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Simplicity -
The MK484
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IC-T3H
Plus all your regular favourites!
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INTEREST FREE OPTION – DETAILS BELOW

* WE NOW ACCEPT THE EURO *

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WON'T DISCOUNT CUSTOMER SERVICE THE ONLY THING WE

WATSON
HIGH QUALITY VSWR POWER METERS

GREAT VALUE!

W-220	VSWR/POWERmeter 1.6-200MHz 5/20/200 Watts	£49.95 B
W-420	VSWR/POWER meter 118-530MHz 5/20/200 Watts	£49.95 B
W-620	VSWR/POWER meter 1.6-530MHz 5/20/200 Watts	£89.95 B

W-25SM
25 AMP SWITCH-MODE POWER SUPPLY.

THE QUIET ONE

Specially designed by Watson to offer extra large terminals and increased terminal spacing to make it easier to attach the thicker HF radio DC cables.
Switched 230 / 115V AC input and fixed 13.8V output at 22 Amps continuous and 25 Amps peak. Over voltage and over current protected and fan cooled. Measures 180mm (W), 75mm (H) and 190mm (D) excluding terminals. Provided with detachable 13 Amp plug and cable.

£69.95 Carr £6.00

YAESU

FT-1000MP Mk-V 200W HF ALL MODE
3 YEARS FREE WARRANTY

SPECIAL OFFER
FREE HEIL GOLD LINE MICROPHONE
When you buy the amazing FT-1000 MK V from us, we will offer you FREE the equally amazing Heil Gold Line microphone with dual inserts and matching lead (base stand optional extra).

£2899
Plus £8.00 Carr.

FT-847 160m - 70cm ALL MODE
3 YEARS FREE WARRANTY

1.8 to 440MHz, this all-in-one station offers unbeatable value. 100W on HF plus 6m, and 50W on 2m and 70cms. You get genuine RF clipping on SSB for up to 6dB gain and there are 4 separate antenna sockets

INTEREST FREE		
DEPOSIT	£120	£1199
6x MONTHLY	£42.33	Plus £8.00 Carr.
OPTION	£825.02*	

FT-100 D 160m - 70cm ALL MODE
SAVE

Yaesu's latest version is now available and includes 500Hz CW filter, high stab. oscillator and CTCSS decoder.

£899
Plus £5.00 Carr.

FT- 920AF HF 160m-6m-100W

100 Watts from 1.8 to 54MHZ with dual VFO controls. Supplied with FREE FM unit.

£1099
Plus £8.00 Carr.

FT-817 160m - 70cms 5W PORTABLE

FT-817 is an incredible design feat by Yaesu, and world reviews agree that there has never been anything like it. It's not expensive either.

£699
Plus £8.00 Carr.

NEW MINI SM PSU PS-817
£19.95 Carr £8.00

KENWOOD

TS-2000 160m - 70cms+23cms OPTION
3 YEARS FREE WARRANTY
+FREE HEIL GOLDLINE MIC

The amazing TS-2000 offers coverage from HF to UHF. And you can go right up to 23cms with the optional module Monitor the DX cluster whilst working other DX, optimise your satellite contacts, enjoy the benefit of built-in ATU. It's all there in one very compact box. Colour brochures available on request.

£1695
Plus £8.00 Carr.

TS-570DG 160m - 10m All Mode
3 YEARS FREE WARRANTY

TS-570 Accessories

VS-3	Voice synth	£45	A
DRU-3A	Recording	£99	B
HS-5	H'phones	£52	B
MC-90	Desk mic	£187	B
MC-80	Desk mic	£72	B
PS-33	Power supply	£199	C
SP-23	Speaker	£68	B
CW	Filters each	£61	B
SSB	1.8kHz	£61.95	B

INTEREST FREE		
DEPOSIT	£85	£849
6x MONTHLY	£29.97	Plus £8.00 Carr.
OPTION	£580.18	

TS-870 160m - 10m 100W Advanced DSP

It has IF-stage digital signal processing on transmit and receive. This raises the performance to a level that is impossible for analogue circuitry to achieve. Also features automatic ATU, interactive menu system, built-in electronic keyer and 100 memories.

INTEREST FREE		
DEPOSIT	£135	£1349
6x MONTHLY	£47.63	Plus £8.00 Carr.
OPTION	£928.22	

SGC SG-2020 £599
Plus £2.50 Carr.

Ideal for QRP, but with VOGAD and RF speech processing it can sound like 100 Watts! Very low current (4A max) makes it ideal for portable work. Variable selectivity down to 100Hz means no extra filters to purchase.
NEW SG-2020 ADSP now available £799 carriage £8.00
SG-237 mini auto coupler ideal for SG-2020 £369

ICOM

IC-756 PRO II £PHONE
Plus £8.00 Carr.

NEW
ARRIVING SOON!
This is Icom's new Flagship.

IC-7400 160m - 2m ALL-MODE

NEW
ARRIVING SOON!

£PHONE
Plus £8.00 Carr.

IC-756PRO 1.8 - 52MHz 100W
3 YEARS FREE WARRANTY

INTEREST FREE		
DEPOSIT	£190	£1895
6x MONTHLY	£66.89	Plus £8.00 Carr.
OPTION	£1303.66	

IC-706IIG 160m - 70cm ALL MODE
3 YEARS FREE WARRANTY
£50 HEIL VOUCHER

The IC-706MkIIG is the latest enhanced version of this popular HF/VHF/UHF mobile rig. It has more features but in the same physical size.

IC-706IIG ACCESSORIES

AT-180	Auto ATU	£379	B
FL-100	500Hz CW	£59	B
FL-232	350Hz CW	£59	B
FL-103	SSB 2.8KHz	£59	B
FL-223	SSB 1.8kHz	£59	B
DC Lead	(spare)	£16	A
3.5m	sep. cable	£33	A
5m	sep. cable	£49	A

INTEREST FREE		
DEPOSIT	£100	£999
6x MONTHLY	£35.27	Plus £8.00 Carr.
OPTION	£687.38	

IC-718 100W HF £549
Plus £8.00 Carr.
SAVE £150

LIMITED SPECIAL OFFER!

If you are looking for a radio with pedigree, but without a high price tag, then this may the one for you. Covers all HF bands including wide-band receive. Plus auto notch, dual vfo, swr meter etc. Plus options including DSP & filters.

INTEREST FREE OPTION – ON SELECTED LINES

Pay 10% deposit and 6 low monthly payments - with OPTION to pay balance* off at ZERO INTEREST or continue monthly payments over 30 months (= 26.8% APR)
Example: FT-817 £799 Pay deposit £80 plus 6 payments £28.20. After 6 months pay balance of £549.80 interest FREE or 30 months at £28.20. Interest charge over 30 months: £297.10
W & S PLC IS A LICENSED CREDIT BROKER. OFFER IS SUBJECT TO STATUS.

FREEPHONE ORDER LINE

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CARRIAGE CHARGE CODES: A=£2, B=£6, C=£8, D: £12

SECOND HAND LIST
.....SEE TRADERS TABLE

RT-11 REMOTE AUTOTUNER

NEW

NEW FROM LDG

ASK FOR DETAILS.
ALSO AVAILABLE IN KIT FORM.

£239 Plus £6.00 Carr.

GZV-4000 40A 5-15V Switch Mode

- Output voltage 5 - 15V DC
- Output current 40A continuous
- Built-in cooling fan
- Supply 230V AC 50Hz
- Size 210 x 110 x 300mm
- Weight 3.5kg

£159 Plus £8.00 Carr.

W-GMV DELUXE MORSE KEY

- Metal parts brass
- Hardwood base
- Two ball races
- Size 140 x 80 x 50mm
- Weight 400g

£39 Plus £6.00 Carr.

W-GMP Morse Key

- Metal parts brass
- Hardwood base
- Miniature size
- Size 100 x 50 x 45mm
- Weight 150g

£29 Plus £2.00 Carr.

KENT TWIN-PADDLE

- Metal parts brass
- Heavy metal base
- Two ball races
- Size 100 x 100 x 40mm
- Weight 1.1kg

£69 Plus £6.00 Carr.

Kent Morse Practice Oscillator

- Size 160 x 55 x 97mm
- Weight 260g

£18.50 Plus £2.00 Carr.

ICOM

IC-207H • 2m + 70cm FM £279 Plus £8.00 Carr.

A great budget class radio for VHF & UHF use.

IC-2800H • 2m + 70cm FM £419 Plus £8.00 Carr.

Large colour display with video input, and airband rx. 50W/35W and remote head unit.

IC-910 • 2m + 70cm ALL MODE £1299 Plus £8.00 Carr.

Icom's new dual band all-mode base station radio with 23cms option.

ICOM

IC-2100H • 2m FM MOBILE £229 Plus £8.00 Carr.

Rugged design with switched receive filters 12.5/25kHz

YAESU

FT-7100 • 2m/70cm MOBILE £PHONE Plus £8.00 Carr.

NEW

Just arrived is this new dual band radio that has extended rx. Power is 50/35W.

Features dual in-band reception and detachable display (requires YSK-7100).

FT-8100 • 2m+70cm MOBILE £279 Plus £6.00 Carr.

SAVE £200

'LAST FEW TO CLEAR'

- 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.

FT-1500M • 2m FM MOBILE £159 Plus £8.00 Carr.

SPECIAL OFFER

'SAVE £70'

Small, compact yet built like a Battleship! Should last for years. Look at the Price!

KENWOOD

TM-D700E • 2m + 70cm FM £449 Plus £8.00 Carr.

Large detached screen and APRS, make this a firm favourite. 50W on 2m and 35W on 70cms. Features 200 memos, CTCSS, Band Scope, built-in TNC, DX cluster monitor, alphanumeric etc.

TM-G707E • 2m + 70cm FM £289 Plus £8.00 Carr.

If you are looking for simplicity and low cost, here's the answer. 2m &70cms with detachable front panel and "Easy operation mode." GREAT!

TM-V7E • 2m + 70cm FM £359 Plus £8.00 Carr.

A lovely cool blue display, easy with 50/35W output. 50W/35W p;us 280 memos and five storable operating profiles.

KENWOOD

TH-D7E • 2m + 70cm £299 Plus £8.00 Carr.

Data Communicator

- 144-146MHz
- 430-440MHz

One of the most successful handhelds over the past few years. It has a built-in TNC for Packet use. You can also use it for APRS operation in conjunction with an external GPS unit. Plus NMEA, 200 memos, and up to 5W output.

TH-F7E • 2m + 70cm £269 Plus £8.00 Carr.

NEW

With extra wide Rx coverage

- 144-146MHz Tx/Rx: FM
- 430-440MHz Tx/Rx: FM

Up to 6W out with Li-ion battery and "scanner" style coverage from 100kHz to 1300MHz including SSB on receive! This is a great radio to have at all times when you are on your travels.

THG-71E £199 Plus £6.00 Carr.

- 144 - 146MHz FM
- 430 - 440MHz FM
- 3 power levels
- 6W (13.8V) 5.5W (UHF) HI
- 0.5W LO • 50mW EL
- 200 multi-function memories
- Freq. deviation: ±5kHz
- CTCSS tone encoder/decoder
- Illuminated keypad, memory name function
- Auto power off • Auto batt. saver
- Time-out timer
- 5.5 - 16V DC (13.8V)

HORA

HORA C-408 • 70cm £49 Plus £6.00 Carr.

HOCKLEY ONLY

- 230mW
- CTCSS
- Digital Display

Very much underrated handy. Covers the full 70cm band. Wideband receive possible. Very compact fits into top pocket. Ideal for use at rallies. Only uses 2x AA batteries (not included).

SPECIAL OFFER

ADI

ADI AT-600 • 2m / 70cms £179 Plus £6.00 Carr.

HOCKLEY WAREHOUSE EXCLUSIVE

- Dual Band 2m/70cms
- Up to 5 Watts out
- Airband Receive
- Nicad Pack • CTCSS
- Hod Charger

You won't find better value than this. Limited stocks

ADI AT-201 £99 Plus £6.00 Carr.

- 2m Handy
- 2.5W, 5W (13.5V)
- 1750Hz & CTCSS
- Wideband receive
- Drycell case
- Batteries not included
- Full keypad

Higher power than most palm sized models. Fully (illuminated) keypad for ease of frequency entry. Channel or frequency readout.

ADI AT-147 • 2m 50W £199 Plus £8.00 Carr.

AIRBAND RECEIVE

2m FM mobile transceiver. Three power levels 50,10,5W. Displays frequency or channel numbers, and offers Airband AM receive

YAESU VX5R • BLACK OR SILVER £PHONE Plus £6.00 Carr.

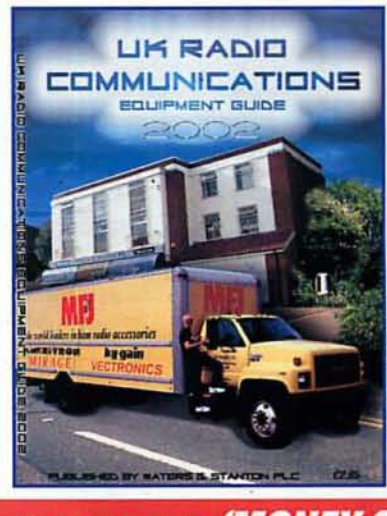
Tiny but incredibly rugged, the VX-5R provides transceiver capability on three amateur bands (50/144/430MHz) and almost continuous reception from 500kHz up to 999MHz.

YAESU VX1R • 2m/70cm £145 Plus £6.00 Carr.

- 76-999MHz Rx
- 144-146, 430-450MHz Tx

Ultra-wide frequency coverage which includes VHF and UHF TV audio, AM broadcast, FM broadcast and AM airband.

NEW AND EVEN BIGGER



New 2002 Catalogue
336 pages
£2.95
carr: £1.25

VISA MasterCard

The foremost guide to amateur radio products from the latest transceivers to the smallest of accessories. Full colour pages with comprehensive specifications, there is nothing else like it in the world! There is also some editorial and reviews. Three times the size of many magazines, yet it costs no more.

INCLUDES 'MONEY SAVING' VOUCHERS

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ORDER DETAILS ON FRONT PAGE.

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Get in Front with HUSTLER

5BTV

£199.95
Carr. £8.00

4BTV

£159.95
Carr. £8.00

HUSTLER®

BASE STATION ANTENNAS

Spec	5BTV	4-BTV
Bands	5	4
Coverage	80m-10m	40m-10m
Bandwidth 10-40m	Full	Full
Bandwidth 80m	100kHz	N/A
Resonance	1.15:1	1.15:1
Power	1kW CW	1kW CW
Traps	1" forms	1" forms
Tubing	1.25"	1.25"
Bracket size	1.75"	1.75"
Height	25ft 1" (7.64m)	21ft 5" (6.52m)
Weight	17lbs. (7.7kg)	15lbs (6.8kg)
Wind (112kph)	13kg	-

"I worked my first ZL while actually on the move using a Hustler whip" - Peter Waters G3OJV. Customers are also telling us how pleased they are with the base verticals. Check the prices!

HUSTLER Mobile Antennas

Model	Band	Bandwidth	Price
RM-10	10m	150-250kHz	£19.95 B
RM-11	11m	150-250kHz	£19.95 B
RM-12	12m	90-120kHz	£19.95 B
RM-15	15m	100-150kHz	£19.95 B
RM-17	17m	120-150kHz	£22.95 B
RM-20	20m	80-100kHz	£22.95 B
RM-30	30m	50-60kHz	£25.95 B
RM-40	40m	40-50kHz	£25.95 B
RM-80	80m	25-30kHz	£29.95 B

Model	Band	Bandwidth	Price
RM-10-S	10m	250-400kHz	£24.95 C
RM-15-S	15m	150-200kHz	£25.95 C
RM-20-S	20m	100-150kHz	£29.95 C
RM-40-S	40m	50-80kHz	£35.95 C
RM-80-S	80m	50-60kHz	£49.95 C

Lower mast sections

MO-1	54" (FOLD @ 22")	£31.95 C
MO-2	54" (FOLD @ 27")	£31.95 C
MO-3	54" (NON FOLD)	£25.95 C
MO-4	27" (NON FOLD)	£21.95 C

GARMIN®

STREET PILOT III £875 Plus £5.00 Carr.

IT TALKS TO YOU

It talks to you and is supplied with street level mapping, 32Mb storage card and card reader for quick PC programming. Examples of voice info are: "turn left 2 miles," "take 2nd left at next roundabout", "house number 17 is on your left," "turn right in 300ft." These are in stock now.

NEW NEW NEW

CUSHCRAFT COMMUNICATIONS ANTENNAS

HF HORIZONTAL BEAMS + DIPOLES

When you buy an HF Yagi, you want quality and realistic performance. You also want to know you can get spares. We offer a wide choice with guaranteed spares availability.

COUNT ON US!

MA5B	10-20m (5 band) 3 el 2.7m radius 1.2kW	£299.95 C
X-7	10-20m 7 el. 12.5 - 13dBi 2kW 6.09m radius	£669.95 D
X-740	40m add on kit for X-7	£269.95 C
A4-S	10-20m 4 el. 8.9dBi 2kW 5.49m radius	£529.95 D
A-744	Gives 40m or 30m operation from A-4S	£149.95 C
A3-S	10-20m 3 el. 8dBi 2kW 4.72m radius	£459.95 D
A-743	Gives 40m or 30m operation from A3-S	£149.95 C
A3-WS	12 & 17m 3 el. 8dBi 2kW 4.4m radius	£349.95 D
A-103	Gives 30m operation from A3-WS	£149.95 C
D-3	10-20m dipole element 7.86m 2kW	£219.95 C
D-3W	12, 17, 30m 17m dipole element10.37m 2kW	£219.95 C
D-4	10-40m dipole element 10.92m 2kW	£299.95 C
D-40	40m dipole element 12.88m 2kW	£259.95 C
XM-240	40m 2 el. 6dBi 7.3m radius 2kW	£699.95 C
Ten-3	10m 3 el 8dBi 3m radius 2kW	£189.95 C
ASL-2010	13.5-32MHz 8 el. log periodic6.4dBd 5.86m radius	£749.95 C

THE MINI-BEAM FOR SMALL GARDENS

Cushcraft MA5B

The best 3 element mini beam you will ever find. 2 element gain on 10, 15 & 20m, and dipole performance on 12m and 17m. Up to 25dB F/B ratio, it accepts 1.2kW yet has a boom length of only 2.2m and element length of just 5.2m Turning radius is 2.7m. Uses a single feeder, this really works the DX. Get one up before winter!£299.95 C

CUSHCRAFT VERTICALS

R8 (Illustrated), covers 8 bands from 6m - 40m, stands 8.7m high and requires no radials. You can feed it with 1.5kW and typical VSWR is around 1.2:1 £469.95 C

R8-GK Optional guy kit for R8 **£49.95 B**

R-6000 6 band 6m-20m that requires no radials and handles 1.5kW. Stands just 5.8m high and was chosen for the RSGB GB4FUN vehicle antenna. It works!! £329.95 C

NEW MA5V VERTICAL 20-10m **£229.95 C**

WATSON

WEP-300B • EARPIECES £2.95 Plus £2.00 Carr.

Over-the-ear earpiece, popular for security and emergency use. Its low cost and firm mounting even in arduous conditions make this a popular item. fitted with 3.5mm jack plug.

WSA-1 PSK-31 Adaptor £39.95 Plus £6.00 Carr.

All you need to connect up to your sound card and run PSK-31. Includes CD software.

YS-130 £79.95 Plus £8.00 Carr.

Ideal for medium sized VHF antenna systems, the YS-150 is a good quality Japanese manufactured product. It is supplied with control box with rotary direction setting, plus upper and lower in-line mast clamps.

FREQUENCY COUNTERS

Each counter is supplied with internal Ni Cad pack, AC charger and whip antenna

Hunter	10MHz - 3GHz	£59.95 B
FC-130	1MHz - 3GHz	£79.95 B
S. Hunter	10Hz - 3GHz	£149.95 B
S. Searcher	10MHz - 3GHz	£99.95 B

MASPRO VHF/UHF YAGIS

These high quality Yagis are made in Japan and superbly engineered. Features folded dipole, balun transformer, waterproof box and SO-239. You won't find anything better on the market.

Take a look at our prices!

144-WH5	2m 5 el. 6.6dBd 0.93m	£26.95 B
144-WH8	2m 8 el. 8.6dBd 1.79m	£37.95 B
144-WH10	2m 10 el 9.7dBd 2.3m	£41.95 B
435-WH8	70cms 8 el. 8.6dBd 0.8m	£29.95 B
435-WH12	70cms 12 el. 12.8dBd 1.51m	£35.95 B
435-WH15	70cms 15 el. 14.2dBd 2.19m	£41.95 B

To compare with dBi figures, add 2.4dB

WATSON

QS-112 • SPEAKER MIC £16.95 Plus £2.00 Carr.

Combined speaker-mic. with PTT switch. Models for Yaesu, Kenwood, Icom, Alinco and Motorola.

SPM-102 • SPEAKER MIC £9.95 Plus £2.00 Carr.

Incredible value!

Has 4-way 3.5mm plug for VX-1, VX-5, FT-50 and IC-Q7E Handies

Limited stocks.

WM-308 • BASE MIC £59.95 Plus £6.00 Carr.

The perfect answer for a high quality base microphone. Built-in pre-amp powered from rig or 2 x AA, electronic PTT and FM/SSB response switch. Includes lead with 8-pin plug. The plug needs to be wired for your radio. We can do this but phone for quote.

WCT-321 • LAPEL TALKER £19.95 Plus £2.00 Carr.

The elegant way of personal communications. Earpiece with combined lapel hanging mic and PTT. Models to suit most radios. State: Kenwood, Yaesu or Icom when ordering

AVAIR VSWR • POWER METERS

Great value and great performance. There's one just right for you.

AV-200 1.8 - 200MHz 5/20/200/400W £49.95 B
AV-400 140 - 525MHz 5/20/200/400W £49.95 B
All fitted with SO-239, PEP/RMS readings, 3W for FSD approx.
Also available AV20 & AV40 compact meters

WATSON

ATX WALKABOUTS

WALKABOUT PORTABLES

Multi & single telescopic whips. Covers 80m to 6m BNC. Ideal for FT-817 and similar QRP radios.

ATX Walkabout 80 - 6m	£69.95B
AT-80 Single band	£24.95B
AT-40 Single band	£24.95B
AT-20 Single band	£19.95A
AT-17 Single band	£19.95A
AT-15 Single band	£19.95A
AT-12 Single band	£19.95A
AT-10 Single band	£19.95A

BASE VHF/UHF VERTICALS

2m / 70cm fibre glass colinears with stainless steel fittings, 3 short radials and SO-239 sockets. These are high performance antennas, pre-tuned and supplied with all hardware for mast mounting.

Dual Band 2m/70cms

W-30	3/6dB 1.15m long	£39.95 C
W-50	4.5/7.2dB 1.8m long	£49.95 C
W-300	6.5/9dB 3.1m long	£59.95 C

Triple band 6m/2m/70cms

W-2000	0/6/9dB 2.5m long	£69.95 C

GREAT VALUE MOBILE WHIPS

W-285	2m 5/8th whip with PL-259 base £14.95 B
W-7900	2m/70cm 5 & 7.5dB length 1.58m £32.95 B
W-627	6m / 2m / 70cm 2 / 4.5 7.2dB length 1.6m £34.95 B
W-770HB	2m/70cm whip 3dB / 5.5dB length 1.1m £24.95 B

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ICOM KENWOOD YAESU

FOR SERVICE

There really is only one choice. The choice many manufacturers have made when they want their own equipment serviced. When you send a repair or service to Castle Electronics, we do the job in house. We do not use sub-contractors!

For a cost of £15.00 Plus Carriage and VAT we can do a full rig check and report - RING FOR DETAILS

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Save money and keep your existing rig. Castle can convert most makes and models. Call us to discuss your requirements.

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MAIL ORDER - Right in the heart of England, we are well placed to supply all major brand names at competitive prices by mail order. Before you buy from anyone, give us a call. You might be pleased you did!

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Cover Subject
The Icom IC-T3H is so versatile it could be used anywhere and in all kinds of situation. Its sturdy, unusually green casing made **Jon Wheeler GOIUE** think it would survive a 'drop test' favourably (he didn't try it though!) and would be a valuable addition to any Radio Amateur's shack, car or shirt pocket.

Photograph: **Tex Swann G1TEX**
Design by: **Bob Kemp**

March features

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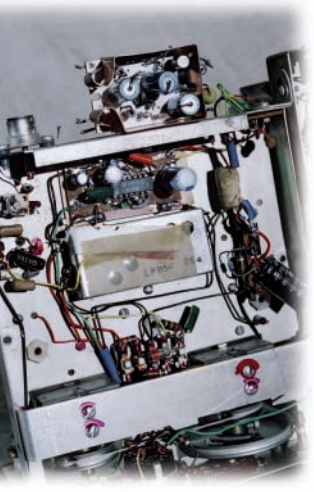

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March regulars

Editorial Note: Due to circumstances beyond our control we have been unable to publish **Chris Edmondson VK3CE**'s column, Down Under, in this issue. We hope to feature tales from our Australian 'cousin' next month.

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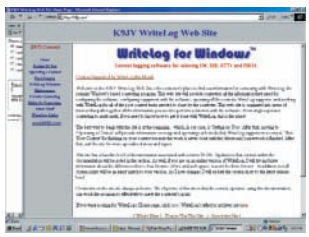

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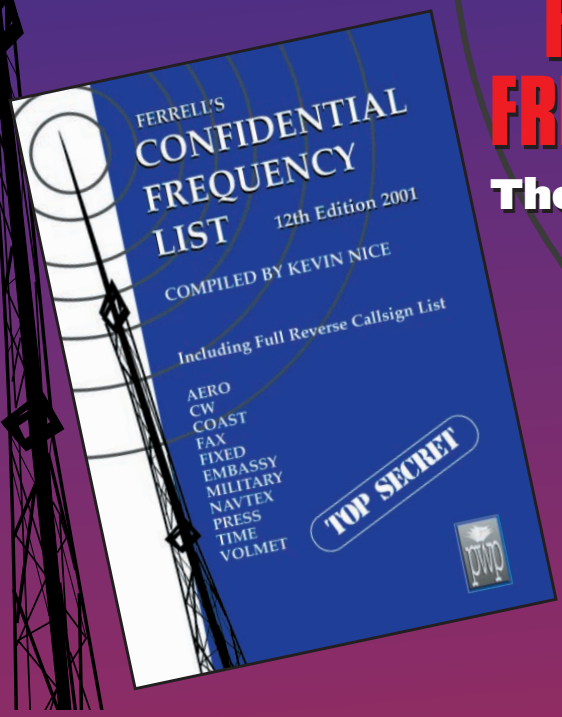

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ANOTHER PACKED ISSUE

rob mannion's keylines

Welcome to 'Keylines'! Each month Rob introduces topics of interest and comments on current news.

I'm aiming to start this month's Keylines editorial off on a lighter note. The chance to do so was provided by the recent acquisition by Thornycroft's (historically well known for shipbuilding and heavy engineering manufacturing) of Merlin, the company who owned the former BBC World Service transmitters and broadcast the programmes on the Corporation's behalf.

Discussing the idea for a humorous cartoon to illustrate - what could be seen as a being an extremely odd purchase - the scenario with **John Worthington GW3COI** our cartoonist, I first suggested a land-based station using redundant dock-side cranes to support the antennas!

"It's been moored there ever since Thornycroft's purchased the BBC World Service transmitters and shut down their land-based stations. But at least it shows that the BBC sees a future in short wave broadcasting....and it's portable, ready to sail to where needed most"!

Then, as the telephone discussion between John and I went on...the idea for the cartoon you see on this page developed. In one picture it lampoons (I couldn't resist it!) the use of a newly-built, redundant/or awaiting refurbishment warship moored off-shore as a cheaper (no rates and a good earthing system!) station in the same way as the 'Pirate Radio' ships of the 1960s.

I was further amused, imagining the possibilities of seeing boarding parties attempting to shut down the BBC World Service or towing the floating transmitters away! Thornycroft still build warships here on the south coast...and I'll be even more amused if I see one under construction with huge masts! However, in the meantime...I can't confirm the rumours that the UK's roads are to be taken over by Railtrack with numerous TOCs (Transport Operating Compaines) causing chaos!

Foundation Fine Tuning

Back to reality! Now that the Foundation Licence is in operation, there will hopefully be some opportunities for some 'fine tuning'. **And in particular I have in mind the very necessary (in my personal opinion) need to include self-build kits as part of the essential self-training element of our hobby.**

I really can't see any objection for students training for the Foundation Licence being able to build approved kits or approved projects. Perhaps this could be done under supervision? This is my only real disappointment with the new regulations.

Surely there can be some way of permitting kit and approved project building within the Foundation system? I say this because there's no real alternative - even in this age of computer graphic generated 'virtual reality' systems **to true hands on experience** in my opinion.

Junction 28 Rally

I'm delighted to be attending the second '**Junction 28 QRP Rally**' (Organised by the **South Normanton & District ARC** and the **G-QRP Club**) at South Normanton near Alfreton, on the **North Derbyshire/Nottinghamshire borders** on **Saturday 23 March**. This event - named because it's very near the M1 Junction 28 had its date arranged last year **before** London's Pickets Lock show re-appeared on the calendar.

Last year it snowed heavily in North Derbyshire...but the event was still well attended and we all had a great time. So, I look forward to seeing you on that Saturday at the Village Hall Community Centre, South Normanton, near Alfreton, Derbyshire...just 5 minutes from the M1 Junction 28.

Irish Whiskey On Air

As Guest Keylines writer **John Corless EI7IQ** briefly mentioned last month - I'll be in EI land during late February (from 22nd) until Monday 4 March. Additionally, on **Monday 25 February** I'll also be visiting the **Foyle & District** club in Londonderry/Derry, before travelling south again to Knock in the Irish Republic for the IRTS AGM/Rally on 2/3rd March. I hope to meet *PW* friends at either location!

I also plan to be very active on h.f. using my **EI5IW** callsign - especially between the Tuesday and March 1st (Friday) from near Westport in County Mayo (Courtesy of good friends **Oliver & Briege Norris**). I'll be using the latest model of the Icom IC-756, the '756PROII, kindly loaned by **Icom**. I plan to be on 7MHz and the other h.f. bands. Let's hope h.f. conditions are good!

Rob G3XFD

practical wireless services

Just some of the services *Practical Wireless* offers to readers...

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Subscriptions are available at £30 per annum to UK addresses, £38 in Europe and £42 (Airsaver), £49 (Airmail) overseas. Subscription copies are despatched by accelerated Surface Post outside Europe. Airmail rates for overseas subscriptions can be quoted on request. Joint subscriptions to both Practical Wireless and Short Wave Magazine are available at £60 (UK) £73 (Europe) and £81 (rest of world), £85 (airmail).

Components For *PW* Projects

In general all components used in constructing *PW* projects are available from a variety of component suppliers. Where special, or difficult to obtain, components are specified, a supplier will be quoted in the article. The printed circuit boards for *PW* projects are available from the *PW* PCB Service, **Kanga Products, Sandford Works, Cobden Street, Long Eaton, Nottingham NG10 1BL. Tel: 0115 - 967 0918. Fax: 0870 - 056 8608.**

Photocopies & Back Issues

We have a selection of back issues, covering the past three years of *PW*. If you are looking for an article or review that you missed first time around, we can help. If we don't have the whole issue we can always supply a photocopy of the article. Back issues for *PW* are £2.50 each and photocopies are £2.50 per article.

Binders are also available (each binder takes one volume) for £6.50 plus £1 P&P for one binder, £2 P&P for two or more, UK or overseas. Prices include VAT where appropriate.

A complete review listing for *PW*/*SWM* is also available from the Editorial Offices for £1 inc P&P.

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Technical Help

We regret that due to Editorial time scales, replies to technical queries cannot be given over the telephone. Any technical queries by E-mail are very unlikely to receive immediate attention either. So, if you require help with problems relating to topics covered by *PW*, then please write to the Editorial Offices, we will do our best to help and reply by mail.

amateur radio waves

Make your own 'waves' by writing into *PW* with your comments, ideas, opinions and general 'feedback'.

The Star Letter will receive a voucher worth £10 to spend on items from our Book or other services offered by *Practical Wireless*.
All other letters will receive a £5 voucher.

Components From Old Telephones

● **Dear Sir**
I noted the recent comments about old telephones being a good source of earpieces. Just to add - the circuit boards inside defunct phones can offer a surprising supply of useful electronic bits and even hardware. I've had stacks of small electrolytics, transistors, diodes, Zener diodes, not to mention electret inserts, resistors, screws, etc.

The most recent life-expired phone even yielded a 3.58MHz ceramic resonator. So I reckon it's always worth dismantling these things before chucking them out. It takes only a minute or two to get the innards out and into the 'useful bits for further dismantling' box. Good hunting and my best regards!
Paul Tuton G0UBV
Hull
East Yorkshire

Editor's comment: Excellent ideas Paul. (Please see page 30 this issue for further advice on buying/rescuing other people's junk!).

Foundation Licences - Further Comments

● **Dear Sir**
I'm writing in response to two letters in the January 2002 issue of *PW* referring to the Foundation Licence. Firstly, Criticising the Foundation Licence I don't know whether you engineered the History in the Making item in the Amateur Radio News to follow the two critical letters or whether it just panned out that way but it was useful! It showed how **Eric M1ZZZ** had mis-read the Foundation Licence information which he downloaded from the web.

I tell all my RAE students to "Read the b****y question". I use this (partially censored for publication) quote in honour of the late **Bill Sparks G8FBX** who got me on the Amateur Radio trail in the mid-1980s with the same advice. Had Eric read the article fully he would have seen that what he was asking for, that holders of B licences only take the Morse assessment to obtain a Foundation Licence, was in point of fact what had been announced.

The subsequent article on History Making in the news may have been a little embarrassing for Eric, but it needn't be. No doubt there are a lot of B and intermediate B licence holders out there who think the same, so with a bit of luck a lot more people will now be enlightened and the numbers taking advantage of this new access to h.f. will rise. (Will the RA be able to cope if there are even more?).

The second letter on the subject is a typical dinosaur attitude and if allowed to prevail would sound a certain death knell for Amateur Radio. It takes an outlay of a few pounds and a half hour wait to get young blood to be able to send text messages to anybody anywhere in the world from a nice new mobile telephone.

From the start of a new course to the final reception of a full Amateur Radio transmitting licence will take the thick end of a year for most students. Add to this the cost of about £150 plus equipment and you can see what the well meaning 'lad about school' is going to go for.

The Foundation Licence is, in our case at the **Widnes & Runcorn Amateur Radio Club**, a two day course with the examination held on the second day. Candidates will know immediately if they've have passed and the certificate is issued there and then. Send it off with the licence application and cash if necessary, and the intending Amateur could be up and running within two to three weeks

If we don't compete with the internet and mobile telephones then our hobby will perish. Who remembers a pop song of the 1980s entitled *Video killed the radio star*? Well let's not have the sequel, *Internet killed the Radio Amateur*!
Dave Bibby G1PIX
Runcorn
Cheshire

Narrow Foundation Filters?

● **Dear Sir**
I can only suppose that Messrs **M1ZZZ** and **G3RXH** (Radio Waves, January 2002 *PW*) had narrow filters selected in their heads when they wrote their respective letters both being very critical of the new Foundation Licence. They may wish to broaden their bandwidths a bit by considering the following.

I recently, along with **David Wilson G7OBW**, had the pleasure of coaching a then a s.w.l., we shall call him 'Bill' as his name and callsign are not important (in the context of this letter), to be successful in passing the Foundation Licence course and examination. What makes this special is that following a road accident many years ago Bill now suffers from a condition that prevents him from being able to take full-time courses and examinations, and thus so far as the traditional RAE and c.w. test is concerned he was effectively destined to be a s.w.l. for ever more.

Now, M1ZZZ and G3RXH may be frustrated at the introduction of the Foundation Licence. But can they even begin to imagine the frustration that Bill must have gone through over the years at being every bit as enthusiastic as they are about Amateur Radio yet having the door effectively slammed shut so far as a licence to transmit was concerned? For Bill to achieve his M3 callsign was far more difficult than it was for many of us to pass the RAE and or c.w. He showed real courage and gained a great sense of achievement for his time and efforts, not to mention the privilege to transmit on the air. Success is not a measure of the position you attain in life but it is a measure of the obstacles you have encountered and overcome to gain that position.

To me 'Bill' is already more successful in amateur radio than people like M1ZZZ and G3RXH will ever be. If all that the introduction of the Foundation Licence means is that Bill - and others like him - can now join fellow enthusiasts on the air ...then its introduction has been for the future good of Amateur Radio.
John Livesey G0JJL
Preston
Lancashire

Crystal Earpiece Problems

● **Dear Sir**
Having read the letter from **David Wilcox M0DAW** (Radio Waves January 2002 *PW*), and having helped my sons to successfully build crystal sets which used crystal earphones I'm sorry to hear he had a problem, which he believes is due to the crystal earphones.

May I suggest however, that I suspect that the real culprit is going to be a diode with a poor forward/reverse resistance ratio, for the following reasons:
1: The set works okay with 4000Ω S.G. Brown headphones.
2: A crystal earphone is much higher impedance (mainly capacitive).
3: For the diode to rectify, it must not allow a voltage to appear across the load in the reverse direction (or at least it must be considerably smaller).
4: The greater the leakage of the diode the lower impedance load it will require to have a suitable rectifying effect.
5: Bear Ohm's Law in mind and imagine a diode with a forward resistance of 100Ω and a reverse resistance of 1MΩ running into an infinite impedance. Because of the infinite impedance no current would flow, and therefore no voltage drop would appear across the diode in either the forward or reverse direction. Therefore the voltage across the load would be identical in the forward and reverse directions and no rectification would result.

Now imagine the same diode working into a 10kΩ load (or actually use Ohm's Law and put figures into it) and see how rectification occurs.

Although I've not found it necessary myself, it may be an advantage to put a resistor of between 10 to 500kΩ across a crystal earphone to provide a suitable load for the diode in a crystal set (use the highest value that works to minimise the damping on the tuned circuit).

Finally, may I say that with my 36m (120ft) long antenna and earth system, a crystal set normally gives very good results from a large number of stations. Best wishes and good listening to everyone.

Ray Marsh G4GRZ
Bentilee
Stoke-on-Trent

John Corless & Keylines

● **Dear Sir**

John Corless EI7IQ, Vice President of the IRTS makes many interesting points writing in last month's (February 2002) Guest Keylines. One question he made concerning the introduction of the M3 callsign is how the 10W limit is to be policed. Presumably the same authorities who police this matter, are the same that 'police' who do the same for the maximum limit that class A licensees are permitted to use?

Why is it that most of the conversations I have heard over the air (and in John's comments) concerning the introduction of this new licence class, have been about the 10W limit? Is their any evidence at all to suggest that M3 callsign holders are more likely to break the law than their class A counterparts who might be tempted to run a couple of kilowatts?

So far, most of the M3 operators I've spoken to over the air have taken great pride in their achievements with the limited power allowed under this new class of licence. As the **Rev. George Dobbs G3RJV** has pointed out before "It is vain to do with more, that which can be done with less" and I trust I have not misquoted George!

Colin Topping
GM6HGW/MM3ACL
Fife
Scotland

Editor's comment: All George G3RJV's E-mails carry the following quotation: *"It is vain to do with more, what can be done with less"* (attributed to William of Occum 1290-1350). Perhaps the QRP organisation is far older than we think Colin?

Capacitor Vet... Author's Hindsight

● **Dear Sir**

"Hindsight has 20/20 Vision"....so with this in mind I think that I should have (in my project published on page 30, February 2002 *PW*) stressed that ONLY the voltage supply actually needed should be connected to the Vet at any one time. Because I fitted both high voltage and low voltage sockets (with individual limiting resistors), it's possible to plug in both supplies. Using the unit in this state could cause damage to any low voltage capacitor under test and possibly exceed the peak inverse voltage (p.i.v.) rating of the diode in the low voltage supply.

Ron Harris GW8DUP
Swansea
South Wales

Amateur Radio Emergency Services

● **Dear Sir**

I was saddened to read **Mr 'Smudge' Lundegard G3GJW's** letter (in the December 2001 issue of *PW*), regarding the **R****t** word. Many years ago (I believe in the 1980s) there was an acrimonious split amongst the volunteers who operate this service on behalf of the community at large. The result was a separate company, RAEN Ltd. and independent groups under the RSGB, both doing the same work apparently in adversarial competition with each other. It seems that this attitude still prevails?

In *PW* December, Down Under by **Chris Edmonson VK3CE** emphasised how emergency communications enhances the perceived value of Amateur Radio in Australia. The situation in the USA is very similar.

The new Foundation Licence documentation prepared by the Government says that one of the reasons for Amateur Radio privileges is Emergency Communications. The authorities quite clearly value this aspect of Amateur Radio.

However, after an innocuous article in *PW* - attempting to widen the appeal of this community service role in the UK- we get a detailed letter about design of, and the copyright in competing logos! **The two do not compare**.

I hope that emergency communications volunteers can bring themselves to bury any historic or political differences and organise under one umbrella, so as to present a united, mature and professional image to the authorities and the public. I'm sure none of the potential users actually care about any distinction between the two groups, all they want is a trained volunteer service that can assist in an emergency situation. They do not need, or want, petty bickering within that service.

Alan Messenger G0TLK
Wickham
Kent

Editor's comment: A truly sensible suggestion Alan - let's hope common-sense prevails. All correspondence on this matter is now closed (I've received many letters and E-mails on this subject all basically agreeing with Alan's sentiments).

○ Keep your letters coming to fill *PW*'s postbag

Letters Received Via E-mail

A great deal of correspondence intended for 'letters' now arrives via E-mail, and although there's no problem in general, many correspondents are forgetting to provide their postal address. I have to remind readers that although we will not publish a full postal address (unless we are asked to do so), we require it if the letter is to be considered. So, please include your full postal address and callsign with your E-Mail. All letters intended for publication must be clearly marked 'For Publication'. **Editor**

amateur radio rallies

Radio rallies are held throughout the UK. They're hard work to organise so visit one soon and support your clubs and organisations.

February 24
The Swansea ARS Amateur Radio & Computer Show
Contact: Roger GW4HSH
Tel: (01792) 404422
The 21st Annual Swansea Rally takes place at the Swansea Leisure Centre on the A4067 Swansea-Mumbles coast road. Doors open 1030. There will be trade stands, a Bring & Buy, v.h.f. talk-in, demonstration station, repeater groups, radio interest groups, licensed bar and refreshments, etc. Admission is just £1.50, children 50p.

March 9
Lagan Valley ARS Rally
Contact: Ron
Tel: 0289-260 1941
E-mail: ronnie@mccaughey2.freeserve.co.uk
The Lagan Valley Amateur Radio Society are holding their rally at the Conference Centre, Lagan Valley Hospital,County Antrim, Northern Ireland. There will be trade stands, radio and computer, Bring & Buy, catering and free parking, talk-in on S22.

March 9
Crystal Palace and District Radio Club Spring Fair
Contact: Bob G3OOU
Tel: (01737) 552170
The Spring Fair takes place at St John's Hall, Sylvan Road, London, SE19 between 1030-1300 hours. There will be Amateur Radio, electronics, computing, tools etc., on offer. Admission, including one free drink, is just £1, children free.

March 10
Wythall Radio Club Annual Radio & Computer Rally
Contact: Martin G8VXX
Tel: 0121-474 2077 evenings
E-mail: enquiries@wrcrally.co.uk
Website: www.wrcrally.co.uk
The Wythall Radio Club are holding their 17th Annual Radio & Computer Rally at Wythall Park, Silver Street, Wythall, near Birmingham. Doors open from 1000 till 1600 and admission is just £1.50. There will be plenty of traders in three halls and a large marquee. There will also be bar and refreshment facilities on site, a Bring and Buy and a talk-in on S22. There will also be a unique free park and ride for easy comfortable parking.

March 17
The Norbreck Amateur Radio, Electronics and Computing Exhibition
Contact: Peter Denton G6CGF
Tel: 0151-630 5790
Organised by the Northern Amateur Radio Societies Association (NARSA) the electronics and computing exhibition takes place at the Norbreck Castle Exhibition Centre, Blackpool. Don't miss the largest single day exhibition in the country! Morse tests will be available on demand.

March 23/24
The London Amateur Radio & Computer Show
Tel: (01923) 893929
FAX: (01923) 678770
Website: www.radiosport.co.uk
The London Amateur Radio & Computer Show is to be held at the Lee Valley Leisure Centre, Picketts Lock Lane, Edmonton, London. Doors open at 1000 each day and daily admission is £3 for adults, £2.50 for OAPs and under 14s. There will be trade stands, special interest groups, Bring & Buy and lots more.

March 23
South Normanton & District ARC Junction 28 QRP Convention
Tel: (01623) 465443
In association with the G-QRP Club the South Normanton & District ARC will be holding their second Junction 28 QRP Convention at the Village Hall Community Centre, South Normanton, near Alfreton, Derbyshire. Just 5 minutes from M1 Junction 28. This well-attended traditional radio event should be even bigger and better this year, with lots of kits and components suppliers in attendance, vintage and surplus gear, G—QRP Club stand, special interest groups, as well as a Bring & Buy. Hot and cold food and drink will beavailable, including our delicious pie and 'QR-Peas'! Talk-in by GB0LOW on S22, doors open 1000, admission £1.

If you're travelling a long distance to a rally, it could be worth 'phoning the contact number to check all is well, before setting off. Editor

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amateur radio news

A comprehensive look at what's new in our hobby this month.

Special Event

Wrexham Science Festival

Wrexham Amateur Radio Society are taking a very active part in this year's Wrexham Science Festival.

The Wrexham Amateur Radio Society are taking part in the town's annual Science Festival, held at Newi in Wrexham. The complete festival runs from 18-24 March 2002 and will include events for schools and businesses as well as the general public. During the week there will be talks, lectures, shows, walks and demonstrations - something for everyone!

The Wrexham Special Event station forms part of the '**Scientriffic**' event which is billed as a whole day of Exploration, Experiment and Excitement for under 5s to 105s and takes place on Saturday 23 March. The Special Event Station, using the callsign **GB2WSF**, will be active from 1000-1700hours on the 23rd on the h.f., v.h.f. and u.h.f. bands as well as ATV and UI-View. The club are also hoping to set-up an ATV link to the Internet, (Radiocommunications Agency permission pending) and there will be a webcam running during the event.

The club has set up a site, which contains story of the Science Festival event, so why not check out **http://www.wrexhamsf.com/** You may also like to take a look at the organisers site at **http://www.qsl.net/gb2wsf**

Wrexham Amateur Radio Society
Ian GW1MVL, Chairman
Tel: (07796) 185703
E-mail: gwlmvl@supanet.com
or
Mark 2W1MDH, Vice Chairman
E-mail: mark_harper@bigfoot.com

Great Success

More than a Load of Old Junk!

The saying 'One man's junk is another man's treasure' rang true at the recent Chelmsford Amateur Radio Society's Junk Sale with many attending to see what was on offer.

Colin G0TRM as the top-hatted autioneer.

The Chelmsford ARS Junk Sale took place on 8 January and proved to be a great success being attended by over 50 members! **Colin Page G0RTM** did a splendid job as the Auctioneer for the evening and very much looked the part in his top-hat, he was ably assisted by **Martyn Medcalf G1EFL/M3VAM**.

If you fancy getting involved with the activities of the Chelmsford club then you can join them on the first Tuesday of the month from 1930 hours at the Marconi Social Club, Beehive Lane, Great Baddow, Chelmsford. The club is actively supporting the new Foundation Licence and will be holding another weekend course in due course for future Foundationeers as their first one ended up 100% over-subscribed!

Full details on the club and their activities are available from David Bradley M0BQC, the club's secretary.

David Bradley M0BQC
Tel: (01245) 602838
E-mail: DavidWBradley1@activemail.co.uk
Website: http://www.g0mwt.free-online.co.uk/

Martyn Medcalf G1EFL/M3VAM demonstrates some of the equipment that was for sale during the auction.

Open Now!

Visit The Marconi Centre

If you enjoyed reading Rob G3XFD's report in last month's PW on the Marconi centenary celebrations in Poldhu, Cornwall then you'll be interested in this.....

Carolyn Rule M0ADA from the Poldhu Amateur Radio Club would like to remind *PW* readers that the new club house and Marconi Centre at Poldhu Cove, Mullion in Cornwall is open every Sunday from 1330-1630 hours and every Tuesday and Friday from 1900-2100 hours, plus at additional times in the summer season. So if you are planning to visit Cornwall this year why not add the Marconi Centre to your trip itinerary?.

The Poldhu Amateur Radio Club,
Poldhu Cove,
Mullion,
Cornwall TR12 7JB
Tel: (01326) 241656
Website:
www.mullionline.com

Ninety Years On...

Titanic Hero Honoured

A world-wide link-up takes place on Saturday 13 & Sunday 14th April in honour of the 90th anniversary of the sinking of the RMS Titanic.

The Titanic Wireless Commemorative Group, a group of 20 Radio Amateurs based in Godalming. Surrey, will honour the memory of **Jack Phillips**, Chief Wireless Telegraphist aboard the *Titanic* by activating the special event callsign **GB9OMGY** from 1000 hours on Saturday 13 April until 0219 hours (the exact time of the *Titanic*'s sinking) on Monday 15 April. The station will operate on c.w. only on 3.5- 28MHz including the WARC bands.The special event callsign is very fitting as the MGY part was the *Titanic's* radio callsign.

Jack Phillips (who was born and bred in Godalming) stayed at his post sending out a SOS distress signal in Morse to alert other ships before he went down with the *Titanic* two hours and 40 minutes after it struck the iceberg. In addition to the special event station the Godalming museum will be running an exhibition from 12 March until 25 May describing the *Titanic* disaster, Jack's heroic efforts and even a replica of the *Titanic*'s wireless room.

Make sure you listen out for GB90MGY and if you get a chance visit the exhibition. For more information contact:

Titanic Wireless Commemorative Group,
Michael Shortland G0EFO.
Tel: (01483) 426510
E-mail: msa-consult@dial.pipex.com
or
Godalming Museum,
Derek Watson, Publicity Officer
Tel: (01483) 426510
E-mail: museum@godalming.ndo.co.uk

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Children In Need

Moorlands & District On Air

The 24-hour on-air radio marathon staged by the Moorlands & District ARS was a great success. Read on to find out more.....

Back in November 2001, to coincide with annual Children In Need event, members of the **Moorlands & District Amateur Radio Society** (MADARS), Staffordshire took to the air at 1900hours with the callsigns **GB0CIN/GB1CIN. Bernard G4HKG** got the show 'on the road' and operated on the key, with **Paul M5DAD**, **Geoff M0GGC**, **Bill G6FXW** and **Dave M0ODS**, using an FT-767GX for the h.f. work and the FT-480 on 144MHz, between them working all through the night.

The event got off to a good start with all bands being worked until the higher ones started to close down around 0100. After that the group concentrated on the 7MHz band until the morning, with the best DX being Asiatic Russia using c.w.

The Saturday morning shift arrived bright and early in the form of **Mark M0BWA.** He eagerly set-up his favourite radio, a Kenwood TS-850SAT, ready to take over the reins as the night shift departed after their twelve hour shift.

The total number of contacts made during the event was 256 on the h.f., and 74 on v.h.f. bands, with Mark making 200! He stayed to the end and did the best part of 12 hours.

Special thanks go to Kenwood UK who sent the club some items to be auctioned off for Children In Need. Paul M5DAD played Auctioneer, with Andy G7KDJ his able assistant. They both provided a valuable service and entertained all those who attended the open night at the club, which helped to raise £85.50. Cheers Kenwood!

The Moorlands Club deserve a huge round of applause for their efforts, as at the time of going to press they had raised over their target of £900 and were confident that the figure would reach £1000! Well done Moorlands!

Help Out Your Fellow Amateurs

Can You Help?

Are you looking for help this month? If so let's see if fellow PW readers can offer any assistance!

Pascal GI0SFT has an AVO transistor tester but the meter movement does not work. He thinks the tester needs a new/replacement meter. Can you help? If so please contact Pascal at **PascalMCD@aol.com**

Terry Lambert G8EZL has a couple of queries for you to ponder over. Firstly he asks does anyone know of a source of 'Panel Signs'? Terry seems to recall that Data Publications who published *Radio Constructor* and later *Radio and Electronics World* advertised that they also produced stick-on panel labels, dials and scales, which were often used on projects described and illustrated in their magazine. However, the ads. seemed to disappear when *RC* became *R&EW*; presumably Data Publications had become defunct. The stick-on labels are probably of limited use nowadays, since they were designed for use on the larger equipments and panels of their 'hey day', but he would still find some use for them, if he could find them.

Secondly, Terry asks about antenna ladder-line feeder spacers. He says he remembers a reference in one of the UK Amateur Radio publications about the availability of a plastic spacer which seemed to be very versatile. From what he can remember it was shaped as the usual elongated rectangle, but its dimensions and the wire attachment provisions enabled it to be used in different orientations (lengthways or sideways) and with different wire sizes to give a variety of different predetermined impedances. He's almost certain it was of British origin and he knows **it wasn't from G4OGP Electronics or Viola Plastics.**

If you can help Terry on either of these queries please contact him via E-mail at **t.lambert@virgin.net**

The next *PW* reader looking for a hand is **Charles Trippett G0VKO** who has a Rapitest digital test meter that he needs a spare part for. Charles says he knows that Rapid Electronics are not the suppliers for this meter and would therefore appreciate any clues on who to contact for spare parts. Contact Charles direct at **Blue Haze, Listowel Drive, Barbican, East Looe, Cornwall PL13 1LB.**

amateur radio clubs

Keep up-to-date with your local club's activities and meet new friends by joining in!

EDINBURGH
Lothians Radio Society
Contact: Peter GM4DTH
Tel: 0131-446 0155
Please note the Lothians Radio Society has now changed venue. The club now meets at The Royal Ettrick Hotel, 13 Ettrick Road, Edinburgh, which is located about 300 metres to the east of the previous venue. All meetings start at 2000 hours local time, Forthcoming meetings include: March 27: Junk Sale and April 10: Moonbounce by **David Anderson GM4JJJ**.

ESSEX
Chelmsford Amateur Radio Society
Contact: David Bradley M0BQC
Tel: (01245) 602838
E-mail: DavidWBradley1@activemail.co.uk
Website: http://www.g0mwt.free-online.co.uk/
The Chelmsford club meet at 1930hours on the first Tuesday of the month at the Marconi Social Club, Beehive Lane, Great Baddow, Chelmsford.For up-dates on club activities check out their website or why not go along and join in? **April 2**: Amateur Television by Ian Waters

MIDDLESEX
Edgware & District
Contact: Bill G0STR/David G5HY
Tel: 0208-958 1255 eves/(01923) 655284 days or 0208-954 9180 eves.
Meeting on the 2nd & 4th Thursday's of the month at 2000 hours at the The Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware, Middlesex, the Edgware club offer a wide and varied programme of events. Forthcoming events include: **March 14**: Talk on D68C DXpedition by **Steve Telenius-Lowe** and **28th**: Video Evening.
Visitors and new members are always very welcome.

NORTHERN IRELAND
Bangor and District ARS
Contact: Mike GI4XSF
Tel: 0284-277 2383
Website: http://welcome.to/bdars
Bangor and District Amateur Radio Society meet on the 1st Wednesday of every month in The Stables at Groomsport from 2000hours. The club is now running courses for the new Foundation Licence so if you are interested in 'having a go' or fancy finding out more about what the club gets up to then why not go along and see for yourself?

WILTSHIRE
Trowbridge & District ARC
Contact: Ian Carter
Tel: (01225) 864698
Website: www.gertdarc.fsnet.co.uk
The club meets at the Southwick Village Hall, Southwick and meetings start at 2000hours unless otherwise stated. All main meetings may be subject to change depending on availability of guest speaker - please watch for up-dates via the club website, *GB2RS* or on the club 144MHz Net on Monday evenings between 1930 & 2000 hours. Visitors are always welcome to all meetings. Look out for the following meetings: **March 20**: Natter night, **April 3:** Air Display Organisation & Communications & Insight by **Paul Brown & Julian Sims** and **17th**: Natter night.

Keep those details coming in!

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(3⁄8 fitting) **£12.95**
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(3⁄8 fitting) **£16.95**
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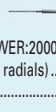

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Looking At... The Power Supply Part 2

Continuing with his series Gordon King G4VFV rounds off his look at power supplies and their uses in radio applications.

In Part 1 of my 'look at' power supplies *(PW* Jan 2002) and their uses in radio applications I concluded with a look at the ripple effect stemming from the charging and discharging of the reservoir capacitor. I also acknowledged of the need for further filtering when the supply is to power sensitive equipment, such as radio receivers and transmitters.

The general consensus is that the peak-to-peak ripple should be less than one per cent of the supply voltage. For a supply of 13.8V the ripple should be less than 138 millivolts (mV). For particularly sensitive and high-gain equipment it would be best to aim for an even smaller ripple amplitude than this. For non-radio equipment, such as electric motors, relays, battery chargers and so forth, such comprehensive filtering is not essential.

The classic way of 'smoothing' the supply is shown in **Fig. 1**, where C1 is the reservoir capacitor (see Part 1), L1 the smoothing choke and C2 the smoothing capacitor. The choke L1 and C2 form a so-called LC smoothing filter, whose design allows the passage of the required current with the least insertion loss, while significantly attenuating the ripple content. In circuits where the current demand is smaller an RC, rather than an LC, a smoothing filter may be adopted, where a resistor of suitable wattage rating is then used in place of the inductor.

WS1763

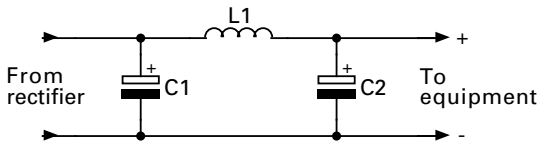

Fig. 1: Capacitive-input filter for smoothing, where C1 is the rectifier reservoir capacitor, L1 the smoothing inductor or choke and C2 the smoothing capacitor.

WS1764

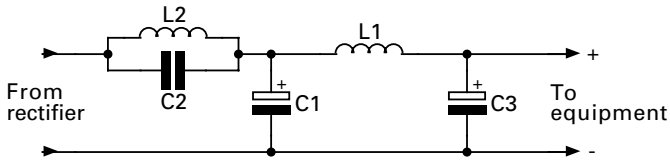

Fig. 2: Choke-input filter for smoothing. In this circuit inductor L1 is connected direct from the output of the rectifier without a reservoir capacitor, while smoothing is provided by C1, L1 and C3. Inductor L2 with C2 form a rejector circuit tuned to the fundamental ripple frequency.

The classic way of 'smoothing' the supply is shown in **Fig. 1**, where C1 is the reservoir capacitor (see Part 1), L1 the smoothing choke and C2 the smoothing capacitor. The choke L1 and C2 form a so-called LC smoothing filter, whose design allows the passage of the required current with the least insertion loss, while significantly attenuating the ripple content. In circuits where the current demand is smaller an RC, rather than an LC, a smoothing filter may be adopted, where a resistor of suitable wattage rating is then used in place of the inductor.

Tuned Rejector

Additional smoothing, applicable to individual high-gain stages, is also achieved by simple Resistance/Capacitance (RC) filtering. Two stages of LC filtering, as shown in **Fig. 2**, might be employed for ripple. Here the extra inductor L2 and capacitor C2 form a parallel-tuned rejector circuit resonated to the fundamental ripple frequency which, in the UK, is 100Hz with full-wave rectification.

You will notice that the rejector circuit in Fig. 2 is located between the rectifier output and the reservoir capacitor C1, where L1 and C3 form the usual LC smoothing filter. There are circuits with two series-connected inductors, but neither is tuned. The first is connected direct to the output of the rectifier without a reservoir

WT1766

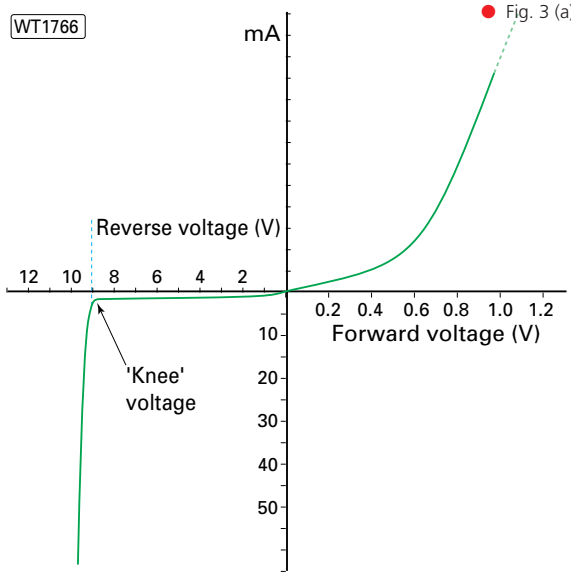

Fig. 3 (a)

WS1765

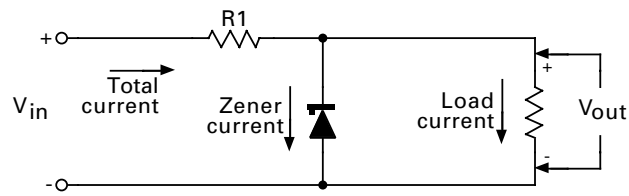

Fig. 3: Characteristics of a zener diode (a) and a zener diode voltage stabilising circuit (b).

Looking At...
The Power Supply
Part 2

capacitor, and the second with a smoothing capacitor connected either side.

A filter circuit which connects direct from the output of the rectifier without a reservoir capacitor is known as a choke-input filter. When there's a reservoir capacitor the circuit is then known as a capacitive-input filter.

Provided the value of the inductance connected directly to the rectifier output is sufficiently large for the voltage and current requirements of the circuit under power, a choke-input filter has the advantage of providing better voltage regulation than a capacitive-input filter. Inductors particularly tailored for choke input filtering are sometimes called 'swinging chokes'.

Peak Inverse Voltage

A point worth remembering is that the voltage rating of a rectifier is affected by the presence of a reservoir capacitor. For example, the voltage which appears across the rectifier of a simple half-wave circuit (as shown in Part 1) during periods of non-conduction is equal to the a.c. input voltage plus the voltage of the charge stored by the reservoir capacitor. This is known as the peak inverse voltage (p.i.v.) and corresponds to twice the peak value of the a.c. input on relatively light loads.

When choosing a rectifier, care must be taken to ensure that it is able **safely** to handle the p.i.v. it might possibly encounter! In this respect, too, it's noteworthy that because the p.i.v. relative to a full-wave bridge circuit is shared by two rectifier diodes connected in series, each diode 'sees' a p.i.v. corresponding only to the peak value of the a.c. input - not to twice the peak value.

Bleeder Resistors

Sometimes you may encounter a high-wattage resistor connected directly across the filtered and smoothed output from the power supply. This is generally known as a bleeder resistor and has several primary functions:

Firstly the bleeder resistor ensures that the high value electrolytic reservoir and smoothing capacitors are smartly discharged when the equipment is switched off! It also tends to inhibit undesirably large swings of output voltage with changing load conditions of the equipment under power, thereby providing some degree of voltage regulation.

These days, however, voltage stabilisation and regulation are handled much more efficiently and exactly by relatively simple solid state circuits. I shall be delving into regulator circuits in the next Looking At, but for now here's a glimpse of the workings of simple zener diode stabilisation.

Zener Diode

A zener diode passes current in the forward direction in the normal diode manner and when reverse-biased the leakage current, too, is at first very low. However, when the reverse voltage reaches a certain value, called the zener voltage of the particular diode, the current suddenly increases very rapidly, after which there is barely any change in voltage across it. In other words, the diode then becomes a very low source resistance.

The zener diode characteristics are shown at (a) in **Fig. 3**, while the little circuit at (b) shows a zener diode circuit. The output is stabilised because variations in load current are compensated by opposing variations in zener current.

For instance, if the load current rises the zener current falls by an equal amount, thereby holding the output voltage fairly constant. The power rating of a zener is chosen to suit the working current at the zener voltage, while the permissible dissipation is sometimes increased by the use of a heat sink.

That's all for this time, as I have already mentioned, in the next instalment I'll be looking at voltage regulator circuits, and with a bit of luck I might also be able to include some information on voltage-multiplier rectifiers.

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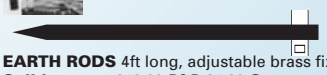
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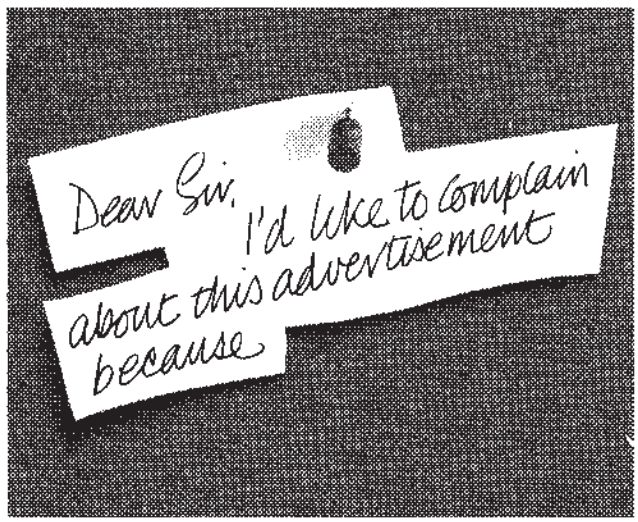

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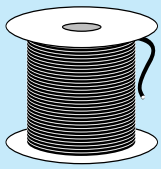

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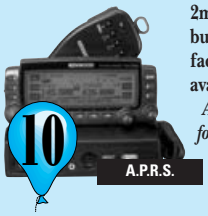

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£319.00 P&P £10

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★ Miniature portable all mode SW receiver ★ Station presets for 50 frequencies ★ Single side band system ★ Synchronous detector ★ Tuning in 100Hz + 1kHz steps ★ Includes compact antenna/stereo earphones/case.

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not to miss!

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BNC 21cm flexible whip that is ideal as replacement.

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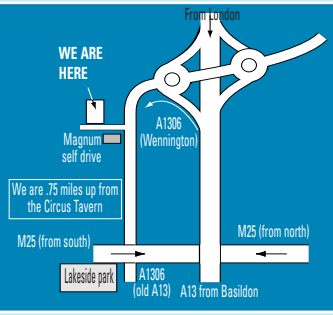

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Radio Basics

This month Rob Mannion G3XFD aims to help solve some of the problems for anyone getting started in the radio hobby. He's found some very reasonably priced headphones suitable for Radio Basics projects and some bargain bags of components.

Recent correspondence in *PW*'s letters pages, plus the continuing feedback I receive directly from readers who follow the Radio Basics (RB) series - draws attention to the problems associated with obtaining suitable headphones. Mind you...it's not a new problem and I've got uncomfortable memories of my first 'headphone'!

I say 'headphone' because that's just what it was - a single low impedance surplus dynamic earpiece bought for 12.5p (Half a crown!). And although cheap, it provided many hours of listening pleasure, although it wasn't fashionable or comfortable to wear...something which didn't worry me much as a schoolboy!

Fortunately, the Bakelite casing had two suitable mounting holes which enabled me to form a headband (this is where the lack of comfort comes in) from a re-shaped wire coat hanger. It worked extremely well, but even with a little padding added it wasn't comfortable to wear for the many hours I sat listening to my early radio receivers. (I could put up with that because there was no alternative).

Thankfully, RB readers who are either just starting out in the hobby or just need a pair of headphones will benefit from a special offer extended to them thanks to the kind co-operation of **Nevada** in Portsmouth (**see information panel**). I spotted the headphones on sale during their open day in December 2001 and immediately obtained a pair myself.

The headphones, although of low impedance - suitable for hi-fi stereo and mono use - are extremely comfortable and are remarkably good for the price. With individual volume controls on each side, plus a stereo/mono switch, they are also perfectly

● Close-up view of the Altai headphones. modelled by *PW* photographer Tex Swann G1TEX's transparent assistant! They're low impedance, stereo, switchable to mono, and are provided with individual volume controls (see text).

suitable for immediate use with the RB integrated circuit (i.c.) audio amplifier unit which regularly features in projects in this series. (It last made an appearance as part of the C/R bridge -the lower circuit - on page 25 of the January issue.

As supplied, the headphones will provide excellent results when coupled to a simple crystal diode detector (crystal set) feeding into the amplifier via C7 on January's circuit. The headphones are then used instead of the 8Ω loudspeaker.

● Problem solved this month - if you need a pair of reasonably priced versatile headphones...you too could be wearing a pair for less than £8!

Future modifications

Soon in the RB series I'll be providing an exceptionally simple impedance matching amplifier circuit. This, using very few components, will in effect provide the modern user with the benefits of high-impedance headphones.

The matching amplifier will provide you with two options: Once built the individual constructor can complete the little amplifier circuit as an 'outboard' unit so it's available to incorporate into a particular project.

Alternatively, it will be possible to place the amplifier and its battery **within the headphones themselves** - in effect making the headphones

● Component 'Goody Bags' are back! One of the best ways of building up a stock of traditional wire ended components is to purchase in bulk form - they are surplus in origin, and need sorting out...but when you consider the price of the individual components bought separately they're real bargains (see text and information panel).

Contents of the mixed resistor and small capacitor bag ready for sorting - G3XFD found they contain a good general selection of common value (see text).

Contents of the mixed electrolytic capacitor bag on display. Bought new...four of the capacitors found by G3XFD in this selection would cost more than the whole bag! (see text).

Contents of the mixed small capacitor selection - containing some electrolytics, mylar, polyester and other types with various values between 1nF to 60µF (selection will vary).

A varying selection (in power ratings and resistance) of wire-wound resistors is available in the 'wire wound' resistor pack. Carbon film and other standard resistors are also available in other packs (see text).

into a permanent high-impedance unit. This won't be at all complicated - the only down side being that the headphones will then be permanently wired in the mono configuration, as the stereo/mono switch (built into one earpiece) has to be used as the amplifier's battery power supply's **On/Off** switch .

I'm delighted to have found these headphones. I've enjoyed using my set - they're pleasant to wear and give very good results - especially when you bear in mind the price. Hopefully you'll find them just as useful when yours arrive!

Goody Bags

Traditionally, the mixed bag of surplus components - aptly nicknamed 'Goody Bag's - have always provided an exceptionally economical and convenient way to build up a stock of components. **They really do provide a good bargain** and can be obtained at rallies and once again (thanks to **Robin Sykes G3NFV** of **Sycom - see information panel**) by post. Coincidentally, I discovered Robin had the bargain bags on his stand at the Nevada open day! I was very pleased indeed to see them, because when last mentioned in *PW* several years ago - the supplier involved managed to clear several shipping container loads of components!

The only disadvantages of buying bulk mixed components (very minor when you consider what you're getting!) is that you've got to spend time sorting the capacitors and resistors out. You'll also get your fingers very dirty - rubber gloves stop this problem - and good eyesight is needed for sorting out the smaller components (I use my workbench magnifier lens).

Another minor disadvantage is that you can end up with relatively large numbers of one value...but not the one you're needing! However, in practice on the rare occasions I've discovered this - delving into another bag of components has produced what I needed. And of course different values can be made up by placing resistors or capacitors into series/parallel combinations to achieve awkward/unavailable values.

So, despite any perceived disadvantage of buying components in Goody Bags (and knowing how much constructors enjoy bargains) I have no hesitation in recommending what Sycom have on offer. In fact - if your club is running a Foundation Licence Course...there's an excellent opportunity for keen 'Foundationeers' to sort out the components with you, learn what they are and what they do at the same time!

Cheerio until next time. Get sorting...you'll enjoy it and save money!

PW

Headphones & Goody Bags

Headphones: The budget-priced headphones are available (please quote *PW* Radio Basics and the reference **MD-806**) for £7.50 inc. P&P) from **Nevada, Unit 1, Fitzherbert Spur, Farlington, Portsmouth, Hampshire PO6 1TT. Tel: 0239-231 3090, FAX: 0239-231-3091**.

Component 'Goody Bags': The component Goody Bags are available by post (and at the rallies they attend) from **Robin Sykes G3NFV** at **Sycom, PO Box 148, Leatherhead, Surrey KT22 9YW**. **Tel: (01372) 372587, FAX: (01372) 361421**. The component bags featured weigh between 300 and 350g - depending on the type ordered (others available, please enquire) and cost **£1.95 each - please specify what you require on ordering**. Postage rates for the component (any combination you wish) bags are:

One bag
£1.25
Two bags
£2.25
Three bags*
£4
Four/five bags*
£4.50
Six to ten bags*
£6.50

***Postage rates:** Orders for one or two bags are sent by **2nd class post**. However, (and explaining the difference in the carriage prices) **orders of three bags upwards are despatched by Parcel Post**.

Plenty to Offer - The Ic

Product	Icom IC-T3H 144MHz n.b.f.m. transceiver
Company	Icom (UK) Ltd
Contact	Sales
Tel	(01227) 741741

Jon Wheeler G0IUE thoroughly enjoyed himself trying the single band IC-3TH hand-held transceiver, using his daughter's climbing frame and even got Dad G1LJT involved!

● The IC-3TH 144MHz hand-held transceiver.

● Close up view of the transceiver's front panel with controls and l.c.d. screen (see text).

I was intrigued when *PW*'s Editor kindly asked me to review the IC-T3H after all it is only a 144MHz hand-held transceiver...and who wants single-band rigs these days anyway? Well, I'm pleased - after experiencing it - to say that this radio, be it a single-band set, has plenty to offer, is a very robust, and I'm sure would do very well in a drop test.

What's On Offer?

So what do you get for your money? In answering, the radio is a 144 to 146MHz n.b.f.m. hand-held transceiver, capable of delivering up to 5W output. So, let's look at what came my way.

The rig arrived packaged in the familiar Icom durable cardboard box. (I assume that by not having fancy packaging Icom can focus all their resources to the important bit - the radio equipment inside the packaging!).

Opening up the box unveils the radio itself, a BP222, 7.2V 600mAH NiCad battery pack, a 'rubber duck' flexible antenna, and a belt clip. However I saw no way of charging the battery as the a.c. adapter and battery charger stand were nowhere to be seen.

On reading the relevant page of the (very comprehensive) 59 page manual - it appears that the charger and adapter, in my opinion essential items, are not supplied with some versions of this radio. A quick call to **Donna Vincent G7TZB**, *PW's* News & Production Editor (who co-ordinates everything to do with the magazine's reviews) soon put this right and the 'optional' items duly arrived the next day – **thanks Donna!**

Charging the battery pack is very simple – you sit the radio in the desktop charging unit connecting it to the mains via the a.c. adapter. The manual states that charging should take less than 24 hours. Alternatively you could opt for the optional BP208 battery case that houses six AA sized (Alkaline recommended) batteries.

On Top

The top of the transceiver is very straightforward. You get a rotary knob for **Channel/Volume** control (set as desired) and a BNC antenna connector.

The front panel sports 16 keypad buttons and two bi-functional **Up** and **Down** arrow type buttons. The latter can either be alternatively used with the rotary knob on the top of the radio to function as either the Up/Down frequency changer or as the **Volume** control.

My own preference was to set the rotary knob as the channel changer and to make the up/down arrows the volume control. However, on the initial switch on these were reversed and I had to change them over myself. This process was fairly easy to do if you follow the initial set up

om IC-T3H

Product

Icom IC-T3H 144MHz n.b.f.m. transceiver

Pros & Cons

Pros: *Simple to use, well made, excellent audio reports, very sensitive receiver.*

Cons: *The l.c.d. display is a bit small, watch where you put your hands.*

Price

£159.95

Summary

I see no reason at all why the Icom IC-T3H shouldn't become a valuable asset in any shack, car or shirt pocket.

Thanks

My thanks go to ***Icom (UK) Ltd., Sea Street, Herne Bay, Kent CT6 8LD. Tel: (01227) 741741, FAX: (01227) 741742,*** *for the loan of the review unit.*

instructions contained within the manual.

Immediately above the keypad is the l.c.d. screen. It's adequate but, in my opinion, a bit on the small side. Above that is a fair sized integral speaker and microphone. I'm sure the display could be made larger given the size of the rig.

For the next stage of the review I refer to the left-hand side of the IC-T3H as viewed from the front. Here there are three push buttons; a red **On/Off** button, a large push to talk (p.t.t.) button and an **Open Squelch** button. Holding this button in, opens up the squelch. (I found it to be **extremely useful** as the squelch control, in normal use, has to be pre-set by the user before operation).

On the right hand side there's just a **Speaker/Microphone** jack socket located roughly about a third of the way down from the top. This is quite a novel idea....as most other radios have these sockets on their top panels and usually close to the antenna connector.

Top mounting the Speaker/Microphone socket can cause problems when the plastic housing around some speaker/microphones are just a shade too wide to fit neatly against the antenna connector (usually either of a BNC or TNC variety). Not so on the review model with its sockets proudly sat on the right hand side panel well clear of any potential obstructions.

● John G0IUE enjoyed using the single-band IC-3TH - and his Father Ron Wheeler G1LJT was also impressed (see text).

Newcomer's Preferences

Rather than go in to explicit detail of every function of this radio, I invited a keen newcomer to the hobby for advice, preferences and comments. **Kevin Valentine 2E1VKD** from Melksham (a near neighbour to me here in Wiltshire) was invited to have a look at the transceiver...and he liked it.

Kevin said size was important (of course it is Kevin...but what of the radio?) In fact the rig is by no means the smallest on the market today - it measures 55W x 132H x 35D mm and he found it fitting neatly in to his palm and it faired well in the shirt pocket test too.

Kevin added that a 1750Hz tone, CTCSS encode, a repeater shift, and scan and memory functions are his other main priorities in a hand-held. All of which are catered for as standard on the IC-T3H.

Although I agreed with Kevin's comments entirely, the IC-T3H offers a multitude of functions for those that wish to use them. For example, there's three display options: operating frequency, channel number, and my favourite, channel name indication (the latter allowing up to five characters of your choice to be stored). So, S20 could therefore be displayed as **145.500**, **Ch20** or **CALL**.

The radio has a very handy 100 memory channels plus a call channel. Unless you're really in to 12.5kHz spacing or storing most of the UK's 144MHz repeaters and their respective CTCSS tones...you'd being doing very well to fill even half of the 100 memories!

The IC-T3H can scan in either **Memory** or **VFO** mode. You have to be quick to see it though – I timed a full sweep from 144 to 146MHz at roughly three seconds.

The **Set** mode allows you to basically customise the radio to you own preferences. For example, in this mode you can set the repeater shift split (-600kHz is standard), the squelch level, the CTCSS tones, the display brightness...to list but a few.

Unfortunately my old* grey matter wasn't up to fully appreciating what I'd refer to as 'luxury items', namely a pager function (when used with an optional UT-108 unit) that maximises the use of the built-in 24 DTMF codes. That said, I'm sure somebody out there could

● Modern hand-held transceivers seem to be mostly battery pack! This view shows the battery detached from the transceiver (see text).

● Kevin 2E1VKD - although a newcomer to the Amateur Radio hobby - has very specific requirements in a hand-held transceiver (see text).

Continued on page 26

make very good use of these facilities.

He's not that old readers....as you can see from the photographs! Editor.

On The Air

With the batteries suitably charged (or so I thought) I went on the air a dull Saturday morning in November. My initial tests were what I'd call truly hand portable, in other words no external supply and using the rig's own rubber duck antenna.

I dropped my daughter **Emma** off for her Saturday morning swimming lesson in Corsham. From the sports centre car park I called "CQ CQ Two" and straight back to my call came **Kevin Romang G4SKN** from Neston, a little over a mile away as the crow flies **but a contact nevertheless**. Kevin, gave me an expected 5/9 report but commented that the audio was "quite impressive" and questioned whether I was actually on my mobile rig, an IC-207, and not a handy. I assured him it was the IC-T3H and that I was stood next to my car using a totally portable set-up.

Having signed with Kevin, I was then called by **Ron Wheeler G1LJT** located, as was I, in Corsham. Ron gave me an excellent report and then duly invited me down to his QTH to 'eyeball' the radio. Actually, I've got to admit...Ron is my Father, and more than likely I would have nipped round to his QTH to show him the radio anyway!

On arrival at Ron's QTH, I handed him the radio to see what he thought of it and gripping it firmly in his palm his first words were: "This is one of the best looking hand-helds I've seen in a long time".... followed by "Icom stuff is very robust". (Dad's has been the proud owner of an IC-24G, an Icom 144MHz mobile of early 1980s vintage and built like a tank).

Just before setting off to collect Emma from her swimming lesson, I quickly set the rig up to run repeater shift and CTCSS. This was done very easily indeed using the **Function** button in conjunction with the **Set/Tone** and **Dup** (Duplex) buttons all of which are clearly marked on the front panel.

Next, I retuned to 145.650MHz and attempted to access the Swindon repeater, **GB3WH**, over around 32km (20 miles) away. To my surprise I was able to access it without any problems at all. Unfortunately though nobody returned my calls though.

Back at the sports centre I made another "CQ" which was responded by **Gee' G4LNA**, about a field's length away from me in Corsham. Gee' said the signal was end stop on his FT-290 and reported favourably on the transmitted audio. Then it happened..... the battery pack ran out on me! (**My fault entirely** as I had only charged the battery for a few hours, clearly not long enough and the QSO ended abruptly).

The following day, with the battery pack suitably charged, I tried a few more CQs. But, try as I may I was unable to raise anyone on either of the two 'local-ish' repeaters (GB3WR and GB3WH) but was able to gain reports from **Paul G7FXY**, near Trowbridge and **Ken G7HOP**, in Melksham.

Ken gave me an excellent report and stated that the transceiver's audio was: "One of the best sounding audios I've heard on a hand-held in a long time".

Paul G7FXY, however, was having trouble hearing me some 13km (8 miles) away so I clambered to the top of Emma's climbing frame and...'hey presto', contact was made. It was especially pleasing because Paul had just returned to the hobby after many years absence and it was great to hear him back.

● Perhaps a future Foundation Licence holder? Young Emma Wheeler even helped her Dad out with the review by loaning him her climbing frame! (see text).

I must admit I made many more CQs that went unanswered and I'm grateful to those who responded. I found the IC-T3H to be a smashing single-band radio that was well built, has an excellent receiver and offered many more functions than I would ever need.

During a QSO on the high power setting with the radio firmly gripped in my left palm my hand began to get very hot, in fact to the extent where I had to release the p.t.t.. It was evident that my palm had been touching the battery contacts at the base of the battery pack leading to an r.f burn. To remedy this I placed some tape over the contact points and no further problem occurred. I must admit I was surprised to say the least at this effect*.

Assuming it's priced competitively, I see no reason at all why the Icom IC-T3H shouldn't become a valuable asset in any shack, car or shirt pocket.

PW

● Comments

* Comments From Icom Via Editorial Desk

Commenting on the review, Icom (UK) Ltd., assure us that all retail IC-T3H transceivers come with a drop-in charger unit, as an oversight led to PW getting their demo model minus charger! Heat sensation on battery pack: Discussing John G0IUE's comments on the 'r.f. burn' sensation he experienced, Icom have not come across the problem. I tried the transceiver out - and found on high power that although the battery pack did get warm and it's my opinion (agreed with Icom) that the metal studs warm up because of heat conduction from the battery itself. It's something I've noticed before with relatively high-powered but small physically sized hand-helds. ***Editor.***

Abridged Manufacturers Specifications

General		**Transmitter**	
Frequency range:	144-146MHz (Tx/Rx)	Modulation system:	Variable reactance n.b.f.m.
Operating temp range:	-10°C to + 60°C		
Frequency stability:	± 10ppm (-10° to + 60°C)	Output power	(at 7.2V d.c.) 5.5 W (High), 500mW (Low)
Antenna impedance:	50Ω (BNC)		
Power Requirement:	7.2V d.c. (6 – 10.3V acceptable)	Max. freq. deviation:	± 5kHz
		Spurious emissions:	<–60 dB
Current Drain (at 7.2V DC)		External microphone:	3 conductor 2.5 (d) mm; 2.2kΩ impedance
Transmit at 5.5W:	<than 2A		
At 500mW:	<700mA		
Receive (at max audio):	<250mA	**Receiver**	
Stand-by:	<70mA	Receiving circuitry:	Double conversion superhet
Power Save:	<20mA		
Memory channels:	107 (incl. 1 call and 6 programmed scan edges)	Intermediate frequencies:	1st 21.7MHz, 2nd 450kHz
		Sensitivity (at 12dB SINAD):	0.16µV (typical)
Tuning steps:	5, 10,12.5, 15, 20, 25, 30, and 50kHz	Audio Output Power:	>300mW at 10% distortion (8Ω load) at 7.2V
Dimensions:	54(W)x132(H)x35(D) mm		
Weight (approx.):	350g (with BP-222) 190g (without battery pack)		

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Listening By Computer - Part 2

Martin Peters continues his journey through the world of alternative listening - Internet Radio.

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John Wilson takes a break from supplying a steady stream of the analysis of old and new receivers to explain what's involved in producing his regular feature.

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March 2002 Issue On Sale 28th February - £3.25 - Miss it! Miss out! SWM - The ONLY choice!

The TW Communicators

Ben Nock G4BXD looks back to the time when the innovative British manufacturer TW Electronics introduced a series of portable Amateur Radio transmitter-receivers... before the sun rose so successfully over the Japanese equipment manufacturers.

Many recent, and some not so recent, converts to the hobby of Amateur Radio might be forgiven for thinking that the 'Land of The Rising Sun', i.e. Japan, has always supplied the hobby with its neat multi-functional black boxes. This is not so, indeed, there was a time...admittedly a long time ago, when the UK was self sufficient in Amateur Radio manufacturers.

For the radio enthusiast around the time of the late 1950s and into the 1960s one of the products they could go out and buy was the TW Electronics range of equipment. This company made various sets, for 1.8 and 144MHz in particular.

So, with the present day 144MHz hand-held being capable of so many additional features, in addition to simply being able to talk to one another, I thought you might like to see what we used in the days when amplitude modulation (a.m.) ruled.

● The TW Communicator in all its glory, sleek and quite smart.

Transmitter Receiver

The TW Communicator 144MHz transceiver, or more correctly, transmitter-receiver (as there are no items common to these sections other than the power supply) was a rather smart, even by today's standards, table top set. They were also popular for mobile use.

The equipment consists of a transistorised double conversion receiver, comprising a crystal controlled converter, bringing 144MHz down to a tuneable first intermediate (i.f.) stage covering 4 to 6MHz. This is then converted down to the second i.f. of 455kHz before detection and the audio amplification.

The converter is some what special in that it uses a 42MHz crystal in fundamental mode (i.e. 14MHz, which it then multiplies by 10 to provide a local oscillator signal of 140MHz. This - after amplification - is mixed with the incoming signal from the antenna to provide the i.f. of 4 to 6MHz and achieves this clever little feat with only three transistors.

The Communicator's tuneable i.f. stage uses a further two transistors as an r.f. amplifier with gain control, and a self-oscillating mixer. The output of 455kHz is fed to a self-contained (assembled into a screened aluminium casing) Mullard i.f. module which gave the set its selectivity - if you can call it that! - and high gain stages. Another Mullard module, this time the a.f. amplifier type, followed the i.f. unit to provide the necessary audio output.

An additional transistor is used along with a 455kHz i.f. screened tuned transformer to provide a beat frequency oscillator (b.f.o.) function. The coupling from the b.f.o. to the main 455kHz i.f. strip is via a length of wire which pokes into the Mullard module though one of the i.f. transformer tuning holes. The amount of coupling, or b.f.o. injection, is controlled by increasing or decreasing the amount of wire inside the Mullard module.

The Transmitter

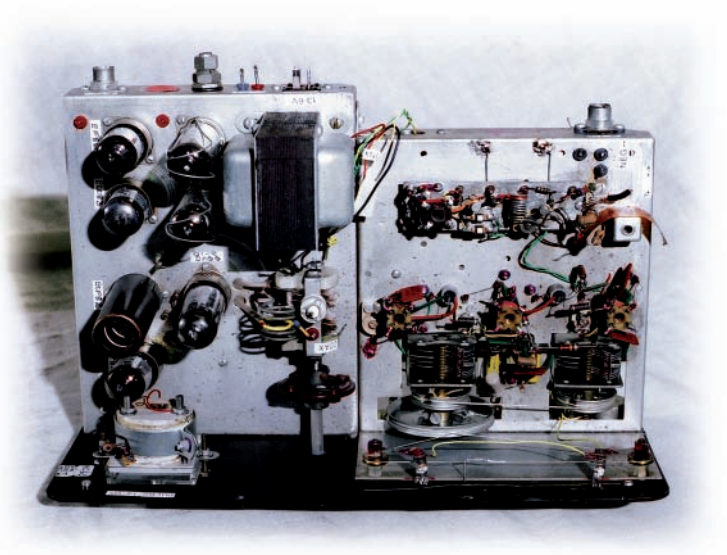
The Communicator's transmitter unit comprises a three valved r.f. stages with a four valved modulator. The modes available are c.w. and a.m.

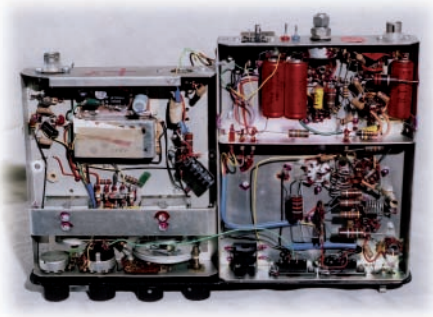
Yes, it was a.m. of course, because in those days, we all used a.m. on 144MHz and narrow band frequency modulation (n.b.f.m.) was not so common. Using an output valve of type QQVO3-10 an output of around 10 to 12W could have be expected.

Power Supply

The power supply unit (p.s.u.) was a separate unit, providing a 12V d.c. output for receiver, and valve heaters and a d.c. high tension

● Inside the TW 144MHz Communicator, transmitter section on the left, r.f. stages at the bottom, modulator on top, receive section on the right. The h.f. converter is at the bottom, with the v.h.f. converter above (see text).

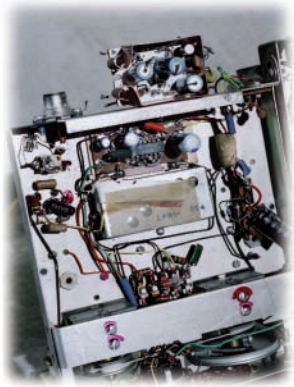




● Underneath the TW 144MHz Communicator - the receiver i.f. and audio modules are on the left, the transmitter section is under chassis on the right (see text).

supply of around 250V for the transmit side. The only odd (from a modern perspective) point about the supplies for this set is that **it runs with a positive earth** on the 12V rail, all the transistors being the older *pnp* germanium variety.

You have to be a little wary making connections to modern shack supplies taking care with polarities. (I believe I'm right in thinking that there was both an a.c. and a d.c. power unit available).



● The replacement audio unit (above Mullard module), using the LM380 i.c., in place with the defunct Mullard unit removed, and placed on top of the chassis (see text).

Remarkable Resemblance

The receiver section of the 144MHz set bears a remarkable resemblance to the 1.8MHz receiver produced by TW. Indeed, it's the same chassis and the same number of front panel controls, as can be seen from the photographic illustrations!

Admittedly, the 1.8MHz TW Communicator pictured does have the earlier i.f. and audio modules. However, the chassis is the same, as is the r.f. and oscillator tuning set-up.

I attempted to get my example of the 144MHz Communicator working. But, although in good external condition, the seller forgot (?) to mention that it had been 'got at' inside. Items were missing and the audio stage did not work.

As the module had already been repaired at some time the copper tracks were already lifting. So, my attempt to remove the output transistors simply lifted more of the printed circuit board (p.c.b.) track off making the unit beyond repair.

So, not to be outdone I made a replacement a.f. output unit, using a simple LM380 audio integrated circuit (i.c.). he point about positive earth being noted, so that the LM380 was in fact 'electronically' hung upside-down, with its power supply grounded and what would have been its earth, floating and negative potential. After some fiddling and certain words or threats voiced...the unit worked. The i.f. unit seemed okay as did the b.f.o section.

The r.f. and oscillator sections of the tuner were then aligned and I could then hear stations in the 4 to 6MHz short wave band. Next, the 144MHz converter section was looked at, but it took careful adjustment of the oscillator coil to get the crystal stage to fire on the 10th harmonic. This produced a nice signal at 140MHz, easily audible on my modern 144MHz hand-held.

Bleeps & Pagers!

I can only assume that the amount of signals present around 144MHz part of the v.h.f. spectrum were a lot fewer back in the 1960s. This I mention because with a suitable antenna connected all sorts of bleeps,

● The TW 1.8MHz receiver front-end, showing the older style i.f. module.

pagers, tones, broadcast and other 'grunge' was heard!

It was hard to find a clear spot on the dial, but a quick check with my hand-held proved the Communicator was capable of reception in the 144MHz band. It was just that with such a 'wide open' receiver it was hearing all sorts of things at once.

I was quite happy to accept that the transmit section would be fine. You cannot go far wrong with a crystal oscillator, a couple of multiplier stages and a QQVO3-10 output stage.

The modulation would have been more than acceptable. This was because a proper modulation transformer was used, providing anode and screen modulation to the power amplifier stage.

● The TW 1.8MHz receiver on top of the 144MHz Communicator. The 1.8MHz receiver unit is a virtual copy of the 144MHz receive section (see text).

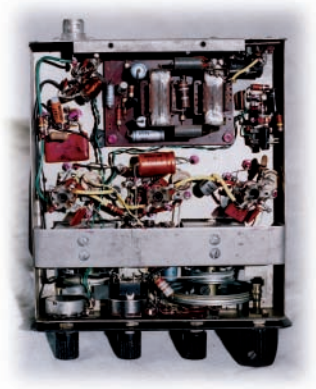
New Lease Of life?

After the poor performance on 144MHz I considered converting the Communicator to 7MHz, and giving it a new lease of life. The receiver, minus the v.h.f. converter could easily be made to tune 7 to 7.1MHz and a change of coils in the transmitter would allow operation on that band with ease. The c.w. mode would be ideal, with the odd excursion onto a.m. if band space and activity permitted.

However, I subsequently decided though not to pursue the restoration of the Communicator further. Instead I placed the set on my vintage collection shelf in the enduring knowledge that it had once been at the forefront of v.h.f. Amateur Radio in the UK.

Maybe, at some time far in the future, when all the modern radios have died and their specially made i.c.s and components are no longer available, it'll be time to restore the rig. I'll resurrect the TW Communicator and fill the v.h.f. airways with its amply modulated voice once again.

PW



● The TW 1.8MHz receiver front-end section under-chassis view showing larger older style audio module (top, centre).

The TW Mystery - Can You Help?

Can you help solve a mystery? Do you have any knowledge of the company, or personalities behind the innovative (for the period) TW Communicator range of transmitter receivers - including the 1.8, 3.5. 7 and 70MHz versions? I was always keen on trying to find a 70MHz Communicator - these seemed to be very rare, but have never found one. Ben G4BXD's article may well bring some memories flooding back...so if you can add more to the story please write to the *PW* offices.
Editor

Treasure That Junk!

- Another person's junk could be your treasure! Brian Kendal G3GDU sensibly suggests you look out at club sales for bargains...but mobile rallies are often a good source. Particularly, the Radio Amateur's Invalid & Blind Club (RAIBC) stand (shown here at the Longleat Rally) is famous for the variety of treasures in store and all in a good cause. Many keen Amateurs are attracted to the bargains...including *PW* author Richard Newton G0RSN (far right) and former RSGB President Peter Chadwick G3RZP (second right). (Photo by G3XFD).

Brian Kendal G3GDU is a firm believer that another person's junk could easily be your treasure. So, as traditional components become more expensive and difficult to find...read on to learn a few tricks from the man himself!

It was as recently as in December 2000 *PW* that the Editor commented on the high cost of components for home constructors. This doesn't apply to all components of course, but it certainly does to the more specialised items!

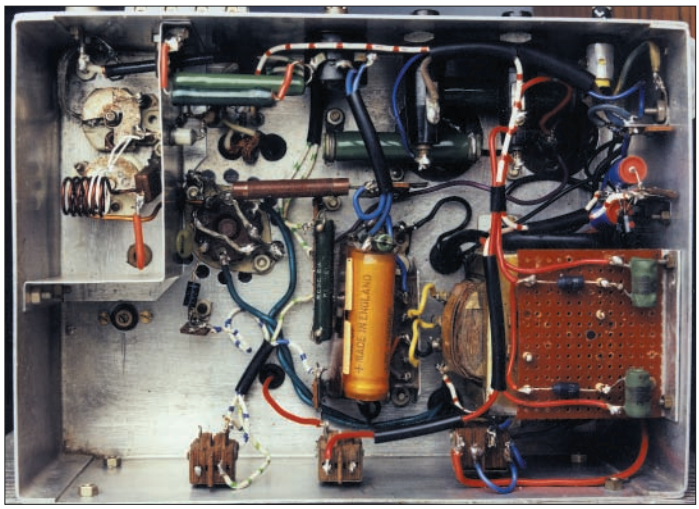
Many items, such as small fixed capacitors, low power resistors and transistors are readily obtainable at modest prices in several catalogues. However, for many other components, such as transformers and variable capacitors, the price has gone through the roof.

How, then can the average home constructor obtain the components which are so essential for almost any home-brew receiver or transmitter project without taking out a second mortgage? The answer is twofold: First forget about trying to make your equipment look as if it started life in one of the factories in the Far East and, secondly, **buy wisely at the club junk sale!**

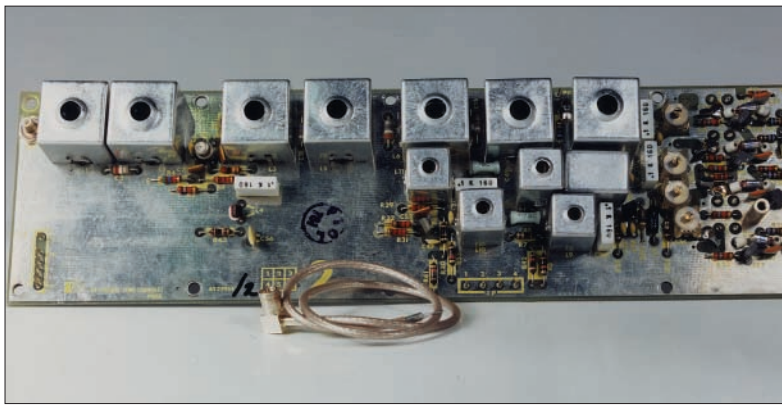
Junk Sales

The vast majority of people who attend junk sales will only consider bidding for items which can be used with the minimum of effort. Equipment which is obviously outdated, incomplete or unserviceable will almost invariably be ignored.

Unsold equipment or components will either be left on the table or given away as a 'free gift'. The wise home-brewer will consider the same equipment as a



- Brian G3GDU suggests that older home-brewed equipment - such as this linear power amplifier - can offer a wealth of quality components for further use.



- Breaking down former Pye equipment - as G3GDU recommends - can provide some really useful items. This board - in effect a complete 70MHz transmitter, pre-salvaged - was bought b at a rally, but you could equally recover one from a bargain at your club Junk Sale!

random selection of components that happen to be connected together at the time of purchase. As such, this approach can be a primary source of components.

Suppose, for example, the auctioneer offers a Pye v.h.f. *Cambridge* for sale. Now, no Radio Amateur worthy of their salt would even consider purchasing such a monstrosity, for it is a bulky 30+ year old valved transceiver. You therefore bid 10p and everyone looks down their noses at your foolhardiness!

However, when you arrive home...get the equipment on the bench and open the case. You'll find that there are three chassis, which you then remove.

Look at the case, there is not much there except a chassis-mounting u.h.f. socket. Remove this, put it in your component store and you are already in profit, for you would not purchase a new one for less than a £1 - foolhardiness turns into financial wizardry at one stroke!.

By looking a little further inside you'll find an antenna change-over relay. This is usable up to the 430MHz band and will handle 50W. Several more £s saved.

Heat up your soldering iron and start removing components and you will find h.f., v.h.f. and r.f. chokes. There also be a 10.7MHz crystal filter, crystal holders (possibly with crystals in them) butterfly tuning capacitors, concentric trimmer capacitors and a host of other components. The control box can provide three knobs, a Yaxley switch and two pea bulbs complete with their holders.

Nuts & Bolts

Even the transceiver's chassis 6BA nuts and bolts, which hold the whole equipment together, will meet all your needs until well past the next junk sale. Most of the valves will be serviceable and the majority of their holders should be reusable.

However, if you don't construct valve gear, pop them in a plastic bag and take them down to the next junk sale. You may get your 10p back!

So, what have you gained for your 10p and an hour's enjoyable work? In answering, I would estimate that you'll have stocked your store cupboard with components which would have cost you at least £30 from any other source...**if you could find them on sale!**

Chrome Plated Bargains

At this point I can't resist telling of the time that I bought an old chassis at a Junk Sale for 20p. On the front panel were two large chrome handles which were stained, had been splashed with paint and generally looked awful.

Once I arrived back home I removed the handles and put them into store. A few months later another Junk Sale was looming and looking for items to dispose of I picked up the handles, put them on the buffing wheel and they came up like new. **At the sale they were sold for 50p – to the vendor of the original chassis!**

Another Pye Buy

The Pye *Westminster* is just as good a buy for components – and the power amplifier (p.a.) block could, in all probability, and depending on the model, be readily modified to an add-on 10W p.a. for 50, 70, or 144MHz when you're using your hand-held portable rig at home.

The audio board on the *Westminster* is a 5W amplifier which can easily be adapted for general use in the shack. Furthermore, the metal stand-offs which support the printed circuit boards (p.c.b.s) will prove invaluable for home construction.

Although I've used two Pye transceivers for examples, almost any other old equipment can provide a component haul of similar proportions. Home built valved transmitters can be particularly valuable, for they will almost inevitably contain meters, wide spaced transmitting variable capacitors, high voltage fixed capacitors and high voltage mains transformers.

Mains Transformers

Valved broadcast receivers, provided that they are not designed for a.c./d.c. operation, will provide a minimum of a 250-0-250V mains transformer, a loud speaker and a twin gang 500 pF tuning capacitor. Defunct mains/battery transistor portables are also worth considering for they will disgorge a mains transformer, loudspeaker, tuning capacitor, ferrite rod and possibly a few serviceable transistors.

Less experienced constructors, or newcomers to the hobby may not be fully aware that so-called 'a.c./d.c.' receivers aren't isolated from the mains supply. Please be aware that if the mains input plug is not correctly wired - the chassis of such equipment can become 'live'.

Isolating transformers (often available second-hand at Junk Sales, etc., can be used to power such equipment - totally isolating it from the mains, safely. Please also be aware that many not-so-old television receiver chassis are also not isolated from the mains.

Always play safe and never work on equipment which is isolated from the mains when dismantling. It's all to easy to pull the wrong plug out on the bench after a test...leaving the wrong equipment live! You should also always thoroughly check insulation between mains primaries and secondaries on transformers recovered from older equipment.

Not Exhausted

Even at this point the potential is not exhausted! I say this because old chokes, transformers and TV scan coils can provide copious quantities of different gauges of wire.

In his book *Trustee from the Toolroom*, the late **Neville Shute** quoted the axiom that "An engineer is a person who can make for ten bob (50p) what any idiot can make for a pound".

Neville Shute's words are as true today as they were when he wrote them over 50 years ago, and nowhere is it more true than in the art of inexpensive home-building of Amateur Radio Equipment. Wise purchases at the club junk sale are the first step in this direction - so good hunting!

PW

● The smaller, specialist rallies such as the Rochdale QRP Convention (Held in October) can provide much for the keen constructor especially interested in older equipment for dismantling, along with modern components and projects. (Photo courtesy of G4EAN)

● This stand at Longleat had a good selection of traditional test equipment for sale. (Photo by G3XFD).

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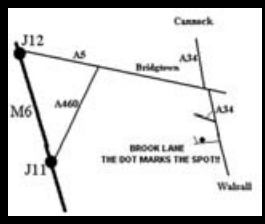

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Antenna Workshop

UP THE LADDER AGAIN!

Professional TV and Radio Antenna Engineer Allan Wightman has found time to join us once again. This time he shares the experiences he's recently had helping a disabled Radio Amateur set his antennas up under difficult circumstances.

Hello... it's good to be writing for *PW* once again! I was invited to do so following my recent experiences in helping out a disabled radio 'Ham' to set up his transmitting station in rather difficult circumstances. There were many problems to overcome and I can assure you - with no exaggeration - that some of them were really awkward. That's why the Editor's asked me to describe what went on...because he knows the Ham I helped won't be alone in suffering difficulties in erecting antennas.

Although I've never been involved in Ham radio myself, my services have often been used by enthusiasts who - for some reason or another - need our specialist knowledge of working aloft. It has led to some interesting problems, providing myself and my younger employees - who climb the ladders quicker than us older types - with some challenging engineering tasks.

Terraced Housing

A very large number of people in the UK live in some form of terraced housing ranging from the three and four houses-joined-together scenario, right up to the huge blocks of terraces, such as seen in Bath in Somerset, London and Edinburgh. These building can prove very difficult for us 'Ladder People' because they're also usually more than two storeys high meaning that a series of ladders has to be used to gain access to any antennas.

Incidentally, I used to say ' Ladder-Men' a few years ago but we've now got two young ladies working with us! Having two teenage daughters myself, our two lady technicians didn't need to prove themselves to me. **But they did**, and they're lighter, quicker, fitter and more enthusiastic in the job than my eldest son was before he moved back to a 'ground job'!

The Radio Ham I was called into help is severely disabled, although active and had recently moved into a three storey Edwardian terrace of houses further down on the south coast from my base, in a seaside resort. Originally a private home, it had been run as a Guest House along with most of the others in the road. As a result, the roofs and walls were festooned with many poor quality 'contractors' Band IV and V u.h.f. TV antennas, along with the occasional partially preserved/disintegrating Band I and III v.h.f. relics!

Fortunately for my customer, although the house is in effect divided up into separate living areas and flats - it's now his family home. This helps to alleviate some of the possible problems with EMC difficulties, especially as his eldest daughter lives in the upper flat with her young children.

The illustrations in **Fig. 1** and **Fig. 2** provide a good idea of what faced us when we arrived to remove some old antennas, replace old cables, install satellite television, and help the Ham to set up his short wave antenna. To help explain the situation - the *PW* illustrator was kindly asked to reproduce my sketch diagram so as to make it appear as though we were looking at the house from the side (Fig. 2).

From the diagram you'll realise that there's a tiny front garden, a wide pavement and then a road. Right in front of the house is a pollarded (pruned to stunt growth of branches in a controlled fashion) tree. At the rear there's a small patio of about six or seven square metres in area. This ends up against the front of the large garage/workshop (already filled with his radio equipment) which has its own roller shutter door opening on to a narrow access lane. The main 'radio room' is in the especially adapted ground floor flat.

Altogether the depth of the property is a little over 30m, with a width of approximately 8m. There's no space wasted and **literally nowhere** to place antennas but we had some ideas, although there were some tricky problems involving telephone wires to overcome.

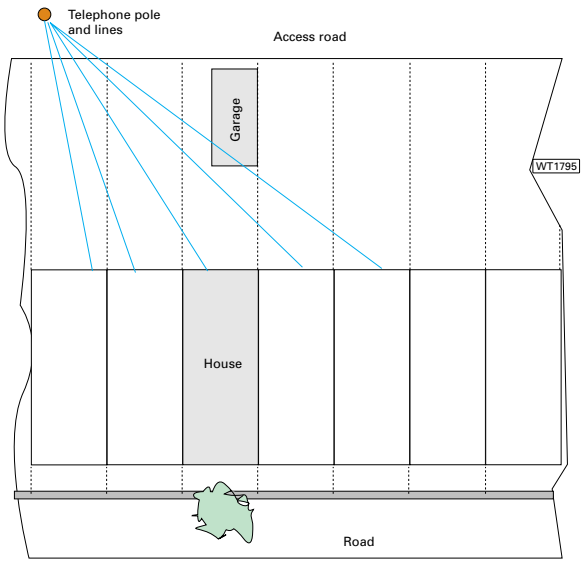

Fig. 1: An overhead section (plan) view of the property owned by a disabled Radio Amateur, to which professional TV and Radio Engineering Antenna contractor Allan Wightman had to use all of his skills to enable reasonable effective antennas to be erected (see text).

Telephone Wires

High density housing, even with modern buildings, can lead to many problems to anyone working overhead because of the large number of telephone wires leading from distributions poles belonging (unless you live in Hull in East Yorkshire) to British Telecomm. Believe me telephone wires can be a real nightmare and in this case they proved to be even more troublesome!

Nowadays there are **some attempts** at putting the wiring underground although you still see a great

number of special poles with great fans of wires spreading from the top. They almost look like those old photographs of early Marconi transmitter stations!

In my customer's case there are a number of lead-ins passing right over the small patio. So, along with making life difficult for erecting ladders there's the very great possibility of short wave radio transmissions causing interference to the telephones, coming under the generally used term of Electro Magnetic Compatible (EMC) which often seems to mean non-compatibility!

The interference problems can arise because, even with the best will in the world, as a result of the closeness of the transmitting antenna and the unscreened telephone wires. Add to this the modern electronic telephone with its host of integrated circuits, memories, etc., even the best prepared Ham can easily, and inadvertently cause, telephone, TV and radio interference of some form or another.

So, with the lack of space in mind, together with the plethora of overhead telephone wires, and the many u.h.f. antennas 'looking' through any likely antenna site to the main regional transmitter serving the area - **Rowridge** (**Station 108.00**, Band IV and V on the Isle of Wight) on the house and surrounding houses, we had to be careful. Ingenuity was of prime importance!

Loop Antennas

In my work with broadcast television and radio antenna engineering I've not come into contact with loop antennas very much at all. I understand though, that they're often used by 'Hams' who don't have much room for any other form of antenna.

My customer had considered the use of a transmitting loop antenna, but when he saw just how close the antenna would be to the telephone wires - he wisely decided against using one. In my opinion it was a good decision in his case, because the intensity of the radio frequency fields from the loop - even at relatively low power levels - could increase the possibility of EMC problems with telephones because of the concentrated nature of radiation from loop antennas.

Interim Solution

The diagram, **Fig. 2** shows the interim solution that my customer and I have comes up with. But please note that the system using the mast at the garage end is not in use as yet... pending planning permission.

He's already got one of the useful, sturdy, little Adaptmast 10 metre masts, made by Tennamast in Scotland. This will eventually be used in conjunction with a 6 metre long alloy scaffold pole - pending the necessary planning permission.

On top of this pole my customer intends to place Yagi arrays for the 70 and 144MHz Ham bands. These will be rotated by a remotely controlled rotator, similar to those we use for broadcast work, mainly for longer distance reception of Band II v.h.f. programmes.

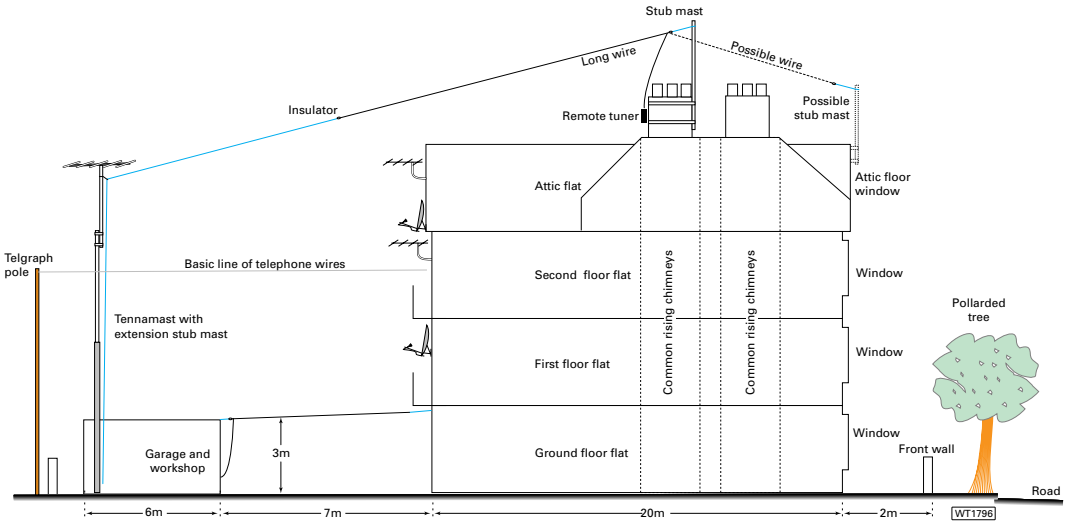

Fig. 2: This illustration provides an excellent impression of the difficulties caused by a 'fan' of overhead telephone wires. This, along with the lack of a garden, the multiplicity of neighbouring television antennas, and the high-density, closely spaced housing demanded careful planning by Allan Wightman and the Radio Amateur to reduce the possibilities of EMC problems arising (see text).

Note that in the diagram Fig. 1, the eventual long wire (to be attached to the extended Adaptamast) is shown. At the moment however, this wire comes down over the eaves and runs down to the lower floor. Using a manually controlled antenna tuning unit, my customer is then able to resonate the length of wire to the Ham bands he's using.

And Finally...!

Finally, after a discussion with me (and telling me of the reviews he'd read in *PW*) my customer decided that he would invest in one of the remotely-controlled r.f. sensing automatic antenna tuners. This will be eventually mounted high up, above the TV antenna 'mounting line' and telephone wires, and will tune the horizontal wire antenna from his operating position.

The system, he showed me was one of the American-made SGC tuners, it's weatherproofed and will be mounted on a set of brackets we've already installed to hold the short fibre-glass pole stub-mast shown in Fig. 2. The entire system is controlled from the ground and is powered by a 12 - 14V d.c. supply fed by separate wires.

In use the system will be fed by a heavy duty low loss coaxial cable, reducing (as far as possible) the chances of EMC problems because the main radiation from the antenna will be restricted to the antenna mounted high up on the roof. Incidentally, my customer decided against the idea of a long vertical whip antenna (often seen on modern pleasure cruisers and fishing vessels) on the roof because of the high winds, possible lightning damage and maintenance. (He also wants to keep his antenna system on the roof line as low in profile as possible).

In the future, I hope to provide you with photographs and an up-date on the system adopted at my customer's home and any modifications and problems he's come across. Hopefully, once planning permission for the Adaptamast has been obtained, my rigger-crews can get up the ladder again to finish the job off.

Whatever happens...it's been an interesting job and everyone (including the radio Ham) has learned a great deal about what you can and can't do in a restricted space. And if you've overcome similar problems successfully - please write in to me (C/O the *PW* Editorial offices) or consider sharing the information via the Readers' Letters pages...your experiences could then help someone overcome their difficulties!

PW

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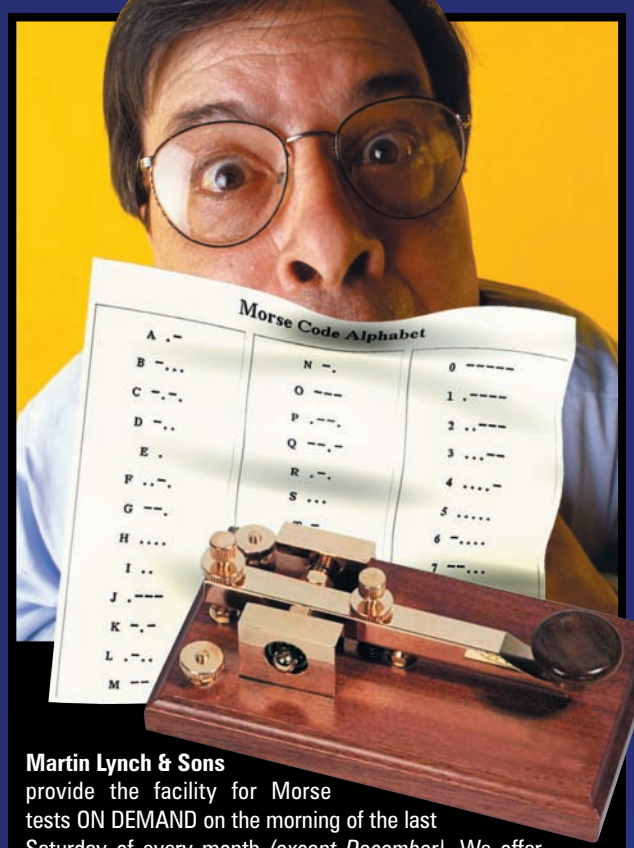

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Above and Beyond
A Simple Short Wave Receiver

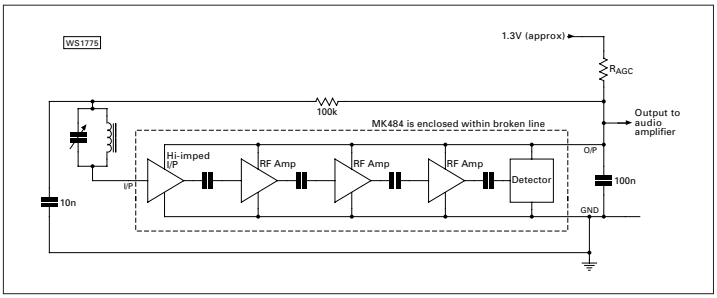
David Allen found that the MK484 single chip radio i.c. works well on short wave frequencies, above and beyond its specifications in his simple short wave receiver for 6-18MHz.

The ZN414 was a ten transistor t.r.f. radio i.c. and for many years formed the heart of many simple a.m. receivers and for many enthusiasts must have been their introduction to the noble art of radio building. Sadly the ZN414 is no longer with us but since its demise a replacement has now arrived in the shape of the MK484, which I gather is electrically similar to the ZN414.

The MK484 consists of a high input impedance buffer stage to maintain the *Q* of the input tuned circuit, several stages of r.f. gain, a detector stage and its own form of a.g.c. as shown in **Fig. 1**. In order to make the MK484 function in its basic form a few external components are required - all six of them! A single 1.5V cell and a high impedance (such as a crystal) earphone will also be required to complete the basic receiver as you can see in **Fig. 2**.

The MK484 is normally intended for use on the long and medium wavebands using a ferrite rod with suitable windings to collect the signal from 'out-of-the-air'. However, with careful selection of components for L1 and and by paying attention to layout it's possible to operate the MK484 at much higher frequencies than originally intended.

My simple short wave receiver covers from approximately 6 to 18MHz in one range which covers many of the more interesting short wave broadcast bands with surprisingly good results. I must confess to being surprised that the receiver could deal with these higher frequencies at all as the data sheet quotes the upper useable frequency limit for the MK484 at 3MHz.



● Fig. 1: The data sheet from Kanga Products, that comes with the MK-484 shows the circuit of a simple a.m. radio.

Front End

Let me start with the front-end of the set, for which I've added a better audio amplifier as shown in the complete circuit **Fig. 3**. Signals from a wire antenna are taken to SK1 and then to one end of a 10pF variable capacitor (C3), the operation of which I shall mention later. The other end of the capacitor is then taken to the signal side of the input tuned circuit (L1/C2) which in turn is taken to the input lead of the MK484 that's wired in its standard form as per the application notes from Kanga Products.

To obtain good selectivity, as with any t.r.f. circuit, a low-loss (high *Q*) input tuned circuit is necessary. With this in mind an air-spaced tuning capacitor is used for C2 and an iron dust toroid used as the former for L1 as very few turns are required for the winding and the magnetic field is kept where it belongs – in the coil.

The capacitor C3, is vital for correct operation of the receiver its function in life is to reduce the coupling between the antenna and the input to the tuned circuit as a strong signal can overwhelm the front end causing spurious signals. It also helps to keep the *Q* of the tuned circuit at a good level as the coupling between the antenna is made deliberately loose.

The loose coupling between the antenna and tuned circuit, makes very little difference as the MK484 has heaps of gain even at these high frequencies and don't be afraid to adjust C3 for a good balance between sensitivity and selectivity. The lay-out of the variable capacitors is shown in the photograph of **Fig. 4**.

My chosen toroid to resonate with C2, has an outside diameter of 12mm and an inside diameter of 8mm with a depth of 5mm and is painted red. I think its code number is T50-2. This toroid is close-wound with 13 turns of 0.45mm dia (26s.w.g.) enamelled copper wire leaving a little spare either end of the coil for subsequent connection to the rest of the circuit.

Don't forget when winding your toroidal coil that, every time the end of the wire goes through the centre hole this counts as one turn. The completed coil is tuned by a good quality 365p air-spaced variable capacitor (C2) which is necessary to maintain the overall *Q* of the input tuned circuit. A slow-motion reduction drive **is a must**, not a luxury, for ease of tuning.

Audio section

From the r.f. section, I now turn to the audio section that consists of a single low voltage audio amplifier the TDA820M. The recovered audio signal from the output lead of the MK484 is coupled to a volume control (R4) via C5, the wiper of R4 is then taken to the input pin of a TBA820M Audio amplifier chip.

According to the application notes – to be found on the Maplin companion CD-ROM for the TBA820M there are circuit options for utilising this i.c. One version returns one end of the output load to the negative power supply rail; the other version takes one end of the output load to the positive rail. And it was this second option I chose, as it saves a couple of components (one capacitor and one resistor).

With the TBA820M, and similar chips, a snubber circuit (or Zobel network if you like) is necessary to ensure its h.f. stability – this function is provided by R6 and C12. There's also a capacitor (C10) wired directly across pins 1 and 5 of the i.c., which offers audio frequency compensation. This capacitor gives a roll-off of audio frequency response at around 7kHz. Conversely a 220pF capacitor gives a roll-off at around 20kHz so, there's scope for experimentation with regards to its value.

The gain for the TBA820M is set by a resistor/capacitor network R5 (22Ω) and C8 (100µF) with these components there is more than enough audio gain. On my particular receiver the output from the TBA820M is taken, via flying leads, to a parallel wired 3.5mm stereo jack socket mounted on the front panel of the suggested enclosure which accepts a pair of personal stereo headphones.

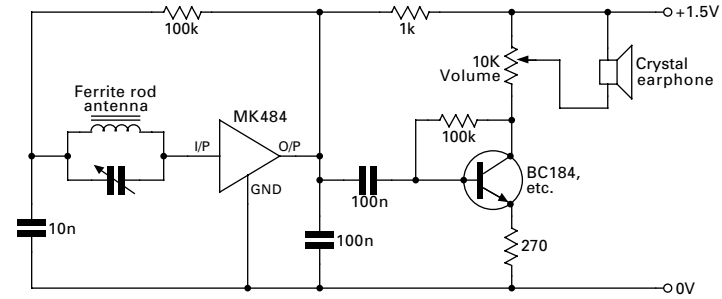


Fig. 2: Adding a stage of audio gain, improves the audibility.

My Prototype

Now I'll talk a little about the construction of my prototype, the insides of which are shown in the photograph **Fig. 5**. I used a slice of strip board approximately 100×50mm to mount all the small component for the r.f. and audio stages.

The coil (L1) is also mounted on the board using a nylon nut and bolt and insulating washer. Solder pins are used for the off-board components. My prototype board is shown in **Fig. 6**, I can recommend that you follow this basic layout, as it works!

Note: As with any high gain r.f. device certain rules must be followed to ensure stable and reliable operation. The steps that you should follow are:

- The output decoupling capacitor of the MK484 (C4) should be connected as close as possible between the output (o/p) and common (GND) leads of the i.c.. Furthermore, the value of the capacitor together with the value of the resistor (R2) should be calculated to give a bandwidth/selectivity (b.w.) of around 4kHz to ensure good separation between stations.

- The value of the capacitor (C2) is calculated using by the following small formula: $C2 = 1/(2\pi \times R \times b.w.)$ Applying the maths to our receiver, with R2 set at 1.2kΩ, the value of the capacitor C4 was found to be 33nF. But as one was not available at the time, I found one of 27nF, which I used instead. To be honest, I've noted no problems and it appears to work well in practice.

- All leads should be kept short particularly those in close proximity to the MK484: (especially the lead-out wires from the coil and the connections from C2 to the component board).

- The tuning assembly should be kept some distance away from the battery and leads going to the headphone socket. The earth/frame connection of C2 should be connected to the junction of R1 and C1 to minimize hand-capacity whilst tuning.

Power Supply

As befits a simple receiver, the power supply used is equally simple, consisting of three C cells mounted in a suitable holder. The connections from the holder go to the main component board via an on/off switch S1a/b to power the completed receiver. Excellent power supply decoupling is provided by C9, C13, C6 and R3 note that C9 should be mounted directly across pins 6 and 4 of the TBA820M audio i.c. for maximum effect.

For consistent operation of the MK484 its power supply voltage should remain within the limits of 1.1V (min.) to 1.8V (max.). To achieve this two forward biased silicon diode are connected across C4 giving just over 1.3V across the capacitor which seems to be about right.

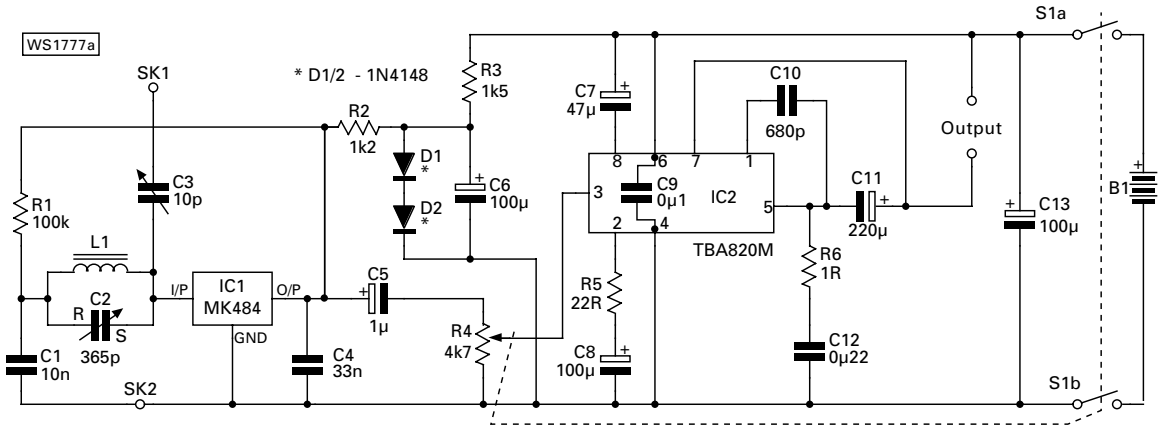


Fig. 3: The full circuit diagram of the circuit that David Allen found worked up to at least 18MHz.

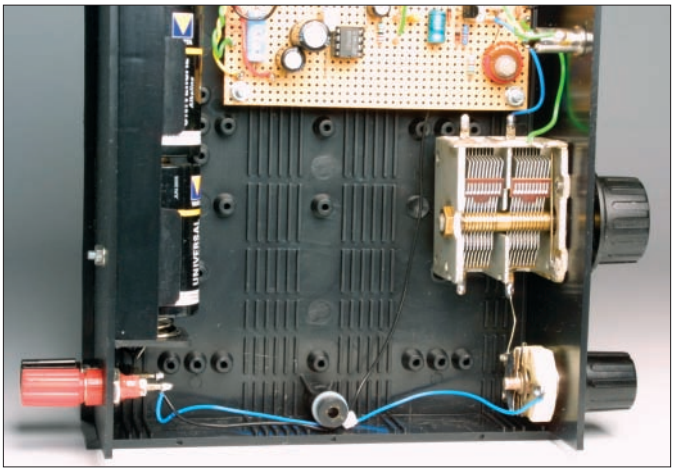


Fig. 4: The input circuit fits well onto the insulating panels as both variable capacitors are not at a d.c. 'earth' potential.

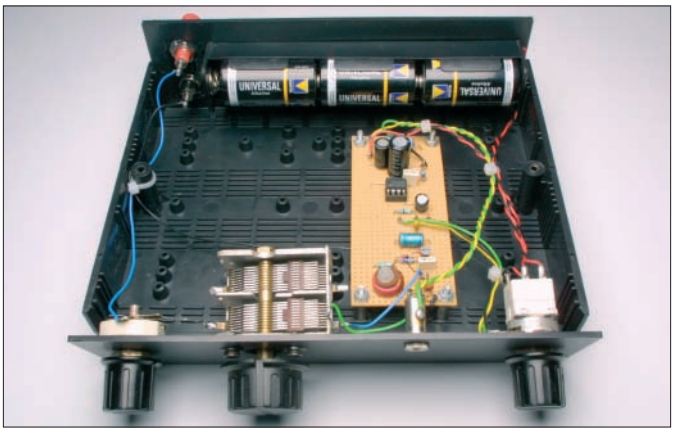


Fig. 5: This is the layout David adopted, and it works although it cannot be called miniature!

Resistor R4 provides current limiting for the diodes should they go short circuit, which is very unlikely.

Dry Joints

After completion of the receiver check for the usual component placement faults, dry joints and for solder bridges across the stripboard tracks. With a pair of headphones plugged in switch on the receiver and advance the volume control next with no external antenna connected rotate C3 and a few powerful stations should be audible - so far, so good.

My main long wire antenna is just 20m in length and when connected to SK1 many stations from around the globe were evident during the day with transmissions from Germany, Prague, UK, Radio Canada, a strange Arabic station, The Netherlands, France, Italy, Spain, and many more.

At night a whole plethora of signals start to arrive, so much in fact, that I have to connect my alternative antenna, all three metres of it, to prevent overloading. An earth connection has been provided for (SK2) should the need arise. I found it made little difference at my location here in sunny Cheltenham. *pw*

Shopping List

Resistors

Miniature Carbon film 1%

1Ω	1	R6
22Ω	1	R5
1k2Ω	1	R2
1k5Ω	1	R3
100kΩ	1	R1

Variable (with double pole on/off switch

4.7kΩ	1	R4

Capacitors

Miniature disc ceramic

680pF	1	C10
10nF	1	C1

Miniature polyester

33nF	1	C4
220nF	1	C12

Electrolytic miniature, 16V working

1µF	1	C5
47µF	1	C7
100µF	3	C6, 8, 13
220µF	1	C8

Variable (air spaced)

10pF	1	C3 (I used a Jackson trimmer here)
365pF	1	C2 (fitted with a slow-motion drive)

Semiconductors

1N4148	2	D1, 2 (or or any similar diode)
MK484	1	IC1 (Kanga Products)
TBA820M	1	IC2 (Maplin)

Miscellaneous

A slow motion drive is a must for C2, knobs and terminals to suit, a three cell holder for the C cells, interconnecting wire, one T50-2 toroidal core, a short (4-500mm) of 0.45mm enamelled copper wire, a piece of Veroboard (100×50mm) and headphones to suit. The box I used is from Maplin (Order No. BZ76), it's a two part plastic box comes in four parts - top, bottom, front and back panels, all in black plastic but any plastic box could be pressed into use.

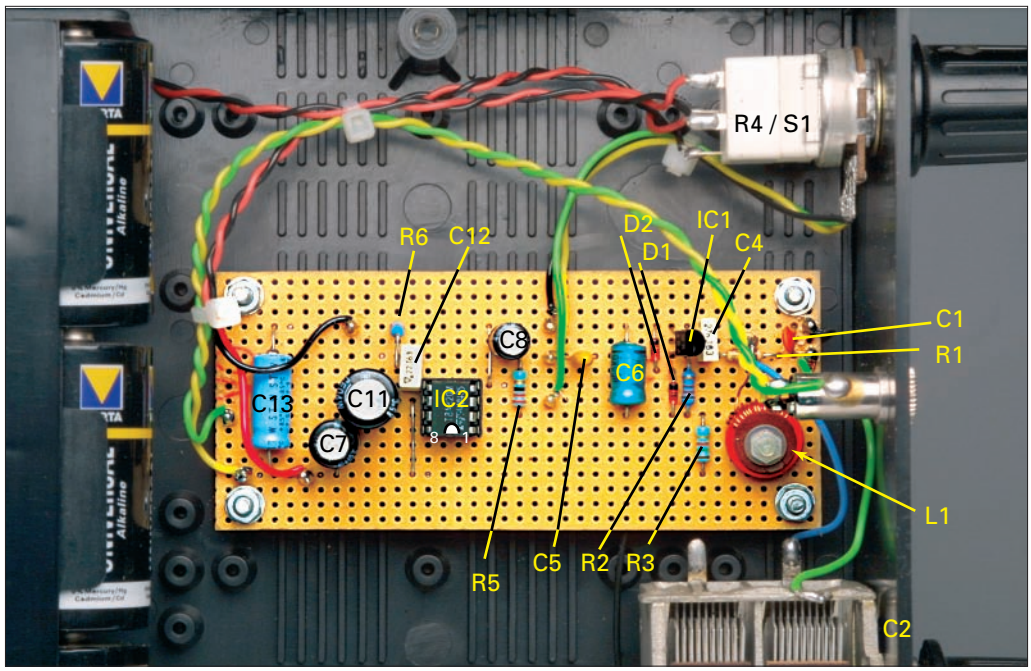


Fig 6: The 100×50mm piece of Veroboard with all the major components identified.

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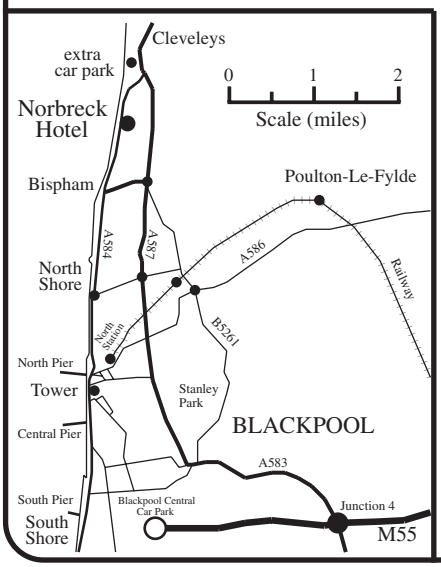

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Valve&Vintage

Phil Cadman G4JCP, resplendent in a brand new brown dustcoat for 2002 is looking after the 'shop' this month. He's taking another look at a famous pre Second World War valve and low voltage h.t. receiver projects.

Hello and welcome to my first column of 2002! I hope you all had a thoroughly good Christmas and an enjoyable start to the New Year. And the case of my thirsty (200 rather than 100mA filament current) PM2DX has finally been solved!

Helpful readers responded to my call for information and measured the filament current of their PM2DXs. While most valves measured around 100mA, two measured almost 200mA.

Philip Davies of Market Drayton, Shropshire, kindly sent me a copy of an early Mullard leaflet on the PM2DX. (Much obliged, Philip). On this leaflet, the filament current is given as 200mA. So, it seems the first PM2DXs **did indeed** have 200mA filaments. Philip suggests that there may have been complaints about how 'thirsty' the PM2DX was. (Quite understandable, given that similar valves in the PM2-series all have 100mA filaments).

Low Voltage Receiver

As I promised in my last V&V column, this time I'm featuring a single-valve regenerative receiver powered entirely by a 4.5V battery. The design, **Fig. 1**, is by the prolific author **F.G. Rayer** - long before he became **G3OGR** - was originally published in the July 1948 issue of *PW*.

The set uses a **triode-connected** 6K7 or 6K7GT with just 4.5V - rather than the usual 6.3V - on the heater. The same 4.5V is also used as the h.t. supply.

My friend **Richard Youard** from North London has recently built the Rayer receiver. He found that the set works reasonably well, but the coupling between the reaction winding and the grid winding has to be significantly tighter than usual. (Hardly surprising, given the valve has much reduced gain when operating under these conditions. Also, some 6K7s work better than others in this circuit, so it's useful to have several valves available).

The headphones **must be of the high-impedance type (2kΩ)**. A step-down transformer is required if you need to use modern, low-impedance headphones.

Generally, I've found modern types have an impedance of 32Ω per earpiece. Two such earpieces in parallel give an effective impedance of just 16Ω.

A small audio output transformer with a ratio of between 10:1 and 15:1 will adequately match this impedance to the 6K7. Alternatively, a low-power, 240V mains transformer with an 18 to 24V secondary will get you by.

To keep costs down, the original design used four brass terminals and a short piece of copper wire to act as both an on-off switch and a wave-change switch. Shorting terminals '2' and '3' switches the receiver on. To change from long wave to medium wave, short terminal '1' to terminals '2' and '3'.

Good Reception

The set should provide good reception of strong stations with nothing more than a few metres of wire connected to terminal '4'. Longer antennas need a low-value (say, 5 to 25pF) capacitor connecting in series, otherwise you might find it impossible to get any reaction. Connecting a reasonable r.f. earth to terminal '2' will also help.

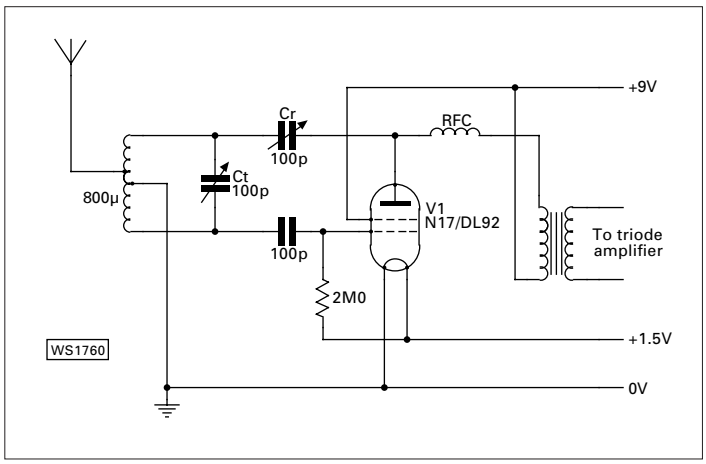

Fig. 2: Many low voltage receiver designs were published during the Second World War. The design here uses similar front-end circuitry as featured in an article by the well known author S. W. Amos (see text).

No coil details were given in the original article, the choice being left up to the constructor. However, the coil shown is a dual-range type, wound for both long wave and medium wave. The winding between terminals '1' and '4' is the medium wave winding, while the additional winding between terminals '1' and '2' allows the coil to cover the long wave band as well.

For single (medium wave) band use, the author suggested Wearite type 'P' coils; both the PA2 and PA7 being suitable. They're no longer made and I have only brief information on them. But I can tell you that the inductance of the PA2 was 170µH, and that of the PA7, 310µH. There's a copy of the information at: **http://www.valveandvintage.co.uk/pw/mar02.htm** Alternatively, send me (**not the *PW* offices**) an s.a.s.e and I'll let you have a printed copy in return.

It's possible to replace the 2kΩ resistor (in series with the headphones) with an r.f. choke. Anything from 1 to 10mH ought to be satisfactory and may

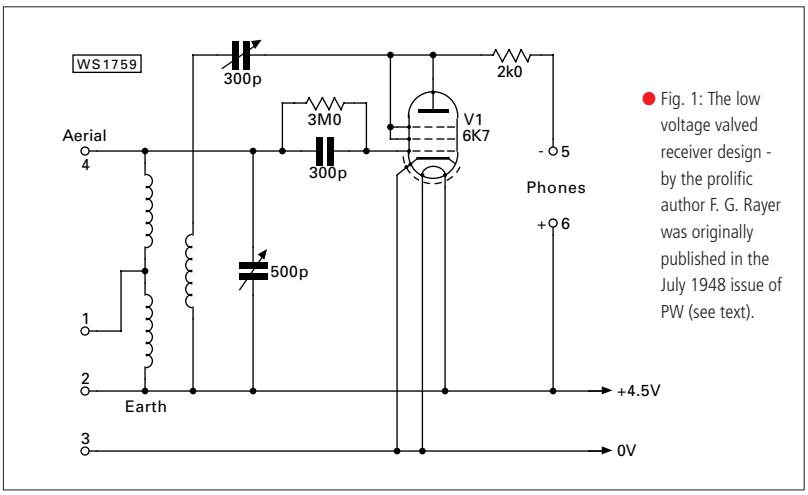

Fig. 1: The low voltage valved receiver design - by the prolific author F. G. Rayer was originally published in the July 1948 issue of PW (see text).

increase both sensitivity and volume.

Richard suggests the 300pF reaction capacitor would be better on the other (earthy) side of the reaction winding. The moving vanes of the reaction capacitor are then at earth potential, greatly eliminating hand capacity effects as it's adjusted.

More Than Novelties

Nowadays, low voltage valved sets such are generally regarded as little more than novelties. However, in the past they provided useful and portable receivers.

In the August 1941 issue of *The Wireless World*, author **S.W. Amos** describes a low-voltage portable set which uses two P220 triode valves. The filaments are powered by a 4.5V battery, while a 9V battery provides the h.t. supply.

Although the set uses the typical arrangement of regenerative detector followed by one stage of audio amplification, the tuned circuit is unusual in that it has a very high L/C ratio. In the January 1942 issue, the same author published a similar circuit, this time using two 1.4V pentode valves, type N14. The first stage of this receiver is essentially the same as the circuit shown in **Fig. 2**.

The input tuned circuit is unusual in two respects: the coil is centre-tapped, without a separate reaction winding. And its inductance - 800µH for the Medium Wave band - is around four times the usual value. Such a high inductance maximises the dynamic resistance (L/CR - gain, to you and me) of the input tuned circuit.

Naturally, if you increase the inductance you have to decrease the capacitance of a tuned circuit to keep the same resonant frequency. Hence the unusually low value of 100pF for Ct, the tuning capacitor. The reaction capacitor, Cr, is also lower in value than usual, again just 100pF.

By the way, the valve in Fig. 2 is an N17/DL92, the nearest modern equivalent to the N14. And yes, **it is a pentode** despite being drawn as a tetrode. Fig. 2 follows the original circuit in this respect.

Because of the high value of inductance, stray capacitance around the tuned circuit must be kept to an absolute minimum. Otherwise it will be impossible to tune the set to the high frequency end of the medium wave band.

To prevent the antenna coupling increasing stray capacitance by any appreciable amount, the antenna is tapped well down the coil. In fact, just 10% of the total turns on the coil are included in the antenna circuit.

The set has one problem: both sides of both variable capacitors are above earth, r.f.-wise. In consequence, hand capacity will affect both tuning and reaction. Ideally, both capacitors ought to be mounted behind an earthed metal screen, but remember all fixings will (in all probability) need insulating from earth.

Audio Amplification

In the original articles, the regenerative detector was followed by one stage of audio amplification, essential even for headphone use. You could use a transistor amplifier instead of another valve, although purists may be offended at this suggestion. Still, an OC71 followed by an OC72 might be deemed acceptable. Anyone care to try?

Actually, obtaining loudspeaker operation from valves with an h.t. of only 9V or so is a major challenge. And to help, a purpose-built, 12V h.t. audio driver valve - the 12K5 - was made for car radios.

The 12K5 is a space-charge valve which can provide 35mW output from a 12V supply. A pair in push-pull ought to give sufficient volume (just).

Current drain (at 12V) is rather excessive: a 12K5 needs 400mA for its heater, its space charge grid draws 75mA and its anode draws 40mA. A pair would sink just over 1A (Frugal they aren't!)

Growing Interest

Interest in these low h.t. voltage sets does seem to be growing. I've been receiving E-mails from **Lutz Gemerski DL4OBG**, who has recently built a two-valve regenerative receiver and has now completed the design and initial testing of a low voltage superhet. Lutz is a great believer in loop (frame) antennas, **Fig. 3**, for his receivers and they're really **impressive!**

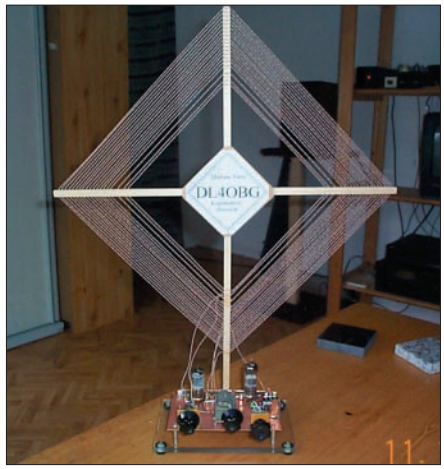

Fig 3: The impressive frame antenna used by Lutz DL4OBG in conjunction with his low voltage valved receiver (see text).

The set uses an ECC88 (or similar) double triode as regenerative detector and audio amplifier. The audio output valve is an EF183 frame-grid pentode. Full details of the receiver are on my web site; same URL as above. And again, an s.a.s.e. sent direct to me will yield a printed copy.

The close-up photograph of the receiver shows Lutz's method of construction. It's very similar to that promoted by our Editor **Rob G3XFD** (amongst others) in his Radio Basics column.

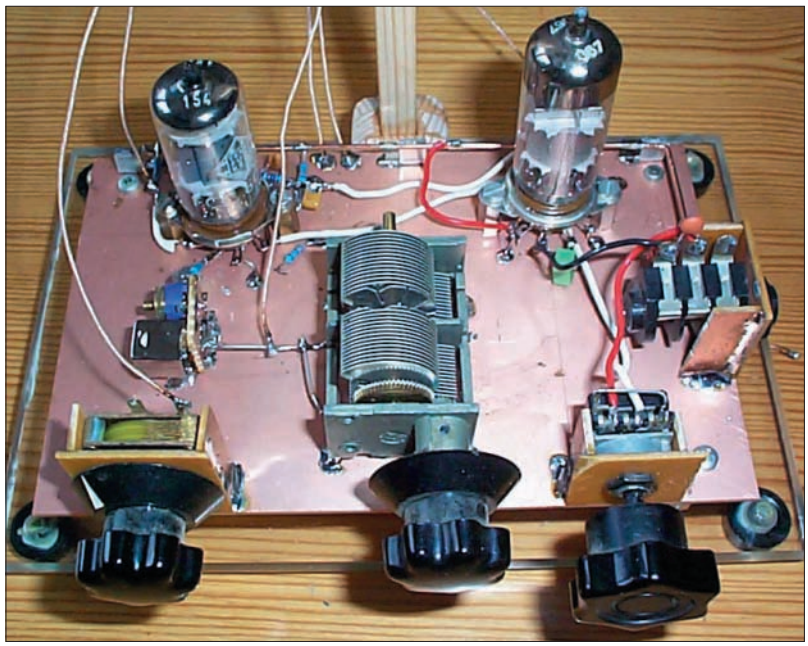

Fig. 4: Close up photograph showing the construction techniques used in the DL4OBG low voltage receivers (see text for comments).

Recently (page 49 January issue *PW*), G3XFD reviewed a kit - the **Copper Island Construction Outfit**, which provides (almost) all the necessary bits and pieces for this type of construction and it's safe for our low voltage h.t. projects. When using valves, the valve holders are simply mounted on the p.c.b. laminate using screws and hex pillars.

The only thing to be aware of is the temperature the valve envelope reaches. They can get quite warm even with so little anode dissipation, particularly if the heater is being run at normal voltage.

Ah well, I see I've reached the end of my V&V 'island' trip. Please send your comments and letters to me either via the *PW* offices, via E-mail to **phil@valveandvintage.co.uk** or direct to: **21 Scotts Green Close, Scotts Green, Dudley, West Midlands DY1 2DX.** *PW*

Resonance & Reactance

Although it's R&R. it's not rest and recuperation - at least not just yet - instead Geoffrey Billington G3EAE is offering us an introduction to tuned circuits principles. It's guaranteed maths-free (well, very nearly).

When alternating voltage is applied to a circuit, it will take a short time, typically a few cycles, for all currents and voltages throughout the circuit to settle into a steady repetitive rhythm with the same frequency as the source. This article will be limited to dealing with circuits of this nature.

It's a fortunate and convenient fact that if the applied voltage is sinusoidal, (varying smoothly with time) like the waveforms shown in **Figs. 1, 2** and **3**, and if the circuit contains only combinations of resistors, inductors and capacitors, **then all the currents and voltages throughout the circuit will rapidly settle into sinusoidal waveforms also**.

The purpose of Fig. 1 is simply to clarify future references to 'voltage' and 'current'.

Current Variations

The curves shown in Fig. 1, show voltage and current variations for a resistor. The current peaks at 5A and the volts at 10V. Not only at the peaks, but at every instant the voltage reading is double the current reading, which means that the resistor obeys Ohm's Law and its resistance is 10/5 = 2Ω.

The voltage and current are tied together so to speak, they peak together and pass through zero together. The voltage across a resistor is always in phase (in step) with the current through it.

Reactance

Both inductors and capacitors exhibit 'impedance', but which is called reactance. Inductors and capacitors have a restricting effect on the flow of an alternating current, but unlike resistors, their impedances are critically dependent upon the frequency, although in opposite ways.

Even though in Fig. 2 and Fig. 3, the ratios of peak voltage to peak current are equal to two, it would be entirely wrong to call these ratios 'resistance'. This would imply the voltage and current are in a constant ratio at every instant, which they are not.

It's possible to refer to the ratio of peak voltage to peak current as an impedance. However, a new name is required to indicate that we are dealing with a special type of impedance for which voltage and current are in quadrature. The term we use 'reactance' - or more correctly 'the reactance at the operating frequency' - is usually denoted by the symbol 'X' and in Fig. 2 and Fig. 3, the reactance, X, is said to be 2Ω in each case.

At very low frequencies, an inductor behaves like a length of conducting wire, but its impedance increases as the frequency is increased. Conversely, the impedance of a capacitor is extremely high at very low frequencies, behaving almost like an open circuit, but it falls virtually to zero at sufficiently high frequencies.

When the frequency is kept constant, the behaviour of an inductor or capacitor may seem superficially similar to that of a resistor. The peak voltage remains in a constant ratio to the peak current, no matter what changes are made to the circuit.

Separated In Time

However, when considering reactance, voltage and current do not peak together, but are separated in time by one quarter of a cycle (termed a 90° phase shift). For the inductor, the voltage peaks one quarter of a cycle before the current, i.e. **V leads I**, while for the capacitor, **V lags I**.

In spite of the fact that resistance and reactance are both measured in ohms, **they are different** and **may never** be simply added together when both occur in the same circuit. In fact, numerical values of reactance are often prefixed by the symbol 'j' to ensure that they are not confused with resistances.

In Fig. 2, the inductive reactance shown would usually be written as j2Ω. However, in Fig. 3, the capacitive reactance shown would be written as -j2Ω. The 'label' 'j' (the symbol has a lot more applications than can be described here) is used to indicate that the voltage leads the current by one quarter cycle whilst '-j' shows that it lags by the same amount.

No Power Dissipated

There is one more important fact which can he shown to follow

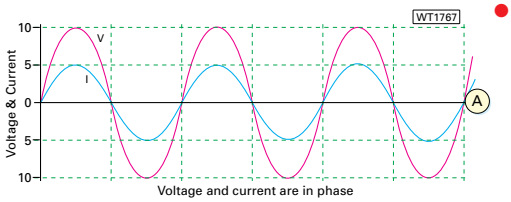

Fig. 1: Plotting current and voltage waveform for a 10V peak sinusoidal signal applied to a purely resistive load of 2Ω.

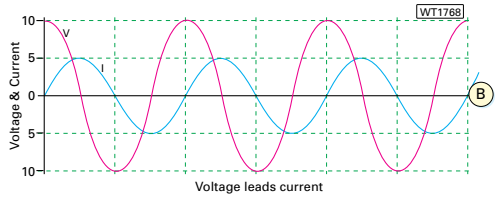

Fig. 2: The current and voltage waveforms for a 10V peak sinusoidal signal applied to a purely inductive load of 2Ω at the operating frequency. The voltage waveform is said to lead the current waveform by 90°. (See text for more detail).

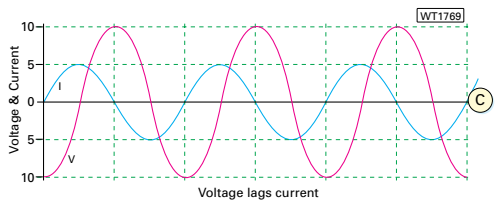

Fig. 3: The current and voltage waveforms for a 10V peak sinusoidal signal applied to a purely capacitive load of 2Ω at the operating frequency. The voltage waveform is said to lag the current waveform by 90°.(See text for more detail).

when volts and current are in quadrature: **no power is dissipated**. Inductors and capacitors (ideally) do not waste energy or get hot in operation.

In actual fact, inductors, which usually consist of a length of coiled wire, have a small, but not negligible resistance as well as reactance, but this will be ignored for the present. Our inductors will remain perfect or 'ideal' until further notice!

Now to look at circuits, such as the box shown in **Fig. 4**, which can represent a resistor, inductor or capacitor, or any combination of them. The box forms part of a circuit in which a sinusoidal alternating current flows.

The remainder of the circuit is unimportant and isn't shown. The meters for measurements of voltage and current are assumed to be sophisticated instruments, able to sample the voltage or current at any point in the cycle without loading.

Real Circuit

Now to a 'real' circuit as shown in **Fig. 5**, a series combination of a capacitor 'C', an inductor 'L' and a resistor 'R' connected to a variable frequency source. Forget about the resistor for the present and concentrate on the voltmeters V_C, V_I and V_O.

The surprising result is that V_O is always equal to the **difference** between V_I and V_C, bearing out what was stated earlier: V_I and V_C always act in opposite directions when the same current flows through both L and C.

Across the inductor, V_I leads the current by one quarter cycle and across the capacitor, V_C lags the current by one quarter cycle. This gives a full half cycle phase difference between the two voltage components. At every instant, these two voltages act in opposite directions (they subtract), though their resultant voltage combination will depend on the frequency of operation.

Series Resonance

Series resonance is a special state as it occurs at the frequency at which the reactance of the capacitor (X_C) and the reactance of the inductor (X_I) are equal. Imagine what happens when the frequency is set to a very low value and then gradually increases. At the low frequency X_C will be high and X_I will be low. At a sufficiently high frequency, this state of affairs will be reversed.

At some intermediate frequency though, the two reactances will be equal. **The frequency at which this occurs is termed the 'resonant' frequency of the combination**. As the same current flows through both inductor and capacitor, the voltages V_I and V_C will be equal as well as opposite (phase), which means that **at every instant, V_O, the voltage across the combination, will be zero**! When this happens, the combined effect of inductor and capacitor is to act like a short length of connecting wire, the only thing which limits the current flowing under this condition is the resistor.

In the real world, every inductor has a resistive component in addition to its reactance, **but its effect is just the same** as if it was a separate series resistance as shown in Fig. 3. If this were absent, the supply would effectively be short circuited.

When the frequency is varied, the current drawn from the supply will peak at the resonant frequency. At this frequency, the voltage generator would only 'see' the resistance, which would be the only thing limiting the current, the inductor and capacitor having neutralised one another (tuned each other out).

It's worth mentioning that at resonance, the voltages across the inductor and capacitor, **although equal and opposite** may be much larger than the applied supply voltage. (And both rise to a maximum at the resonant frequency).

At frequencies other than at resonance, the circuit behaves as a 'complex impedance' with both a resistive and a reactive component. At very low frequencies, the reactance of the capacitor would predominate, at very high frequencies, the reactance of the inductor predominates.

The arrangement of Fig. 5 is known as a series tuned circuit, or sometimes, an 'acceptor circuit', because it readily passes or accepts currents at the resonant frequency. Now let's look at another case!

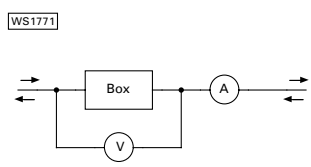

Fig. 4: The basic measurements are made of the voltage across and the current through a circuit represented by the box. (See text for more detail).

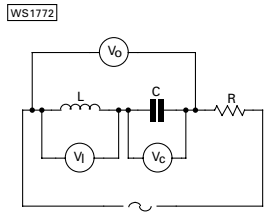

Fig. 5: Considering the separate constituent parts of a series tuned circuit. The resistor R is the calculated sum of all the resistive losses of the complete circuit. (See text for more detail).

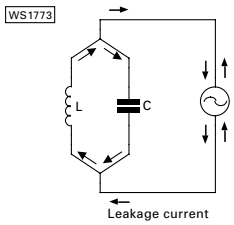

Fig. 6: In a parallel tuned circuit, using ideal components the leakage current could drop to zero, while huge currents could flow back and forth between the capacitor and inductor. (See text for more detail).

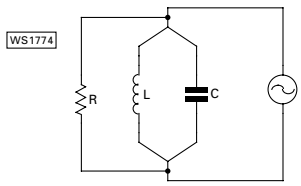

Fig. 7: With non-ideal components in the parallel tuned circuit, the resistive losses may be represented as a high value resistor in parallel with the capacitor and inductor. (See text for more detail).

Parallel Resonance

The other case of resonance is that of a parallel tuned circuit, as shown in **Fig. 6**. This is probably the more familiar circuit. In this case, the alternating voltage is applied equally to both L and C. In this circuit, the voltage (level and phase) must be the same across both L and C. But the **currents** through L and C will flow in opposite directions in order to maintain the correct cycle phase differences with the voltage.

With parallel resonant circuits, the current supplied by the generator is the **difference** between the currents through L and C. Again at the resonant frequency (when $X_I = X_C$) the currents will be equal - but in opposition. So, they'll be effectively sourcing each other, requiring no current from the generator once the system has settled down.

At resonance, the equal and opposite currents in the two arms simply form a closed circulating system, with the current surging clockwise and anticlockwise around the LC combination. An ideal parallel tuned circuit at resonance, would draw no current from the supply, its impedance would be therefore be infinite, behaving as an 'open circuit'.

Fortunately, the impedance of a real-life parallel tuned circuit at the resonant frequency is not too difficult to predict. I explained earlier that the impedance of a real inductor may be represented by **a pure inductance in series with a small resistance.** It may equally well be represented as a **pure inductance in parallel with a high resistance**.

As an extreme example, let's now take the case of the perfect inductor. We could say either that the series resistive component is zero or alternatively that the parallel resistive component is infinite. Things are a bit more complicated with a real inductor, but even so, any real parallel tuned circuit can be represented as shown in **Fig. 7**, i.e. as an ideal tuned circuit with a high resistance connected in parallel.

At the resonant frequency, this ideal tuned circuit would behave as an open circuit so only the high parallel resistance would be 'seen' by the generator. The behaviour of parallel tuned circuits is often illustrated by a set of resonance curves as shown in **Fig. 8**. The curves show how the complex impedance 'Z' - typically measured in kilohms - varies with frequency.

Continued on page 46

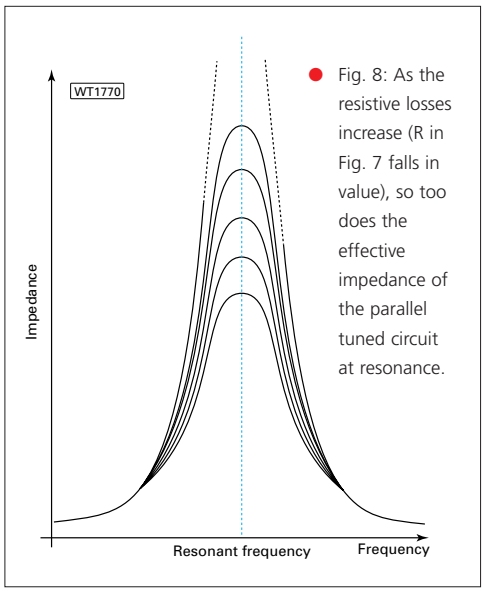

Fig. 8: As the resistive losses increase (R in Fig. 7 falls in value), so too does the effective impedance of the parallel tuned circuit at resonance.

Become Infinite

For a perfect resistance-free parallel tuned circuit, the impedance at resonance would become infinite and the resonance curve would rise to an infinitely high spike. The result of increasing the residual series resistance is the same as **decreasing** the equivalent parallel resistance, causing the spike to flatten into a lower and lower 'bump'.

Although resonance curves are useful, they do not show the composition of the impedance. This increases (at low frequencies) from an almost pure, low inductive reactance through to a pure high resistance at resonance, then decreases to an almost pure, low, capacitive reactance at high frequencies. Apart from at the resonance condition, the impedance will always be 'complex', i.e. it will contain both resistive and reactive components.

The numerical value (in ohms) of a complex impedance is once again equal to the ratio of peak volts to peak current, but a knowledge of this figure is of limited value unless the phase lag or lead (any value between one quarter cycle and zero) is also known. (This state is beyond the scope of this article to pursue this topic).

Finally, it's interesting to imagine what would happen if we could really connect up a perfect tuned circuit to a supply at the resonant frequency. The circuit would eventually draw no current from the supply, which could then be disconnected. The circulating currents would continue oscillating indefinitely in the isolated circuit!

With a real circuit however, the oscillations will die out rapidly due to losses. A similar train of damped (decaying) oscillations at the resonant frequency could be obtained without using any source of alternating voltage, by simply discharging a charged capacitor through an inductor. It's always a good thing to have a working understanding of **why** things happen. So, the following non-mathematical explanations may be of some use.

Capacitive Quadrature

Once explained, it should be fairly easy to see why any capacitor produces a capacitive quadrature shift when a capacitor is being repeatedly charged and discharged by an alternating current. All you need to do is think about an instant when the capacitor has just finished charging and is about to start discharging. **At this instant, the capacitor's charge is at maximum and therefore so is the voltage across it**.

However, the current, at this instant of charge maximum, is on the point of changing direction - **it's flowing neither one way or the other**, so it is momentarily zero. This shows that the voltage across the capacitor is at maximum when the current is passing through zero, i.e. they are in quadrature.

Inductive Quadrature

Inductive Quadrature on the other hand, is a little more awkward to explain. With this phenomena an inductor only produces a voltage when the current through it is changing, the greater the rate of change, the higher the voltage it produces. If you look at any of the current graphs you can see that the current maximum rate of change occurs where the current graph crosses the horizontal axis, i.e. as the current passes through zero. **It's at this point that the voltage peaks**.

Once again, current and voltage are in quadrature. (I warned you that this explanation was not as straightforward). Unfortunately, these two explanations of quadrature do not explain why inductors and capacitors produce **opposite** quarter cycle shifts, although it's possible to give fairly simple working explanations.

Capacitors & Generator

Suppose that a capacitor was connected directly to the output of a signal generator whose peak voltage remained constant, but whose frequency could be varied. **Whatever the frequency**, alternate current surges would charge up the capacitor to the same peak voltage and this would always require the same quantity of electric charge to circulate.

At a higher frequency, less time is available for the circulation of the charge so, the current must be larger. The reactance of a capacitor decreases when the frequency is increased.

Now let's consider inductors, but with them connected to a signal generator with a constant output current. At low frequencies current has a long time to build up. And this slow buildup equates to a low voltage (and low impedance).

As the frequency is increased, the peak current is still the same as before, but it has to change in a shorter time, thereby producing a higher voltage. The reactance must have therefore increased. Admittedly, the above explanations could benefit with a more detailed explanation, but they are basically valid!

Actual Units

One thing which has been ignored so far, is the contribution to reactance by the actual units of the inductance or capacitance as measured in Henrys (for inductors) or Farads (for capacitors). Once again, inductors and capacitors behave in opposite ways, the larger the inductance in Henrys the larger the reactance at any given frequency, whilst for capacitors, the larger the capacitance in Farads, the smaller the reactance.

Calculating Reactances

If you wish to find the approximate reactance of a known inductance or capacitance at some particular frequency, you will find the charts given in the RSGB and ARRL handbooks and elsewhere, which will enable you to do this. If you want a more accurate value, the textbooks give the formulas, but unfortunately, these are awkward to use because of the inconvenient size of the units involved.

If you already know the reactance of 'X1' of any given capacitance C1 or inductance L1 at any known frequency (F), it is easy to find the reactance (X) of any other capacitance (C) or inductance (L) at any other frequency (F) using the formulas given below.

The great beauty of these formulas is that they will work with **any** units. For example, capacitance could be in picofarads or microfarads, inductance could be in millihenrys or microhenrys, frequency could be in MHz or kHz...or whatever you like, so long as you are consistent.

For capacitances

$$X = X_1 \left(\frac{C_1}{C}\right)\left(\frac{F_1}{F}\right)$$

For inductances

$$X = X_1 \left(\frac{L}{L_1}\right)\left(\frac{F}{F_1}\right)$$

A useful set of figures for use with picofarad capacitors is the fact that a capacitance of 100pF has a reactance of 160Ω at a frequency of 10MHz. As an example, let's suppose you want to find the reactance of a 50µF capacitor at a frequency of 5MHz.

$$X = 160\left(\frac{100}{50}\right)\left(\frac{10}{5}\right) = 640\Omega$$

You can work out your own figures for use with the inductance formula, given that the reactance of 1µH at a frequency of 1MHz is 6.28Ω.

Note: The figures quoted above, of 160Ω and 6.28Ω, are close approximations rather than the more accurate versions that may be needed for some problems. For the capacitor a more accurate figure is 1000÷2π or 159.164Ω. Similarly, the figure 6.28Ω for inductive impedance is an approximation for 2π (6.2828Ω). Challenging perhaps...but useful knowledge!

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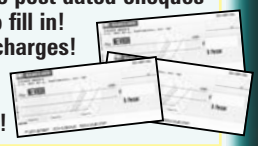

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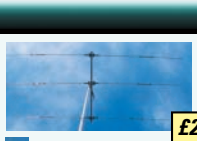

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Carrying On The Practical Way

This month, after providing the usual appropriate quotation, the Rev. George Dobbs G3RJV describes the 'Simply Two Bands' approach for equally simple receivers on 3.5 and 7MHz.

"A complex system that works is invariably found to have evolved from a simple system that works".
John Gaule

Welcome to Carrying On The Practical Way (COTPW)...where we enjoy the simple approach. However, most simple Amateur Radio projects, be they receivers, transmitters or transceivers, usually only cover a single Amateur band. Enabling a project to work over more than one band is often dogged by complication and compromise.

That doyen of Amateur Radio construction, **George Burt GM3OXX**, eschews multi-band transceivers, or at least the usual types of multi-band transceiver. Instead, he tends to build a high frequency single range transceiver and have plug-in transverters for each band. Each transverter can then be optimised as if it were a single-band transceiver.

Plug In modules

Several commercial multi-band transceiver kits have used plug-in modules; each module containing the band determining components for the circuit. I also know of one commercially built transceiver, the Ten Tec Scout, which also used this idea.

I recall from my earlier days in the hobby, a number of older valve transmitters which used the harmonic relationship of the Amateur bands to multiply the higher bands from the lower bands. This was often an 'iffy' approach, which used many of band-pass filters and did not always eliminate the lower frequencies.

The COTPW column, because of its size and nature, deals with simple circuit ideas...the type of project that can be tried out quickly, without a lot of expense, by the average Radio Amateur on the kitchen table. Because of this I've rarely included circuits that can function on more than one band.

Despite this, such circuits do appear occasionally. Faithful readers, with a good memory, may just recall that exactly two years ago in the March 2000 of this column, I did describe a dual-band variable crystal oscillator circuit using the NE602.

Delightfully Simple

Recently **Rudi Burse DK2RS**, sent me a delightfully simple little circuit idea for a rudimentary two-band direct conversion receiver. It was a modification to an early simple direct conversion design called the 'Lauser'. In this circuit Rudi had made use of the harmonic mixer idea to achieve a very simple approach to a two-band receiver

The diagram, **Fig. 1**, shows the two-band mixer with an audio pre-amplifier. This version is set up the 3.5 and 7MHz bands.

In the circuit the antenna input goes to a very simple input filter,. The tuned coil L1, (40 turns 28 or 30s.w.g. enamelled wired on a T50-2 core, tapped four turns from the ground end) is an inductor in the order of 9µH, which with a 350pF polyvaricon capacitor can tune both bands. The inductive tap, near the ground end of L1, provides a low impedance input and L2 (five turns 28 or 30s.w.g. enamelled wire wound over the centre of L1) provides impedance transformation to the input to the mixer.

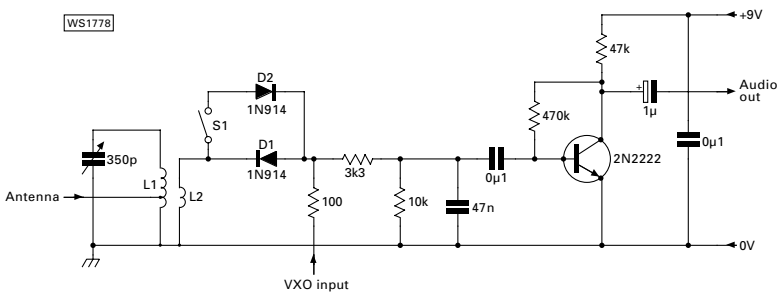


Fig. 1: Rudi Burse DK2RS, sent G3RJV a delightfully simple little circuit idea for a rudimentary two-band direct conversion receiver. Using the harmonic mixer idea to achieve a very simple approach to a two band receiver the diagram shows the two-band mixer with an audio pre-amplifier for the 3.5 and 7MHz bands (see text).

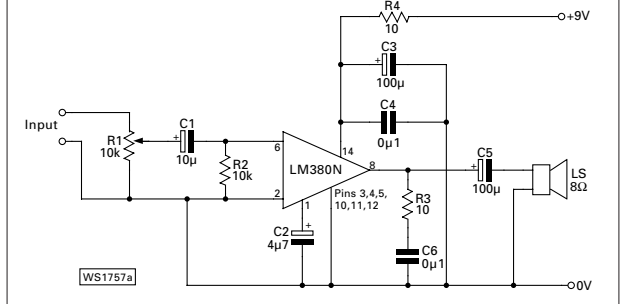
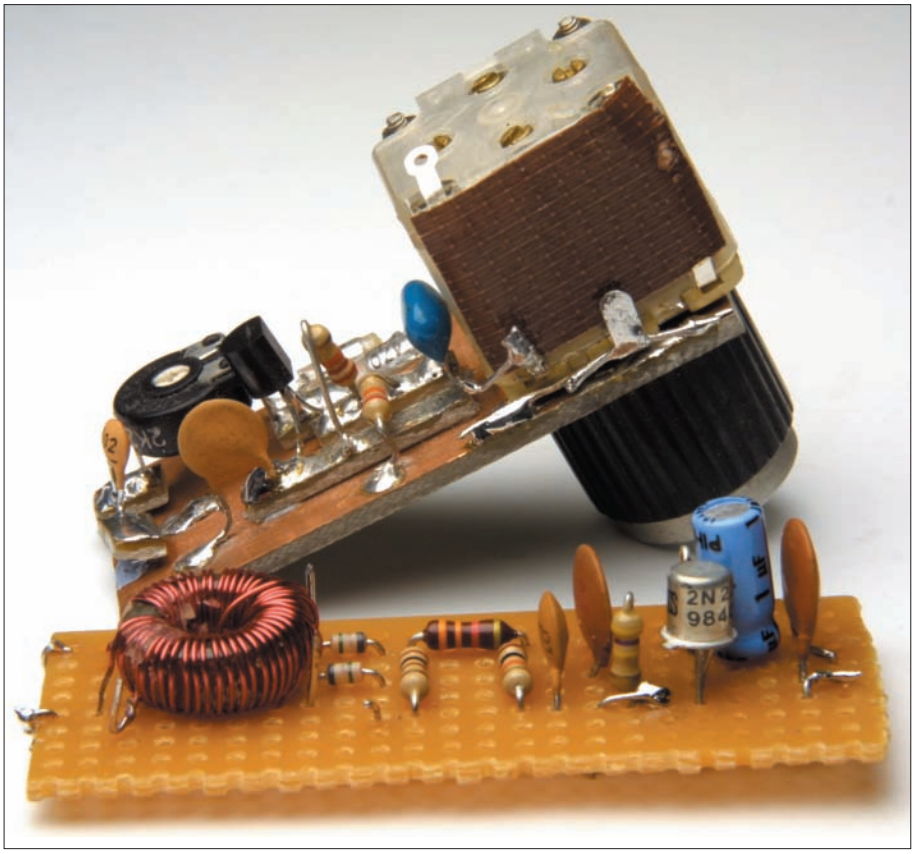


Fig. 2: George G3RJV says he was "lazy and used the LM380 amplifier I described in the February issue of *PW*, which is adequate for headphone reception"! (The circuit is shown again here for convenience).



● This month's project...'Simply Two Bands' using an idea from DK2RS.

With the switch, S1, open, D1 (1N914 or similar suitable) acts as a single-ended diode mixer. (A less ambitious constructor could stop here and make a single band direct conversion receiver).

When S1 is closed D2 joins the circuit in anti-parallel with D1. This forms a simple diode harmonic mixer...an idea introduced into direct conversion receiver design in the late 1970s by **Victor Polyakoff RA3AAE**.

Victor ran the local oscillator of simple direct conversion transceivers at half the signal frequency and used anti-parallel diode mixers to reduce the radiation in the receive mode. It's a simple and elegant idea.

Readers will already know the effect of the two-diode arrangement from the full-wave rectifier circuit used in power supplies. This is where only positive peaks of the signal pass through the circuit giving a series of double peaks on the output.

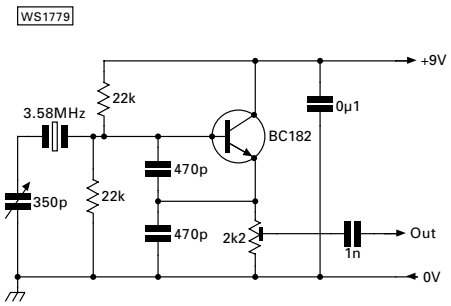
The losses through the circuit are quite high but the attenuation (up to 50dB down) of the fundamental is relatively high. High speed silicon diodes work well in the circuit, although at higher frequencies the use of hot carrier diodes provide an advantage.

Audio Stages

In the circuit in Fig. 1, the diode mixer is followed by a single stage audio pre-amplifier. This simple direct conversion receiver develops all of its amplification in the audio stages... **what's offered here is a basic receiver**.

Naturally, readers can add their own refinements. Some may want to add audio selectivity or perhaps a better band-pass filter on the input path.

Depending upon what addition audio amplification is to be added, the gain of the audio pre-amplifier can be changed by adjusting the 470kΩ biasing resistor. However, I was lazy and used the LM380 amplifier I described in the last issue of *PW*, which is adequate for headphone reception! (The circuit is shown again in **Fig. 2**).



● Fig. 3: Diagram showing the circuit of a ceramic resonator VXO (variable crystal oscillator) used in G3RJV's prototype receiver. (see text).

Ceramic Resonator

The diagram, **Fig. 3**, shows the circuit of a ceramic resonator VXO (variable crystal oscillator) I used in my prototype receiver. This is version of a circuit I've used before in this column.

Small, inexpensive, ceramic resonators, available in a range of frequencies...are very useful. The resonator available on 3.58MHz is easily variable over most of the band.

The diagram in Fig. 3. shows how I used another polyvaricon variable capacitor to shift the frequency. This arrangement managed to cover the whole c.w. portion of the band and extend into the s.s.b. portion.

Note: The amount of shift **depends upon individual resonators**. You should also be aware that there's a limit to the amount of shift that can be achieved before instability occurs.

The circuit shown in Fig. 3. is a version of the Colpitts Oscillator with two 470pF capacitors providing the feedback path. Most common bipolar transistors with a fair amount of gain at higher frequencies would do the job and in an earlier version of this circuit I used a 2N2222 transistor.

Radio frequency (r.f.) output is taken from the emitter resistor. I used a small pre-set resistor and a relatively high coupling capacitor (1000pF) to allow for experimentation with the oscillator injection to the mixer. Some people find high frequency (h.f.) oscillators tricky...but this little circuit seems to work every time.

Setting Up

Setting up the little receiver is simple, and a signal source for both bands is a great help. It's easiest to begin the process on 3.5MHz with the switch, S1 open.

With the values given, the input tuned circuit should resonate on the 3.5MHz band with the variable capacitor about three-quarters 'meshed'. Getting the VXO on to the band is also simple.

Those constructors with a frequency counter can adjust the VXO with great ease. However, those without will have to find the signal on a receiver that tunes the required frequency. (It should be possible to hear the VXO on a receiver with a short piece of wire connected to the antenna and placed close to the VXO board).

For the 7MHz band close S1 and set the input tuning capacitor at almost 'open mesh'. There should then be a distinct peak in the strength of 7MHz band signals when the input tuning is correct.

I was surprised at how well this little receiver worked. With the circuits laying loose on the bench, I was able to hear a good variety of Amateur band signals on both 3.5 and 7MHz. So, try it yourself...you'll have great fun! *PW*

VHF DXER

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REPORTS & INFORMATION BY THE LAST SATURDAY OF EACH MONTH.

Propagation during the latter months of 2001 was tremendous with significant openings occurring on all the v.h.f., u.h.f. and microwave bands. The 50MHz band has been open virtually every day since October 24 with world-wide contacts being made via F2-layer propagation.

During October and much of November the openings were to the Far East with c.w. and s.s.b. contacts being made with stations in Australia, China, Hong Kong, India and Japan. By the middle weeks of November the propagation had shifted from the Far East to North America with numerous openings into central America, the Caribbean, Mexico, USA and Canada. This continued through to early January by which time there were indications that propagation was again slowly moving back to the Far East area.

Widespread auroral back-scatter openings were reported on October 2-3, October 21-22 and November 6. Many DX contacts were made on the 50, 70, 144 and 430MHz bands. Most activity was on the 144MHz band with c.w. contacts being made from central UK with stations in Denmark, Finland, Norway, Sweden, Belarus, Latvia, Lithuania, Poland, Hungary, Czech Republic, Slovakia, Switzerland and Slovenia.

The annual Leonids meteor shower on November 18 was spectacular with contacts being made all over Europe on the 50 and 144MHz bands. Some long distance s.s.b. contacts were made on the 144MHz band including the stations of YO2GJH (2243km) and OH5LK (2071km) by G7RAU and the stations of RX1AS (2121km) and OH8NXE (2112km) by G0XDI.

For the majority of v.h.f. operators though the most significant events were the tropospheric openings which occurred in the period November 2-4 and December 8-11. These were quite extensive and enabled contacts to be made from the UK with stations in excess of 1000km away. Propagation was excellent with DX contacts being made on all bands from 144MHz right up to the 10GHz band.

Now it's time to look at your reports in more detail.

THIS MONTH DAVID BUTLER G4ASR HAS REPORTS OF DX CONTACTS ON ALL BANDS FROM 50MHZ THROUGH TO 10GHZ.

THE 50MHz BAND

Jim Rabbitts GM8LFB (IO88 Wick) uses a Yaesu FT-736R transceiver running only 10W output into a 3-element Trident Yagi. Despite the low power he has made some very good long distance contacts on the 50MHz band. He reports making s.s.b. QSOs during November with the stations of OD5UT (Lebanon), UN6P (Kazakhstan), 4X6ON (Israel) and 5B4AZ (Cyprus). Stations in the Far East included VU2ZAP (India) and VK8TM (Australia), from Africa the station of 9G5AN (Ghana) and from North America the stations of N1RZ (USA) and VE1YX (Canada).

Other DX contacts made during the month included JX7DFA (Jan Mayen), LY2SA (Lithuania), OY9JD (Faroe Is.), OH3BHL (Finland), OH0JFP (Aland Is.) and SM5CZK (Sweden). Jim also worked a number of Scandinavian stations in auroral openings on November 6 and 24 and stations in Finland and Sweden via Auroral-Es on November 19.

Propagation on the 50MHz band has been so good that it enticed well-known microwave operator **Peter Day G3PHO** onto the band!

Peter who edits the RSGB *Microwave Newsletter* mentions buying an Icom IC-706 MkII transceiver primarily for a talk-back rig whilst out portable on the microwave bands. However, it seems to have been used more on the 50MHz band than for microwave liaison work!

Peter reports making a close-spaced gamma-matched 3-element Yagi (W6SAI design from his *Beam Antenna Handbook*) on November 15, erecting it on November 17 and immediately working VE9AA at 599 both-ways. With 100W output from the IC-06 further contacts were made with K1KI, K3KYR, VE1YX and VY2SS.

The following day, November 18, was the peak of the Leonids meteor shower. Peter was active from 0653UTC by which time the 50MHz band was already wide open with wall-to-wall European stations coming in via meteor scatter. The station of XV3AA (Vietnam) was also romping in at 59+ via F2 propagation as were the stations of DU1XGM and 4F2KWT (Philippines).

Without really trying, G3PHO worked 25 stations via m.s. It was so easy that he thought that it must be some other form of propagation as there were no obvious bursts, just solid signals for minutes at a time. Contacts on s.s.b. were made with stations in Aland Islands, Corsica, Croatia, Czech Republic, Denmark, Estonia, Germany, Hungary, Italy, Norway,


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Slovenia, Sweden and Switzerland. By now Peter was totally 'hooked on Six Metres' and during an afternoon opening on November 19 he worked a few more USA stations including W6JKV/5 (EM10).

In the following days very little else was heard until November 24 when a large auroral opening took place. At 1400UTC G3PHO's receiver which was left on 50.100MHz suddenly burst into life with rough sounding c.w. signals. A quick rush into the shack and the band was found to be full of signals.

After making some initial contacts with stations in Eire (EI), Germany (DL) and The Netherlands (PA) Peter put out a CQ call on 50.099MHz which brought back 29 c.w. contacts one after the other. Ten countries were contacted, the best DX being SP4MPB (KO03 Poland).

In the space of one week Peter had experienced F2 propagation into North America and Asia, meteor scatter all over Europe and an excellent aurora. It's going to be difficult getting back to the microwave bands!

At my QTH (IO81 Herefordshire) much effort was put into working as much DX as possible on the 50MHz band. The trouble with this band is that you can never be sure when the world-wide propagation is going to disappear. **So my motto is work it while it's there!**

My first F2 contact of the autumn season was made at 1155UTC on October 24 with the station of E30NA (Eritrea) followed by 12 c.w. contacts with stations in Canada and the USA. The 50MHz band was then open on successive days right through to the end of the month. Contacts on c.w. and s.s.b. were made with the stations of DU1EV (Philippines), D44CF (Cape Verde Islands), EK6ED (Armenia), JA7WSZ (Japan), J28FF (Djibouti), PY0FM (Fernando de Noronha), UN3G, UN5PR, UN6P, UN9P (Kazakhstan), VU2MKP, VU2ZAP (India), YB5QZ (Indonesia), ZF1DC (Cayman Islands), 9G5AN (Ghana) and 9M2TO (West Malaysia).

Propagation on October 31 was tremendous with contacts being made with UK9AA (Uzbekistan), VU2RM (India) and XW0X (Laos). Between 1016-1102UTC the 50MHz band opened up to Japan on a skewed path of 60° (true heading is around 35°). A total of 12 Japanese stations were worked on c.w. in the JA4, JA5 and JA6 call areas. Four of the stations (JR6) were located on the island of Okinawa. In between all this JA activity were c.w. contacts with the stations of VK4ADC, VK4BLK and VK4FNQ (Australia).

Conditions during November were equally impressive with almost daily openings to the Far East and North America. Other stations worked included BG7OH (China), DU1/GM4COK (Philippines), HC8N (Galapagos Islands), KP4EIT (Puerto Rico), VK8TM (Australia), VP5/K5CM (Turks & Caicos), VR2KW, VR2LC, VR2XMT, (Hong Kong), XE1KK (Mexico), XU7ABW (Cambodia), YS1RR (El Salvador), ZS6WB (South Africa), 9M6EVT (East Malaysia), 9V1UV (Singapore) and hundreds of stations in Canada and all USA call areas including W6. Eat you heart out Mr. h.f. column man!

So into December and although the Far Eastern stations had disappeared there was still much DX to found. The early morning openings (0800-1000UTC) were now to the Middle East area with contacts being made with stations such as HZ1MD (Saudi Arabia), JY4NE (Jordan), OD5/OK1MU (Lebanon), RU4CE (Russia), SU1SK (Egypt), UN7GM (Kazakhstan), 4X1IF, 4X4UR, 4X/WB4FSV, 4Z4TL, 4Z5FC (Israel) and 5B4AZ (Cyprus).

From midday the band opened up to South America and more regularly to North America. Again all USA call areas were worked with W6 and W0 stations appearing later in the afternoon around 1600UTC. New stations worked included C6AIE (Bahamas), FY5KE (French Guiana), PP8KWA, PY8MD (Brazil), P43JB (Aruba), WP4KJJ (Puerto Rico) and YV4DDK (Venezuela).

TROPOSPHERIC OPENINGS

Now I'm moving away from the ionosphere and looking at your reports of an extensive tropospheric opening which occurred in the period December 8-11. It all started during the evening of December 8 when a high pressure weather system centered itself over the UK and continental Europe. Almost immediately the stations of PA0BAT and PA0WWM reported hearing the UK beacon GB3CCX over a 600km path. Then some long distance contacts were made including a 720km s.s.b. QSO between G4EAT (JO01) and DK1KR (JO53) and an 830km contact between the stations of G4BRK (IO91) and DL5LF (JO54).

Russ Stewart G4PBP (IO82 Wolverhampton) reported working a number of German stations including the station of DJ6JJ (JO31) who was contacted on s.s.b. and f.m. Oh, and before I forget, **I am talking about the 10GHz band**. Yes that's right, 10,000MHz! Just imagine therefore the activity levels on the more popular v.h.f. and u.h.f. bands!

Colin Smith GM0CLN (IO85 Midlothian) uses a Trio TR-751E transceiver and a 100W Microwave Modules amplifier into a 14-element MET Yagi. He reports working 12 Norwegian stations on the 144MHz band including LA1EKO on the Ekofisk oil platform (JO16). He found propagation very strange as all DX stations to the south and south-east from his QTH peaked up on a beam-heading of 50° (north-east).

Dave Edwards G7RAU (IO90 Isle of Wight) reported that he needed to beam at 35 degrees to work GM0CLN instead of the direct path at 350° I also observed this effect whilst working GM3POI on the Orkney Islands (IO88). If I beamed on the correct beam-heading at 000° his s.s.b. signal was around S1. When I beamed due East at 90° his signals were 59+. The duct that caused this scatter effect was located over the North Sea near the Belgian coast.

Angie Sitton G0HGA (IO91 Hertfordshire) is really pleased with what can be achieved with a low power station and a simple antenna. Running 10W into an indoor 5-element Yagi fixed on a south-westerly heading she made c.w. and s.s.b. contacts on the 144MHz band with the stations of DK1KO (730km), ON4KRI (438km), PB0AOL (417km), PD2DB (360km) and PA5WT (395km).

John Laffey G0WHP (JO02 Norfolk) was also pleased to make some s.s.b. contacts on the 144 and 430MHz band as he was only running 2W output from a battery powered Yaesu FT-817 transceiver into the supplied 'rubber duck' antenna. His contacts included a QSO with yours truly over a 270km path and with PA5KM some 253km away.

Carl Peake G0NZI (IO92 Warwickshire) also runs low power on the 144MHz band with an Icom IC-202S, a 20W amplifier and a loft mounted Halo antenna. A similar set is used on the 430MHz band, an Icom IC-402 transceiver, a 20W amplifier and a loft mounted Clover-Leaf antenna. During the period December 9-10 many s.s.b. contacts were made on both bands with stations in Belgium, Germany and The Netherlands.

Following a contact with the station of ON5NY on the 430MHz band Carl then tried a contact on the 144MHz band. Using a battery powered Icom IC-202E transceiver running 2W into its built-in helical antenna reports of 58/56 were exchanged. Carl hopes that this will encourage more low power operators to try c.w. and s.s.b operation on the v.h.f. and u.h.f. bands.

FORECAST FOR DX

During and just after the peak of the sunspot cycle the months of February and March are optimum for making DX contacts on the 50MHz band with stations in Australia, Japan, Hong Kong and the Far East. If solar activity remains stable then contacts should take place on a number of consecutive mornings.

So, if you hear that the 50MHz band was good one morning you should make an effort to be at home the following day. If you want to work VK on the 50MHz band your only chance will be in the next few weeks. Point your antennas on the direct short path between 0900-1100UTC and you may be lucky. Signals can be surprisingly strong.

John Redgate G4ANS (IO92 Nottingham) using a simple dipole antenna at just 2m above ground heard the low power Australian beacon VK6RSX (50.304MHz) at 0900UTC on both November 17 and 18. If solar activity becomes unsettled due to a solar flare or coronal hole then keep a look out for auroral activity on a northerly beam heading. Some of the better events occur during the spring equinox period and that's around now.

That's it again for another month. Please let me know what DX you have been working on the v.h.f. bands. Forward any news, views, comments or photographs to the address and by the date given at the top of the column.

Thank you for your E-mails and good luck with the DX. See you again next month.

73 David G4ASR

DX contacts mentioned in this column are made using either morse (c.w.) or s.s.b. telephony in the appropriate sub-bands for each mode. On v.h.f. and u.h.f. this equates to contacts being made in the bottom 200kHz or so of each band.

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MISCELLANEOUS

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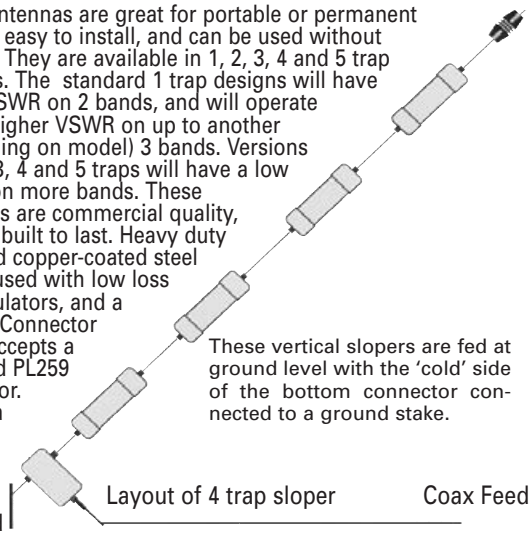
These antennas are great for portable or permanent use, are easy to install, and can be used without radials. They are available in 1, 2, 3, 4 and 5 trap versions. The standard 1 trap designs will have a low VSWR on 2 bands, and will operate with a higher VSWR on up to another (depending on model) 3 bands. Versions with 2, 3, 4 and 5 traps will have a low VSWR on more bands. These antennas are commercial quality, and are built to last. Heavy duty stranded copper-coated steel wire is used with low loss end insulators, and a Bottom Connector which accepts a standard PL259 connector. Antenna tuners are usually never required



These vertical slopers are fed at ground level with the 'cold' side of the bottom connector connected to a ground stake.

Layout of 4 trap sloper Coax Feed

It is advisable to use Copper based Anti Corrosion Compound No. 1 on all connections.

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REPORTS, INFORMATION AND PHOTOGRAPHS TO ME PLEASE BY THE 15TH OF EACH MONTH.

I've received quite a few letters and E-mails since the mention of QSL cards in January. One was from **Mike Baker G3SUK** who asks the question "How often have we all heard the following?" 'QSL 100% sure', 'QSL sent via bureau', 'Card written as we speak', 'Please QSL'. Frequently these statements roll off the tongue with the same effortless ease as '5/9'.

Mike continues "I suspect that at times none of these statements are true. Following contact with a new Country, IOTA Island, Special Event Station or rare callsign a QSL card is filled in and sent via the appropriate method. One then sits back and eagerly awaits a QSL card to return.

Months later, the realisation then dawns that a card has not yet arrived and probably never will. Searching through my logs, it appears that the ratio between promise and reality is about 20:1. I have checked my own logbook this certainly seems to be the case"!

Mike goes on to say "Both old and new operators coming into the hobby will be eager to send and receive a QSL card and it can be very discouraging when that special contact is not confirmed. The production of cards can be expensive, especially if they are commercially printed.

"However, there are many ways to reduce this cost such as sponsorship, duplicating/photocopying and more popular now computer generated. The choice is up to the ingenuity and means of the individual concerned.

"I now have a digital camera and I get immense enjoyment from creating a QSL card, if within days of me operating, one should be requested. I usually take a photograph of a local landmark or take a picture in my garden of a suitable flower etc. Whilst working mobile or portable a photograph of the area is often appreciated. I then use a programme called *QSL Maker* by WB8RCR, which is sufficient to produce my card. It's also possible to create your own cards using the software normally found on most home computers".

"If you are keen to receive a card find out by what route it should go. Is a bureau used? Does it go to a QSL Manager or direct to the station by post? Remember that it is courteous when sending direct to include an s.a.e. and International Reply Coupons (available from the Post Office and currently cost 60p each) to cover the return postage. The receiving station can then exchange these at their Post Office for return postage to you".

The collecting of QSLs appeals to many of us and these cards can be both fun and educational. To others a QSL card is a necessity in order to obtain an award or certificate. Our hobby is about communicating, so let us all at least be honest in both 'QSL 100%' or 'Do not QSL'. I am sure we can all learn something from the information and advice that Mike has given. You can find *QSL Maker* at **http://hfradio.org/wb8rcr/QSLMaker.html**

Mike Baker G3SUK says creating your own QSL cards can be cheap, effective and fun especially if you are lucky enough to own a digital camera. Here are a couple of his cards.

CAPE VERDE OPERATION

Henryk Kotowski SM0JHF, *PW* author and reader has recently returned from a visit to Cape Verde Island where he managed to operate in the CQ World Wide DX Contest as **D44CF**. Henryk was able to give the Cape Verde prefix to the Multi Single Team D44TF as a multiplier on six bands despite having to change hotel rooms during the contest!

The antenna was an 18m long-wire suspended from the hotel bedroom window and logging was done by hand. Henryk is now working out just how many contacts he has made and says "Next time I will make things easier by using a laptop computer".

DX NEWS

Working in Algeria since June last year is **Mirek SP5IXI** (VK3DXI, 9V1XE and 9M8DX) who has now been issued with the callsign **7X0DX.** Mirek hopes to be active on all h.f. bands for the next month or two with QSL cards going via DL4DBR. Updates and logs will be available at **http://www.7x0.sp5zcc.waw.pl**

If you need to work Vietnam **Karl W9XK** is now operating using the call **3W2XK** from a QTH near Saigon. Reports indicate that he will be active on the 21/28MHz band and he has already been spotted on 14260kHz. You can also check the Southern Cross Net on 14226kHz at 1200UTC and the DX Family Hour Net on 14245kHz at 1500UTC almost every day. If you do manage to work Karl your QSL should go via his home call after 9 April.

CARL MASON GW0VSW HAS MORE OF YOUR HF LOGS AND REPORTS AND BY THE LOOKS OF THINGS THE BANDS HAVE BEEN 'BUZZING'.

YOUR REPORTS

On to your reports now and first off is **Roy Walker G0TAK** near Kendal, Cumbria. Roy has had a change of QTH since his last report and is doing very well with his new antennas. Top Band QRP contacts include GM3YTS (Scotland), OQ6CK (Belgium), OZ5W (Denmark), PA0LOU (Netherlands) and OL3A (Czech Republic) using a TS570DG, 80m long wire loop and 5W of c.w. between 2200 and 2252UTC.

THE 7 & 14MHz BANDS

Here in South Wales **Robin Trebilcock GW3ZCF**, Bishopston, nr. Swansea managed to operate for just a few hours despite a heavy workload. His two contacts on 7MHz were PY7XC/PY0F (Fernando de Noronha) at 2001 with c.w. and VE1CDD (Canada) using PSK31 at 2332UTC.

Mike Baker G3SUK, Stowmarket, Suffolk also found GB100GM, a Marconi Special Event Station at 1431 and a little later 3A2MG (Monaco) at 2248UTC using an IC-746, 80W s.s.b. and a Carolina Windom antenna.

On to 14MHz now where **Paul Morrison G0VHT** has sent in our first h.f. Slow Scan TV report. An interest in PSK31 has been put to one side while the urge to dabble in SSTV has

● Henryk SM0JHF was lucky enough to operate in CQ World Wide DX Contest as D44CF. Pictured here is the rest of the 'team': L to R Matteo IK2SGC, Xara CT1EKF, Vittorio I4YSS, Fabio I4UFH, Alberto IV3TAN, Gabrielo IK4UPB, Franco I4LCK and Santos CT1DVV

taken its place.

Paul's set-up includes a TS-50 at 50W, AT-300 a.t.u. and home-brew 21m Windom antenna at 11m, 300MHz Pentium computer with VOX soundcard interface (G8SLB) and MMSSTV version 1.05. Contacts this month include I1MIL (Italy) 1022, YU7BDR (Yugoslavia) 1113, UA1ZEE (European Russia) at 1145, HB9AXG (Switzerland) 1220 and SP9CWF (Poland) at 1734UTC.

THE 18 & 21MHz BANDS

The 18MHz band had all c.w. man **Ted Trowell G2HKU**, Isle of Sheppy, Kent hunting for DX using QRP at 5W. Contacts were made using an IC-721S and G5RV or HF6 vertical including F6AUS/HI9 (Dominican Republic) and J88DR (St Vincent) around 2000UTC.

Also active was Roy G0TAK who worked OY2H (Faroe Islands) 1259, 3A2MD (Monaco) 1559 and JW/DL3NRV (Svalbard) at 1424UTC with just 5W QRP.

Despite what appeared to be a flat band around 0800UTC Mike G3SUK made a CQ call and received replies from 7X2DG (Algeria) and VK3CML (Australia) with 80W of s.s.b. Slightly later followed T77C (San Marino) at 1630UTC.

Don McLean G3NOF, Yeovil, Somerset found band conditions "generally very good" during daylight hours. All s.s.b. contacts on 21MHz this month were made using a TS-950 and trapped dipole antenna. They include HL4SF (South Korea) 1046, W1AW/80 (U.S.A. – ARRL Club Headquarters) 1729 followed by 7Z1AC (Saudi Arabia), ZF2YL (Cayman Islands), ZS6JM (South Africa), YS1/K9ULW (El Salvador) and VO1S (Canada – Marconi Special Event Station) between 1810 and 1935UTC.

THE 24 & 28MHz BANDS

Two more c.w. contacts now for GW3ZCF on the 24MHz band. Robin worked JT1BH (Mongolia) at 0945 and NU7T (USA, Nevada) later at 1707UTC using his IC-775DSP and 40m loop antenna.

Once again 28MHz has been open for most of the day and most of our reporters have managed a few contacts on this band. One operator who spends a good deal of time here is **Jon Wheeler G0IUE**, Melksham. Jon says "Just letting you know that I have been experimenting with an Albrecht AE201S multi-mode hand-held and just managed to work OG2HMA (Finland) on s.s.b. whilst stood in my back garden freezing in the winter weather. I was using a base loaded telescopic whip antenna when Mike, who lives near Helsinki, gave me a 5/7 report and explained that the OG prefix is to commemorate 80 years of the Finish National Radio Society. I was amazed how well my signal was getting out".

Later, at around 1425UTC Jon worked three stations in the USA, K9NW (Indiana), K5TR (Texas) and KR0B (Minnesota) all with 5/9 reports. A change to f.m. at 1823 caught VE9GP in New Brunswick (Canada). "It seems that cycle 23 has left a sting in its tail as I had not expected conditions this winter to be so good. It's a great shame that Foundation Licensees do not yet have access to 28MHz as it is very easy to work the world here with very low powers". I am sure we all agree with Jon.

Incidentally, Jon's father is Ron G1LJT who has just passed his Morse assessment and is hoping to obtain the call M3LJT. Congratulations to you Ron and I hope you enjoy using your new callsign.

The c.w. of Ted G2HKU reached HZ1AB (Saudi Arabia), V26K (Antigua), P3A (Cyprus), P40Q (Aruba), XT2DX (Berkina Faso) and F6AUS/HI9 (Dominican Republic) between 1200 and 1530UTC. Also enjoying a few hours here was Mike G3SUK who used s.s.b. once again working OD5NH (Lebanon), LW5DXZ (Argentina) VE9ALX (Canada), as well as numerous stations in the USA between 1450 and 1618UTC.

Finally, to the log of Don G3NOF who used s.s.b. to work 5R8FU (Madagascar) 1642, 3E1DX (Panama) 1711 and FP8AC (St Pierre) at 1743UTC.

QSL CORNER

Just enough space this month to fit in some more QSL information starting with 5H1F via KQ1F, 8R1USA via 8R1AK, 9Q0AR via F2YT, AH2K/KH0 via JE8KKX, CE9C via CE4EBJ, CN8NK via EA5XX, CN8YR via K4KU, D902WSF via DS5UCP, FY5FU/P via F5AEG, LU5DX via AC7DX, TF6GX via K1WY, TG9AJR via Juan Carlos Munoz, P.O. Box 61, Periferico, Guatemala 01011, GUATEMALA or via WA1ECA, V51KV and V51VE via ZS6DX and finally YC3MM/P via IZ8CCW.

Thanks to **Ted Mirgliotta** and the *OPDX Bulletin* for the QSL information

SIGNING OFF

It has been yet another busy month for our reporters. Nearly all of the h.f. bands have provided some degree of both short and long distance propagation despite some mixed conditions.

It certainly pays to put out a 'CQ' call even if the band appears dead. You never know who might be waiting to return to your call! Thanks to everyone for their reports and input to the column.

73, Carl GW0VSW

● Paul Morrison G0VHT has sent in the first h.f. Slow Scan TV report.

PW Listening & Operating Watch List. (All times UTC)

Sean Gilbert G4UCJ operates most days around 0700-1100 and 2200-0200 on all bands using an IC-746 and 50W into a half-size G5RV, WARC inverted V or HF6 vertical.

Carl Mason GW0VSW listens and operates on 7.030 and 10.106 most evenings at 1900 with a Ten Tec Argonaut 2 and inverted G5RV.

Don McLean G3NOF operates 1030 Saturdays on 3.685KHz on the ISWL Net or 1030 Sundays on the Yeovil ARC Net on 3.665KHz as well as all the other h.f. bands using a Kenwood TS-950SDX, Drake linear with up to 400W output and various antennas including a Cushcraft A3WS 3-element yagi and trapped dipole antenna.

Leighton Smart GW0LBI operates most weekday evenings on 28.500KHz s.s.b regardless of conditions using a President Lincoln transceiver with 20W output to a 11m half-wave vertical.

Brian Williams GW0GHF operates most afternoons around 1400. He also simultaneously monitors 70.200KHz s.s.b. and 51.510KHz n.b.f.m at this time and is looking for weekly skeds especially on 70MHz. Contact Brian QTHR.

George Woods G3LPT operates an open net on 29.630KHz n.b.f.m. 0930 Tuesday to Friday.

Jon Wheeler G0IUE monitors 29.600KHz n.b.f.m. every evening between 1730 and 2230 regardless of conditions using a Yaesu FT-920 transceiver running 100W and 2-element tri-band beam.

Brian Parsons GW0KZK listens and operates on 14.250KHz 1000-1200 and 7075KHz 1400-1600 most days using a Yeasu FT-1000MP and 100 watts into a Inverted G5RV.

KEYBOARD COMMS

BY ROGER COOKE G3LDI
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E-MAIL: rcooke@g3ldi.freeserve.co.uk
PACKET: G3LDI @ GB7LDI

ROGER COOKE G3LDI LOOKS AT CONTESTING SOFTWARE AS WELL AS POINTING YOU TOWARDS SOME INTERESTING WEBSITES

Choosing software for contesting can be a nightmare and a minefield. Until recently, software choices in the digital world were limited to a few DOS programs. The products were of reasonable quality and had been around for a while.

Pricing was relatively modest, but the authors didn't or couldn't keep up with the dramatic changes taking place inside those boxes sitting around the shack. It was time for change. First came the new modes - Clover and Pactor II - each requiring a significant hardware and software investment. Neither made a big, lasting dent on the bands, except for traffic forwarding by h.f. BBS. Pactor II has taken over from Packet in this respect. The modem, however, is still very expensive in comparison to a standard TNC.

Then, along came the sound card and higher computer speeds. And the software gurus went to work. The first big splash was RITTY. This was a good program but again expensive.

Then the dam broke and we were suddenly flooded with new options, many of them multi-mode, most based on sound card technology and many of them free. This phenomenon helped create the explosive growth of PSK31 with freeware like DigiPan. Still free, DigiPan continues to dominate the new mode. Even so, new opportunities present themselves regularly and most are freeware.

Subsequently, RTTY caught the bug. Writelog broke some new ground in the contesting arena but its cost at $75 is fairly steep for those who are not serious contesters. So, N1MM Logger entered the fray and although not yet ready for prime time, it's free and is undergoing constant change and improvement. Then MMTTY blew away those who tried this new and free digital product.

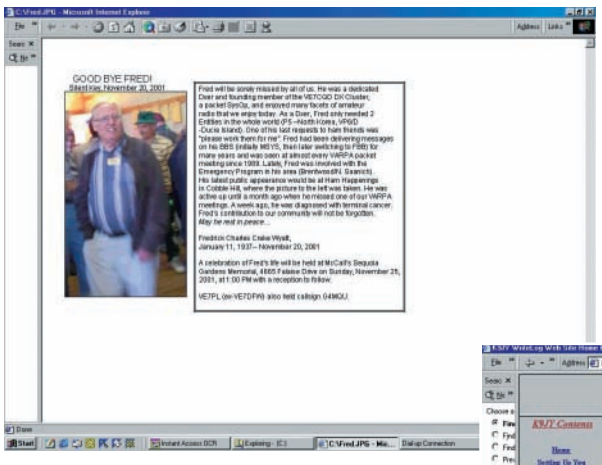
From the producers of DigiPan, MixW made its appearance recently and is getting good reviews. Nick UT2UZ offers MixW at $50 but there is a working download at **http://tav.kiev.ua/~nick/my_ham_soft.htm** that is worth a trial.

Andy KB2EOQ argues that the combination of MMTTY (which is free) and Writelog (which costs $75) is the best combination for contesting. He says MMTTY does "very good RTTY work and Writelog does lots of good contesting". Go to **www.qsl.net/mmhamsoft/** to download MMTTY and for Writelog look at **www.writelog.com.**

Try looking at **www.qsl.net/mmhamsoft/mmtty/help-dl.htm**. This will give you help for MMTTY. To print out a large help file in .PDF format, go to **Jim W0EB's** site at **http://home.kscable.com/w0eb** It runs to 111 pages but is filled with everything you might ever need, including pictures, diagrams and annotations. **Don AA5AU** has a good MMTTY support site at **www.aa5au.com** as well.

You should get MMTTY up and running before you even think about adding something like Writelog to the mix. Once you have the latest version of MMTTY up and under control, then get the Writelog download (and the MMTTY plug in) and put them together.

Finally, try visiting **http://k9jy.com** You'll find excellent basic stuff for getting Writelog going, including the use of Rttyrite, which is included in the Writelog package. It will lead you down the path of setting up and testing one element at a time. This is the best approach to adopt.

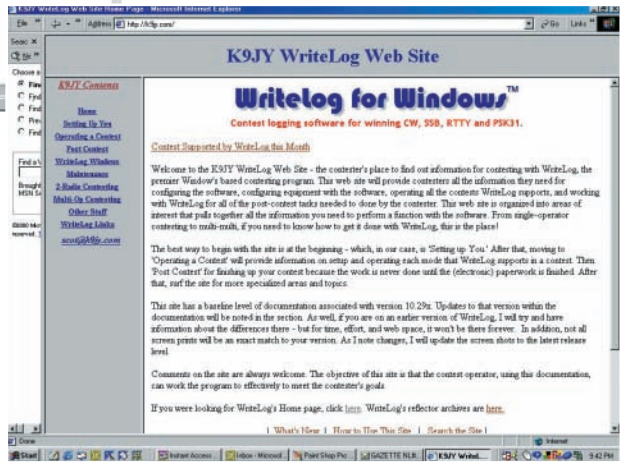


TEXT FILER

Text Filer is **Dave Guest**'s latest piece of freeware and it is a dazzling piece of work. The secret lies in the software. Text Filer creates a database as you tell it what to include.

You can add Microsoft Works files, Word Perfect, E-mail, rich-text, etc. There is almost no limit. Then type in a name, phrase or whatever, and you instantly get a list of locations and Text Filer will then display the document when you pick one of the options.

Believe it or not, you can even type in a 'sounds like' clue and you'll get everything that's close. Read the help files and download



the free program at: **www.readersandwriters.com/textfiler** then send Dave a note of thanks.

MAILWASHER

MailWasher is remarkable for its simplicity, and really remarkable for what it does for you. So, what does it do? Simple - it let's you preview your mail on the server!

You can delete or bounce any message that seems suspicious. In fact it even highlights those that appear to be irregular. You can open the message and take a good look at it **without** downloading the mail. You really need this one! It's free, but I urge you to send in the requested $20 for a subscription because it's being constantly upgraded.

Don't fail to add MailWasher to your portfolio because there are going to be more, not less virus, spam, trash and nonsense mailings in your future.

BLUETOOTH

Bluetooth is a technology that has the potential to significantly change the role of wireless networking by enabling connectivity between a wide range of devices from many different manufacturers. It's well supported by suppliers from a number of industries, and the first tranche of Bluetooth devices are starting to appear.

The concept of Bluetooth originated within Ericsson in 1994, initially as a study to investigate low-power, low-cost radio. Named after a tenth Century Danish king, Bluetooth provided an interface between mobile telephones and their accessories with the aim of completely eliminating cables. Ericsson continued working on the project alone until 1998, when it formed the Bluetooth Special Interest Group (SIG) and shared research with companies it felt would be appropriate partners to develop the technology further, Nokia, Intel, IBM and Toshiba.

The task of this SIG was to develop Bluetooth into a de-facto standard as well as providing the specification for radio links between devices. In order to encourage its take-up, the cost of the Bluetooth chip has been deliberately kept very low and indeed since 1998, membership of the Bluetooth SIG has grown at an astonishing rate to more than 2,000 companies, making it one of the fastest growing industry standards ever!

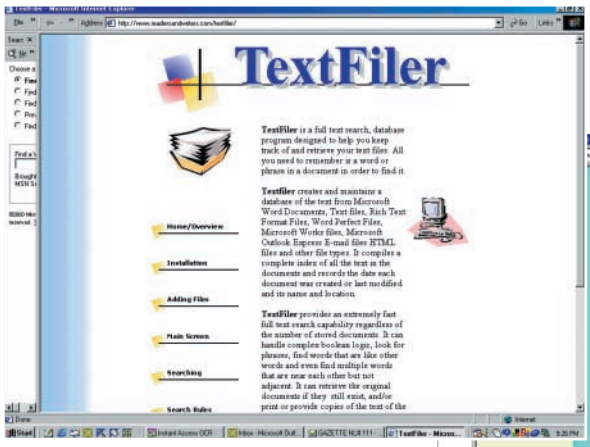
Bluetooth is by no means the only wireless networking standard available, and it's important to stress that Toshiba products support all current, popular, wireless standards as well as Bluetooth. However, the enormous support for the technology and fact that the SIG membership has reached 'critical mass' probably means that Bluetooth will win the day.

So, how does Bluetooth work? The Bluetooth specification is freely available to companies wishing to build Bluetooth compatible devices on **www.bluetooth.com**

The specification defines the two primary Bluetooth technologies: the radio transmitter/receiver that allows devices to communicate and the underlying network logic, which makes that communication meaningful. Bluetooth operates more than 79 different frequencies with the licence-free 2.4GHz radio band (the same band used by some high-end cordless phones).

Since the future for Bluetooth envisions that the technology will be ubiquitous, it's necessary for many different Bluetooth devices to operate in close proximity. This is achieved through 'frequency-hopping' to find the frequency within the band with the least interference and noise.

The Bluetooth specification also allows devices to transmit on up to five frequencies simultaneously through the use of Spread Spectrum techniques. Bluetooth devices can transmit and receive over a distance of approximately 10 metres (although this can be increased up to 100 metres with the use of an amplifier).



A group of devices communication within that 10 metre range is known as a PICONET (or PAN, Personal Area Network) and since Bluetooth devices can support three voice channels (operating at 64kbit/s) or one data channel, they can achieve data rates of up to 1Mbit/s.

Bluetooth devices can be set to either transmit their own availability and capabilities (master) or just listen for other devices that may wish to communicate (slave). Typically, devices that have a permanent power connection will function as masters since they do not have the power limitations and constraints (battery life) of mobile devices such as phones or PDAs.

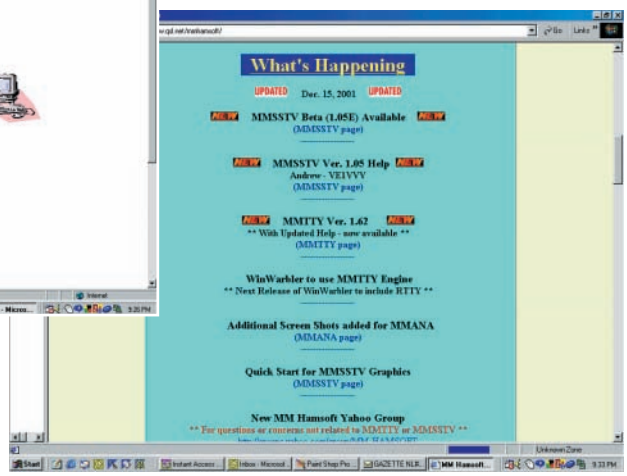
Once a device detects the presence of another Bluetooth – enabled device in the vicinity, those devices exchange information on their capabilities and a PICONET is established. Up to eight devices can exist on the same PICONET and frequency hopping enables multiple PICONETS to exist in the same area. It's even possible to bridge multiple PICONETS to merge them into a single entity.

THE FUTURE

Bluetooth's future will be determined by three factors: competition from other wireless networking standards, technology and application development and issues of interoperability between devices. Support for Bluetooth will drive down the cost and have a profound effect on take-up. The two emerging application development paths for Bluetooth are:

- ❑ Personal communications devices – personal information transfer, home device links and messaging.
- ❑ Ad-hoc networking – the rapid establishment of wireless LANs for training, conferences, meetings or any other application that requires a fast but temporary, network connection.

The idea of interrogating your Bluetooth enabled fridge to check if you have enough milk, then getting the fridge to call the supermarket to order more via the Internet is perhaps not too far off! Nor perhaps is the Bluetooth enabled transceiver. Just let your imagination run wild and think of all the possibilities there!



SILENT KEY

Fred Wyatt,VE7PL, a friend of mine for some 25 years, became a silent key on November 20 2001. He was a dedicated DXer and a founding member of the VE7CQD DX Cluster, a packet sysop, and enjoyed many facets of the hobby.

Fred was always keen to support the Satellite Gateway forwarding system, although he was not part of it. We had exchanged visits on several occasions, two of which were timed to coincide with our local annual barbeque, and he will be greatly missed.

Fred ran the MSYS BBS program for a number of years before changing over to FBB. He was also a very active member of the Victoria Amateur Radio Packet Association and attended just about every meeting since 1989.

Roger G3LDI

TUNE-IN

TOM WALTERS
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WALTON
ESSEX
CO14 8BX

E-mail: tom.walters@aib.org.uk

TOM WALTERS HAS THE LATEST NEWS OF WHAT'S HOT TO LISTEN TO ON THE BROADCAST BANDS.

At the time of writing in January, we'd just passed a very significant anniversary - 100 years since Marconi received Morse signals from across the Atlantic. Or did he?

Some people say that he couldn't really separate the spark signals from the background noise. An experiment in the USA last December using a Marconi-style spark transmitter failed to reach further than about 800 miles. The experiment used a frequency of 1700 kHz.

However, in the **Voice of America**'s *Communications World* programmes, a US coastguard was quoted as saying that in the 1970s and 1980s, he heard medium wave broadcast stations from Europe at noon local time in Newfoundland. He noted that with a low sun angle and weak ionisation of the D layer of the ionosphere at that latitude in winter, medium wave signals crossed the Atlantic Ocean easily. This, he reckoned, was especially true during the low part of the sunspot cycle, such as was the case in December 1901. So there!

Anyway, Marconi's experiment was a landmark in international broadcasting, as were the first transatlantic voice signals, just a few months later, to the astonishment of ships' radio operators.

ANOTHER ANNIVERSARY

Another anniversary that passed recently was 60 years on-air for what is now called **China Radio International** (CRI). With 43 languages CRI is a vast undertaking. The English service alone is seriously ambitious broadcasting at: **Americas:** 0100-0200 on 9.580, 9.790; 0300-0400 on 9.560; 0400-0500 on 9.730 and at 0500-0600 on 9.560MHz. **Africa, Asia, Pacific:** 1200-1300 on 9.730, 9.760, 11.760, 11.980, 15.415; 1300-1400 on 9.570, 11.760, 11.900, 11.980, 15.180; 1400-1500 on 7.405, 9.700, 11.675, 13.685, 15.125, 17.720 and at 1500-1600 on 7.160, 9.785, 13.685, 15.125, 17.720MHz. **Africa & Europe:** 1600-1700 on 7.190, 13.650; 1700-1800 on 7.150, 9.570, 9.695, 11.910; 1900-2100 on 9.440, 9.585; 2000-2130 on 5.965, 13.640, 15.125; 2130-2200 on 13.640, 15.125 and at 2300-0000 on 5.990, 13.680MHz. But then, if you have plans to reach the whole world, that's the price of scale that you've got to pay.

Now for news of some expansions and some closures. **Radio Vlaanderen International** (RVI), which has already given up using expensive Belgian short wave transmission facilities, replacing them with rented transmitters abroad, has done a further deal with Merlin Communications.

Using their UK and South African sites, Merlin now transmits RVI signals on the first hop into Europe and Central Africa. Vlaanderen broadcasts in Dutch, English, French and German. The current English service is: 0400-0430 America on 11.985MHz; 0800-0830 Europe 1512 medium wave, 5.985; 1130-1200 Europe, Asia 9.865; 1230-1300 Europe 1512 m.w.; 1830-1900 1512 m.w., 9.925, 13.685, 13.710MHz; 2030-2100 on 1512 m.w., 9925 and 2230-2300 America 13.710MHz.

The Merlin additions (to RVIs other languages) are **Europe:** 0757-0956 on 13.685, 1157-1226 on 13.685, 1357-1656 on 15.325 (Sun), 1757-1956 on 13.685, 2057-2156 on 5.960MHz; **Central Africa:** 1057-17670 (Sun), 1157-1226 on 17.6670 and at 1857-1956 on 5.960MHz.

RUMOURS

There are rumours that **Radio Polonia** might be looking abroad to cut short wave costs. **Swiss Radio International**, meanwhile, is solving the problem by giving up short wave altogether, hoping that all its former listeners will find their way to the web site **www.swissinfo.org**. Listeners certainly won't find much on-air, only: **Africa** at 0600-0800 on 9.885, 13.635, 17.665; 0830-1030 on 21.770; 1630-1815 on 9.605 13.790, 15.555; 1830-2130 on 9.605, 13.660, 15.485, 17.660 and South **America** on 9.885, 11.660MHz.

It really is shadow of the former schedule. All short wave from **Swiss Radio International** (that name seems strangely inappropriate now) will be abandoned by 2004.

Joining the procession of rented-not-owned stations, **Adventist World Radio** has given up its low-power (2.5kW) station at Forli, in Italy. Coverage is taken up by facilities provided by Deutsche Telekom, and good old **Radio Austria International (ORF)** (the renowned Moosbrunn station), as well as relays in Russia, Kazakhstan, Uzbekistan, Germany, Austria, Slovakia, South Africa, Madagascar and the United Arab Emirates, plus satellite to Latin America. You've got to be fleet of foot to keep your international presence alive these days!

Adventist World Radio however, still keeps its potent short wave station on Guam in operation, producing the following schedule: **Asia:** 1000-1030 on 11.705 (11.560 to 1.100), 1300-1400 on 11.705, 11.980, 1430-1500 on 15.225, 1730-1800 on 11.965 and at 2130-2200 on 11.960, 15.240MHz **Middle East:** 1730-1800 on 11.965MHz.

Radio Norway International, which a few years ago stopped its English service, has now ceased Norwegian, and wound up altogether. Which hasn't done much good to **Radio Denmark**, which used Radio Norway's facilities. A subscription service from Norway for shipping will be considered if people are willing to pay for it.

Meanwhile, plans to build a 1.2megawatt long wave transmitter in Norway (216kHz) are making some progress. Signals from a station probably to be Christian-based and called **Cruisin' 216** could reach as far as the UK, Ireland, much of Scandinavia, the Faroes and Iceland.

The future wasn't looking too bright for long wave station **Delta 171** either. They wanted to continue operations from two 412 metre masts on a platform in the North Sea, in order to transmit an easy listening format to be branded as **171 - the Lounge**. There's not much chance of permission being given.

AFGHANISTAN

As I've been had by the swiftness of the ending of the war in **Afghanistan** more than once already (you will have been reading about radio developments long outdated), I won't say too much this month, except that a lot is in the melting pot.

Radio Free Voice of Afghanistan is operating from London, and the Russians are plotting to get signals into Afghanistan via Tajikistan, the Americans are working on **Radio Free Afghanistan**. Everyone is being tapped for resources to get some revived internal radio up and running from the bomb-shattered ruins.

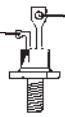
FINALLY

To round off, a footnote from Canada. A new boss with considerable authority has been appointed at **Radio Canada International**. (RCI). Now we wait to see how he will ensure that RCI's stature in the world of international radio is maintained, following some fairly swingeing cutbacks last year.

Bye for now
Tom

J. BIRKETT

SUPPLIERS OF ELECTRONIC COMPONENTS



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UHF R.F. POWER AMPLIFIER UNIT with 4 PT9700, 4 J02015A 70 watt power transistors. No info @ £10 (P&P £5).
SMITHS WIRE ENDED GOLD PLATED RELAY SPCO 12 volt @ £1.
AIRLITE TYPE 62 HEADPHONES with boom mike needs attention two pairs for £15 post paid.
COLLINS 618 HF DRIVER MODULE for 4CX250 with 4 off 12AT7, 4 off 6AH6, 2 off 6CD6, 2 off 6CL6 @ £10 (P&P £8).
STORNO HAND TRANSCEIVER PA MODULE No PA-831-5 @ £3.95, Storno Tone Modules @ £2.
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SILVER MICA CAPACITORS 350v.w. 62, 100, 120, 150, 1000pF, all @ 10 for £1.
SMALL WIRE ENDED 33µF 450v.w. @ £1.15, 5 for £5.
POWER TRANSISTORS 40310 @ 5 for £1, 2N3055 @ 3 for £1, BDY96 @ 3 for £1.
AIRSPACED VARIABLE CAPACITORS with slow motion drive 365+190pF @ £3.50, 350+400pF @ £3.50, 325+380pF with 3/16" spindles @ £3, 4 for £10.
WIRE ENDED R.F. CHOKES 14µH 3 amp @ 15p, 7µH 3 amp @ 15p, 7.5mH 100mA @ £1.20, 10mH 100mA @ £1.20, 22mH 100mA @ 40p.
RADIAL POLYESTER CAPACITORS 400v.w. 0.15µF, .02µF, 0.01µF, all @ 20p each.
VHF FETS 2N5486A equiv. to BF256 @ 6 for £1.

ACCESS, SWITCH, BARCLAYCARD & AMERICAN EXPRESS cards accepted. P&P £2 under £10. Over Free, unless otherwise stated.

BOWOOD ELECTRONICS LIMITED

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75	1N4001 rectifier diode	£1.00	5	OA91 diodes	£1.00
50	1N4007 rectifier diode	£1.00	1	M34-1 LED flasher 1Hz inc. 3 h.b. LEDs	£1.00
30	1N5401 rectifier diode	£1.00	1	M34-2 LED flasher 2Hz inc. 3 h.b. LEDs	£1.00
12	1N5408 rectifier diodes	£1.00	4	741 OP. AMP	£1.00
5	W02 1.5A bridge rectifier	£1.00	4	LM324 quad OP. AMP	£1.00
5	7805s voltage reg. ins. tab	£1.00	2	LM386 audio AMP	£1.00
5	7812 voltage reg.	£1.00	2	TBA 820M audio AMP	£1.00
20	BC182L NPN transistor	£1.00	8	555 timer IC's.	£1.00
20	BC212L PNP transistor	£1.00	10	Ins. crocodile clips	£1.00
20	BC327 PNP transistor	£1.00	1	5mm white LED	£1.00
20	BC337 NPN transistor	£1.00	1	5mm blue LED	£1.00
20	BC547B NPN transistor	£1.00	50	1NF 100V poly caps	£1.00
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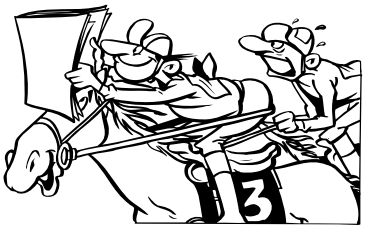

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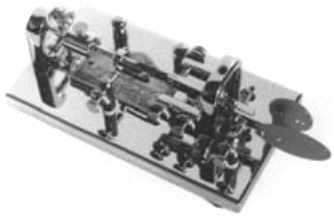

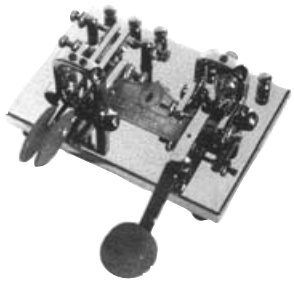

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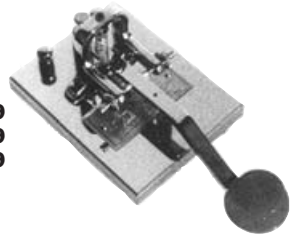

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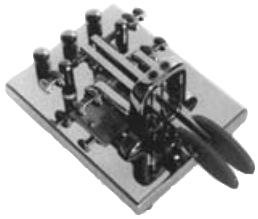

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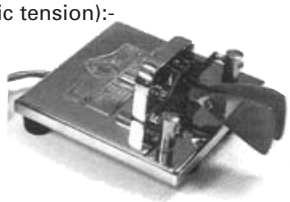

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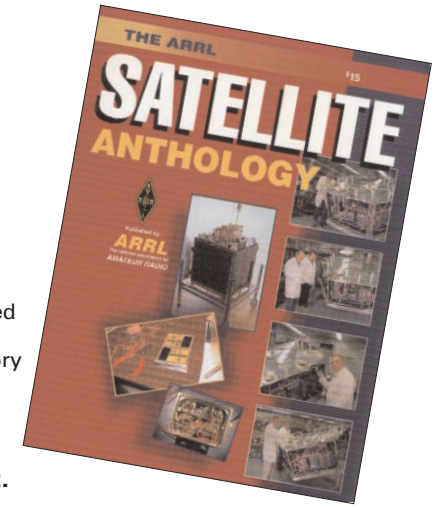

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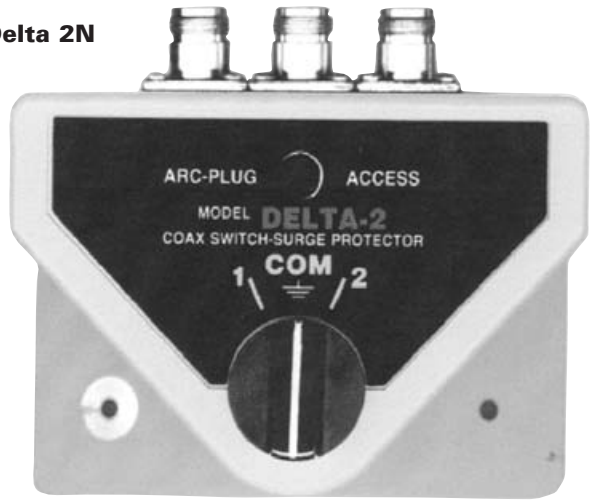

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topical talk

Our 70th Year goes International!

Everyone on the *PW* Editorial team were delighted to receive our very first celebratory card, marking *PW*'s 70th year of continuous publication. The card featured on this page is from **Zdenk Hajek** in Prague, in the Czech Republic.

The team were rather touched by the friendly greetings from Zdenk, who went on to say in his brief letter within the card, that he used to enjoy reading *PW* when he was living in South Africa. He still enjoys the magazine and sent the card in appreciation.

Zdenk's very welcome card reminded everyone working on *PW* that readers living in the UK and Ireland, and nearby mainland Europe, will find it relatively easy to attend the Leicester Show by train and air travel in September. This is where everyone will be welcomed to share our formal 70th anniversary.

However, those living farther away might feel left out. So, although you may be a reader and supporter of *Practical Wireless* - perhaps living in Holland, Hawaii or Hong Kong, or New Zealand, Australia, Canada, USA or anywhere away from the *PW* home base - please feel free to write in with your own stories and memories.

● The card from Zdenk Hajek.

Nowadays, E-mail along with activity on the Amateur bands keeps us in contact and (in particular) the Editor is kept **very busy indeed** replying to readers from all over the world - so we know you're there! Just drop us a line sharing your memories and ideas...the *PW* team would enjoy hearing from you.

Wartime Issue

The issue of *PW* featured on this page comes from December 1944, and within its contents is a project from well-known author **F. G. Rayer** (of course!) along with articles and adverts expressing much hope for the future as they were clearly anticipating the end of the Second World War.

● This Second World War issue of *PW*, dated December 1944, is a rare survivor but despite the paper shortage the publishers managed 44 pages within its covers.

However, on seeing this loose issue (most are bound into book form, minus front covers in our archives) our Editor was reminded of a visit he made to Holland five or so years ago.

During his visit, whilst enjoying the company of many Dutch Amateurs at a reception on board the huge Nedlloyd company's MV *Africa* container ship - G3XFD was presented with a copy of the May 1945 issue of *PW* by the son of the man who received it by parachute!

It arrived during the time when the RAF, on their way to Germany, unofficially dropped sweets and other luxuries to waiting children as they flew over Holland. The parachuted *PW* still survives - and it led to both the original recipient and his son enjoying a lifetime in the radio hobby. Perhaps you too have an interesting story of how your copy of *PW* arrives? If so, write in and share it with everyone else! *PW*

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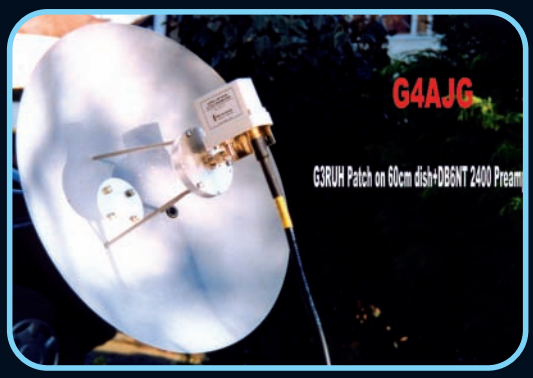

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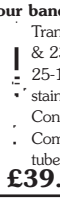

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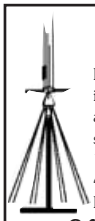

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"Brick-Wall" Selectivity

Today's Premier class operators demand the best RF weaponry available. Yaesu's exciting new MARK-V FT-1000MP answers the call, with an expanded array of receiver filtering, 200 Watts of power output, and Class-A SSB operation capability for the cleanest signal on the band. Enhanced front-panel ergonomics saves you precious seconds in a DX or contest pile-up. Yaesu HF design and manufacturing know-how ensures that no short-cuts have been taken in our effort to bring you the best HF transceiver money can buy. For more QSOs in your log, and more awards on your wall, there is only one choice: the MARK-V FT-1000MP from Yaesu!

I. IDBT: Interlocked Digital Bandwidth Tracking System

The IDBT feature greatly simplifies operation by matching the bandwidth of the DSP (Digital Signal Processing) system to the net bandwidth of the 8.2 MHz and 455 kHz IF stages. The IDBT system monitors the settings of the SHIFT and WIDTH controls, and automatically sets the DSP bandwidth to match the user settings within the net bandwidth of the Analogue IF Filtering.


IDBT: A Breakthrough in Selectivity!


10-pole Collins® Mechanical SSB Filter

II. VRF: Variable RF Front-End Filter

Protecting the MARK-V's receiver components from strong out-of-band signals, the VRF system acts as a high-Q "Preselector," located between the antenna and the main bandpass filter networks, providing additional RF selectivity on the 160-20 meter Amateur bands for multi-operator contest teams, DX-peditions, or for operation near MW/SW broadcast stations.

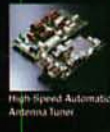

VRF Features Large High-Q Coils and High-Quality Relays


VRF Typical Bandpass Response (3.5 MHz)

III. 200 Watts of Transmitter Power Output

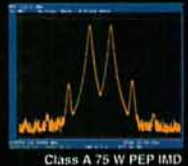
Utilising two Philips® BLF 147 Power MOSFETs in a 30 V push-pull configuration the MARK-V's Transmitter generates up to 200 Watts of the cleanest RF Power output available thanks to the conservative design of the PA Section.


Philips Power MOSFETs


High-Speed Automatic Antenna Tuner

IV. Class-A SSB Operation

Exclusively available on the MARK-V FT-1000MP , a press of a front-panel button engages Class-A SSB operation of the transmitter, at a power output level of 75 Watts. Class-A operation produces incredibly clean signal quality, with 3rd- order IMD suppressed 50 dB or more, and 5th- and higher-order products typically down 80 dB or more!


Class A 75 W PEP IMD

V. Multi-Function Shuttle Jog Tuning / Control Ring

The immensely-popular Shuttle Jog tuning ring, which is concentric with the Main Tuning Knob, has a new look in the MARK-V: it now includes the activation switches for the VRF (left side) and IDBT (right side) features, so you don't have to move your hand position to activate these important circuits during contest or pile-up situations!

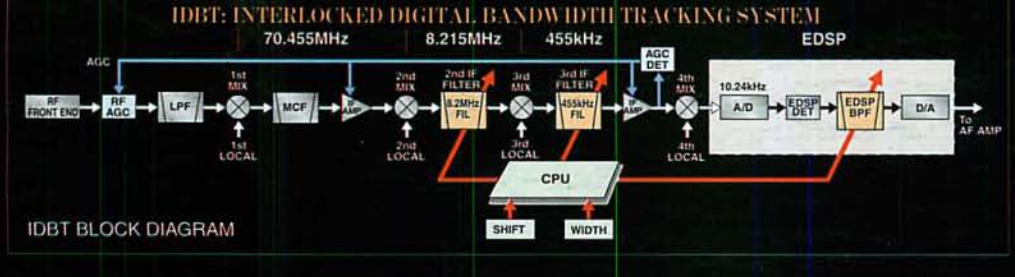

Access VRF and IDBT Features via Shuttle Jog Dial

DC 30 V / 13.8 V Power Supply FP-29

Photo shows optional MD-100A8X Deluxe Desk Microphone

HF 200 W All-Mode Transceiver

MARK-V FT-1000MP



IDBT BLOCK DIAGRAM

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Specifications subject to change without notice. Some functions guaranteed only within Amateur bands. Some accessories are options and standard in certain areas. Check with your local Yaesu dealer for specific details.