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PW

amateur radio & more!

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Multi-band Mobile Antenna

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32-page magazine

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- Mobile & Portable Fun
- Delta Beams
- Top Band Helical

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May 2003 £2.85

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In our 30th Year of Trading!
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Stands include - Manufacturers, Repeater Groups & Clubs

1973 WATERS & STANTON PLC 30th ANNIVERSARY 2003

NEW RIGblaster pro

New in the line up is the RIGblaster pro rig to sound card interface. Full status front panel LEDs, electret mic. input plus second mic. Now features dual headphone outputs 1/4" and 3.5mm. Built-in Yaesu CAT and Icom CI-V interface and Kenwood compatibility. Two independent keying outputs for CW and FSK. New CD-ROM program selections including sound card based DSP software. Large number of leads supplied for most hook-ups.

£299.95 B

BRAND NEW ! ! !

ICOM IC-703 · HF/50MHz Transceiver
0.1-10W Portable, Mobile, Base-Station. (9-15.87V DC)

Designed especially for the Foundation Licence/QRP. Built-in features auto ATU, DSP memory keyer. (5W when using 9.6V batts)

. . . AVAILABLE SOON . . .

YAESU FT-857
HF/50/144/430MHz Mobile Transceiver
HF/6m 100W, 2m 50W, 70cm 20W. (13.8V DC)

Developed on the FT-897 and FT-817 transceivers. Built-in features 32 colour display, spectrum scope, AM airband receive, built-in memory keyer, detachable front panel, DSP unit supplied.

IN STOCK NOW PRICED £849 ! !

ICOM IC-756 PRO II £1999 C

Flagship of the Icom range of HF transceivers. HF & 50MHz, features large colour LCD with spectrum scope, auto ATU and 32-bit floating point DSP unit.

ICOM IC-7400 Special offer £1449 C

COMES WITH FREE SP-21 & SM-20

HF/VHF 100W transceiver. Features large LCD with spectrum scope, auto ATU and same DSP system as IC-756PRO II. Supplied with free SP-21 speaker & SM20 desk mic.

ICOM IC-706 IIG DSP £799 C

HF/VHF/UHF mobile DSP transceiver. Its relative small size not only makes it a great mobile rig but also for fixed station use as well. HF general coverage Rx and VHF & UHF.

ICOM IC-718 £449 C

HF 100W transceiver. Covers all HF bands plus wideband receive. C/w auto notch, dual VFO, SWR meter etc. Options include extnl ATU DSP & filters.

ICOM IC-910X with 23cm £1249 C

Icom's all mode VHF/UHF transceiver with 23cm. Large clear LCD with lots of facilities. 100W on VHF and 75W on UHF, 10W on 23cm. IC-910H version £1149

KENWOOD TS-2000 £1695 C

Top-of-the-range 100W Kenwood transceiver. HF/VHF/UHF or up to 23cm with the optional module. Built-in auto ATU, DSP and its unique TNC.

KENWOOD TS-870S DSP £1399 C

HF DSP 100W base station. Excellent all round rig great for DX working with its ability to winkle out weak stations using its true IF DSP. No filters to buy.

KENWOOD TS-570DGE £849 C

HF100W base station with built-in auto ATU. Very popular rig, excellent performance on SSB and CW. Two fitted antenna sockets - very handy.

YAESU FT-1000 mKV £2499 C

200W HF transceiver, EDSP, Collins filter, auto ATU, 220V AC PSU - Acknowledged as one of the finest DX rigs on the market. Superb tailored audio and the ability to select Class A bias for dramatic signal purity.

YAESU FT-1000 FIELD £2199 C

100W HF transceiver, EDSP, Collins filter, auto ATU, 220V AC / 13.8V DC - Building on the success of the FT-1000MkV, the Field has become a respected leader in its class.

YAESU FT-897 NEW £989 C

100W HF rig plus 2m and 70cms (50W/20W) 13.8V external supply / internal optional FP-30V AC power supply / self powered portable using optional Ni-MH pack at 20W output. Compatible with FC-30 auto ATU and ATAS 120/100 antennas. The "must have" radio for 2003.

YAESU FT-847 £1199 C

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

YAESU FT-817 £569 C

All bands & All modes gives you a totally portable HF DX or VHF/UHF station. *Ours includes* battery and charger.

LINEAR AMP UK CHALLENGER III £1795 C

HF linear amp 160-10m including WARC bands. Output 1500W CW or SSB, 400W RTTY. Soft start and timer protection at switch-on. Front panel adjustable ALC.

LINEAR AMP UK RANGER 811H £895 C

HF linear amp 160-10m including WARC bands. Drive 10-100W, output 800W (max) CW. Soft start on switch-on. Compatible with all modern 100W HF rigs. Silent running Papst fan.

AMERITRON AL811 XCE £799 C

Ideal 600W HF Linear more than enough for the full UK limit. 160-10m including WARC bands. Uses 3x 811A low-cost valves. Matches all modern 100W solid state HF rigs. Silent running cooling fan.

TOKYO HY-POWER HL-50B £265.95 C

This model has been specifically designed for the FT-817. Enjoy up to 50 Watts output

FD-7021 POWER TANK £24.95 B

12V DC 4Ah supply, ideal for FT-817 and the new IC-703.
**2x 12V, 12A Cigar lighter sockets *+3/6/9V outputs *Computer controlled battery state *Built-in lantern *AC charger & cigar lighter power cord included *Shoulder strap *Compact size: 180 x 85 x 210mm *2.3kg*

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PRICE MATCH

WON'T DISCOUNT CUSTOMER SERVICE THE ONLY THING WE

ICOM IC-2725E NEW £309 C

The Icom IC-2725 dual band FM transceiver is proving very popular. Easy to install, the controller is separated from the main unit - great where space is limited.

ICOM IC-207H £279 C

Great budget price dual band FM 50W/35W transceiver. Simple band operation. Front panel detachable from main unit if required.

ICOM IC-2100H £229 C

2m 55W FM mobile. Commercial grade, rugged construction. One piece die-cast aluminium chassis. Selectable green or amber display.

YAESU FT-8900R NEW £349 C

Want the best of all worlds then the FT-8900R is just the ticket! A rig with four of the most popular mobile bands - 10m/6m/2m & 70cm. Detachable head. Airband Receive.

YAESU FT-7100 £329 C

Excellent dual band radio that has extended rx. Power is 50/35W. Features dual in-band reception and detachable display (requires YSK-7100).

YAESU FT-1500M Special Offer £159 B

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

KENWOOD TMD-700E £449 C

Certainly the best dual band mobile transceiver with APRS. Does not need extra high cost boards to function. The only extra if required is a compatible GPS receiver.

KENWOOD TM-V7E £359 C

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

KENWOOD TM-G707E £289 C

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

YAESU VX-7R NEW £329 B

6m/2m/70cm

Available in Silver or Black

The VX-7R is the best outdoor handie ever. The case, keypad, speaker and connectors are all sealed against water damage. Wide Frequency coverage from 500kHz to 900MHz the VX-7R is ideal for monitoring a variety of broadcasts. The display is a dazzling 132x64 dot matrix providing easy-to-read frequencies and information plus pictorial graphics.

YAESU VX-1R GREAT PRICE £119.95 B

2m/70cm

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

SAVE £100 WAS £219

YAESU VX-110 £99 B

Combining the ruggedness of the VX-150 with the simplicity of 8-Key operation, the VX-110 is a fully featured 2m handheld ideal for the most demanding of applications. It has a die-cast csae, large speaker and illuminated keypad.

ICOM IC-E90 NEW £269 B

The new E-90 offers triple band coverage of 6m, 2m and 70cms. Up to 5W output and rx coverage from 495kHz - 999MHz makes this a very attractive rig.

ICOM IC-T3H £129 B

The IC-T3H 2m handheld features tough quality but with slim looks. Its striking green polycarbonate case has been ergonomically designed. The rig is capable of providing a powerful 5.5W output with either Ni-Cad or Ni-MH battery packs. Supplied with charger and rechargeable battery.

KENWOOD TH-D7E £319 B

DATA COMMUNICATOR

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.

KENWOOD TH-F7E £259 B

WITH EXTRA WIDE RX COVERAGE

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

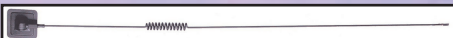
Up to 6W out with Li-ion battery and "scanner" style coverage from 100kHz to 1300MHz including SSB on receive! This is a great radio to have at all times when you are on your travels.

KENWOOD TH-G71E £199 B

If you want an excellent 2m/70cm dual-bander then you can't go wrong with the TH-G71. Fully functional with three power levels, 200 memories, CTCSS tone encoder/decoder, illuminated keypad and backlit LED.

MOBILE ANTENNAS

WATSON ANTENNAS (PL-259 base type)



NEW WGM-270. *ON GLASS ANTENNA*
Dual Bander 2m/70cm, 3.7m coax, Power 50W.
Supplied with matching box and mounting kit.

W-2LE	2m quarter wave 2.1dBi 0.45m	**£9.95**	A
W-285S	2m 3.4dB 0.48m (fold over base)	**£14.95**	B
W-77LS	2m/70cm 0/2.5dB 0.42m	**£14.95**	B
W-770HB	2m/79cm 3/5.5dB 1.1m	**£24.95**	B
W-7900	2m/70cm 5.6/7.6dB	**£32.95**	B
W-627	6m/2m/70cm 2.15/4.8/7.2dB 1.6m	**£34.95**	B
WGM-270 NEW	2m/70cm On glass 3.7m coax 50W	**£29.95**	B

MOBILE BASES

DIAMOND

K-600M.
Deluxe boot mount SO-239, c/w 5m RG-58 & PL-259

AML	Gutter mount fold over type	**£15.95**	A
K-11	Universal gutter mount	**£24.95**	A
K-33	Adjustable hatch mount	**£23.95**	A
K-400	Adjustable boot mount heavy duty	**£26.95**	A
K-600M	Deluxe boot mount + cable	**£49.95**	B
DPK-TR	Stainless Steel boot mount (ECH)	**£18.95**	A

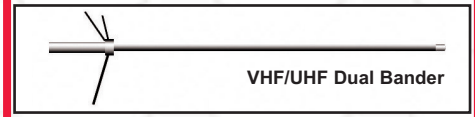
WATSON

WM-14B.
Large diameter 14cm magnetic mount SO-239, c/w 5m RG-58 & PL-259

W-3HM	Adjustable hatch mount	**£14.95**	A
WM-08B	8cm mag mount, 5m cable PL-259	**£9.95**	A
WM-14B	14cm hvy duty mag mount+cable	**£12.95**	A
WSM-88V	BNC mag mount plus 3m cable	**£14.95**	A
W-3CK	5m 5D-FB cable assembly+pigtail	**£18.95**	A
W-ECH	5m standard cable kit assembly	**£12.95**	A

BASE STATION ANTENNAS

DIAMOND



VHF/UHF Dual Bander

X-200	2m/70cm colinear 6/8dB 2.5m	**£79.95**	C
X-300	2m/70cm colinear 6.5/9dB 3.1m	**£99.95**	C
V-2000	6m/2m/70cm 2.15/6.2/8.4dB 2.5m	**£89.95**	C

WATSON

W-300.
Very popular dualband base antenna. Supplied with u-bolts for mast fixing.

W-30	2m/70cm colinear 3/6dB 1.15m long	**£39.95**	C
W-50	2m/70cm colinear 4.5/7.2dB 1.8m long	**£49.95**	C
W-300	2m/70cm colinear 6.5/9dB 3.1m long	**£64.95**	C
W-2000	6m/2m/70cm 2.15/6.2/8.4dBi 2.5m	**£69.95**	C

WATSON SAFE-2-WAY NEW £89.95 B

AT LAST ! !
A HANDS FREE SYSTEM THAT REALLY WORKS!

**Widely used commercially *Approved to Pan-European Standards *True Hands-Free *Noise Reducing *Acoustic Tailored Mic *Remote (3m) Latching PTT *Boom mic (3m) with Velcro *Adjustable gain *Adjustable Time-Out *Powered from rig mic socket *Ready made rig leads (£14.95 extra) *Also matches handhelds.*

The **Safe-2-Way** mobile Interface is made for Watson in the UK by the same company that equips UK Police and Emergency services with similar units. Purchase the ready-made lead to match your radio and tuck the unit out of sight. The plug-in PTT and boom mic both have 3m leads for dressing around vehicle. Don't risk your Licence or people's lives! Drive with **Safe-2-Way**.

CHECK OUR WEBSITE WWW.WSPLC.COM FOR MORE DETAILS OF THESE PRODUCTS

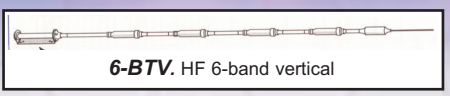
WATERS & STANTON

1973 WATERS & STANTON PLC 30th ANNIVERSARY 2003

PRICE MATCH

VERTICAL ANTENNAS

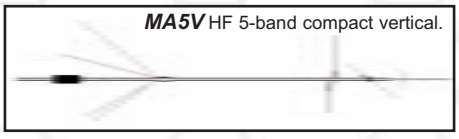
HUSTLER



6-BTV. HF 6-band vertical

6-BTV *NEW*	80-40-30-20-15-10m 1kW PEP	**£239.95**	C
5-BTV	80-40-20-15-10m 7.64m 1kW	**£209.95**	C
4-BTV	40-20-15-10m 6.52m 1kW PEP	**£169.95**	C

CUSHCRAFT



MA5V HF 5-band compact vertical.

MA5V	20-17-14-12-10m 250W PEP	**£229.95**	C
R8	40-30-20-17-15-12-10-6m 1.5kW	**£529.95**	C
R6000	20-17-15-12-10-6m 1.5kW PEP	**£349.95**	C

HORIZONTAL BEAMS & DIPOLES

CUSHCRAFT

Not got the space for a full sized HF beam antenna, then the mini beam MA-5B should be considered.

MA-5B	10-12-15-17-20m 4 el. Yagi 2kW	**£349.95**	D
A4-S	10-15 & 20m 4 el. Yagi 2kW	**£599.95**	D
A3-WS	12 & 17m 3 el. Yagi 2kW	**£399.95**	D
X-7	20/15/10m 7 el. Yagi 2kW	**£699.95**	D
TEN-3	10m 3 el. Yagi 2kW	**£219.95**	C

RADIO WORKS

A choice of quality wire antennas available to fit almost any circumstances.

CW-160	160-10m 76.8m long	**£139.95**	C
CWS-160	160-10m 40.5m long	**£134.95**	C
CW-80	80-10m 40.5m long	**£99.95**	C
CWS-80	80-10m 20.1m long	**£119.95**	C
CW-40	40-10m 20.1m long	**£94.95**	C
CW-20	20-10m 10.36m long	**£84.95**	C
CW-620	20-6m 9.7m (32ft) long	**£94.95**	C
G5RV PLUS	80-10m with balun 31m (102ft) long	**£64.95**	B

MOBILE ANTENNAS

HUSTLER

Standard Resonator 400W (mast sections not included)

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	**£24.95**	B
RM-20	20m 80-100kHz	**£24.95**	B
RM-30	30m 50-60kHz	**£26.95**	B
RM-40	40m 40-50kHz	**£26.95**	B
RM-80	80m 25-30kHz	**£29.95**	B

Super Resonator 1kW (mast sections not included)

RM-10-S	10m 250-400kHz	**£24.95**	C
RM-15-S	15m 150-200kHz	**£26.95**	C
RM-20-S	20m 100-150kHz	**£31.95**	C
RM-40-S	40m 50-80kHz	**£37.95**	C
RM-80-S	80m 50-60kHz	**£51.95**	C

Lower Mast Sections

MO-1	54" (FOLD @ 22")	**£33.95**	C
MO-2	54" (FOLD @ 27")	**£33.95**	C
MO-3	54" (NON FOLD)	**£26.95**	C
MO-4	27" (NON FOLD)	**£22.95**	C

Mobile Mount Accessories

SSM-1	Ball mnt stainless steel spring&stud	**£45.95**	B
SSM-2	Ball mount	**£28.95**	A
SSM-3	Stainless steel spring & stud	**£24.95**	A
HOT	Trunk lip mount	**£24.95**	A
RSS-2	Stainless steel resonator impact spring	**£10.95**	A
QD-2	Quick disconnect adaptor	**£19.95**	A
VP-1	Multi-band adaptor	**£7.95**	A

LOWE SPS-8400 PSU £99.95 C

SPECIAL OFFER

A general purpose variable 3-15V DC, 25A (30A peak) power supply. Modern design, dual analogue meters, front power terminals. More than enough for 100W trnasceivers.

MANSON EP-925 PSU £99.95 C

A general purpose 3-15V DC, 25A (30A peak) power supply able to provide the needs of the modern 100W HF transceiver.
**Dual analogue meters *Over current protection *Large power terminals for rigs *Quick snap connectors for ancillaries*

LDG RT-11 Asm ATU £239.95 B

**1.8-54MHz *5-150W *6-800 Ohm loads *Remote Autotuner *RF sensed *Dipoles, Verticals, Beams *Water resistant enclosure *built-in Icom and Alinco connectivity *Supply 11-15V DC *Size 216 x 140 x 76mm *Weight 1.14Kg*

MFJ-969 ATU Deluxe Versa Tuner II £199.95 C

**1.8-54MHz*
**300W PEP*
**T-match network*
**Internal 4:1 balun*
**Built-in dummy load*
**X-needle meter*
**3-way ant switch*
One of the most popular 300W models.

WATSON FC-130 Frequency Counter £79.95 B

The FC-130 is an ideal frequency counter for the shack, mobile or portable use. Supplied complete with Ni-Cads, charger and telescopic whip.

AVAIR AV-20 VSWR/Power Meter £39.95 B

Two cross-needle VSWR/PWR Meters ideal for any shack.
**AV-20 3.5-150MHz *AV-40 144-470MHz *FWD/RFLD VSWR + PWR *150W *Sockets SO-239 *50 Ohms *Size 85x87x95mm *Weight 280g*

AV-40	X-needle VSWR/PWR 140-525MHz	**£39.95**	B

WATSON W-GMP Morse Key £29.95 A

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

WATSON W-CRI Morse Key £46.95 B

- Metal parts brass
- Hardwood base
- Size 145 x 80 x 50mm
- Weight 375g

MFJ-461 Morse Code Reader £84.95 B

**Stand alone unit *Built-in mic *32char high contrast LCD *Automatic speed tracking *Serial port *Built-in speaker *9V PP3 (not included)*
Simple PC program available (user supplies disk)

WEST MOUNTAIN RIGBLASTERS

RIGblaster pro	Data interface 8-pin/mod, Cd & cables	**£299.95**	B
RIGblaster Plus	Data interface 8-pin/mod, Cd & cables	**£139.95**	B
RIGblaster M8	Data interface 8-pin, software & cables	**£109.95**	B
RIGblaster M4	Data interface 4-pin, software & cables	**£109.95**	B
Rigblaster RJ	Data interface RJ45, software & cables	**£109.95**	B
RIGblaster nomic8P	Data interface 8-pin, software & cables	**£59.95**	B
RIGblaster nomicRJ	Data interface RJ, software & cables	**£59.95**	B
FT100-CBL	Adapts all units to FT100 input	**£12.95**	A

AUDIO ACCESSORIES

HEIL

Desk Microphones

HCL-5/4	Classic retro-look HC-5/4 desk mic	**£259.95**	B

Hand Microphones

GM-4/5	Goldline HC-4/HC-5 hand mic	**£129.95**	B

Headsets & Boom microphones

HST-817	Traveler single side headset for FT-817	**£89.95**	B
HST-706	Traveler single side headset for IC-706	**£89.95**	B

Headphones & Boom Microphones

PRO-SET-PLUS	Large H/phones with HC-4 & HC-5	**£199.95**	B

WATSON

Base Microphones

WM-308	Desk electret mic c/w ML-308	**£59.95**	B

Earpieces

WEP-300B	Over the ear, 3.5mm mono jk-plug	**£2.95**	A

Speaker Microphones

QS-112(Y,K,I,M)	H/held spkr/mic (state which model)	**£16.95**	A

bhi NES10-2 & NES-5 DSP Speakers

NES10-2

£99.95 B

**Speaker with built-in DSP noise filters *Dip switches for 8 filter settings (NES10-2) *DSP settings preset, no user adjustment (NES-5) *Plugs directly into 3.5mm speaker socket *Handles up to 5 Watts input *Max 2.5 Watts output *Requires 12V at 0.4 Amps max*

NES-5

£79.95 B

bhi NEIM1031 NEW £129.95 B

NOISE ELIMINATING IN-LINE MODULE
** Noise attn -20dB (typical) * Noise Attn levels 8 * Audio output power 2.5W RMS max (8 Ohms) * Audio connections: Line level in/out (RCA Phono), Audio in/out 3.5mm mono jack * Line i/p impedance 10K * Line o/p impedance 100 Ohms * Line in sensitivity 300mV -2V RMS * Headphone socket 3.5mm mono jack * Power 12-24V DC 500mA*

bhi 1042 SWITCH BOX NEW £29.95 B

Connect more than one piece of equipment to your bhi noise eliminating speaker with the 1042 Switch Box.
Allows 6 pieces of equipment to be connected, 3 inputs loaded at 8 Ohms and 3 unloaded inputs (for low level signals). Two audio leads provided.

TRANSMITTING LOGBOOK NEW £4.99 A

Traditional Logbook for Radio Amateurs, A4 size, spiral bound for ease of use plus updated Prefix List and room for extra notes. A log is a legal requirement for any radio station.

MOBILE/PORTABLE LOGBOOK NEW £4.99 A

The new Radio Amateurs Mobile/Portable Logbook. A5 size, spiral bound. Also contains relevant repeater information. Not a legal requirement for mobile, but great for recording QSO's.

CHECK OUR 2003 PRODUCT GUIDE FOR MORE DETAILS OF THESE PRODUCTS

PW

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Cover Subject

There's so much going on in this issue... that we were at a slight loss as to what to show on the cover this month! So we've shown a selection of the delights you'll find inside. And of course this month you'll have plenty to keep you busy as there's an extra 32 pages in the free *Antennas To Go - Chase That HF DX* magazine for you to read. The team hope you enjoy it and welcome your comments.

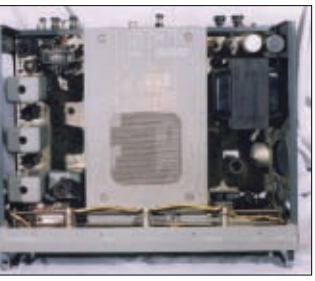
Remember Amateur Radio is a hobby for us all to enjoy - no matter what your level of expertise so, keep on spreading the word and encouraging newcomers to join in and have a go!

Design: **Steve Hunt**

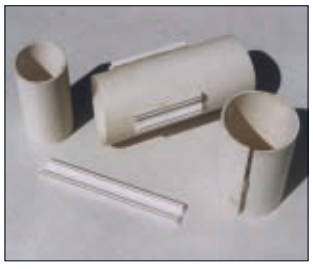
Free with this issue!

May features

Page 4



Page 26



Page 29

Page 34

Page 37

4

Page 46

May regulars

Page 9

Page 56

Page 60

Page 64

Page 66

Page 68

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Lets face it, you have to get used to hearing that every day when you own a Kenwood TS-870S – its digital technology has transformed the world of amateur communications. This HF all-mode transceiver is equipped with powerful twin 24-bit DSP (digital signal processors) at the IF stage – an innovation that leads to such benefits as high-efficiency digital filtering, powerful noise/interference reduction, equalizers and DSP detection. And the TS-870S is digital in other ways: it can be fully computer-controlled using a high-speed link. There's an antenna splitter, dual antenna connectors and an automatic antenna tuner that works on transmit and receive. All of this, plus the full range of high-performance features for which Kenwood reigs are renowned. By any measure, Kenwood's TS-870S merits true distinction.

▮ IF-stage digital signal processing & digital filtering ▮ SPAC noise reduction (CW/SSB) ▮ Built-in K1 Logi-Keyer with full contest mode ▮ Built-in Com port (to 57k bps) – standard Kenwood protocols ▮ AIP and IF auto notch ▮ Menu system ▮ 100 memories ▮ Multiple scan functions ▮ Time or carrier scan-stop ▮ All-mode squelch ▮ Optional digital recording unit ▮ Optional voice synthesizer for CQ calls, etc.

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E-mail: comms@kenwood-electronics.co.uk

ANOTHER PACKED ISSUE

rob mannion's keylines

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

When I was first licensed as G3XFD I was determined to mark the passing of **everyday mainline** steam locomotive operation in the UK on my QSL card. I did so with one of my own photographs of a Standard Class locomotive running light from Eastleigh (near Southampton) to Bournemouth.

My original card carried the phrase "*Gone...but not forgotten*" under the loco's photograph. However, I ran out of the cards some years ago and had also lost the printing block...so it was back to square one searching for a new subject.

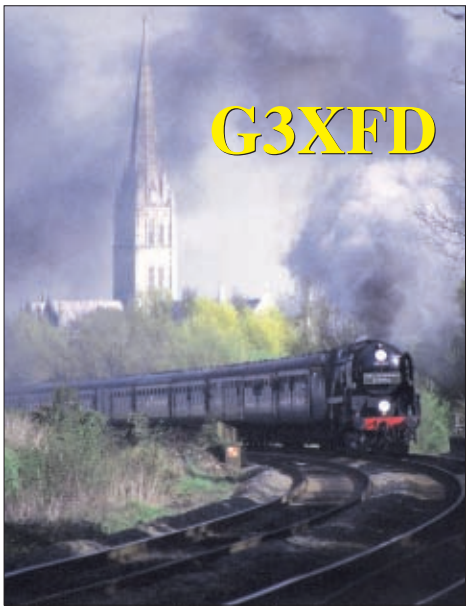
An amazing series of coincidences then took place which I know will amuse readers. They started last year on Monday 15 April with my mother's gift of a steam loco hauled trip on *The Cathedrals Express* (a crew training run from Eastleigh to Yeovil via Salisbury). The first coincidence was meeting many other Radio Amateurs on the train...including **Chris Lorek G4HCL**! Eventually there were well over 20 Amateurs on board - all enjoying the day out.

Unknown to me, as the train pulled out of Salisbury, the photograph, shown here was taken by **Paul Blowfield** (although I had seen that every lineside vantage point seemed to have a photographer in position!). And although G4HCL and friends were in the front carriages - I chose the rear of the train so I could seem more of **Merchant Navy Class 35005 *Canadian Pacific*** on curves, etc. But the last coach (mine) is just visible!

Paul's photograph eventually appeared in the *Railway Magazine* later in 2002. The Editorial staff there kindly forwarded my letter to Paul who lives in Andover. He then kindly agreed to provide me with two large prints at cost and to allow me to use the shot on my QSL card.

The coincidences continues! My late father-in-law worked on the locomotive, and a school friend's father drove it on many occasions. So, I'm delighted to promote the ancient Kingdom of Wessex, my love of all things railways, and our hobby via my QSL card...thanks to Paul Blowfield's superb action shot.

Now I need a suitable photograph of an Irish locomotive and train for my Irish QSL card representing **EI5IW**. However, I'll have to decide whether it's to be of an Irish standard gauge or my beloved County Donegal narrow gauge trains!



Merchant Navy Class 35005 *Canadian Pacific* leaves Salisbury bound for Yeovil Junction on Monday 15 April 2002. It so happens...G3XFD (and other Radio Amateurs) were enjoying the ride! (Photograph courtesy of Paul Blowfield)

Chelmsford Club Visit

On Tuesday 4 March I had a wonderful evening with the truly enthusiastic a members of the **Chelmsford Amateur Radio Society** (**CARS**), at the Marconi Company's base in Essex. Over 80 people were in attendance at the Marconi Sports & Social Club in Beehive Lane (an appropriate location for such an active club!). It was such an enjoyable evening that we over-ran somewhat, with the result that the Question and Answer session was shorter than I prefer.

As I've already mentioned, Chelmsford is an incredibly active club and although they're all as keen as mustard...one man in particular - **Trevor Hawkins M5AKA** - has to be singled out for special attention. **He's an extremely effective and active** Public Relations Officer. I think every club should have a Trevor...if this was possible Amateur Radio would be efficiently promoted. And as I said during the evening - let's hope Trevor will one day make it to RSGB President or another post where his work for his own club, its members and our hobby will be used to best advantage. Well done Chelmsford...and Trevor!

Cheerful Times

Sometimes when I visit a club I'm left in no doubt that our hobby is forging ahead - fizzing with enthusiasm. Sometimes, however, it's the other way round and I can sense that 'apathy rules', although this is fortunately a rare occurrence and is outweighed by clubs such as Colchester.

As we forge into the future...we can build on the foundation to the hobby provided by the local groups of like-minded enthusiasts. So...long live the local club! *PW*

practical wireless services

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

Subscriptions

Subscriptions are available at £31 per annum to UK addresses, £39 in Europe and £43 (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 £61 (UK) £74 (Europe) and £82 (rest of world), £94 (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 £2.85 each and photocopies are £2.85 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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Orders for back numbers, binders and items from our Book Store should be sent to: **PW Publishing Ltd., Post Sales Department, Arrowsmith Court, Station Approach, Broadstone Dorset BH18 8PW**, with details of your credit card or a cheque or postal order payable to PW Publishing Ltd. Cheques with overseas orders must be drawn on a London Clearing Bank and in Sterling. Credit card orders (Access, Mastercard, Eurocard, AMEX or Visa) are also welcome by telephone to Broadstone **(01202) 659930**. An answering machine will accept your order out of office hours and during busy periods in the office. You can also FAX an order, giving full details to Broadstone **(01202) 659950**.

The E-mail address is **bookstore@pwpublishing.ltd.uk**

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 £20 to spend on items from our Book or other services offered by *Practical Wireless*.

Those Dreaded Toroids Again!

● **Dear Sir**

Well done on another fine issue, for March 2003. I think the Editor's comments in the Radio Basics article about winding toroids absolutely hit the nail on the head! For every reader that builds a circuit from *PW*, or indeed from The Rev. George Dobbs G3RJV's *SPRAT* issues, there must be several who are put off by having to wind coils and toroids. As someone who has always been scared off by winding inductors myself, I can say with certainty that there are two problems.

Firstly: supply...capacitors and resistors are different. You can get them anywhere! But If I need to wind a particular toroid with a centre-tapped 10 turns of 16s.w.g. wire for a simple regenerative receiver, then where do I start? I can get the copper wire from Maplins, **but not the core**. If I do find a supplier of cores, then I'll have to mail off for one, and wait. Then I'm paying premium for postage, or £5 for a minimum order. If I want to build the receiver that badly, then I might do that...but generally I won't. I'll build yet another side-tone oscillator or magnetic loop antenna instead. Maybe I should buy a selection of cores and wire in one go, but every circuit I come across specifies something different, I simply wouldn't know what to buy.

Secondly: When I do buy and wind my own toroid, I can't measure its value with my multimeter. I could build or buy a dip meter if I had a suitable moving coil meter, but I've no idea what a suitable meter is.

What I feel is needed is an Inductor Starter Pack! This would be a pack which contains a selection of the six or so most commonly used toroids and the most used s.w.g. wire to wind them. Additionally...maybe three or four sides of A4 text would help to outline why different cores are used, and how to use the contents of the pack to substitute for toroids in different circuits. Perhaps a selection of pre-wound choke-inductors could be included too...as these are a nightmare to locate.

Maybe a starter pack could also include a kit dip meter? If such a starter pack were available, from *PW* or the **G-GRP Club**, or the likes of **Kanga** or **Tim Walford G3PCJ (Walford Electronics)** then I for one would buy one without hesitation, and I think a lot of others would too. If a pack like this was made available, I could see you doubling the number of readers building your circuits.

The Editor got it absolutely right in the Radio Basics article. But the worry for constructors **is not the actual winding**, the main problem **is not having the right bits and pieces, or the knowledge and confidence to go and buy what's necessary**.

John Clavin G0WPA
Ferndown
Dorset

Editor's comments: Some interesting and worthwhile suggestions their John! Please see Topical Talk this month for further suggestions. There's also hope for those of you who want to buy a dip meter, rather than build one for yourself. See you on page 77!

Radio Basics - Thanks

● **Dear Sir**

Although I thoroughly enjoy the Radio Basics series, as written by the Editor, particularly the edition dealing with toroids (March 2003). Despite his helpful advice, here in the Scottish Borders where I stay - I have a problem. Unless I send away for components by post - providing I know what's needed - there's no source locally that I know of. Hawick, being half way between Carlisle and Edinburgh, is a bit difficult and flitting is not an option for my family.

I have been interested in radio for many years, and inherited all of my late father's radio equipment. But none of his large collection of spare/components contained anything like a toroid or Toko coil! Instead, I have enough EF91s and SP61 valves to last for years.

Thank you Mr Editor for providing as much information as you do in Radio Basics. All I need now is to know **where I can get those necessary bits and pieces**. Can you possibly help even further by providing some sort of list or contacts...especially for toroids? Who else can we ask but the person who writes Radio Basics?

Ian Johnson
Hawick
Scotland

Editor's reply: A cry from the heart eh Ian? I take your point...please join the *PW* team on page 77, where we'll try our best to help you. Incidentally (for English readers) the delightful term 'Flitting' - as used in Scotland - refers to a legitimate house move!

On The Fringe?

● **Dear Sir**

My late father was a keen *PW* reader, and started taking it before joining the RAF around 1938 when he became a ground based wireless mechanic. After the War, he worked in England for a number of years, bringing many surplus radio parts back from London to our then home in County Dublin. From what he used to tell me, he spent most of his spare time in Tottenham Court Road and Edgware Road, where I believe there were many surplus radio shops. He also enjoyed the fish and chips from the Irish chippy on the left-hand side of Tottenham Court Road. Most of the staff there were from County Kerry originally and I wonder Sir, if they are still there?

My main reason for writing to you, is that although *PW* is easy to buy in the shops here in Ireland, including Sligo city where I stay, **radio components are not**. Perhaps some advice on how we can find some of the recommended parts would help readers? Such advice would really help me and I do appreciate that you kind people do your best for the readers spread all over the world... including me in the West of Ireland, on the fringes of Europe.

Pat Kennedy
Sligo
Republic of Ireland

Editor's comment: Nice to hear from you Pat. And yes Pat, many of us remember the Irish chippy in Tottenham Court Road. A convenient half-way meal point. Lovely food too! Please see page 77.

Warning Bell From Germany

● **Dear Sir**

I thought it a god idea to write to *PW* and sound a warning bell for all UK Radio Amateurs suspect that few UK Amateurs are aware of the situation which has now come to fruition in Germany for Amateur Radio. I am referring to a new Law

which has, after a lot of discussion, now been implemented and is binding for all Amateur Radio stations. This law concerns safety levels for field strengths surrounding the antenna. The law now obliges all operators to comply to a strict regime of 'Safety Zones'. To this end all operators now have to produce calculations or measurements to prove that the Safety Zones are being complied with.

The calculations or measurements must be carried out for every band, every antenna and the maximum operated power level. Any change in the antenna system necessitates the re-submission of the calculations/measurements. The measurements also have to take into account special limits which may apparently be dangerous for heart pacemaker wearers.

The operator has to prove that they control this "safety zone" and that they will be aware if anyone enters it. The calculations have to be accompanied by a scale drawing of the antenna site including buildings, waterways, etc. and in the case of directional antennas, a gain diagram is, to be included. **No this is not an elaborate early April Fool's joke** - I include literature from the German regulatory board to prove it so UK Amateurs watch out!

This madness is already established here and we all know how quickly such things can creep across European borders and establish themselves. No matter that the Safe Levels are purely arbitrary either. The (German Government) Minister responsible replied that in her view there are no objective scientific safety levels only 'politically acceptable' ones.

You can all imagine how this situation affects the hobby of an Amateur who has very little time for his favourite hobby and lives in a block of flats! Here are some sample Safety Zones: a Yagi for 28MHz at 5m height, transmitter power 200W p.e.p. = 18.01 metres. A ground-plane for 21MHz at 5m height, transmitter power 200W p.e.p. = 5.42 metres. A Yagi for 144MHz at 12.5m height, transmitter power 160W p.e.p. = 74.28 metres.

All I can say to British Amateurs is that the first noise of such things from the UK Authorities should be stamped on firmly, quickly and decisively.

Chris Eckett
G0MZX/DL4XAC
Berlin
Germany

Editor's comment: If this isn't, as Chris says, an elaborate hoax/media hype...it could cause us problems in the UK eventually. We hope to publish a fully detailed report in *PW* very soon.

Thank You George G3RJV!

● **Dear Sir**

George Dobbs ended his article on the single coil Z match in the March issue by asking people to let him know how they got on with it. And I would let him know, through you, that I made the Z match up from my spares box in an afternoon. I happened to have all the bits, including the ferrite, and a box to put them in... which was a big incentive to try it)! It tunes my W3DZZ trapped dipole perfectly from the top of 28MHz right down to the bottom of the 3.5MHz band.

I have made several a.t.u.s including a two coil Z match and a T section with a roller coaster and I think George G3RJV's single coil Z match betters them all; it was certainly the cheapest of them all to make. Please pass my thanks on to George for yet another excellent article and project! Kind regards to everyone at *PW*.

Peter Boyd M0PMB
Porthleven
Cornwall

Editor's comment: Thanks passed on Peter - carry on enjoying George's column!

Memories Of Fred Ward G2CVV

● **Dear Sir**

I was much moved by your obituary to the late **Fred Ward G2CVV** in the March issue of *PW*. I thought you captured his character absolutely spot on.

Of course, my memories of Fred do not go back as far as yours do but every year we used to meet up either at the Agency Roadshow or at some other event and the conversation was always a lively one. It was Fred and I who were present together at the very first RSGB Morse Test at the NEC in Birmingham when they took over its running from BT. It went very well but then everything involving Fred usually did! After such meetings it was often hard getting away as Fred invariably had just that 'one more' story to tell as you were going out of the door!

Every year Fred turned up at the Agency Roadshow to meet and greet his former colleagues or to 'tweak the tails' of panel members from within the audience. There was only one occasion when I got the better of him and that was a couple of years ago when he stood up in a 100 strong audience and asked what he could do about interference from a baby alarm into his Amateur Radio gear. If he was expecting some deep technical response...then he was disappointed because I told him that the most appropriate course of action that would remedy the problem would be for him to go next door and change the baby's nappies. As a response it brought the house down with laughter...but Fred took it all in good part!

I last saw him in November 2002 when the Roadshow called at Coventry. I gave Fred an Agency tie and one of my younger colleagues said to me that he thought these were only to be issued to Agency personnel. I gently told him I was giving a memento to a legend.

I will miss him lots and, as you said, it was a real privilege to have known him. Best wishes to everyone at *PW*.

Barry Maxwell
Director
Radiocommunications Agency
Wyndham House
London E14

Editor's comment: I'm delighted my humble 'from the heart' comments were enjoyed by you and others Barry...Fred was a truly great Radio Amateur and friend to everyone...even when he didn't agree with something/or someone he kept on an even keel! Perhaps the RA might like to think of continually honouring his name by instituting an award to be presented to like-minded Amateurs, reflecting the Agency's appreciation of such an attitude and approach to our hobby? I think it would be a singular honour for the recipient, and would further cement the excellent relations between the RA and our wonderful pastime.

Practical Wireless Bad For Health?

● **Dear Sir**

The new issue of *PW* has just landed on my door-mat and within minutes my blood-pressure was sent soaring! It's sad when my favourite magazine becomes a health hazard!

As you no doubt intended, the timely article on forthcoming bureaucratic problems of Operating Portable caught my eye and immediately had me reaching for the Beta-blockers to persuade the old ticker back to its normal lethargic rhythm.

AND THEN ... I realised the date of the new issue! A little early, possibly, but then relief swept over me in a tidal wave as it dawned on me **I'd been had**. You've done it again! A brilliant piece of work. I'm sure you will be inundated with either praise or medical bills (not to mention irate letters from over-stretched Parking Agencies across the country). At least - I sincerely hope it was an April fool spoof?

I also read about the FT-75 with particular interest - and recalled the sad demise of my own FT-75. In 1972 I bought one from Lowe, together with a series of G-Whips for /M from my Citroen D Pallas in which there was abundant room for mobile rigs - (unlike modern cars). The results were fantastic /M and I was soon tempted to try it out from the shack, feeding it into the G8KW trapped dipole, where, despite its VXO limited tuning, it out-performed the FT400/FL400 DX

rig even when using its maximum 30W ()it also had a 15W option).

For indoor use, I bought its matching mains p.s.u. and that is where the problem arose. The main switch was a push-button on the front panel of the TX/RX, comprising merely a spring-loaded slider over a thin brass strip, intended for switching the 12V d.c. input. However, the 240V a.c. mains unit was also activated through this relatively flimsy switch. Unfortunately, after a short time it appeared that 'tracking' occurred on the brass strip causing a carbon trail to form which became a high-resistance path when the unit switch was **Off**. One day, after operating for a while I switched off and went for lunch, only to find on my return an hour later that the shack was full of smoke pouring from the FT-75 where the whole of the power-switching section had overheated and begun to smoulder as the plastic sleeving melted.

I later sold the carcass to an enterprising amateur who contacted to Yaesu about the problem. Yaesu then supplied all the new components for him to re-build the melted section. Later, they acknowledged the problem and beefed up that particular switch on all their FT-75s to a ceramic job, more suitable for the higher current.

John Thexton G3URE
Cambridge park
Twickenham

Editor's re-assurance: Although we (successfully) raised your blood pressure John I'm glad you enjoyed the joke! Yes, rest assured...you have got the right idea! Mind you...even though we've had a few melted telephone handsets here in the office...it doesn't equal the fireworks which accompanied the article from Perè Sottise last year! Finally, we'd like to hear from anyone who still regularly uses/or has a working FT-75 in their shack.

Power Line Transmission

● **Dear Sir**

It looks as though Power Line Transmission (PLT) is going to be on the scene despite the efforts of the RA, RSGB, BBC, etc. Scottish Hydro-Electric and SSE Telecom have started their commercial Powerline (broadband Internet access via power cables).

Starting with the town of Stonehaven, also covering their previous trial areas of Crieff and Campbeltown, coverage is expected to expand, with areas in Southern England also apparently on the list. No doubt other Companies will follow in due course.

You may be interested in the pertinent section of the reply which I received from SSE regarding possibilities of breakthrough with respect to short wave listening. (I contacted them via their Website). "I do not expect our operation of this system to make any difference to your radio reception....the work which the RA, the BBC and RSGB have been doing to date has concentrated on measurements using specialised equipment within a few metres of the cable carrying the signal".

With that sort of attitude, I don't think that rational argument will have any effect on a decision to introduce this service. It's my understanding that Japan has banned PLT because of EMC problems, but in my opinion this won't stop the Government's drive towards Broadband Britain, whatever the cost to existing legitimate users of the h.f. spectrum. Besides which, don't forget that there's a **lot of money** to be made from such a 'service'.

What chance do we have?

Mark Coultas G0SLP
Bowburn
County Durham

Editor's comment: Following the information arriving from Mark, I contacted Scottish Power in an effect to learn their side of the story. We hope to have authoritative comment from them and also the Radiocommunications Agency in time for the next issue of *PW*.

● 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.

April 13
The Cambridgeshire Repeater Group Annual Rally
Contact: Paul Dyke G0LUC
Tel: (01462) 683574
E-mail: g0luc@btinternet.com
The Cambridgeshire Repeater Group are holding their Annual Rally at Bottisham Village College, Bottisham, which is six miles east of Cambridge. Access is via A14 and A1303. Features will include a large hall, car boot sale and a Bring & Buy. Doors open at 1030 and admission is £1.50. Refreshments will be available and there will be a Talk-in on S22.

*April 27
West London Radio & Electronics Show
Contact: Paul Berkeley M0CJ
Tel: (01737) 279108
E-mail: m0cjx@lineone.net
Website: www.kemptonrally.oc.uk
The West London Radio & Electronics Show organised by Radio Fairs takes place at Kempton Park Racecourse, Sunbury-on-Thames, Middlesex. Several major radio traders will be attending this new event as well as a Bring & Buy sale manned by the Echelford Amateur Radio Society and Morse code testing. The Whitton Amateur Radio Group will provide a Talk-in on S22 using GB2KRT. Show times are 1000-1700 hours, admission £3.50 (£3 after 1230), under 16s, Free.

April 27
The Aldridge & Barr Beacon ARC Radio & Electrical Sale
Contact: Doug G4LQY
Tel: (01543) 571269
The Aldridge and Barr Beacon Amateur Radio Club are holding their 4th Annual at Aldridge Community Centre, Anchor Meadow, Middlemore Lane, Aldridge, Walsall. Admission is just 50p and doors open at 1030 - there will be a free car park and refreshments.

May 4
Spring Great Northern Hamfest
Contact: Ernie Bailey G4LUE
Tel: (01226) 716339/(07787) 546515
The South Yorkshire Repeater Group are holding their 2003 Spring Great Northern Hamfest at the Metrodome Leisure Centre Complex, Queens Road, Barnsley, South Yorkshire. Doors open at 1000. The venue is all on one level and has excellent disabled facilities. Features include all the usual trade stands, component and specialist interest groups and a large Bring & Buy.

May 5
Dartmoor Radio & Computing Rally
Contact: Ron G7LLG
Tel: (01822) 852586
The Dartmoor Radio & Computing Rally is to be held at Pannier Market, Tavistock, Devon - in the same new location as last year - giving plenty of space for traders to display their wares and for visitors to see them and talk to old friends. There is access for disabled visitors and plenty of public car parking within five minutes walking distance. There will be trade stands, a Bring & Buy and refreshments. Doors open at 1030 (1015 for disabled visitors), talk-in on S22. There are beautiful views over Dartmoor - ideal for picnics, why not bring the family?

May 5
Winsford Amateur Radio & Computer Rally
Contact: David G4XUV
Tel: (01606) 77787.
The Winsford Amateur Radio & Computer Rally is to be held at Winsford Civic Hall. Doors open 1000 (0945 for disabled visitors). There will be a large Bring & Buy, radio, computer and antenna traders, plus special interest groups. Full catering and bar. Admission is just £1.50.

*** Look out for a representative from PW Publishing Ltd. at this rally. Go along to the stand for great deals on subscriptions to *Practical Wireless, Radio Active* and *Short Wave Magazine*, clearance books and a selection of back issues.**

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.

amateur radio news

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

Island Activities

Minkieboys On Air Again

Listen out for the Belgian DXpedition team, the Minkieboys when they take part in the 2003 IOTA Contest from Ile de Sein EU-068.

The Minkieboys are no strangers to activating the Ile de Sein for the Islands On The Air (IOTA) contest as they have successfully done so for the past three years. This year the team will set up their station on the island from **Thursday 24 July** and will operate using the callsign TM3ON until **Tuesday 29 July** 2003 when they will leave the island

This year's team will consist of ON4ASG, ON4AVA, ON4ON, ON5SY, ON6CX, ON7PQ, ON7XT, ON9CGB & ONL10451 the cook. The QSL manager for all calls will be **Danny Commeyne** ON4ON, via the bureau or direct to **Rozenlaan, 38, B-8890 Dadizele, Belgium.**

We'll bring you more news as we receive it, but in the meantime why not check out the Minkieboys website at **http://users.skynet.be/minkies/** where you'll find details on previous DXpeditions and updates on this year's contest.

A New Generation of Amateurs

Battery Power!

Always keen to encourage newcomers to our hobby, PW's h.f. columnist Carl Mason GW0VSW believes in catching them young.....

● Class 8 of Coedffranc Infants School with Deputy Head Teacher Mr Joe Cudd (Alastair is 4th from left).

Carl GW0VSW's son **Alastair** attends Coedffranc Infants School and in conjunction with Science Week Carl was roped in to putting on a radio demonstration for Alastair's class. The class have been studying batteries so all the radio equipment had to be battery powered.

Using an FT-817, a v.h.f. hand-held, a couple of PMR sets and a selection of Morse trainers the class were delighted and fascinated to hear a selection of stations on 7MHz. Unfortunately the indoor dipole antenna and the 2.5W of power wasn't quite enough to break through the 'pile-ups' and so unfortunately no QSOs were made. Nevertheless the children enjoyed the session and who knows some of them may form the next generation of Radio Amateurs!

Not content with encouraging Class 8 of Coedffranc Infants School, Carl has also been busy refurbishing the training room at Neath & District Sea Cadets. He has given the classroom a coat of paint, put up shelving and installed some h.f./v.h.f. radio equipment! It's a wonder Carl has time to write his HF Highlights column because he's also a busy TV news cameraman!

Keep up the good work Carl. The *PW* team appreciate your efforts in encouraging the next generation of enthusiastic Radio Amateurs.

Listen Up!

Short Wave Magazine Listening Contest

If you enjoy a spot of short wave listening why not join in with our sister publication Short Wave Magazine's Listening Contest, which is taking place on Sunday 4 May 2003?

Short Wave Magazine will be running a station manned by SWM Editor **Kevin Nice G7TZC**, **M3SWM**, **Clive Hardy G4SLU** and various other keen volunteers. The station will operate from Dorset's famous Island of Portland at grid reference SY700727 and during the day **G3SWM** will also be activated.

Operation will be from 0500 until 1700hours and the main band in use will be 7MHz on approximately 7.070MHz however, it's likely that the station will operate on other bands, which will be mentioned on the day. The event station's objective will be to work as many other stations as possible so that listening contest entrants have as many logging opportunities as possible.

Licensed Amateurs are invited to work the event station. Every hour, on the hour, starting at 0700, G3SWM will observe a 10 minute window for M3 exclusive contacts to promote M3s working the station. There will be an attractive and unique QSL card available for the day's activity. To make things even more interesting the station will be located in the relatively rare WAB square SY77DOR*****. This square's rarity is due to most of the area being occupied by the English Channel.

***** Note that G3SWM is not a WAB Book Holder.

The overall winner of the *SWM* Listening contest will be the entrant who has amassed the most points based on the stations they have logged during the 12 hour operating period. All stations **must** have worked the Event station G3SWM to be a valid logging.

All reports must include the report given to G3SWM and the serial number allocated by G3SWM, if the contact is to be considered. There will be several winning categories for the Listening Contest; Overall Winner, Best UK Place and Best Overseas Place. So go on - make sure you lend your support!

For the full rules see the April issue of *Short Wave Magazine* and on the *SWM* website at **www.pwpublishing.ltd.uk/swm/contest/**

Terrorist Attack

Radio Amateur Missionary Killed

An American Southern Baptist missionary who was among 21 people killed as a result of a terrorist bomb blast in the Philippines was an avid Amateur Radio operator.

Bill Hyde KB0KUB of Cedar Rapids, Iowa, was tragically killed on 4 March in Davao City, the second largest city in the Philippines. Bill, together with his wife **Lyn**, worked extensively in the Southern Philippines Baptist Missionary Seminary.

Together with a friend **Larry Greene N7LG**, Bill maintained an Amateur Radio station at his remote outpost home, providing him with the only reliable means of contact with the rest of the world. In addition to his wife, Bill leaves behind the couple's sons, **Steven and Timothy**. Our condolences go out to the family.

Science Week Success

Introduction to Radio

During March and National Science Week Southport & District Amateur Radio Club presented Bishop David Sheppard Primary School's Year 6 children with an Introduction to Radio as part of National Science Week.

National Science Week is run every year to raise the awareness, increase appreciation and improve understanding of science, engineering and technology. In 2002, over 1,850 events took place throughout the country, over a third of them were aimed at children under 12 years old, and more than 710,000 people visited and participated in them.

The Southport & District ARC presentation was to 45 children and consisted of a slide show covering the history of radio and its uses today. After which the class got involved in hands-on sessions which included building a crystal radio, operating and listening to a shortwave receiver where they heard Amateur and commercial stations, operating a pair of PMR446 hand-held transceivers and using the phonetic alphabet. Finally, the children were able to talk to another member of the club a few miles away using a special event station that had been established specially for the event, **GB5BDS.**

● Brian Rimmer G0JCQ oversees the operation of the special event station.

Each child received a special commemorative certificate and a number of promotional items that had been kindly donated by the **Radiocommunications Agency**. Headmaster, **Alan Marston**, and Deputy Headmistress, **Stephanie Tasker**, said that the event had been a great success and that the children had thoroughly enjoyed it.

Derek Hughes G7LFC, the club's Publicity Manager and organiser of the event, would like to thank the Radiocommunications Agency and the RSGB (who provided a pack of books for the school's library) for their generous support of the event, **Don Atkins M1BUL**, the club's Secretary, and **Brian Rimmer G0JCQ** for assisting in the running of the event at the school and **Jim Mealey G0LBF** for being 'out there' and allowing the children to talk to a 'real' radio operator.

● Building the crystal radio.

As a special thank you to Jim for spending all day at home on the radio, a special A3 QSL card was designed and the children put all their names on it.

If you'd like to know more about the Southport & District Amateur Radio Club's activities please contact **Don Atkins M1BUL** or take a look at the club's website.

Don Atkins M1BUL
79 Roe Lane, Southport, PR9 7HR. Tel: (01704) 227726
E-mail: donatkins@lineone.net Website: www.southportarc.org.uk.

Help Out Your Fellow Amateurs

Can You Help?

Patrick and Daniel need your help!

Patrick Xavier M3XAP describes himself as an old s.w.l. from 1959 and a *PW* reader. He is trying to lay his hands on a *PW* blueprint of an electric Hawaiian guitar which he thinks was published in 1967 or before. If you can help Patrick with his request please contact him direct via E-mail at **Xaps@aol.com**

Daniel Rodzen SP9EME is a 22 year old Radio Amateur from Poland and an electronics student who wants to spend his holidays in the UK to help him improve his English. If you can help Daniel by offering him accommodation and board in return for housework, etc., he would love to hear from you. You could also share Amateur Radio experiences with him too!

Daniel Rodzen SP9EME
Modrzewiowa 3a/4 Street
41-706 Ruda Slaska
E-mail: sp9eme@poczta.onet.pl

Unveiling Marconi

Chelmsford Celebrations

The Chelmsford Publicity machine's been busy again! This time they've sent us news about the unveiling of a rather special statue in Chelmsford.

Members of the Chelmsford Amateur Radio Society (CARS), **Harry G5HF** and **John G8DET** recently attended the official unveiling of a statue of Marconi at the entrance hall of the Record Office, Wharf Road, Chelmsford. **Princess Elettra** attended the event and was invited by Councillor **Michael Mackrory**, Leader of Chelmsford Borough Council, to unveil the statue of her Father, Guglielmo Marconi. She gave a nice speech in which she said she was pleased that Chelmsford had honoured her Father.

● Princess Elettra and John G8EDT with the statue of Marconi.

The Chairman of Chelmsford Amateur Radio Society, **John G8DET** was fortunate to chat with Princess Elettra and he reminded her of the 100 year Marconi Celebrations that took place just over two years ago when she transmitted to Cape Cod. She said she remembered the event with pleasure and liked the photographs of herself on the CARS website.

If you'd like to get involved with CARS activities contact the Secretary **David Bradley M0BQC** on **Tel: (01245) 602838** or via **E-mail** at: **cars@g0mwt.org.uk**

Callsign Activated

Steaming Ahead

The Events calendar for the Windermere Steamboat Museum has now been finalised for the coming season.

The Windermere Steamboat Museum Amateur Radio Society will be activating the Callsign **GB2WSM** on the following days from the Museum premises at Rayrigg Road Bowness on Windermere.

The station will be running on Sunday 13 April, Sunday 18 May, Sunday 8 June, Sunday 13 July, Sunday 17 August and Saturday & Sunday 1-7th September. If any licensed Amateur would like to visit the station and help to operate the station on any (or all) of the dates please get in touch with the Museum Administrator, **David Addison** on **(01539) 445565, G0XTC** on **(01539) 446863** or **G0TAK** on **(01539) 738293**.

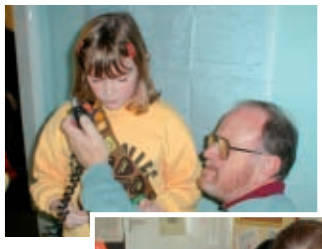
Guiding Radio

'Surprise Yourself' is the challenge Girl Guiding UK puts to its members and that's exactly what Debbie Cheshire M3DHC and her 17 year old daughter Victoria did!

Guiding has a long association with Amateur Radio and events like Thinking Day on the Air gives members the chance to gain new skills, have fun and even open career opportunities. Thinking Day on the Air is an annual event on the Guiding Calendar, providing an opportunity for the members of Girl Guiding UK from the youngest Rainbow (five years) to the oldest Trefoil Guild member (65 years plus) to talk to other members of the World Association of Girl Guides and Girl Scouts all over the world via Amateur Radio and to other Radio Amateurs around the globe.

Last summer on a week long International Guiding Camp at Lyndhurst in the New Forest attended by 1500 participants, Debbie & Victoria experienced their first real 'taste' of Amateur Radio. One of the activities was a visit to a radio shack - GB2HWG (Hampshire West Guides) - set up by the Itchen Valley Amateur Radio Club (IVARC) Special Event Team from Chandlers Ford, Hampshire.

● Learning the Phonetic Alphabet was made easy with Debbie MSDHC's game.



● Experiencing the thrill of talking to the world via Amateur Radio!

● Morse magic!

Victoria was especially keen to visit GB2HWG as there was a chance that her Grandpa **David Anger M0BMF** from Suffolk might be listening and after a quick telephone call Victoria had her first QSO. Also during the two hour session Victoria was able to learn to solder and made an amplified loudspeaker to fit on her CD player to use instead of her earphones as well as playing battleships on two-way radios!

The members of the IVARC were really enthusiastic about the hobby and Victoria was so excited having spoken to Grandpa that she was encouraged to enrol on the next foundation course and before long they found themselves driving down the motorway to Chandlers Ford. Debbie had been told that if she had to take Victoria to the course she might as well take part while she was there!

After completing our 12 hours of tuition, the examination and getting over their nervousness on the radio, Victoria and Debbie became the proud owners of Foundation Licences and the M3 callsigns **M3VIKI** and **M3DHC** respectively.

Not long after gaining her M3 Licence Debbie found herself volunteering to arrange a Thinking Day on the Air event for the Winchester Guiding Division! Enlisting the help of **Liz Jones M0ACL** of IVARC who's also a member of Girl Guiding UK the preparations began.

With the help and support of the Commanding Officer, Colonel David Norris, Army Training Regiment, Winchester and the members of IVARC, the weekend finally arrived. Debbie had planned the weekend like a military manoeuvre and says she had not slept properly for weeks! The response to the event was better than Debbie could have hoped for.

In two hour sessions up to 20 participants came through the door. Each visitor was given the chance to learn the phonetic alphabet by playing with a puzzle Debbie had devised, the chance to learn to send Morse code, making QSL cards and of the course the chance to go on air with the special event callsign **GB2WD** (Winchester Division).

Contacts were far and wide, some being with other special event radio stations. Guide station GB2WD made contacts in the USA, Java, Austria, Finland, Germany, France, Sweden, Italy, Russia, Niger, Argentina, Brazil, Holland, Greece, Columbia, Tenerife, Wales, Northern Ireland and the UK. The maps around the shack were used to show the girls where their contacts were, and they found this very exciting.

The equipment used for v.h.f. contact included a Kenwood TR-751E transceiver putting 25W into a co-linear antenna, which was about 25 feet high on a pump-up ex-army mast. The h.f. equipment used was a Kenwood TS-850SAT transceiver putting 100W into a G5RV antenna at about 15 feet between two cherry trees.

Over the weekend some 140 participants visited the shack, the youngest being a Rainbow aged six, two Cubs Scouts who didn't want to be left out because their sisters were attending, 72 Brownies aged between seven and 10, 15 Guides aged 10 and a handful of adults. The Brownies used their new skills to gain their Radio Communications Badge and the Guides completed clauses in the World Guiding Badge.

All the participants were given Guides on the Air Badges. Victoria M3VIK also used her newly acquired skills and her Foundation Licence to achieve the skills section of her Silver Duke of Edinburgh Award.

The response to weekend was more than Debbie could have hoped for. The aim had been to introduce Amateur Radio to the girls and to ensure that they had fun and by the look of sheer pleasure on their faces on making contacts on the radio, learning phonetics and hearing Morse code and trying to decipher this was achieved.

So if anyone from Girl Guiding approaches you towards the end of the year asking for your help to set up a special event radio station next February, please consider helping. The pleasure, excitement and enthusiasm shown by the youngsters is an untapped source - you never know, they may be the Amateur Radio enthusiasts of the future!

amateur radio clubs

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

BRISTOL

Shirehampton ARC
Contact: Ron Ford
Tel: 0117-985 6253
Website www.shirehampton-arc.org.uk
Shirehampton Amateur Radio Club meet every Friday evening at the *TS Enterprise* Sea Cadet Unit, Station Road, Shirehampton from 1930hours. The club is currently running Foundation Course and Morse Assessment classes and further information can be found on the club's website. The club holds the callsign GX4AHG and can be heard on h.f. and v.h.f. most Friday evenings

CENTRAL SCOTLAND

Falkirk Amateur Radio Society.
Contact: Robert GM4CAQ
Tel: (01506) 844418
E-mail: rmiles@zetnet.co.uk
The Falkirk Amateur Radio Society is moving to a new venue. The club will now meet on Monday evenings at 1930hoursrs in the 62nd Forth Valley Scouts Hall, Larbert Cross, Larbert, nr Falkirk. Any members or visitors who are unfamiliar with the area please call on S20/SU20 or GB3OH for talk-in. The club offers c.w. as and when required as well as Amateur Radio Foundation and Intermediate courses. For course information please contact: **Ken GM4NTX** via e-mail at **gm4ntx@nfld.totalserve.co**

MANCHESTER

Manchester Wireless Society G5MS
Contact: Steve
Tel: 0161-330 0914.
E-mail: secretary@g5ms.com
Wesbite: www.manchester-wireless-society.co.uk
Members of G5MS meet at the Simpson Memorial Hall, Moston Lane, Moston, Manchester. Meetings are held on Tuesday evenings at 1900 hours (local time). All Radio Amateur and Short Wave Listeners are assured of an enjoyable evening and a warm welcome. Forthcoming meetins include: **April 15:** On air with Hellschreiber - the digital mode**; 22nd**: G5MS Annual General Meeting; **May 6**: Saftey in the shack..By the St. Johns Ambulance Brigade and **13th** Quiz Night. So why not go along and join in the fun?

NORTHERN IRELAND

Bangor & District ARS
Contact: Mike GI4XSF
Tel: 0284-277 2383
E-mail: mike@gi4xsf.com
Website: http://welcome.to/bdars
The Bangor and District Amateur Radio Society meet on the first Wednesday of every month in 'The Stables, Groomsport, County Down at 2000hours. Visitors and new members are always welcome. On Wednesday **7 May**, the club are hosting a talk on EMC by **Jeff Smith MI0AEX**. The club are also preparing for their summer radio rally on Sunday 22 June. There promises to be a good selection of radio and computer traders in attendance and as well as a Bring and Buy. The rally will take place at Crawfordsburn Country Club, which is near Bangor, County Down. Doors will open at 12noon.

ANTRIM & DISTRICT ARS

Contact: David GI4FUM
E-mail: chairman@gn4siw.co.uk
Website: http://www.gn4siw.co.uk
The Antrim & District Amateur Radio Society meet at Clotworthy Arts Centre in the Castle Grounds in Antrim on the Second Thursday of each month at 1900hours. The club is open to all who have an interest in Amateur Radio and is linked with the Antrim and District Scouts. The club also offers corses for the Foundation, Intermediate and Full Amateur Radio Licences. Forthcoming meetings and club activities include: **May 8:** Construction evening - 3.5MHz DF; **June 14**: N.I. ARDF championship and **July 5th/6th**: GN4SIW/P VHF NFD.

Keep those details coming in!

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SO239 double female £1.00

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HF YAGI

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BOOM:4.42m LONGEST ELE:8.46m
POWER:2000 Watts £269.95

ADEX-6400 6 BAND 4 ELEMENT TRAPPED BEAM FREQ:10-12-15-17-20-30 Mtrs GAIN:7.5 dBd BOOM:4.27m LONGEST ELE:10.00m
POWER:2000 Watts £499.95
40 Mtr RADIAL KIT FOR ABOVE £99.00

HF VERTICALS

VR3000 3 BAND VERTICAL
FREQ: 10-15-20 Mtrs
GAIN: 3.8 dBd HEIGHT:3.80m POWER:2000 Watts (without radials)
POWER: 500 Watts (with optional radials) £89.95
OPTIONAL 10-15-20mtr radial kit £34.95

VR5000 5 BAND VERTICAL FREQ:10-15-20-40-80 Mtrs GAIN:3.5 dBd HEIGHT:4.00m RADIAL LENGTH:2.30m (included). POWER: 500 Watts £169.95

EVX4000 4 BAND VERTICAL FREQ:10-15-20-40 Mtrs GAIN:3.5 dBd HEIGHT:6.50m
POWER:2000 Watts (without radials) POWER:500 Watts (with optional radials) £99.95
OPTIONAL 10-15-20mtr radial kit £34.95
OPTIONAL 40mtr radial kit £12.95

EVX5000 5 BAND VERTICAL FREQ:10-15-20-40-80 Mtrs GAIN:3.5 dBd HEIGHT:7.30m POWER:2000 Watts (without radials) POWER:500 Watts (with optional radials) £139.95
OPTIONAL 10-15-20mtr radial kit £34.95
OPTIONAL 40mtr radial kit £12.95
OPTIONAL 80mtr radial kit £14.95

EVX6000 6 BAND VERTICAL FREQ:10-15-20-30-40-80 Mtrs HEIGHT:5.00m RADIAL LENGTH:1.70m(included) POWER:800 Watts £249.95

EVX8000 8 BAND VERTICAL FREQ:10-12-15-17-20-30-40 Mtrs (80m optional) HEIGHT: 4.90m RADIAL LENGTH: 1.80m (included) POWER: 2000 Watts £269.95
80 MTR RADIAL KIT FOR ABOVE £79.00

(All verticals require grounding if optional radials are not purchased to obtain a good VSWR)

TRAPPED WIRE DI-POLE ANTENNAS

(Hi Grade Heavy Duty Commercial Antennas)

UTD160 FREQ:160 Mtrs LENGTH:28m POWER:1000 Watts £44.95
MTD-1 (3 BAND) FREQ:10-15-20 Mtrs LENGTH:7.40 Mtrs POWER:1000 Watts £39.95
MTD-2 (2 BAND) FREQ:40-80 Mtrs LENGTH: 20Mtrs POWER:1000 Watts £44.95
MTD-3 (3 BAND) FREQ:40-80-160 Mtrs LENGTH: 32.5m POWER: 1000 Watts £89.95
MTD-4 (3 BAND) FREQ: 12-17-30 Mtrs LENGTH: 10.5m POWER: 1000 Watts £44.95
MTD-5 (5 BAND) FREQ: 10-15-20-40-80 Mtrs LENGTH: 20m POWER:1000 Watts £79.95
(MTD-5 is a crossed di-pole with 4 legs)

PATCH LEADS

STANDARD LEADS
1mtr RG58 PL259 to PL259 lead £3.95
10mtr RG58 PL259 to PL259 lead £7.95
30mtr RG58 PL259 to PL259 lead £14.95

MILITARY SPECIFICATION LEADS
1mtr RG58 Mil spec PL259 to PL259 lead £4.95
10mtr RG58 Mil spec PL259 to PL259 lead £10.95
30mtr RG58 Mil spec PL259 to PL259 lead £24.95
1mtr RG213 Mil spec PL259 to PL259 lead £4.95
10mtr RG213 Mil spec PL259 to PL259 lead £14.95
30mtr RG213 Mil spec PL259 to PL259 lead £29.95
(All other leads and lengths available, ie. BNC to N-type, etc. Please phone for details)

COMMING SOON! **CS401 4-WAY COAX SWITCH**

Just **£49.95**
plus £6.00 P&P
We are taking pre-orders **NOW!!!**

Scarborough Special Events

The Scarborough Special Events Group (SSEG) are celebrating their 15th Anniversary year by airing from various special callsigns from some interesting locations in the coming months. Listen out for the following events, lend your support and work the stations:

Scarborough Windmill GB2SW May 10-11th

The group will be active from the Old Windmill, Scarborough, during National Mills Weekend. A succession of windmills have stood on this town centre site for more than 500 years; the present windmill dates from 1784 and eventually stopped grinding corn in 1927.

Now beautifully restored as a high class hotel, this is one of the most unique locations from which the group have operated. A full postcard sized colour souvenir QSL of the Windmill will be available.

15th Anniversary Of SSEG GX0OOO June 21-22nd

The first Special Event organised by the Group was in June 1988. Since then they have operated more than 30 GB stations, dozens of unique portable stations and issued more than 40,000 QSL cards. The Commemorative 15th Anniversary card (shown here) features a selection of recent QSLs. Although active mainly during this weekend, the call will be used for 28 days.

International Lighthouse Weekend GB2SCA August 23-24th

The station will be active from the Lamp Room at the top of Scarborough Lighthouse in support of International Lighthouse Weekend. This year the QSL will be a souvenir painting of Scarborough Lighthouse by a local artist.

The Scarborough group will also be active throughout the year during international contests using the callsign **M0O** and on 144MHz f.m. from the top of various UK mountain summits using the club callsigns GX0OOO/P, GS0OOO/P and GC0OOO/P in support of the Summits-On-The-Air organisation. The group's Intermediate class demonstration station 2E0OOO will also be active on the QRP frequencies on 17 June, which is International QRP day.

HAYDON Communications

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Mail order: 01708 862524

See over for address

NEXT DAY DELIVERY TO MOST AREAS, £10.00.

New MOBILE PENETRATOR

1.8-30MHz (200W PEP) mobile antenna – no ATU required. Length 102" (52" collapsed). Fits 3/8 mount (SO239 feed point)

INTRO PRICE **£129.95** delivery £10

Mag mount £24.95	Body mount £12.99
"Roof bar" mount £9.95	Cable kit £9.99

Q-TEK PENETRATOR

"WE'VE SOLD 100s ALL OVER EUROPE"

★ 1.8 - 60MHz HF vertical ★ 15 foot high ★ No ATU or ground radials required ★ (200W PEP).

ONLY **£179.95** delivery £10

SEND SAE FOR LEAFLET

Q-TEK ZL SPECIALS

Delivery £10.00

2m	5ele (boom 45"/9.9dBd)	£49.95
2m	7ele (boom 60"/12.5dBd)	£54.95
2m	12ele (boom 126"/14.5dBd)	£79.95
70cm	7ele (boom 28"/12.5dBd)	£39.95
70cm	12ele (boom 48"/14.5dBd)	£59.95

Q-TEK YAGIS

Delivery £10.00

2m	5ele (boom 63"/10.5dBd)	£49.95
2m	8ele (boom 125"/13dBd)	£64.95
2m	11ele (boom 156"/13.5dBd)	£94.95
2m	5ele crossed (boom 64"/10.5dBd)	£79.95
2m	8ele crossed (boom 126"/13dBd)	£99.95
4m	3ele (boom 45"/8.5dBd)	£56.95
4m	5ele (boom 128"/11.5dBd)	£69.95
6m	3ele (boom 72"/8.5dBd)	£59.95
6m	5ele (boom 142"/11.5dBd)	£79.95
70cm	13ele (boom 76"/14.9dBd)	£46.95
70cm	13ele crossed (boom 83"/14.9dBd)	£79.95

NEW DOUBLE DELUXE G5RV

160-10M double length (200 foot). **£84.95** del £8.50

DELUXE G5RV

Multi-stranded heavy duty flexweave wire. All parts replaceable. Stainless steel and galvanised fittings.

Full size - 102ft (80-10m).....£42.95

Half size 51ft. (40-10m) £36.95

Choke Balun ..... Inline balun for G5RV.....£24.95 P&P £3

STANDARD G5RV

Full size 102ft (now includes heavy duty 300Ω ribbon)....£28.95 P&P £6

Half size 51ft (now includes heavy duty 300Ω ribbon).....£24.95 P&P £6

Q-TEK INDUCTORS

80mtr inductors + wire to convert ½ size G5RV into full size. (Adds 8ft either end).....£24.95 P&P £2.50 (a pair)

DIPOLE CENTRE PIECES

Open wire.....£5.99

SO-239.....£5.99

300Ω HEAVY DUTY FEEDER

5m length.....£5.00 P&P £3.00

10m length.....£10.00 P&P £3.00

BALUNS & TRAPS

1.1 Balun		£25.00 P&P £2
4.1 Balun		£25.00 P&P £2
6.1 Balun		£25.00 P&P £2
40 mtrs	Traps	(a pair) £25.00 P&P £4
80 mtrs	Traps	(a pair) £25.00 P&P £4
10 mtrs	Traps	(a pair) £25.00 P&P £4
15 mtrs	Traps	(a pair) £25.00 P&P £4
20 mtrs	Traps	(a pair) £25.00 P&P £4
5.35MHz	Traps	£25.00 (a pair)

1kw Handling

CUSHCRAFT ANTENNA SALE

MA5V	New vertical 10, 12, 15, 17, 20m	~~£229.95~~	£215.00
MA5B	Mini beam 10, 12, 15, 17, 20m	~~£349.00~~	£299.95
A3S	3 ele beam 10, 15, 20m	~~£499.95~~	£449.95
A4S	4 ele beam (10-20m)	~~£599.95~~	£529.95
R-6000	Vertical 6, 10, 12, 15, 17, 20m	~~£349.95~~	£315.95
R-8E	Vertical (40-10m)	~~£499.95~~	£449.95
X-7	7 ele 10, 15, 20m	~~£699.00~~	£599.95

Q-TEK COLINEARS

P&P £10.00

QT-100 GF 144/70, 3/6dB (1.1m) glassfibre	£39.95
QT-200 GF 144/70, 4.5/7.2dB (1.7m) glassfibre	£54.95
QT-300 GF 144/70,6.5/9dB (3m) glassfibre	£69.95
QT-500 GF 144/70, 8.5/11dB (5.4m) glassfibre	£149.95
QT-627 GF 50/144/70, 2.15/6.2/8.4dBi (2.4m) "	£69.95

MOBILE ANTENNAS

P&P £8.50

DB-770M	2m/70cm (3.5 - 5.8dB) 1m PL-259	£24.95
DB-7900	2m/70cm (5.5 - 7.2dB) 1.6m PL-259	£39.95
PL-62M	6m + 2m (1.4m) PL-259	£19.99

NEW: MOBILE HF WHIPS THAT REALLY WORK

PLT-20	20m mobile whip (56" long)	£24.95
PLT-40	40m mobile whip (64" long)	£24.95
PLT-80	80m mobile whip (64" long)	£24.95
New, PLT-5MHz	5MHz mobile whip	£27.95
PLT-259	PL-259 converter for above	£5.95

COPPER ANTENNA WIRE ETC

Enamelled (50m roll)	£12.95 P&P £5
Hard drawn (50m roll)	£13.95 P&P £5
Multi-Stranded (Grey PVC) (50m roll)	£10.95 P&P £4
Flexweave (H/duty 50 mtrs)	£30.00 P&P £5
Flexweave H/duty (18 mtrs)	£15.95 P&P £5
Flexweave (PVC coated 18 mtrs)	£18.95 P&P £5
Flexweave (PVC coated 50 mtrs)	£40.00 P&P £6
Special 200mtr roll PVC coated flexweave	£99.00 P&P £10
Copper plated earth rod (4ft)	£13.00 P&P £6
Copper plated earth rod (4ft) + earth wire	£18.99 P&P £6
15m pack of earth wire	£10.00 P&P £6

NEW NOISE FILTER!

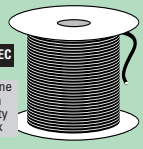
A superb TDK 'snap fix' ferrite clamp for use in Radio/TV/ Mains/PC/Phone etc.

On thin cable simply wind cable round clamp 1-to-2 times. Simple yet effective!

Simply close shut over cables and notice the difference! Will fit cables up to 13mm diameter. Ideal on power supply leads/mic leads/audio leads/phone leads.

OUR PRICE: **2 for £10** (p&p £2.50)

COAX BARGAINS



RG-213 Mil spec x 100m. MILITARY SPEC

ONLY **£69.95** P&P £10

RG-58 Mil spec x 100m.

ONLY **£35.00** P&P £10.00

Genuine high quality coax

COAX SWITCHES

(P&P £4.50)

2 way CX-201 (0-1GHz) SO239	£18.95
2 way CX-201 'N' (0-1GHz) 'N'	£24.95
4 way CX-401 (0-500MHz) SO239	£69.95
4 way CX-401 'N' (0-500MHz) 'N'	£79.95

NISSEI PWR/SWR METERS

RS-502 1.8-525MHz (200W)	£79.95 P&P £5
RS-102 1.8-150MHz (200W)	£59.95 P&P £5
RS-402 125-525MHz (200W)	£59.95 P&P £5
RS-3000 1.8-60MHz (3kW) Incls mod meter	£79.95 P&P £5
RS-40 144/430MHz Pocket PWR/SWR	£34.95 P&P £2

CAROLINA WINDOM

CW-160S	(160-10m) 40m long	£139.00 P&P £8.50
CW-160	(160-10m) 80m long	£134.95 P&P £8.50
CW-80	(80-10m) 40m long	£99.95 P&P £8.50
CW-80S	(80-10m) 20m long	£119.95 P&P £8.50
CW-40	(40-10m) 20m long	£94.95 P&P £8.50

DOUBLE THICK FERRITE RINGS

A superb quaility ferrite ring with increadible properties. Ideal for "R.F.I". Width 12mm/OD35mm.

6 for £12.00 18 for £20.00

P&P £3.50

LOW LOSS PATCH LEADS

Connectors	Length	Price
PL-259 - PL-259	0.6m	£5.99
PL-259 - PL-259	4m	£9.99
BNC - BNC	1m	£6.99
BNC - BNC	1.5m	£8.99

+ £2.50 P&P

TELESCOPIC MASTS

6 section telescopic masts. Starting at 2½" in diameter and finishing with a top section of 1¼" diameter we offer a 8 metre and a 12 metre version. Each mast is supplied with guy rings and steel pins for locking the sections when erected. The closed height of the 8 metre mast is just 5 feet and the 12 metre version at 8 feet. All sections are extruded aluminium tube with a 16 gauge wall thickness.

8 mtrs **£109.95** 12 mtrs **£149.95** *Carriage £12.00.*

Telescopic mast lengths are approx.

Tripod for telescopic masts.....£89.95

20ft BARGAIN MAST SET

4 x 5' lengths of approx 2" extruded (16 gauge) heavy duty aluminium, swaged at one end to give a very heavy duty mast set.

OUR PRICE **£44.95** Del £10

TWO FOR £79.95 THREE FOR £109.95

2 for £79.95 Del £12.50

3 for £109.95 Del £15.00

NEW 20' (approx) SLEEVED SLOT TOGETHER MAST SET

A heavy duty-sleeved, mast set that will tightly slot together. 4 x 5' (2" dia) 16 guage heavy duty aluminuim tubes (dim. approx).

£49.99 Del £10.00. TWO FOR £90.00

ALUMINIUM POLES

ALL MEASUREMENTS ARE APPROX.

2" x 1.5m length	2mm wall thickness	£12.50 P&P £10
2" x 2.5m length	2mm wall thickness	£24.99 P&P £10
2" x 10ft collection only	2mm wall thickness	£29.99
2" x 12ft collection only	2mm wall thickness	£29.99
2" x 20ft collection only	2mm wall thickness	£39.99

FIBRE GLASS POLES

Del £10.00

	1½"	1¾"	2"
1m	£8.50	£10.50	£12.50
2m	£16.00	£20.00	£24.00

NEW EASY FIT WALL PULLEY

Pulley will hang freely and take most rope up to 6mm. (Wall bracket not supplied).

PULLEY **£8.99** + P&P £2.50

Wall bracket, screws not supplied. Simply screw to outside wall and hang pulley on

WALL BRACKET **£2.99** P&P £1.00

MAST HEAD PULLEY

A simple to fit but very handy mast pulley with rope guides to avoid tangling. (Fits up to 2" mast).

£8.99 + P&P £2.50

METAL WORK & BITS

2"	Mast base plate	£12.95 P&P £5
6"	Stand off	£6.95 P&P £5
9"	Stand off	£8.95 P&P £5
12"	T&K Brackets	£12.00 P&P £8
18"	T&K Brackets	£18.00 P&P £8
24"	T&K Brackets	£20.00 P&P £8

10mm fixing bolts (needs 8mm hole)	£1.40 each
U bolts (1¼" or 2")	£1.20 each
8 nut universal clamp (2" - 2")	£5.95
2" - 2" cross over plate	£10.95
3-way guy ring	£3.95
4-way guy ring	£4.95
2" mast sleeve	£9.95
1½" mast sleeve	£8.95
Standard guy kits (with wire)	£24.95 P&P £6
Heavy duty guy kits (with wire)	£29.95 P&P £6
Ground fixing spikes (3 set) powdered coated	£24.00 P&P £8
30m pack nylon guy 4.4m/B/load 480kg	£10.00 P&P £2
30m pack (3mm dia) winch wire	£16.00 P&P £4
Self amalgamating tape (roll)	£6.50
'Nylon' dog bone insulators	£1.00 each
Chimney lashing kit	£12.99

HAYDON Communications

For accessories see over

Mail order: 01708 862524

PRICES SUBJECT TO CHANGE WITHOUT PRIOR NOTICE. PLEASE VERIFY BEFORE ORDERING. E&OE.

NEXT DAY DELIVERY TO MOST AREAS, £10.00.

power supplies

NEW NISSEI PS-1225

25A @ 13.8V yet lighter than an IC-706 but about the same size. *Features:* ● Ultra quiet fan ● Over voltage/current protection ● Weighs ~ 1.8kgs ● Size: 70 x 177 x 190mm

THE GENUINE ARTICLE

~~£79.95~~. **£59.95** Delivery £10.00

PS-1020 as above with meters £89.95

NEW NISSEI MS-1228

28A at 13.8V yet under 2kgs. (H 57mm, W 174mm, D 200mm approx). Fully voltage protected. Cigar socket & extra sokets at front/rear. Ultra slim professional power supply.

'Smallest version to date' now with cigar socket + loads more.

our price **£79.95**

NISSEI PS-300

Features: ★ Over voltage protection ★ Short circuit current limited ★ Twin illuminated meters ★ Variable voltage (3-15V) latches 13.8V ★ Additional "push clip" DC power sockets at rear

DIMENSIONS: 260mm (w), 134mm (h), 260mm (d)mm. Wt: 9kgs.

A SNIP AT **£119.95** Del £10

hf @ slae prices

KENWOOD

KENWOOD TS-570DGE

In our opinion, the best HF Tx below £1500.

OUR PRICE **£815.00**

PS-53 matching power supply.....£229.00
MC-60A Desk mic.....£119.95
SP-23 matching speaker £68.95

KENWOOD TS-870S

TRUE IF DSP TRANSCEIVER When only the best will do! Incl's ATU.

STILL OUR No1 SELLER!

SALE PRICE **£1279.00**

PS-52 matching power supply.....£229.00
MC-60A Desk mic.....£119.95
SP-31 matching speaker £79.95

KENWOOD TS-2000

New all mode multibander: HF/50/144/430 optional 1200MHz. Optional UT-20 (1200MHz module) £299.00

Optional MC-57 DTMP mic £69.95. (Normal hand mic supplied).

SALE PRICE **£1549.00**

PS-53 matching PSU.....£229.00

KENWOOD TM-D700E MkII

2m + 70cm transceiver with built-in modem and APRS facility. Optional extended Rx available. £439.00

A true dual-band radio suitable for the most demanding operator.

Now with much more

SALE PRICE **£399.99**

ICOM

ICOM IC-706II G

Now on its 3rd generation, this classic all-band transceiver is still our No. 1 best seller. HF + 6m + 2m + 70cm.

2 year warranty.

SALE PRICE **£795.00**

SPECIAL OFFER IC-756 PROII
~~£2499~~ OUR PRICE £1899

NEW IC-7400

HF+6m+2m, All mode, 32bit DSP for outstanding signal enhancing. ~~£1549.00~~

OUR PRICE **£1349.00**

FREE THIS MONTH
SP-21 + SM 20 WORTH £200.00

ALINCO

ALINCO DX-70TH

100W HF + 6m transceiver. SSP £699.00 SAVE £100

LATEST UK VERSION

ONLY **£599.00**

EDX-2 Remote ATU ..... OUR PRICE £269.00
EDX-1 Manual ATU .....OUR PRICE £149.00

YAESU

YAESU FT-817

100kHz-440MHz (with gaps). All mode transportable. Includes nicads/charger. O/P:- up to 5W. ~~£799.00~~.

LATEST UK VERSION

SALE PRICE **£549.99**

YAESU FT-100'D' NEW VERSION

Superb mobile/base TVCR for HF/VHF/UHF, all mode. Now includes: TXCO/CW filter (narrow), larger speaker + loads more!

SPECIAL PRICE **£749.00**

FT-847 now in stock £1149.00
FT-897 new model now in stock £975.00
VX-7R new model now in stock.....£325.00

YAESU FT-847

Super base TVCR for HF/VHF/UHF, all mode.

OUR PRICE **£1149.00**

FC-20 matching ATU.....£219.00

YAESU FT-897

New HF + VHF/UHF.

OUR PRICE **£999.00**

Optional battery £99.99
CD-24 adapter requires 12V supply.....£99.99
FC-30 matching auto ATU.....£219.95

vhf-uhf

ALINCO DR-605

2m/70cm. 50/35W. True dualbaner at a sensible price. (Optional extended Rx).

SUPERB DUAL BAND MOBILE AT A REALISTIC PRICE

£229.99

DR-620 2m/70cm mobile new model.....£275.95
DS-596 2m/70 handie £169.95
DR-135 2m FM mobile .....our price £179.00

KENWOOD TH-F7E

Transceiver & scanner 2m/70cm Tx (5W). Rx:- 0.1-1300MHz, all mode (incl SSB). Incls:- Lithium ion battery & charger.

+ FREE REMOTE MIC

'BEST VALUE HANDIE 2003'

SALE PRICE **£249.00**

TM-G707 2m + 70cms mobile £269.00
TM-D700MkII NEW MODEL 2m + 70cms mobile.....£399.99

NEW ICOM IC-2725

2m/70cm dual bander. Includes multi-function D.T.M.F. mic + loads more.

OUR PRICE **£305.00**

E-90 New 6m/2m/70cm handie .....Sale price £259.00
IC-207H.....Sale price £249.99

shack accs

YAESU G-450C

Heavy duty rotator for HF beams, etc. Supplied with circular display control box and 25m of rotator cable. GC-038 Lower mast clamps £25.00

GC-065 2" Thrust bearing £48.00.

SAVE £60

OUR PRICE **£315.00** P&P £10

G650C £359.00
G-1000DXC.....£499.95
GC-038 .....£25.00
GC-065 .....£48.00
G-5500 Azimuth/elevation £535.00

D-308B BLACK DELUXE DESK MIC

(with up/down). Many amateurs using this mic (over 4000) have expressed extreme pleasure with it's performance. Includes 8-pin round "Yaesu" mic lead.

£49.95 P&P £6.00

Yaesu	8 pin round to modular adapter (FT-100, etc.)	£17.99
A-08	8 pin "Alinco" round	£9.95
K-08	8 pin "Kenwood" round	£9.95
I-08	8 pin "Icom" round	£9.95
AM-08	Modular phone "Alinco"	£9.95
IM-08	Modular phone "Icom"	£9.95
KM-08	Kenwood modular lead	£9.95

Spare foram wind guard (M.C.) .....£2.00 each

MFJ PRODUCTS

MFJ-259B

HF digital SWR analyser + 1.8-170MHz counter/resistance meter.

ONLY **£249.95** P&P £6

MFJ-269	160-70cm analyser	£315.95
MFJ-949	300W ATU + dummy load	£149.95
MFJ-969	HF + 6m ATU	£179.95
MFJ-962D	1.5kW versa tuna	£249.95
MFJ-784B	DSP filter	£229.95
MFJ-901B	200W "versa tuner"	£75.95
MFJ-260C	300W dummy load (600meg)	£39.95
MFJ-16010	Random wire tuner	£56.95

UK VERSIONS

desktop receivers

REALISTIC DX-394

★ Superb performance SW receiver ★ 0.2-30MHz (all mode) ★ Selectable tuning steps

OUR BEST SELLING LOW PRICED RECEIVER

OUR PRICE **£199.95**

ICOM IC-R75

The short wave receiver for the true enthusiast. Includes free power unit. ● 0.03-60MHz (all mode)

OUR BEST SELLING RECEIVER

OUR PRICE **£589.00**

JRC NRD-545 DSP

The ultimate short wave receiver with DSP - for the real perfectionist. (Incl's PC software).

OUR PRICE **£1299.00**

NEW - EVOKE-1

SEND SAE FOR COLOUR BROCHURE

Using the latest third-generation D.A.B. technology, Evoke-1 delivers outstanding digital sound quality at an affordable price. A stylish, mains powered receiver without the normal hiss, crackle and fade of old AM/FM broadcast. Transform your radio listening.

OUR PRICE **£99.95** P&P £10.00

SONY SW-100E

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

£159.95 P&P £10

ACE-30 Power supply unit for above.....£26.95
AN-100 Active antenna.....£64.95

SANGEAN ATS-505

DUAL CONVERSION

NEW! Wins Dutch "Automobile" award. Excellent small short wave receiver (digital). 0.15-30MHz (AM, USB, LSB, CW). 88-108MHz FM stereo. Includes carry case.

BEST BUY

OUR PRICE **£89.00** P&P £10

Optional power supply.....£16.95

SANGEAN ATS-909

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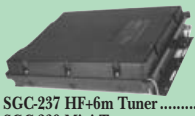

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Looking At...

The Birth of a Radio Wave

Gordon King G4VFV takes us back to the birth of radio signals as he looks at the radio wave.

After launching into the transmission side of Amateur Radio in the last four instalments of Looking At... by looking at simple transmitting circuits and network configurations for coupling the generated radio frequency (r.f.) energy into the ether to yield radio waves, it's now time to start looking at the specific stages of more realistic transmitters and transceivers in more detail. The best place to start, of course, it at the beginning where the r.f. is created and where the radio wave is actually born.

What's A Radio Wave?

So, what is a radio wave? Well, a radio wave is part of the great natural electromagnetic (EM) wave family which has residence not only around this planet of ours but also right into the depths of space. Waves in the so-called radio spectrum differ from their kin, light, heat, X-ray, cosmic, waves etc., only in terms of their wavelength and therefore frequency. All these EM waves travel through space at exactly the same speed, which is mighty close to 300 metres per microsecond!

The constant speed makes it so easy to find the length of a wave in metres (m) simply by dividing 300 by its frequency in megahertz or, conversely, to find the frequency of a wave in megahertz (MHz) by dividing 300 by its wavelength in metres. Let's look at a couple of examples:

The wavelength of a 21MHz wave works out to a shade over 14,28m (300/21=14.28), and the frequency of a 150kHz (0.15MHz) wave works out to 2000m (300/0.15=2000). This simple bit of arithmetic is applicable to all and every EM wave.

Electromagnetic radio waves are created by a rapid change in electric current passing through an antenna that's 'coupled', so to speak, into space (which, from the radio wave point of view, was once called the 'æther' - still a lovely word, but rarely used in this sense any more, which is a pity). Such coupling starts initially with the production of out of phase electric (E) and magnetic (H) fields.

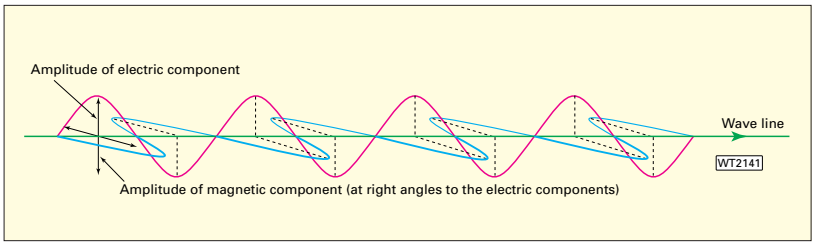


Fig. 1: Representation of the electric and magnetic components of a radio wave travelling through space. Wave polarisation is in the direction of the amplitude of the electric component.

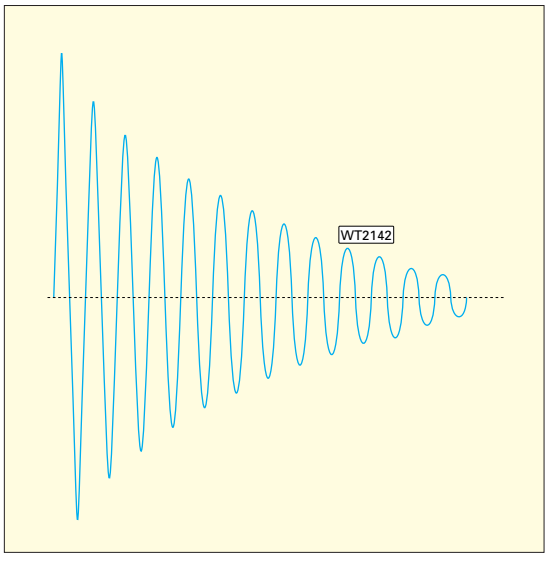


Fig. 2: Oscillogram illustrating a burst of damped oscillation.

However, at a relatively short distance after leaving the antenna, the E and H fields become phase coincident, and when this happens a fully-fledged EM radio wave is born. As the waves spread out from the antenna their amplitude progressively reduces, rather like the waves, which spread out on still water when disturbed by a stone.

Spreading causes the amplitude of the fields to diminish reciprocally with distance, which simply means that each time the distance is doubled, the strengths of the fields is halved. Field strength is usually a measure of the amplitude of the E field in terms of volts per metre (V/m).

A representation of a space-bound section or ray of an EM wave is given in **Fig. 1**, where it will be seen that the amplitudes of the E and H fields are at right-angles to each other and to the direction of wave travel.

Wave Polarisation

Polarisation of a wave is in the direction of the amplitude of the electric field, which implies that the diagram represents a horizontally polarised wave. Excluding the effects of reflection, refraction and diffraction, EM waves travel outwards from source in straight lines at the remarkable speed of 300m per microsecond, just noted - the greatest speed so far proven in our universe.

The first designer-EM-wave was created by an electric spark or arc. This formed the heart of early transmitters - e.g. the spark or arc transmitter.

Before then, when our planet was very young, prior to the advent of man, naturally occurring EM waves would have caused a radio receiver to crackle or crash. Every flash of lightning or naturally occurring electrical disturbance gives rise to its own train of EM waves. Witness how we are bugged by QRN when endeavouring to DX when static is about!

Static QRN

Static QRM is caused by steep-sided pulses of electrical energy consisting of a wide spectrum of frequencies from zero upwards, diminishing in amplitude with increasing frequency that when picked up by the receiver have the effect of 'triggering' the tuned circuit into a chain of damped oscillation **(Fig. 2)**. The oscillatory

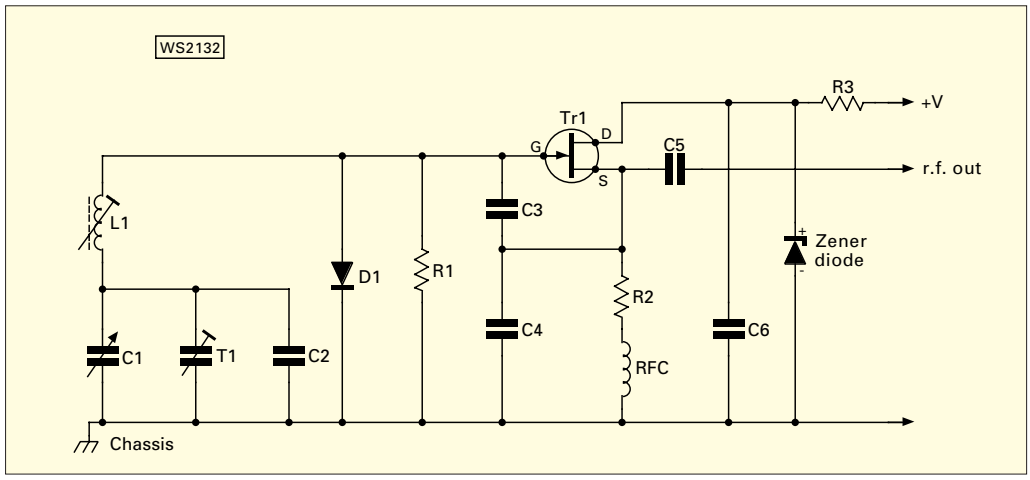
chain is amplitude modulated at a frequency related to the pulse time. Interference sidebands are thus generated, and resolved by the detector in the usual way, the audio manifestation being the characteristic staccato crackles and crashes from headphones or loudspeaker!

So, you now have an elementary impression of what a fully fledged radio wave might look like if it could be seen, how it can be generated naturally and how it travels through space (the ether?). In the previous four Looking At .. columns I have looked at two simple transmitters and various ways in which the radio-frequency (r.f.) energy can be directed into an antenna.

As this series continues I will be investigating the aspects of transmission in greater detail, while also considering how best to focus on to the bands of frequencies that we are able, legally, to exploit without spilling into forbidden (to Radio Amateurs) parts of the radio spectrum and how to keep our signals clean and frequency stable, along with other interesting transmission-related subjects.

Variable Frequency

To round off let's take another look at the embryo of the radio wave, before its launch into the ether - the circuit which is responsible for the actual generation of the r.f. energy in the first place. A classic circuit of this kind, known as a variable frequency oscillator (v.f.o.), is shown in **Fig. 3**, where the active device is a junction-gate n-channel field effect transistor (f.e.t.).



● Fig. 3: Circuit diagram of an f.e.t. variable frequency oscillator - the generator of the r.f. signal. Suggested experimental component values for the 3.5MHz Amateur band are: Tr1 2N3819 or more recent equivalent; L1 circa 22 microhenry; C1 air-spaced 25pF; T1 50pF; C2 75pF; C3 and C4 1nF; C5 47nF; C6 33pF (but see text); D1 1N914 or similar; R1 100k; R2 270; R3 circa 150 (but to relate to the zener diode and supply voltage and current); zener diode; circa 9.1V with 12V to 5V supply; r.f.c. 2.4 millihenry.

The oscillatory circuit consists of inductor L1 tuned by the parallel combination of the tuning capacitor proper VC1, the trimmer capacitor T1 and the fixed capacitor C1, whose values are chosen in conjunction with the inductance of L1 to suit the required amateur band. Trimming of the tuning range is also possible by adjusting the dust-iron core in L1, which alters the inductance value.

Positive feedback, and hence oscillation at the tuned frequency, results from the source (s) back coupling to the gate (g) of the f.e.t. The radio-frequency choke (r.f.c.) retains a high r.f. impedance, while the feedback ratio is a function of C2/C3 values. Drain (d) voltage is stabilised by the zener diode in conjunction with R3 and the decoupling capacitor C4.

The circuit, known as a series-tuned Colpitts oscillator, is renowned for stable operation when care is taken over the choice of components related to the sensitive frequency determining functions. The gate-clamping diode D1 is a specific aid in this respect, as also is the zener diode whose job is to stabilise the supply voltage. Output r.f. is taken from the source through C5, the value of which should be as small as possible consistent with the drive demands of subsequent stages. To help enthusiasts wishing to experiment with this kind of oscillator, I have included components values relevant to the 3.5MHz Amateur band.

Once again I have reached the end of this month's instalment. Enjoy your radio, and I'll be back the month after next.

PW

Radio Basics

Now that Radio Basics readers are armed (hopefully!) with a dip meter, Rob Mannion G3XFD continues describing the preparation stages of the latest project...the Basic-4 receiver.

Although this column is by far the most difficult for me to prepare for readers...it's also the most rewarding! It's only difficult because - due to space limitations - I have to limit the amount of information provided each month, together with the fact that the column is read by a wide range of readers... from outright beginners 'upwards' so to speak. And obviously, readers will understand I have to try to develop a balance so that beginners are assisted and the more experienced don't feel left out.

The feedback (see letters pages) - is most helpful and we're doing our best to respond. And while responding to your letters (I apologise we can only publish a selection of your letters) I suggest - that those of you who don't have a dip meter yet...to look in this month's information panel where there may be some good news for you!

Now it's time to get stuck in...and try some experiments. Please try them out for yourself...because they'll be very helpful - providing knowledge and experience.

Local Oscillator

Whenever superhet receiver designs are mentioned the term 'local oscillator' is always close by. This is because the local oscillator (l.o.) performs a vital task in the superhet by operating in conjunction with the 'mixer' circuitry to provide the required 'difference' or intermediate frequency (i.f.).

However, there's always the danger in over-simplifying explanations regarding the mixer-oscillator of a receiver. So I must point out that although often described separately as 'The Mixer' and 'The Oscillator' these particular stages are in fact often combined. When this is the case they're referred to as 'Mixer Oscillators'.

Additionally, not all simple receivers have radio frequency (r.f.) amplifying stages before the mixer/oscillator. Instead, they'll often just have the incoming r.f. fed straight into the mixer/oscillator unit. So, don't get yourself confused trying to find three separate stages...it might all be happening in the one stage!

The circuit, **Fig. 1**, shows a very simple crystal oscillator which I used in the 3.5MHz to medium converter project in the November 1998 issue of *PW*. It uses the MPF102 field effect transistor (f.e.t.) which I've chosen as the 'standard' active device for the simple RB projects.

The crystal used in the oscillator is a very cheap 4.43MHz colour sub-carrier crystal as used in PAL equipped television receivers. These are available from many sources and only cost around £1.50. The MPF102s are available from sources such as Sycom (see ad this issue), Bowood Electronics, etc.

A variable frequency oscillator could have been used for the project - but I had reasons for not adopting this approach! A variable frequency oscillator (v.f.o.) has to be set-up correctly to work on the frequency required and you need knowledge, experience and some form of indicator to prove that it is on the right frequency. (It's not unknown for a 3.5MHz v.f.o. to be effectively operating on 7MHz...the first harmonic of 3.5MHz - and I say this because I've been caught out myself in the past).

Instead, by using a crystal oscillator you can be assured that (a) the oscillator **should work** first time and (b) it should also be within a 'cat's whisker' of the frequency it's meant to be on (more of this later). However, the disadvantage is that the crystal oscillator in the form shown in Fig. 1, can also cause problems by producing many harmonics (multiples of the original crystal frequency). Despite this though, in this application the little crystal oscillator featured here is perfectly adequate and it can now form part of the learning and preparation process for the full Basic-4 receiver.

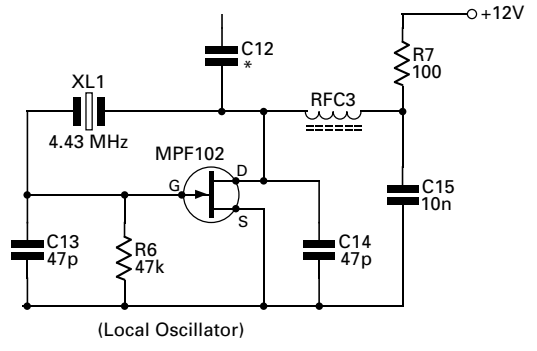


Fig. 1: The local oscillator is the 'heart' of any receiver based on a superhet. For efficient operation of the receiver it is essential that the oscillator operates correctly, and on the right frequency to produce the intermediate frequency (i.f.) required. Variable oscillators can be difficult for inexperienced constructors, and for this reason G3XFD has opted for the fixed frequency crystal oscillator (see text).

Full Circuit

If you now look at the full circuit, **Fig. 2,** you'll see that the local oscillator circuit in Fig. 1 forms the lower part of the illustration. Note that the oscillator's 12V power supply feed goes off to the common 12V d.c. positive supply rail which is also used by the rest of the converter. Note also that the negative '0V' rail (wire) is n now connected to the '0V' rail on the rest of the circuitry.

When the power is provided the l.o.'s MPF102 will start generating the 4.43MHz signal (the local oscillations) and this is then fed (The term 'injected' is commonly used) via capacitor C12 to the Gate (G) of the MPF102 which is situated directly above. This of course is the mixer transistor.

In the example shown, the incoming (amplified by the MPF102 f.e.t. tuned r.f. (t.r.f.) stage is tuned (by the inductor L1) to the 3.5MHz Amateur Band. It then - 'mixes' with the l.o. signal (Which is at 4.43MHz). This mixing process results in a number of 'difference' frequencies being generated* and we will then 'select' (or 'tune') the one we require. In this case the required frequency will be the difference between 4.43 and 3.8MHz (top of the 80 metre band), and 4.43 and 3.5MHz (bottom of the 80 metre band).

****Other signals appear, but we'll ignore the others at present***.

If you now do a simple bit of arithmetic you'll see that at the top end of the 80 metre band the difference between

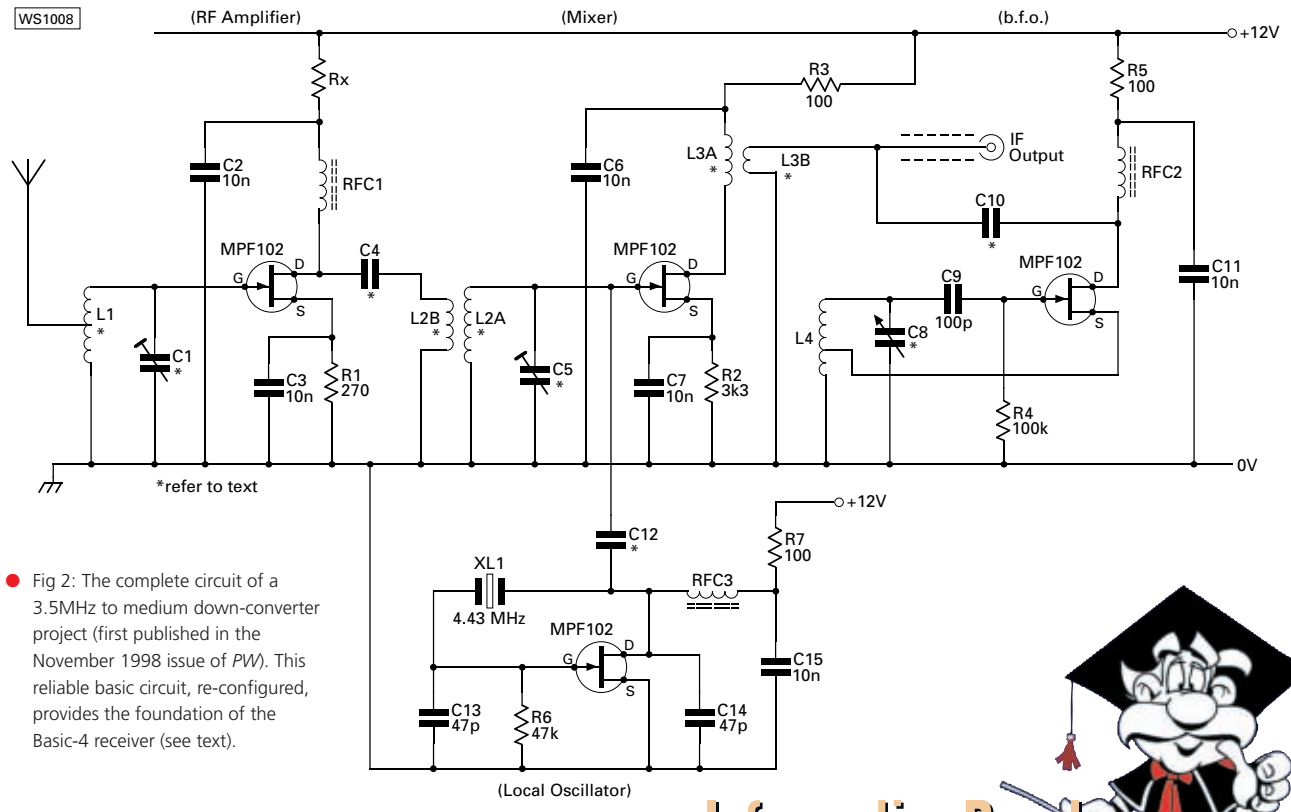


Fig 2: The complete circuit of a 3.5MHz to medium down-converter project (first published in the November 1998 issue of *PW*). This reliable basic circuit, re-configured, provides the foundation of the Basic-4 receiver (see text).

4.43MHz is 630kHz. At the bottom end of 80 metres the difference between 4.43 and 3.5MHz is 930kHz. In other words - the i.f. tuning range for the band covered by this converter is from 630 to 930kHz...ideal for tuning in on a medium wave radio (a car radio with a screened antenna input connection for the converter output was used in the original project).

However, as the 4.43MHz l.o. frequency is **ABOVE** the frequency of the incoming 80 metre band signals...**the i.f. tuning is reversed**. In other words 3.5MHz will appear at 930kHz, and 3.8MHz will appear at 630kHz. In practice this is not a disadvantage - a little odd at first perhaps...but not a real disadvantage.

Incidentally, with one of the odd little coincidences that happen in life...you can actually read about a famous receiver that uses the 'reverse tuning' technique in *PW* this month! You'll find it in the It's A Classic article which features the truly collectable Eddystone EA12 double conversion crystal controlled front-end receiver. So, if the famous Eddystone company can use crystal controlled front-end receivers...we can too!

Experiment & Build

Explanation over, I would like you to now build the l.o. from the circuit provided. If you don't have a 4.43MHz crystal (immediately) to hand - you can use another (surplus crystal between 4 and 12MHz abound in junk boxes, rallies stalls, etc.). Get the oscillator working, and then listen for it on a receiver.

Next, using your dip meter, wind and set-up an inductor to cover the band you want (let's stay with 3.5MHz for the moment eh?). Then build sections A and B in Fig. 2. (r.f. and mixer, not the b.f.o.). Wind and set-up L1 for 3.5MHz, and L3a for the middle of the medium wave band...using the dip meter to get the best results and, importantly, on the correct frequencies. Finally, you can apply the power to each stage, check for short circuits and if all is well...apply the antenna and feed the i.f output to a medium wave (preferably a car radio). Tune between 930 and 630kHz for the amateur band. We'll talk about the necessary b.f.o. section later!

If you don't feel confident enough to do as I've suggested...build the l.o. by itself and get that working. You can do that without a dip meter! Next time we'll move on to look at the regenerative 'active' detector stages and other tuning requirements. *PW*

Information Panel

Up-date information on buying a dip meter: I'm pleased to say that there's good news for prospective purchasers of dip meters! Following my mentioning the MFJ-201 dip meter which **Waters & Stanton PLC** import from the USA - as the MFJ agents in the UK - the company have informed me that they've managed a significant price reduction. So, with that good news I can tell you that a brand new MFJ-201 dip meter will now cost **£99.95** (Reduced from £129.95). Incidentally, for anyone familiar with the once commonly-available (but seemingly now not on sale in the UK) Altai dip-meter....the MFJ-201 meter has exactly the same styling, and technical details. It also looks very similar! Both the old Altai and the MFJ-201 dippers also include a built-in audio oscillator and modulator unit. **This is of great help when tuning up simple receivers which do not have beat frequency oscillators (such as crystal sets)**. I mention this because I know that many RB readers thoroughly enjoy experimenting with such receivers. So, a 'dipper' with a built in modulator should prove very helpful! I'm also hoping that there will be a kit dip meter available again soon. Watch this space for further news on this topic!

Headphone adapter project: During recent club/rally visits, a number of RB readers have reminded me that I've promised to present the high-to-low impedance project which will enable the efficient use of modern 8Ω impedance headphones with simple receivers (particularly crystal sets). I had intended to base this on discrete components and transformers but following a lengthy search a reliable supply of the latter has not been found. I now plan to present it in an i.c. (transformerless) version soon. **I'm sorry to keep you waiting**.

It's A Classic
The Eddystone Amateur Ban

● It's A Classic! The Eddystone EA12 receiver. The small control above the S-meter is the calibrator On-Off push button. The knurled spindle on the right hand opposite side, is the cursor adjustment for calibration purposes (see text).
Photographic facilities courtesy of Ken O'Brien.

Ben Nock G4BXD, takes a look at the Eddystone EA12 Amateur Bands only receiver...a receiver which many of us viewed as the 'ultimate' in the 1960s. Now very much collectable... what does Ben think of the design?

The recent demise of the once famous Eddystone name (latterly part of the Marconi Group and specialising in Broadcasting equipment) is certainly a sad event for radio communications. In their time Eddystone produced some memorable receivers for all aspects of radio, marine, commercial and of course amateur operating.

One of the few receivers **specifically designed** by Eddystone for the Amateur Radio operator was the EA12. This set, produced between 1964 and 1969 costing £178 at the time, covered what at that time were the Amateur Bands, i.e. the 1.8 to 28MHz (160, 80, 40, 20, 15 and 10 metre bands) before the advent of the WARC bands. The receiver used the high performance double conversion principle, was given a tuning scale large enough to read from across the room and a styling that was very eye-catching and still looks very smart today.

Many refinements were incorporated into the EA12 receiver, including filters for both radio and audio frequencies. It was also provided with a built-in calibrator, tuneable notch filter, separate detectors for a.m. and c.w./s.s.b., a large S-meter and fitted loudspeakers to name just a few.

Crystal Controlled

In total 13 valves and five silicon diodes are used in the EA12's double conversion superhet, which employs a crystal controlled front end. This converts the incoming antenna signal to a 60kHz wide intermediate frequency (i.f.), and a second tuneable mixer then converts this to a fixed tuned 100kHz second i.f. stage.

The front-end of the receiver comprises three valves, V1, 2 and 3, as a crystal controlled unit with an output of 1.1 to 1.7MHz. To provide better cross modulation reduction and signal blocking on strong stations a cascade type radio frequency (r.f.) amplifier circuit is used.

Bandpass coupling of tuned circuits between the antenna and r.f. amplifier ensure excellent front end selectivity. Next, a third section, coupled to the first two, connects the amplifier to the first mixer. The input circuitry includes a high-pass filter, providing better than -90dB attenuation below 1.7MHz.

The r.f. amplifier stage has both manual and automatic (when selected) gain control applied to it. There's a facility to mute the r.f. stage, and also on the last (100kHz) i.f. stage during transmissions, the mute level being adjustable to allow the monitoring of any outgoing transmissions.

The crystal oscillator operates on the fundamental crystal frequency on all but the 21 and 28MHz bands. On these bands its output is doubled in frequency. The oscillator frequency is on the high side of the signal frequency on all bands, which produces 'reverse tuning' on the main dial.

Stabilised Supply

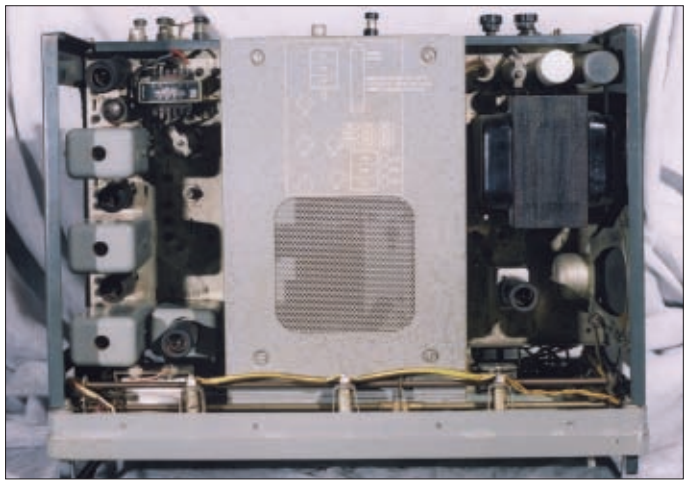
A stabilised 150V supply is provided for the oscillator and buffer/doubler circuit. The first mixer stage uses the heptode section of V2, combining the amplified antenna signal and the crystal oscillator output, the other half of V2 acts as a buffer to the oscillator on all bands except 21 and 28MHz, where, as previously mentioned, it has to work as frequency doubler.

Band-pass coupled tuned circuits feed the signal to the second mixer stage and tune the range 1.1 to 1.7MHz utilising two sections of a three-gang capacitor unit. The second mixer, the heptode section of V4, is fed from its triode section, which acts as a buffer to V5, the tuneable oscillator. This light coupling allows automatic gain control (a.g.c.) to be applied to the 2nd mixer without pulling the second oscillator frequency.

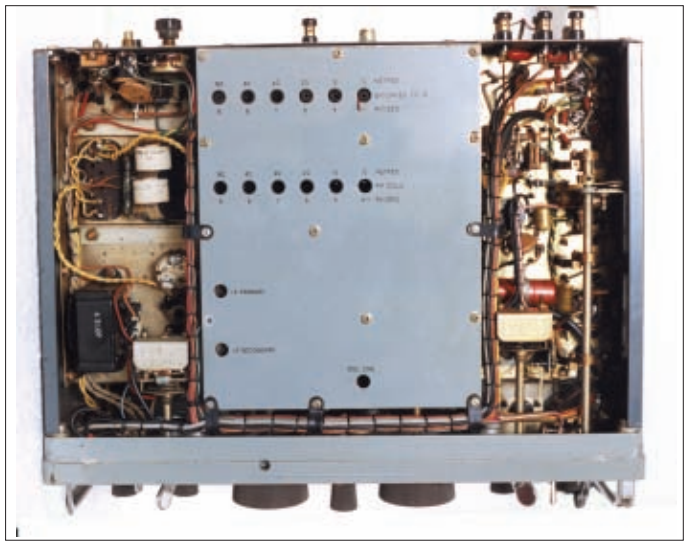
The third section of the main variable capacitor unit forms the tuning circuit for the 2nd oscillator, V5. This oscillator operates on the low side of the i.f. range.

Unusually, the h.t. feed to the 2nd oscillator is from the unregulated supply. The idea behind this is that any variation in a.c. line voltage would cause the h.t. to vary but the tendency towards drift would be compensated by the opposite reaction due to the heater voltage change. If the stabilised h.t. was used then the change in heater voltage would not be compensated for.

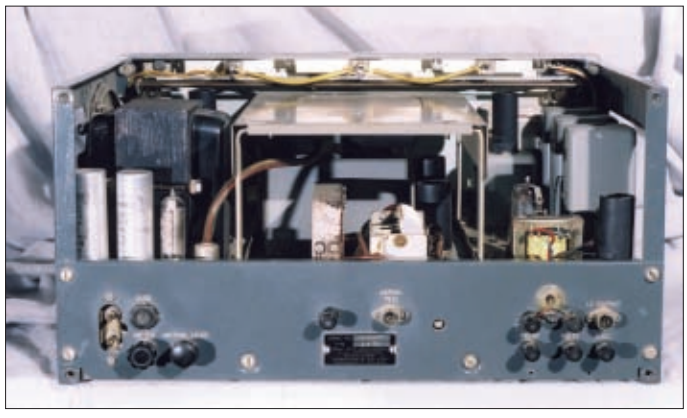
ne EA12
nds Receiver



● Fig. 1: Inside (above chassis) view of the EA12. The receiver can clearly seem to be substantially built (see text). Photograph G4BXD.



● Fig. 2: Under chassis view of the EA12 receiver. Note coil and range details, necessary for calibration purposes (see text). Photograph G4BXD.



● Fig. 3: Eddystone equipment is built to last! The rear panel view f the EA12 receiver showing. r.f., i.f. (for spectrum analyser 'Pan Adapter' unit) a.f. outputs, etc. (See text). Photograph G4BXD.

Valves 6 and 7 are employed as i.f. amplifiers with both stages being a.g.c. controlled with the addition of manual control of the first stage. This section of the receiver also includes the crystal filter unit and the notch filter.

Notch Filter

The tuneable notch filter can impart up to 40dB of very sharp rejection to the pass-band. The design uses the (much favoured by Eddystone) variable/adjustable secondary windings on the three i.f. transformers, which allow continuously variable selectivity.

A front mounted control gives three positive 'click' stops at 6, 3 and 1.3kHz bandwidth and if the same control is advanced further the crystal is introduced into the signal path, reducing the amazing bandwidth to 50Hz, all quoted to the -6dB points.

The 2nd amplifier stage also drives the S-meter but this is disconnected when the **AGC Off** position of the relevant switch is selected.

Muting voltages are obtained from the first stage and fed to a control on the rear panel of the set. External muting, from a transmitter relay for example, can also be applied.

A double diode in V8 is used as the a.m. detector and a.g.c. rectifier. Noise limiting in the a.m. mode is achieved with a silicon diode. Two speed a.g.c. response times are available, when the **AGC Off** condition is selected.

Valve 10 functions as product detector and beat frequency oscillator (b.f.o.). Switched fixed capacitors are used to select between upper and lower sideband and a pre-set offset, these capacitors are in series with the main b.f.o. tuning capacitor. The result is that on c.w. the b.f.o. can be varied by ±3.5kHz, whilst on s.s.b., only ±100Hz adjustment is available.

Detection Audio & Power

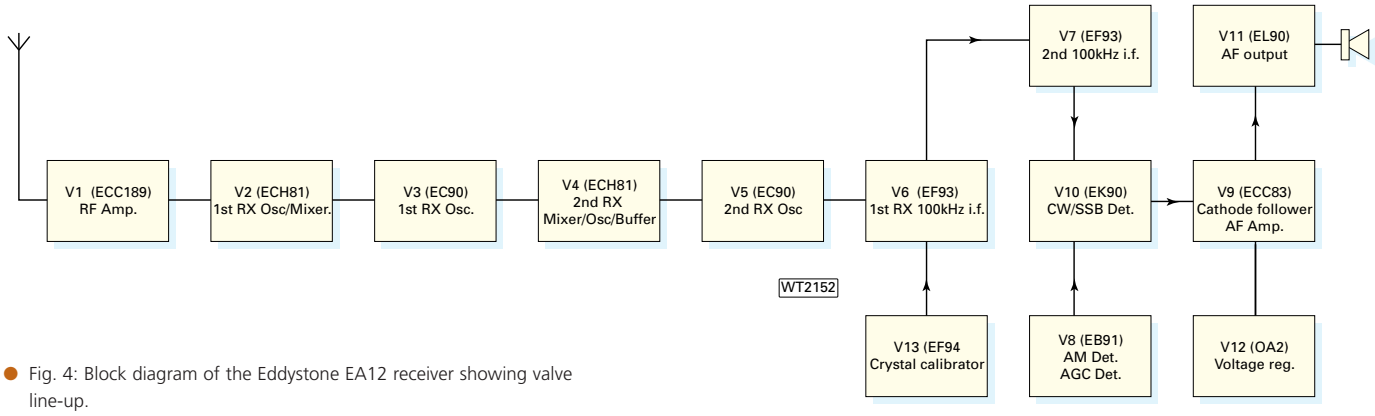
The product detector's audio output is taken through a diode noise clipper that can be switched out of circuit. The threshold of clipping can be manually set while a low-pass filter follows the clipper or detector output, giving a response of 500Hz at -10dB and 5kHz at -30dB.

A bandwidth of 300Hz at -6dB can be obtained when the c.w. filter is switched into circuit. Indeed as I've already mentioned, with the selectivity control settings of between 1.3kHz and just 50Hz are available to the listener.

Audio amplification is provided by half of V9 and then by V11, the output valve. An internal low impedance speaker is fitted to the set, but connections are also available for external speakers. Inserting high impedance headphones via the provided standard jack socket disconnects the internal speaker.

The power supply is fairly standard and uses a full wave rectifier circuit giving the main 250V h.t. rail. An OA2 regulator valve is used to provide a stabilised 150V rail. The low-tension side powers the valve heaters and also the plentiful and well thought-out dial illumination.

A 100 kHz crystal oscillator circuit is provided by V13. When required it's switched on by depressing a button at the



● Fig. 4: Block diagram of the Eddystone EA12 receiver showing valve line-up.

top left of the receiver front panel, which grounds the cathode of the valve and starts the oscillator. Cleverly it also reduces the gain of the r.f. amplifier...making the calibration pips easier to find.

In practice, as the second i.f. is the same frequency as the calibrator fundamental, a beat note is heard even when the receivers is operating in the a.m. mode. Finally, the main tuning cursor can be physically moved to achieve accurate calibration settings.

Super Smooth Tuning

The large well illuminated tuning scale, the super smooth slow motion tuning and various variable pass-bands make the EA12 one of the nicest and easiest receivers to operate on the air. The main tuning has a 140:1 reduction gearing and with the large flywheel and a scale of over 254mm (10 inches) there's a 12kHz frequency shift per revolution of the tuning control which, with no backlash, makes for high resetting accuracy.

The EA12 was available in table top and rack mounted versions. An additional plate could be fitted under the front of the table version to raise its operating position making some of the controls easier to use.

The large knob style controls on the receiver all give a positive feel, are easy to operate and finish off the general appearance very effectively. Matching chrome levers are used on the a.g.c., selectivity and mode controls.

The internal layout of the receiver is very clean, r.f. sections in the centre, i.f. and the audio stages down one side, and the p.s.u. and b.f.o. down the other. However, the p.s.u. filter choke seems to be precariously close to the **Mode** switch! Incidentally, very detailed information on coil location and alignment points is carried on the base plate of the set.

Impressive Performance

Even when I've only used the EA12 on a short length of antenna, just five metres or so, the receiver has provided an impressive performance. Interference can be filtered out, and weak stations copied easily using the variable selectivity.

Very weak c.w. signals can be resolved using the adjustable selectivity and the various filters. On the my station's main outside antenna (35m of wire) the selectivity levels and filters really came into play. Incidentally, Eddystone also produced a panoramic display unit, the EP20, that could be used with the set to provide a visual display of the received signals.

The EA12 is heavy! It weighs nearly 23kg (50lbs or so in old money), but its relatively small 'footprint' - the space it occupies on the table - compared to an AR88 or RA 17 for instance, does mean that it could fit into a small shack.

In its day the EA12 must have been a quantum leap on other sets around at the time. For Radio Amateurs used to operating outdated war surplus it really must have been a futuristic set. Finally, my thanks to **Graeme Wormald G3GGL** for letting me photograph the inside of his EA12 which is in a better condition than that in my own collection. PW

Manufacturer's Specifications

Frequency range:	1.8-2.5, 3.4-4.0, 6.9-7.5, 13.9-14.5, 20.9-21.5, 27.9-30MHz (in four bands)
Intermediate freq:	1st i.f. 1.1-1.7MHz, 2nd i.f. 100kHz
Stability:	<100Hz drift per hour after 20 min. warm up <100Hz per hour drift for ±10% line voltage variation
Reception modes:	a.m., c.w., l.s.b., u.s.b.
Sensitivity:	2µV for 10dB SN/N for s.s.b., 0.5V for c.w.
Selectivity:	Variable 6kHz to 1.3kHz, 50 Hz with crystal filter (all -6dB)
Image rejection:	50dB or better
Dial accuracy:	Within 0.5% on all bands, 1kHz when using built-in calibrator
Power requirements:	105-125V or 210-250V a.c. 50/60Hz at 85VA
Rear panel connections:	h.f. antenna (75Ω unbalanced), i.f. o/p, 250Ω, Speaker 8Ω, headphones (2kΩ impedance), S-meter zero, mains input socket
Dimensions:	425 x 222 x 346mm
Weight:	approx.23kg (49lbs)

Valve compliment: V1: ECC189 (r.f. Amp). **V2**: ECH81 (1st receiver mixer/osc buffer). **V3**: EC90 (1st receiver osc). **V4**: ECH81 (2nd receiver mixer/osc buffer). **V5**: EC90 (2nd receiver osc). **V6**: EF93 (1st 100kHz IF). **V7**: EF93 (2nd 100kHz i.f.). **V8:** EB91 (a.m. det/a.g.c. det. **V9:** ECC83 (cathode follower and a.f. amp. **V10:** EK90 (c.w., s.s.b., detector). **V11**: EL90 (a.f. output). **V12**: OA2 (voltage regulator).**V13:** EF94 (crystal calibrator).

Diodes: D1 - DD006 : a.m. noise limiter. **D2/3 DD006**: c.w./s.s.b. noise clipper. **D4/5 DD058**: h.t. rectifier.

The *PW* Midge Catcher

David Banks M0EJB describes the *PW* Midge Catcher…an inexpensive multi-band mobile antenna. If you're keen on working h.f. mobile...it may be just the project for you!

I live on the western edge of the Lake District in North West England. My home is almost surrounded by hills, but with many high roads leading to sites with good horizons, mobile operation in the high h.f. bands is an attractive idea.

However, few multi-band mobile antennas are available, none, apparently, made in Europe. The American-made centre loaded 'Bugcatcher' is very highly regarded but expensive. Fortunately, this type of antenna was very popular for many years in the United Kingdom and information is available which will help the home constructor to build a similar type.

So, determined to have a go myself…I've built one using simple methods, materials from my local builders merchant and the scrap box. My costs were under £20, which compares favourably with the £125 - £300 for commercial versions. This article describes the production of my Mark One Midge Catcher***** its set-up and use.

Note: The author decided on this name because of those rather prevalent nuisance (the polite term!) insects which are found both beside English Lakes and Scottish Lochs!). **Editor.*

Principal Dimensions

The principal dimensions and electrical layout of the prototype are shown in **Fig. 1**. The arrangement shows a continuous lower section, although the original was made demountable.

The coil, wound on a plastic water pipe former has a calculated inductance of 118µH. The upper section, shown in two pieces was so made, such that the retracted whip need not be lowered into the bottom metal section for tuning.

A telescopic upper section would also avoid this. Because the antenna is so freely adjustable for centre-inductance and length, none of the dimensions appear critical and it's inexpensive to try your own variations.

Much Heavier

The total length of the antenna, fully extended, is 2.8m, similar to many monoband whips, but much heavier! The lower stub can be of aluminium or copper and about 18mm diameter, the coil former and joint plugs are of white plastic water pipe, **Fig. 2**, whilst the upper stub is again of aluminium or copper, 9-12mm diameter.

The whip, from another discarded antenna, is 1.2m long and 2.5 mm in diameter. **Warning:** The water pipe **must be suitable** for use at the intended frequencies. A small piece may be tested in a microwave oven, where it should be heated dry in the presence of a cup of water, which should be boiled for two to three minutes. The chosen pipe should remain cool; if it isn't…try another type or make.

The coil is made from single strand copper wire of 1.7mm diameter stripped from three core high current mains lead – 13A is suitable. If the full length coil is made, about 7.2m of wire is required, taken from 2.5m of three core cable. **Be generous**…as you'll need an extra length to grip during winding.

Joints may be soldered. If purchased retail (as mine was), this is the only significant expense in building the antenna! The final material requirement is for the spacer plugs.

On the prototype the spacer plugs were made from various diameters of white pipe. They were then filled with polyester resin and filler as used in boat building in glass reinforced plastic (g.r.p.). This material appears to be widely used in commercial antennas.

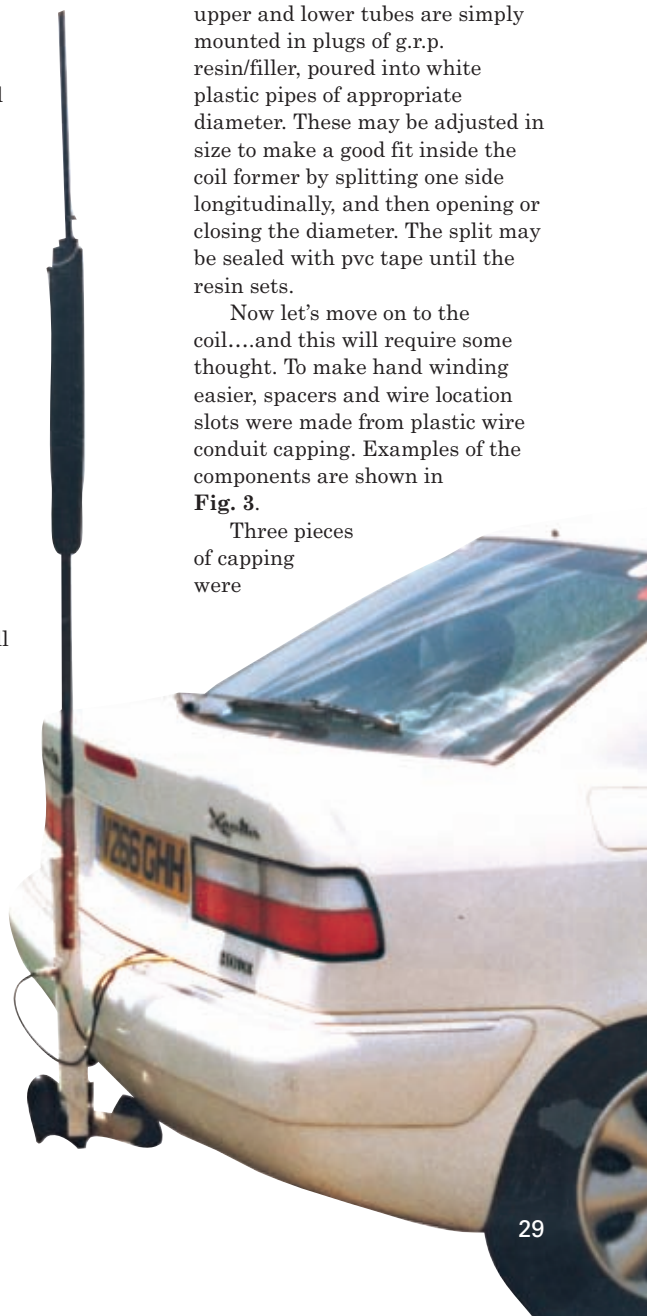
As an alternative, Tufnol (a phenolic resin & fibre material) or even wood may be used. But the ability to pour a liquid resin into a cylinder makes the plug making the easy.

Construction & Assembly

Let's now look at the construction and assembly stages. Firstly, The upper and lower tubes are simply mounted in plugs of g.r.p. resin/filler, poured into white plastic pipes of appropriate diameter. These may be adjusted in size to make a good fit inside the coil former by splitting one side longitudinally, and then opening or closing the diameter. The split may be sealed with pvc tape until the resin sets.

Now let's move on to the coil….and this will require some thought. To make hand winding easier, spacers and wire location slots were made from plastic wire conduit capping. Examples of the components are shown in **Fig. 3**.

Three pieces of capping were



● The completed *PW* Midge Catcher h.f. mobile antenna, posed on M0EJB's car.

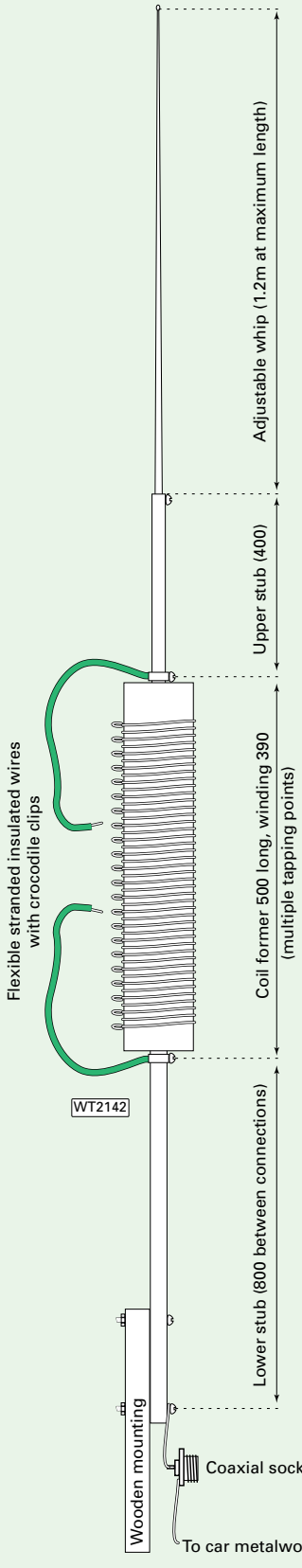


Fig. 1: Details on physical lengths, dimensions and lay-out of the mobile antenna. (See text).

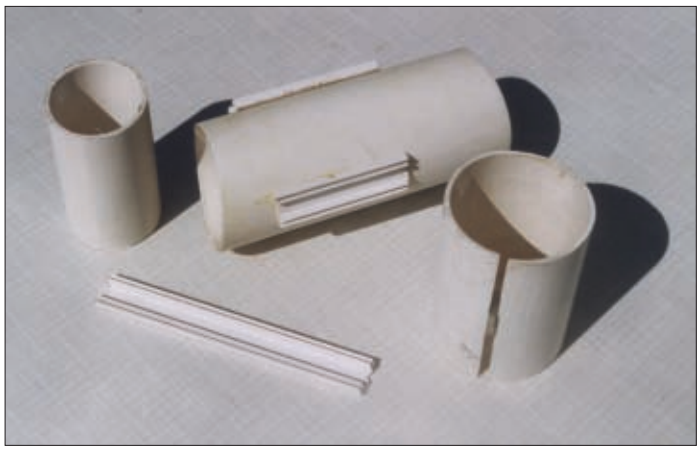


Fig. 2: The starting point - pvc tubing for the loading coil body. The author explains a simple, but essential, test to check that the piping chosen is suitable for radio frequency work (see text).

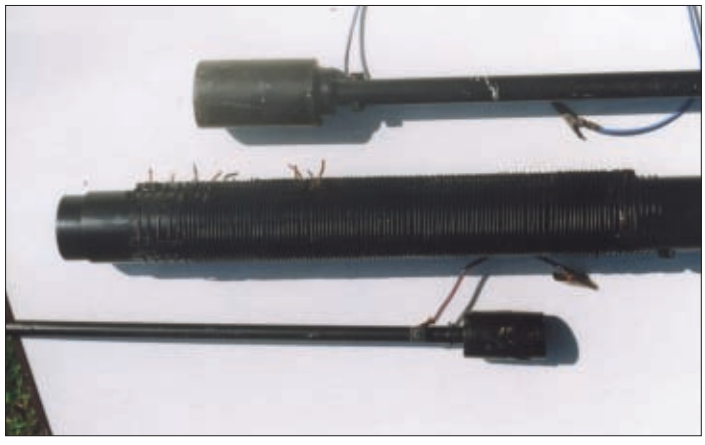


Fig. 3: The principle components of the antenna, the lower section (top), loading coil (with multiple tapping points) and part of the whip section (below).

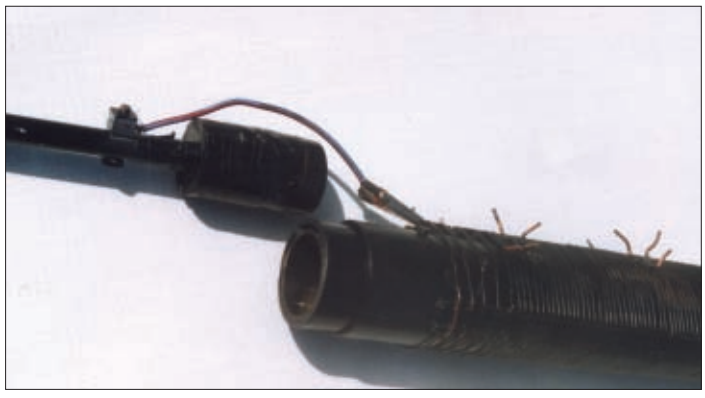


Fig. 4: Author's photograph of the top section whip with its associated plug connection. Note that epoxy resin adhesive must not be used to fix the plug into place and that the last four turns of the loading coil are wide-spaced (see text).

taped, side-by-side, to a piece of wood and slotted, ensuring that wire spacing was maintained close to 3.2 turns/cm or 8 turns/inch. The strips were glued to the former longitudinally at 120° intervals with Evo-Stik floor tile adhesive.

Winding The Coil

Winding the coil was accomplished by stretching one length of stripped wire, holding one end very firmly in a vice. I then walked the former towards the vice whilst rotating, slotting the wire into the slots, taping at intervals to retain position. (The helix was wound anti-clockwise).

As one length of stripped wire is too short for the full coil, where required I soldered the necessary lengths into place. **Note that whilst the wire pitch is nominally as noted above**...the last four turns at the top are 6-8mm spaced to assist fine tuning.

On my prototype a total of 112 turns were wound to cover 3.5 to 28MHz. (Tapping positions will be described later).

The coil ends are then secured by self-tapping screws, see **Fig. 4**. **Note: no epoxy resin adhesive, e.g. Araldite should be used**. Incidentally, Self-tapping screws can also be used to stop the plugs sliding too far into the coil former.

Finally, the upper end of the upper rigid tube must be adapted to clamp the whip. The simplest way is to split the pipe and use a small clamp, e.g. a hose clip.

Alternatively, the pipe wall **may accept** a self-tapping screw with the end filed flat. I used a small, thicker walled brass pipe fitting tapped M4, and this provided an

Fig. 5: Full end-on view of M0EJB's car with the Midge Catcher in place and operational. Note the flying leads for selecting tapping points. See text for mounting and attachment suggestions.

effective clamp with a good electrical contact.

Mounting The Antenna

The lower end of the antenna may be mounted in a variety of ways. I fitted mine to an accessory plate on my car's caravan towing bracket (Heading photograph and **Fig. 5**).

I simply bolted the lower stub to a piece of plastic covered wood and connected the bottom fixing bolt to the centre feed from the coaxial cable to the transmitter. The earth is taken to the car body by 6mm diameter flexible wire.

Braid from discarded large diameter coaxial cable is often used for this job and can be very successful. The quality of the earth connections is important. **Make sure they're clean and paint free!**

Setting Up

It's now time to start the setting up the antenna ready for use on the air. And here…as many readers will remember…the tapping of a close wound centre loading coil is a well known problem…to such an extent that special clips are sold to assist in the use of small crocodile clips without fouling adjacent turns.

I initially tested my completed antenna for feed point impedance and s.w.r. using an Autek RF1 analyser to measure these values at each frequency. (This is not easy, as at this stage, the user will not know where to fix taps, and clips must be used).

However, when the first approximations are made, small **L** shaped stand-off taps may be soldered to the coil for clip connections. The top four or five wide spaced coils require one or more L clips each.

Next, using an analyser or your s.w.r. meter, find the approximate setting on the coil body and finely adjust at the top take-off point. On first tests I found, as expected, impedance of the order of 18-25Ω on 3.5 and 7MHz, but even so, at all frequencies from 3.5 to 28MHz, the s.w.r. was less than 2:1.

As I have a mobile antenna matching unit (An MFJ 845, as often illustrated by the Editor as he uses one for mobile/portable work), I use this for final adjustment for transmission. This has allowed me to record s.w.r.s below 1.3:1 on all bands.

As a guide, **Table 1** shows some of my final tap positions. However, you'll be very fortunate to duplicate these with a home built system!

Band (MHz)	Top lead (Tapped)	Bottom lead turns:- (Tapped)	Whip (extension)
3.5	2 turns down	9 turns from the base	Full
7	2 turns down	34 turns from the top	Full
14	1 turn down	10 turns from the top	Full
18.068	Top turn	5 turns from the top	Full
21	-	*Direct to top (coil by-passed)	Full
24.89	-	*Direct to top (coil by-passed)	70%
28	-	*Direct to top (coil by-passed)	50%

Table 1: Tap and whip positions for matching on seven h.f. bands. Note: In the direct mode, the two crocodile clips are connected together, eliminating the coil.

Ready To Go!

So, you're now ready to go. It's not necessary to set all frequencies before using the antenna, as this can be done in stages. In use, I carry mine dismantled and use it only when stationary.With suitable bracing the antenna could be carried erect. But at full length the whip moves some distance…so please bear this in mind!

As with many home projects, this antenna evolved during construction and several possibilities for improvement exist. When, as is likely, a MkII is built, the modifications shown below will probably be adopted:- (i). The lowest frequency covered will be 40m, making a shorter, wider spaced coil for easier adjustment. (ii). The mounting plugs will be made integral with the coil former, to tidy these areas, and simplify the joints. (iii).

Either a telescopic whip, or two fixed length sections for low and high frequencies will be used to avoid any possibility of a lowered whip sliding into the lower stub. So, there it is…the *PW* Midge Catcher! I hope that your project gives you as much pleasure and interest as mine has - I've certainly learned a great deal. *PW*

Further Reading

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2) **Irwin, W.K. W*1*KI** The High Sierra HS 1500 Mobile Antenna. ARRL, *QST* Nov.1999 pp 72-73
3) **King, F.W. KM4IE** A $20 mobile antenna. ARRL, *QST* April 2000 pp *33-35.*
4) *Moxon L. HF antennas for all locations* RSGB 2nd Ed. 1993 Chapter 16.
5) *Dodd, P. Backyard Antennas RSGB 2000 pp 35-38.*
6) High Sierra Antennas http://www.hsantennas.com/info
7) http://www.texasbugcatcher.com/
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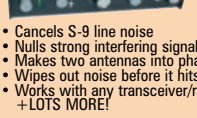

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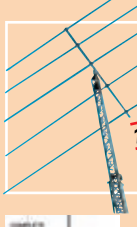

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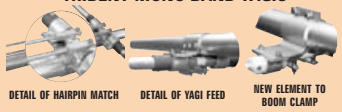

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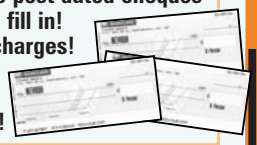

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Licensed & Ready To

In the second of his articles aimed at advising the many keen new h.f. operators, Rob Mannion G3XFD takes a look at the all important antenna and essential accessories.

Following last month's article you'll now know there are a lot of useful transceivers available to you, so this month...I'm planning to concentrate on looking at the important antenna aspects. Without an effective antenna you could have the best rig money could buy but still not be heard!

However, before I delve into antennas, etc., it's necessary to comment on the subject of M3 operators using 'non-CE certificated' equipment. I'm doing this because following last month's article several readers contacted me on the subject, and I also heard it being discussed on 3.5MHz, where the participants in the QSO seemed to be thoroughly confused following my recommendation of older equipment...particularly the Trio/Kenwood TS-120V QRP transceiver.

The general consensus of opinion (of those people who contacted me) and those heard on the air was, that M3 Licensees **would not be complying with their Licence** – and consequently the law - by operating equipment not carrying the CE mark. Obviously, my personal recommendations had caused some concerns because I had seemingly encouraged M3s to (possibly) risk breaking the law.

However, I'm pleased to report that, following further discussions with the Radiocommunications Agency's (RA) Amateur Radio Section, there is no doubt in their opinion that M3 Licensees **would not be breaking the law in any way whatsoever providing the Amateur Radio equipment in question complied with the regulations which were in force when the equipment was manufactured**. **The CE regulations are not retrospective and transceivers such as the TS-120V** were, and are or course, still very much legal to operate on the Amateur Radio bands, under the conditions of your Licence.

Despite what I've just written, I can re-assure readers that before preparing the article and presenting it in *PW*, I was already confident that when M3s do operate non-CE approved equipment the above information was correct. But if you do come across any equipment (especially any which has been converted to work on the Amateur Bands from other allocations)...that you seek advice.

In closing on this matter, the RA spokesman assured me that none of the new regulations were intended to discourage or cause problems to the M3 Licensee. Personally speaking...that shows me just what a close and supportive regulatory body we have in the UK!

Antennas & Accessories

So, it's time to start looking at those all important antennas and the essential accessories. But I must warn you…**here I'm adopting a truly simplistic approach -** if you want a technical treatise I strongly recommend you buy a copy of *The ARRL Antenna Book*...which should be in your library anyway! And finally - before I get stuck into the main article - as I've been preparing it for you it's become glaringly obvious that there's so much information to pass on - what was intended to be a single article has rapidly turned into a mini series. So, with out further ado...let's get on with it.

My first advice to you is - if you're completely new to h.f. - that you try some of the ideas I'm suggesting in this article, get some experience and then go on to enjoy some of the more complicated projects which are

● Just starting out on h.f.? If so...in this article aimed at you Rob Mannion G3XFD thinks that the SGC-230 automatic antenna tuner - amongst other equipment...will be ideal. It's rugged, waterproof, very reliable and will get you on the air quickly!

● A standard, two meter antenna tuner/standing wave ratio indicating unit capable of taking a long wire antenna is a necessity says Rob G3XFD (see text).

Go!

Antennas

offered in the special free *Antennas To Go* magazine that comes with this issue of *PW*. The suggested combination is ideal in my opinion and should keep you busy for a few years! (I've been playing around with antennas for approaching 50 years and have not yet finished learning. In fact, the more I enjoy the subject, the more I realise just how little I know!

Much has been said about what you can buy and erect for h.f. operations but when it comes down to it one of the simplest approaches is the good old 'long wire' (l.w.a.) antenna. **Often misnamed, this antenna is strictly only a long wire when it's longer than necessary for the frequency band in use**. So, let's now take a look at this amazingly versatile antenna.

Popular Wire

Listening on the bands, and from the notes I've made in my log book over the years, it's interesting to read how popular the l.w.a. is in the UK. However, it seems to be not so popular in the rest of Europe and the evidence indicates it's a particular favourite in that little group of Islands that begin just off the French coast (Britain and Ireland!).

Yes, indeed, from what I've learned in my travels Britain and Ireland share much more of an interest than just a joint international golfing team…we also enjoy using the l.w.a.! Nothing strange in that…it's an effective, very simple, and straightforward antenna.

There are many advantages for the operator using a l.w.a. - **but there are also disadvantages**. The first is that unless proper investigations are carried out (beyond the scope of this article) you'll never know just what the individual antenna is doing. In other words...where the main radiation lobes are, its most effective direction, etc.

So, you should be aware that the l.w.a. is a 'suck it and see type of antenna. **You'll get results**, and they can be superb…but each antenna (due to its location and the local situation) will be different. Some operators will be able to work the world with a l.w.a., and other will find it difficult to work the USA, etc.

The other thing to remember about long wires is that you need a good earth (ground system) and the best antenna tuning unit (a.t.u.) you can afford to buy or make. I think the best types are those fitted with two meters so that it's possible to adjust the tuning on the unit while closely watching the forward power (**the energy you want to be radiated**) and the reflected power - that energy which has not been radiated which is being returned down the wire.

The lower the reflected power the better - both because it means you'll be radiating more effectively and that unwanted excessive heat build-up (from the reflected power) cannot rise to a level where damage to the power amplifier (p.a.) transistors. Less reflected power also reduces the risk of your transmissions causing interference (more on that later).

Literally any of the commercial manual antenna tuning units which comes with a connection marked **Wire/Single Wire/Long Wire** terminal on the rear will be suitable. The a.t.u. is simply connected directly into your transceiver via the coaxial input, and a low pass filter* (l.p.f) and the l.w.a. is then connected on to the connection mentioned.

I strongly advise any beginner, or less experienced operator to only purchase an a.t.u./s.w.r. unit which comes with **two individual moving coil meters**, so that both the **Forward Power** and the **Reflected Power** can be watched at the same time. In this way it will be possible to carefully monitor that the reflected power does not inadvertently increase during adjustment. If it does...you can stop immediately and start re-adjusting.

My advice is that you should buy an a.t.u./s.w.r. meter unit which will measure to below 10W output. Yes, I know M3s operate at low power anyway…but if you adopt the habit of tuning up using the lowest power as possible...you'll be less likely to damage the power amplifier (p.a.) stages of your rig if something did go wrong.

Additionally, if you did accidentally tune up on a frequency which is in use (**you will listen first won't you?** ...it really does pay to do so, even if conditions can change quickly, leading to those mostly accidental 'I was here first' confrontations!) you'll stand much less chance of causing inference to another QSO already in progress.

**** More about this important requirement later**.*

Antenna Tuning Luxury?

Many Radio Amateurs, particularly those just entering the hobby are often restricted to a tight budget so they may consider buying specialist antenna tuning systems a luxury. But they're not a luxury really…instead they can help provide you with an instant, easy-to-use solution and provide an enormous amount of enjoyment, with many other advantages. And in this category I'm thinking particularly about the various automatic antenna tuning units (a.a.t.us) which are available.

I feel bound to recommend an a.a.t.u. to readers, especially to the less experienced. This is because by using an a.a.t.u. - much of the guesswork is taken away – leaving you to enjoy working the bands. Eventually, you'll have the confidence to begin experimenting with antennas, adding even more to your pleasure...and knowledge.

Another reason for being so keen on a.a.t.u.s …is that I use the extremely successful SGC-230 system at home myself. I also use it in my portable work*. It has the tremendous advantage that it starts tuning up as soon as it sees r.f. appearing at the input. It does it extremely rapidly, and it 'remembers' your favourite frequencies.

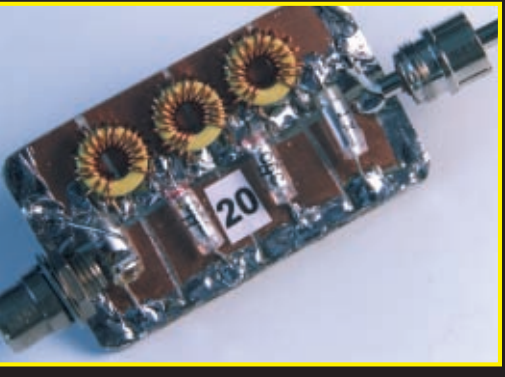
I shall be mentioning this approach again next time, as I

● In use the SGC automatic antenna tuners (a.a.t.u.s) only require r.f. drive and a 13.8V power supply).

● There are a variety of a.a.t.us. available for Amateur Radio use. This version, the SG-239 can be mounted inside a building or a vehicle.

consider it to be ideal for the beginner on h.f.

Fortunately for any one intending to follow my suggestions, **Waters & Stanton PLC** – who are the Agents for the American SGC Company – have announced significant price reductions on the selection of auto tuners they sell. I mention this because as they are imported from the USA – the a.a.t.u.s still aren't cheap...but on the other hand you do get an extremely versatile unit for your money. So, all in all….perhaps they aren't that expensive are they?



● A low-pass filter.

The SGC-230 I use I has seen some terrible weather over the winter, and has operated faultlessly. Mounted on the side of my garage, I feed it with double screened coaxial cable and a lightweight cable with a 13.8V d.c. power feed. An l.p.f. is fitted at the transceiver end of the coaxial cable.

The system either operates a long wire for me (when working portable) or the 10m long fibreglass fishing pole These necessary earth is provided by a copper spike, driven into the sandy soil below the garage.

***Note: more about this topic next month**.

Antenna Length?

When using the l.w.a. system – a good length to start off with – if you have the space - is one approximately 41 metres long (the good old 132 footer for us greybeards). Placed as high as you can get it – it will work well indeed, even if it isn't straight and has to be 'dog-legged' to fit in your available space..

Warning note: Please ensure you keep your l.w.a. away from overhead telephone, wires, downleads, etc., to avoid possible interference. Bear in mind also that the long wire can be a difficult antenna to use whenever there's the slightest possibility of television interference (TVI) or radio interference (If you notice antennas in your area carry mast-head amplifiers...be prepared for possible problems!).

The TVI can develop because the l.w.a.'s single wire in effect acts as **feeder and radiator** and depending on the band you're working on, and the individual circumstances of your antenna and its location – you could end up with a very high field strength very near the house, or near overhead power/or telephones lines.

When it comes to reducing the possibility of interference...**it's always good practice to use a low-pass filter***.

You'll have seen my previous references to the l.p.f. and those we use in Amateur Radio normally severely attenuate signals above 30MHz, in an effort to reduce harmonic interference to the broadcast services etc., which operate between 40 and (approximately) 900MHz.

Note:** ***These filters are available from Amateur Radio dealers...and you may even get a discount if you buy an a.t.u. and l.p.f. at the same time. It's worth asking anyway!

High Field Strength

Despite the inclusion of the l.p.f. between your transceiver and the a.t.u., you should be aware that when confronted by a very high field strength (perhaps from your transceiver) nearby radios/TVs and hi-fi units can suffer from interference. This can happen because the majority of domestic radio/TV equipment is mounted within unscreened plastic casings nowadays. As a result it's possible for such equipment to be susceptible to picking up transmissions either from the antenna input (TVs and radios, via coaxial cable inputs or via wire or ferrite rod antennas) or from speaker leads/microphone leads/cassette recording inputs, etc., and via telephone wires.

Incidentally, in my experience telephones are some of the worst effected items of equipment by otherwise perfectly legitimate radio transmissions. Not surprising when you remember they're connected – mostly – to long overhead 'antennas' (those dratted wires which festoon our streets!

Fortunately, the low power available to the M3 means that it will be less likely for your transmissions to cause any bother. But be on the look out, especially on your own family's broadcasting receiving equipment.

Earthing System

A good 'radio earth' is essential for Amateur Radio, and especially when you're using a l.w.a. But you should really avoid using the house mains wiring earthing system. Don't rely on water piping either - even if you do find some exposed metal piping to connect the earth wiring to - there could be a section of plastic pipe between your system and 'true earth' and you could end up radiating a signal from the 'earth' into house wiring, etc.

Warning: Never, on any account use any central heating or gas piping, both of which can be extremely dangerous. (Don't forget, there are many items on a central heating system at mains potential…not just the circulating pump. The gas pipe dangers speak for themselves don't they?

It's best to buy a really good, long, copper earth spike and drive it into dampened soil in your garden, patio, or wherever you can. But please be careful and avoid gas, or electricity pipes to your home. Common sense will indicate the route the pipework takes going into a house (usually the straightest line possible to the front or back door, and into the house).

Personally speaking, I feel perfectly safe when my earth is connected directly to my rig, especially when the mains power input is fully isolated on the primary side of the transformer. Again, my personal choice is always to go for a power supply which is fully isolated from the mains….and this means using a transformered unit. In effect of course, the transceiver is then operating from a low voltage supply which is 'induced' (you could regard it as being 'generated') by the mains 240V a.c. supply input.

There will usually be a safety earth linkage on the chassis, from the mains earth. This will be via the **yellow/green striped** wire you'll see soldered or attached to a bolted lug. This then, through the three core cable to the 13A plug, connects your whole system to the mains earthing for safety purposes. So, if a fault on the mains transformer primary develops and a short circuit occurs, the protecting fuse will rupture ('Blow') removing the mains supply.

Transformer secondary problems (the low voltage side) don't normally cause instant failures. Instead...the transformers tend to overheat...and the cooking smell is un-mistakable! Eventually the transformer overheats so badly that the inner winding insulation burns through and there would be short circuiting of windings- and the mains fuse will rupture. **So please ensure you always have the correct, specified fuse in the 13A plug (or on the unit itself)**.

Finally, for radio frequency purposes, it is - in my opinion, completely safe to directly connect the transceiver and a.t.u. directly to your 'radio earth'. It helps reduce mains borne noise from household equipment and will greatly assist your outgoing transmissions because the ground surrounding your antenna then literally becomes a reflective radio 'mirror'. So, get busy **and set up a good earth system now!**

Next month I'm planning to describe some simple antenna systems using wires and whips - together with how you can set about enjoying the hobby using a little bit of carpentry and your car roof. Don't forget...even if you live in a tiny one-bedroomed flat...you can enjoy our hobby outdoors too!

PW

Mobile Origins

Nowadays, many people take mobile working for granted. However, John Worthington GW3COI remembers a time when mobile working was not permitted!

I suppose many newly licensed Radio Amateurs take mobile working for granted, as these days not only are there many hand-held rigs available, but nearly all equipment can be readily and easily mounted in a car and special antennas are also freely available. However, during the decade from 1947 **mobile working was not permitted**, although a few operators were experimenting with specially home-brewed gear that could be used, and I was among them.

To comply with regulations, I would stop the car in a suitable spot and then operate. You wouldn't expect me to break the regulations, would you?

Fascinating Problems

Mobile operation brought with it its own fascinating problems. By far the biggest as far as I was concerned was the fact that in spite of the many hours spent working with a.t.u.s. and different sized whips and wires, I was unable to work anyone further away than about a couple of miles and at the extreme of this range, signals were weak indeed.

The other main problem was interference from the car engine and electrics, but gradually as my expertise increased and co-operation plus conversation with other /M experimenters soon brought forth remedies and tips. One of the best of these was to choose your car from a very short list, i.e. certain models which were known to be relatively interference free!

The equipment used, of course were from, the years of bountiful 'ex government' surplus sales, and there were several Army transmitter/receiver combinations which gave excellent account of themselves as portable gear. Naturally, would-be /M folk, like yours truly, soon acquired one and it was a luxury to have transmitter, receiver, power pack and even a.t.u. all in one box, whereas before I'd always used separate units, which were mostly home-made.

Made Official

However, the poor results I was getting, even though I was using a huge 14 foot (4.2m) whip antenna, puzzled me. So, I renewed my trials of different a.t.u.s. with vigour in an effort to discover what I was doing wrong.

Then suddenly, or so it seemed, mobile working was made official and there was a small upspurge of new people coming into the hobby who really knew something about radio. In a short time, these 'geniuses' were making contacts at a range of 20 miles (32km) on 'Top Band' and from eyewitness accounts this was achieved by having a loading coil somewhere on the whip. Apparently, it could be at the bottom, middle or top and had to be the right inductance for the band you worked.

Yes, I know all you technical 'boffins' reading this are probably falling about with these revelations! But such was the 'modus operarandi' among the radio illiterates like myself at the time (and we were the pioneers)!

Coil Wound

I soon wound a coil and mounted it at the bottom of the whip. It looked 'right', but no matter how I juggled with a matching unit etc, I could still only 'get out' less than two miles (3.2km). I also tried mounting the coil at the top and I changed the winding.

In fact, I went through a whole range of trials without any success, then word came that the secret had been revealed. A certain 'G' whose call I have since forgotten, was giving lectures to certain clubs to spread the 'gospel' of constructing a whip that was resonant λ/4 wave against the mass of the car.

At last I appreciated what a grid dip meter was for! So I built one using the little Eddystone plug-in coils and was soon achieving contacts of ten miles (16km) on Top Band! The thrill of this has to be appreciated when you consider the for years I had been barking up the wrong whip!

Lots of Actviity

It soon became obvious that 1.8MHz (160m) was where most of the /M activity happened and where many of the designs of antenna appeared. The dictum that coils should be physically long, three times width was followed most of the time but there were some wonderfully bizarre productions where even guy wires were needed to protect the pedestrian and travelling public alike. It was still tbelieved that large antennas resulted in greater signals and 12ft (3.6km) whips soon became common.

Gradually, all the experimental work produced the type of loaded whip, which you can now easily buy. This was because it was eventually agreed that although the theory about coil proportions was substanially correct, you could have a more aesthetic looking antenna and lose little S-meter movement!

Mobile Progress

I haven't mentioned the progress of mobile v.h.f. working as that merely became a question of transferring existing commercial frequency designs. However, v.h.f. mobile was not popular and even in the heavily populated Midlands, a mobile to fixed QSO was quite rare and a mobile-to-mobile could literally only occur by arrangement.

It took the arrival of the, then new B licence to really establish mobiles on v.h.f. when numbers became large enough and of course, news of USA repeater experience plus native commercial repeater use led to native Amateur models. And now, of course, it's really 'old hat'!

PW

"It's my new 'hands always on' mobile radio system...."

A Spectrum Analyser I

A spectrum analyser is an extremely useful piece of test equipment. If you don't have one, why not read on, as Andrew Holme describes his home-built version.

I decided to try my hand at building a spectrum analyser after seeing a design by **Roger Blackwell G4PMK**, in *The Radio Communication Handbook*. I had to adapt Roger's design though, because I couldn't get the Motorola MC 3356 i.c. used in his design. This article is an account of what I came up with, how it performed and how it might be improved.

A block diagram of the analyser is shown in in **Fig. 1**. You'll see that it's, in effect, a dual conversion superhet with a video output rather than audio. The unit takes input signals in the range 0-50MHz, mixing them with the output from the first oscillator, a voltage controlled oscillator (v.c.o.). So, up-converting the band to a first intermediate frequency (i.f.) of 170MHz.

Although I've not shown it in any of the diagrams, **a low-pass filter is required at the input, otherwise there would be many more spurious signals, due to unwanted inputs**. There have been several low-pass filter designs in *PW* that would be suitable.

Before filtering, the mixed signals from the first mixer are broadband amplified (20dB) before passing through the helical filter (centred on 170MHz). The first i.f. was chosen to suit a helical filter I had in stock. There's no real reason why another frequency (such as 145MHz) couldn't be used instead. The helical filter's bandwidth of 2MHz, serves only to reduce or remove spurious responses.

Spurious Output

Without the helical filter, there will be many spurious output signals at 26.45, 31.8, 38.833, 45.967 and 63.6MHz. These spurii are due to harmonics created from the first mixer, that fall exactly 10.7MHz above or below harmonics of the second local oscillator.

The narrower first i.f. band of signals, is then mixed again, this time with the output of a crystal oscillator (159.3MHz) to create the second i.f. This time a narrow band crystal filter with a centre frequency of 10.7MHz is used, and it's this crystal filter that determines the actual resolution bandwidth.

So, let us turn now to the main controlling sweep generator, the circuit of which, is shown in **Fig. 2**. This circuit consists of a '555' timer (IC1) that controls the sweep rate. Variable resistor Ra sets the speed, while an integration function circuit around IC2 generates the ramp voltages. Integrator capacitor Ca is a polyester layer type.

Other controls are: Rb, which sets the sweep width and Rd (coarse) and Rc (fine) variables, set the display centre frequency as coarse and fine 'tune'. I could have used a 10-turn pot to set the centre frequency, but frequency changes are faster to achieve with separate controls.

The sweep output on IC4 pin 6 is directly connected to the v.c.o. control input. The oscilloscope is triggered using the flyback pulses on IC1 pin 3. Most spectrum analyser circuits usually have the oscilloscope's X-input driven by a ramp voltage. But my 'scope doesn't have an X-input!

Sharp And Steady

Smoothing at the input to IC5 (pin 3) is essential for a sharp, steady display when zooming in. Ca, c and d are 270nF metallised polyester film capacitors. I put three capacitors in parallel as I had no bigger value non-polarised types to hand. Electrolytics are suitable for power supply decoupling, though a ceramic disc decouples pin 5 of IC1.

The 741 type i.c. is adequate in this application except for its limited output swing. A rail-to-rail output would be better. The 12V rail itself is also a limitation, as some varicap diodes need up to 30V. The POS-300 v.c.o. mentioned elsewhere requires only a 1-16V swing for the control voltage.

The front-end schematic is shown in **Fig. 3** And is as outlined above. The inductor, RFC, in the supply feed of the IC6, is made of two turns of 0.45mm (26 s.w.g.) enamelled copper wire on a ferrite bead. The helical filter, a Toko 272MT-1007A, was purchased from Barend Hendricksen.

For this application, the i.f. and r.f. ports of the SBL-1 mixer are reversed. The analyser input (0-50MHz) is fed to pins 3/4 because these pins are directly coupled to the internal diode ring mixer, enabling very low input frequencies to be up-converted to the first i.f. stage. The transformer-coupled ports, of the SBL-1, don't work down to low frequencies.

Optimum Balance

For optimum balance, the SBL-1 requires a 50Ω broadband resistive termination on all ports. The 4dB attenuator at the output port was an attempt to provide this. A 2.5dB pad was used on the v.c.o. input. The SBL-1 requires +7dBm (1.4V peak to peak) drive from the local oscillator (l.o.). The output of my v.c.o. amplifier is +9.5dBm. The POS-300 output level is +10dBm so a 3dB pad would be required if that were used.

The MMIC, IC6 provides 20dB of gain to compensate for the SBL-1's insertion loss. The signal

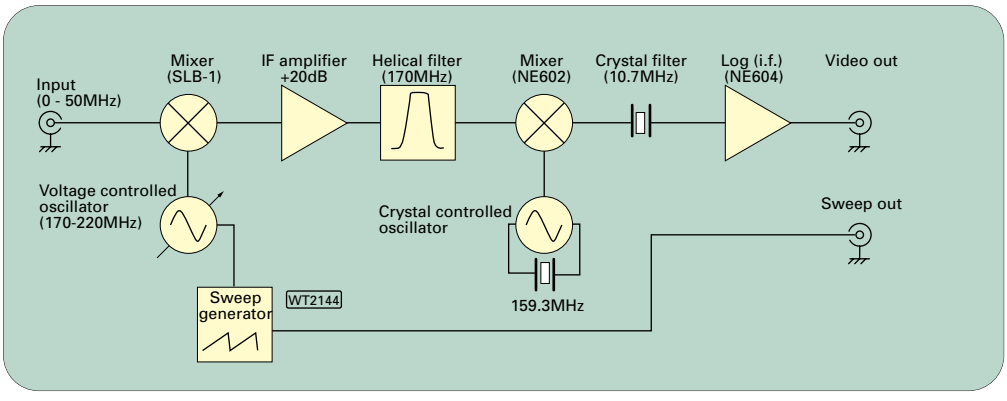


Fig. 1: The block diagram of Andrew's design.

n Your Shack!

suffers 6dB loss in the mixer, 4dB more in the attenuator and a further 9dB through the filter. So, I placed the gain before the filter to improve overall sensitivity.

Conveniently, the MMIC is powered through the filter. The R-BIAS resistor, sets the current at 45mA. Unfortunately, the MMIC doesn't see a broadband match. A better solution might be to place a further small attenuator after the i.c. or to use a diplexer.

Now to the second i.f. stage, shown in **Fig. 4,** which shows the second mixer, crystal filter and logarithmic amplifier, that make up the second i.f. stage. The NE600 series of i.c.s were originally developed for analogue cellular 'phones.

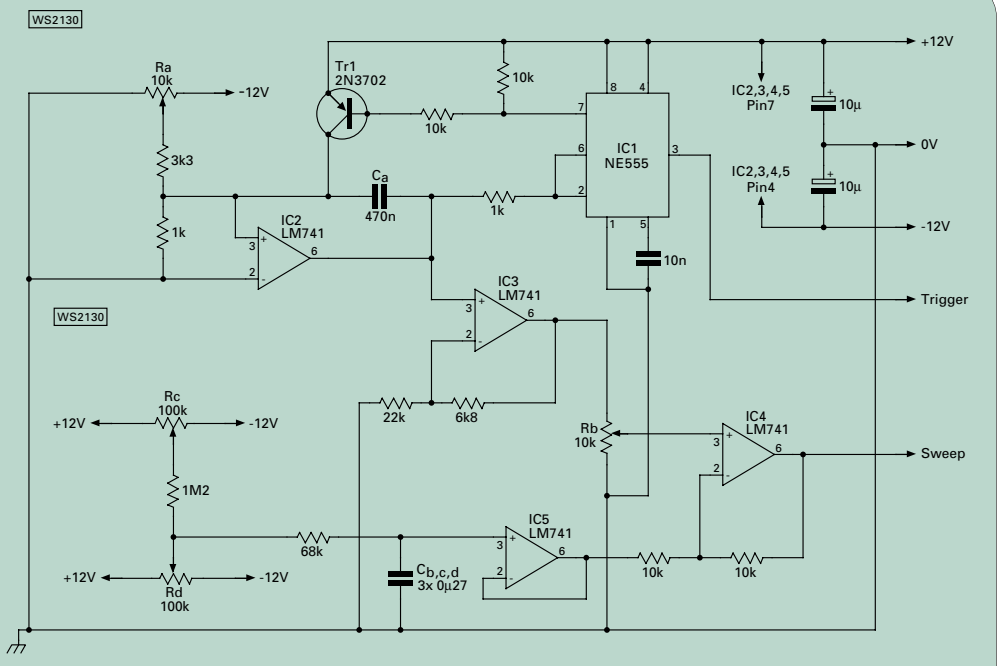


Fig. 2: The basic timing and control circuit.

Now Obsolete

Although still popular with amateur constructors, regrettably, both i.c.s are now obsolete‡. The NE602 contains an r.f. amplifier, oscillator transistor and balanced mixer, while the NE604 is the complete electronics of an i.f. amplifier and f.m. demodulator. **(‡ *Equivalents to the NE602, labelled SA602AN and SA612AN are now available from RS Components. Search* http://www.rswww.com *for SA602AN or SA612AN.* Editor)**

The inductor in the 170MHz tuned circuit, L2, is a Toko S18 series 0.040µH coil with ferrite slug. The filter coil, L3, consists of five turns of 0.45mm (26s.w.g.) enamelled copper wire on a ferrite bead, The 10.7MHz tuned circuit, T1, is a Toko KACSK3894A coil.

I adjusted the input matching circuit by connecting a terminated oscilloscope to the input whilst injecting a signal into L2 using an inductively coupled oscillator. The optimum oscillator drive level into pin 6 is 200mV peak-to-peak (-10dBm in R1).

The termination impedance (1.5kΩ) of the 10M15A crystal filter is compatible with the single-ended output impedance of the NE602. Though the matching of the crystal filter to the NE604 via T1, and the purpose of resistors R2 and R3 require explanation.

The NE604 i.c. has over 100dB of gain. To ensure stability, the manufacturer's data sheet recommends the use of external shunt resistors. The 1.6kΩ input resistance at pin 1 is shunted by R2. The filter 'sees' 1.66kΩ across half the primary of T1, which has a turns ratio of 7+7 to 4. The 82pF capacitor is integral to the Toko coil.

No attempt is made to match the 1kΩ output impedance of the first i.f. amplifier at pin 14 to the 330Ω termination impedance of the ceramic filter, however, the input impedance of the limiter at pin 12 in parallel with R3 correctly terminates the filter output.

Aids Stability

Resistor R3 also aids stability. A 12dB insertion loss is required between pins 12 and 14 for maximum received signal strength indication (r.s.s.i.) linearity. This was not achieved and so the unit is not completely linear.

Good power supply decoupling is essential with so much gain so, monolithic

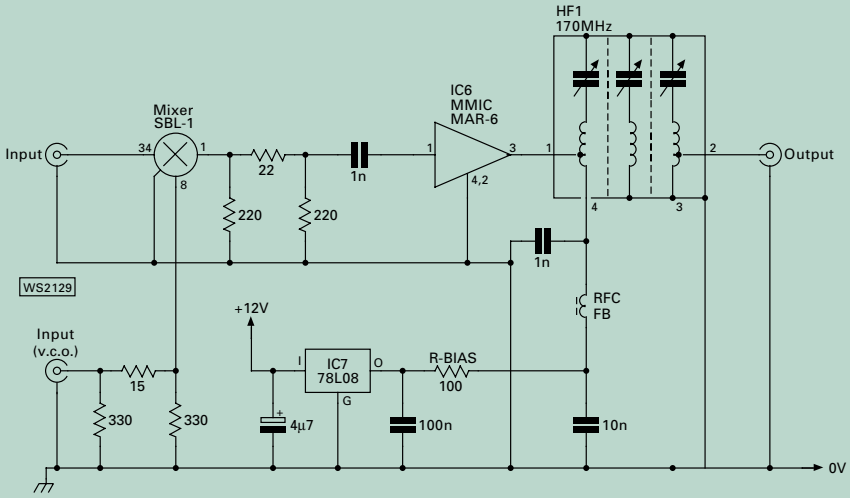


Fig. 3: After a low-pass filter the input signals pass into the first mixer.

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27th April 2003

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Taking place at the Kempton Park Race Course, Sunbury-on-Thames, Middlesex

Managing the very successful Epsom Rally, 'Radio Fairs' announce a new London Show in April

- All major manufacturers. Yaesu Kenwood & Icom
- RSGB, PW & RAIBC plus many more club stands
- Just off of Junction 1 of the M3
- Main traders and the 'small hard to find retailers' will be there
- Bars and hot food available thoughout the day
- Free entry for under 16yrs
- Normal entry £3.50 and £3.00 after 12.30pm
- Morse testing with free entry for those taking part
- Exceptionally good parking facilities on site
- Bars and restaurants
- Free tables for charities and subsidised tables for clubs
- 2 metre talk-in managed by the Whitton Radio club
- Bring & Buy operated by Echelford Radio Society
- Seating and picnic area outside

ALSO SEE US AT Drayton Manor on the 18th of May!

MALDOL ANTENNAS

We have just received our new delivery from Maldol. Call today for a catalogue of the range.

NEW! FT-1000 Mark V Field

zero DEPOSIT

ML&S £2199
ZERO DEPOSIT!
36 x £79.95

Following on from the sucess of the amazing FT-1000MP the new FT-1000MP Mk V Field gives 100 watts plus all the features of The FT-1000 MP MkV ! This is the only HF radio available with a built in PSU! Built in ATU

- *High Efficiency Cooling system*
- *Conservative 100 Watt Low Distortion Final Amplifier Design*
- *High Speed Automatic Antenna Tuning System*
- *Dual Receive With Independent AGC Systems*
- *Enhanced Digital Signal Processing*
- *Selectable SSB Pattern Contour Filters*
- *Industry-Leading RF Front End Design*
- *3 RF Preamp Modes+ IPO (Direct Mixer Feed)*
- *Outstanding IF Filter Chain*
- *Full Breaking CW and Electronic Keyer*
- *Multifunction Display with Improved Contrast*
- *Enhanced Shuttle Jog Tuning Dial*
- *Direct Keypad Frequency Entry*
- *Twin Stacked VFO Registers*
- *Easy Digital Mode Interfacing*
- *And MORE.....*

YAESU FT-897

At last the New Multiband Yaesu has arrived. 160m-70cms all mode with DSP. Designed by the same team that gave us the amazing FT-817 - you know it will be good. Options available are:-
Internal PSU, Internal batteries, Matching bolt on ATU, Collins CW filter, Collins SSB Filter,DTMF Microphone.

ML&S £989
ZERO DEPOSIT!
36 x £35.96

LOOK! New Miracle Antenna MkII has arrived!

MIRACLE WHIP MkII

This antenna has been designed with the Yaesu FT-817 & FT-897 in mind. The MkII uses a black anodized longer flexible whip for better low frequency tuning. The performance is staggering and it will work with any radio from 3.5-460MHz (25W max), without a counter poise. Ideal for listeners, radio amateurs and commercial applications.

ML&S £129.95 IN STOCK!

LIMITED TIME OFFER!

Brand New Tokyo HiPower HL-50B Amps only £229.95!

- 50W on 160m-6m
- Only 5W drive
- Ideal FT-817
- Small & Compact

RRP: £299.95

ML&S price: £229.95.

Icom IC-E90E

The new 3 band hand held from Icom is long over due and well worth the wait. The buttons have a very positive feel and audio is good on both TX and RX. With lithium Ion Battery giving 5 watts on 2,70 & 6 "Another winner from the Icom stable"
ML&S price £269.
ZERO DEPOSIT, 24 x £13.48

FT-1500M

50 watt 2m FM mobile with DTMF mike and CTCSS making it ideal for internet linking (See www.g7wfm.co.uk <http://www.g7wfm.co.uk> for details on internet linking)

ML&S price still only £159.00 ZERO DEPOSIT, 36 x £5.78

Icom IC-2725E

When I first saw the IC-2725 I thought it was just another dual band radio! When I connected it to an ariel I soon discovered it was the Dual Band Radio. The first radio I have seen to be able to monitor 2 Airband signals at the same time. Pagers do not seem to bother it at all. The remote head puts all the controls where you want them. The mike can completely operate the radio (including frequency entry and DTMF). If you want a serious dual band radio with excellent scanning facilities then the IC-2725 is ideal. ML&S price £349.ZERO DEPOSIT, 36 x £12.69

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HAVE YOU GOT UNWANTED GEAR THAT YOU WOULD LIKE TO TURN INTO READY CASH?

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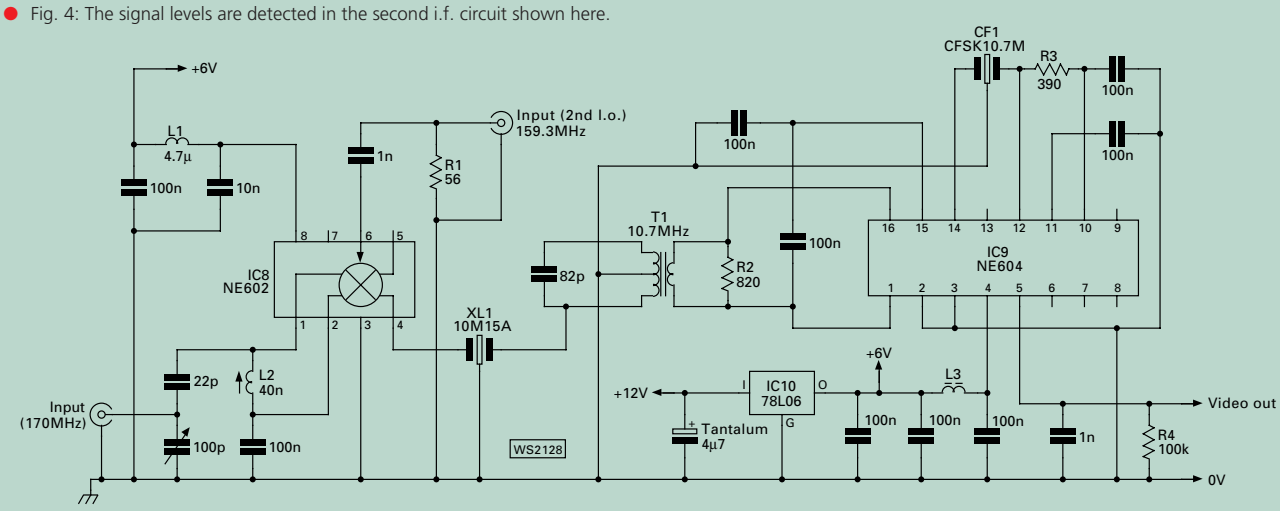
Fig. 4: The signal levels are detected in the second i.f. circuit shown here.



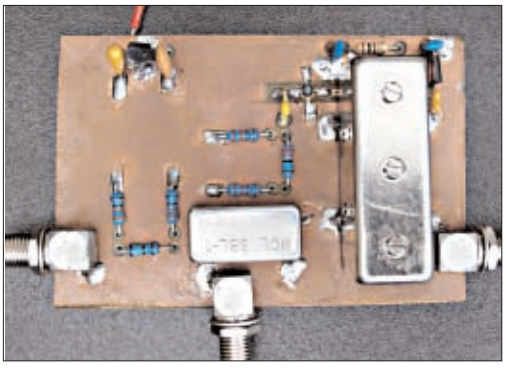


Fig. 5: Looking down on the components of the first mixer p.c.b.

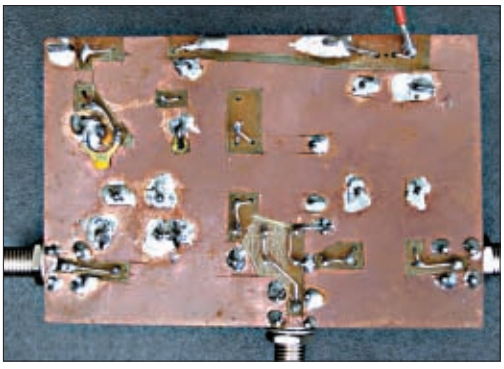


Fig. 6: The first mixer board from below.

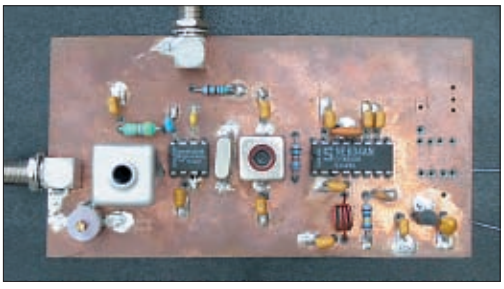


Fig. 7: The second i.f. board follows the general layout of its circuit diagram.

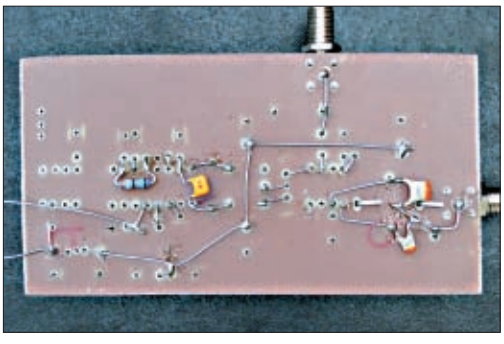


Fig. 8: The second i.f. and detector board from below.

ceramic decoupling capacitors were used throughout. An r.s.s.i. output greater than 250mV without an input signal is an indication of unwanted oscillation.

I was pleased to note that on my prototype, the quiescent r.s.s.i. was well below 200mV. Fortunately, a quadrature coil is not required in this application, as the audio output is not used. This probably helps to reduce feedback.

My original voltage controlled oscillator (v.c.o.) is a varicap-controlled f.e.t. oscillator, followed by an emitter-follower stage, made up from discrete components. An amplifier stage, to raise the output sufficient for the SLB-1 mixer, consists of a pair of cascaded MSA-0404 MMICs.

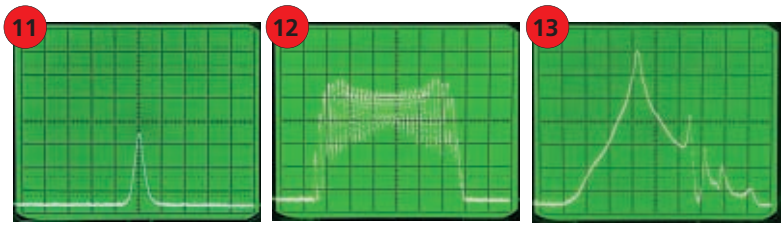
Other than that description, I'm not going to describe the first oscillator in any more detail, because I recommend using a commercial v.c.o. such as the Mini-Circuits POS-300 instead. This module can be mounted adjacent to the first mixer. Its compactness, frequency span and linearity are unbeatable.!

Similarly, I won't describe the second local oscillator either, except to say it was a separate Butler circuit using a custom made fifth-overtone 159.3MHz crystal. Though for my next version, I'll probably use the NE602/612's internal oscillator which, according to a Philips application note, operates reliably with crystals 'cut' as high as the seventh overtone.

The internal mixer of the NE602 isn't though, the best in the world at 170MHz! It's noisy and, the input match is tricky from a 50Ω input. But the circuit's saving grace is that it's a simple design to implement.

Construction

Throughout the construction, it's a good idea to use ground plane techniques for all r.f. circuitry. And my design was no different. The front-end **Figs. 5**



- Fig 11: An un-modulated -85dBm carrier at 50kHz per division.
- Fig. 12: An f.m. signal with a deviation of 50kHz modulated by a 1kHz sine wave.
- Fig. 13: The analyser shows the response of its 2-pole 10M15A filter at approximately 50kHz per division.
- Fig. 14: The narrower, steeper sided passband of the 8-pole 10F15D at 20kHz per division.
- Fig. 15: A comb of 'pip' markers produced by a 1MHz square-wave crystal oscillator.
- Fig. 16: Signals down to 1µV e.m.f (-113dBm) are visible above the noise 'lawn' (4MHz per division).

and **6**, was built on double-sided copper clad printed circuit board, though single sided board was used for the other r.f modules.

The front-end circuit itself was built on double-sided copper clad board. The MAR-6 amplifier was surface mounted by burring out a shallow recess with a sanding bit. Underneath, unwanted copper was removed by peeling it up whilst simultaneously applying heat.

I also used SMA connectors and miniature coaxial cable to route signals between the separate boards. The second i.f. board is shown in **Figs. 7** and **8**, which like the first mixer follows the circuit diagram in layout. The i.f. strip was built on single sided copper clad board with the copper acting as a ground plane. A few components, including R3, are mounted underneath the board.

I built a second i.f. strip to try out the 10F15D 8-pole filter. To match this filter's 3kΩ-termination impedance, a 1.5kΩ resistor was inserted in series with the filter input, and the value of R2 was increased to 2.7kΩ.

The sweep generator **Figs. 9** and **10** was built on 0.1in perforated board using Molex connectors for external connections. The circuitry around IC1 and IC2 is 'borrowed' from Roger Blackwell's design.

Drilling Templates

I made drilling templates, marked out on 0.1in graph paper first. I could have created them on a computer, but often 'one-offs' are quicker by hand. I just pushed the legs of the helical filter through the paper to mark its pinout.

The boards were drilled with a small craft drill. The residual copper from around the holes, was cleared using a Vero cutting tool. Heat breaks in the copper foil were scored with a scalpel to make soldering to the top easier.

The prototype was constructed as six modules:

1 Sweep generator
2 Voltage controlled oscillator (v.c.o.)
3 An amplifier for the v.c.o.
4 Front-end (first mixer, i.f. amplifier and filter)
5 Second local oscillator
6 Second mixer and logarithmic i.f. amplifier / detector

You may wonder why I created so many modules. Well, my answer to that, is that the design was experimental. I didn't know how much gain would be needed to raise the output of the first oscillator to the required level until I'd built and tested it.

I also didn't want to put too much of the circuitry on one board in case something went wrong! This way, each module could be tested separately. As it was experimental, I also built two versions of the second i.f. to try different crystal filters.

Fun To Play

The spectrum analyser is fun to play with! Activity in the h.f. spectrum can be seen using a short antenna. I've also connected the analyser to the panoramic output of a Racal RA1217 Receiver. It's sometimes possible to simultaneously see and hear individual c.w. signals.

Without an antenna, I can see the base and handset carriers of my cordless telephone at 31 and 40MHz and I can also see my neighbour's wireless baby alarm at 49MHz!

An un-modulated -85dBm carrier is shown in **Fig. 11**, at 50kHz per division using the 2-pole filter. The display is very stable. The screen of **Fig. 12** shows an f.m. signal with a deviation of 50kHz modulated by a 1kHz sine wave. Varying the deviation, modulating frequency and sweep rate produces interesting effects!

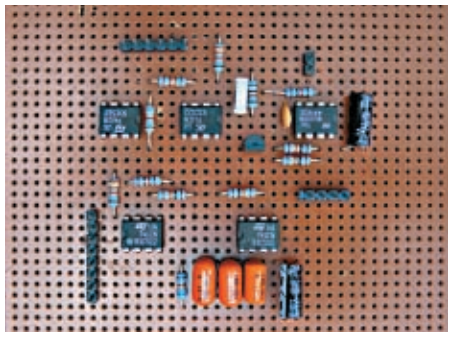


Fig. 9: A perf-board layout for the control and sweep oscillator.

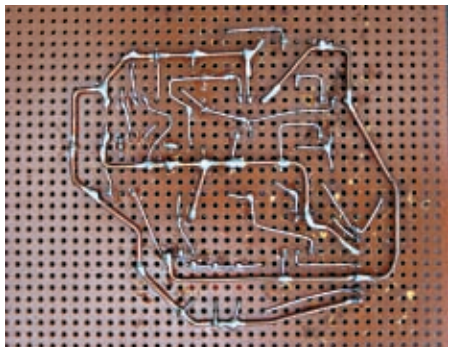


Fig. 10: Interconnections on the control oscillator board.

The analyser can curve trace its own crystal filter, as **Fig. 13** shows the response of the 2-pole 10M15A at approximately 50kHz per division. The second peak is 34dB below the top.

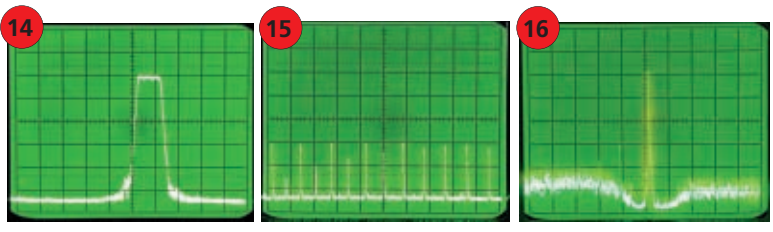
The well defined curve of **Fig. 14** is the narrower, steeper sided pass-band of the 8-pole 10F15D at 20kHz per division. Passband ripple is visible. The character of these filters is not ideal for a spectrum analyser! They were designed for f.m. communications.

A comb of 'pip' markers produced by a 1MHz square-wave crystal oscillator is shown in **Fig. 15**. The span was 0.5 to 13.5MHz. Note the level of the first few even harmonics relative to the other peaks. A perfect square wave is composed of only odd harmonics.

The trace of **Fig. 16** shows a -10dBm signal at 4MHz per division. Signals down to 1μV e.m.f (-113dBm) are visible above the noise lawn. The r.s.s.i. is fairly logarithmic up to -30dBm where it limits, giving a dynamic range of about 80dB. Inputs above -20dBm increase the noise level across the band - except near the carrier. I suspect the MAR-6 output only sees a 50Ω load in this quiet zone.

Although both, the NE602 and the NE604 i.c.s have been discontinued, samples can still be obtained. I found Barend Hendricksen in Holland a useful source for r.f. components.

I can also recommend another source at **Sycom** where **Robin G3NFV** will often look specifically for many components for *PW* and similar projects. The SMA plugs and sockets, along with other 'professional' parts, can often be picked up cheaply at rallies and 'junk sales'. *PW*



References

Barend Hendricksen
http://www.xs4all.nl/~barendh

Sycom: Tel: 01372 372587

Philips application note AN1983 *Crystal oscillators and frequency multipliers using the NE602 and NE612* (available in PDF format; search the Internet for AN1983)

Wes Hayward W7ZOI, and Terry White K7TAU, A Spectrum Analyzer for the Radio Amateur *QST*, August and September of 1998

Roger Blackwell, Simple Spectrum Analyser *Radio Communication Handbook*, 6th Edition, RSGB.

There are many interesting articles about spectrum analysers on the Internet. Some to try are:

http://www.nitehawk.com/rasmit/sa50.html

http://www.qsl.net/n9zia/wireless/pdf/9808035.pdf

http://www.qsl.net/n9zia/wireless/pdf/9809037.pdf

http://www.bright.net/~kanga/w7zoi/SAphotos.html

http://www06.u-page.so-net.ne.jp/ga2/semba/speana/e_speana.htm

Billy Williamson GM8MMA lives in the Shetland Islands near where the former USSR's giant aircraft often probed UK airspace. He's now found a fascinating Russian book crediting most radio inventions as being Soviet!

RADIO? Russia

I recently acquired a book entitled *In the World of Radio Waves* published in Moscow in 1951. I doubt if it was ever translated from the Russian...but it makes very interesting reading today, giving a Soviet view of radio history.

Although published by the State Publishers of Children's Literature, the book is written at about popular science level and seems rather advanced for children in my opinion, and it may perhaps be aimed at teenagers.

One of the most bizarre aspects of Soviet propaganda was its insistence that virtually everything was invented in Russia or the Soviet Union. So, no surprise to find this improbable idea well represented here!

No foreigners are credited with actually having invented anything; although **Hughes**, **Hertz**, **Branly** and **Lodge** are said to have studied radio waves. Marconi fares even less well...he's dismissed as having simply copied the work of the Russian pioneer **Alexandre Popov**! (**Fig. 1**).

Fig. 1: Alexandre Popov 1859-1906. Beware of imitators...although a great innovator and scientist...Popov is credited with 'inventing' Radar in the interesting Soviet-era book discovered by GM8MAA (see text).

Claims Exaggerated

Even if the book is not telling direct lies, it's obvious that many of the claims are exaggerated. For instance Popov is credited with being the chief inventor not only of radio but also of radar, even though he died as long ago as 1906!

The basis for the claim that Popov invented radar is that he carried out some laboratory experiments, which showed that radio waves could be reflected from metal sheets. There are a number of similar cases given where Russians are credited with complex inventions when it's clear they did no more than carry out a few basic experiments.

For the benefit of historians who may wish to investigate I've given a list of these supposed inventions. Apart from this, the book is, for it's time relatively free from political rhetoric.

Most of the propaganda is confined to a single chapter: *The Voice of Soviet Radio*. The chapter's contents can be summed up in two quotes: *"Capitalists use (radio) to deceive the workers of their country, to spread slander against the Soviet Union and democratic countries and to kindle a new war. Soviet Radio is the voice of truth and freedom, the voice of a great nation leading the struggle for peace"*. So now you know!

Fig. 2: In 1882 an early pioneer, Dr. Bogoslovski set up two microphones on the stage of the Bolshoi Theatre. By this means 12 people, were able to listen to a performance of Verdi's opera Rigoletto at his home. (See text).

Radio & Electronics

The book's *Radio & Electronics* title is somewhat misleading since it describes not just radio...but all aspects of electronics. An early story concerns one **Dr. Bogoslovski** who in 1882 set up two microphones on the stage of the Bolshoi Theatre.

The Doctor ran cables back to his house and connected them to telephone receivers. By this means 12 people, **Fig. 2**, were able to listen to a performance of Verdi's *Rigoletto*.

Nowadays you would hardly think that this 'Dial an Opera' system could have had more than novelty value. **However, it proved extremely popular**! In fact, so much so that the good Doctor eventually had to abandon it as it was taking up more time than he could afford!

However, it may be that opera-by-telephone experiment influenced the development of radio entertainment in the USSR. This may be the case because, in 1925 an amplifier was installed in Union House in Moscow with cables connecting it to loudspeakers, **Fig. 3**, fitted in workers' clubs throughout the city. It was then extended with cables being run to theatres, concert halls, sports stadiums, etc., so that Union House became a sort of distribution centre for broadcasting live performances from various sources of entertainment.

Fig. 3: The opera-by-telephone experiment may have influenced the development of radio entertainment in the USSR because in 1925 an amplifier was installed in Union House in Moscow with cables connecting it to loudspeakers, fitted in workers' clubs throughout the city. Note that the receiving station was located away from the city to limit interference (see text).

Similar Systems

Similar systems were set up in other Soviet cities. When radio broadcasting began radio receivers were added, often located outside the town to reduce local interference, and again 'piped 'to the distribution centre.

Loudspeakers were now also being located in private houses and blocks of flats. The distribution station could then either rebroadcast the national services, or transmit local programmes.

At the start of the Second World War in the USSR, there were more than 11,000

Invented It!

distribution centres supplying about 60,000,000 loudspeakers. There were also more than 1,000,000 conventional radio receivers.

The system proved very useful during the war, when it was the practice to switch off the national transmitters during the hours of darkness to prevent enemy aircraft using them as navigational aids. The wired system meant that important announcements could still be made and morale raising local broadcasts transmitted. Interestingly, the system was still in use when the book was written. With the Soviet obsession for statistics the book informs the reader that in Moscow there were more than 3000km of cable and about 1000,000 loudspeakers.

Pulse Position Modulation

While most of the inventions described are familiar to me, mention must be made of one which isn't. At the risk of incurring the scorn of more knowledgeable readers I have to confess to never having heard of the system in question.

The book's chapter *One Radio Station Carries Several Transmissions* describes a modulation system, which seems remarkably advanced for its time. This is particularly remarkable when it's remembered that it was all done using valve technology.

Basically, the system as described, used a pulsed transmission system employing Pulse Position Modulation. In the gaps between the pulses, other pulses corresponding to another programme are inserted. In this way several music programmes or several tens of telephone conversations can be transmitted simultaneously. The system seems to have been confined to ultra short wave (now v.h.f.) which suggests that quite a wide bandwidth was needed.

Television Broadcast

The first TV broadcast took place from Moscow on the 2 May 1931 on a wavelength of 56.6m. Radio Amateurs in Moscow and Leningrad received pictures on home built machines. Although the book doesn't mention whose invention this was, it seems very similar to Baird's mechanical system, using a rotating Nipkov scanning disc to give 30 lines at a resolution of 40 elements per line.

The received picture was about the size of a matchbox. Later, regular broadcasts were started, the frequency being changed to a much lower on, a 'very long' wavelength...the other details are vague I'm afraid. Pictures were received as far away as Novosibirsk, at a distance of about 2000km.

Then, in 1938 an all-electronic system was introduced in Moscow and Leningrad, although standards unfortunately are not specified. By 1951 a 625 line system was operating in Moscow, giving (it's claimed) the clearest TV pictures in the world.

Curiously, the distribution station philosophy also afflicted the start of TV. In 1940 one such station was installed at the top of a block of flats on Petrovski Boulevard in Moscow. Since extension cathode ray tubes c.r.t.s) were hardly feasible, it was necessary to use TV sets..."Of very simple construction" in all the flats.

Presumably the simple sets were similar to present day monitors. However, as they would have to contain the timebases and high voltage power supplies,(the circuitry which was most likely to fail) it really seems more trouble than it was worth!

Colour Television

At the time the book was written, experiments in colour TV were taking place. Two systems were being tested with one being credited to **I. A. Adamian** using rotating colour filters (the sequential system).

The other system, devised by **Y. S. Volkov** used a c.r.t. with colour phosphors to produce images in red, green and blue...the three primary colours being optically combined. (The idea is illustrated in **Fig. 4.**).

There were obvious disadvantages to both the Russian systems and it seems neither was accepted. Eventually the USSR and its satellite states adopted the French SECAM system.

Hazardous Predictions

Occasionally throughout the book, the author indulges in the hazardous business of prediction with the usual mixed success. He seems unaware of the invention of the transistor in the USA, and speaks instead of valves of the future which will be no larger than a pea.

Although writing less than a decade before the USSR's spectacular space successes...the author makes no mention of space communication. On the other hand he correctly predicts that congestion on the m.f. bands will cause most future communication developments to take place in the v.h.f. and u.h.f. bands.

The author also successfully foresaw teleconferencing! However, in the final chapters he really lets his imagination go and wrote - in the chapter *Transport of the Future* that "*G. I. Babat has invented a new system of road transport. Comrade Babat proposes a network of wires to be run under the surfaces of main roads and fed with high frequency current. The vehicle, which he calls the Vechmobile, has a coil mounted underneath to draw power from this network by induction*". The Vechmobile was also to have to been provided with auxiliary batteries so that it could also be used on side roads not provided with a power network.

In another chapter entitled Transmission *of Electricity without Wires* the author described the possibility of transmitting significant amounts of power using concentrated microwave beams. The accompanying illustration, **Fig. 5**, however, is pure fantasy. Ships, cars, aircraft and (this being the USSR) ....tractors, all optimistically carry small dish antennas.

It would certainly help to keep your fish supper warm on the way home. But...I wonder what the anti-mobile telephone mast lobby would make of this idea! The book is a fascinating look back into the past and I'm pleased I can read Russian, as I would have missed it otherwise!

PW

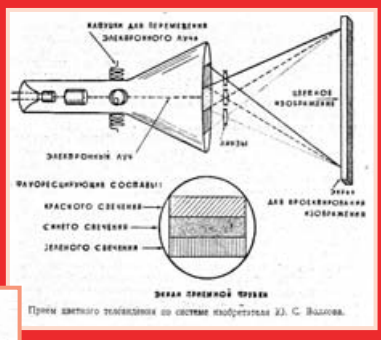


Fig. 4: The proposed Volkov colour television system (see text)

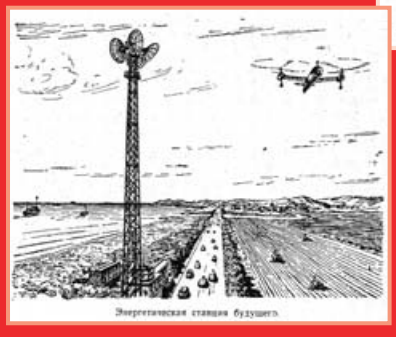


Fig. 5: The book also describes the possibility of transmitting significant amounts of power using concentrated microwave beams. The accompanying illustration shows ships, cars, aircraft and tractors under power from a microwave transmitter! (See text).

RUSSIAN INVENTIONS

Photocell	A. G. Stoletov (1888)
Magnetron	N. F. Alexeyev & D. Y. Malyarov 1937
LORAN	E. M. Rubchinski
Decca Navigator	L. I. Mandalshtam & N. D. Papalevski (1930)
Electronic camera tube	S. I. Katayev (1938)
Aircraft auto pilot	K. E. Tsiolkovski
Film sound system	A. F. Shorin, P. G. Tager & V. D. Okhotnikov (1926)
Electronic organ	A. A. Volodin

Valve&Vintage

It's Ben Nock G4BXD on duty in the vintage 'shop' this month and he's already been out and about visiting rallies! Some of the treasures he's found now appear in the column...and in his photographs!

A warm welcome to you as I man the Valve & Vintage 'shop' once more! We are well into the year now and already several rallies have gone by....and I say "thank you" to all those who've said "hello" at the various venues.

A big thanks go to Ann and the gang at the **Harwell Rally Group** for the show in February, another great event. And also to the lads at the Swansea rally in February.

Surprise...surprise...a few new items have found their way into the stores here! What a surprise?... I hear you say...so let's press on and have a look at what's turned up.

Fig. 1: The Receiver 78 and Transmitter 53 in a mounting cradle.

Aircraft Radios

First off this time I've got some aircraft radios to show you: the Receiver Type 78 and the Transmitter Type 53, **Fig. 1**, which are part of the ARI.5205 station. These are two aircraft sets, for high frequency (h.f.) use , covering 2.4 to 13MHz in two bands.

The receiver is in fact just a front-end, and there's an additional box which contains the intermediate frequency (i.f.) stages and the audio amplifier. The transmitter runs three 807 valves, one as the master oscillator and two in parallel as the power output stage, giving 33W on c.w. and 8W on radiotelephony.

The receiver front-end is a five valve tuner with a 560kHz i.f. output. A calibrator gives 100kHz pips and there's also a radio frequency (r.f.) preselector control. In original service use there would be two receiver tuners and two transmitters. the 53 and 78 were the h.f. units, with the low frequency (l.f.) 76 and 51 sets tuning 150 to 505kHz. (**Fig. 2**, shows an internal view).

The receiver is a standard superhet design, comprising of an r.f. amplifier, mixer, local oscillator and the circuit is straightforward to trace. The transmitter on the other hand is a little different in that I think the oscillator tunes just the one range and its output is doubled on the higher range.

I don't have a circuit of the transmitter though, so if anyone can help out there I'd be most obliged. As usual I will gratefully acknowledge any help from our loyal readers.

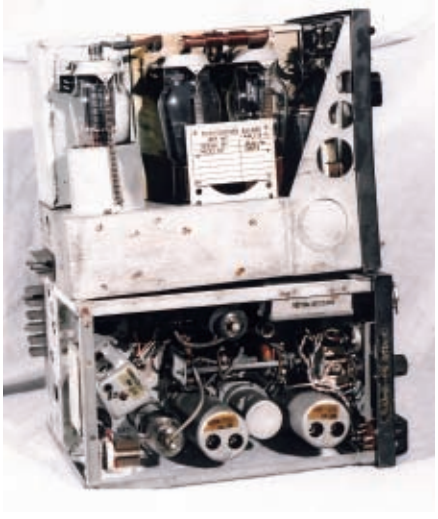


Fig. 2: Inside the 78 (bottom) and 53 sets, note the three 807 valves in the transmitter.

Aircraft To Army

It's from Aircraft to Army use now as I look at the UK/PRC-352 equipment. This comprises of the PRC-351 manpack with the additional UK/AM-352 high power amplifier. The photograph, **Fig. 3**, shows the transceiver with the power amplifier mounted in the UK/VRQ-301 vehicle interface unit.

The PRC-351 is an 1,841 channel 25kHz spaced v.h.f. set operating between 30 and 76MHz. It delivers 4W of narrow band frequency modulated (n.b.f.m.) or 20W with the additional amplifier.

The previously mentioned vehicle interface unit allows the radio and amplifier to be powered from the vehicle battery. It also provides interconnections to the main radio harness when used in an FFR (Fitted For Radio) military vehicle.

The specification for the radio states a 5kHz deviation n.b.f.m. signal and a sensitivity of 1µV for 10db S/N. Power is from a 24V supply, either the 3.3Ah clip on battery or the vehicle supply. The 351 on its own draws 100mA on receive and 850mA on transmit, with the added amplifier that increases to 2.85A on transmit.

Canadian Manpack Set

Another Army set now, but this time it's one from across the water in Canada. The CPRC-26, **Fig. 4**, is an earlier v.h.f. manpack set, crystal controlled and self contained unit for infantry use.

The CPRC-26 resembles the British Wireless Set No 88 in its shape, size and operation. It also uses the same battery type valves, its power amplifier (p.a.) stage is a 3B4 type giving in the order of 300mW of output.

In use the radio offers six channels between 47 and 55.4MHz and employs frequency modulation. However, there are six separate versions of this set labelled A to F which have slightly different frequencies (though in service use, channel 1 was a common frequency to all variants).

The manual states the set is designed for short range communication, 1.6km (1 mile) being normal range, and that the equipment is both shock and immersion-proof, also withstanding being dropped by parachute. A special loop antenna can be fitted which would enable the operator to home in to another set.

On an interesting note, the manual states there is an extension cable that can be used between set and battery so that in cold weather operations the batteries can be carried inside the operators clothing. Real central heating...for the batteries only!

Construction of the Canadian set is modular, see **Fig. 5**, and each unit can simply be replaced to speed up

repair in forward positions. The top plate covering the units identifies each module again aiding repair.

The radio runs off a dry battery supplying 90, 45, 3 and 1.5V with an expected life of 20 hours in service use. In addition to the normal 1.5m (4ft) whip antenna, a trailing wire counterpoise could be used to increase range. This could also be used as the antenna itself, allowing less conspicuous operation but reducing the set's range.

The Versatile Valve

Valves are versatile and just to prove that they're not only used in receivers or transmitters...a nice little stabilised power supply, Fig. 6., arrived for my collection the other day. In fact it was 'donated' to me as it didn't work, it was going to the tip but I took it as the case looked worth re-using. The fault quoted was that as the h.t. came up to full strength...the fuses popped.

Opening up the unit revealed three rectifiers and two 5B/240M valves. Measurement showed that two of the rectifiers, R18 types, were unserviceable. These were replaced with modern silicon diodes and the unit retried.

Fig. 4: The CPRC-26 in canvas case with handset and whip antenna (See text).

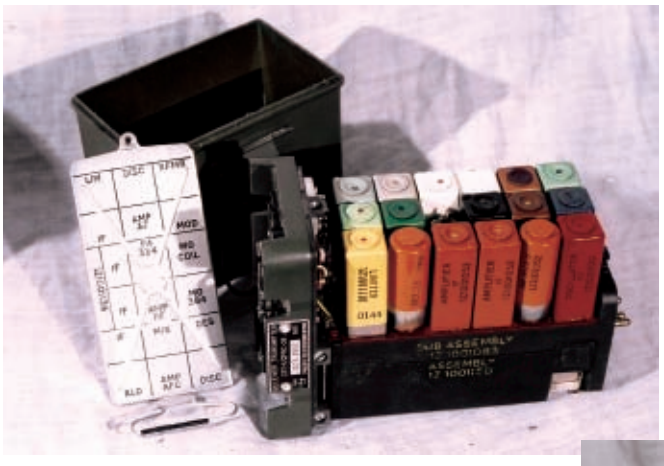


Fig. 5: The internal modular construction inside the CPRC-26 radio.

This time all was well, the 5B/240M's being operated as series regulators. I noticed though, that even with the voltage control at zero as the unit warmed up from switch-on that the output volts rose then fell back. This was soon traced to the fact that there was still a valve rectifier in the negative control voltage feed.

I found that as the heaters of the 5B/240s warmed they were passing voltage until the negative rectifier also warmed up and gave the required clamping volts. Replacing the negative valve rectifier with a modern diode cured this effect.

The front meter is a strange device in that it has two sets of connections, one for current and one for voltage. On investigation further I found that the current part didn't work, so using the working voltage section, with some rewiring later, this was eventually used to measure both the current and voltage.

So, I now have a regulated 0-500V high tension power supply ideal for testing these valved sets. If anyone else has anything they are thinking of throwing out...please do let me know!

Fig. 3: The PRC-351 transceiver with amplifier (right) and vehicle interface below (see text).

And Finally

Finally this time...two readers have sent requests for help. Firstly **Blair VE6AGH**, would like to hear from anyone with operational experience of using the SSR-5 receiver transmitter equipment. Please contact him QTHR or via E-mail at **ve6agh@rac.ca** Also, **Bill GI4OYM**, would like to obtain a circuit and info on the Racal Field Kaynard equipment, contact him at QTHR or via **wire@breathemail.net**

Well that's all for now and I'm looking forward to seeing you at possibly the London, Great Barr and Drayton Manor rallies. As always you can write to me at: **62 Cobden Street, Kidderminster, Worcestershire DY11 6RP**, or via e-mail at **G4BXD@qsl.net** and why not have a look at my web pages at **www.qsl.net/g4bxd**

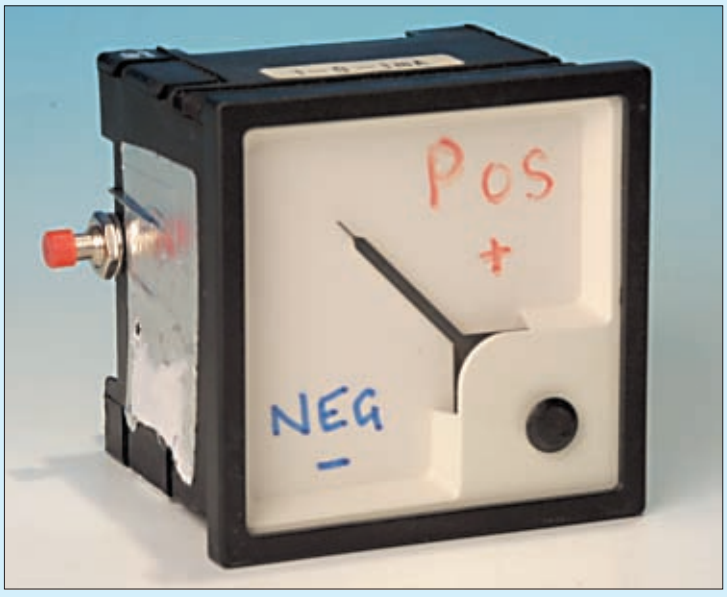
Cheerio for now. *PW*

Fig. 6: The valve regulated high tension power supply, now fully working. Before being nutured back to good health it was heading for the rubbish skip (see text).

AVOID THAT ZAP!

Build The Simply Static Meter

Bill Jarvis GM8APX, was surprised at the high static levels around his own home and shack. The resulting project should help anyone who has been caught out by static - from a simple finger-tip zap to a destroyed semiconductor.



The Simply Static project is both fascinating and really simple to build! If you have ever experienced the effects of a static discharge this instrument will open a new world to you. But be warned...don't stroke the cat while it's switched on!

We're all bothered by static charges aren't we? Ranging from the static 'belt' we get when passing office furniture such as filing cabinets, right round to inflicting instant death to sensitive semiconductors...there's a static charge waiting for its chance! So, my project will be ideal for people who are worried about high static charges when handling semiconductors, etc.

If you're interested in detecting a static charge...it's easy to make an electroscope. This can be made from an empty bean tin, an empty yoghurt pot, a pin, and a dab of Blu-Tak, and a piece of foil chocolate wrapper. However, the resulting simple instrument does not indicate the sign and magnitude of the charge unless you give it a known charge first - which can be inconvenient!

So, you then have to consider making a dedicated, but simple instrument which will do what's needed and then of course you'll have to look at the inevitable money input! However, a 1-0-1mA moving coil meter (centre zero), **Fig. 1**, has been available for under £10 from Greenweld. This, together with an ICL7611 op-amp with input impedance of 10^12Ω turns it into a bi-directional electroscope which tells you the sign of the charge on yourself, and provides you a good idea of its magnitude.

You could also calibrate the pull-out dial scale in volts (or, more appropriately, kilovolts - if you have modern synthetic clothes, shoes or carpets) although the circuit I suggest cuts off before the meter can reach full scale deflection (f.s.d.). So it becomes impossible to overload it, and easier to estimate static charges by the distance needed to give half-scale deflection (i.e., half way from centre zero to either end).

Fig. 1: The Simply Static project is based on a 1-0-1mA moving coil meter (centre zero), which has been available for under £10 from Greenweld. This, together with an ICL7611 op-amp with input impedance of 10^12Ω turns it into a bi-directional electroscope which tells you the sign of the charge on yourself, and provides you a good idea of its magnitude (see text).

Meter Sizes

The required 0-1-0 mA meter is available in two sizes, **Fig. 2**, but it is easy to construct the op-amp circuit in the back of the meter, even in the smaller size one. Both sizes have easy-to-remove-and-replace card dials, on which you could write anything which suits your needs.

The meters were intended for mounting in a square panel hole, the larger of the two versions measures 91 x 91mm and the smaller being 67 x 67mm. However, they don't need mounting in this application, and can stand alone on the side of your choice, with the PP3 battery and circuit safely inside the recessed back panel.

I made both of my prototypes with push-on-release-off buttons, as there's no need to leave the battery draining away. To operate the instrument all that's needed is just push on the button when you want to know whether there's any static near you - and it's sign confirm...you'll be able to do so...and soon get used to what combination of clothes, shoes, and carpets lead to what sign of static!

Metal Strip

One version (Fig. 2) has a metal strip along the bottom, as a vague sort of 'earth' (but remember your work-top could possibly show a different earth potential to your body, if the floor is a good insulator).

The other version, **Fig. 3**, has two 4mm terminals on top, and the push switch on the left-hand side. The layout is highly non-critical!

You will also need two 10MΩ (or any very high) metal film

resistors, to avoid frightening the (albeit well protected) i.c. inputs; and two of about 8.1kΩ, so that the meter cannot go off scale with a 9V supply. You could also of course use a 6V supply, and lower voltage halving resistances...but that would mean more drain when the on-button is pressed.

The Circuit

The circuit is shown in **Fig. 5**, and for my version I used an i.c. holder and 8-pin i.c. pads from the Copper Island Construction kits (from **Duncan Walters G4DFV**, **see note*** below), which I fixed into place - using Cyanocrylate adhesive - between the meter terminals. But you could mount the i.c. many other ways but you do get the adhesive with the kit! The battery clip is also glued to the inside back of the meter movement; but I'm just lazy.

When it comes to calibrating the instrument it would be easy to calibrate the instrument in volts, by connecting in parallel with a conventional digital voltmeter. However, for evaluating the field (in volts per metre) you would also need a ruler....and as most rulers nowadays are made of plastic, just picking it up would cause chaos!

Note:* *For further information on the Copper Islands Kits please see G4DFV's advert in the Classified Ads section this issue, or the review in page 49 January 2002.* ***Editor**).*

Coulomb Meter

To make a coulomb-meter, you could parallel the inputs with a small capacitor. For a pico-ammeter, all you need to is bridge the terminals with a piece of dry paper.

Fig. 2: The required 0-1-0mA meter is available in two sizes. However, the author explains it is easy to construct the required op amplifier circuit in the back of the meter, even in the smaller size meter unit. Both sizes have easy-to-remove-and-replace card dials (see text).

The i.c. I've used in the project has provision for setting an accurate zero **but I found no need for this**. If the needle moves one way, you've "gotta plus charge" ...and if it moves the other way..... (guess what?).

When it's all set up and working you'll find it's amusing to hold the meter whilst going round the house stroking different objects (But be careful when stroking the cat!). And you never know...the Simple Static meter might even make the basis of a party game!

To test the quality of insulators, just bridge the positive (**+**) and negative (**-**) terminals with a strip of the insulating material, and see how long the meter takes to return to centre zero. A really good insulator gives an indication which makes the meter move so slowly back to zero...it's like watching paint dry.

The 4mm terminals in my larger prototype have the added convenience of also taking 2 or 1mm plugs when the threaded insulator is loosened, and of accepting a wide range of wire gauges. Altogether it's a very useful little unit...and it should help you to avoid being zapped and also save those precious field effect transistor from the dreaded mini-thunderbolts!

PW

Contact Address

Greenweld Ltd.,
Unit 14, Horndon Business Centre, West Horndon, Brentwood, Essex CM13 3XD.
No telephone numbers are mentioned in their adverts - other than a FAX number: **(01277) 812419** for orders**.** Alternatively they can be contacted by e-mail at
bargains@greenweld.co.uk

Please note: Readers are asked to bear in mind that the meter used by GM8APX would be of surplus origin. However, if they aren't available from this source, the centre zero 1-0-1ma meter is quite common - although other suppliers may have different sizes, styles and shapes of meter. Whatever happens though...do build a Simply Static meter for yourself...they're fascinating to use! **Editor**.

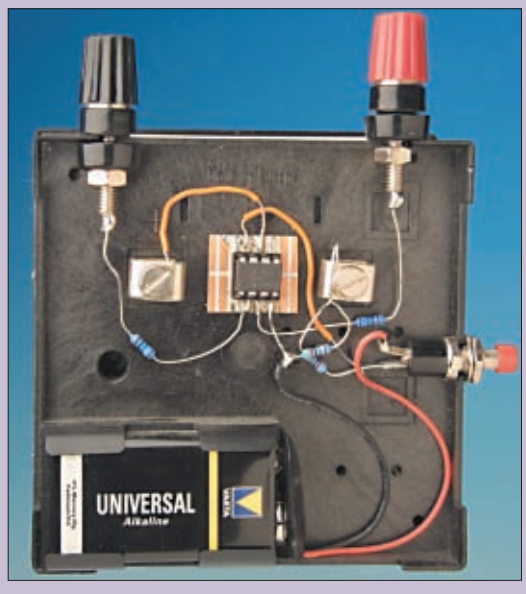


Fig. 3: The author built his second prototype into the smaller meter case, and employed two terminals for holding (for example) insulating materials to be tested. He also says that you must be prepared to like "Watching paint dry" when testing materials! (see text).

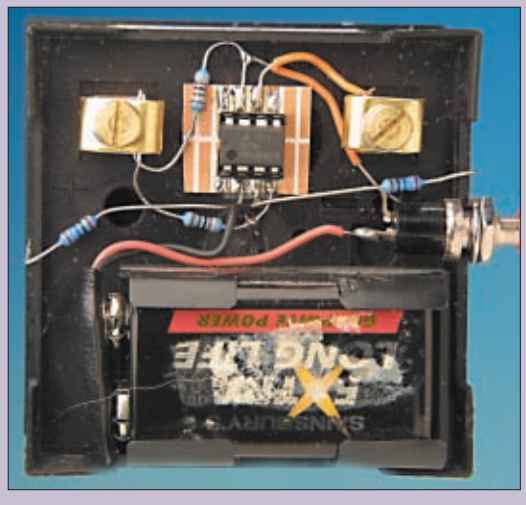


Fig. 4: The Simply Static project shown built into the larger meter's housing. Not that the op amp is mounted on a Copper Islands Circuit Outfit (CICO) i.c. holder. (See text for details).

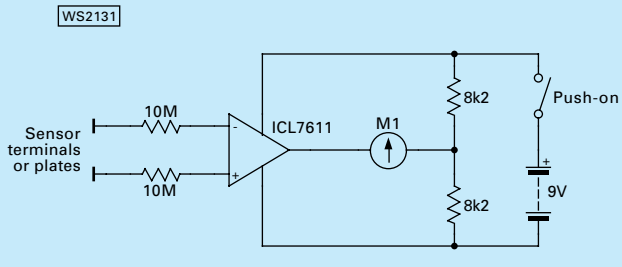


Fig. 5: Circuit of the Simply Static project. It really could not be simpler! The project uses an op amp and very few components (see text).

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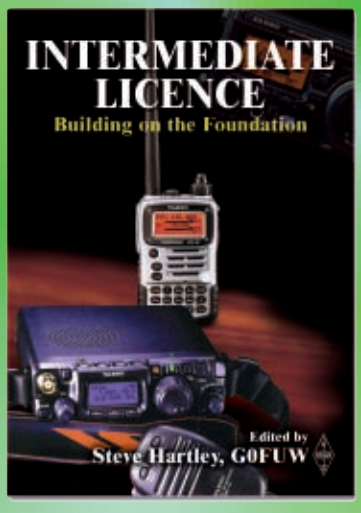

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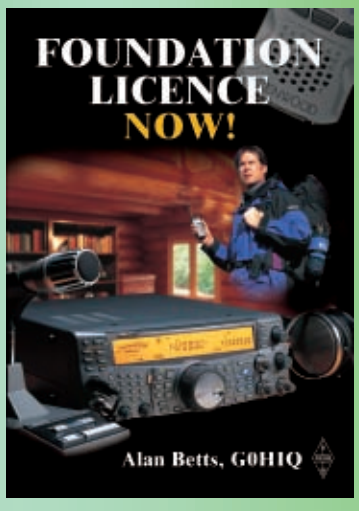

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Antenna Workshop

The versatile SPC Antenna Tuner for the h.f. Bands, is described by John Heys G3BDQ this month.

With it's acronym name derived from **S**eries, **P**arallel **C**apacity the SPC matching circuit is a modification of the 'T' matcher and is attributed to the late **Doug de Maw W1FB**. The circuit offers many advantages over other designs and internal matching units. When correctly adjusted, an SPC a.t.u. will efficiently match the 50Ω transmitter output impedance to impedances from under 25Ω to over 1kΩ.

There's now a growing trend to incorporate an internal a.t.u. into many new transceivers. Should the operator of one of these transceivers wish to use an end-fed single wire antenna though, the inboard matcher will be unable to cope with the wide ranging impedances presented by the antenna on different bands.

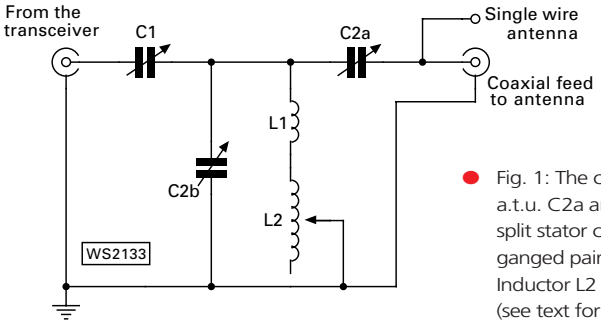


Fig. 1: The circuit of the SPC a.t.u. C2a and b may be a split stator capacitor, or a ganged pair of capacitors. Inductor L2 is a rotary unit (see text for details).

Fig. 2: Front view of the a.t.u. which has a Perspex panel. The turns counter for the rotary inductor allows for quick band changing.

High Impedances

Most internal matching units cannot deal with the high impedances that are often presented by long wire, Windom or other wire antennas. When you employ a linear amplifier, the internal matcher becomes redundant and an external a.t.u. able to handle the higher transmit power becomes essential.

Internal a.t.u.s are really designed to work with antenna systems that present, at the transmitter, impedances not too far removed from a nominal 50Ω. Quite often a multi-band beam antenna, incorporating traps for multi-band operation will show a low s.w.r. only over small sections of each band.

On one of the wider bands, such as 21 or 28MHz, an internal a.t.u. can 'tune out' any small mismatches created by the antenna's limited bandwidth. So, the transceiver will always be presented with a 50Ω load and full output power is maintained. But these internal matching units are engineered to cope with quite a low range of impedances

Due mainly to space limitations, inbuilt matchers tend to use quite small toroidal inductors and fixed capacitors. Though these components take up little space, they generally result in a power through-loss of ten per cent.

Air spaced variable capacitors and cylindrical inductors when used in a matching circuit, as shown in **Fig. 1**, will allow the construction of an a.t.u. which has virtually no loss of power and which can be designed to safely handle transmitter powers ranging from QRP levels up to our legal limits and beyond.

There will always has some capacitance across the inductances L1 and L2, which helps to reduce unwanted h.f. harmonics. This feature although, is perhaps not quite so important, as modern transceivers tend to have very little unwanted harmonic output.

Ganged together

The variable capacitors C2a and C2b (Fig. 1) are ganged together and may be either a split stator item or a pair of capacitors, one of which must have both front and rear spindles to allow coupling. The maximum capacitance of each capacitor should be at least 150pF.

The values for C2a and b, are not critical and higher value capacitances may be employed. My SPC matcher uses 356pF capacitors for C2a and C2b. Values for capacitor C1 can have a maximum capacitance anywhere between 175 and 360pF.

The vane spacing of the variable capacitors used determines the power handling capability of the a.t.u. and wide spaced variable capacitors are now becoming scarce and expensive. Fortunately, they can still turn up at Rallies and Club 'Junk' sales.

I find that variable capacitors from old aircraft transmitters are ideal buys, and many capacitors used in my a.t.u. designs were from this source. Often they have spent many years in the junk box before being used.

However, capacitor 'flashover' **is not just a product of close vane spacing**. Flashover can also arise when the a.t.u. inductance is set incorrectly. To allow fine setting of the inductance value, the inductance L2 should preferably be a rotary unit, often known as a 'Roller coaster' or 'Mangle'. If you're unsure what one of those is, ask grandma!

A multi-tapped coil may be used, but it can often be difficult to find the correct tap point for each band. You would also need a high quality ceramic rotary multi-way switch, to be able to handle high transmitter power. These rotary inductors are becoming scarce too, but they sometimes turn up at club sales, or surplus flea markets.

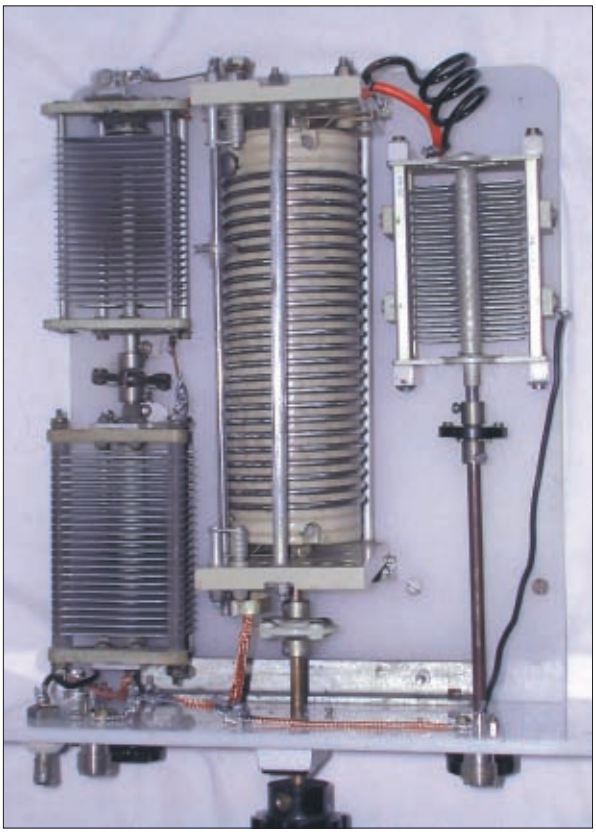


Fig. 3: Top view of the SPC antenna matcher. The layout is arranged to allow short wiring, minimise stray inductance and unwanted capacitance.

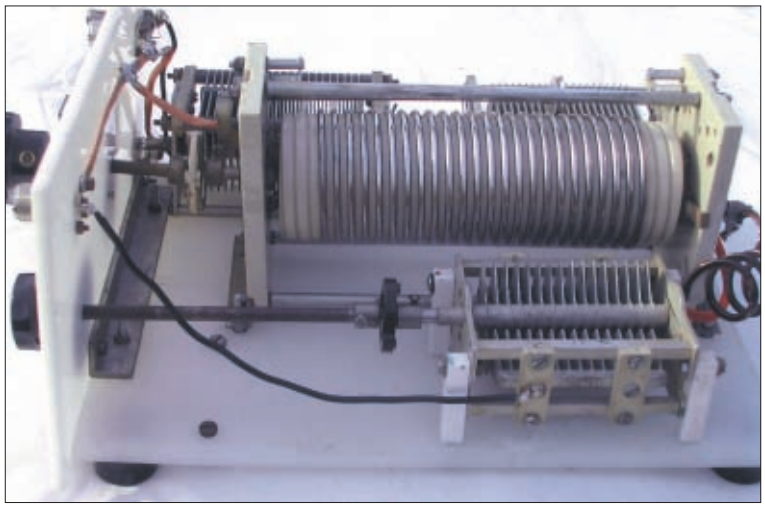


Fig. 4: Side view of the a.t.u. with C1 in the foreground. This capacitor came from a wartime aircraft transmitter. Inductor L1 is wound with enamelled heavy gauge wire.

Not Grounded

Please note, that in Fig. 1 the earthy end of the L2 is not grounded. Although you may see some published SPC circuits where this point of the the coil is grounded, I've found that when this is linked, there's always a possibility that unwanted resonances can occur at some settings.

Unwanted resonances in the coil will cause power loss and coil heating. If the matcher is to be used on all the h.f. bands, L2 must have a maximum inductance of at least 20µH. As the inductor used in my prototype version has a maximum inductance of only 11µH, it cannot tune the 1.8 and 3.5MHz bands.

Conversely on the 28MHz band, L2 is at a minimal value, and would only use less than one turn. So, its efficiency would be low. To obviate this, a small fixed coil L1 is used in series with the variable inductor L2. This small inductor has an inductance of about 1µH and should be made with heavy gauge (three or four millimetre - 8/10s.w.g.) copper wire.

Old starter motors have some really thick wire. But wherever you get it from, form it into three turns with an internal diameter of 25mm stretched over a 38mm length.

Real Hardware

Translating the circuit diagram (Fig. 1) of the SPC a.t.u. into real hardware can invite certain problems. The connections to C1 and C2a are all above earth potential and the inductor L2 will only have its designed high *Q* (efficiency) when positioned at least its diameter, or more, from any earthed or metallic surface.

A metal base and panel would invite insulation and spacing problems so, I made mine from plastic materials. The base, a slab of Polypropylene material, measures 305×40mm. Fortunately, the new cutting boards for kitchen use are made from this and are available quite cheaply.

My local discount store had large 480×320mm boards for a little over £3. This plastic can be sawn and drilled easily and is fine for self-tapping screws. It has a smooth waxy feel and superb insulating properties.

The front panel is a piece of white Perspex bought as an 'off-cut' from the scrapbox of my local glass works. It is held securely to the baseboard by a short length of stout non-ferrous (aluminium) angle shape. The photograph of **Fig. 2** illustrates the panel layout.

It may look rather unusual, but the antennas enter my shack from the left so the antenna connectors are positioned to the left, whilst the input SO-239 coaxial socket is on the right. Normally, coaxial connectors are located at the back of an a.t.u., but my table top and shelf arrangements would make this awkward.

Top View

The top view of the completed unit, **Fig. 3**, shows C2a and b on the left of the baseboard, with C1 is on the right hand side towards the back. The connections to the fixed vanes of C2a and C2b go to L1 as do the moving vanes of C1.

If a split stator variable capacitor unit is used for C2, then the combined moving vanes will connect to L1. Earth loops are avoided by having a length of copper braid run along the panel to which all earth connections are made.

The layout used makes for very short r.f. wiring, as you can see in **Fig. 4**, which gives a side view of the a.t.u. and two of its four 'feet' are just visible at the front and back edges of the baseboard. These feet raise the board away from any earthy surface.

Operation

In operation on 7MHz, the variable inductor (L2) only needs nine turns in circuit. This setting reduces to five turns on 10MHz, two turns on 14MHz, one and a half turns on 18MHz. On trying the 21MHz, just one turn was needed , dropping to just half a turn for the 24MHz band. As I mentioned before, on 28MHz just L1 is in use.

The initial setting up on each band can be done by using a low transmit power and a resistive dummy load. This can be in the range 100 to 600Ω to simulate an actually antenna connection.

The capacitor controls may be set to between a third and half maximum value, then the variable inductor, L2 is rotated until the lowest s.w.r. is found. All the capacitors then should be adjusted to bring down the s.w.r. to unity. Now you're ready to go with higher power. Do not adjust L2 with full transmit power applied.

I've found that the tuning is fairly sharp on 7MHz and ideally, reduction drives for the variable capacitors would be useful. A turns counter for L2 is obligatory, to make repeated settings easily, and I obtained a suitable one from **Mainline Surplus Sales**.

Works Well

This SPC design works well and shows almost no power loss. My unit can easily handle 1.2kW without capacitor flashover and 'loafs' along at the UK legal power levels. Using a rotary inductor with an inductance of 20µH or more will allow operational additionally on the 1.8 and 3.5MHz bands.

Finally, I am indebted to **Bill Staples G0AKY** for taking the pictures to illustrate this article.

PW

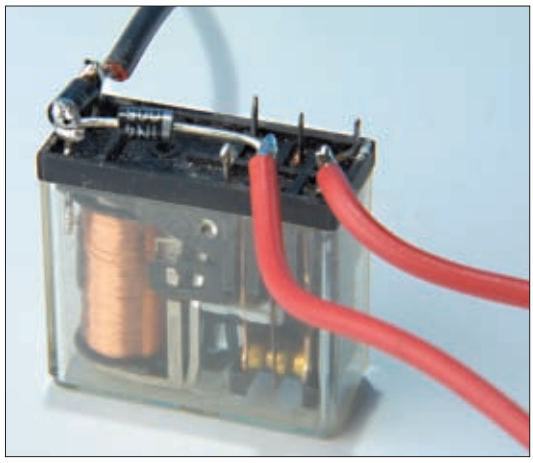
Carrying On The Practical Way

"Getting it the right way round" is the theme of this month's practical ideas column by the Rev. George Dobbs. And by using 'Idiot diodes' he's playing very safe....by ensuring that his radio equipment isn't damaged by incorrectly connected power supplies.

"Experience is the name everyone gives to their mistakes"

Oscar Wilde (1854 - 1900),

from *Lady Windermere's Fan*.



This month's G3RJV project...protect your equipment by providing 'Idiot proof relaying safety' against wrong polarity power supply connections!

On the shelf above my main workbench, I have a nice home-brew 7MHz transceiver. It's a reliable small transceiver I once enjoyed using for occasional portable work but it lies there unused nowadays...because of two classical mistakes.

The first mistake was that I lent it to a fellow Radio Amateur and the second was that I forgot to install reverse polarity protection when I built it! No doubt, by now, you're ahead of me in the story. He borrowed it and connected the power supply the wrong way round causing its demise. So, now the rig is in the "I'll get around to repairing it one day" queue of the shelf that grows with the years.

I'm not one to apportion blame, but I guess that the bottom-line reason really lies with me. This is because it's a basic error to build any precious item of equipment without adding provision for reverse polarity protection.

A lot of active components in electronic circuits simply do not like being connected the wrong way round to a power supply and most of them die very quickly. The great pity of reverse polarity accidents is that they are so easy to avoid. Just a few extra parts will protect equipment from expensive, and very often difficult to change, components going up in smoke.

The Idiot Diode

Most radio constructors know about the 'idiot diode', the most basic method of polarity protection. This simply makes use of the property of a diode to pass current one only way.

A single 'idiot diode' protection circuit is shown in **Fig. 1**, where a diode is placed in series with the power supply line. **The diode must be capable of passing the maximum current the equipment is likely to draw**.

Silicon diodes in the 1N4000 series are commonly used for the circuit. It's a popular idea with constructors because a single diode is easy to add to any electronic circuit.

Like many simple solutions, the single diode has drawbacks. The most obvious is the loss of voltage across the diode as the device will have a forward voltage drop.

In the case of the 1N4001 the voltage drop will be in the order of 0.8V. This is quite a significant loss of power supply voltage.

A series diode also adds a non-linear impedance to the power supply. This is not a problem for many items of equipment but not good practice in radio frequency circuits. However, it's surprising how many stability problems can begin with a poor power supply.

Ultimate Idiot Circuit

The diagram, **Fig. 2**, shows the ultimate idiot diode circuit. Rather than a single diode, here a diode bridge is included. This could perhaps be called the 'moron diode' as it's foolproof.

When the equipment is connected via the bridge, the power supply can be connected either way round and it will offer the correct polarity to the equipment. Obviously the real problem here is the voltage loss through the diodes, and that will be at least 1.5V...which is usually unacceptable for most applications.

A diode can be added in parallel to the power supply as shown in **Fig. 3**. In this situation, the diode is reverse biased and only draws very little leakage current.

Should the supply be connected the wrong way round, the diode will act as a short circuit to ground. This should shut off a well-protected, or fused, power supply but the safest method is to add a series fuse, as shown in Fig. 3.

The fuse should be rated high enough to pass the maximum current drawn by the equipment **but not much higher**. It needs to blow if the polarity is reversed and the diode

begins to draw a high current.

I've seen discussions in Amateur Radio literature about using a transient suppressor diode for the bridge application. It would directly replace the normal diode in Fig. 3.

Transient suppressor diodes are similar to regular zener diodes, but can suppress larger amounts of energy. They are designed to fail-safe, so if a surge damages them, it won't damage the rest of the network. A normal diode is likely to fail open-circuit, thus losing protection entirely, but the suppressers are designed to fail, ending up short-circuited.

In Junk Box?

Transient suppressor diodes are hardly the sort of thing many of us have lying around in our junk boxes but they are available from electronic suppliers, companies like Farnell. The type 1.5KE18A looks suitable for the application.

The 1.5KE18A is made by General Semiconductor and Fairchild and appears in the Farnell catalogue. The diode has low leakage for a reverse voltage up to about 15V, and then conducts heavily when the voltage exceeds 18V. So it can protect against surge voltages, as well as providing protection if the supply is reversed.

My favourite polarity protection circuit is shown in **Fig. 4**. There's a few more bits in it, **but it is foolproof**. If the supply is connected the wrong way round, the equipment receives no power whatsoever. Nowadays...if I'm building any significant equipment, this is what I add in the power supply line.

The requirements are small; two diodes and a 12V relay. The relay must have at least one set of change-over contacts and these contacts should be large enough to handle switching the total current of the equipment being protected. (Almost any 12-volt relay will do the job).

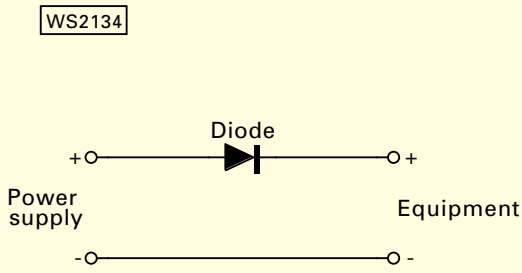
Simple Circuit

The circuit is simple: When the power is applied, the series diode ensures that the relay does not 'see' the voltage unless the polarity is correct. The diode - in parallel with the relay coil - helps to reduce voltage spikes caused by the magnetic field of the relay coil.

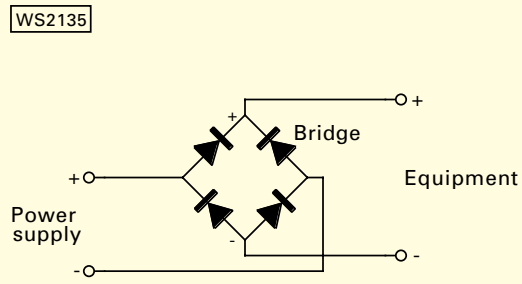
The power supply is connected to the equipment via the switching contacts on the relay. The normally open (NO) relay switch contacts are between the power supply and the equipment. These are the contacts that are open when the relay is switched off.

If the supply is connected the right way round, the 12V reaches the relay coil and the normally open contacts will close. This allows the full supply voltage to reach the equipment. No positive voltage at the top of the relay means no voltage reaching the equipment.... **and that is what I call safe!** *PW*

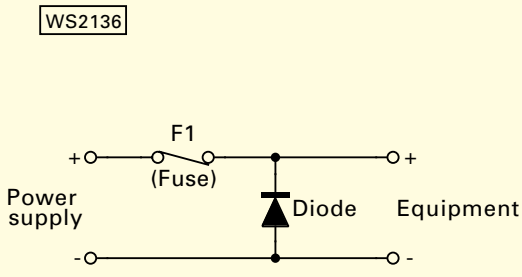
● Fig. 1: A single 'idiot diode' protection circuit is shown here, when a diode is placed in series with the power supply line. The diode must be capable of passing the maximum current the equipment is likely to draw (See text).

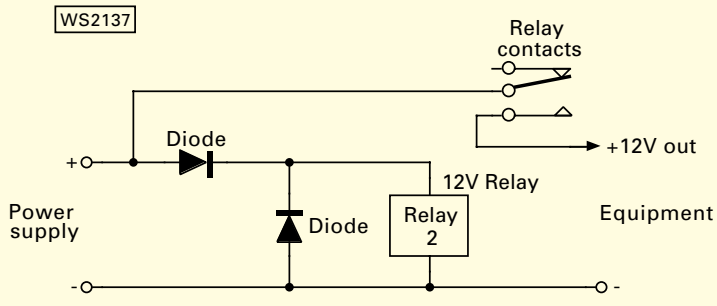


● Fig. 2: Diagram detailing the circuit which G3RJV considers to be the "ultimate idiot diode circuit". Rather than a single diode, a diode bridge is included (See text).



● Fig. 3: A diode can be added in parallel to the power supply as shown here. Here the diode is reverse biased and only draws very little leakage current. Should the supply be connected the wrong way round, the diode will act as a short circuit to ground (see text).





● Fig. 4: This polarity protection circuit is a favourite of G3RJV's. George says "There's a few more bits in it, but it is foolproof". If the supply is connected the wrong way round, the equipment receives no power whatsoever (see text).

VHF DXER

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REPORTS & INFORMATION BY THE LAST SATURDAY OF EACH MONTH.

THIS MONTH DAVID BUTLER G4ASR HAS REPORTS OF TROPO OPENINGS ON THE VHF, UHF AND MICROWAVE BANDS

If you were listening to the 50MHz band during February all you probably heard was the hiss emanating from the receiver's loudspeaker! The band was very quiet and apart from a few auroral back-scatter openings at the beginning and end of the month nothing else was reported.

On the other hand if you listened to the 144MHz band and higher frequencies you may have noticed that tropospheric propagation was enhanced on a number of days during the period with contacts being made into Scandinavia and the near Continent.

AURORA

Ionospheric auroral back-scatter propagation was recorded in the UK between February 1-11 and February 26-28. It's interesting to note the 14-day decline in auroral activity between February 12-25.

This event was a classic example of solar rotation and if you maintain an auroral calendar the cyclic effect of the Sun is clearly seen. It will show periods when the noisy face of the Sun is pointing towards Earth and similar periods when the quiet side is pointing towards Earth. Of course, this effect isn't so obvious for much of the time as the Sun can be geomagnetically quiet over its entire surface and you won't be able to record noisy and quiet sides.

However, when the Sun is active, especially during the equinox periods (October-November and February-March) and in the years' either side of sunspot maximum, the effect is very noticeable. To an h.f. operator it will indicate periods of disturbed ionospheric propagation and periods when DX conditions return to normal or are enhanced on favourable paths. Operators of the 50MHz band will find it useful for spotting periods of auroral activity and (around sunspot maximum) the best periods for F2-layer propagation.

Although auroral activity was reported on 14-days during the period most events were rather weak with few openings creating much activity. A back-scatter opening on February 2 however was quite intense with c.w. and s.s.b. contacts being made on the 50, 70 and 144MHz bands.

Auroral propagation was reported on the 50MHz band between 1300-2000UTC, returning later in the evening around 2230UTC. The stations contacted were mainly at fairly short-range, generally inter-UK traffic between England, Ireland, Scotland and Wales. The propagation appeared to intensify between 1525-1600UTC with a few contacts being made with stations in Finland (OH), Norway (LA) and Sweden (SM) during this period.

A similar enhancement, between 1535-1615UTC was noticed on the 144MHz band. During this time UK operators reported making c.w. contacts with the stations of ES6RQ (Estonia), OH1JCS, OH6KTL and SM5CUI.

Last month I reported that **Clive O'Hennessy GM4VVX** had noted auroral activity on January 3 and 30 which had occurred 27-days apart. I suggested that by adding further 27-day periods to these dates it may be possible to predict the likelihood of future events.

I calculated that an auroral opening might occur during the late afternoon of February 26. Well I'm pleased to report that after a two-week absence of any auroral activity it reappeared on February 26 at 2240UTC. For the record the station of GM4WJA spotted the OY6SMC beacon (50.035MHz) at 2240UTC, EI7IX heard the GB3RMK beacon (50.060MHz) at 2250UTC and PA0OOS found the GB3LER beacon (50.064MHz) at 2255UTC.

Although the opening was very brief it does show the value of maintaining a 27-day calendar to increase the likelihood of catching re-occurring ionospheric events. If every active v.h.f. DX operator were to maintain one I could be reporting on real contacts rather than beacon reception reports!

TROPO OPENINGS

During February there were periods when operators over much of the UK reported particularly good tropo openings on the v.h.f., u.h.f. and microwave bands to stations located in Denmark (OZ), Germany (DL), Norway (LA) and Sweden (SM). The openings were caused by an enhancement to the prevailing tropospheric conditions, but what exactly causes these lifts that enable v.h.f. operators to contact DX stations much further away than normal?

The Earth is surrounded by atmospheric layers which comprise of the troposphere, extending to a height of around 10km, a middle layer called the stratosphere which extends to around 80km high and an upper layer called the ionosphere which stretches about 500km or more into space. As far as day-to-day propagation of v.h.f. and u.h.f. signals are concerned the troposphere is the most important layer.

All our weather occurs in the troposphere and during 'normal' conditions its temperature decreases with height. During low pressure weather the air mass is rising gently and as it climbs it cools and any moisture in it condenses to form clouds. Under these conditions the troposphere is generally well 'stirred up' and unsettled.

During high pressure weather the air mass is sinking slowly and as it falls its temperature increases to produce a warmer and drier atmosphere, very often without clouds. Under these conditions the troposphere is generally very still and settled.

Although the temperature normally decreases with height, certain weather conditions can result in a layer of air being formed whose temperature remains constant or even increases with height. In the United Kingdom such a layer can occur anywhere from immediately above the earth's surface up to a height of around 3km. This condition is known as a temperature inversion.

Temperature inversions mainly occur during high pressure periods as the still air allows stratification of the atmosphere to take place. They have a pronounced effect on the propagation of v.h.f., u.h.f. and microwave signals, particularly if there are corresponding changes in the humidity.

Signals on the v.h.f. and u.h.f. bands normally travel through the troposphere in a slightly curved path. As a result of this 'bending' they are able to travel further than the visible horizon to a point known as the radio horizon.

The bending of these waves is caused by

refraction and the extent to which they curve depends on the refractive index of the troposphere. This in turn depends on the temperature and humidity of the air.

In a normal atmosphere the temperature and humidity generally decrease with height and this produces a steady fall in the refractive index with height. Under these stable conditions the radio horizon can easily be calculated.

However. if a temperature inversion occurs the refractive index can increase dramatically and a normal tropo signals which is usually lost into space is refracted back to Earth well beyond the normal radio horizon. This type of inversion propagation is often described as a tropo opening or 'lift' and is the most common form of propagation encountered by the v.h.f. DX operator. There are four types of temperature inversion which can lead to enhanced tropo propagation; **subsidence**, **advection**, **nocturnal** and **frontal** inversion and I'll now take a look at each of these.

INVERSIONS

Tropospheric openings often occur towards the end of a period of stable high pressure. If the pressure system eventually moves east from the UK, it can allow moister and cooler Atlantic air to move in near the surface below the subsiding mass of warm dry air associated with the high.

The sharp contrast of temperature and humidity between the two layers of air produces substantial refraction of a v.h.f. or u.h.f. signal as the subsidence inversion develops. Had the high pressure moved in a different direction, an opening may not have occurred as the temperature and humidity contrast between the two layers may have been too slight.

A **subsidence** inversion can happen at any time of the year but is more common in the spring and autumn. It can produce enhanced propagation for extended periods over large distances of several hundred kilometres.

The **advection** inversion is caused by an air mass moving (adverting) across surfaces of differing temperature. During the summer many inland locations may be subjected to temperatures approaching 30° Centigrade for several days on end while nearby coastal locations are enshrouded in fog at around 15°C.

Warm dry air above the land masses blown over the colder sea produces a layer of cool foggy air immediately above the water. This large contrast in the weather provides the right conditions for long-distance marine propagation. An advection inversion can also occur over the land during the winter if warm moist air from the sea is blown over cold frosty or snow covered ground to produce a surface layer of fog or mist.

The **nocturnal** type of inversion can occur after dark if the land cools more rapidly than the air above it. During the daytime the sun heats both the ground and the air and there is a normal fall of temperature and refractive index with height.

In the evening the ground cools rapidly and the layer of air closest to it becomes colder than the layer immediately above. Around dawn the air in contact with the ground is at its coolest and may also be very moist, resulting in fog or dew. As in the case of the advection inversion, the sharp contrast between the two layers of air, one cool and foggy, the other warmer and drier, provides the right conditions for long range propagation of v.h.f., u.h.f and microwave signals. Nocturnal inversions occur exclusively over the land as the ground can cool much quicker after sunset, than the sea.

A **frontal** inversion occurs during low rather than high pressure weather. Associated with a low there are often warm and cold fronts. Changes in temperature and humidity with height occur at these fronts and abnormal propagation along the advancing front may occur. These conditions generally develop only for a short time, along a limited path, and are fairly insignificant.

LONG DISTANCE CONTACTS

During February a number of temperature inversions caused by the clear, cold weather and associated stable high-pressure systems enabled many long-distance tropo contacts to be made on the v.h.f., u.h.f. and microwave bands. For example tropo conditions were up on February 25 and 26 with the station of PA0WWM (JO22) hearing c.w. signals from G3LQR (JO02) over a 210km path. Nothing spectacular in that other than it was on the 24GHz band! The low-power transmissions from G3LQR on 24192.100MHz were received at times with S9 signals.

Tropo conditions were also good on the 10GHz microwave band with **John Quarmby G3XDY** (JO02) hearing the station of SM7ECM peaking 519 on 10368.100MHz. On the following day, February 26, G3XDY heard the DF0UD beacon (JO31) at 425km, DB0JK beacon (JO30) at 470km and the c.w. station of DG1KJG (JO30) at 435km. Earlier in the month on February 16 the station of OZ1CTZ (JO46) reported hearing the GB3CCX beacon (10368.920MHz) over an 873km path.

Moving down to the 5.7GHz band and John G3XDY reports making his furthest ever distance contact on February 25 when he completed a two-way c.w. QSO with the station of SM7ECM (JO65) over an 860km path. There was a reasonable amount of DX activity on the 430MHz, 1.3GHz. 2.3GHz and 3.4GHz bands with UK stations reporting c.w. and s.s.b. contacts with stations such as LA4YGA, LX1DB, OZ1BEF, OZ1CTZ, OZ1FF, OZ5KM, SM6ESG, SM6VSZ and SM7ECM. Although there was considerably more activity on the 144MHz band the distances involved, up to 900km or so, were no different from that worked many of the microwave bands.

DEADLINES

That's it again for another month. Forward any news, views, comments or photographs to the address and by the date given at the top of the column.

Thanks for your letters and good luck with the DX. See you again next month.

73 David G4ASR

The 144MHz station T7IARU in San Marino operated by Dick PA2DWH.

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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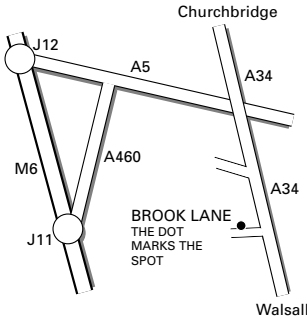

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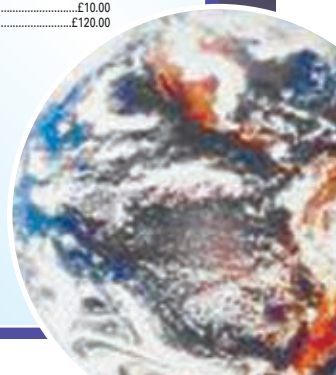

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REPORTS, INFORMATION AND PHOTOGRAPHS TO ME PLEASE BY THE 15TH OF EACH MONTH.

There could soon be two new DX entities as Yugoslavia's Parliament formally abolished its nation on Tuesday 4 February 2003. The remaining two republics of Serbia and Montenegro will now become loose unions with semi-independence.

A deal arranged by the European Union will keep the two republics together sharing the capital of Belgrade, as well as a joint administration for both defence and foreign affairs. With approval by the two chambers of the Yugoslav parliament, the birth of a new country called 'Serbia and Montenegro' was agreed.

The new arrangement will have little immediate impact on Amateur Radio and for DXCC purposes, Serbia and Montenegro will be considered a single entity at least for the time being. Radio Amateurs are expected to continue using YU/YT prefixes, although the situation could change in three years time when residents of the two republics will be allowed to vote to remain together or go their separate ways.

CELTIC CONNECTIONS

In Scotland the **GMDX Group** has introduced an event called **Celtic Connections** to encourage activity by all Radio Amateur's world-wide to contact areas generally agreed to be those with Celtic origins. This includes Galicia and Asturias in Spain (EA1), Ireland (EI), Northern Island (GI), Brittany, France (F), Cornwall, England (G), Isle of Man (GD), Scotland (GM), Wales (GW) and Nova Scotia, Canada (VE1).

The 'activity weekend' is to be held on the third weekend of April each year and this year will start at 0000UTC on the 19th and last until 2400UTC on the 20th. This weekend should provide a good start for all those interested in claiming the groups **Celtic Knot Award**. Reports from s.w.l.s are welcome and certificates of participation will be awarded to anyone who submits a log.

If sufficient numbers are received the leading stations from both Celtic and non-Celtic areas will be presented with an engraved commemorative Quaich which is a small Scottish drinking cup. Further details are on this event and other awards from the GMDX Group are available from **Drew Givens GM3YOR, 5 Langhouse Place, Inverkip, Scotland PA16 0EW** or from the website **http://www.gmdx.org.uk**

DX NEWS

Chasers of the DX might like to know that **Tadao Yamamoto JF6OJX** will be operating from Fuji as **3D2JX** from Mana Island (IOTA OC-121) between the 19 & 24th April. His equipment will be a FT-897 and a wire antenna.

Activity will be on the lower bands 3.5 to 10MHz especially for Europe and 14 to 28MHz as time allows. Tadao's QSL Manager is JN1HOW and a log search will be available after the operation at **http://www.NDXA.jp/pedi/3d2-2003/**

Members of The Federacion de Radioaficionados de Cuba (FRC) will activate several special event stations over the next few months. These celebrate the 150th anniversary of the birth of Cuban national hero Jose Julian Marti who was born in Havana in 1853 and died fighting in a war he had helped organise for Cuban Independence in 1895.

Activity can be expected to be on all bands and various modes will be used. All QSOs will automatically be confirmed via the bureau. The callsigns to be used include CO0S (11-13 April), CO0E (10-11 May), CO0M (14-15 June), CO0A (12-13 July), CO0R (9-10 August), CO0T (13-14 September), CO0I (11-12 October).

DX SURVEY RESULT

The results of the *425 DX News* and *The DX Magazines* 'Most Wanted Surveys' are now available on-line at **http://www.425dxn.org/surv2003/** and **http://www.dxpub.com/dx_news.html** These surveys make interesting reading as well over 2660 operators participated this year compared to 1985 in 2002.

Bernie McClenny W3UR Editor of *The Daily DX*, has combined the results of both surveys and has come to the following conclusion. The top 10 positions are now currently being held by Andaman Island (VU4), Scarborough Reef (BS7), Lakshadweep Island (VU7), Juan de Nova (FR/J), Peter I Island (3Y), Desecheo Island (KP5), Yemen (7O), Navassa Island (KP1), North Korea (P5) and Aves Island (YV0). The top scorers of last year Ducie Island (VP6D) and North Korea (P5) dropped to the 45th and 12th place respectively whilst the biggest change is Cocos Island (TI9) which drops from the 24th to the 124th place thanks to the TI9M Dxpedition. The biggest rise was Moldova (ER) which moved up 57 places from 304th to 247th on the list!

QSL INFORMATION

On to this month's QSL information which includes: 3C5XA via G3XAQ, 5H9IR via ZS6EZ, 8Q7AM via EA5MB, A45WD via YO9HP, A61AR via UA6MF, C6ALB via AA8LL, CT9DLH via DL4FP, EM60USB via UX5UG, ER60SB via ER1DA, P40AV via K4AVQ, RP4AMK via UA4ACP, VK0MQI via JA1ELY and YB0ECT via K5ZE.

YOUR REPORTS

All c.w. man **Ted Trowell G2HKU** on the Isle of Sheppy, Kent used his Tec OmniV with 70W and G5RV antenna or vertical on the lower bands working OH0R (Aland Island), LX1NO (Luxembourg) and EA6IB (Balearic Islands) around 200UTC on 1.8MHz followed later by a contact with PI53WAL (Netherlands) at 2200UTC who was operating from a Dutch flood warning station in memory of the tragic floods that occurred in 1953. Ted says "This contact with the Dutch station on the island of Walcheren was very poignant for me as the operator PA0ABM was using the flood warning gear of **Piet PA0PN**, now a silent key, who was a very dear friend of us both. Both Piet and I had our homes flooded in the great flood of 1953 and lost all our gear. Subsequently, when our stations were re-built we maintained a weekly Sunday sked on 1.8MHz. This was some time before the Dutch Amateurs were allowed to operate on this band. Piet had special permission from the Government to work me in order to test out the Dutch Flood Warning Station".

The 10MHz band had a lot of attention from **Roy Walker G0TAK**, Kendal, Cumbria this month judging by his QRP logbook. Contacts using a Index QRP Plus, Alinco EDX tuner and 3.5MHz long wire loop include LA2MJA (Norway) 1404, DL6LBI (Germany) 1448, F6GE) (France), GM3XGX (Scotland) 1505, OZ6AGD (Denmark) 1400,OH4RH (Finland) 1437, SM3AF (Sweden) 1607 and OK2PIX (Czech Republic) at 1644UTC.

THE 14MHz BAND

Peter Lowrie MI5JYK, Newtonabbey, Northern

CARL MASON GW0VSW REPORTS ON ALL THE LATEST NEWS FROM THE HF BANDS

The Celtic Knot Award

Ireland has been operating portable on 14MHz even though the weather conditions have not been at their best! Peter says "I was testing a ground mounted quarter wave with 9 radials for 14MHz with my MFJ-9420 SSB QRP (5W) rig and even with flat band conditions the station performed extremely well". Stations worked included ES1BA (Estonia) 1105 and 5/9 both ways, DF1QA (Germany) 1125, HF70A (Poland) 1136, EA5KV/P (Spain) on Palmara Island 1114, SM6EGY (Sweden) 1143, EW8OG ((Belarus) 1158, SP3LRK (Poland) 1233, WB1GQR (U.S.A.) in Essex, Vermont 1235 which was the only North American Peter heard on the band and again reports of 5/9 both ways were passed, F5UOE (France) 1353, OM5QM (Slovakia) 1403 which a new DXCC country for Peter on the band and PA3FAO (Netherlands) at 1435UTC.

Martyn Medcalf M3VAM, Chelmsford, Essex uses a Yaesu FT-897 connected to his SGC-237 tuner and 8.2 metres of wire for the antenna. Countries worked on s.s.b. include HA3FN (Hungary) 1203, JW9DL (Svalbard) 1352, IK8WEJ/P (Italy) 1207, RA9FLW (Asiatic Russia) 1511, OK1BNS (Czech Republic) 1535, 9A3MN (Croatia) 1715, OD5/OK1MU (Lebanon) 1720 and RZ3RX (European Russia) 1729UTC.

Short wave listener **Geoff Wallis**, Corsham, Wiltshire also spent a good deal of time on 14MHz. Calls logged include KH6ZM (Hawaii) 0730, VK3EGN (Australia) in Geelong, Victoria at 0900, CT9DLH (Madeira Island) 0935, EK3SA (Armenia) 0940, ER60SB (Moldova) 0941, FY5YE/F (French Guiana) 1140, VP5/W5AO (Turks & Caicos Islands) 1200, 5B4AGC (Cyprus) 1700, E21EJC (Thailand) 1900 and finally A71EZ (Qatar) at 2300UTC.

Geoff's receivers include an AOR-730 and Yaesu FRG-7700 with a vertical or long wire antenna tuned with either a SGC-230 or MFJ-949E. Geoff comments "Conditions have not been particularly good lately. Africa has been very poor with little heard on any bands from that direction. However, the Caribbean and North/South America are coming in strong despite a lot of QSB. You just have to try and sift the stations out".

THE 18 AND 21MHz BANDS

Regular reporter **Mike Baker G3SUK**, when not operating his rig is co-ordinator for the **Salvation Army's Emergency Response Group** (SAERG) in Suffolk which is on call 24 hours a day, 365 days a year. The group has been active for many years, and has attended over 100 call-outs to serious incidents giving support and refreshments to Emergency Workers.

Over this period the SAERG have provided assistance to 6,541 emergency workers, served 19,700 drinks, made sandwiches using 1,228 loaves and served over 2,330 hot meals. Recently the group received a new purpose

Mike Baker G3SUK at the wheelof the Salvation Army's new Emergency Response Vehicle.

built response unit on which Mike has just completed his driver training. This has left him with little time for h.f. activities this month although he did manage to make a few s.s.b. QSOs on 18MHz with EA8/G3NKQ (Canary Islands) 1641, Z33Z (Macedonia) 1426 and SV8SQ (Greece) at 1449UTC using an IC-746, 80W to a Carolina Windom antenna.

Also on this band was **Gary Macleod MM3SCO** in Tongue, Sutherland who used a TS-50, MFJ-948 tuner and converted CB antenna to work YI1BGD (Iraq) at 1425 followed by 3DA0TM on 21MHz at 1641UTC. It took Gary a bit of time to break the large pile but he says, "It was very satisfying to make it running just 10W".

A Yaesu FT-902 with matching a.t.u. and dipole antenna provided some good results for new reporter **M. Mackinway M3BDK**, Kidderminster. Having just retired there is now plenty of time to chase the DX and logbook entries for 21MHz include VK2KPP (Australia) in Canowindra, New South Wales at 1210, EP3SMH (Iran) 1430, A47RS (Oman) 1510, VQ9LA (Chagos) 1740, EZ8AQ (Turkmenistan) 1145 and AA2FO (U.S.A.) in Rochester, New York at 1820UTC.

Welcome now to new reporter, **John Flynn** who picked up a copy of *PW* during a recent visit to the UK and decided to send in his log. John has recently been licensed as **EC7AII**, which is a Spanish intermediate licence and is limited to using s.s.b. on the 3.5, 21 and 28MHz bands. John uses an IC-746 and inverted V dipole and managed several QSOs this month on 21MHz working UU5JA (Ukraine), DJ2JH (Germany), IK6DTB (Italy) and M3DOL/M (England) who was operating from his Taxi in London!

Also active on this band was mobile h.f. operator **Mark Taylor G0LGJ**, Dereham who found ZD7MY (St. Helena) at 1131 followed by HZ1JF Saudi Arabia) at 1210UTC. All contacts were s.s.b. using an Yaesu FT-100, 100W and Pro-Am whip antenna.

THE 24 & 28MHz BAND

In Chelmsford, Essex **Rob Hastings M3AHH** used his Kenwood TS-50 once again and 10W s.s.b. on 24MHz to work Z35G (Macedonia) 1303, SV2CXI (Greece) 1315, YO2BMI (Romania) 1322, 4X4FR (Israel) 1338 and UT4EO (Ukraine) at 1441UTC. The antenna was a Carolina Windom 80 Special.

Ending our reports is **Paul Burgess M0CCQ**, Ellesmere, Cheshire who uses his FT-920 with 300W to a 5-element Yagi. Paul's log lists contacts with YA/F6EAY (Afghanistan), 3B9FR (Rodriguez Island), HK4BKB (Colombia), HH6/DL7CM (Haiti), VQ9DT (Chagos), TI0RC (Cocos Island), ZF1DZ (Cayman Islands), 9G5GA (Ghana), 8P6JQ (Barbados), 5X1DC (Uganda), 8Q7CR (Maldives) and J37LR (Grenada).

SIGNING OFF

Well that's it for this month and I think you'll agree that band conditions have not been at their best. Being on the right band at the right time helps, so keep your eyes on the clock and listen out for those big openings. Thanks to all our reporters for their logs and to **Mauro Pregliasco I1JQJ** the *425 DX News* Editor and **Tedd Mirgliotta, KB8NW** editor of the *OPDX Bulletin* for all the DX news. Keep your reports, letters and emails coming and have a good DX filled month.

73, Carl GW0VSW

Trader's Table

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TEX SWANN G1TEX/M3NGS JOINS THE DATA BURST TEAM OF AUTHORS

Hello and welcome to my first outing in the Data Burst column! Unlike the other clever columnists who take turns to write for you in this column, I don't really have a speciality subject - so, bang goes my chance of gaining the 'Mastermind' glass bowl.

Despite not having a specialist subject, I have however, experienced a great deal of history in computing and using computers. I started way back in 1974, when working at college. Editing then was on a teletype machine, the program being put onto punched paper tape. No wizz-bang, hi-res. graphics in those days. Not even a screen!

Just four years later I was playing with my own self-assembled computer with **eight kilobytes**, of memory (RAM), and able to edit a simple program written in Beginners All-purpose Symbolic Instruction Code (BASIC). I then progressed onto using Pascal, and C as programming languages, before venturing into Xbase, a database manipulation language.

I now use Hypertext Markup Language (HTML) the language of producing internet web pages on your screen, to do some work. So, you may think this makes me superbright! Wrong I'm afraid! As, in modern terms, I'm such a dinosaur in programming terms that I am likely to flounder along with the worst.

I hope though that I can make up for my lack of 'cutting edge' skills, by a degree of cunning, that has almost 30 years of computing to call upon. I hope that I will be able to give you the benefit of this ability, as I hope to become the clearing house for ideas, and information as to how you can use computers to make your radio experience better.

I shall be trying to answer some of your questions about computer problems, although I cannot go into the realms of the operating system, as that is not the sort of thing that I intend to cover. I will be bringing you perhaps, new ideas for your use of computer in the shack.

Let me start by setting the basic idea of the type of computer I will be dealing with here. At *PW* I use both Apple Macintosh computers as well as the generic PC running a form of Microsoft's Windows operating system. I also am playing with different distributions of the Linux operating system, again on PCs.

But I suppose that the vast majority of you, who have computers in your shack, are probably using a PC with Windows. Some may be running Windows95 still, many of you, I suspect, are running Windows98, with more running WindowsME or WindowXP.

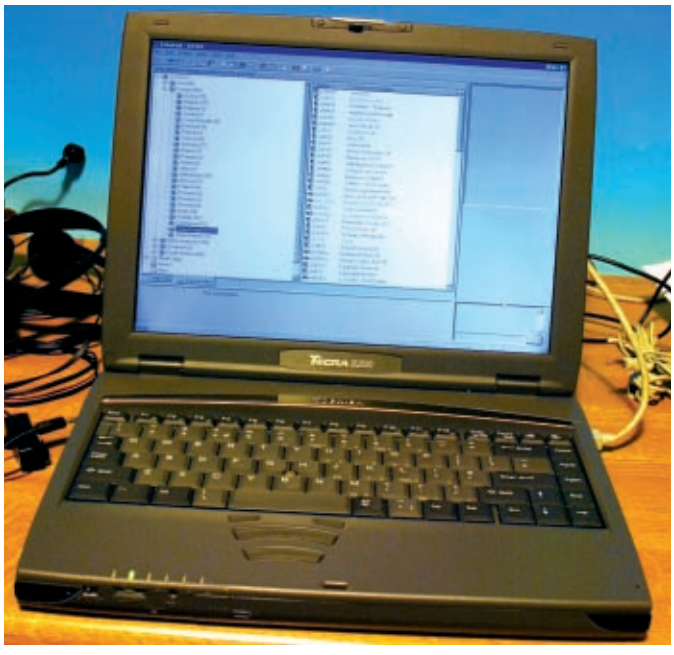
So, with the PC virtual monopoly, I suppose it's almost a forgone conclusion that programs that run under these systems are going to predominate. Although I will be covering Macintosh and Linux based programs, too. I will also be covering the use of the Internet as a means of enhancing the Amateur Radio hobby.

Specifically I will not be 'treading on the toes' of our other authors, as I shall be looking at unusual and interesting uses of computers not covered by them. Often computers are used to solve problems, rather than being used directly in the communications process, although they are encroaching even more and more into that side.

One aspect that I shall be looking at in the coming months is the use of direct computer-to-computer voice communications. Imagine talking to others around the world, using the the microphone and loudspeakers of your computer. Arrange A QSO, by clicking with the mouse on someone in a list of names **Fig. 1**. But that's in the future, what shall I talk about this month?

Well, I thought I'd start with a run down of the general programs that will probably have come with your computer, and how you can begin to use them to enhance your radio hobby. The computer, as it comes out of the box, is little use, other than as a time passer playing *Solitaire* or other games.

To make use of the computer, you'll have to delve into other programs, such as Word Processors, Spreadsheet or Databases. You may even go further and look to using computer aided designing (CAD) software, or even circuit emulation software (it's usually cheaper than building many prototypes). Over the coming months I shall be looking at all of these topics!



● Fig. 1: Direct voice communications using *Echolink*, via the computer sound card.

WORD PROCESSOR

One of the most basic uses for a computer, is to act as a word processor, to manipulate text in word, sentence, paragraph and document modes. I'm using a basic word processor as I write this article on my Macintosh. It's a simple program that does all I want of it, it doesn't need to be clever, or to have pretensions of desk top publishing (DTP). By using such a word processor you could publish your club's

newsletter, after all, it's content that your club members will want, rather than fancy layouts!

Have a look at the screen-grab of a simple layout of the spoof club newsletter **Fig. 2**, that I was able to throw together in only a few minutes. A simple two column layout, with a couple of embedded pictures to enhance the look. You wouldn't need much to create this newsletter! Perhaps a 200MHz PC and a reasonable inkjet printer, and your club newsletter could be in colour!

An older 200MHz Pentium based PC would be more than adequate for all purposes bar the most intense of graphics operations. Newsletters using a word processor, CAD and club accounts using a spreadsheet program, are all within the easy workload of such a machine.

I've used a portable PC with only 16Mb of memory and featuring a Pentium processor running at only 133MHz to work with Amateur radio data transmissions. Modes such as Packet operation, Morse decoding, PSK31 and SSTV are all suitable to be used on such a machine.

Let's look at what you might need to 'get-going' with a computer in the shack. And as I mentioned earlier, that computer is most likely to be a PC running either Windows95/98 or similar. I would suggest that you look to the following minimum specification:

- Pentium processor running at a speed of at least 200MHz. it should have at least 2Gb (Giga bytes) of hard disk space, 16Mb (Mega bytes) of memory (RAM) and a CDROM.
- A video card capable of 1024×768 pixels in thousands of colours.
- A monitor capable of showing the same displayed information.

I'm going to assume that, what I'm suggesting, will be the minimum specification for a PC. But I'm not going to neglect the other machines, such as the Apple Macintosh. Neither do I intend to ignore the other PC operating system Linux.

MINIMUM SPECIFIED

I would recommend going for the minimum I've specified for your PC, as today this sort of specification is what is being replaced by business users, and I've bought similar base units (the computer box itself) for as little as £20. This sort of value leaves much to be added to make up a working machine so let's look at what else you might get.

There are three items that must be at the top of your shopping list:

A suitable monitor. I would recommend a 17in monitor to make maximum use of the high resolution graphics card. Go for a 15in version only if you're pushed for space on your desk. And yet as you can see from **Fig 3**, I make maximum use of all near-horizontal surfaces as storage points.

What ever, size monitor you choose, go for one with a flat screen, as this will give the best images, and will invariably be the most recent type. **Buy only second-hand when circumstances force it**, and take advice when you do. I'd advise tee the screen working at the same resolution that you intend using it for at home.

You will also need a keyboard, and these can be so cheap these days, buy new from a reputable source, or one that you trust. A keyboard, bought over a pint in a pub for pence, may have some keys that do not work properly. Again try the keyboard out, to see that you're happy with 'the feel' of it.

So what have you to look for in a keyboard? Well, you should choose one that's got a positive feel to its action so, that you know when a key has made contact. Choose between a simple 'square' keyboard, with just the basic layout and function keys plus the numeric key pad to the right, or a 'super-duper' one with a key specifically for solving every trouble in the world.

The choice is yours, choose the keyboard you're happiest with. After all you will have to type something on it. Also, if you haven't used a typewriter or computer keyboard before, then look to buying a simple typing tutorial program, even if you give up before reaching a hundred words a minute, at least you'll know where the basic keys are.

And lastly, you'll probably need a mouse to complete your Windows, Icons, Mouse pointer (or WIMP) system. You could always look to add the following items to your machine, but in no particular order.

- A sound card that is 'Sound-Blaster' compatible
- A suitable printer (Inkjet or cheap laser)
- An internet connection
- An digital flat-bed scanner
- A digital camera

Finally before I sign off from my first appearance in the Data Burst column, please remember, that unless you buy a complete package, with additional programs (software), you will need to put aside more money for that too.

Please do not '**borrow a copy from a friend**' to install on you machine. The chances are that he also 'borrowed it', and he doesn't have the accompanying book, or the supplier's support either.

If you borrow a copy of commercial software from a friend, to install on your machine, it's likely to be illegal. You would also not be able to get help should you have problems, with the software.

However, there are many programs out in the public domain, that are shareware, or 'try-before-buy' as I prefer to call it, that should suit your needs perfectly. and I'll look into that side of things in my next column.

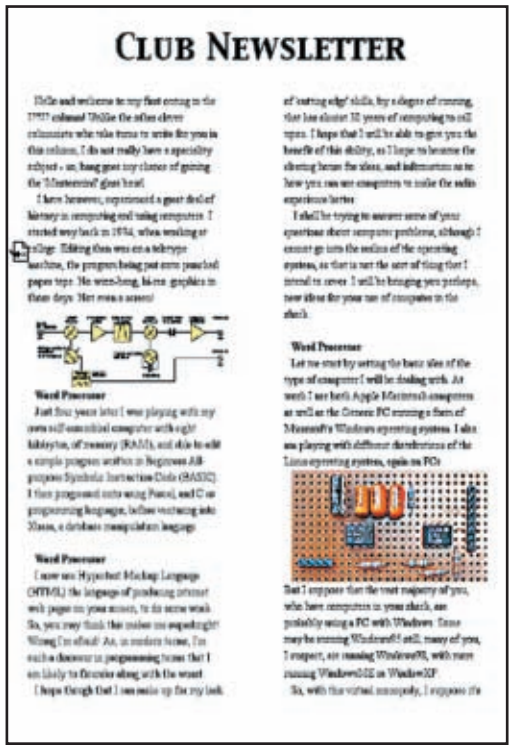


Fig. 2: A screen grab of a simply laid out club newsletter created with an ordinary word processor.

Fig. 3: A 22in very high resolution screen may take up a lot of desk space, but it makes a good book shelf too!

Please remember to send me in your comments, suggestions and ideas of what you'd like to see covered in this, my column.

Bye for now,

Tex G1TEX/M3NGS

TUNE-IN

TOM WALTERS
P.O. BOX 4440
WALTON
ESSEX
CO14 8BX
E-mail: tom.walters@aib.org.uk

TOM WALTERS HAS ALL THE LATEST BROADCAST NEWS, STARTING OFF WITH INFORMATION ON HAUNTING RADIO SIGNALS!

Well, they're back, or perhaps they never went away? What am talking about? - The **Numbers Stations**. It seems they still 'haunt' the international radio airwaves. Here's an extract from an E-mail I received from **Diodon**, in Belgium:

"I receive two enigmatic stations. One on **6958.7MHz u.s.b.** and the other on **6950.0MHz** every day at **2100UTC**, and finish around **2200UTC**. After a ritornello, a nice woman's voice gives plenty of figures. What is that?"

There is just a possibility that this could be a coded weather report, like those used by aircraft. But in that case there would be some words included. No, it sounds just like the old-fashioned coded messages for espionage agents.

Just imagine, a spy, overcoat collar turned up, crouched furtively in some attic, frantically scribbling numbers for a hour! It was widely reckoned that during the Cold War - up to about 1990 - certain countries, probably in Eastern Europe, maybe Cuba, maybe even in the distant past the USA and Britain, would use unscrambled channels to transmit instructions to spies or even embassies. With all the technology available today, it's an incredibly crude technique, but someone somewhere seems to think it's still worth it.

Diodon reckons the bearing from Belgium to be about 50° could just be North Western Russia. Thanks, Diodon, for reminding us of this antique procedure.

OBSCURE SERVICE

A somewhat obscure service is that offered by the international radio service of **Radio Tashkent**, originating from that exotic-sounding country, **Uzbekistan**. If you haven't connected with Tashkent yet, that's not for want of trying on their part.

As proclaimed recently, Radio Tashkent, broadcast in no less than 12 languages, and since independence they have been able to get first-hand news from abroad. Here's an English schedule, listen at: 0100-0130 on 7.190, 9.375, 9.530, 9.715; 1230-1300 and 1330-1400 on 12.85, 97.15, 15.295, 17.75 and at 2030-2100 and 2130-2200 on 5.025, 7.185, 11.905MHz.

Radio Tashkent's website is currently 'under construction', but you can try E-mailing them at **uzradio@eanetways.com** or **uztele@tkt.uz**

By the time you read this, the case will be either won or lost for **Radio Austria International**, which it was to be hoped would be reprieved. It all depended on whether the central management was prepared to finance an overseas service out of its own resources. Check out the website at **http://roi.orf.at/en_infocenter.asp**

THE DIGITAL BANDWAGON

The digital bandwagon rolls on. **Digital Radio Mondiale (DRM)** has now gained double international standards approval from the International Electrotechnical Committee (IEC) and from the International Telecommunication Union (ITU). The latter will allow for digital modulation on a provisional basis to any broadcaster who wants to use current assignments in the a.m. bands for digital broadcasting.

In other words, use existing frequencies, provided that digital broadcasts conform to existing levels of protection (meaning that they don't interfere with other transmissions). This is a real feather in DRM's cap, and puts them on target for a June launch.

Radio Sweden intends to start digital shortwave broadcasts in June, using the DRM system. The new transmissions will be via **Radio Canada International**, which is already relaying Radio Sweden's English and Swedish broadcasts to North America.

Radio Canada International will also be carrying a number of digital English language programmes from various international broadcasters. The other stations expected to take part are the **BBC**, **Radio Netherlands**, **Vatican Radio**, **Radio Japan** and **China Radio International**. The only thing is – will there be any DRM receivers available in time, and what will they cost?

OTHER NEWS

Writing this in mid-March, it was very frustrating not to be able to find frequencies for the period April-October. However, Radio Canada proved to be an exception. Here's RCI's shortwave schedule from 6 April to 26 October: 0000-0057 on 9.640, 15.205; 0100-0159 on 9.755, 15.170, 15.305; 0200-0257 on 15.510, 17.860; 1200-1259 on 9.660, 15,190; 1200-1459: (Mon-Fri) on 9.515, 13.655, 17.820; 1300-1559: (Sat-Sun) on 9.515, 13.655, 17.800; 1500-1557 on 15.455, 17.720; 2000-2059 on 5.850, 5.995, 11.690, 11.965, 12.015, 15.325, 15.470, 17870; 2100-2129 on 5.850, 7.325, 13.690, 15.325, 17.870; 2200-2229: on 9.590, 11.820, 13.670, 15.170, 15.455, 17.880 and at 2229-2359 on 9.590, 13.670 and 15.455MHz

Now that Afghanistan is back on something like the straight and level, watch out for a return of **Radio Afghanistan**. **Shams Rad**, head of foreign radio broadcasting recalls the time when this station had 6 languages on the air. Mr Rad added: "Foreign broadcasting has completely ceased operating for the last year and a half. A bomb targeted the short-wave broadcasting unit and still no step has been taken to reactivate it. Seeing the rising demand of local and foreign listeners for those programmes, we hope that the authorities will take steps to coordinate with friendly countries to restore this section of the radio".

But of course, the Middle East is still very far from peaceful, and Britain had a reminder of how disturbances can reach even the hallowed halls of the **BBC World Service**. Some 50 intruders got into Bush House hours before a huge demonstration against the possible war with Iraq.

The intruders were said to have penetrated deep into the building, including the offices of one of the foreign language services. However, they did not enter the newsroom or any of the studios, which are protected by security-coded doors.

A while ago, we heard that **Radio Ukraine International** was upping its shortwave coverage. Well, now it seems that they've really got the international broadcasting bug, because they're starting up on satellite as well!

Radio Ukraine International are broadcasting on radio to no less than 50 countries in Europe and Asia, with transmissions to the USA expected before long. They are on satellite nine hours a day, morning, afternoon and evening. And they've got over a million dollars to do it with!

That's all for this month, so until next time keep an ear on those broadcast bands and remember to let me know of any interesting finds.

Bye for now, Tom

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10-element 2m (144MHz) XY, £80 o.n.o. 12-element 70cm (430MHz) XY, £70 o.n.o. 2 x h.f. beams 10/20/15m (28/14/21MHz), £160 each o.n.o. Oscillator J2E, £50 o.n.o. 14-element 2m Tonna, £175 o.n.o. never used. Tel: (07952) 051111.

136kHz c.w. equipment: Well-made home-brew gear, 15W transverter with cable for FT-707/IC756PRO (10MHz); ATUs; high Q loading coils; receive noise canceller; 400W amplifier. Also, KW1000 h.f. amplifier. Steve GW4ALG. Tel: (01291) 625977.

Antenna sale 2 x 2000 mini beam for 10/15/20 (28/21/14MHz) excellent condition, & performer, £150. Cushcraft R5 vertical, £50. Tonna 9-ele crossed Yagi, £50. Buyer collects or pays P&P. M5JON, Bristol. Tel: (01454) 326869.

AOR 5000 with 500Hz filter, AS5000 antenna switch, allowing four antenna connections, boxed, with manual, excellent condition, £800 o.n.o. Telephone for details (not after 2100). Tel: Warwick: (01926) 854556.

AVO instrument testing electronic multi range No1 MOD wireless set No 31 sensible offers. Wanted AVO valve tester anything considered, also audio valves genuine private collector. Tel: 0113-255 9475.

AVO MkIII and MkIV valve testers in very good clean condition with books, £350 each or £600 for the two. Oscilloscope, Textronic 50MHz DB modern style with probe, £250 including carriage. Tel: (01872) 862291/241005.

B40 Second World War Warship communications receiver in original condition with all correct knobs (unlike the one in the science museum!), £100. Also rare valve from Tiger Tank, £offers. Tel: Fordingbridge, Hampshire (01425) 650772.

Bearcat 9000XLT 500ch scanner brand new, boxed, never opened, £185 plus P&P bargain buy. Commtel 225 500ch scanner, £185 new, never opened box, a real bargain again. Both scanners unwanted gifts. George, Tonypandy, Rhondda. Tel: (01443) 437343.

Collection of 50 generally immaculate domestic sets including Ekco ACT96, Ekco U245, several DAC90 and 90A, Bush TV22 Bakelite, Zenith Transoceanic, Philips 17 TV 1954. Also several communication sets including ACL R209 surveillance receiver with several plug-ins and spectrum display, £450, Racal RA153 twin receiver (no PSU), £200. Wanted Reception set R101, £750 offered for example in excellent condition. Many others, list by e-mail to alan.ainslie@lineone.net or Tel: Surrey (01252) 782932.

Complete Satellite System comprising IC-821, Ele and A2 rotators with controllers, elevation and rotator unused. 70cm and 2m (430 and 144MHz) XY ants, one unused, free BNOS. 100W amplifier with system. Buyer collects, inspects, cash only please, £800 or v.n.o. Pete Roe G0DLJ, QTHR. Tel: (01623) 513573.

Copies of *SWM* and *PW* from Oct/Nov 1984 to date most in binders, £offers, buyer must collect or arrange transport. Alinco DR112T v.h.f. transceiver 45W, boxed. mobile bracket, £75. Bob G0DYB/G4IAV, Wigan area. Tel: (01942) 870954 anytime.

Eddystone RX-680X v.good condition, buyer collects, bargain, £30. Tel: Exmouth (01395) 271414.

ERA Morse decoder and tutor plus RTTY decoder, with manual, demo tape and original packing, £40. John G3EGC, QTHR, Bolton. Tel: (01204) 301502.

Four Eddystone 6-pin coil formers with 6-pin socket, £5. Two UX7 Ceramic valve holders, £2. Colvin 50kΩ instrument type pot with ball race shaft, £5. Syd Fenwick, 28 Gimble Way, Pembury, Kent TN2 4BX. Tel: (01892) 822836.

Free to collector: 500 *PW, SWM, Radcom, QST, CQ DX* Listing Callbooks 1968, 1969, 1970, 1972, 1977, 1981, 1980, 1984 1990, £15 each inc postage. Tel: Chesire (01606) 883355.

FT-726R all-mode Tri-bander 2m (144MHz), 70cms (430MHz) fitted, ex condition, £325 o.n.o. Tel: Worthing (01903) 766418 or (01903) 753893.

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Icom IC-R75 receiver 30kHz to 60MHz with built-in DSP and manual, boxed for quick sale, £400, pensioner buying simpler set, buyer collects. Ron, Beeston, Notts. Tel: 0115- 849 3049.

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Kenwood TS-2000 as new boxed little scratch on top, exc condition, £1250 o.n.o. still in guarantee. Mr Cochran. Tel: (02392) 426507.

Kenwood TS-450SAT h.f. multi-mode TCVR 100W output with auto a.t.u. gc RX, £400. Yaesu FTV-901 transverter FC902 a.t.u. all WARC bands, £95. Barry G4GPW, Worthing. Tel: (01903) 763226.

KW Atlanta new p.a. valves, buyer collects. Tel: GM3ZXG on (01475) 781568.

Lowe H150 shortwave RX needs new home p.s.u. and instructions included only £150. Paul, Peterborough. Tel: (01733) 704836.

Minimitter RX converter 80-10m (3.5 - 28MHz) valved,

£20. TW, 2m (144MHz), TX a.m./c.w., £40. TW 4m (70MHz) TX a.m./c.w., £20. Wire recorder, £25. Tel: North Dorset (01747) 822652 or E-mail: peterB666@hotmail.com

North Atlantic flight communications with improved software on two floppy discs only £20 includes post. Tel: Frank on (01608) 663745.

NRD345 mint c/w manual, £280o.n.o. Target HF3S with software, manual, still under warranty, boxed, £80. Datong v.l.f. converter, £25. Scan master SP55 aerial amp, £35. Boxed, postage extra. Mick, Croydon area. Tel: (01689) 842223.

Racal RA17L in excellent condition and g.w.o. with photocopy of manual. £150 o.n.o. Ron GW4EVX on (01352) 755433 or E-mail: ron.price2@virgin.net

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WANTED

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AVO valve tester wanted. Prefer CT160 but otherAVO models considered, also wanted manual for AVO transistor analyser CT446 Type 1. Tel: Yorkshire (01482) 887938.

Black Control knob for old amplifier (see photo). Does anyone have one of these to sell me? 28mm diameter 14mm high, slightly oval, gold coloured inlay with pointer, grub screw. Tel: John on (01977) 614277.

Does anyone have a defunct KW180 Monitorscope with a good mains transformer? I can use it. John G3EGC, QTHR, Bolton. Tel: (01204) 301502.

FRG-7000 looking for manual, photocopy ok, also carry handle will consider scrap receiver, all expenses paid. Mel, Queensbuy. Tel: (01274) 817178.

G2DAF RX parts, IFs, coils, Kokusai filter, Xtals, switching coils. RX complete or part made, also Atlas TX/RX working or not for spares. Peter G8CKM. Tel: (01939) 250679 or E-mail: peterparker@g8ckm.fsnet.co.uk

Hansen FS-500H peak reading power meter or similar. Tel: (01986) 896658.

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Naval Type 618 and 619 TXs and cables plugs mic key, handbook for 619. Tel: North Dorset (01747) 822652 or E-mail: peterB666@hotmail.com

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Would like to purchase cheap Amateur Bands short wave receiver, analogue dial type. Info via post please. Y. Gebbsqyzz, 35 Pinfold Road, Streatham, London SW16 2SL.

Yaesu FT-101Z or FT-101ZD for spares, any condition considered. Tel: Tim, Lancs on (01706) 521692 or (07811) 510674 or E-mail: wallistg@aol.com

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topical talk Troublesome Toroids

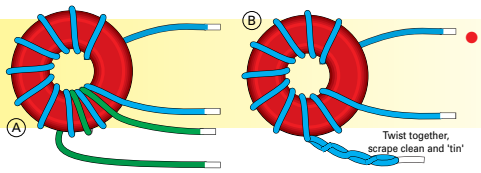

Fig. 1: They might look inoffensive...but those dratted toroids cause some constructors a lot of problems!

The letters pages always seem to be busy in *PW*! But this month, in answering some of the requests for help, the *PW* team now provide some advice, suggestions and ideas and how to find those components!

As the Editor has pointed out in Keylines this month, he's not long returned from visiting the **Chelmsford Amateur Radio Society** (CARS), and it appears that Rob G3XFD had an interesting time at that club. Interestingly, several of the topics brought up during the evening at CARS have also been raised in the month's letters. The subject? - toroids, and specialised coils and components. It seems as though those otherwise innocent looking components, **Fig. 1**, can cause constructors a little bit of bother.

Easy Standard

The toroid problem became a topic of conversation in the office and (especially) when our Editor explained his own approach to inductors for projects specifically aimed at the less expended constructor. Rob said, "I can understand the frustration which is so clearly expressed in the letters we've got this month. One of the most frustrating things for me as a hard-up schoolboy was finding the money to buy coils for projects, or finding the information I needed to wind them.

Rob continued his office lecture ..."One of the main reasons in Radio Basics why I adopted the rolled paper tube coil, formed onto a pencil and fixed with ordinary adhesive was purely for simplicity". He then went on to explain that everyone should have access to a standard pencil and an A4 sized sheet of paper. With these - with the paper cut into three equal sized strips along the longest measurement - it's possible to roll three coils.

"However"...the Editor continued..."there comes a time when to progress on to more advanced projects....and to get the best results possible....you have to start using toroidal formers. Fortunately...they're not as difficult to make as you might imagine and the recent article in Radio Basics should help".

Despite what the Editor says...when you want to have a go yourself at using toroids...where do you get them, and what should you use?

The Buying Approach

The *PW* team then discussed the various ways of getting hold of toroids, and other specialised components. Everyone agreed, that for smaller orders...pricing was a problem. However, despite the costs of small orders...most *PW* advertisers are keen to help the individual constructors and don't have 'minimum order' prices.

The discussion ended up with the Editor volunteering to check with the specialist dealers who provide components, and compile a list detailing which advertisers can help you. Rob is planning to provide as much information as possible on general components, inductors (including toroids) and wire suppliers.

Our Editor's idea seemed logical because the list could be up-dated whenever it's required and he'll be able to talk to the suppliers direct to keep readers informed. The list will contain new and surplus sources, and as much information as we can squeeze onto the sheets of A4 paper!

Please send an A5 sized 1st class stamped, self-addressed envelope (same size as folded A4 sheet) requesting 'Toroid Information' and in return you'll get as much helpful details as the *PW* team can provide.

Finally, if you belong to a club have you ever thought of buying components in to make up the 'Starter Packs' as suggested in the letters pages? This is where clubs could really help members by having the materials to hand. This approach will also immediately overcome any problems with the 'minimum order' size requirement when it does appear.

Don't forget to let us know how well you have overcome the problems once you have the information sheets!

PW

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FT-897 DESIGN HIGHLIGHTS

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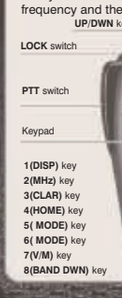

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