747 851 774 (Shaftesbury).

QRP 80/40m homebrew tcvr, 4/8W, 1968 valved circuit with PSU and spare valves, £10. Command tcvr (2MHz?) and odds and ends, free (collect) or charity donation. G0NID, QTHR. 0161 998 2921 (Manchester).

R1155A, no DF, with h/book, PSU, o/p stage, speaker cabinet, gwo, £50. HP 616B microwave sig gen, gwo, £25. 0118 979 1488 (Wokingham). E-mail: cacooper@iee.org

R-7000 vertical antenna, 10-40m, boxed, full instructions, £175. G0ORH. 01635 866 881 (Newbury). E-mail: g0orh@aol.com

RADCOM bound volumes 1965-1997, vgc, kept in bookcase, £250. G3UGL, QTHR. 01234 750 050 (Cranfield). E-mail 100704.302@compuserve.com

SERVICE mans. Icom IC-R7000, £15. IC-2SRE/A, £12. IC-28A/E/H, £12. IC-125/T/TM, £12. IC-211 instruction man, £6. Kenwood TS-440, £15. TM-732, £12. TS-530S, £15. TS-50S instruction man, £6. CR100 technical man, £6. Yaesu FT-One technical man with service extender kit, £25. All inc p&p. CSC 5001 universal counter/timer, with man, £15 plus p&p. G3FUN, QTHR. 01795 532 608 (Faversham).

SHACK clearance: Yaesu 8800 gen cov rcvr with VHF module, vgc, £180. Icom 730 HF tcvr, good, £140. Trio 530S tcvr, complete station with SP-230 speaker and AT-230 ATU, £300. Datong Morse tutor, £20. Alinco 25A PSU, £35. Ferguson BSB satellite rcvr and dish, £15. Yaesu GR-400RC rotator, £50. Kenwood MC-50 mic, £15. HS-5 headphones, £10. G0MND, QTHR. 01767 221 944 (Biggleswade). E-mail: terry.rogers@freeuk.com

SILENT key sale, G3III. Tennamast galvanised 40ft retractable post-mounted mast, with post, cage with top bearing, G400 rotator + control unit with cable. Ready dismantled for collection, £250. G0UWB. 01608 685 476 eves (Shipston on Stour). E-mail: ralph@rmoyle.freeserve.co.uk

SILENT key sale: Late G4MXH. Trio TS-530SP, £210. Offers for following: Uniden 2030 VHF rcvr, Yaesu FT-7B with power supply, Dentron HF matching unit and monitor, Netset SWR/power meter, Ross headphones, AEG SWR-50A SWR meter, Labpack variable output PSU, Trio 9R590 rcvr and SP-5DS speaker, Tech TE-20D signal generator, Yaesu FR-50B rcvr, Eagle TT-145 transistor/diode tester, Codar PR-40 preselector, Datong DT0 Morse tutor. Grundig Satellit 3400pro SW rcvr, £200. 01642 653 159 (Stockton).

STANDARD 2m all-mode tcvr with man and diagrams, £100. Yaesu FT-790, new, never used, all boxed, £200. Callers only. Peter, M1DBB. 02380 254 249 (Southampton). E-mail: m1dbb@aol.com

STRUMECH 60ft heavy-duty tower with KLM-34A 4-ele beam plus Yaesu 1000SDX rotator, complete installation only 3 years old, full planning permission obtained. Installed in beautiful ½ acre garden of 17th century detached house in pleasant Somerset village. House and gardens in outstanding condition with interesting history, double garage, central heating, summer house, orchard, etc, etc! Ideal for idyllic operating in retirement. £200,000 – No Offers. G4LZU. 01823 400 926 (nr Taunton).

TRIO TR-7730 2m 25W, extras, £60 ono. Alinco DJ-480 70cm h/held, extras, £60. Packet PacComm Tiny-2, £60, extras. Kenwood TH-25E, £50, extras. G3UCE. 01524 822 125 (Lancaster).

TRIO TS-520 HF tcvr, gwo, c/w mic, CW filter, mans, spare valves, £160. Icom IC-730 HF tcvr, gwo, c/w mic, CW filter, man, £250. Diamond SX-200 SWR/Pwr meter, as new, £35. Pro-Tel AM-601 condenser desk mic, £30 ono. 01789 267 430 (Stratford-upon-Avon). E-mail:101465.1071@compuserve.com

TW-4000 dual bander, gwo, £150 ono. RN 2m - 4m transverter, £150 ono. Hi-mound HK-708 key, as new, £12. G3JQL, QTHR. 0191 386 1116 (Durham).

TWELVE ex-DDR field-telephone units with one ten-line four-way exchange, in die-cast case, plus knapsack wire reel carrier and various spares. Buyer collects, £150. Also Racal RA-17, £140, buyer collects. G7KKC. 01384 877 336 (Stourbridge).

UNIDEN Bearcat h/held scanner, 10 bands, aircraft, 800MHz, Ni-Cd (rech), 200 channels, as new, 5yr warranty, £75 ono, all p/work. 01245 223 494 (Chelmsford). E-mail: glmills@freeserve.co.uk

VARIABLE voltage transformers, some with cover, 0-270V output @ 20A, £75 ono each. GW0ALR. 01267 222 445 (Carmarthen). E-mail: adrian@amgenerators.com

YAESU 224FT, £40. Kantronics all mode/packet, £80. 70cm reflectometer type RFL, freq 400-500MHz, imp 50 ohms, £95. Ferrograph series 5 tape recorder, h/book, £30. 01745 590 064 (Rhuddlan). E-mail: roy@stubbo70freeserve.co.uk

YAESU FT-101B, little used, pre-WARC bands, £125. Microwave Modules 10m - 2m transverter, £45, or £150 the pair. Also Heybrook TT2 turntable + Linn Basik arm, needs new stylus, offers? Shure 444 mic, £5. Compaq Deskpro 286E PC, £40. Boxed, software with mans: Lotus 123, release 2.2, Wordperfect release 5.1, offers? David, G4BIX, QTHR. 01727 843 277 (St Albans). E-mail: davidprice3@compuserve.com

YAESU FT-101ZD HF tcvr, new tubes fitted, also FC-902 ATU, together, £225, may split, offers considered. Dennis, G0BPM, QTHR. 01142 872 358 (Sheffield).

YAESU FT-23 VHF h/held, battery poor but gwo, no h/book, £35 + post. 07768 492 562 (Isle of Wight). E-mail: paul.i.martin@btinternet.com

YAESU FT-290R Mk2 with h/book, scanning mic, 12V PSU, case, £175. 145MHz end-fed VHF aerial, £15. GM4HWO (not QTHR). 0131 664 5417 (Edinburgh). E-mail: colin.wright@iclway.co.uk

YAESU FT-736R VHF/UHF all-mode tcvr, exc cond, owned since new, boxed, man, etc, 240V AC, £675. G0KDR, QTHR. 01728 663 476 (Saxmundham). E-mail: g0kdr@btinternet.com

YAESU FT-757GX 100W HF tcvr, gen cov rcvr, CW filters, elec keyer, mic, man, original packing, exc cond, £275. Keith, G4YQW. 0113 255 2615 (Leeds).

YAESU FT-763R 2m/70cm multimode base, boxed, man, exc cond, £700. G0WUG, QTHR. 01509 672 846 (Kegworth). E-mail: gary.bishop@talk21.com

YAESU 767GX, fully banded, automatic ATU, instruction man, £650 ono. Trio 830S, mint cond, boxed, instruction man, speaker, £350 ono. 01782 544 731 (Stoke-on-Trent). E-mail: miemie@4unet.com.uk

EXCHANGE

ALINCO DR-140, as new, only used on packet for short time, boxed with man. Exchange for 70cm rig of similar value. John. 021 688 3862 (Birmingham)

WANTED

ALL early wireless equipment wanted. rcvrs, crystal sets, early transmitters, horn speakers, valves, Morse keys, spy sets, pre-war television. Any cond considered. Jim Taylor, G4ERU, 5 Luther Road, Winton, Bournemouth, BH9 1LH. Tel/fax: 01202 510 400 (Bournemouth).

VALVE/tube tester required by OAP returning to ham radio. Must be fully working and in good cond. Phone/fax 020 8946 2028 (London).

WANTED: Handbook/manual for Icom IC-735**.** All expenses covered. G3XBE (not QTHR). 0115 970 4184 (Notts).

AEA MM1 Morse machine, urgently require h/book or photocopy of same, will pay all costs involved. GW4TVQ, QTHR. 01639 813 431 (Port Talbot).

ATLAS tcvr, 1.8 - 30MHz, valve type, working or not. Peter, G8CKM. 01939 210 670 (day), 01939 250 679 (eves) (Shrewsbury).

BC-375 tx, complete or parts, mans, etc. AN/ART13 tx, complete. Power unit DY11/ART13, DY12, etc or parts, incomplete unit considered or in any cond. BC-348, must be complete and original - no mods. BC-312, BC-342, must be original. Any other WWII American aircraft equipment wanted. Cash waiting, will collect. 01202 484 838 (Christchurch). E-mail portfield.garage@virgin.net

COLLINS R391/URR and R389/URR rcvrs. Overall cond unimportant, provided complete. I am not interested in so-called 'mint' examples offered at inflated 'collector' prices. Details to Neil, G8LIU, QTHR. 01895 230 006 (Uxbridge).

FLUKE scope meter 105B. Rohde & Schwarz Polyskop IV or V. GW0ALR, 01267 237 078 (day), 01267 222 445 (eve) (Dyfed). E-mail: adrian@amgenerators.com

KW-109 Supermatch ATU. Any condition will be considered and reasonable offer made. David. 01823 323 015 (Taunton).

MARCONI rcvrs wanted. Mercury, Apollo, Yeoman, Elettra, Seaman and any other Marconi Marine sets. Richard, G0OGN, QTHR. 01789 293 375 (Stratford-on-Avon). E-mail: g0ogn@aol.com

MINIBEAM and rotator in gc. John, G0GHQ. 020 8561 3837 (Hayes). E-mail: john@peppsdemon.co.uk

QTH in S Gloucestershire / N Somerset areas, 2/3 bed detached or semi-large gardens and garage, price up to £130,000. John, M5JON. 01179 311 693 (Bristol).

SILENT key clearout, or just not needed. Wanted for research project. QSL accumulations, old call books, etc. Can collect. 0113 269 3892 (Leeds). E-mail: g4uzn@qsl.net

VIBROPLEX key. Details and price to GM4FH. 0131 664 3046 (Edinburgh). E-mail geoffrey.walsh@ed.ac.uk

VR6/VP6 QSL cards. Any unwanted QSL cards for the Pitcairn Island would be gratefully received for my Pitcairn collection. Any postage costs will be refunded. If you are about to dispose of your collection please check for VR6/VP6 cards first. Many thanks. Paul, G3VCN. 01752 339 738 (Plymouth).

WANTED any working 934MHz obsolete CB tcvr for research project, or info on possible sources. G3TCO, QTHR. 0117 968 1068 (Bristol). E-mail: a.w.preece@bristol.ac.uk

WANTED for Drake R4C, 250Hz crystal filter, your price paid, also 2m co-linear ant. Frank, G3KJG. 01132 842 597 (Leeds).

WANTED Icom IC-746, SP-21 speaker, PS-85 PSU, Yaesu FT-847, FP-1030A, PSU, MD100 mic, Yaesu FT-736R (must have 6m module), SP-767 speaker, Weltz SP-15 power meter. Cash waiting for clean, boxed examples. Steve, G4TRA, QTHR. 01453 842 723 (Wotton-Under-Edge). E-mail: steve_redway_traction@compuserve.com

WANTED Norfolk/Suffolk area, QTH edge of village, 2 to 3 beds, house, workshop, some land for antennas/dogs, detached preferred, max £125,000, cash buyer. GW0ALR. 01267 222 445 (Carmarthen). E-mail: adrian@amgenerator.com

CLUB NEWS

DEADLINE – Items for club news should be sent to the *RadCom* Office at HQ to arrive by the 26th of the month, ie approximately a month before publication. For example, 26 January for the March Issue. News items should be sent in writing (fax or letter) and be signed by the club secretary or the person responsible for publicity. Post cards for this purpose are available from RSGB HQ.

Note: This is a service for clubs affiliated to the RSGB. The announcements are intended to notify non-members and potential members of your club of specific events. Therefore, 'committee meeting', 'natter night' and 'ragchew evening' etc will not be included. Basic, unchanged details about RSGB-affiliated clubs are published annually in the *RSGB Yearbook*.

ALDRIDGE & BARR BEACON ARC – 4, JS 10.30 - 2.30. Charles, G0NOL, 01922 636 162.

APPLEDORE & DARC – 4, Club Radio and Equipment Field; 19, Comment/Report to members. Brian Jewell, 01237 473 251.

ARC OF NOTTINGHAM – 1, Forum; 8, Antenna Logistics, Design & Build Part 2; 15, ARDF No 3; 22, Come & Build a 'Touch' Morse key; 29, T 'The mystery man'. Ron, G4XOU, 01159 199 177.

BANGOR & DARS – 7, Barbecue and QRP evening; 25, Summer 'Radio and Computer Rally' at the Clandeboye Lodge Hotel, Bangor. Mark, MI1DRU, 028 9058 6515.

BARRY ARS – 3/4, Club entry in the RSGB HF NFD ; 6, T 'Introduction to HF Data', by John, GW4SKA; 13 & 20, OTA & MP; 27, Final planning meeting for the RSGB VHF NFD. Rich, GW4BVJ, 01656 658 830.

BRACKNELL ARC – 14, The future for GB3BN. Baugh @compuserve.com

BRAINTREE & DARS – 5, 10GHz Demo/Talk with Ken, G0WZV; 19, G4JIE with his mobile HF aerial design. Keith, M0CLO, 01376 347 736.

BROMSGROVE ARS – 13, OTA, DXing; 27, ARDF – Mobile. B Taylor, G0TPG, 01527 542 266.

CHELMSFORD ARS – 6, CC; Charles, G0GJS, 01245 256 654.

CHESHAM & DARS – 14, OTA; 21, Tech Talk; 28, Shack Night. P Blakeney, G8BLB, 01494 784 811.

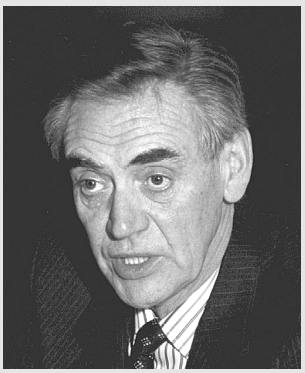
CHESHUNT & DARC – 7, Members' Forum; 14, Aerial Tuners - David, M1DGS; 21, OTA; 28, Portable on Baas Hill Common. David, M1DGS, 01920 463 746.

COCKENZIE & PORT SETON ARC – 18, *Practical Wireless* 144 MHz QRP Contest; 21, C&PS ARC 10m Contest. Bob, GM4UYZ, 01875 811 723.

COLCHESTER RA – 8, T 'Archaeology by Traditional and Modern Techniques', by Phillip Crummy, Colchester Archaeology Trust; 22, Colchester Mobile Rally - pre-planning and

organisation. Frank, G3FIJ, 01206 851 189.
CRAWLEY ARC – 21, T 'Amateur Television', by John Stockley, G8MNY. Stewart, G3YSX, 0772 006 8493.
CRAY VALLEY RS – 1, Rob Mannion, G3XFD, Editor of *Practical Wireless*; 15, Annual ARDF. Tony, G4WIF, 020 7739 5057 (OH).
CROWBOROUGH & DARS – 22, CC Activity Evening and CC judging. Margeret, G6UIF, 01892 663 666.
DERBY & DARS – 7, JS; 21, T 'Thomas Edison', by Phil Rosen; 28, Technical Topics Evening. Martin, G3SZJ, 01332 556 875.
DORKING & DISTRICT RS – 4, Mid Hampshire Rally 2000, ES; 27, VHF NFD planning meeting. John, G3AEZ, 01306 631 236.
DUDLEY ARS – 17, The World Wide beacon system (Update). Bill, G3CAQ, 01902 843 873.
ECHELFORD ARS – 8, T 'Basic HF Station Set-Up', by Ken Kenward, G4WPD; 22, Mutual verbal intercourse night. Robin, G3TDR, 01784 456 513.
EDGWARE & DARS – 8, ES; 22, VHF Field Day briefing. David, G5HY, 01923 655 284.
EXMOUTH ARC – 14, Computer Forum; 28, T 'Telephones', by Ray and Mike. Alec, G8GON, 01395 264 872.
FALKIRK RC – 24/25, Scout Field Day in BP Club, Grangemouth. Bob, GM4CAQ, 01506 844 418.
FARNBOROUGH & DARS – 8, ES; 22, T 'Club Awards' by Ivor, G4BJQ & Bob, G0YYY. Norman, G0VYR, 01483 835 320.
FELIXSTOWE & DARS – 5, Novice RAE Exam; 12, HF Kite Flying; 26, CQ WW. Paul, G4YQC, 01394 273 507.
GLOUCESTER AR & ES – 5, OTA; 12, 5WPM; 19, Midsummer outdoors event; 26, OTA. Tony, 01452 618 930, OH.
GREAT LUMLEY AR & ES – 11, Organising a bus to the Elvaston Rally, anyone interested in going please ring. Dave, M0BPM, 0191 388 8113.
GRIMSBY ARS – 1, NFD organisation; 15, Report on RIG conference by Dave, G0IIQ. Brian, G4DXB.
GUILDFORD & DRS – 9, CC. Tim, G7JYQ, 020 8399 5125.
HALIFAX & DARS – 20, Barbecue with Rev George Dobbs, G3RJV and his wife as guests. Ray, 01274 600 297.
HARWICH ARIG – 14, Barbecue Night. Eugene, G4FTP, 01206 826 633.
HEREFORD ARS – 2, Talk by Don Beattie, President, RSGB (Note date changed). Tim, G0JWJ, 01432 279 435.
HORNDEAN & DARC – 6, Club Social Evening; 27, T 'Radio-Controlled Model Aircraft', by John Brandhuber, G4PDY. Stuart, G0FYX, 01705 472 846.
HORNSEA ARS – 7, ARDF; 14, T 'Hull, Then and Now', by G4UOG; 21, Activity; 28, VHF Field Day preparations. John, G0TPS, 01964 562 258.
HORSHAM ARC – 1, T 'Phased Vertical Antennas', by John Matthews, G3WZT. David, G4JHI, 01403 750 228.
HULL & DARS – 9, Technical Forum, G0TPS. John, G0TPS, 01964 562 258.
IPSWICH RC – 21, 2m ARDF starting at 7.00pm; 28, Morse Evening. Keith, G7CIY, 01394 420 226.
ITCHEN VALLEY ARC – 9, Treasure Hunt (from the Scout Hut); 23, Great Egg Race, Brian, G0UKB. D C Symonds, G0PRZ, 023 8026 1877.
KIDDERMINSTER & DARS – 6, ARDF; 10, Surrey & District Clubs, & local radio amateurs get together. T 'The Internet and Amateur Radio', by Jeremy Boot, G4NJH. GB2KOT Special event station, Bring & Buy. Mary, G0BQV.
LEICESTER RS – 5, JS; 19, OTA; 26, Lecture. A T Wann, G0TNI, 0116 263 0947.
LINCOLN SHORT WAVE CLUB – 7, Millennium Quiz; 21, New Shack Opening/Barbecue; 28, Walking Treasure Hunt. John, G1TSL, 01522 793 751.
LIVERPOOL & DARS – 13, OTA; 27, ES. Ian, G4WWX, 0151 722 1178.
LOTHIAN RS – 7, AGM; 21, Social Evening. Brian, GM4DIJ, 0131 334 2247.
LOUGHBOROUGH & DARC – 6, Old Photographs & Pluto - Bob and Ian; 13, Treasure Hunt with Noel, G0WTA; 20, 3rd ARDF of the year. Bands TBA; 27, Radio & Computer Workshop. Someone may be able to help with your problem. Chris, G1ETZ, 01509 504 319.
MAXPAK – 5, Packet Radio software review. Ron Taylor, G6LRD, 01922 684 496.
MID-WARWICKSHIRE ARS – 13, ARDF Contest - 145MHz; 27, T 'Stepper Motors', by Bernard, M1AUK. Bernard, M1AUK, 01926 420 913.
MORECAMBE BAY ARS – 6, Annual Hiljon Trophy ARDF Hunt. Brian, G0RDH, 01524 42 4522.
NEWBURY & DARS – 18, 14th Annual Amateur Radio Car Boot Sale, Cold Ash Playing Field, nr Newbury. George Cook, 01488 682 814.
NORFOLK ARC – 28, National Field Day; 28, Annual ARDF Foxhunt. John, G0VZD, 01953 604 769.
NORTH BRISTOL ARC – 9, T 'The Radiocommunications Agency - Exposed!', by John, G4GAU; 16, Logging and Operating - Training for VHF NFD; 30, VHF NFD Preparation. Dick, G0XAY, 01454 218 362.
NUNSFIELD HOUSE ARG – 2, OTA; 9, Rally Preparation Evening. Please come and lend a hand; 11, 31st Elvaston National Radio Rally; 16, Rally Post Mortem; 23, Fox Hunt by Brian Reid, G1CUH; 30, ES. Ann, 2E1GMP, 01332 752 997.
OXFORD & DARS – 8, T 'Setting up a Web site', by Paul Goodhall, BRS176562; 22, Summer Social Evening. Dave, G3BLS, 01865 247 311.
OSWESTRY & DARC – 4, T 'Radio Signalling', by Mr L Bridges of *RailTrack*. Contact number is 01939 261210; 8, Visit by Don Beattie, G3OZF (RSGB President). Ant Astley, GW0AJA, 01691 860 545.
QRZ AR GROUP OF SUSSEX – 9, T 'Getting started on Microwaves', by Derek Atter, G3GRO. Stuart, M0CHW, 01435 863 020.
RS OF HARROW – 23, Midsummer Kite flying. Trying for an airborne antenna at the Arts Centre Field; 24, GB2DHH on the air with Military Vehicle Rally, London Colney. Jim Ballard, G0AOT, 01895 476 933/020 7278 6421.
READING & DARC – 8, T 'Digital Radio', by Simon Mason - Digital Development Manager, NTL. Pete, G8FRC, 0118 969 5697.
SALOP ARS – 15, Second ARDF 144MHz; 22, Preparations for NFD. Fred, G3NSY, 01743 790 457.
SHEFFORD & DARS – 1, Flying at Henlow with Derek, G4LWA; 3/4, CW NFD; 8, Pedestrian ARDF, or how to get lost in deepest Shefford; 15, VHF NFD planning; 22, Morse Testing & Talk on Morse, by Bob, G4CEO. Mike, G8BEG, 01462 816 738.
SILVERTHORN RC – 23, OTA. Andrew, G0LWS, 020 8504 2831.
SOUTH BRISTOL ARC – 7, Bob's Computer Clinic, with Bob, M1BOB; 14, Horticultural Evening, Mrs Susan Grace; 21, Preparation for Longleat Rally; 25, Longleat Rally; 28, Longleat Debriefing/ Bristol Rally Planning. Len, G4RZY, 01275 834 282.
SOUTHDOWN ARS – 5, T 'Operation Sniff', by Barry Loram, G0ILK. Glynn, M0CHO, 01323 765 731.
SOUTHGATE RC – 8, Astronomy by Peter Simmons. Brian, G0MEE, 01707 257 534.
SOUTH NOTTS ARC – 7, Open Forum - Preparation of Elvaston Castle Rally; 11, Elvaston Castle Rally; 14, Shack Clearance Evening; 21, OTA HF/VHF; 28, T 'Up, Down, Left & Right', by John Kinsella. 01509 672 846.
SPEN VALLEY ARS – 8, Kite on the air. D Russell, G0FOI, 01274 875 038.
ST AUSTELL (G0ECC) ARC – 5, Amateur TV presentation by John, G0VDU. Reg, G4TRV, 01726 72951.
STRATFORD-UPON-AVON & DRS – 12, VHF ARDF; 26, OTA/BBQ. Ron, G0MRH, 01789 267 430.
STOCKPORT RADIO SOCIETY – 14, The Boeing 777, Nigel, G0RXA; 28, SRS on the Road from Marple Ridge. David, M1ANT, 0161 285 0017.
STRATFORD UPON AVON & DRS – 1, Special Event Station Charlecote (G0MRH); 3/4 CW National Field Day; 12, ARDF VHF; 26, OTA/BBQ. Ron, G0MRH, 01789 267 430.
SWANSEA ARS – 15, Car Treasure Hunt. Dave, GW4BNJ, 01792 519 046.
SWINDON & DARC – 1, World War II Military Radio - Tony Hunt; 3/4, 6m SSB Contest @ Barbury; 15, AGM; 29, Barbeque in Savernake Forest. Den, M0ACM, 01793 822 705.
TELFORD & DARS – 3/4, HF NFD @ Bridgnorth Fields; 7, OTA; 14, T 'RSGB today', by Paul Essery, GW3KFE; 21, VHF NFD Planning; 28, 2nd ARDF Hunt. Mike, G3JKX, 01952 299 677.
THORNTON CLEVELEYS ARS – 5, T 'Fixed Wing Aircraft', by Pete, G4BVW; 12, T 'Repair and Restoration of Vintage Radio', by Dr David Stiribley; 19, Preparation for VHF Field Day June 26th – VID. Jack, G4BFH, jack@duddingt.u-net.com
TORBAY ARS – 23, G4VFG, Peter Lewis. Peter, G4VTO, 01803 864 528.
TROWBRIDGE & DARC – 7, Transceiver Night – 'Bring, Show & Try a Rig'; 21, Longleat planning, for helpers; 24, Special Event Station at Southwick & North Bradley Scout Fete, GX2BQY & MX1BQY - 11.00 - 17.00; 29, Barbeque hosted by Swindon ARC in Savernake Forest. Ian, G0GRI, 01225 864 698, EW.
WEST SOMERSET ARC – 6, ARDF. Alan, M0AOJ, 01643 707 207.
WESTON-SUPER-MARE RS – 5, Show & Tell - Graham Jones; 19, Workshop. Graham, G8WAR, 01934 415 700.
WIDNES & RUNCORN ARC – 14, Tales of the Sea with 2E0AYL; 28, Preparation for Field Day. Martin, G4LUQ, 01928 714 843.
WORTHING & DARC – 7, Discussion Evening; 14, 50MHz Aerials , G8BTK; 21, Plans for Special Event Station; 24, Exhibition & Display of Old Radios & Equipment. Operating GB2KAY. Lancing Parish Hall, 10am - 4pm; 28, Barbecue. Roy, G4GPX, 01903 753 893.
YARMOUTH RC – 3/4, NFD at Green's Fishery; 9, OTA; 24, Preparations for VHF & Low Power Field Days (QRP 2/ 7/00 VHF 1&2/7/00). Tony, G3NHU, 01493 721 173.

John Hall OBE, G3KVA



IT IS WITH GREAT sadness that we report the passing of John Hall, G3KVA, on Saturday the 29th of April 2000, after a long battle with cancer.

After service in the Royal Air Force and a distinguished career in the Police Service John, on retirement, worked tirelessly for the Society as a volunteer, both as Company Secretary from 1991 to 1996 and QSL Bureau Manager from 1990 to 1999. John was a true professional and a true gentleman, and it was a great shock to all who knew him when he had to stand down from the position of Company Secretary in late 1996 at the onset of his illness. John fought his cancer as he led his life, with determination and dignity. In December of last year, with his illness in remission, he decided to step down as QSL Bureau Manager, in his words "to enjoy some simple amateur radio operation".

John was a true supporter of the Society, its membership, Council, Committees and Headquarters staff. He will be remembered also for his QSL column in *RadCom* and for his terrific sense of humour. An accomplished after-Dinner speaker, he was the star turn at a number of Presidential Installation Dinners in the 1990s. He will be sadly missed by all who knew him.

John is survived by his wife Audrey and daughter Jane. Our thoughts and prayers are with them at this difficult time.

SILENT KEYS

WE REGRET to record the passing of the following radio amateurs:

G3VO	Mr J R Brierley	29/03/00
GM1IXW	Mr R Izatt	01/04/00
G3LDB	Mr C B Cox	18/02/00
G5TU	Mr JCH Tucker	03/04/00
G0IZF	Mr A H Hill	26/02/00
G3LSL	Mr D I Lunn	15/03/00
G3RAE	Mr R A Eldridge	04/04/00
GW2FVZ	Mr D C Morris	29/03/00
G3AVV	Mr G Gunnill	28/03/00
G4FOQ	Mr J W Golightly	01/02/00
G2WQ	Mr A Brown	29/03/00
G8RZ	Mr H R Fox	25/04/00
G3CQE	Mr W M Brennan	05/03/00
G8LGB	Mr J L Stephens	12/04/00
G6YGQ	Mr C P Lilley	21/12/99
WB6YLI	Mr E G Lewin	28/11/99
G0NRR	Mr D Fox	04/03/00
G4FYW	Mr J Coles-Macgregor	

KEY

Club News
AD - Annual Dinner; **AGM** - Annual General Meeting; **ARDF** - Amateur Radio Direction Finding; **B&B** - Bring and Buy; **CON** - CONstruction; **CC** - Construction Competition; **D** - Details; **ES** - Equipment Sale; **EW** - Evenings/Weekends; **JS** - Junk Sale; **MP** - Morse Practice; **OH** - Office Hours; **OTA** - On The Air; **Q** - Quiz; **RP** - Rally Preparations; **T** - Talk; **VID** - VIDeo;

Rallies & Events
TI - Talk-In; **CP** - Car Park; **£** - admission; **OT** - Opening Time - time for disabled visitors appears first, eg (10.30/11am); **TS** - Trade Stands; **FM** - Flea Market; **CBS** - Car Boot Sale; **B&B** - Bring and Buy; **A** - Auction; **SIG** - Special Interest Groups; **MT** - Morse Tests; **LB** - Licensed Bar; **C** - Catering; **DF** - Disabled Facilities; **WIN** - prize draw, raffle; **LEC** - LECtures / seminars; **FAM** - FAMily attractions; **CS** - Camp Site.

RALLIES AND EVENTS

This is a list of all rallies, hamfests, exhibitions and conventions notified to HQ (as at press date). Items are given in detail for the next three months inclusive and in brief thereafter. Please send detailed information, including contact callsign and telephone numbers direct to HQ and marked 'Rally News - DIARY'.

4 JUNE 2000

BENTLEY RC Mid-Hampshire Radio Rally – Medstead Hall, Medstead, Alton, Hants. OT 10.30am, £1.50, TI, CP, TS, FM, SIG, C, WIN. Chris, 07790 577 945 or e-mail chris@g0wyf.freeserve.co.uk

LEEDS & DARS Twice-yearly boot sale – Yarnbury Rugby Club, Brownberrie Lane, Horsforth, Leeds. CBS, C, CP free for buyers. J A Mortimer, M1CAI, 01943 874 650.

MANSFIELD ARS Annual Rally & Electronics Car Boot Sale – Debdale Lane Sports and Social Club, Debdale Lane, Mansfield Woodhouse. OT 10am, LB, C CP. Angela, 01623 429 218 or e-mail andange@netscapeonline.co.uk

SPALDING & DARS Rally – Springfields Exhibition Centre, Spalding, Lincolnshire. OT 10am, CBS, CP, C, CS. Ray, G8ELV, 01775 711 953 or Mick, 07976 271 796.

WEST MANCHESTER RC 4th Red Rose QRP Festival – Formby Hall, Alder Street (off High Street), Atherton, Manchester. OT 11am, £1, TS, SIG, CP, DF, R, LB, B&B. Les, G4HZJ, 1 Belvedere Avenue, Atherton, M46 9LQ, 01942 870 634.

11 JUNE 2000

NUNSFIELD House ARG Elvaston National Radio Rally – Elvaston Castle Country Park, Elvaston, Derby. Located on B5010, which runs between A6 and A52, 5 miles SW of Derby. TS, FM, B&B, C, MT, etc. Les, G4CWD 01332 559 965 or les@g4cwd.demon.co.uk

18 JUNE 2000

NEWBURY & DARS Boot Sale – Acland Hall and Recreation Field, Cold Ash. OT 9am, free but donation appreciated, CP, TI on S22. George, 01488 682 814.

NORFOLK ARC Barford Rally and Electronics Car Boot Sale – Barford Village, 9 miles W of Norwich off the B1108, signposted. OT 10.30am, free, CP, B&B, C, CBS, SIG, WIN. John, G0VZD, 01953 604 769.

22 - 24 JUNE 2000

HAMRADIO 2000 – Friedrichshafen, Germany

25 JUNE 2000

BANGOR & DARS Radio and Computer Rally – Clandeboye Lodge Hotel, Bangor. OT 12 noon, £2. Mark, MI1DRU, 028 9058 6515, or e-mail mi1dru@amrad.net

LONGLEAT Rally – Longleat House, Warminster, Wilts. Ron, G4GTD, 0117 985 6253.

8 JULY 2000

CORNISH Radio Rally & Computer Fair – Penair School, Truro. OT 10.30am, B&B, TI, CP, MT. Robin, 01209 820 118.

9 JULY 2000

SUSSEX Amateur Radio & Computer Fair – Brighton Racecourse, East Sussex. OT 10.30am. Ron, G8VEH, 01903 763 978 or 01273 417 756.

YORK RC (Amateur) Radio Rally – Knavesmire Building, York Racecourse. OT 10.30am, £2, accompanied children free, CP, TI S22, SIG, MT, LB, C. Pat Trask, G0DRF, 01904 628 036.

16 JULY 2000

HUMBER BRIDGE Rally – Bob, G0VVP, 01482 834 240 or John, G0TPS, 01964 562 258.

McMICHAEL 2000, The McMichael Amateur Radio Rally & Car Boot Sale – Faymill Youth and Community Centre, 112 Burnham Lane, Slough, near jn 7, M4. OT 9.30am, £1.50, C, LB, TI on S22. Dave, G4XDU, 01628 625 720 or g4xdu@amsat.org

23 JULY 2000

COLCHESTER Radio Rally & Computer Fair – Dave, M1CZY, 01206 523 123.

RUGBY ATS Radio & Computer Fair – BP Truckstop, near Rugby. £2 per car, C, CP, TS, TI on S22. Richard, M1CVE, 17 Sheriff Road, Rugby, 01788 843 435.

30 JULY 2000

HORNCASTLE Amateur Radio Rally - Horncastle Youth Centre, The Old School, Cagthorpe, Horncastle, Lincs. Tony, 01507 522 482 or Chris, 01526 860 320.

RSGB HAMFEST – Hatfield House, Herts, CBS, SIG, TS, FM, LB, C, FAM. RSGB, 01707 659 015.

6 AUGUST 2000

DERBY & DARS Mobile Rally & Computer Fair – Littleover Community School, Pasture Hill, Littleover, Derby, on the A5250 just north of A38 junction, on Derby outskirts. Martin, G3SZJ, 01332 556 875 or e-mail martin@martinshardlow.demon.co.uk

11 AUGUST 2000

COCKENZIE & PORT SETON ARC 7th Annual Radio Junk Night – Cockenzie & Port Seton Community Centre, South Seton Park, Port Seton. OT 6.30pm, £1, JS, C, DF. Bob, GM4UYZ, 01875 811 723, e-mail bob.gm4uyz@btinternet.com or GM4UYZ @ GB7EDN.

13 AUGUST 2000

FLIGHT REFUELLING ARS Hamfest 2000 – Flight Refuelling Sports Ground, Merley, Wimborne, Dorset. OT 10am, TS, B&B, CBS, TI on S22, CS. Keith, G1VHG, 01202 577 937.

KING'S LYNN ARC 11th Great Eastern Rally – Park High, Queen Mary Road, Gaywood, King's Lynn. TI on S22, CP free, B&B, C. Derek, G0MQL, 01553 841 189, Fred, 01760 440 570 or www.qsl.net/g3xyz

20 AUGUST 2000

LEEDS & DARS Twice-yearly boot sale – Yarnbury Rugby Club, Brownberrie Lane, Horsforth, Leeds. CBS, C, CP free for buyers. J A Mortimer, M1CAI, 01943 874 650.

27 AUGUST 2000

MILTON KEYNES ARS 14th Fayre and Car Boot Sale – Bletchley Park Museum. OT traders 7am, buyers 9am, £1, TI on 145.550 and 433.550MHz, C, MT, museum open. Dave, G3ZPA, 01908 501 310 or e-mail m0bzk@bletchley.madasafish.com

TORBAY ARS Mobile Rally – Churston Grammar School, Greenway Road, Churston, Torquay. OT 10am, £1, TI, CP, C, TS, WIN, MT, B&B. Jonn, 01626 205 514 or rally@tars.org.uk

28 AUGUST 2000

HUNTINGDONSHIRE Amateur Radio Rally – Ernulf Community School, St Neots, Cambs, near Tesco superstore on the A428. OT 10am, £1.50, C, CBS, TI on S22. David Leech, G7DIU, 01480 431 333 between 9am and 9pm.

3 SEPTEMBER 2000

SOUTH BRISTOL ARC Bristol Computer & Radio Rally – Muriel, 01275 834 282.

10 SEPTEMBER 2000

LINCOLNSHORTWAVE CLUB Hamfest – John, G8VGF, 01522 525 760.

TELFORD & DARS Radio Rally – www.telford-rally.co.uk or Bob, 01952 770 922 or bob@somrob.u-net.com or Jim, 01952 684 173.

VINTAGE Technology 2000 – Blackpool. Brian 01253 508 232.

22 / 23 SEPTEMBER 2000

LEICESTER Amateur Radio Show – Geoff, 01455 823 344, fax 01455 828 273, or e-mail g4afj@argonet.co.uk

1 OCTOBER 2000

GREAT LUMLEY AR & ES Rally – 0191 384 2803 or 030 8937 2772.

8 OCTOBER 2000

NORTH WAKEFIELD RC 17th Radio Rally – http:/www.nwrc.mcmail.com or 01924 824 451.

13 -15 OCTOBER 2000

RSGB International HF and IOTA Convention - RSGB, 01707 659 015.

15 OCTOBER 2000

BLACKWOOD & DARS Radio, Computer & Electronics Rally – Stuart, 01495 243 824 or 07970 777 756, fax 01495 240 260 or e-mail fireham@aol.com

HORNSEA ARC Rally – Duncan, G3TLI, 01964 532 588.

29 OCTOBER 2000

GALASHIELS & DARS Annual Radio and Computer Rally – Jim, 01896 850 245 or e-mail jimk@gm7lun.freeserve.co.uk

12 NOVEMBER 2000

GREAT NORTHERN HAMFEST – Ernie, G4LUE, 01226 716 339 or 07787 546 515.

MIDLAND ARS 12th Radio & Computer Rally – Peter, 0121 443 1189.

19 NOVEMBER 2000

WEST MANCHESTER RC Red Rose Rally – Don, G3BSA, 01942 871 620, or don@g3bsa.freeserve.co.uk

25 / 26 NOVEMBER 2000

LONDON Amateur Radio & Computer Show - 01923 893 929.

26 NOVEMBER 2000

BISHOP AUCKLAND RAC Rally – Mark, G0GFG, 01388 745 353 or Brian, G7OCK, 01388 762 678.

21 JANUARY 2001

OLDHAM ARC Rally – Geoff, 01706 846 143.

28 JANUARY 2001

LANCASTRIAN Rally - G0GVA, 01772 621 954.

4 FEBRUARY 2001

HARWELL ARS Rally – Ann, 01235 816 379.

CONGRATULATIONS

To the following whom our records show as having reached fifty years' continuous RSGB membership this month:

Mr T N Green	G3GLL
Mr G C Cutting	G3GNQ
Mr J D Smith	G3KGW
Mr E F Harverson	G3OEG
Mr R A Rimmer	G3RQS
Mr A W Wright	GM3IBU

GB CALLS

These callsigns are valid for use from the date given but the period of operation may vary from 1 – 28 days before or after the event date. Operating details are provided in an abbreviated form as follows: T = 160m; L = 80 or 40m; H = HF bands (30 – 10m); V = 6 and / or 4m; 2 = 2m; 70 = 70cm; S = satellite and P = packet. Please send operational details of your special event station to the RadCom office at least five weeks before publication.

1 Jun GB0KWA: Korean War Anniversary. Plympton, Devon. H2 (M0AVS)
GB0SRS: Stockport Radio Society. Stockport. LH2 (G0RXA)
GB2ECR: Elvaston Castle Rally. Elvaston, Derby. LH27 (G0IYZ)
GB8SRS: Stockport Radio Society. Stockport. 27 (M1ANT)

2 Jun GB0LCF: Leyland County Fair. LHV27 (G0GVA)
GB0MAH: Muckamore Abbey Hospital. Muckamore, Co. Antrim. L (GI0THZ)

3 Jun GB2ASC: Apollo Sun Club. West Sussex. LH2 (G0UFP)

4 Jun GB0ESE: Ellenroad Steam Engine. Rochdale, Lancs. L (G0WTB)
GB1ESE: Ellenroad Steam Engine. Rochdale, Lancs. V27 (G7BRJ)
GB6ORA: Oswestry Rheumatology Assoc.. Rhosllanerchrugog, Wrexham. V27 (GW6ZCR)

9 Jun GB0RAF: Royal Air Force. Derbyshire. TLHV27P (G0DAM)

10 Jun GB0DBP: Dolly's Birthday Party. Windemere, Cumbria. LH (G0TAK)
GB2KOT: Kingston on Thames. Surbiton, Surrey. LH2 (G0BQV)
GB2MND: Motor Neurone Disease. Ripon, North Yorks. LH27 (G0VXH)

11 Jun GB0RID: Wartime Call sign. Great Yeldham, Essex. L (G3MMA)
GB2CC: Clanfield Carnival. Hants. TLV27 (G4PRG)

17 Jun GB0HCF: Hamstreet Country Fayre. Nr. Ashford, Kent. (M0AVY)
GB0OTH: One Tree Hill. Nr. Standford-Le-Hope, Essex. LV2 (M0AKE)
GB0WFD: Walgrove Fun Day. Letchworth, Herts. HV27P (M0AZZ)
GB2AGM: Annual General Meeting. Dorset. LH27 (G0WEE)
GB2GMC: Grantham Millenium Carnival. Lincs. LHV27 (G0KAU)
GB2LBY: Lavis's Boat Yard. Exmouth, Devon. LH2 (G3PLT)
GB8CA: Axe Vale ARC callsign. Axminster, Devon. L2 (G0GHH)

18 Jun GB4NBS: Newbury Boot Sale. Nr. Thatcham, Berks. (G3RVM)

20 Jun GB0VIK: Viking Festival - Scarborough. North Yorks. LH2 (G4SSH)

23 Jun GB0RAF: Royal Air Force. Alvaston, Derby. TLHV27P (G0DAM)

24 Jun GB0RGC: Robert Gordon's College. Aberdeen. LHV27 (GM4OBD)
GB2WAD: Waddington. Lincolnshire. L2 (G0NWY)
GB4ASC: All Saints Church. Whitstable, Kent. LH2 (M5AGA)
GB4FOL: Festival of Leisure. Swadlincote, Derbyshire. LHV2 (G4CRT)

25 Jun GB4MCH: Methodist Conf. Huddersfield. Huddersfield. LH27 (G4YRH)

30 Jun GB2EBS: East Birmingham Scouts. Blackwell, Worcs. (G4TDF)

HAYDON COMMUNICATIONS

MAIL ORDER: 01708 862524

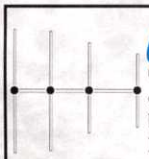
NEXT DAY DELIVERY TO MOST AREAS, £10.00.

Q-TEK PENETRATOR

Short of space? Going on holiday? Boating or sailing or do you need an antenna to use with no fuss, no tuning and with no ATU required. If so then the Q-Tek Penetrator is the ideal answer for you. Comments from a satisfied customer:- "I recently purchased the Q-Tek Penetrator from you. I have an Alinco DX-70TH. I took the Penetrator on holiday to Skegnes, mounted just 20 foot above sea level with one foot of wire for the earth connection along with many European contacts, all with good reports. I also worked:- X0! CWi 5-9 both ways 20mtrs/VK2XH 5-9 5-4 20mtrs/JA2 VMD 5-9 5-4 20mtrs/PY5CC 5-9 5-2 25-950MHz plus five new islands on 20mtrs EVO 53-129-016-090 and 030. The antenna is very good and I can change bands anytime and the SWR is no higher than 1.3 to 1. I think the antenna will be even better as cycle 23 gets better", G0VHI. Power rating (max 200W SSB) length 4.5m (1.3 collapsed) fitting PL-259 (mast clamps supplied).

RRP **£179.95** Delivery £10

Q-TEK TRITAN



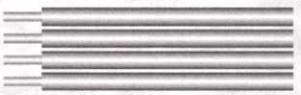
6m + 2m + 70cm. A superb compact 4-element, 3-band yagi. 4.5dBd gain (all bands). Boom length 1.13m (max). Longest element 2.96m (max).

ONLY **£59.95** del £10

★ 22FT MAST SET ★

4 x 5' lengths of 1¼" swaged slot together aluminium pole.

SSP ~~£29.95~~



LIMITED STOCK **£19.95** DEL £10

★ 20FT BARGAIN MAST SET ★

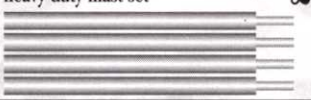
4 x 5' lengths of 2" extruded (16 gauge) heavy duty aluminium, swaged at one end to give a very heavy duty mast set

SSP ~~£60.00~~

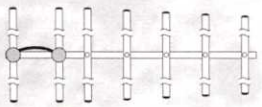
LIMITED STOCK

£35.00

DEL £10

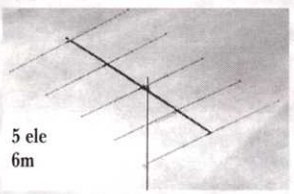


7 ele ZL special



Q-TEK ZL SPECIALS *Delivery £9.00*

2m	5ele (boom 45"/9dBd)	£29.95
2m	7ele (boom 60"/11dBd)	£39.95
2m	12ele (boom 126"/13.8dBd)	£59.95
70cm	7ele (boom 28"/11dBd)	£22.95
70cm	12ele (boom 48"/13.8dBd)	£39.95



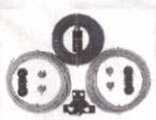
5 ele 6m

Q-TEK YAGIS FOR 2/4/6M + 70CM

Del £9.00

2m	5ele (boom 63"/9dBd)	£32.95
2m	8ele (boom 125"/11dBd)	£39.95
2m	11ele (boom 156"/12.7dBd)	£59.95
2m	5ele crossed (boom 64"/9dBd)	£59.95
2m	8ele crossed (boom 126"/11dBd)	£74.95
4m	3ele (boom 45"/7dBd)	£39.95
4m	5ele (boom 128"/9dBd)	£54.95
6m	3ele (boom 72"/7dBd)	£44.95
6m	5ele (boom 142"/9dBd)	£54.95
70cm	13ele (boom 76"/12dBd)	£34.95
70cm	13ele crossed (boom 83"/12dBd)	£49.95

DELUXE G5RV



Multi-stranded PVC coated heavy duty flexweave wire. All parts replaceable. Stainless steel and galvanised fittings. Full size - 102ft.

ONLY **£39.95**

Half size 51ft. Only **£34.95**

Carriage £6.00.

Choke Balun Inline balun for G5RV.....£24.95 P&P £2

STANDARD G5RV

Full size	102ft	£19.95 P&P £6
Half size	51ft	£16.95 P&P £6

NEW Q-TEK INDUCTORS

80mtr inductors + wire to convert ½ size G5RV into full size. (Adds 8ft either end). **£22.95** P&P £2.50 (a pair).

Q-TEK COLINEARS *P&P £9.00*

Erect and go! Superb quality, no fuss antennas. Simply put together in minutes & erect. (No tuning required). All fibre glass & stainless fittings.

QT-100 GF 144/70, 3/6dB (1.1m)	£39.95
QT-200 GF 144/70, 4.5/7.2dB (1.7m)	£54.95
QT-300 GF 144/70,6.5/9dB (3m)	£69.95
QT-500 GF 144/70, 8.5/11dB (5.4m)	£125.95
QT-627 GF 50/144/70, 2.15/6.2/8.4dBi (2.4m)	£69.95

RECHARGEABLE ALKALINE CELLS

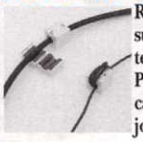
Starter kit includes charger & 4 x AA cells.

£13.99 + £2.50 P&P.

Please note that only the special cells can be recharged with this charger.

8 x AA pack £10.99 4 x AA pack £5.99 4 x AAA £6.25 P&P £1

INTERFERENCE ☐ STOP IT!



Rectangular snap-fixing ferrite cores suitable for :- Radio coax/TV/mains/telephone/PC & data cables. Plastic teeth prevent it from sliding on cable. Simply snap close onto cable and job is done!

BULK PURCHASE hence **2 for £7.50**

(P&P £2.50). HURRY – LIMITED STOCK

COPPER ANTENNA WIRE (All 50mtr rolls)

Enamelled	£9.95 P&P £5
Hard drawn	£12.95 P&P £5
Multi-Stranded (Grey PVC)	£9.95 P&P £4
Extra H/duty (Clear coated)	£24.95 P&P £5
Flexweave (H/duty 50 mtes)	£24.95 P&P £5
Flexweave H/duty (20 mtrs)	£15.95 P&P £5
Flexweave (PVC coated 20 mtrs)	£18.95 P&P £5
Flexweave (PVC coated 50 mtrs)	£34.95 P&P £5
Earth wire (6mm) 30m roll	£10.00 P&P £5
Copper earth rod (4ft)	£13.00 P&P £6
Copper earth rod (3ft) + earth wire attatched	£14.99 P&P £6

Q-TEK BALUNS & TRAPS

Baluns are wound on ferrite rod and encapsulated into a dipole centre with an SO239 socket. Brass terminals form the balun output and stainless steel screw eyes offer an anchor point for antenna ends. Maximum power rating is 1kW.

1.1 Balun		£19.95 P&P £2
4.1 Balun		£19.95 P&P £2
6.1 Balun		£19.95 P&P £2
40 mtrs	Traps	(a pair) £19.00 P&P £4
80 mtrs	Traps	(a pair) £19.00 P&P £4
10 mtrs	Traps	(a pair) £19.00 P&P £4
15 mtrs	Traps	(a pair) £19.00 P&P £4
20 mtrs	Traps	(a pair) £19.00 P&P £4

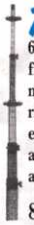
4kW handling

FIBRE GLASS MASTS

1½" Dia	£7.50 per metre	*Delivery £10*
1¾" Dia	£9.50 per metre	*Delivery £10*
2" Dia	£10.50 per metre	*Delivery £10*

NB. WE CAN ONLY DELIVER 2.5m LENGTHS

TELESCOPIC MASTS



6 section telescopic masts. Starting at 2½ in diameter and finishing with a top section of 1¼" diameter we offer a 8 metre and a 12 metre version. Each mast is supplied with guy rings and stainless steel pins for locking the sections when erected. The closed height of the 8 metre mast is just 5 feet and the 12 metre version at 10 feet. All sections are extruded aluminium tube with a 16 gauge wall thickness.

8 mtrs **£79.95** 12 mtrs **£109.95** *Carriage £10.00.*

Weight approx 6kg Weight approx 8kg

COAX SWITCHES (P&P £3.00)

CX-401	4 way (SO-239)	£49.95
CX-401 'N'	4 way (N TYPE)	£54.95
CX-201	2 way (SO-239)	£18.95
CX-201 'N'	2 way (N-type)	£24.95

MAST HEAD PULLEY

A simple to fit but very handy mast pulley with rope guides to avoid tangling. (Fits up to 2" mast).

£8.95 + P&P £2.00

WALL BRACKETS + MAST BASE PLATES

2"	Mast base plate	£12.95 P&P £5
6"	Stand off	£6.95 P&P £5
9"	Stand off	£8.95 P&P £5
12"	T&K Brackets	£12.00 P&P £8
18"	T&K Brackets	£18.00 P&P £8
24"	T&K Brackets	£20.00 P&P £8
U bolts (1½" or 2")		£1.10 each
8 nut universal clamp (2" - 2")		£5.95
3-way guy ring		£3.95
4-way guy ring		£4.95
2" mast sleeve		£9.95
1½" mast sleeve		£8.95

COAX BARGAINS

100m roll of RG-213 coax

ONLY **£69.95** P&P £10

100m roll of RG-58 coax

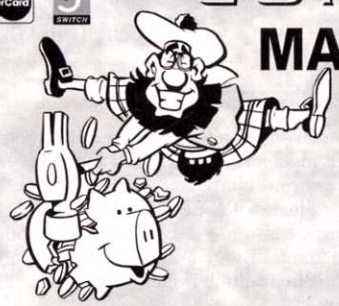
ONLY **£35.00** P&P £8.50

HAYDON COMMUNICATIONS

MasterCard SWITCH

Access VISA

NEXT DAY DELIVERY TO MOST AREAS, £10.00.



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WE DON'T PRICE MATCH . . . WE PRICE SMASH!

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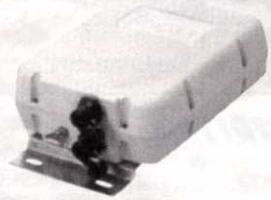
ICOM IC-706MKIIG

Now on it's 3rd generation of the classic transceiver and still out selling it's competitors. Covers 160m - 70cm (all mode).

SPECIAL OFFER
£799.95

ICOM AH-4



Automatic antenna tuner.
Covers 3.5-54MHz (100W).
SSP £339.00.

SPECIAL OFFER
£239.99

ICOM IC-756PRO

Materialising techniques not previously achievable, the IC-756PRO and Icom will take you, your transceiver and operating capabilities into a new power performing dimension. Becoming the best of the best, the IC-756PRO stands second to none. ~~£2100.00~~.

WE WILL NOT BE BEATEN **£Phone**

IC-746 .....£1099.00
IC-8500 Wideband all mode receiver.....£999.00

KENWOOD TS-870S

★ 160m-10m amateur band operation, 100kHz-30MHz receive ★ IF-stage DSP ★ Speech processor ★ Built-in automatic antenna tuner ★ LF auto notch ★ variable AGC circuit ★ 100W output.

SPECIAL OFFER **£1399.00**

TS-570DG £795.00

ALINCO DX-70TH

The DX-70TH packs a hefty punch on all ham bands 1.8-50MHz. It is backed up by a superb receiver with narrow filters fitted as standard. Ideal for use at home or in the car for that portable DX expedition. Wideband transmit available for export customers.

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FT-847 SPECIAL OFFER.....£1199.00
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KENWOOD TM-V7E

★ 2m + 70cm FM mobile transceiver ★ Dual receive on same band ★ Detachable front panal display ★ 50/35W H CTCSS & DTMF ★ Optional extended Rx 108-950MHz.

SPECIAL OFFER **£329.95**

TM-G707 2m + 70cm mobile £259.95
TM-D700 2m + 70cm data mobile £449.95
IC-2800H 2m + 70cm mobile £335.00
IC-207H 2m + 70cm mobile £265.00
FT-90R Miniature 2m + 70cm mobile £309.00
FT-8100R 2m + 70cm mobile £349.00

KENWOOD TH-D7E

★ 2m + 70cm hand-held with built-in packet modem ★ 6W output on 13.8V D.C. ★ CTCSS + 1750Hz tone ★ Optional wideband receive.

SPECIAL OFFER
£259.00

TM-G71 2m + 70cm hand-held £189.95
VX-5R 6m, 2m + 70cm hand-held £269.00
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IC-T81E 6, 2, 70 + 23cm hand-held.....£239.95
IC-22E 2m hand-held £99.95

ICOM PCR-1000

Amazing front end performance

Bring another world to your computer. The PCR-1000 connects externally to your computer and offers exceptional receiver performance. 0.5-1300MHz (all mode). Includes SSB. ~~£349.00~~.

2 YEAR GUARANTEE

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AR5000

The AR-5000 advances the frontiers of performance providing excellent strong signal handling, high sensitivity and wide band coverage. Covers 10kHz-2600MHz.

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WITH SPECTRUM MASTER SOFTWARE WORTH £130.00

MVT-7100EU

Wideband hand-held scanner covers 500kHz-1650MHz. (All mode). Includes nicad/car charger/charger/antenna. Extremely user-friendly hand-held reciever with outstanding performance unmatched by its rivials.

SPECIAL OFFER
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MVT-9000MkII Flagship hand-held scanner £319.95

Soft case for 7100EU/9000 - specify.....£19.99
HD-010 deluxe stereo/mono headphone for hand-held scanners.....£7.99 P&P £2.00

SONY SW-100E

Award winning miniature portable all mode SW receiver. ★ Station presets for 50 frequencies (with station names) ★ Single side band system ★ Multi-function LCD display ★ FM stereo via headphones ★ Synchronous detector ★ Sleep function ★ Short wave tuning in 5Hz & 1KHz steps ★ Includes compact antenna/stereo earphones/carrying case/comprehensive short wave handbook. Due to over stocking at Sony UK we are able to offer for a limited period the Sony SW-100E at £100 off retail price. RRP ~~£229.95~~.

SPECIAL OFFER **£129.95** P&P £10

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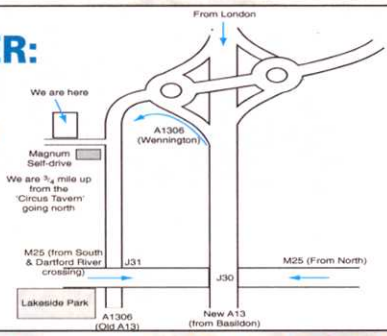

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Brierley Hill
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REALISTIC DX-394

The DX-394 is a modern, dual converstion receiver featuring phase locked-loop technology for tuning accuracy and stabilty plus a comprehensive range of memory functions. The frequency coverage provided is 150kHz through to 30MHz with no breaks. This wide range, combined with SSB, CW and AM receive modes, makes this receiver ideal for a wide range of listening styles. Keeping track of all those favourite frequencies is helped by the 160 internal memories. The steps available are 100Hz, 1, 5 and 10kHz, which should suit just about everyone. The internal processor includes some presetting of tuning steps to align with correctly displayed frequency. This is very helpful and greatly speeds up tuning operation. This is the best communications receiver under £350.00. SSP ~~£299.95~~.

OUR PRICE **£149.95**

NISSEI PS-300

Superb 30 amp/12V power supply built to combat most needs.
Features: ★ Over voltage protection ★ Short circuit current limited ★ Twin illuminated meters ★ Variable voltage (3-15V) latches 13.8V ★ Additional "push clip" DC power sockets at rear ★ Multiple front outlets ★ Detatchable IDC lead (supplied) for mains connection ★ Ultra quiet fan ★ Professional build (black finish). *Dims:* L308 x W268 x H135mm. *Wt:* 9kg. SSP £149.00.

INTRO PRICE **£99.95** Del £10

YAESU G-450C

Heavy duty rotator for HF beams, etc. Supplied with circular display control box and 25m of rotator cable.

ONLY **£319.95** P&P £10

G650C	Special offer	£349.00
G1000	Heavy duty rotator	£499.95
GC-038	Lower mast clamps	£25.00
GC-065	2" thrust bearing	£48.00
AR300XLT	Quality rotator for VHF/UHF	£49.95

D-308B BLACK DELUXE DESK MIC

(with up/down). Every amateur using this mic (over 2000) has expressed extreme pleasure with it's performance.

£49.95 P&P £6.00

OPTIONAL LEADS (P&P £1.50)

A-08	8 pin "Alinco" round	£9.95
K-08	8 pin "Kenwood" round	£9.95
I-08	8 pin "Icom" round	£9.95
AM-08	Modular phone "Alinco"	£9.95
YM-08	Modular phone "Yaesu"	£9.95
IM-08	Modular phone "Icom"	£9.95

NISSEI PWR/SWR METERS

Super quality meters made to a professional standard with meter illumination.

RS-502 1.8-525MHz (200W) £99.95
NOW £59.95 P&P £5

RS-102	1.8-150MHz (200W) £59.95	£49.95 P&P £5
RS-402	125-525MHz (200W) £59.95	£49.95 P&P £5
RS-101	1.8-60MHz (3kW) £79.95	£69.95 P&P £5
RS-40	144/430MHz Pocket PWR/SWR Meter (200W) (SO239)	£34.95 P&P £1
RS-40N	As above with N-type	£39.95 P&P £1

MFJ-259B MKII

HF digital SWR analyser + 1.8-170MHz counter/resistance meter.

ONLY **£189.00**
P&P £5

UK VERSIONS

MFJ-949	300W ATU + dummy load	£115.95
MFJ-969	HF + 6m ATU	£139.95
MFJ-962D	1.5kW versa tuna	£239.95
MFJ-784B	DSP filter	£176.95
MFJ-418	CW tutor	£58.95

NISSEI EP-320

Hanging type earphone with boom mic & PTT. Fits Kenwood, Alinco, Yaesu or Icom.

£24.95 P&P1

NISSEI EP 300T

Over the ear earpiece with lapel mic & PTT. Fits Kenwood, Alinco, Yaesu or Icom.

(Please specify brand of radio when ordering)

OUR PRICE **£24.95** P&P £1

This Ear/Mic comes with an "over the ear" earpiece as EP-300

GARMIN STREET PILOT

This unit contains a reference basemap covering all of Europe, showing motorways, roads, railways, rivers and shorelines. Down-load data from Garmins metro guide, map source CD ROMs for street level map details and access to business listings and points of interest.

Street Pilot £419.00 Street Pilot Colour £549.00

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Garmin GPS-12 Navigator	£129.95
New Garmin Etrex	£115.00
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RM-913

RADIO CONTROLLED CLOCK.

- 12/24hr function
- Auto clock from "Rugby" RF signal
- Alarm function
- Backlight & more
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BA-928

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- Weather forecast
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- Wireless outdoor temp sensor
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Professional digital multi-band world receiver
Continuous AM coverage 150 - 29999 kHz
Five tuning methods -
direct frequency access, auto scan, manual tuning, memory recall and rotary tuning
45 Presets - ATS (auto tuning system) - auto scan and preset, SSBShortwave dual conversion, 1kHz / step fine tune
Memory scan, Tone control etc.

NEW!!

£99.00 + p&p

AKD HF-3S SHORTWAVE RECEIVER

30kHz to 30MHz
USB / LSB / AM
Included in this package:
The popular HF3 Short Wave Receiver with NEW 10 Memory Facility
Data Out put on the Receiver and Data lead to your computer
Software JFAX 7.1 & Hamcomm 3.1
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SANGEAN ATS-909

Quality Portable Shortwave Receiver

153kHz to 30MHz (AM, SSB)
87.5MHz to 108MHz (FM)
Features: (RDS) Radio Data System; 307 memory channels; World Clock; 3 Timers; LCD display; Signal strength meter etc.

8.25 x 5 x 1.5 inches

£129.95 + p&p
(Free Headphones & SW Antenna)

UNIDEN BEARCAT UBC 9000XLT

AM / FM / WFM Switchable Base Scanning Receiver

25-550 MHz and 760-1300 MHz
Features: Headphone socket, Speaker socket, Baxklit orange L.C.D display, Squelch control, Rotary tuner, Sound squelch, Scan delay, Auto sorting, RF attenuator, 500 memories, Scan rate of 100/3000 channels/sec

£219.95 + p&p

UNIDEN BEARCAT UBC220XLT

AM / FM / Handheld Scanner

66MHz to 956 MHz (with gaps)
Features: 200 memories, Scan rate 100/300 channels/sec, 10 priority channels, Lock out, Headphone socket etc

£129.95 + p&p

UNIDEN BEARCAT UBC3000XLT

AM / FM / WFM Handheld Scanner

25 to 550MHz and 760 to 1300 MHz
Features: 400 memory channels, Scan rate 100/300 channels/sec, 10 priority channels, Headphone socket, Backlit LCD display etc.

£179.95 + p&p

QS300

Desk top stand for handheld radios includes BNC to SO239 lead. Angle can be adjusted

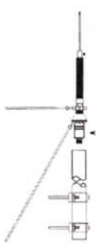
£13.99 + p&p

ROTATOR AR300 XL

Max load 60kg (with support bearing)
360de. rotation in approx. 65 sec.
(Support bearing optional £14.95)

£29.95 + p&p

SILVER DIAMOND



Four band discone TX
6m, 2m, 70cm & 23cm
200W
RX 25-1300 MHz
stainless steel construction.

£29.95 + p&p

WIDEBAND PRE-AMP

Variable gain and bypass facility.
Boosts weak signals adding clarity to let you listen with ease.

£39.95 + p&p

DC-AC INVERTERS 12V DC IN 240 AC OUT

	p&p
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CONTEST

TIM KIRBY, G4VXE
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I AM WRITING THIS column after our first portable contest of the year at GW5NF/P. It's amazing how quickly you forget exactly how the mast goes together and all those little things, but it was really good to get on again and make some contacts on VHF.

HESITANT CONTESTERS

SOMETHING THAT DID come out in the April 50MHz contest though, was that phrase beloved of all contesters, 'I'm not in the contest, but…'

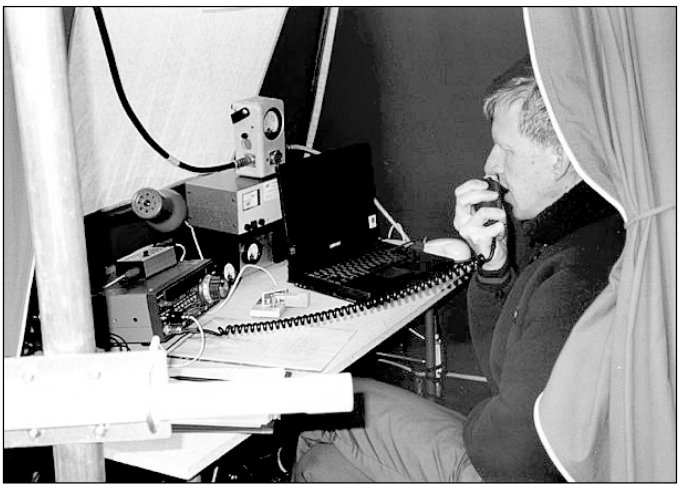
As I have said a number of times in the past, serious contesters rely on the participation of people tuning around casually in the contest and are very grateful for the points that they provide. Sometimes, naturally, those tuning around are not sure of the contest exchange. Actually, even as a contest enthusiast, I'm not always sure of the contest exchange! So very often, it befalls the contest station to guide the caller into the exchange that is required, which of course we are always happy to do. Once in a little while, however, people call who are amazingly reluctant to give a serial number – ie the number of stations that they have worked in a contest. I've sometimes wondered why, but suspect that some people believe that if they give a serial number in a contest then they are in some way bound to put in an entry. This is absolutely not the case! In the majority of contests it is not mandatory for the contest station to record a serial number from another station – but it is preferred. I always have the nagging doubt that if I don't ask for a serial from a station who later in the contest gives a number to another contest station, then I might be about to lose some points. For that reason I tend to be as politely insistent as possible in obtaining a number! So, for those 'casual' participants amongst you that take part in contests, please keep up the good work – and don't be hesitant about giving the contest exchange.

WRT CHAMPIONSHIP

TIME NOW TO 'warn' you about the World Radio Team Championship to be held in Bled, Slovenia in July. The main event is the contest on July 8/9, when two-person teams from all over the world will take part. There are several national teams, including one from the UK, together with some wildcard teams representing continents and organisations. Some of the major contest clubs in the US will be represented, such as the Frankford Radio Club. The championship is billed as an 'Olympics' of radio contesting. The nice thing is that, unusually, for a radio contest, the entrants are all located in the same geographical area – and will be using stations of roughly similar capabilities. The intention, then, is to provide a level playing field – and may the best team win!

A week or two back I spent some time in Toronto, Canada and saw John, VE3EJ, who will be one of the Canadian participants in the event. John was telling me that there are several other events involved in the programme this year, including both CW and SSB pileup tapes – along with the 'real' on-air contest. It sounds like a fascinating and fun time. The addition of the pileup tapes has created some discussion amongst participants, but the organisers say that they have done it to try to make things even more equitable. Pileup tapes at Dayton and events like the RSGB HF Convention are always interesting, but it may provide something new for some of the entrants. Quite what some of the 'real' stations will be like is unclear. The WRTC website mentions that a number of them are 'field day' style. One wonders what this might mean! Hopefully the Slovenian climate is a sufficient improvement on the UK to make taking boots and wet weather gear unnecessary. We shall look forward to pictures and stories from the event in due course. I'm sure that many friendships will be forged as the contesting fraternity comes together in Bled. Good luck to all the participants, of course, especially to the British team of G3SXW and G4BUO, who represent, in my view, a very strong and skilled team indeed. We wish Roger and Dave much success and fun. You can do your bit to make the contest even more fun by looking out for and working the special S5 callsigns that the stations will use during the WRTC event. The actual call allocations will not be made public before the contest, so you cannot arrange to work a particular team. You can see all the callsigns that will be used on the WRTC website. I know I am glad that I don't have to send some of them on the key! Try to work as many of the stations as you can. This may be more challenging than you think, as I understand that in the last championship one team went QRT to go shopping! To encourage participation there will be a number of awards and prizes for working WRTC stations.

You can find full details on the WRTC event at the official website, http://wrtc2000.bit.si which makes quite interesting reading. The WRTC is held during the IARU HF championship contest. This is a multimode event – (bizarrely perhaps, since IARU recommend that contest organisers organise single-mode events). It's a great contest, which hasn't enjoyed the greatest of UK participation in recent years. However, I can recommend it to you as a good one whether you are a beginner or a more seasoned veteran. Propagation is significantly different from some of the other major events, such as the winter time CQ and ARRL events, which of course makes things quite interesting. There are certificates to be won for making 250 and 500 QSOs, together with the usual country and continent winners. With careful choice of your section, you can probably stand a good chance of winning something. I have a real soft spot for the event, as it was the first contest in which I ever won a certificate.



Neil, G4BRK, operating G4BRK/P during VHF NFD 1999.

RSGB NFD 2000

MORE IMMEDIATE is National Field Day, on the first weekend in June. This is one of the major events in the RSGB Contest Calendar for HF CW enthusiasts. If your club or contest group is taking part, don't forget to support them – maybe by operating, making the tea, or helping erect (and dismantle) the station. All being well, the weather will be kind and will make the event even more enjoyable. The 'soapbox' after the contest always paints a great picture of what the event is like. Let us hope that this year no group will have its generator stolen whilst it is being used.

Finally, I know many of you have some great photographs of your various contest exploits. I would really appreciate having some of them to publish in this column. The preferred method is for you to drop me an e-mail with the photographs attached in JPG format. If you're not sure what to do, let me know and I'll try to help. If you

can't e-mail the images, I can scan the photograph for you, but this is not the preferred option as it is somewhat more time-consuming. Thanks in advance, and I am looking forward to receiving some of your pictures.

QSLing

THOSE OF YOU who know me well will know that I am not the world's keenest QSLer. Actually, of course, I do understand that QSL cards are required for awards and that, more simply, some people get a real thrill from obtaining and exchanging cards. I certainly would not wish to detract from their enjoyment of part of the hobby. Over the last year or two, though, I have become aware of some people saying that they will not take part in contests as much as they did before, because they are tired of the QSL chores. Some contest stations, I know, send a QSL card for every contact they make in a contest. Why? Because it is simpler to do that than to reply to individual cards. But what a waste of resources – of the cards, of money and time! I always enjoy taking part in contests that I am not seriously participating in, but I become seriously galled when I receive a flood of QSL cards that I would really rather not have.

I am sure that we would all agree that everyone who wants a card should be able to get one, either directly or via the bureau, but flooding the system with unwanted cards is surely a waste of everyone's time and money.

1.3/2.3GHz Cumulatives, 1999

SOME IMPRESSIVE SCORES on 23cm enabled John Quarmby, G3XDY, to widen the distance this year between him and the rest of the pack. The race for second place was very close, with Anthony Coldman, G7LRQ, narrowly beating Neil Whiting, G4BRK.

The Open Section attracted two entrants this year and produced the same result as last year, with the South Birmingham Radio Society narrowly beating Andrew Hutley, G6SPS, for first place.

On 13cm Neil Whiting, G4BRK, managed to turn the tables on John Quarmby, G3XDY, to claim first place by a narrow margin. Last year's winner David Millard, G8NEY, slipped to third place this year. The Open Section was won by Andrew Hutley, G6SPS. The Single Antenna 25W award on 23cm goes to G4GFI and the Overseas Award goes to PE1EWR.

Ian Pawson, G0FCT

1.3/2.3 GHz Cumulatives 1999

13cm Single Operator Fixed

Pos	Callsign	Total	Locator	7/10 Pts	22/10 Pts	1/11 Pts	16/11 Pts	1/12 Pts	QSO	Pwr	Ant	Rig/tvtr
1 *	G4BRK	3000	IO91DP	1297	763	828	498	984	31	5	90 d	FT-290/DB6NT
2 *	G3XDY	2623	JO02OB	808	775	993		501	19	25	44	FT-736R/LMW
3	G8NEY	2122	IO81VK	272	300	839	443		16	40	44	TVTR
4	G3MEH	1816	IO91QS	262	413	893	191		18	20	67	IC-275E/DB6NT

13cm Open

1 *	G6SPS/P	3000	JO01IT	1101	919	1118		668	27	40	25	FT290+SSB

23cm Single Operator Fixed

1 *	G3XDY	3000	JO02OB	5290	3146	6671	501		82	300	8x23	IC-756+TVTR
2 *	G7LRQ	2291	IO91TQ	2427	1709	3187	1814	3038	120	100	4x55	FT-736R
3	G4BRK	2213	IO91DP	2463	1883	2532	2172	2186	91	40	35	FT-290+DB6NT
4	G4DEZ	2051	JO01IN		1781	3234	2427		57	100	4x55	IC-1271
5	G8NEY	1889	IO81VK	2009	2161	2279	1995		65	200	55	MM-1296
6	G3MEH	1556	IO91QS	2389	1835	2769	1265		78	100	4x35	IC-275E+LT23S
7 *	G4GFI	1010	IO91VH	1452	1180	1181	876	463	57	20	28	FT-101E+MM-1296
8	G4JTJ	947	IO92SD	1399	658	1181	948	887	51	25	35	CR-5800+MM-1296
9 *	PE1EWR	760	JO11SL	661	900	1129	485	834	17	10	2x23	TS-790E
10	G4SJH	543	IO91PI		237	1234	687		28	18	15	FT-290+TVTR
11	G3FIJ	260	JO01KV	291		1018	128		16	10	35	FT-736R

23cm Open

1 *	G8OHM/P	3000	IO82QL	3387	2889	4453	3195	3307	117	150	55	IC-970H
2 *	G6SPS/P	2930	JO01IT	3225	2617	4353		3514	88	120	23	TS-711E+MM-1296

* Certificate Winner

VHF Championship 1999

YET AGAIN, the Northern Lights has emerged as the overall winner in the Open Section of the VHF Championship. The Five Bells Contest Group was second and the Villa Contest Group was third. The top three groups managed to enter all of the contests that make up the Championship.

In the Fixed Station section, G4AEQ and G3MEH fought for the honours with G4AEQ managing to stay ahead. G3XDY was third. In the QRP section, G4HGI emerged as the clear winner, with G4APJ in second place. G1TWS was placed third.

The result table only lists those stations that entered three or more qualifying contests.

Congratulations to the Northern Lights for winning the Open Section. They will receive the Racal Radio Cup. Congratulations to Steve Redfern, G4AEQ, for winning the Single Operator Section. He will receive the John Pilags Trophy. Finally, congratulations to Richard Staples, G4HGI, for winning the Fixed Station QRP Section. He will receive the Low Power VHF Championship Trophy. The winners and runners-up will also receive certificates.

Ian Pawson, G0FCT

VHF Championship 1999

Open

Pos	Group	Events	Points
1 *	The Northern Lights CG	9	7573
2 *	Five Bells CG	9	5907
3	Villa CG	9	4253
4	Parallel Lines CG	3	2912
5	A1 CG	4	2701
6	Victory CG	3	1663
7	Bracknell ARC	4	1306
8	South Birmingham RS	4	855
9	GM4WLL/P	6	483
10	G4HLX/P	5	469
11	Swindon & DARC	3	396
12	MM0BQI/P	3	302
13	Dacorum ARTS	3	257
14	Culverstone CG	3	212
15	GW8ZRE/P	3	183

* Certificate Winner

Single Operator Fixed

Pos	Callsign	Events	Points
1 *	G4AEQ	9	4839
2 *	G3MEH	9	3339
3	G3XDY	4	2946
4	G4HGI	4	912
5	G4APJ	5	647
6	G3FIJ	3	384
7	G8NEO	3	177
8	G1TWS	4	173
9	G4OTY	3	74
10 *	2U0ARE	3	64

Single Op Fixed 25W Single Antenna

1 *	G4HGI	3	2940
2 *	G4APJ	5	2451
3	G1TWS	4	2062
4	G8NEO	3	1766
5	G3FIJ	3	1476
6	G4OTY	3	1176
7 *	2U0ARE	3	1089

144MHz Fixed/AFS, December 1999

ENTRIES FOR THIS contest were slightly down this year, as were QSO numbers, although there were still over 6,000 QSOs made during the 8 hours of the event. The leading stations are the same as last year in all three sections, despite the Martlesham DX & CG team being reduced to a single station.

The vast majority of entries are now being received via a disc in the post, or by e-mail. The adjudicator can normally cope with just about any form of electronic log, although I must admit I couldn't get any useful information from the digital picture of the Chocolate Christmas Log sent in by G1DUO, a member of the Wythall Group, other than the callsign written in icing! Seriously, though, please continue to send via this media if you can, as it speeds up the adjudication process considerably.

A special mention for Colchester RA group who managed a 10-team entry, and the Wythall Group who had 5 stations in the same locator square and whose club station had to go QRT early due to RFI disrupting the local pantomime production.

Next year this contest will be open to portable stations for the first time, although portables will not be eligible for the AFS team event.

Pete Lindsay, G4CLA

CONTEST CALENDAR

HF Contests

Date	Time	Mode	Contest
3/4 June	1500-1500	CW	RSGB National Field Day
3/4 June	*1500-1500*	*CW*	*IARU Region 1 Field Day*
10 June	*1200-1200*	*SSB*	*TOEC WW Grid Contest*
10/11 June	*0000-2359*	*RTTY*	*ANARTS WW RTTY Contest*
17/18 June	*0000-2359*	*CW*	*All Asia DX Contest*
24/25 June	*1800-2100*	*CW/SSB*	*ARRL Field Day*

VHF Contests

Date	Time	Mode	Contest
3/4 June	1400-1400	CW/SSB	RSGB 50MHz Trophy
4 June	1100-1500	CW/SSB	RSGB 50MHz Backpackers #1
11 June	1800-2200	FM	RSGB 432MHz FM
18 June	0900-1300	CW/SSB	RSGB 144MHz Backpackers #2
18 June	*0900-1600*	*CW/SSB*	*Practical Wireless 144MHz QRP*

The full rules of RSGB HF and VHF/UHF contests were published in the RSGB Contesting Guide in October 1999 *RadCom*. Brief rules for non-RSGB contests, which are listed in italics above, can often be found in the *HF* and *VHF/UHF* columns.

144MHz Fixed/AFS December 1999

Affiliated Societies Section

Pos	Group	Call	Points	Call	Points	Call	Points	Total
1 *	Martlesham DX & CG	G0KPW	116683					
2 *	Colchester RAA	G4ZTR	49723	G6SPS	23760			
		G7PLL	10009	G7MHK	9197	G1OGY	8599	101288
3	Bently RC	G7RAU	68223	G0NFA	16867			
		M0BTZ	10377					95467
4	Wigan Douglas Valley	G4HGI	31469	M1AIX	25469			
		G1SWH	14238	G8ZRE	13617	G3BPK	8024	92817
5	Reigate ATS	G0VVE	50043	G3YSX	11454			
		G8JXV	2331	G3TRC	2223			66051
6	Chesham & DARS	G3MEH	36498	G0ODQ	16279	G0VFW	4266	57043
7	Harwell ARS A	G4HLX	15622	G0ADH	6285			
		G0AOZ	5608	G3PIA	5514	M0BRE	3043	36072
8	Wythall RC A	G8MYK	12250	G1WAC	7439			
		G0EYO	4986	M0COK	4722	M0COP	4650	34047
9	Harwich ARIG	G0DVJ	15671	G7MOT	10518			
		M1EGQ	3034	G0SCP	2480	G7HOW	2001	33704
10	Mid Cheshire ARS	G6ZTT	19655	G0VOK	767			
		G0LBO	566	2E1GDA	87			21075
11	West Kent ARC	G0GCI	20540					20540
12	S Derby & Ashby Woulds ARG	G3KTC	10815	G7NBE	2799			
		G7MGX	2705	G4XHH	2295	G7WFK	1746	20360
13	Colchester RA B	G3FIJ	5748	G0HKG	3559			
		2E1GUA	3138	G0YAE	1229	G0WJO	207	13881
14	Wythall RC B	G4VPD	3972	G6ZDQ	3720			
		G7UGC	3328					11020
15	Dacorum ARS	G7RIH	8393					8393
16	Mid-Sussex ARS	G0APZ	4923	G3JMB	3373			8296
17	Sandwell ARC	G1SAN	3723					3723
18	Harwell ARS B	M0ACU	274					274

Multi operator

Pos	Group	Zone	Call	Locator	QSOs	Points	Best DX	km	Power	Ant
1 *	Northern Lights		GD0EMG	IO74QD	243	92977	DF6PW	901	400	8x9
2 *	Mid Cheshire ARS	A	G6ZTT	IO83QE	127	19655	DF6PW	742	250	17
3			G0DRM	IO83SB	93	11996	F5MVX	571	80	9
4	Sth Derby & Ashby Woulds ARG		G3KTC	IO92GR	100	10815	GM4AFF	459	400	9
5	Harwich ARIG	C	G7MOT	JO01MW	58	10518	DF2VJ	506	100	17
6	Dacorum ARS		G7RIH	IO91RR	91	8393	ON4AMY	394	50	17
7	Wigan Douglas Valley		G3BPK	IO83QN	70	8024	G3MLO	366	100	11
8	Wythall RC A	B	G1WAC	IO92BJ	76	7439	ON1AEN	420	25	18
9	Sandwell ARC		G1SAN	IO92AL	64	3723	GM4AFF	483	25	8
10	Harwich ARIG	C	M1EGQ	JO01PW	27	3034	GD0EMG	465	40	7

Single operator

Pos	Zone	Call	Locator	QSOs	Points	Best DX	km	Power	Ant
1 *		G0KPW	JO02OD	363	116683	DD0VF	882	400	2x17
2 *		G7RAU	IO90IR	231	68223	DH9NBB	800	400	2x9
3	C	G0VVE	IO91SG	212	50043	GM4AFF	630	400	4x10
4	C	G4ZTR	JO01KW	200	49723	F6FHP/P	807	100	2x9
5	D	G3MEH	IO91QS	192	36498	DK8SG	729	180	2x10
6		G4HGI	IO83PL	183	31469	F5MUX	620	400	11
7		M1AIX	IO83QM	143	25469	F6DKW	626	400	2x12
8	B	G4UXC	IO92BC	166	24064	DC6IA	610	250	2x14
9	C	G6SPS	JO01IS	120	23760	DL9NEK/P	775	100	14
10	C	G0GCI	JO01ED	122	20540	DH9NBB	689	140	9
11		G0NFA	IO91NE	113	16867	DL9GS	562	150	9
12	D	G0ODQ	IO91NQ	134	16279	GM4AFF	579	140	2x9
13	F	GI6ATZ	IO74AJ	46	15902	G3MLO	593	400	13
14		G4DEZ	JO01IN	89	15820	DL9NEK/P	770	400	2x13
15	C	G0DVJ	JO01MX	94	15671	DL1FX	586	50	5
16	D	G4HLX	IO91FP	113	15622	DC6IA	580	100	13
17		G1SWH	IO83QO	108	14238	G3MLO	370	400	19
18	A	G8ZRE	IO83NE	90	13617	G3MLO	350	80	8XY
19	B	G8MYK	IO92BJ	108	12250	LX2DX	624	50	17
20	C	G3YSX	IO91WF	102	11454	GI6ATZ	527	100	16
21 *		PE1EWR	JO11SL	37	11068	GD0EMG	623	25	10
22		M0BTZ	IO91LC	85	10377	GD0EMG	416	100	11
23	C	G7PLL	JO01IW	84	10009	DD1WKS	516	100	9
24	C	G7MHK	JO01JP	65	9197	GD0EMG	457	50	13
25	C	G1OGY	JO01GR	64	8599	GD0EMG	438	200	13
26	D	G0ADH	IO91KO	53	6285	GD0EMG	367	100	17
27 *		G1TWS	JO01HO	51	5791	GD0EMG	451	25	11
28	C	G3FIJ	JO01KV	50	5748	GI6ATZ	534	10	10
29	D	G0AOZ	IO91GQ	56	5608	ON1AEN	370	150	16
30	D	G3PIA	IO91IN	56	5514	GD0EMG	363	25	17
31	B	G0EYO	IO92BJ	52	4986	GD0EMG	267	25	9
32		G0APZ	IO90WW	48	4923	GD0EMG	469	23	8
33	B	M0COK	IO92AJ	58	4722	GD0EMG	263	100	7
34	B	M0COP	IO92BK	60	4650	GI6ATZ	347	100	8/8
35	D	G0VFW	IO91RR	45	4266	DC9KU	475	45	17
36	B	G4VPD	IO92BJ	35	3972	GD0EMG	267	25	17
37	B	G6ZDQ	IO92BJ	51	3720	GM4AFF	493	50	7
38	C	G0HKG	JO01IV	36	3559	GD0EMG	436	100	9
39		G3JMB	IO91WA	35	3373	GD0EMG	462	20	7
40	B	G7UGC	IO92BK	52	3328	GD0EMG	264	50	6/6
41	B	G4XPE	IO92GU	26	3167	GD0EMG	254	10	10
42	C	2E1GUA	JO01FS	39	3138	GD0EMG	431	7	5
43	D	M0BRE	IO91IQ	45	3043	G4HGI	221	25	9
44		G7NBE	IO92GS	33	2799	GD0EMG	259	80	9
45		G0TIB	IO82XJ	47	2774	GD0EMG	260	20	12ZL
46		G7MGX	IO92FR	36	2705	GD0EMG	258	50	7
47	C	G0SCP	JO01NT	30	2480	GD0EMG	464	25	10
48	C	G8JXV	IO91WE	24	2331	GD0EMG	447	100	9
49		G4XHH	IO92FS	31	2295	GD0EMG	255	3	4Q
50	C	G3TRC	IO91WF	26	2223	GD0EMG	444	25	8
51	C	G7HOW	JO01NW	23	2001	GD0EMG	456	50	9
52		G7WFK	IO92DP	27	1746	GD0EMG	255	50	Vert
53	C	G0YAE	JO01IS	17	1229	G4UXC	181	10	5
54	A	G0VOK	IO83RG	11	767	G4ZTR	274	25	5
55	A	G0LBO	IO83RF	8	566	G0KPW	280	25	9
56	D	M0ACU	IO91JR	10	274	G0VVE	73	10	9
57	C	G0WJO	JO01MX	9	207	G1EFL	46	25	4
58	A	2E1GDA	IO83RE	4	87	G1SWH	47	10	Vert

*Certificate Winner

144MHz CW, November 1999

THIS YEAR'S CONTEST was held on a cold and windy weekend, and the conditions were all that you would expect of a weekend like that - dreadful. QSO totals were significantly below par, and even the well-sited and well-equipped east coast stations found it hard going into Europe, although they did manage to attract some good DX. Only in the last hour of so of the contest did things liven up, with a little aurora, although not everyone was alert enough to catch it while the event was still running. Only G0KPW and GM4WLL/P made auroral QSOs before the end of the event, in spite of there being 59A signals as far south as JO02.

Some people will go to any length to make a few QSOs, even if they don't have a real antenna for the band. Congratulations to M0ATY for getting on and making a few QSOs with a half-size G5RV antenna!

The contest was very closely fought at the top of the 24-hour single operator table, and all logs were very carefully checked, but both David Johnson, G4DHF, and John Lemay, G4ZTR, had good clean logs, losing only around 3% each of claimed points. Congratulations to G4XPE for having the only log in which I couldn't find any errors at all! All logs will now be forwarded to ARI for inclusion in the European Marconi Contest.

Andy Cook, G4PIQ

144MHz CW November 1999

24-hour Single Operator

Pos	Callsign	Points	QSOs	Locator	Power	Antenna	Best DX	km
1 *	G4DHF	43620	123	92UU	400	4 x 11Y	F4BDT/P	829
2 *	G4ZTR	43074	127	01KW	400	18Y	OL3Y	885
3	G4BRK	13700	45	91DP	70	9Y	DK8ZB/P	799
4	G4OUT	10060	48	92AT	40	12ZL	F5KOJ	702
5	GW4HBK	3879	20	81KP	60	9Y	OT9M	485
6 *	G0TIB	2155	24	82XJ	20	12ZL	GM4WLL/P	375

24-hour Multi Operator

1 *	G0KPW	93887	207	02OD	400	2 x 17Y	OK1AGE/P	933

6-hour Single Operator

1 *	G4NOK	17378	65	93FR	100	4 x 16Y	F6ETI/P	654
2 *	GM4WLL/P	12719	38	85NR	200	8/8Y	SK7MW	999
3	G0DVJ	10184	41	01MX	50	5Y	DL0PVD	563
4 *	G1WAC	9138	38	92BJ	25	18Y	DL2OM	683
5	G4DDL	3603	24	91PJ	25	9Y	GM4AFF	613
6	G4XPE	3464	21	92GU	10	10Y	F6DWG/P	461
7	G0PZO	899	10	83LJ	20	11ZL	F5JLQ/P	450
8	M0ATY	406	7	92PB	50	G5RV	G4NOK	188

6-hour Multi Operator

1 *	G0FBB	25637	85	01EI	400	2 x 17Y	DL9NEK	789
2 *	G0WIH	1160	14	91RR	10	Yagi	F9LT	370

* Certificate Winners

144MHz CW, January 2000

THE NUMBER OF stations active for this contest was well down this year, which is a shame because conditions were well up. John Lemay, G4ZTR, increased last year's score by six-fold to take first place in the Single Operator section. North Wakefield RC also took full advantage of conditions to win the Multi Operator section. The 25W single antenna award this year goes to Lee Volante, G0MTN, operator of G1WAC.

Pete Lindsay, G4CLA

144MHz CW January 2000

Multi Operator

Pos	Group	Call	Locator	QSOs	Mults	Points	Total	Best DX	km
1 *	North Wakefield RC	G4NOK	IO93FR	52	23	15885	365355	DJ0QZ	861
2 *	Bracknell ARC	G4BRA/P	IO91OK	26	22	5042	110924	DL6BF	569

Single Operator

Pos	Call	Loc.	QSOs	Mults	Points	Total	Best DX	Dist	Power	Ant
1 *	G4ZTR	JO01KW	67	32	22904	732928	DL3BUE	927	400	2x9
2 *	G4HGI	IO83PL	43	33	11120	366960	F/G8MBI	991	300	11
3	G0DVJ	JO01MX	32	17	7073	120241	DJ0QZ	620	50	5
4	G1WAC	IO92BJ	26	22	4209	92598	DF0WD	703	25	18
5	G0PZO	IO83LJ	9	10	994	9940	G4ZTR	310	20	11
6	G4XPE	IO92GU	8	7	899	6293	G0DVJ	195	10	10

*Certificate Winner

HF

DON FIELD, G3XTT
105 Shiplake Bottom, Peppard Common, Henley on Thames, RG9 5HJ
e-mail: hf.radcom@rsgb.org.uk

AS EXPECTED, the Chesterfield Islands were added to the DXCC list, and the TX0DX operation made over 72,000 QSOs. The other new DXCC entity, East Timor, has also been very active, with operations by W3UR, N5KO and others. And, too late for last month's column, I received news of a big operation from Bhutan to coincide with what should be the opening-up of a new era in amateur radio from that rare one, with the introduction of a new Telecommunications Act finally putting amateur radio on a structured and formal footing. Jim Smith, VK9NS, was also due to be in Bhutan at the same time, although operating independently of the larger group. Those operations should be history by the time this appears, although I would expect regular activity from Bhutan from now on. Some German operators also appeared unexpectedly in April, signing 7O1YGF (Yemen-Germany Friendship), for the first legitimate activity from Yemen for some years. Jukka, OH2BR, wrapped-up his VP6BR operation from Pitcairn having pleased many; one UK friend of mine was able to work him on all nine HF bands. And Mike, KM9D, put on a solo effort as XR0ZY from San Felix Island, which is another one high on the Most Wanted lists. Again, he was worked in Europe on all nine HF bands, so we seem to be going through exciting times as far as rare DX is concerned. All we need now is an operation from North Korea (P5), and there are increasingly plausible rumours that such an operation may take place as early as June. Keep your ears to the bands!

6th EUHFC 1999

Call	Position	Score
Mixed Low Power (72)		
G0MTN	32	57190
CW High Power (53)		
G4BWP	23	171082
G5LP	31	120932
G0LII	35	109620
CW Low Power (173)		
G3SXW	26	99828
G4OGB	54	51450
GM3CFS	56	47716
GW3NJW	76	33264
G6QQ	159	1728
G0VFV	172	198

The 5Z4WI (Wasini Island) team: l-r David, G3UNA; Rob, 5Z4RL; Ian, 5Z4IC; Jim, G3RTE; Phil, G3SWH; Graham, 5Z4GS; Bill; Ted, 5Z4NU.

DX NEWS

JIM, MM0BQI, TELLS me that he will activate the Summer Isles (EU-092) between 16 - 18 June. Activity will be on 80 to 10m (excluding WARC) from 1200 on Friday to 1600 on Sunday, mostly SSB near the IOTA frequencies, but with some CW. QSL via his home call, direct or through the bureau.

The Council of Europe Radio Club plans an operation from 9 - 11 June with the call TP2000CE. Activity will be on SSB, CW, and RTTY. This one just counts as France for DXCC.

A Croatian team will undertake a DXpedition to Palagruza Island (EU-090, World Lighthouse LH-057, Croatian Island CI-084), from 7 - 14 June with a possible 2 - 3 day extension. Activity will be on all HF bands including WARC, using two callsigns, 9A10C and 9A7K/P.

Jim, N6TJ, was expecting to be back on Ascension Island as ZD8Z from 25 May until 3 June. He plans a serious effort in the CQ WPX CW Contest.

Fernando, EA4BB, should be back in Angola by now, and operating as D2BB. He expects to remain there for one year. He is taking an old Drake TR7A and a 6-element Yagi, together with some wire to make dipoles. This time he plans to try harder on 40, 80 and 160m, if local circumstances permit.

1999 Russian DX Contest

Call	Position	Class	Score
G0MTN	19/30	SO MIX MB	118872
G3TXF	29/109	SO CW MB	605016
G4OGB	32	SO CW MB	513095
G3VQO	39	SO CW MB	382653
G3ESF	43	SO CW MB	339612
G4EBK	54	SO CW MB	204120
G3UFY	57	SO CW MB	173745
G6QQ	59	SO CW MB	164625
G3RSD	64	SO CW MB	143634
GM3CFS	9/37	SO CW 14	133500
G0DVJ	11/35	SO CW 21	35112

Tony Selmes, A45ZN, was due to be back in Muscat, Oman from 19 April for three months. As in the past, you are most likely to catch him on CW.

Jari, OH2BVE, will be in Beijing for two years and plans to operate using the club callsign BY1DX and possibly from other club stations as well. Jari will confirm all QSOs automatically through the bureau. Anyone wanting a direct card should send to Jukka Klemola, Aarontie 5, 31400 Somero, Finland, who will act as a maildrop.

Masa, JA6GXK, will be active in his spare time from AS-056 (Danjo Archipelago) between 30 May and 6 June and between 30 June and 11 July. Look for him on or around 14,260 and 21,260kHz. QSL via the bureau to his home call.

Gerard, PA3AXU, has cancelled his trip to Niue and has rescheduled his summer activities as follows: on 3 - 7 July and again on 15 - 20 July he will be active (SSB, CW, RTTY and PSK) from Rarotonga (OC-013), South Cook Islands; on 8 - 15 July he will operate (hopefully on all modes) from Penrhyn (OC-082), North Cook Islands. He expects to use the call ZK1AXU from both the locations. His web site is at http://www.qsl.net/pa3axu/zk.htm

Kimio, JA9BOH, operated from Ongul Island as 8J1RL during the period 21 March 1998 to 31 January 2000. During that time he made some 24,000 QSOs. Now that he is home he will be dealing with QSL cards. However, he points out that he is unable to deal with cards for

WARC BANDS TABLE 2000

Call	10	18	24	Total
G0NXX	117	99	120	336
G3SXW	118	114	100	332
G4KHM	77	92	27	196
G4UCJ	66	64	66	196
G4AFI	24	59	37	120
GW0VSW	21	20	40	81
GM4OBK	20	18	24	62
G0VLC	23	22	9	54
MM0BQI	18	17	19	54
2U0ARE	51	0	0	51
M0CAL	0	12	26	38
G0TSM	10	10	17	37
G4ERP/M	0	31	0	31
M0CNP	1	14	11	26
G4FVK	0	7	15	22
M5AFA	0	7	11	18

the new operator at the base, who is Takumi, JG3PLH. There will be no QSLing for this operation until after Takumi's return home in March 2001. His address will appear in the next QTH corner.

VK0MM on Macquarie Island reports, via his web page (see January 'HF'), that he is currently limited to operation on 20 and 30m only. The QSL route will be announced after his return to Australia at the end of the year.

CONTESTS

AL CRESPO, nh7a@arrl.net, has reported that he has a number of certificates for CQ contests for which he has been unable to find the correct mailing address. If your callsign appears in the following list, you might want to contact Al to claim your certificate: 1997 WPX CW – G0JQN; 1998 WPX SSB - G3VAO, GW8J, GX4WSM; 1997 CQWW CW - G3JXC.

Roger G3SXW, who is on the CQ Contests Committee, writes that, in the 1999 contests, the proportion of entries received electronically (by e-mail or disc) has rocketed, which is very good news for adjudication accuracy. Electronic submission is encouraged, even for small logs. 4,015 logs were received for the Phone contest, of which 3,000 were electronic, while 3,600 logs were received for the CW contest, of which 2,650 were electronic.

In the 1999 ON Contests which took place last October, G0MRH and G4OGB were first and second respectively in the overseas section of the SSB event, while G4OGB was second and G0MRH third in the overseas section of the CW event.

In the 1999 YO DX Contest, G4OGB was the highest-placed UK station, with 149,762 points, in the single-op, multi-band section. In the same section, G3KKQ scored 9,424, while in the 20m single-band section G0MTN scored 2,958 points, and G4GSA 1,056 points.

The complete results of the SP DX Contest 1999 can be found at: http://www.sp5pbe.waw.pl/SPDXC/SPDXContest/spdx99.html

The CW leg of the 41st JARL All Asian DX Contest takes place over the weekend of 17/18 June, and the Phone leg over 2/3 September. Both are for 48 hours. Work stations in Asia and exchange RS(T) plus your age (those who do not wish to share their age send 00!). There are a few rule changes this year, so it is worth getting hold of the new rules if you intend to take part. Get them from the Internet or drop me an e-mail or letter plus SAE.

HF F-Layer Propagation Predictions for June 2000

	7.0MHz	10.1MHz	14.0MHz	18.1MHz	21.0MHz	24.9MHz	28.0MHz
Time	000001111122	000001111122	000001111122	000001111122	000001111122	000001111122	000001111122
(UTC)	024680246802	024680246802	024680246802	024680246802	024680246802	024680246802	024680246802
*** Europe							
Moscow	7663.....267	888555555688	888776666788	...87777788.	11..........	.......1....	.....1.....
*** Asia							
Yakutsk	21.......12	443....1..33	54431.1..235	.....3.2....	....	.........11.	....
Tokyo	....	11	2211....1..3	...11..1234.	....	....	....
Singapore	1	.........1..	.1.......12	.....1...122	1122	11........	..1.......
Hyderabad	1.........1	3........1.3	432.....1144	..311...2344	...221.13344	....1.....	....1..1....
Tel Aviv	654.....46	66532111.266	6.6444444566	.........55.	....	....	....
*** Oceania							
Perth	1	.........1..	1.......1...	....	..1.1.1.....	1.1.1.1.....	...11.....
Sydney	....	.........1.	.......1....	1	1..11.......	1	...1.....
Wellington	....	....	....	.1........	.1........	....	...1.....
Honolulu	....	....	....	....	....	...1......	.....1...
W. Samoa	....	..1.......	.........11.	....	....	...1....1...	....
*** Africa							
Mauritius	1.........1.	13.......1	33	..1.....1233	1..111.1223.	...2221123.4	....1.....4.
Johannesburg	.1........	1.........1	.......1.3.	....1....2.4	...1.11.124.	....1222.44.	....
Ibadan	4431.....34	4552.....45	6654111..366	65.544434566	5..544444555	.1.......5.	....
Nairobi	321.....113	542.....45	5441.....345	41.332113344	...4443434.4	....4444..5.	.....44....
Canary Isles	77621....157	877544444577	888666445778	88.877777888	8..887778888	....	....
*** S. America							
Buenos Aires	11...........	222.......2	3331.....13	4433.....23	44.3.....133	....	....
Rio de Janeiro	2211.....11	443.1.....4	4443.1...44	54.1..111144	555..2223345	1.1...334455	.....1111...
Lima	1	121..........	2221.1...11	33.21.1..112	3.........11.	....	.....1..1...
Caracas	332.......1	444.1.....13	5553..1..144	55.442222345	.....1....4.	..1.......	1...1111.1.1
*** N. America							
Guatemala	12...........	444..........	4443.....13	44...2112244	.1...1.3334.	.......1....	....
New Orleans	1111........	.44.......2	4443..1..123	.......1.234	....	.......1.1..	....
Washington	332.......1	4443.....1.	4554..112354	55....444455	....	....	....
Quebec	4441.....4	5552.....145	555..2233455	55	11	....	....
Anchorage	.1........	222.......12	4442....1134	....	..1.......	.........11.	....
Vancouver	.1........	231..........	322.....122	3..........	.....1.....	....	....
San Francisco	.1........	.2...1.....	3321.....112	2.1....1..33	11	....	....

Key: The numbers in the table represent S-meter reading on the average amateur rig, whilst colours represent availability. When the predictions are expected to be 67-100% certain, the numbers are blue; when 33-66% certain, red; when less than 33% certain, black.

The RSGB Propagation Studies Committee provides propagation predictions on the Internet at www.g4fkh.demon.co.uk The page is updated weekly.

The provisional mean sunspot number for April 2000 issued by the Sunspot Data Centre, Brussels, was 125.3. The maximum daily sunspot number was 193 on 2 April and the minimum was 94 on 7 and 18 April. The predicted smoothed sunspot numbers for June, July and August are respectively: (SIDC classical method – Waldmeier's standard) 105, 103, 101 (combined method) 119, 120, 122.

9-Band Tables No 34

Mixed Mode

Call	1.8	3.5	7	10	14	18	21	24	28	Total
G3KMA	245	294	325	306	331	321	331	303	323	2779
G4BWP	231	298	329	308	332	322	330	293	313	2756
G3XTT	227	272	313	267	330	299	322	277	298	2605
G3GIQ	143	243	301	255	331	309	329	277	319	2507
GW3JXN	171	239	279	257	319	298	297	258	271	2389
G3TXF	126	224	280	245	316	257	314	220	287	2269
G4OBK	140	196	253	244	318	278	292	263	269	2253
G3TBK	118	230	264	230	317	268	297	240	265	2229
G3YVH	123	144	243	266	310	295	284	251	250	2166
G3WGV	106	183	250	267	295	272	283	249	254	2159
GM3PPE	148	210	246	260	294	243	259	214	224	2098
G3IGW	128	197	311	233	282	238	243	110	220	1962
G3NOF	5	125	131	0	329	288	329	257	303	1767
G4XRX	3	65	166	141	288	221	291	184	242	1601
G5LP	63	215	276	178	296	79	261	17	209	1594
G3VKW	42	147	183	64	310	126	300	106	284	1562
G0JHC	1	29	144	153	126	242	253	241	280	1469
G4NXG/M	24	56	130	0	279	171	265	162	238	1325
G4UCJ	29	76	175	124	210	148	184	143	166	1255
GM4OBK	39	94	129	58	160	92	145	97	178	992
M0AWX	37	90	85	0	214	129	170	99	109	933
G4FVK	40	75	101	54	179	99	169	59	150	926
G0LRX	1	69	105	0	222	10	240	2	202	851
GW0VSW	28	35	87	111	153	115	113	77	72	791
MM0BQI	39	52	90	39	124	60	112	45	101	662
M0BIB	1	24	56	14	67	46	89	77	209	583
M0DBW	31	45	80	34	109	38	94	28	67	526
AVERAGE	**85**	**145**	**197**	**152**	**253**	**195**	**244**	**168**	**226**	**1667**

CW only

G3KMA	239	273	319	306	329	313	329	288	311	2707
G3XTT	217	240	298	267	297	273	291	240	263	2386
G0NXX	163	222	266	273	285	273	258	237	252	2229
G3TXF	126	214	279	245	310	257	305	220	267	2223
GW3JXN	168	203	261	257	286	276	273	229	239	2192
G4BWP	200	204	270	307	253	276	233	245	188	2176
G3WGV	106	183	250	267	295	272	283	247	253	2156
G3YVH	122	141	239	266	298	278	264	228	237	2073
G4OBK	127	168	237	244	274	260	252	242	234	2038
G3SXW	91	192	241	224	307	230	288	198	255	2026
G3AKU	104	150	219	229	278	245	258	226	240	1949
G3NOH	48	123	202	249	292	274	274	231	235	1928
G3VKW	34	70	114	64	173	87	167	66	133	908
GM4OBK	30	76	112	58	127	77	122	82	124	808
GW0VSW	28	30	79	111	125	109	96	71	63	712
AVERAGE	**120**	**166**	**226**	**224**	**262**	**233**	**246**	**203**	**220**	**1901**

UK results from the 6th European HF Championship and the 1999 Russian DX Contest appear in the boxes.

AWARDS

WAYNE MILLS, N7NG, joined the ARRL HQ staff as Membership Services Manager, effective 2 May. He succeeds Bill Kennamer, K5NX (ex-K5FUV), who retired in March. First licensed in 1953 at age 10, Wayne has served as chairman of the ARRL DX Advisory Committee since March 1997. He also served on the DXCC 2000 Committee. He is best known for his operating on DXpeditions over the past 15 years - XZ1A (1995), BV9P (1995), BS7H (1997), H40AA (1998) and the most recent TX0DX, to name just a few.

The ARRL DX Advisory Committee and the ARRL Awards Committee have voted to add the Chesterfield Islands of New Caledonia to the DXCC List. For DXCC credit, contacts made on or after 23 March 2000 will be accepted. Cards for this new entity may be submitted after 1 October 2000.

Alan, M0BFU, reports early receipt of the ARRL DXCC Millennium Award (see March *RadCom*, p10). Alan says the highlight for him was working FO0AAA (Clipperton Island) on 12m. With just 100 watts to a dipole at 7m, Alan was able to work the team on his first call!

Martin, (martin@cleddau.com) MW0BRO, writes that he will be operating from an oil rig 20 miles offshore Equatorial Guinea, but in their territorial waters. As the rig is permanently fixed to the seabed, and he will have a legitimate 3C call, he wonders whether his operation will therefore count for DXCC. He would like to hear from anyone who has a view or a firm answer on this one.

Fred, G4BWP, the RSGB HF Awards Manager, has written to tell me he is receiving a number of enquiries about the CQ Magazine awards, particularly WAZ (Worked All Zones). Fred says that the UK checkpoint for CQ Awards is Rob Ferguson, GM3YTS, who has recently moved to a new QTH. The address is: 19 Leighton Avenue, Dunblane, FK15 0EB.

TABLES

RICHARD, G4ERP, makes a first entry to the tables, with a score achieved on 17m using his mobile station (and these were actual on-the-move contacts). As Richard says, 17m is ideal because there is less competition than on the other bands, and his all-time total by this means is now 64 countries.

Andrew, G4AFI, also makes a first appearance. He runs an FT-920, plus Explorer amplifier (only used when the 100 watts fails to make it), to a homebrew antenna which consists of interlaced 3-element monoband Yagis on the same boom for 17 and 12m, up at 40ft. A wire dipole is used on 30m.

My apologies if I have missed anyone's update this month (or, indeed, any other information which may have been sent to me). We had some computer problems, and some e-mails may have been lost. Hopefully normal service will be resumed next month! Due to lack of space, QTH Corner will appear next month.

THANKS

MY THANKS TO all who have provided information. Special thanks go to the authors of the following for information extracted: *OPDX Bulletin* (KB8NW), *The Daily DX* (W3UR) and *425 DX News* (I1JQJ). Please send items for the **August** issue by **23 June.** ♦

28MHz COUNTRIES TABLE 2000

Call	CW	SSB	Mixed
G4DUW	134	199	220
M0BZQ	20	208	219
M0BIB	10	182	192
G0VHI		180	180
G0TSM	32	110	124
G3SXW	124	0	124
G0NXX	123	0	123
G3MDH	0	108	108
G4MUW			104
G0CAS	1	102	103
M0CTQ		103	103
GM4CHX	0	93	93
G4UCJ	79	0	79
GI4XSF			70
M0CAL	0	67	67
G0CGV	50	31	60
G4IDL	56	0	56
MM0BQI			50
GU0SUP			42 †
GM0FNE			36 †
M0CNP			35
GW0VSW	27	11	33
G0URR			31 †
G0KDS/M	0	30	30
G4FVK			27
G0NCS			21 ‡
M0ASJ			17
M5AFA			17
GM4OBK	15		15

† RTTY
‡ PSK

VHF/UHF

NORMAN FITCH, G3FPK
40 Eskdale Gardens, Purley, Surrey CR8 1EZ
E-mail: g3fpk@compuserve.com

IT HAS BEEN eleven years since we last enjoyed a really big aurora, not only a radio one, but also a really widespread visual event, so the event over the night of 6/7 April was most welcome. There have been openings on 50MHz to southern Africa and South America and some periods of Sporadic-E (Es) propagation into Europe. In the Band Reports section, an asterisk (*) indicates a CW QSO and all times are UTC. 'QTHR' signifies that the operator's address is in the current *RSGB Yearbook.*

USEFUL WORLDWIDE WEB SITES

Cambridgeshire RG	http://www.qsl.net/crg/
Central Scotland FMG	http://www.csfmg.co.uk
Gloucestershire RG	http://www.gb7lgs.demon.co.uk/grg/
Leicestershire RG	http://www.metalmike.free-online.co.uk/lrg/
VHF Communications	http://www.vhfcomm.co.uk
University of Barcelona	http://www.infomet.fcr.es
PW Contest data	http://home.neill.org/contest
NASA Space Science	http://spacescience.com/headlines/y2000/ast07apr_2m.htm

REPEATER NEWS

THE CAMBRIDGESHIRE Repeater Group's *Newsletter No. 39* runs to 12 pages and the editor is disappointed with the paucity of input from members, in spite of promises of articles. The CRG runs one voice repeater on VHF, two on UHF and one on 23cm, plus five other assorted data and ATV relays. These are comprehensively listed in a table. The minutes of the AGM held on 16 November 1999 take up seven pages.

Terry Bickell, G0UIO (QTHR), edits the *Newsletter* and membership inquiries are handled by Treasurer Roger Carder, G7SRK (QTHR), whose e-mail address is rcarder@virgin.net The group has a website - see the panel.

The Spring 2000 issue of *FM News*, the thrice-yearly publication of the Central Scotland FM Group, comprises 34 pages of A5. The status of their numerous repeaters includes a report on UHF repeater GB3KA, the supporting tower of which failed during a storm on 9 February. It was kept 'ticking over' using a temporary pole. The minutes of last year's AGM are included and a membership list shows the number of members on 2 March was 276.

John Power, GM7KTO (QTHR), edits *FM News* and Treasurer Robert Henry, GM7AON (QTHR), handles membership inquiries. The CSFMG has a website - see the panel.

The March issue of the Gloucestershire Repeater Group's *Newsletter* consists of four A4 pages. The GRG runs 12 assorted repeaters, nodes, mailboxes and a beacon, and there are brief reports on the status of them all. Stewart Wilkinson, G0LGS (QTHR), edits the *Newsletter* and is also the Treasurer. Secretary Graham Nye, G8URP (QTHR), is the person to contact about membership details: his e-mail address is grg@tyndale.demon.co.uk and the GRG has a website - see the panel.

The April issue of *LENS*, the Newsletter of the Leicestershire Repeater Group, runs to 12 pages of A5 and includes information on the group's repeaters and beacon, the balance sheet for the year to 31/3/99, the notice for the 2000 AGM and notes about the G7WFM internet link. Mike, G0ATR, edits the *Newsletter* and the membership secretary is Stefan Esposito, G4MGG (QTHR), whose e-mail address is stefanuk@aol.com The LRG has a website - see the panel.

PUBLICATION

THE SPRING ISSUE of *VHF Communications*, 2000-Q1, includes articles on a frequency divider up to 4GHz, a frequency counter that can count and display two frequencies simultaneously, details of a 144MHz SSB/CW transceiver and the index to Volume 31 (1999). Andy Barter, G8ATD (QTHR), edits this quarterly publication. His e-mail address is andy@vhfcomm.co.uk and there is a website - see the panel.

PROPAGATION

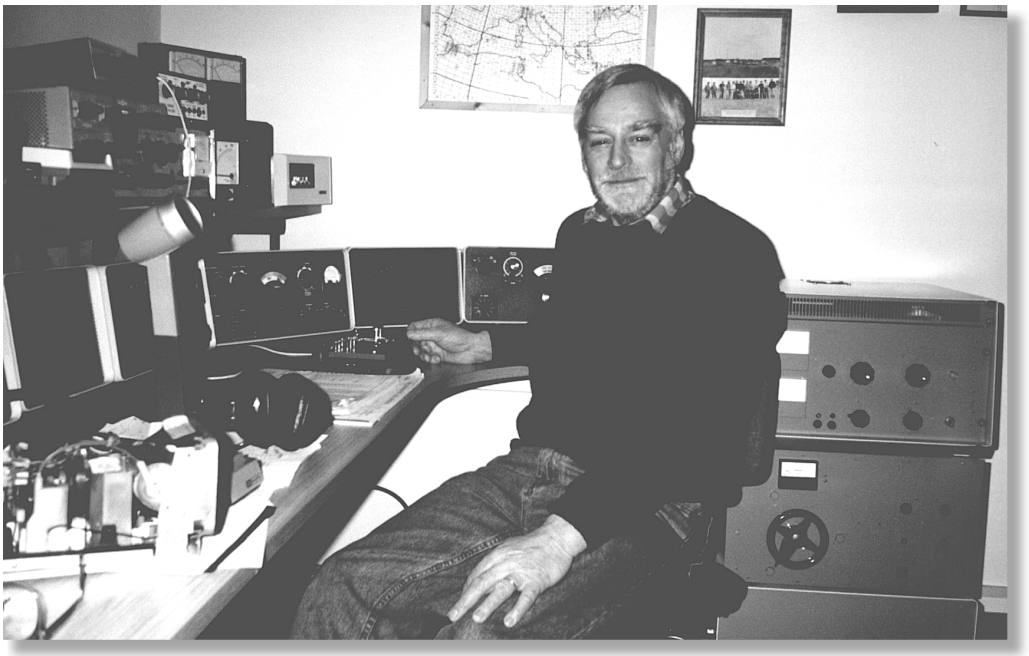
THE MARCH ISSUE of *SunMag* begins with several articles, the first of which deals with the interplanetary wind storm that hit Earth at the end of February. The next piece describes the technique that scientists have developed to enable the Solar and Heliospheric Observatory spacecraft (SOHO) to 'view' stormy regions on the far side of the Sun. This uses the Michelson Doppler Imager (MDI), the most elaborate of three helioseismic instruments on SOHO.

Another piece is a 'Solar Cycle Update', which suggests that we are still on course for a peak in mid-2000 but that the maximum might prove to be slightly smaller than those of 1978 and 1989. The last piece concerns the recent successful launch of the IMAGE spacecraft - see page 62 in the May *RadCom.*

SunMag includes tables of daily solar, geomagnetic, particle and sunspot group data, a solar flare list and other graphs and tables. It is compiled and distributed by Neil Clarke, G0CAS (QTHR), whose e-mail address is neil@g0cas.demon.co.uk

The February edition of *The Six and Ten Report* mentions the brief 6m Es openings on 7, 15, 20 and 27 February. Steve Reed, G0AEV, remarks on the very little DX heard on the band in the month. 'Scottish-type' auroras were reported on 5-8, 11, 12, 14, 15 and 21 February. There is an analysis of inter-continental DX on 6m in 1999, based on data supplied by Martin Harrison, G3USF.

There is the usual table of daily solar and geomagnetic data, plus 6m activity reports from observers outside Britain. The *Report* is an activity of the RSGB's Propagation Studies Committee (PSC) and is edited by Dr Steve Reed, G0AEV, and Prof Martin Harrison, G3USF. Subscription inquiries should be addressed to Steve (QTHR) whose e-mail address is g0aev@explore.force9.co.uk



Roy Reed, G3ZIG, in his Norfolk shack. He is a keen EME operator on 144MHz, with over 200 different stations worked. He contributes frequently to 'VHF/UHF'. See 'Moonbounce'.

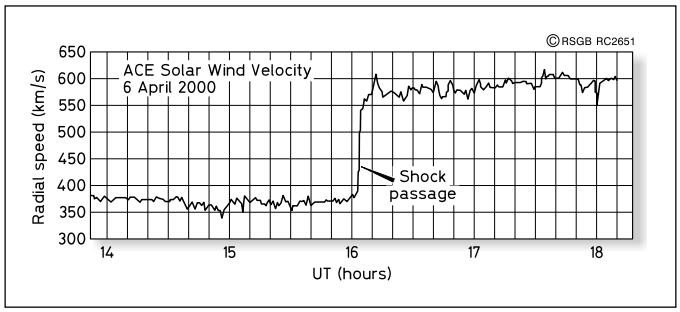


Fig 1: Data from the ACE spacecraft show the speed of the solar wind, as measured 1.5 million km from Earth at the L1 Sun-Earth libration point. The discontinuity, where the wind velocity jumps from 375 km/s to nearly 600km/s, marks the passage of an interplanetary shock wave caused by a solar coronal mass ejection on 4 April 2000. Events detected by ACE usually reach Earth about an hour later. (NASA)

Bob Sroczynski, EA1TH (ex-G3URY), reports that the University of Barcelona is back on line with its met balloon data for Europe. The soundings are taken at 0000 and 1200 and you can get the current data from their web site - see the panel. Clicking on 'sondatges europeus' brings up a map of Europe with many weather stations identified, such as Herstmonceaux and Boulmer in Britain. Click on your chosen place and you get a page of very useful tropo data. There are links to many other sites and services - eg NOAA and Meteosat images. The text is all in the Catalan language, rather different from the Castillian Spanish I learned at school, but don't let that put you off.

CONTESTS AND AWARDS

TED DOUBLE, G8CDW, advises that the Worked All Italian Provinces award is now available for 50MHz devotees. It requires proof of confirmed contacts with 40 of the 103 provinces. Ted has received certificate number 25 and worked the required number of provinces with just 30-40W to a colinear antenna just 18ft AGL.

The award is sponsored by the Italian national society, ARI, and is managed by Giovanni Zangara, IW0BET, PO Box 36, I-00100 Roma Centro, Italy. Contact him for the rules and a list of the original 95 provinces plus the eight new ones. His e-mail address is iw0bet@ik0usa.ilaz.ita.eu

Neill Taylor, G4HLX (QTHR), has forwarded brief details of the 18th Annual *Practical Wireless* 144MHz QRP Contest scheduled for 18 June, 0900-1600. There are several cups and trophies on offer, and further details can be found on the *PW* QRP Contest web pages - see the panel.

MOONBOUNCE

ROY REED, G3ZIG (JO02), operated on 2m CW in the first leg of the *DUBUS/REF* contest in the 18/19 March weekend, making 60 QSOs with 27 multipliers for a claimed score of 162,000 points. He got nine 'initials' - stations worked for the first time - UA4AQL, RA4AOR, YU1IO, NJ0M, N5BLZ, W1FIG, JH0VJW, PE1LWT and YO2AMU. He lost about two hours at the Saturday moonrise due to equipment problems. On 8 April, ZS6ALE and K6AAW were two more initials, bringing his band total to 202.

Bryn Howell-Pryce, G4ZHI (IO91), was QRT on 2m for a while, but is now QRV again with four 3-wavelength 'BVO' antennas, SSB Electronics masthead preamp and a good PA.

The 3/4 June weekend is a perigee one with the high declination giving 32.5 hours of Moon time for London latitude stations, but Sun noise will be a problem with the offset at Saturday midnight only +21°. The declination varies between +20.50° and +21.73°, the 144/432MHz sky temperature range is mostly 'Sun', otherwise it varies from 575/44K to 399/29K. The signal degradation, referred to perigee, is more-or-less 0dB throughout.

METEOR SCATTER

JUNE IS A reasonable month for MS operators, with a couple of showers. The Arietids are active for about five days, peaking on the 7th, with a zenithal hourly rate (ZHR) of about 60. The radiant is above a mid-UK horizon 0100-1730. The Zeta Perseids are expected to peak on the 9th, with a ZHR of around 40. The radiant is above the horizon between 0200-1930.

THE AURORA

THE TRAIN OF events leading up to the magnificent aurora on the night of 6/7 April is chronicled on the NASA Space Science News site on the Internet - see the panel. At 1541 on the 4th, the SOHO spacecraft captured pictures of a full halo coronal mass ejection (CME) coming towards Earth.

NASA's Advanced Composition Explorer (ACE) spacecraft, which is positioned at the L1 Sun-Earth libration point 1.5 million kilometres from Earth, recorded the interplanetary shock wave at 1600 on the 6th, when the solar wind velocity jumped from 375 to nearly 600km/s, see **Fig 1**. It hit the magnetosphere - a region of space around Earth controlled by the planet's magnetic field - about an hour later. The gust was so strong that it compressed the magnetosphere, triggering the geomagnetic storm.

Just as terrestrial wind velocities are measured on the Beaufort scale - eg 'gale force 8', 'storm force 10' - there is a space weather 'G' scale. This one was a G4, less than the March 1989 event, which was a G5, and the aurora was widely seen much further south than are the great majority.

RadCom Editor Steve White, G3ZVW (NL), was QRV on 6m SSB. In the half hour from 2012 he worked as far south as F1FUX (JN16). Best beam heading (QTE) was about 40°. The aurora intensified around midnight and he worked stations in DL, EI, F, GI, OZ, PA and SP on CW and SSB. Other DX heard included ES1CW (KO29) and YL3AG (KO25). Conditions faded by 0100, but he could not see the aurora from North London.

Ted Collins, G4UPS (EX), first noticed the event on 6m at 2030 then worked a few stations in G, GM, ON and PA on CW and SSB, but found the SSB very difficult to copy. It faded out in Devon by 2200. Phil Hocking, G8ZDS (TR), heard a few signals on a temporary antenna and reports that the aurora was visible in Camborne.

Mike Johnson, GU6AJE, opened his account on 6m at 2208, working MM0AMW (IO75), followed by some Gs and an EI on SSB and CW. He was beaming due north most of the time, partly due to computer QRM, and thinks he would probably have heard more had he beamed north-east. He did not go outside to look for the aurora, but says it was seen in Jersey.

Jamie Ashford, GW7SMV (NP), couldn't believe his eyes when he looked up to see "a large swathe of deep crimson from straight up and towards the north-east; what a sight!". On 2m, though, there was very little activity on SSB and he only worked three stations, but the CW end was completely full. On 6m SSB he worked into EI, G, GI, GM and OZ.

LOCATOR SQUARES TABLE

Starting date 1/1/1979

Callsign	50	70	144	430	1300	Total
G3XDY	-	33	246	170	120	569
G3IMV	600	15	610	125	53	1403
GJ4ICD	753	1	267	121	79	1221
G6TTL	182	-	133	89	27	431
G4DEZ	445	17	256	81	67	866
G1SWH	338	42	222	81	30	713
G0EVT	416	14	292	77	16	815
G4YTL	-	50	490	72	-	612
G0XDI	196	-	213	59	-	468
G8TOK	293	31	132	55	29	540
G3FIJ	222	29	104	50	23	428
G0GCI	279	19	99	39	-	436
G7LRQ	212	-	60	36	34	342
G4ZHI	39	-	238	32	-	309
MM1BUO	296	-	76	31	-	403
G0ISW	162	-	80	22	-	264
G4APJ	111	-	39	20	-	170
G8GNI	124	14	38	18	-	194
G1UGH	265	-	130	14	-	409
G7CLY	238	-	221	13	-	472
2U0ARE	238	-	18	12	2	270
M0CNP	-	1	29	10	-	40
G0FYD	468	1	255	7	-	731
GW6VZW	488	-	146	6	-	640
G0JHC	718	20	48	4	-	790
G4FUJ	57	17	19	4	5	102
G3NKS	5	52	12	4	-	73
MM0BQI	44	-	18	1	-	63
GW7SMV	409	-	157	-	-	566
GU7DHI	415	-	-	-	-	415
G8XTJ	247	-	137	-	-	384
G4OBK	279	-	58	-	-	337
G1EFL	207	-	64	-	-	271
GU6AJE	226	6	30	-	-	262
G3FPK	2	-	246	-	-	248
GW3EJR	233	-	-	-	-	233
GM1ZVJ	224	-	-	-	-	224
G4UCJ	141	-	26	-	-	167
G4OUT	-	23	107	-	-	130
EA7IT	-	-	71	-	-	71

No satellite, repeater or packet radio QSOs.
If no updates received for a year entries will be deleted.
Next deadline is 22 June. Band of the month 430MHz.

BAND REPORTS

50MHz

There should just be time to catch proposed operation by a group of Italian operators from Giftun Island in the Red Sea group, scheduled for 21-28 May, possibly using the call sign SU9DX. The team leader is I8IYW and QSLs will be handled by IK8UHA. Thanks to Elio, IS0AGY, who passed on this information.

Welcome to new correspondent Dudley Clapp, M1ANL (BS), who worked ZS6AXT (KG33) on 27 March, exchanging 59/55 reports with no pile-up during a 20min opening. On 5 April, the best DX (ODX) of Bryn Llewellyn, G4DEZ, was ZD9BV in the first-ever 6m operation from Tristan da Cunha. In the same opening, he worked six ZS stations and LU6DRV.

G4UPS copied the ZD9 weakly in Devon and heard ZS6s, PY5CC, TU2OJ and LW5DX. (The two Argentine stations were just about readable at G3FPK on the Cushcraft R8 vertical antenna). Ted reports that club station FY7KE (GJ35) is QRV from French Guiana and that 5X1GS (home call G0VNW) in Kampala has worked into LU and PY; his QSL manager is WB2YQH.

There was a big opening in the afternoon of 27 March and GU6AJE worked six ZS6s, giving Mike a new country. GW7SMV contacted four ZS6s on 24 March and on the 27th Jamie contacted ZS1AVP, ZR1EV (JF96), 3C5I, PY5CC, ZS6 and IZ7, but a QSO with LU9AG was lost. He was unlucky with ZD9BV who was in for 90min.

70MHz

Jon Joyce, G4JTJ, listened for the Slovenian beacon S55ZMB (JN76VK) on 70.029MHz on 21 March, and detected possible snatches from it. Next morning, 0935-1040, he heard fragments of CW and definitely copied M, B, 6 and V.

David Dodds, GM4WLL, was out portable (IO85NR) for the contest on 19 March, which was not listed in the *Contests* section in the March *RadCom*, and made 12 QSOs, ODX being G4RFR at 555km. He was also QRV in the 2 April event, completing 23 QSOs in good conditions, ODX being G0GCI (JO01ED) at 553km.

1.3GHz

Ross Wilkinson, G0WJR, reports that several stations are now QRV in the Bristol area on SSB with a couple on FM only. They operate around 1297.50MHz (SM20), mainly with horizontal polarisation, and call for cross-band QSOs with 2m and 70cm stations.

Graham Wright, G4FUJ (GL), runs 10W to a 48-ele beam and was QRV in the 23/13cm contest on 9 April. He was pleased to work into the Isle of Man, since his ODX before had only been the other side of Warwick.

Activity on 23cm seems quite healthy in parts. According to an e-mail from GD0TEP the following are thought to be QRV: G0EHV, G0HNW, G1JDP, G4AEQ, G4THI, G6DER, G8PNN, G8XVJ, GD4GNH, GM0UHC, GM1CNH, GM4DIJ, GM4LBV, GM4OGI, GM4WLL/P, GM4ZUK/P, GM6CMQ and GM8BDX. G6TTL adds G3FIJ, G3MEH, G3XDY, G4DEZ, G6SPS/P, G8NEY and G8VR, plus possibly G4LIP/P and M0CRO.

GD0TEP reports that Robert Ferguson, GD4GNH, has been suffering wide-band QRM on 1295-1297MHz. Up to 18 April the racket had been on continuously for at least 12 days. There are peaks exactly 1MHz apart and they drift slowly up and down the band. The signals are not radar or pulsed, so has anyone any idea what's going on? Some DFing suggests that the offending signals might be coming from Kippur near Wicklow, so they wonder if there are any EIs with 23cm gear who could do a bit of DFing? Andy's e-mail address is gd0tep@qsl.net

DEADLINES

NO 2m OR 70cm INPUT this time, in spite of the aurora - maybe next month? The August deadline is **22 June** and the September date is **20 July,** by which time let's hope there will be some 2m Es to report. My telephone answering and fax machine is on 020 8763 9457 and my CompuServe ID is g3fpk. ♦

RadCom Helplines FOR MEMBERS

● Tony, G3ICB, is looking for a copy of the circuit diagram of the **BC312**. G3ICB, QTHR. Tel: 01635 872762.

● Ted Fletcher, G4EGB, was an electrician stationed at **2 Base Workshops, REME, Tel-el-Kebir, Egypt**. He is now researching the history of the workshops and army garrison, and would like to hear from anyone who knows anything about either. G4EGB, QTHR. Tel: 01723 362537.

● Frank, G2QT, would like assistance in recovering the following **stolen equipment**. An Icom IC-775, an Icom IC-746, a 'Morse Machine' and a pair of 'Warren Gregoire' headphones. He doesn't think that the Morse Machine has been on offer in this country, and would be useless without the handbook. G2QT, QTHR. Tel: 01303 814194.

● Chas, M0CDD, is looking for information on the military radio type **A14** high and low power variants, the military radio **A13** valve power amp, and the **Decca Voyager** marine transceiver type 120 plus power supply. All costs reimbursed. Tel: 01775 766398 (evenings).

● EH Trowell, G2HKU, is looking for a copy (or photocopy) of the manual for the **Toshibe T2000SXE** laptop computer, or any other information on the model. All costs covered. G2HKU, QTHR. Tel: 01795 873100.

● Richard, G3JAX, is looking for 'module A' of the **Plessey 2280** HF receiver. Part No 630/1/45011/001; RF amp and first mixer. G3JAX, QTHR. Tel: 01243 574210.

● Bill, GW3DGT, is looking for a copy of the instruction manual for the **Sharp EL-1615** electronic printing calculator, similarly the instruction manual for the **Hitachi D-E10** stereo tape deck. W Barrett, 'Stevina', Ludchurch, Narberth, Dyfed SA67 8JF. Tel: 01834 831369.

● Tony, G0GJP, is looking for a copy (or photocopy) of the manual for the **Icom IC-229H**. Tel: 01628 604953.

● Joe, G3EUS, is looking for a copy (or photocopy) of the manual for the **Yaesu FRG-8800** receiver. All costs covered. G3EUS, QTHR. Tel: 01462 433390.

● Jorge, EA4EO, is looking for a copy (or photocopy) of the circuit diagram of the **Vantron 300-A** linear amplifier (equipped with two EL34s). J Dorvier, PO Box 8407, Madrid 28080, Spain.

● John, VK6HQ, (formerly G3LXD and DL2XH) is attempting to form the 'Ex DL2 Club', so he would like to hear from any amateurs who served with the **British Forces in Germany** and who held DL2 call signs whilst there. There may also be services personnel who held DL2 calls but who did not take up G or other call signs when they left the services, or who have allowed their call signs to lapse. They are especially asked to make contact. J Hawkins, 17 Shasta Road, Lesmurdie, WA 6076, Australia. Tel: 00 61 8 9291 7908. E-mail: jhawkins@iinet.net.au

● Clive, RS171363, is looking for a copy of the User Manual for the **Kenwood TM-211E**. All costs covered. Tel: 01302 844788. E-mail: clivethomas@cwcom.net

● Mike, G3OOQ, wishes to thank everyone who responded to his 'Helplines' appeal in the April edition of *RadCom*.

Helplines is a free service to members. Requests for help are published in the order they are received. We regret it is not possible to provide an undertubmitted request will be published.

EMC

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THERE ARE various new developments in the field of home networking. This not only includes data links between home computers, printers etc, but also future 'smart' household appliances. To avoid the need for new wires, manufacturers are developing and selling products that use microwave radio links or existing telephone wires or mains cables. Some of these developments may be affected by amateur radio transmissions or may interfere with amateur radio reception.

RF IMMUNE TELEPHONE

SOME TELEPHONES have poor immunity to RF breakthrough of amateur transmissions, particularly at HF. For details of BT policy on such cases, see the April 1997 'EMC'. Several members have asked which type of telephone has good RF immunity and where it can be obtained.

The Ascom 'EMC Berkshire' used to be one of the best phones for RF immunity (see the June 1993 'EMC'). It was developed for business users who may have various radio transmitters nearby and do not wish to hear these signals breaking through on their office telephones. The 'EMC Berkshire' is no longer available, however, and we understand that current Ascom 'Berkshire' models have lower immunity.

At the moment, telephones can still be tested to the old 1992 version of the Generic immunity standard, EN 50082-1, which allows testing with an unmodulated carrier (see also the June 1998 and April 1999 'EMC'). Eventually, all new telephones will have to meet the EN 55024 immunity standard, which tests with an amplitude-modulated carrier, but attempts are being made to weaken this standard.

Meanwhile, one manufacturer, Siemens, has paid attention to EMC and the Siemens 'euroset 805' has been found to have good RF immunity to amateur radio transmissions in practice. Like the Ascom model, the 'euroset 805' is primarily aimed at business users. It has a 'Recall' button that is only used when connected to a PABX (Private Automatic Branch Exchange), but the phone is also suitable for use at home on a domestic phone line.

The photo opposite shows the 'euroset 805' which has 10 memories. The model 805S has a mute button and an additional memory key. A model 815S is also available with a 12 digit display, memory keys and a 'hands free' facility. The 835 model, with built-in digital answering machine, has been discontinued however.

'euroset' phones are available from the Rocom Group of Wetherby, tel: 01937 847 777. The price of the 805S in April 2000 was £14.50 + VAT. Postage and packing was £6 per order +VAT. Payment by credit card is accepted. Euroset phones are also available from the retail division of Nimans of Manchester, tel: 08705 102 020.

There are other suppliers, but these only deal with business customers. These include East Central (Business Machines) Ltd, tel: 01708 722 400 and Siemens Business Direct, 0845 795 9245, www.siemenscomms.co.uk/business_direct

The euroset 805S and 815 are due to be replaced by new models in Autumn 2000. We shall publish an update when the new models become available.

HOMEPLUG ALLIANCE

AFTER THE Home Phoneline Networking Alliance (www.homepna.org) comes the HomePlug Powerline Alliance. This organisation has 13 members including 3Com, AMD, Cisco Systems, Intel, Motorola, Panasonic and Texas Instruments. In a press release dated 10 April 2000, the president of HomePlug stated, "HomePlug is leveraging the ubiquity of the home power outlet to network an ever-increasing number of Internet devices, smart appliances, PCs and consumer electronics to distribute broadband multimedia content".

The Vice President of Windows Networking at Microsoft said "Microsoft applauds the HomePlug Powerline Alliance in its efforts to create standards that will help to make the digital home a reality".

On the HomePlug Web site (www.homeplug.org), I couldn't find anything about the radio frequencies it hopes to use for mains-borne communication, but it seems likely that someone will try to 'leverage' his way into the HF radio spectrum somewhere.

BLUETOOTH

MEMBERS HAVE asked about the Bluetooth system and whether it is likely to cause any EMC problems with amateur radio operation. Bluetooth is named after a 10th Century Viking king, Harald Blåtand, whose name has been mis-translated as Harald Bluetooth.

It is a standard for short-range 2.45GHz radio data links between devices such as computers and mobile phones within a room. It is similar in some ways to a radio Local Area Network (see the April 2000 'EMC'), but with lower power, lower cost and shorter range. It operates within the 13cm amateur band along with ISM (Industrial, Scientific and Medical) equipment such as microwave ovens.

PHONELINE NETWORK

HOME PHONELINE networks were mentioned in the December 1998 and February 2000 'EMC' columns. Thanks to the member whose organisation lent me a pair of home phoneline network cards for testing. These were Actiontec 'Actionlink' model HP1000 which, along with other models, are on sale in the UK and are CE-marked.

I did some laboratory tests to see what signals these network cards transmit along the phone line, and the results are shown in **Figs 1**, **2** and **3**. Fig 1 shows a single burst of 7.5MHz carrier. Fig 2 shows the start of a packet of data consisting of many bursts. Fig 3 shows the typical frequency spectrum when many packets are being transmitted. The signals below 1.5MHz are local MW broadcasts.

I then set up two PCs at home, one downstairs and one upstairs in the radio shack. I plugged each of them into extension telephone sockets. This was a near worst-case situation, with a telephone, answering machine and modem downstairs and three phones upstairs. The HF wire antenna goes over the house roof, so it is fairly close to the upstairs extension phone wiring.

Both PCs were running Windows 98® (2nd Edition) with the NetBEUI networking protocol and Client for Microsoft Networks installed. This enabled files to be

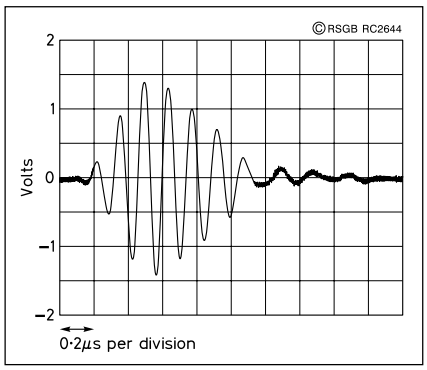

Fig 1: Waveform of a single burst of 7.5MHz carrier from a phoneline network card.

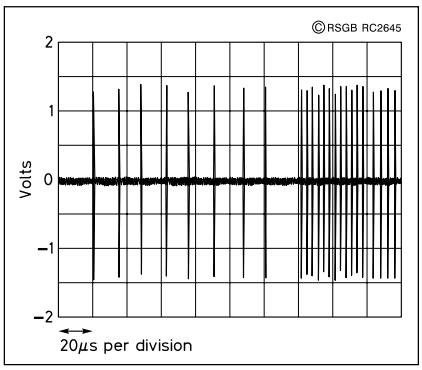

Fig 2: Waveform of the start of a data packet from a phoneline network card.

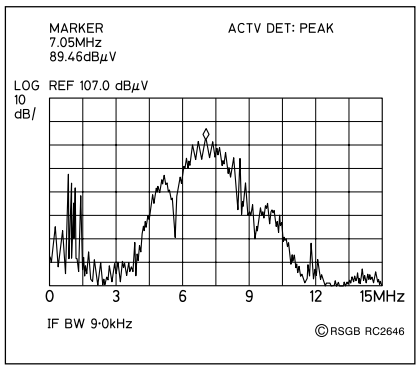

Fig 3: The frequency spectrum of the output from a phoneline network card.

transferred between the two PCs via the phone line and also allowed printer sharing.

When transferring large files, the interference radiated from the home phone wiring was S9+10dB across the whole 7.0 - 7.1MHz band and beyond, but was not audible on any other amateur band. It sounded like irregular bursts of white noise, rather like a lot of lightning flashes in quick succession. When no data was being transferred, the two PCs were sending very short 'handshaking' packets about once per second.

A pair of Actiontec 'Actionlink' home phoneline network cards.

This network seemed fairly immune to my SSB or CW transmissions on the 7MHz band because the data packets can get through between the 'dits' and 'dahs' on CW or between the words on SSB. Transmissions using SSTV or RTTY were another matter however, because of the continuous carrier. A transmission at 10W or more lasting more than 30 seconds caused an error message saying that the network was busy.

When the transmission ceased, the protocol did not recover. Once, I managed to re-establish the connection by logging off the shack PC and logging on again but, on another occasion, I had to restart Windows® 98. After finishing the tests and shutting down the shack PC, I shut down the downstairs PC and it warned me that two users were still connected! It seems that I should have restarted both PCs after the 'network busy' message.

MORE NOISY TV SETS

FOLLOWING THE item in April 2000 'EMC', we have received more reports of TV sets that radiate broad-band RF noise on the HF bands. These are mainly new large-screen models such as 28-inch or more. There are reports of RFI from a number of brands, but two brands are in the lead.

The first is a leading Japanese brand, and we are still trying to persuade the manufacturers to investigate this problem. The second used to be a well-known British radio and TV brand, but the noisy 28-inch model in question is made in Turkey. It is being sold by Makro, Kwik Save and some branches of Tesco. Major electrical retailers, such as Currys, Comet or Tempo, sell some small-screen portable models of the same brand, but I did not find any large-screen models.

The interference covers roughly 16 to 21MHz, peaking at around 18MHz. It appears to come from the switch-mode power supply, but only when the TV set is in standby mode. It can be received 200 yards away and has a very distinctive characteristic that sounds just like a fast steam train making a 'chuff-chuff' noise at about 8-10Hz. If anyone else hears this noise peaking at around 18MHz, please write or e-mail and I can tell you what it is likely to be.

The EMC Committee is in contact with the manufacturers concerned and we intend to publish further details in the future. In the meantime, if you plan to buy a new large-screen TV, it would be advisable to buy it from a retailer who will exchange it if you are not satisfied for any reason.

UNLICENSED FM

A G7 MEMBER reported a problem with a signal that was preventing him from operating his packet station on 144.950MHz. The interference was a carrier at 144.900MHz with wideband FM that rendered much of the range 144.800 - 145.000MHz unusable. The modulation was the same as a nearby unlicensed FM broadcast station on 96.6MHz, but why did it have a substantial spurious output in the 2m band?

It appears that a popular design of pirate FM broadcast transmitter uses an oscillator at half the carrier frequency, followed by a frequency doubler. In this case, the oscillator would be at 48.3MHz and the doubler was also producing some third harmonic at 144.900MHz.

Our G7 member asked me whether the operators might improve their output filtering if he asked them nicely. I suggested that they probably didn't have any filtering and that as their fundamental was illegal, they probably wouldn't worry about spurious signals. He then reported the station to the RA in writing and received a reply stating that they would investigate and that the station had been raided 3 days earlier.

According to a press release on the RA Web site, the Agency carried out 1414 raids on 239 unlicensed broadcasting stations in 1999. Of these, 1218 raids were on 167 stations in the London area.

The Siemens 'euroset 805' telephone. Photo: Siemens Communications Limited.

CABLE TV

WE HAVE A long-running case with leakage from a cable TV system in Strood, Kent, after it started using 145.850MHz as a vision carrier. This is an old system with coaxial cable above ground on poles. These carrier frequencies are unusual, unlike modern systems that use harmonically-related carriers on exact multiples of 8MHz. I have measured leakage levels at a location in Strood that are far in excess of the MPT1510 limit and would be interested to hear from any other members in the Medway towns who suffer 2m interference from this source. ♦

RSGB BOOKSHOP

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By Kirk A. Kleinschmidt, NT0Z
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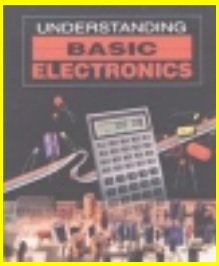

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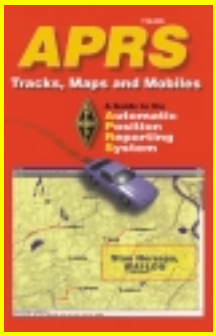

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DATA

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E-mail: data.radcom@rsgb.org.uk

THE BRITISH Amateur Radio Teledata Group (BARTG) is the main organisation representing radio amateurs interested in data communications in the UK. The whole spectrum of interest is catered for and a quarterly journal *Datacom* is produced. An annual BARTG Rally has been a usual feature in the past, but unfortunately, due to spiralling costs of venues, has had to be cancelled this year. It is hoped that a suitable venue for future rallies can be found soon. Full details of BARTG and its range of products and services can be found at www.bartg.demon.co.uk

The section on high-speed linking on microwaves in the last column generated a few responses from packet node keepers. It appears that there is a demand for short-distance links, often of only a few kilometres. The newly-formed UK Microwave Group has a special interest in developing this aspect of microwave operation and one of its aims is to make equipment available. See their website at www.microwavers.org

TRANSCEIVER CONTROL

ONE AREA THAT has come to light, when talking to writers of software for radio amateurs, is the lack of uniformity between transceiver manufacturers for remote programming. At the moment any author needing remote control of frequency, mode or other parameters has to include drivers for all transceivers ever likely to be used with the software. Even within equipment from one supplier, there are apparent differences between models such as the transceiver address codes.

One solution would be development of a common set of commands for the basic functions needed and then use a relatively simple interface module - probably built around a simple processor such as the PIC - which could then translate these commands into the control codes needed by the transceiver. One protocol that might work could be similar to the National Marine Electronics Association (NMEA 0183) standard for interfacing between navigational equipment on boats. Here, plain text ASCII sentences are sent between equipments using RS-232-type protocols. Just for illustration, a typical sentence for transceiver control along these lines might be as simple as '$RIGCTL,FRQ 14.0950,USB,TX ON*' which should be self explanatory. Some work will need to be done on generating a set of commands to cover all likely amateur requirements, but still remaining compatible with the remote control capabilities of the equipment likely to be used. Who knows, once a 'Rig Control Standard' is established, perhaps manufacturers will take it on board and build compatibility into their transceivers!

FUNDAMENTALS

WIDE-SHIFT FSK, or Frequency Exchange Keying, where the frequency shift is significantly greater than the data rate, has a very poor bandwidth efficiency, using significantly more than is needed to send the data. Not very socially acceptable in the congested amateur bands! One way to lower bandwidth is simply to use a lower frequency shift for a given data rate. This has the effect of merging the sidebands from the two tone frequencies into one continuous spectrum and means that the approach of using two tuned circuits to separate which tone was transmitted is no longer feasible. There are many ways of converting a varying audio frequency to a changing voltage, which can then be fed to a comparator to decide whether a One or Zero was sent. The Phase-Locked Loop (PLL) is the most popular means of doing this in hardware. Other techniques are used in DSP-based demodulators. However, an FSK demodulator using a PLL generally needs a higher S/N ratio than a two-tone type, as it must remain in lock and track the changing frequency continuously. This makes it more susceptible to noise and interference than a design which compares relative power levels of the two tones. Narrow-shift FSK has been employed with good results in the early days of telephone modems where, originally, 300 bits per second (b/s) were available using two tones with a shift of 200Hz. 1200b/s with either 800Hz or 1000Hz shift followed shortly. This worked reliably enough over the 25 - 40dB S/N capability of the analogue telephone network in its day. The 1200b/s standard, with its switching sidebands, takes up much of the available 3kHz audio bandwidth, so data rate could not be raised further by using FSK techniques. Simple, low cost modem chips appeared to cater for these modes and the packet radio community adopted these telephone standards in the 1980s, due to their simplicity of implementation.

Unfortunately, the high S/N requirement for narrow-shift FSK means that, for radio communication, high error rates frequently occur. If an FM link is used for transmission of the two audio tones, the inherently good quality of this mode allows narrow-audio FSK to work successfully for short range local contacts. The vast majority of the packet network relies on this medium of 1000Hz shift audio carrying 1200b/s data, frequency-modulated on a 25kHz (I know, 12.5kHz now!) channel. Hardly an efficient modulation scheme. For some reason, now probably buried in history, direct FSK never appeared to have been seriously tried at these rates. On HF, attempts to use 200Hz shift for 300b/s data were fraught with failure and lost data, and HF packet forwarding was for some time limited to the 50b/s or less of AMTOR or RTTY. A better way of modulating an RF carrier is needed if we are to improve on this.

The Multyterm Terminal Unit, available from BARTG as one of its range of products for amateur datacomms. It is designed for use in conjunction with an IBM-compatible computer running the Grosvenor Software *Multy* suite of programs for PACTOR, AMTOR, RTTY, CW, FAX and SSTV.

Over 50 years ago Claude Shannon, a mathematician, worked out a relationship between channel capacity, in bits per second, channel bandwidth and S/N ratio. While the derivation of this relationship is both tortuous and complex, the conclusion is given quite simply by:

Channel Capacity (b/s) = Bandwidth (Hz) x $\log_2(1 + S/N)$

S/N is in numeric units, not the dB in which it is usually specified, and the error rate is defined as being 'arbitrarily low'. What was never stated by Shannon is how the information has to be encoded to achieve this purely theoretical limit. The efficiency of a data communications system or modulation scheme is often given as how close it can approach the Shannon ideal and the majority of modulation schemes in use today fall well short of this, although some very good ones are beginning to appear. Typical amateur RTTY of 50baud at 170Hz shift needs around 300Hz bandwidth. Plugging these figures into the formula suggest communication can be reliably made with a S/N ratio of 0.122 or –9dB. In practice, a S/N as low as that would lead to a signal that couldn't be heard by ear, and a figure some 20dB greater than this is usually required for normal RTTY. We will return to the Shannon ideal in the future, but at the moment it is a target to aim for. ♦

IARU

TIM HUGHES, G3GVV
10 Farm Lane, Tonbridge TN10 3DG.

EACH YEAR the Executive Committee (EC) of IARU Region 1 meets to review work achieved and to consider plans and action for the future. Many aspects of its activities are carried out by permanent working bodies, committees and coordinators, each of which submits reports. Thus the EC receives information from the HF committee, the VHF/UHF/Microwave Committee, ARDF, Radio Regulatory Working Group (RR-WG), EMC, High Speed Telegraphy (HST), IARU Region 1 Monitoring System (IARU-MS), International Beacon Project (IBP), Information Programme for Handicapped Radio Amateurs (IPHA), STARS, and EURO-COM. RSGB members are chairmen or coordinators of RR-WG (G3HCT), IARU-MS (G4GKO) and IBP (G3USF).

IN OUR INTERESTS

THE CORE WORK of IARU is the defence of our interests in the face of increasing pressure from other users of the radio-frequency spectrum. From our own Region, SP5FM is a tireless worker in his capacity of Chairman of the External Relations Committee (ERC), attending meetings of the International Telecommunication Union (ITU) and CEPT. He reports on achievements and problems, and plans for the World Radio Conference to be held this year, with a further WRC in two or three years' time. ZS5AKV is involved in the work of the Pan-African Telecommunication Union (PATU), a conference which he attended in South Africa in December 1999. G3HCT has attended several meetings associated with regulatory and licensing matters.

EMC

SOME OF THE concerns of radio amateurs are the problems associated with electromagnetic compatibility. Christian Verholt, OZ8CY, reported on four major issues: standardisation of EMC in general, follow-up of specific issues, preparation for the open EMC meeting at the Wroclaw EMC Symposium, and preparation for the working group meeting in Friedrichshafen. A report by Gaston Bertels, ON4WF, detailed progress on CTE/RTTE (Connected Terminal Equipment), on a harmonised standard for Amateur Radio Equipment, on the present status of drafted harmonised standards, and the telecommunications regulatory package. The RF-emission limits in connection with pacemakers in Germany were reported by Karl Vogele, DK9HU.

The three Chairmen at the REF Headquarters station: l-r Fred Johnson, ZL2AMJ (Region 3); Tom Atkins, VE3CDM (Region 2); Louis van de Nadort, PA0LOU (Region 1).

Within Region 1, which covers Europe, the Middle East, the former Soviet Union and Africa, attention is always directed to the development of amateur radio in Africa. Both Tafa Diop, 6W1KI, (Vice Chairman) and Hans von Groenendaal, ZS5AKV, are involved in this work, both having the advantage that they travel extensively in Africa. Courses for administrators are provided, together with guidance for those involved in encouraging newcomers to the hobby. It is important to recall that all member countries of the ITU have equal voting rights, regardless of their size and population.

The finance of the Region came under close scrutiny, the costing of each activity being evaluated before approval.

Two members of the EC were nominated for service on the Administrative Council - the Chairman and Secretary Louis van de Nadort, PA0LOU, and Tim Hughes, G3GVV, being thus chosen, with Ole Garpestad, LA2RR, as an alternative.

All members of the Executive Committee were present at this meeting: PA0LOU, 6W1KI, G3GVV, F6DRV, A41JT, DK9HU, LA2RR, SP5FM and ZS5AKV. The Chairman welcomed visitors from the Administrative Council: Larry Price, W4RA (President of IARU), David Wardlaw, VK3ADW (Vice President of IARU), Tom Atkins, VE3CDM, and Eduardo Estrada, HC2EE (Chairman and Secretary of Region 2), Fred Johnson, ZL2AMJ, and Sangat Singh, 9M2SS (Chairman and Director of Region 3).

ANNIVERSARIES

THE YEAR 2000 is a notable one for amateur radio and for one of its major Societies, which is why both IARU Region 1 Executive Committee and the IARU Administrative Council held their meetings in Tours, France. This city is the home of l'Union Française des Radioamateurs (REF), a member society of Region 1, founded 75 years ago, the President of which is Élisée Bismuth, F6DRV - and he is Region 1's Treasurer. REF's Headquarters provided extensive facilities for the meetings and we were able to admire its antenna farm in the surrounding field. A commemorative plaque, recording the anniversary, was unveiled by W4RA.

The millennium also marks the 75th anniversary of the founding of IARU and the fiftieth anniversary of the establishment of IARU Region 1, more on which will appear in the August column. ♦

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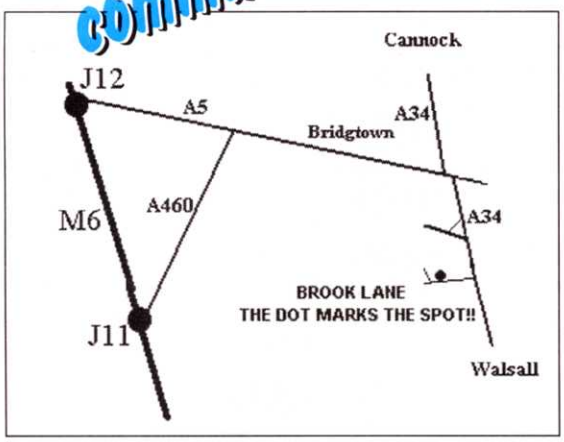

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ATV

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MANY THANKS to Dave McQue for starting the *RadCom* 'ATV' column and to Norman Fitch for holding the fort for the last few months. I have been active on fast-scan ATV for some 30 years, originally using 405 lines.

NOSTALGIA

THE FEBRUARY 2000 edition of *CQ-TV*, the journal of the British Amateur Television Club, has a lead article on a 625-to-30-line standards converter designed by Peter Smith, G4JNU. The device, built some 10 years ago using CMOS devices, was intended to demonstrate a replica of a 1930 mechanical Baird Televisor exhibited at special event stations. Peter explains that whilst recordings taken from gramophone records of Baird's transmissions are available, the results are not good!

The project was very much a 'one off', but the techniques used are interesting and the results very pleasing. If such a project were undertaken today, either a PIC micro-controller or PC would probably be used to perform the majority of the work, but the basic principle would be similar.

Reflecting on the article, my mind was taken back to the first attempt at video generation and transmission from G3YMK. A 'flying spot scanner' was built using an old (at that time) Ferguson TV receiver as a scan source. A 35mm filmstrip projector was used back-to-front as a pick-up device, with a 931 photomultiplier tube physically replacing the bulb. Synchronisation pulses were actual broadcast standard; they were taken off air from the original receiver section, tuned to the BBC! The projector faced the screen of the television set, which was biased to produce a white raster. This in turn was focused on the film in the projector. The resulting video from a 35mm negative could only be described as 'soot and whitewash', but text was recognisable. The shack was almost totally dedicated to the TV equipment and no supplementary heating was needed, even in the depths of winter.

The 70cm video transmitter used a QQVO2-6 valve as a grid-modulated 1W PA. The precious, fragile and expensive valve did not last very long if more than 180V was applied to the anode but, by the time enough money had been saved to buy a replacement, I had obtained a new job as a trainee transmitter engineer which meant living in digs. ATV activity was temporarily curtailed. Imagine my surprise and delight as the first job I was given at the Dover ITA transmitter was to re-align the Marconi Flying Spot Scanner used as a standby to radiate Test Card C and 'apology' captions in the event of failure of the incoming 2GHz microwave link. To have the manuals and circuit diagrams was a dream come true - and they paid me to have fun as well!

The GB2RS news is transmitted each Sunday morning by Roy Powers, G8CKN, via ATV repeaters GB3AT and GB3HV.

ATV TODAY

DEVELOPMENTS IN video communication are accelerating at such a pace that the Buck Rogers dream of wrist-mounted visual communicators is almost a reality. This has made it much easier to become active and explore the world of ATV. Video sources are numerous; cameras can be obtained at prices such that it is more expensive to build them nowadays, and home computers produce high-quality graphics indistinguishable from those seen on entertainment television. Space is no longer such a problem and additional heating is often needed in TV shacks. Slow-scan HF operation (SSTV) is very popular using computer programs available as shareware, and the results are excellent. Fast-scan activity is possible on 70cm and above, and there are many pockets of activity around the country; listen on 144.750MHz FM (the commonly-used ATV talk-back frequency) in your area and you may be surprised at the level of activity. Amateurs interested in fast-scan welcome and encourage new enthusiasts to become operational, so give a call.

Transmitters and receivers for fast-scan ATV are now easier to build. Satellite receivers can be used for 23cm (24cm) FM TV and are capable of acceptable results with a simple pre-amp and aerial, but the bandwidth of most is greater than is needed and hence the signal-to-noise ratio is less than is achievable using a properly designed receiver. Future columns will describe some of the designs available, and I would be delighted to hear from active ATV enthusiasts regarding their experiences and recommendations. Don't neglect 70cm, though. It is possible to obtain very good results on this band, albeit in monochrome, as it is no longer wide enough to contain conventional colour ATV transmissions.

It surely cannot be long before the chips and modules become available at reasonable prices to allow amateur digital colour transmission. Watch this space!

REPEATERS

ATV REPEATERS have increased the popularity of amateur fast-scan television. Groups have provided repeaters on the 23cm (24cm) and 3cm bands. Some details can be found in the RSGB *Yearbook 2000* (p72) or on RMCWEB, the website of the RSGB Repeater Management Committee. The 23cm band is shared with aeronautical radar and great care has been needed regarding the technical specifications and siting of ATV repeaters. Recently, a review of the specifications was carried out between the Repeater Management Committee, Radiocommunications Agency and BATC, resulting in a new less-restrictive and easier-to-achieve technical specification. The RA has circulated the draft documentation to existing repeater keepers for comment, and once feedback has been assessed it is hoped that the new document will be finalised by mid-2000. If any groups have not already commented, please do so directly to the RA.

The RA has also agreed to consider, on a case-by-case basis, any applications to increase the ERP of TV repeaters above the former 25W limit. This will help some groups to compensate for loss of high sites due to increased rental.

2.4GHz

THE 13cm BAND has not received much attention from ATV enthusiasts until recently. However, that is likely to change with the advent of inexpensive transmitters and receivers which are available from out-of-town DIY stores. These units are intended for wireless communication within the home for security cameras, DVD video and other boxes external to the TV receiver.

These devices usually have four wide-band channels, the lowest two of which are at the top end of the amateur band. There is a snag in that the top end of the amateur band is allocated to space communications. Whilst it is very unlikely that the devices in normal use will cause interference to satellite enthusiasts, clearly it would be inadvisable to increase the power or fit a better aerial in any location where amateur colleagues are trying to receive weak signals from the heavens.

Several amateurs are known to be trying out these devices and I would welcome the results of any successful experiments in bringing the frequency down and increasing the power.

SIGN OFF

LET ME KNOW what aspects of ATV you would like reviewed in this column. Items for inclusion can either be forwarded by post or sent via e-mail to G3YMK@aol.com The Internet contains a wealth of information regarding ATV and a good place to start looking is the site of the BATC: www.batc.org.uk ♦

SWL

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TWO OR THREE years ago Paul, EI5DI, developed *SDL* as a contest logger for SWLs, largely in response to an appeal by myself. *SDL* offers direct support for SWLs in the major international contests, including the CQ WPX contest, and in dozens of others worldwide. I believe it's the only such SWL contest logger available anywhere in the world. Listeners should not confuse *SDL* with other SWL logging programs, as it is dedicated to contesting. It uses a separate file for each event which can then be imported into, and integrated with, the user's station log. As such, *SDL* does not offer facilities to print QSL labels or other features that are appropriate for general logging software, for example *ShackLog*. *SDL* is free, and any SWL who enjoys participating in contests should be aware that *SDL* is quite possibly the only software that is suitable for SWL contest participation. It can be downloaded from www.ei5di.com Simon, RS177448, and I have used it several times recently - for a multi-single effort in CQ WPX and single operator participation in the SP DX Contest and the Holyland Contest. We were certainly impressed with the ease with which it handled three very different contests. I encourage readers to download the software - thus increasing the amount of SWL participation in local, national and international contests.

SLP

ONCE AGAIN there is an update on the latest Set Listening Periods organised by Dutch SWL, Lambert Wijshake, NL-10175. This month he provides the full listing taken from the three SLPs which have taken place so far this year. The next SLP is not until 9/10 September.

I hope that in the months to come there will be greater participation by British SWLs.

BAND REPORTS

APART FROM the regular reporters, I am pleased to mention the report made this month by Wally Mawer, BRS96639. He had just returned to the listening ranks and referred to interesting DX logged - 3W, XV, KH0, 3B8, KL7, 5Z4, P29, VK7 and XU - over the last few months. Elsewhere, listeners reported an upturn in conditions. Solar flux numbers had been above 200, the HF bands had been staying open for DX through the night, and there had been some choice DX to catch. Several even remarked that band conditions over the period covering late March/early April had been the best for many years. We did, of course, have the two new DXCC entities to chase - TX0DX (Chesterfield Island) and 4W6 (East Timor). As Robert Small remarked, "You wait years for a new one, then two come at once". Apart from these DXpeditions, we have also been treated to the FO0AAA trip (Clipperton Island) and CE0ZR (Juan Fernandez Island).

Looking at your reports, the following appear to be the best of the DX that has been on offer:

10MHz - KH0/JA5EWH, CE0Z/OH3JF, PJ5/K7NAA and 3B8MM.

14MHz - FO0AAA, FO0HWU, 7Z1ZZ, 3W50K, BX4AD, TY1DX, HK0OEP, ZK1XXC, FW5ZL, FK/F6DLN/P, HS2FDX, J73HPL, 3V8BT and AH7A.

18MHz - VP6BR, FO0AAA, HK0VGJ, 3D2QB, 3W50K, V2/W4WX, FM/F5JOT and CE0Z/OH3JF.

21MHz - BD9SD, 5Z4WI, YC8XWJ, T88KM, 9M6BAA, FO5NL, V8IAN, XU7ABB, 4W/W3UR and 9G5MD.

24MHz - PA3GIO/HC8, A35MQ, CE0ZR, KH6LEM, 5Z4WI, P29VMS, V51HK, R1ANZ, JN1HOW/JD1, V31GI and ZD9BV.

28MHz - CE0Z/OH2MXS, FO0AAA, D3SAF, XF4LWY, VP6BR, 5A23PA, VP5V, TL8GZ, CE0ZR, 9E1C, 3W2GAX, EL2DT, DU3SV, TU2WL and DU1IHU.

However, the best news of the month has to be that my R-6000 vertical received its long-awaited planning permission and has already accounted for three new band countries and a host of other goodies - CE0ZR (18 and 24MHz), BQ9P (28, 21, 18 and 14MHz), HF0POL (18MHz) and T88CL (14MHz).

The QSL card from Sark. See 'Sark 2000'.

SARK 2000

NOBBY, G0VJG, one of the M2000A operators, was active from Sark between 12-19 May. He was keen to be quite active, so that as many SWLs had the opportunity of logging a station on Sark. Although it is not a separate DXCC entity (it counts as GU), it does have its own IOTA reference (EU-114) and there cannot have been much SSB activity from the island on the WARC bands.

Anyone who heard Nobby can send for his DXpedition QSL card (above), either direct or via the bureau.

I would be interested to have details in advance of other DXpeditions which are especially keen to receive SWL reports.

REMINDERS

DON'T FORGET to let me have the details you would all like included in the Society's *Yearbook 2001*. Also, I really do need some feedback quickly about this year's SWL exhibit at the RSGB HF and IOTA Convention in October. ♦

Set Listening Periods up to June 2000

SWL	SLP1	SLP2	SLP3	Total
OM3-27707	0	15480	20952	36432
NL-7280	14758	0	14520	29278
ONL-383	0	5286	18252	23520
NL-7403	8208	4176	9240	21264
NL-12089	5610	0	9424	15034
NL-290	3706	0	7980	11686
OE1-0140	1496	1952	6942	10390
GW-5218	8284	0	0	8284
NL-11099	1974	0	3900	5874
NL-11976	0	1749	3962	5711
F-11734	2258	0	2868	5126
F-17789	0	754	4030	4784
NL-9723	250	1540	2871	4661
BRS-88921	0	0	2835	2835
I1-14016	0	0	1742	1742
PY2-80124	0	551	0	551

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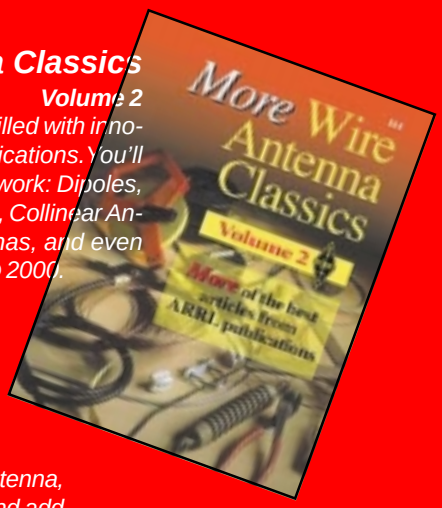

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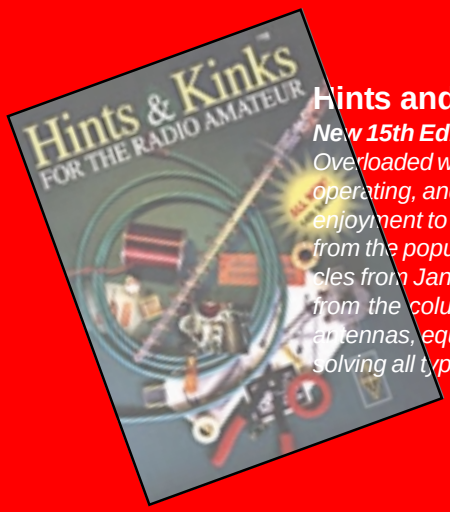

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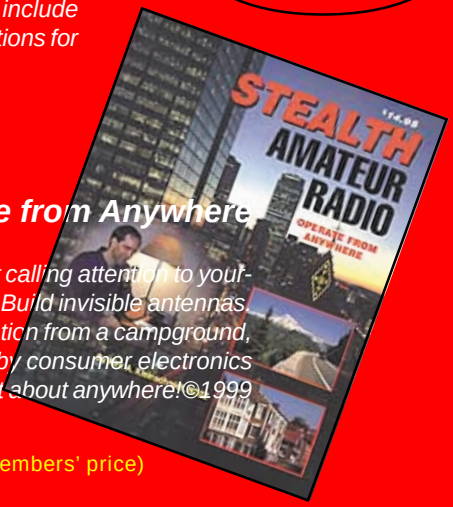

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the last Word

The Much Maligned dBW

I refer, as a 'professional radio amateur with lots of letters after my name' (only a few letters, actually), to G3XIZ's letter regarding dBW ('The Last Word', May 2000). I don't understand why dBW either - it seems pointless to me. After all, I don't measure the mains as +47.23dBV.

I suspect it came from the use of dBm for measuring receiver sensitivity, which originated from the radar/electronic warfare community, where matched impedances and received powers were the major parameters of interest. In communications equipments, Europe used generally to use EMF microvolts for receiver sensitivity, which had advantages in comparison measurements. The USA used PD microvolts - according to the cynical, because it gave a lower number and so looked better! dBm is the power in decibels relative to 1mW, which would be provided to the equipment if the load impedance was 50 ohms - a lot of assumptions.

dBs are best kept for the areas where they are of most use - and the power column of the log book is not that place.

Peter Chadwick,
Senior Member IEEE, G3RZP

Shrinkwrap Disincentive

I am pleased to see the RSGB presence at radio rallies, but regret that so many of the books displayed for sale on the stands are encased in plastic, preventing prospective buyers from inspecting their contents.

I feel that if opened copies were available for inspection, this would greatly aid sales. Badly worn copies could be sold off later, at reduced prices.

Ken Craven, G4LKP

[RSGB currently carries about 120 titles, six of them being shrinkwrapped. The Commercial Manager advises me that if anyone wants to browse such a book on the RSGB stand at a rally, all they need to do is ask one of the staff. - *Ed*]

Uninformative Feature

'An Introduction to VHF/UHF Range', (*RadCom*, May 2000) really failed to tell us very much. It seems more geared to setting up an RT site than amateur radio. The author suggests that better software and modelling could tell us more. Ultimately we could just have virtual contacts. I suppose it would cure the TVI menace at a stroke. From the article, any potential VHF operator would be thrilled to know that they could work into Newmarket from Cambridge! Several operators' logs would tell us more; 144MHz FM range for moderate stations is around 100km. SSB would be 400km. High power SSB from a good site, 700km. HB9RDE regularly works 1000km from his 1000m site under totally flat conditions.

Brian Clowes, GW4HBZ

[An aspect of 'Down To Earth' that is sometimes overlooked by those with many years of amateur radio experience is that features in this section of *RadCom* are aimed specifically at newcomers. Bombarding them with too much detail - in what I hope will become a lifetime's interest in amateur radio - could be counter-productive. - *Ed*]

QSL Bureau Plea

As my wife and myself are part of the band of volunteer QSL Sub Managers, can we, through your column, ask all users to supply envelopes to their respective Managers? We're sure we are not alone in holding cards for 'address withheld' amateurs; at times it amounts to a fair sized forest. It seems the most prolific card-gatherers have no envelopes and are address withheld!

We hold cards as long as possible, but eventually they go in the bin. What the senders think is another matter. There seem to be vast quantities of cards nestling in Sub Managers' homes.

The question is: how can we deliver said cards to address withheld amateurs? Answer: we cannot. So, if you don't want the cards, tell your contacts 'no QSL'. If you do want the cards, please supply your Sub-Manager with enough envelopes to complete the delivery of proof of your hard won contacts. Don't forget, you'll need the cards for DXCC and other awards.

Dave & Joy Hughes, G0RVW & XYL

We've Been Squeezed

Fellow members of the Yeovil Amateur Radio Club and I have just spent an extremely arduous weekend staging our annual QRP Convention. We enjoyed having our QRP enthusiast friends visit our event and will have hopefully made enough money to avoid having to increase club subscriptions again at our AGM on Thursday. If it has to be increased, no doubt there will be a further drop in membership and eventually the members will decide it is not worth the effort and the Club (which was formed in 1946) will cease to exist.

RadCom and the RSGB could help if it was not so infatuated with selling space to advertisers and then allowing them to organise what are virtually advertising events under the RSGB banner; space which should be used to back-up members' fund-raising efforts.

Space for our notices in the Events Diary is being whittled away all the time, firstly by asking us to abbreviate everything and now by reducing the size of print and spacing so that us oldies need a magnifying glass to read it; and by putting the later entries above ours under the date line, so relegating us to the bottom of a list which usually has far more content than we are allowed. In the April issue we had a mere three lines and I guess if there had been more Silent Keys we would have been off the page altogether!

Ours was the first entry in last September's *RadCom* and we feel, to be fair, the later entries should be below ours. Maybe the advertisers will still be there when all our members and your readers have left, but I wouldn't bet on it!

Peter Burridge, G3CQR

[The Members' ads / Rallies / Club section of *RadCom* was slightly reduced a while ago, the knock-on effect of which has been space for a little more technical content. In any case, rallies are listed in alphabetical order under the date lines. We cannot know in advance how many members' ads and how much rally/club/GB call sign info we are going to receive for any given edition, so, in our efforts to publish the most up-to-date and comprehensive lists, we adjust the size of the type to fit. Having said that, this month sees a slight re-ordering of *RadCom* and as a result it has been possible to allocate a bit more space to that section and colour pages to more of the regular columns. - *Ed*]

Too Demanding?

It happens every year, the people at the Radio Licensing Centre seem to delight in wasting time and money (or is it just inefficiency?) in sending-out quite unnecessary mail to license holders who have arranged standing orders with their banks to pay the annual fee.

On 11 April I received a Final Notice, telling me that the renewal fee (due on 15 April) had not been received. Yet again I phone my bank and ask if the annual fee has been paid, which by the way is dated for 1 April. 'Yes, it was sent out on the said date, as requested' they said, so what's with these people, is the service too demanding for them?

Jim Roberts, G3EGY

The Finer Points

I was interested in the letter on apostrophes from GM3LVA in 'The Last Word' in the April 2000 edition of *RadCom*, with which I absolutely agree. Those showing possession are also there because something is left out. "John's radio" is short for "John his radio", the "hi" being omitted.

This piece of grammar is called the *Saxon genitive*. It is not politically correct from the gender point of view, but originated around 1000 years ago.

J H Cook, G0EQM

Complementary Interests

Peter Kirby, G0TWW, in his '*RadCom* Leader' (May 2000) is absolutely correct in advising clubs to think about changing their names. This is something we considered when we launched the Christian Radio and Computer Association (CRACA) on 1 January this year.

Christian radio amateurs suffer from the double whammy of declining interest in the hobby as well as falling church attendance in general, however, since our inclusion of interest in computers we have gone from strength to strength. In just four months our membership has passed the 100 mark and is increasing exponentially. We find that the two interests tend to complement each other - radio amateurs are glad to pick up useful tips from our computer colleagues and, perhaps best news of all, some of the computer whiz kids are showing an interest in ham radio.

Particularly pleasing is the fact that we find we are attracting a lot of younger people who not only have the necessary energy and enthusiasm which any club needs, but tend to be full of new and innovative ideas to keep the club active for the foreseeable future.

Charles Elliott, G4UJW

Please note that the views expressed in *The Last Word* are not necessarily those of the RSGB. All letters received by the Editor are considered for *The Last Word*, unless marked 'not for publication'. Letters may be passed to the relevant person, department or committee.

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Advertisement Index

C.A. Electro-components Ltd	27	Longleat Rally	32
Castle Electronics	86	Lowe Electronics	25, 27
Chelcom	96	Martin Lynch & Sons	6, 50, 51, 93, 97
Cliveden Recruitment	29	Moonraker	60
Colomor (Electronics) Ltd	29	Nevada	18, 19, 58, 59
Communication Specialists	29	Postcard Co.	23
Cushcraft	93	Quartslab Marketing	23
Elvaston Castle	40	Radio World	88, 89
Entel	34, 35	Ronal Computers	98
FDS Graphics	76	SRP Trading	68
GZ4PY	72	Spacetech	40
GWM Radio	27	Tennamast	72
HF Instruments	76	Ultimate Industries	23
Ham Radio 2000	32	Unicom	23
Haydon Communications	65, 66, 67	Vine Antennas	86
Icom	49	Wacral	72
Ipac	72	Walford Electronics	72
J Birkett	72	Waters & Stanton	IFC, 3, 4, 5, 20, 28
J B Engineering	40	Westlake	87
Klingenfuss Publications	72	Wilson Valves	72
Lake Electronics	40	Win Radio	IBC
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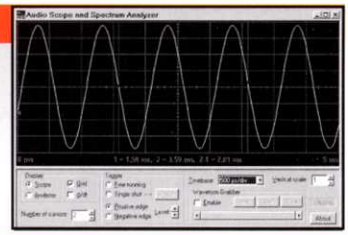

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- **WR1550e - £429 INC VAT**
- **WR3100e - £1169 INC VAT**

Each stand-alone unit connects to your PC through either the basic RS232, or through an optional PCMCIA adapter (for high speed control).
The units are powered through either your existing 12v supply, or through an (optional) NiMH rechargeable 12v battery pack.

"It's software is excellent.. more versatile and less idiosyncratic than that of the Icom IC-PCR1000"
WRTH 1999 Review

"Five stars for its mechanical design"
WRTH 1999 Review

"Most Innovative Receiver"
WRTH 1998 Awards

Model Name/Number	WR-1000i & WR-1000e	WR-1550i & WR-1550e	WR-3100i & WR-3100e
Construction of internals	WR-1000i/WR-1550i-3100iDSP- Internal full length ISA cards		
Construction of externals	WR-1000e/WR-1550e - 3100e - external RS232/PCMCIA (optional)		
Frequency range	0.5-1300 MHz	0.15-1500 MHz	0.15-1500 MHz
Modes	AM,SSB/CW,FM-N,FM-W	AM,LSB,USB,CW,FM-N,FM-W	AM,LSB,USB,CW,FM-N,FM-W
Tuning resolution	100 Hz (5 Hz BFO)	10 Hz (1Hz for SSB and CW)	10 Hz (1Hz for SSB and CW)
IF bandwidths	6 kHz (AM/SSB), 17 kHz (FM-N), 230 kHz (W)	2.5 kHz(SSB/CW), 6 kHz (AM) 17 kHz (FM-N), 230 kHz (W)	2.5 kHz(SSB/CW), 6 kHz (AM) 17 kHz (FM-N), 230 kHz (W)
Receiver type	PLL-based triple-conv. superhet		
Scanning speed	10 ch/sec (AM), 50 ch/sec (FM)		
Audio output on card	200mW	200mW	200mW
Max on one motherboard	8 cards	8 cards	6-8 cards (please ask)
Dynamic range	65 dB	70 dB	85dB
IF shift (passband tuning)	no	±2 kHz	±2 kHz
DSP in hardware	no - use optional DS software		YES (ISA card ONLY)
IRQ required	no	no	yes (for ISA card)
Spectrum Scope	yes	yes	yes
Visitune	yes	yes	yes
Published software API	yes	yes	yes (also DSP)
Internal ISA cards	£299 inc vat	£369 inc vat	£1169.13 inc
External units	£359 inc vat	£429 inc vat	£1169.13 inc (hardware DSP only internal)

PCMCIA Adapter (external):	£69.00 inc vat when bought with 'e' series unit (otherwise: £99 inc vat)
PPS NiMH 12v Battery Pack & Chrgr:	£99 inc vat when purchased with 'e' series unit (otherwise: £139 inc vat)
The WiNRADiO Digital Suite:	£74.99 inc vat when purchased with a WiNRADiO receiver (otherwise: £81.05 inc vat)

For your free (no obligation) info pack & WiNRADiO demo disk go to: http://www.broadercasting.com. If you don't have access to the internet then by all means feel free to phone/fax us. *Trunked radio transmissions should only be received & decoded with permission of the originator of the transmission.

Please send all your enquiries to: info@broadercasting.com or Telephone: 0800 0746 263 or +44 (0)1245 348000 - Fax: +44 (0)1245 287057
Broadercasting Communication Systems, Unit B, Chelford Court, Robjohns Road, Chelmsford, Essex, CM1 3AG, United Kingdom

HF ENTHUSIASM

Yaesu, Choice of the World's top DX'ers

FIELD COMMANDER

Over 40 years of experience in HF transceiver design has firmly established Yaesu as the choice of the world's top DX'ers. The knowledge that produced unequaled RF technology and design that is found in the State of the Art FT-1000MP can also be found in the miniature FT-100. The FT-100 while small in size 6.3" × 2.1" × 8.1"(160 W × 54 H × 205 D mm :w/o knob) is large in features and performance. This is accomplished by using the most advanced manufacturing techniques and component mounting technology. High Dynamic range RF front-end technology and Advanced Digital technology such as DSP sets a new standard of receiver performance for miniature HF transceivers. The single piece die cast frame, dual cooling fan system and revolutionary RF high power design technique keeps the FT-100 running cool and smooth in the most adverse operating environments. (TX Power output=100W HF, 50W VHF/20W UHF) The TX Equalizer offers crisp, clear and clean TX audio reproduction that until now was only found in top of the line HF base stations. The optional ATAS-100 (active tuning antenna system) ushers in a new age of mobile and field day operation (from HF to UHF frequencies). Add the optional ATBK-100 base kit (Good for limited space, simple setup.) and you've got a base station that ranks among the best in the world.

Features

- Frequency coverage:
  RX : 100 kHz-970 MHz
  TX : 160-6 m/144-146 MHz/430-440 MHz
- Power output : 100 W (160-6 m), 50 W (144 MHz), 20 W (430 MHz)
- DSP Bandpass Filter, Notch Filter, Noise Reduction, and Equalizer
- IF Noise Blanker
- IF Shift
- SSB, CW, AM, FM, AFSK, Packet (1200/9600 bps) operation
- Detachable Front Panel
- Two Antenna Jacks (HF/50 and 144/430)
- VOX
- Dual VFOs
- Available IF bandwidths of 6 kHz, 2.4 kHz, 500 Hz, and 300 Hz (6 kHz, 500 Hz, 300 Hz filters optional)
- Built-in Electronic Memory Keyer
- Speech Processor
- Built-in CTCSS and DCS for FM operation
- Automatic Repeater Shift and Auto-Range Transponder System
- Smart Search™ Automatic Memory Channel Loading System
- 300 memory Channels
- Quick Memory Bank (QMB)
- Bright LCD with multi-function display
- Optional FC-20 External Antenna Tuner
- Compatible with ATAS-100 Active-Tuning Antenna System. Add the optional ATBK-100 base kit

FIELD COMMANDER

FT-100

Ultra-Compact HF/VHF/UHF Transceiver

YAESU

Choice of the World's top DX'ers

For the latest news, hottest products:
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Specifications subject to change without notice. Specifications guaranteed only within Amateur bands.Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.

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