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Operating from The Gambia

Antenna Workshop
Construct a 7MHz Dipole
using a Slinky toy

Doing It By Design
Hints and Tips from G4CFY



Get Building! The Sutton Multi-Band Transceiver Pt 1

May 2005

£3.00



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New Magic Loop

**MFJ-935
MFJ-936**

*The most amazing antenna we have seen in years!
We worked VK & W stations on SSB from indoors!!
Radcom Review says:
"Having a 100% 'armchair copy' QSO with a station
nearly 1000km away on 40m SSB using 10W to an
indoor bit of wire draped over a curtain rail was, I
felt, extremely impressive."*



Icom HF Transceivers

ICOM IC-756 PRO III

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



£2099 C

IC-7800 £6400 C
Icom's Flagship HF 200W transceiver. 200W max. The
ultimate receiver - the ultimate design! AC PSU built in.
IC-7800-PACK £6995 C
The superb transceiver as above plus 17" flat screen,
keyboard and SM-20 base microphone.

IC-756 PRO MkII £1699 C
Last few of this model at knock-down price. If you
don't want the latest model - then save £600!!

IC-7400 £1299 C
HF/VHF 160m - 2m transceiver 5 - 100W. SSB CW
FM AM. 12V DC. Nice big display. Lovely price.

IC-706 MkII GDSB £769 C
It's unbeatable. 160m - 70cm (up to 100W HF) yet so
small with detachable head. The ultimate mobile..

IC-718 £449 C
This is a budget class radio HF 16 - 10m at a price
that belies its performance. Beautiful display.

IC-703 FREE IC-703 Logbook £539 C
Take an IC-706, reduce power to 10W max and get
rid of VHF. 160 - 6m of pure QRP joy!!

Going HF Mobile?

Then check out the great 80m - 6m
SIDEKICK magnetic mount whip from USA.
No hassel and great performance. £249.95 C

Kenwood HF Transceivers

KENWOOD TS-2000

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



£1389 C

TS-2000
The station in a box. 160m - 70cm with every feature
imaginable inc. DX cluster. Kenwood fans dream rig.
TS-2000X £1799 C
Take the TS-2000 and add a superb 23cm module.
The best 23cm we know of plus all other bands!

TS-B2000 £1299 C
Designed for the 21st century. You get HF - 70cm with
PC software for direct PC control. It works great.

TS-870S £1249 C
Kenwood's great HF radio that uses phasing for SSB.
No more filters to buy - they are all inside the box!

TS-570DG £839 C
The best budget radio at the price. Superb 100W from
160m to 10m. As used by Peter Waters, G3OJV

TS-50S £595 C
A great rugged mobile for 160m to 10m with up to
100W output. Also a great price.

TS-480SAT £899 C
HF 160m - 6m with remote front panel. Large enough
for base use, small enough for mobile. Big display

TS-480HX £1049 C
Take the TS-480SAT, remove the auto ATU and offer a
beefy 200W output. That's a really potent package!

Yaesu HF Transceivers

YAESU FT-1000 MKV

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.



£2099 C

FT-1000 FIELD £1699 C
The HF choice for DXers. With this rig's reputation on
DXpeditions what more persuasion do you need?

FTV-1000 £729 C
6m 200W module for the FT-1000 range. Probably the
ultimate for 6m DXing.

FT-897D £759 C
160m - 70cm self-contained portable. 100W and up to
20W with optional internal battery.

FT-857D SPECIAL LOW PRICE £579 C
160m - 70cm mobile with up to 100W output. Lovely
tuning control from remote head unit - and great price!

FT-847 £999 C
Complete station in a box! 160m - 70cm - up to 100W
(50W 2m/70cm). Great for satellite work.

FT-840 £399 C
Is there any other radio that comes close to this price?
One of our all-time best sellers. 100W 160m - 10m

FT-817ND SPECIAL OFFER £489 C
The ultimate QRP self-contained radio. Up to 5W out-
put 160m - 70cm. New low price. UK warranty.

FT-817DSP SPECIAL OFFER £589 C
FREE CSC-83 CARRYCASE WITH FT-817ND/DSP

Warning - as a regular advertiser you can be sure all our
stock is genuine UK warranted. Check serial numbers!!

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Icom VHF/UHF Mobile/Base

ICOM IC-E208

VHF/UHF FM Dual Band Mobile Transceiver
*Freq range 144-146MHz, 430-440MHz Tx
*55/50W (3 pwr steps each band)
*Wideband Rx 118-173, 230-549 & 810-999MHz

£239 C

IC-910H

2m / 70cm 100W Base station all - modes with option for 23cm module (UX-910 £359)

IC-910HX

As above but with 23cm module ready fitted and a big saving as well.

IC-2100V

2m 55W FM mobile with rugged construction and all-in one die-cast chassis.

IC-2725E

Icom's new dual band 2m / 70cm radio. Very easy to operate and install and a lovely detachable head.

Kenwood VHF/UHF Mobile/Base

KENWOOD TMD-700E

2m/70cm dual band mobile transceiver with APRS. Does not need extra high cost boards to function. Only extra if required is a compatible GPS receiver.

TM-G707E

Dual Band 2m & 70cm with detachable front

TM-V7E

Dual Band 2m & 70cm with 50/35W output

TM-271E

Dual Band 2m FM 60W mobile transceiver

Yaesu VHF/UHF Mobile/Base

YAESU FT-7800E

*2m/70cm Dual Band Mobile *High power 50W 2m /40W 70cm
*Wide receive inc. civil & military airband
*CTCSS & DCS with direct keypad mic. *Detachable front panel
*1000 memories plus five one-touch

FREE YSK-7800 SEPARATION KIT £229 C

FT-2800M FREE ML3-100 SPEAKER £159 C

*2m FM Mobile transceiver * High power 65W * Capable of VHF wideband receiver

FT-8800E LOW PRICE £269 C

*2m/70cm Dualband FM Mobile transceiver * 50W 2m, 35W 70cm * Wideband receiver

FT-8900R £339 C

*2m, 70cm, 6m & 10m Quadband FM Mobile transceiver * Independent dial for each band

Watson On-Glass Antenna

WSM-270 £19.95 B

Dual Band 2m/70cm mobile whip. 2.5dB gain and 1.5:1 VSWR. 0.8m long. Complete system including 3.5m cable. No drilling involved. Antenna sticks on glass and interface assembly sticks on inside. Simple and very effective.

Icom VHF/UHF Handhelds

ICOM IC-E90

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

£269 B

IC-T3H

2m FM handheld 5.5W c/w BC-01 & BC-146

IC-T22A

2m FM 5W handheld transceiver

Kenwood VHF/UHF Handhelds

KENWOOD TH-F7E

* 144-146MHz Tx/Rx; FM
* 430-440MHz Tx/Rx; FM
Up to 6V 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.

£239 B

TH-D7E

2m/70cm dualband FM handheld transceiver with data communications

TH-G71E

2m/70cm dualband FM handheld transceiver

TH-K2E

2m FM 5W portable transceiver c/w Ni-MH battery/charger

TH-K4E

2m FM 5W portable transceiver c/w Ni-MH battery/charger

TH-K4E

70cm FM 5W portable transceiver c/w Ni-MH battery/charger

Yaesu VHF/UHF Handhelds

YAESU VX-7R

Totally waterproof, wide frequency coverage 500kHz-900MHz AM/FM. 132x64 dot matrix display providing easy-to-read frequencies and information plus pictorial graphics.

FREE VC-47 EXPLORE KIT £249 C

VX-2E

2m/70cm miniature handheld transceiver with LiON battery/charger

VX-110

2m handheld transceiver with 8-key keypad Ni-Cd & charger

VX-150

2m handheld transceiver with 16-key keypad Ni-Cd & charger

Alinco VHF/UHF Handhelds

DJ-V5E

2m/70cm FM 5W dualband handheld transceiver

DJ-193E

2m FM transceiver no keypad, Ni-Cds & charger

DJ-195E

2m FM transceiver with keypad Ni-Cds & charger

DJ-C7E

2m, 7cm credit size FM handheld

Linear Amp UK HF Linear Amplifiers

RANGER 811H

*1.8 - 29.7MHz
*800W CW or SSB, 400W RTTY
*Uses 4 x 811A vertically mounted
*Drive 10 - 100W
*Toroidal AC Power Transformer
*6:1 Reduction Drive on Tuning
Controls "Near Silent" Papst Cooling fan "Front-panel ALC Adjust Control "Built-in AC 230V @ 8A Supply



£945 B

CHALLENGER III

HF linear amplifier 10-160m WARC 100W in 1.5kW out

£1795 C

Ameritron HF Linear Amplifiers

AL-811XCE

HF linear amp 10-160m 600W

AL-1200XCE

HF linear amp 10-160m 1.5kW

AL-1500XCE

HF linear amp 10-160m 1.5kW

AL-82XCE

HF linear amp 10-160m 1.5kW

AL-80BXCE

HF linear amp 10-160m 1.5kW

AL-811HXCE

HF linear amp 10-160m 500W (3x811A)

ALS-500MXCE

HF linear amp 10-160m 500W solid state

ALS-600X

HF linear amp 10-160m 600W (export only)

SGC HF Linear Amplifiers

SG-500

Power Cube 1.6-30MHz 500W solid state

Yaesu HF Linear Amplifiers

YL-1000 QUADRA

HF + 6m linear amp. 1kW comes with PSU

Tokyo Hy-Power HF Linear Amplifiers

HL-1FKX

HF linear amp. 1.8-29.7MHz 500W PEP max, solid state

HL-2FKX

HF +6m linear amp 1.8-29.7MHz + 50MHz 1kW PEP max, solid state

HL-100BDX

HF+6m linear amp 3.5-29.7 & 50MHz 1-10W in 100W PEP solid state

ANTENNAS

W-2LE 1/4 wave 2m 0.48m 200W £9.95 B
W-285 5/8th 2m 1.33m long 200W £14.95 B
W-77LS 2m/70cm 0.42m 50W £4.95 B
W-770HB 2m/70cm 1.1m 200W £4.95 B
W-7900 2m/70cm 2m/70cm 1.58m £32.95 B
WSM-270 Dual band mini magnetic £19.95 B

BASES

WM-08 8cm diam magnetic £9.95 A
WM-14B 14cm diam magnetic £12.95 A
W-3HM Hatch mount £14.95 A
ECH Cable kit £10.95 B

NOTE: All antennas have PL-259 ends. Mag mounts have cable attached. Hatch mount needs ECH cable.

NEW STOCK & OFFERS

YAESU FT-60E

Wide band Reception 105-520MHz & 70-999.990MHz
(Cellular blocked)
New Emergency Automatic ID System
High 5W Power Output
100MH Long-Life Battery
FNB-83 (7.2V 1400mAh)
Programmable Keys for use with conventional CTCSS/DCS and DCS Enhanced reliability.



NEW

£179 B

MFJ-935 "Magic Circle" Loop Tuner

This is the most amazing antenna we have seen in years. For optimum results take a wire around 1/5th wave long, bend into square loop (1ft on 20m = 3.5ft square) and attach to MFJ-935. Result: Ultra low indoor noise and VLF, ZL & W all on SSB! That's what we achieved in one day's operation! 20m loop works on 15m as well. Now In Stock. Great for QRP and portable as well.



£179.95 B

bhi DSP Equipment

bhi NES10-2 MkII

NES10-2 Combined speaker and program-mable DSP unit. Offers dramatic noise reduction, even reduces annoying helicopters. Power On/Off switch with auto bypass, 8 Ohms, 8 filter settings, 3-30V reg., 12-24V DC.



£99.95 B

NES-3

8 Ohm Speaker Basic Plug & iso mount

NEIM-1031

Noise Eliminating In-Line Module with auto

1042

Switch box allowing up to 8 items to be connected to one bhi speaker/module

NEDSP-1061

Small DSP PCB module for retrofitting into

NEDSP-1062-PCB

Amplified DSP module to insert in speaker cab

NEDSP-1062-KBD

As NEDSP-1062 but with small keypad

NCH

NR Noise Cancelling headphones

Watson Mobile Antennas



Carriage Charges: A=£2.75, B=£6, C=£10

NEW STOCK & OFFERS

MANSON SDC-2010

£9.95 A



- 1 Clear plug-in DC adaptor
- 1 1.8 - 1VDC 1.5 amp
- 1 Stabiliser and protector
- 1 1.8 - 1VDC adaptor set
- 1 Matchless Yasho / Alind
- 1 sockets
- 1 Works from 1.8V to 24V
- 1 vehicle systems.



POCKET MORSE READER MFJ-461

Reads CW
Just hold near
receiver speaker

£84.95 B



The sight - just hold the self-contained code near your speaker and see the text scroll across the screen. Absolutely amazing.

SG-2020 DSP QRP 20W HF Radio

160m - 10m
0.1 - 20W
Full DSP
Diecast Chassis

£589.95 B



Perfect for QRP, SSB, CW and
DSP processing. Pushing down
to 100Hz. Built-in SWR meter and
electronic keyer. Max. 60dB gain.
Size: 15 x 6.5 x 7.5cm. 9500.

Antenna Accessories

Dipole Kits

- 1 Meter Strong 400b strain line 200W £29.95 A
- 1M - VC50 50m clear PVC 2mm wire £39.95 A
- 1M - VC50 50m multi-strand 2mm wire £39.95 A
- 1M - CW 50m heat shrink 16 gauge wire £39.95 A
- 1M - 8 50m black braided insulation £39.95 A
- 1M - 50 SO-239 dipole centre insulation £39.95 A
- 1M - 50 Medium ceramic 19mm insulation £39.95 A
- 1M - 50 Small ceramic egg insulator £39.95 A
- 1M - 50 25pcs 3/16 inch line spacers £39.95 A

Diamond 50 Ohm Baluns

- 1M - 10 1:1 1.7MHz - 40MHz 1.5kW £29.95 A
- 1M - 15 1:1 1.5MHz - 75MHz 500W £39.95 A

Antenna Traps (pairs)

- 1M - 200 2 200V 60Hz 10m - 20m £49.95 A
- 1M - 200 2 200V 70MHz £49.95 A
- 1M - 200 2 200V 7MHz £49.95 A
- 1M - 200 2 200V 3MHz £49.95 A
- 1M - 100 4 1kW bands 10m - 20m £39.95 A
- 1M - 100 4 1kW 30MHz £39.95 A
- 1M - 100 4 1kW 40MHz £39.95 A
- 1M - 100 8 1kW 80MHz £39.95 A

German Made High Quality Baluns

- 1M - 200 1:1 1.5 - 30MHz 100W £29.95 A
- 1M - 200 4:1 1.5 - 30MHz 200W £29.95 A
- 1M - 200 6:1 1.5 - 30MHz 100W £29.95 A
- 1M - 1 1:1 1.5 - 30MHz 1kW £29.95 A
- 1M - 1 4:1 1.5 - 30MHz 1kW £29.95 A
- 1M - 1 6:1 1.5 - 30MHz 1kW £29.95 A

Remote 4:1 1.5kW Balun

- 1M - 1 4:1 1.5kW 100W matched for FT-100/FT-847 £49.95 A

Patch Leads

- 1M - 1 70V low loss 75cm PL 259 £29.95 A
- 1M - 1 50V Standard 50cm PL-159 £29.95 A
- 1M - 1 50V BNC version of above £29.95 A
- 1M - 6 66cm FT-214 PL 259 £29.95 A
- 1M - 6 10m long PL-259 £29.95 A

SGC External Auto ATU's

SGC SG-231

1 60MHz. 3 100W pep
(50W CW). Min wire length,
7m. 50 Ohm feed. Needs
12V at approx 900mA.



£349.95 C

SG-239

Mini auto ATU 1.8 - 30MHz 1.5 - 200W PEP primarily for long wires - non waterproof. 12V DC

SG-231

1.8 - 60MHz 100W PEP. A great random wire tuner that you can use outdoors. 12V DC

SG-237

1.8 - 60MHz 100W PEP. Great for mounting outdoors and feeding long wire. Waterproof. 12V DC

SG-230

1.8 - 30MHz 200W PEP. The original design that handles end fed or coax unbalanced. Waterproof. 12V

Icom External Auto ATU's

AH-3

1.8 - 28MHz. A hunky 120W PEP tuner that handles whips or wire longer than 2.5m. Waterproof.

SG-235

3.5 - 54MHz. A hunky 120W PEP tuner that handles long wires. Great outdoor design. Waterproof.

Alinco External Auto ATU's

EDX-2

1.8 - 30MHz 150W long wire tuner designed for use with DX-70 transceiver. Waterproof.

MFJ Internal Auto ATU's

MFJ-993

*Auto ATU with digital data display *1.8-30MHz *Long wire, coax & balanced line *300W SSB, 150W CW *Cross needle metering



£249.95 C

MFJ-991

1.8 - 30MHz auto ATU. Similar to MFJ-993 but no digital display. Works with any HF transceiver. 150W PEP

MFJ-994

1.8 - 30MHz high power auto ATU. 600W PEP / 300W CW. Tunes wire, coax and balanced feed.

SGC Internal Auto ATU's

MAC-200

1.8 - 60MHz 200W PEP. Wire, coax and balanced feeder. Features auto antenna switching.

SGC-237PCB

1.8 - 60MHz 100W PEP. Same as SG-237 but without housing for building into your own housing.

SGC-211

1.8 - 60MHz works off internal dry cells. Zero drain wait state. 60W PEP. Ideal for portable (Min 1W).

Yaesu Internal Auto ATU's

FC-20

1.8 - 60MHz 100W matched for FT-100/FT-847. Desk top unit to match transceivers. Coax systems only.

FC-30

1.8 - 60MHz 100W. Designed for use with FT-857/FT897. Coaxial input / output.

FC-40

1.8 - 60MHz 100W. New waterproof ATU designed for use with FT-897 / FT-857 and mobile operation.

Icom Internal Auto ATU's

AT-180

1.8 - 54 MHz ATU designed for IC-706. Plugs directly into transceiver for seamless operation. Coax only.

Kenwood Internal Auto ATU's

AT-50

1.8 - 30 MHz 100W ATU specifically designed for use with TS-50 transceiver. Coaxial only.

Cushcraft HF Antennas

MA5V

Vertical 5-band 20m - 10m. No separate radials needed. 250W. Self-supporting. 4.48m tall.

A3-S

The classic 20, 15, 10m 3-el beam. 2kW 8dB gain. 8.45 el. Turn radius 4.72m. F/B ratio 25dB.

A3-WS

Dual Band 3 el. beam for 17m & 12m. 2kW. El length 7.66m. Turn radius 4.4m. Gain 8dB. F/B ratio 25dB.

A4-S

Tri-band 4 element Yagi. for 20m - 10m. DXers delight. 2kW - 8.9dB gain F/B 25dB. Turn radius 5.49m

R-8

8-band vertical 40m - 6m. No separate radials needed. 1.5kW. Height 8.7m

R-6000

6-band vertical 20m - 6m. No separate radials needed. 1.5kW. Height 5.8m. Great small garden ant.

MA5V

5-band 2 El mini beam. 20m - 10m 2kW. Elements 5.2m Turn radius 2.7m. (Dipole on 17/12m) 5dB gain



Diamond HF Antennas

DIAMOND CP6

Covers five popular HF bands and the 6m band. Low angle radiation makes it ideal for DX work. Outperforms dipoles for long distance contacts and compares favourably with beams located 10m+ above ground.

*Bands: 3.5-50MHz *Power: 200W/VSWR: Better than 1.5:1 *Socket: SO-239 *Height: 4.6m

*Radials: 1.8m rigid adjustable **£239.95 C**

Radio Works HF Antennas

CW-160

8-band 160m - 10m dipole with 22ft vertical radiating feeder. 1.5kW. Balun fed. 265ft long.

CWS-160

Compact 8-band 160m - 10m dipole with 22ft vertical radiating feeder. 1.5kW. Balun fed. 133ft long.

CW-80

7-band 80m - 10m dipole with 22ft vertical radiating feeder. 1.5kW. Balun fed. 133ft long.

CWS-80

Compact 7-band 80m - 10m dipole with 22ft vertical radiating feeder. 1.5kW. Balun fed. 133ft long.



G5RV Plus

Rugged 2kW balun matched G5RV with 102ft element and 31ft ladder line. Requires ATU. Made in USA

Hustler Base Antennas

6-BTV

80 - 6m 6-band vertical. 7.3m tall 1kW. Can be used at ground level with earth stake. Ideal small gardens

5-BTV

80 - 10m 5-band vert. 7.64m tall 1kW. Can be used at ground level with earth stake. Ideal small gardens

4-BTV

40 - 10m 4-band vert. 6.52m tall 1kW. Can be used at ground level with earth stake. Ideal small gardens

Butternut Antennas

HF-2V

80 / 40m high performance vertical. 1kW PEP 9.75m tall. Self supporting for ground mount use.

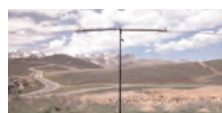
HF-6V

6 band vertical 80-40-30-20-15-10m. 2kW. 7.9m tall. Use own radials or ground mount.

HF-9V

9-band 80 40 30 20 17 15 12 10 6m vertical 1kW 7.9m tall. Use radials or ground mount

Buddipole Products



HF Portable at its Best

W3-BP

40m - 2m adjustable dipole. 250W and max length of 4.65m. Packs down to 65cm approx.

W3-MBP

Sames as W3-BP but packs even smaller.

W3-BS

40m - 2m vertical is half a Buddipole. Ideal for QRP and rucksack - as used by Peter Waters G3OJV.

Peter Waters says: *I think these products are great. Superbly engineered and very efficient. Options include adaptor for dipole to decorators pole £6.95, Field tripod £89.95, 2.45m telescopic mast £49.95, mini tripod for Buddiwick.*

Super Antennas



MP1-SA

Screwdriver style adjustable HF QRP whip 40m - 70cm. 150W PEP. Max extended 185cm approx

MP2-SA

Electrically tuned version of the above. Requires around 9V - switch control box not included.

MP-80M

Add on 80m coil to extend the LF coverage of the MP1 and MP2.

High Sierra Mobile Whips

HS-1800/PRO

The ultimate mobile whip. Electrically tuneable 80m - 6m 1kW PEP Includes switch box and 12V cable. Massive 2" coil. Made in USA. Superb!!



SIDEKICK

As used by Peter Waters G3OJV/M

Get mobile on all bands from 80m to 6m in minutes. This compact screwdriver antenna comes with cables and control box. Designed to go on our 3-way magnetic mount (£39.95 extra) it is an amazing performer and only 1.37m maximum!

UK's Premier Service Centre

WE ARE STILL THE MOST COMPETITIVELY PRICED SERVICE CENTRE



WE NOW HAVE NEW WORKSHOPS IN MID WALES

FOR SERVICE & SUPPLY OF PARTS

There really is only one choice. The choice many manufacturers have made when they want their own equipment serviced. We have a comprehensive workshop, fully equipped with modern radio test sets and spectrum analysers, along with 25 years experience in all the main manufacturers **PLEASE RING US FOR YOUR SERVICE AND REPAIR NEEDS**

SPARES

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Cover subject



Cover Subject
The Sutton direct
converters on receiver project
is the first stage in the
Sutton 'family' of multi-
band transceiver kits
designed by **Tim Walford**
G3PCJ. The project is
named after the village of
Sutton in Somerset, Tim's
home county and is
shown in the background
of the front cover. Enjoy!

Design: Steve Hunt
Photograph:
Tex Swann G1TEX/M3NGS
Background
Photograph:
Tim Walford G3PCJ

may features



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Tony Nailer G4CFY is back at his designer's desk and this time he's looking at further uses of the f.e.t. and m.o.s.f.e.t.s. There's also a selection of projects for you to try your hand at building.

21 Make a MicroHenry Meter

Take the mystery out of identifying inductance values with **Walter Farrar G3ESP**'s useful project. Have a go at building one for yourself.

24 The Sutton Part 1 - Receiver Stage

Tim Walford GPCJ introduces the Sutton - a project based on a 'family' of multi-band transceiver kits. This month, in Part 1, he gives an overview of the whole project before concentrating on the receiver stage.

28 A Two Band Dipole System

Got the urge to 'work the world' but are short of space to erect suitable antennas? If so, **Pete Miller G4AAW**'s design for a 7 and 10MHz antenna system may be just the thing for you.

30 The Oscilloscope Part 5

This month **Gordon King G4VFV** looks at oscilloscope bandwidth, rise time, square waves and ancillaries.

34 Antenna Workshop

John Heys G4BDQ has been in the toy shop again buying Slinky toys! This month he shares a design for a short helix dipole for the 7MHz band that creates another use for a Slinky.

38 Radio Basics

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40 Verticals Upon Sea

Operating from The Gambia with **Henryk Kotowski SM0JHF**. Henryk shares his experience of antenna selection whilst taking part in a CQ WW 'phone contest in this tiny African Country.

42 Valve & Vintage

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may regulars

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9 Amateur Radio Waves

You can have your say! There's a varied and interesting selection of letters this month as the postbag's bursting at the seams with readers' letters. Keep those letters coming in and making 'waves' with your comments, ideas and opinions.

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A round-up of radio rallies taking place in the coming months.

12 Amateur Radio News & Clubs

Keep up-to-date with the latest news, views and product information from the world of Amateur Radio with our News pages. Also, find out what your local club is doing in our club column.

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If you're looking for something to complement your hobby, check out the biggest and best selection of radio related books anywhere in our bright and comprehensive revamped Book Store pages.

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Subscribe to *PW* and/or our stable-mates in one easy step. All the details are here on our easy-to-use order form.

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author info

Our Radio Scene reporters' contact details in one easy reference point.

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PW Callsign Directory 2005!

Due to mailing/binding problems, some readers didn't receive the full order form wrapped around the cover of last month's magazine. Because of this, we've extended the Callsign CD offer for another month. See page 70 of this issue for the order form. For full details on the CD content see page 57 of the April issue.

book store

Page 58 - The biggest and best selection of radio related books anywhere!



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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.

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. See page 72 for details.

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Orders for back numbers, binders and items from our Book Store should be sent to: **PW Publishing Ltd.,**
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Technical Help

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

rob mannon's keylines

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



Fig. 1: Tex Swann G1TEX and Rob G3XFD pair up their digits for photography!

Looking for the *PW* April Fool spoof each year has become quite a sport for some of our readers and this year has been no exception! We were determined to do something really different, amuse you and to save precious editorial space at the same time.

As usual we aimed to provide some clues as to what the spoof was this year. In fact, one or two readers spotted the front cover explanation (provided by Group Production Editor **Donna Vincent G7TZB**) and immediately realised that it was part of the joke. However, even though readers were on their guard a number of you telephoned me to ask. "Okay Rob - we know the joke is featured on the front cover but where and what is it?"

In fact, as **Stewart Mackay G14OCK** (a fellow journalist, albeit retired, always on the look out for a joke!) spotted it very soon. There were two hands on the front cover, and a 'complete Editor was shown posing in front of his new Workshop/shack. (Don't worry readers, I won't make a habit of having my photo appear too often in *PW*!).

Congratulations also go to **Mark Coultas G0SLP** on one of his rare times ashore from sea-going marine engineering duties (he won the informal Editorial coconut prize) for the first E-mail mentioning the spoof, and to **Wyn Mainwaring GW8AWT**, buried away in his beautiful west Wales valley hide-hole, relying on the letter post. Well done both - you were very quick off the mark!

The spoof was made possible by *PW*'s staff photographer/Tech Sub-editor, IT manager *et al*, **Tex Swann G1TEX**. He gave up most of a Saturday afternoon to join me at home. Although larger than usual, my workshop is not designed for two large men, lots of photographic lighting equipment and the requirement to place two separately owned hands, **Fig. 1**, to give the impression of a dedicated pair! It took quite a time before Tex was satisfied at the result we published on the April front cover.

The photo of me posing in front of the workshop door was only made possible because of digital photographic techniques, some awkward poses from yours truly and Tex's skill. He worked hard to produce the published image but his next job's even harder - I've asked him to see if he can superimpose the modification permanently as I would find it extremely 'handy'! Thanks Tex, and to everyone who enjoyed this year's rather different spoof.

Phonetics Old & New

In his letter published in this issue, keen *PW* reader **Dave Plumridge G3KMG** raised some interesting

points on the NATO phonetics. The subject of phonetics has been in discussion for many years and Dave's letter reminded me that I recently discovered where the odd name 'Toc H', belonging to a famous First World War wartime charity, derived its name.

Recently Toc H was mentioned on a BBC Radio 4 documentary, and I discovered it's linked to the phonetics used in those days for the headquarters (Talbot House) where it was first operated by an Army Chaplain, the **Rev. Geoffrey Studdert Kennedy MC**, who had the wonderful nickname of 'Woodbine Willy'! The 'Toc' was the phonetic for the letter T, and (presumably as I've never seen a phonetic published) the 'H' stood alone. Perhaps it wasn't provided with a phonetic?

My late Grandfather **Fred Durnford** (he had also been a journalist and had the callsign 2FD before the Second World War), didn't often volunteer stories from the First World War period when he served in the Royal Signals. But he did tell me about Woodbine Willy who earned his nickname because he always had a plentiful supply of those truly dreadful (but still much appreciated by the soldiers) cheap cigarettes to give away to all and sundry.

I far prefer the NATO system of phonetics myself as it is excellent in my opinion and there's bound to be an interesting debate. However, I deviate from the NATO system for the benefit of my Irish callsign EI5IW so that I can get the full benefit of the Echo India Five 'Irish Whiskey'!

Dear Sir?

Regarding the 'Dear Sir' formality, also mentioned in David G3KMG's letter, I'm afraid it's a publishing tradition! Originally, I wanted it to be less formal, but in an effort to stop *PW* (rightfully as it is *PW* and in reality I'm only the latest 'caretaker') seemingly becoming the 'Rob Mannion' magazine, we retained the Dear Sir.

However, I do agree, especially after working for almost 16 years striving to make *PW* friendly, informal and informative, I also find Dear Sir rather formal. So, in future Dear *PW*, or Dear Editor will appear when you address them as such, even though most of the letters arrive headed as Dear Rob. We can meet half way! Regards to you Dear Readers!

Rob G3XFD

amateur radio waves



'Armless Fun? Spoof Spotted!'

● Dear Sir

When the April issue of *PW* dropped through my letterbox, I was determined that, by hook or by crook, I would find the April Fool spoof feature in record time. A quick scan revealed nothing unusual. I looked at my watch. The second hand was ticking relentlessly on. Then it dawned. That was it - the second hand! **Tex Swann G1TEX** the *PW* photographer, I thought, must have had a hand in this! His digital camera was at work - except he had fewer digits to work with. A bit of elbow grease was required but the result - sure it's just a bit of 'armless fun!

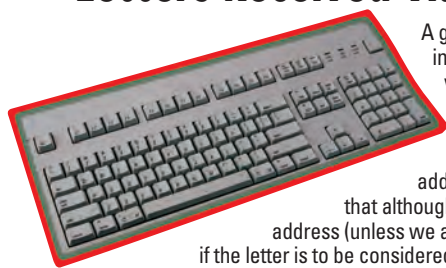
Stewart Mackay G140CK
Bangor
County Down
Northern Ireland

Editor's applause: Well done Stewart, on spotting the spoof, and you win the prize for the first letter to arrive. Please see Keylines for further comment.

The Star Letter will receive a voucher worth £20 to spend on items from our Book or other services offered by *Practical Wireless*.

● 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

Worried About The Future?

● Dear Sir

It seems many people are worried about the future of 'two-way hobby radio', with ever declining numbers, despite Novice & Foundation Amateur licences. Does the fact that CB radio was responsible for the biggest ever rise in hobby radio (CB & Amateur) numbers, ever

spring to mind? This being so, is it not blatantly obvious and plain common-sense to foster CB as the **real** gateway into our hobby?

The 2003 announcement by the RA; 'Deregulation of Citizens' Band Radio and Eventual Withdrawal of the 40 UK-only Channels' states that due to low number of users, the UK's 27/81 CB allocation is to be withdrawn. It will be remembered by

many that we've already lost an important and much loved two-way radio band, used by the more advanced CB operator and many Amateurs as well; namely the UK's wonderful 934MHz u.h.f. CB allocation, which remains unused to this day. This act resulted in the redundancy of many thousands of pounds worth of radio kit, which at microwave frequencies, was not cheap for the public to buy (up to £500 for a 934MHz radio) and cannot be written off against tax as businesses can do with obsolete kit.

The 934MHz equipment was in fact directly comparable to Amateur Radio equipment in terms of cost and build quality. As those in the know will recall, 934MHz was second to none regarding the politeness and decency of operators - who unlike many black box Amateur Radio users, knew how to solder N-types on to ultra low loss military specification 50Ω cable, and a good deal of antenna experimentation was conducted on this almost microwave band. It was the ideal half way house between the mayhem of 27MHz and the often 'stiff upper lip' and red tape (logbooks and callsigns) of Amateur Radio, allowing many operators a 'safe haven'.

Due to its cost, 934MHz; the government's preferred CB frequency, never really caught the public's imagination, and was withdrawn at the end of 1998, even though there was more activity on the meagre 1MHz of 934MHz/32cm in my area at the time (north London, which had few 934MHz stations compared to other parts of the country), than there was on the entire 12MHz allocation provided on 144 and 430MHz!

If low user numbers signify the automatic withdrawal of bands, why weren't 144 and 430MHz withdrawn? Indeed, the ratio between Amateurs and available Amateur bands makes the ridiculous 'low user numbers' argument, which lost 934MHz and now threatens the 27/81 CB channels totally unjustifiable!

Considering that the overwhelming majority of two-way radio hobbyists on air since the late 1970s, have entered our hobby by way of easy access CB radio, whether 27 or 934MHz, the entire amateur/CB community should have been up in arms about this, which

should also have rung alarm bells over the loss of other bands, yet there wasn't a whimper.

The RSGB was actively recruiting CB operators ten years ago, yet when I wrote to them asking if they were going to take CB frequencies including 934MHz under their wing, I didn't even get a reply! Many Radio Amateurs look down their noses at CB, in denial at the decline of our hobby, and amazingly, I've read letters that call for CB to 'die a natural death'. Do amateurs realise that CB radio is probably the most valuable asset we have for bringing future generations into the two way radio hobby?

The 27MHz allocation may be cheap and cheerful (and very noisy) while a re-introduction of u.h.f. CB on preferably a lower, cheaper-to-build-kit-for frequency around 500MHz, as suggested by **Vaughan Asque** of the former Radiocommunications Agency several years ago, would attract more serious operators. Many shops and businesses as well as ordinary people have discovered how much better u.h.f. is for local communications by using the popular low powered PMR446 radios.

Rather than being scrapped, if as should happen; CB is accepted as part of the whole two-way radio hobby, it will no doubt still continue to allow the public an easy quick access to useful radio communications, while some will advance on to the Amateur bands.

With recent floods and disasters in mind, and doom and gloom stories about global warming, why on earth shouldn't the general public have access to licence and test free decent frequency two way radio communications? Lives may depend on such a system! Bus drivers, boat owners, light aircraft owners; don't need to sit exams to use their radios. There are lots of people who don't want to - and shouldn't need to - sit in classrooms and/or take exams just to use a radio. I passed my RAE but if I'd known about 934MHz I might not have bothered.

The r.f. spectrum is a natural resource. It doesn't belong to Ofcom or anybody - within reason the public should decide how it is used. By allowing the

public a decent u.h.f. slot for two-way communications, perhaps an extension on the popular PMR 446MHz walkie talkie band, Europe as a whole could catch up with the American and Australasian nations with a modern CB system fit for the 21st century. Australia has a wonderful u.h.f. CB system centred on 477MHz, with hundreds of repeaters. Indeed, some Asian nations are spoilt for choice with three or four CB or 'public access' allocations, on h.f., v.h.f. and u.h.f.!

Cheap and cheerful 27MHz is centred on, let's face it, an awfully noisy frequency. It's often rendered totally useless due to overseas interference, and is likely to put people off our hobby. Up market u.h.f. CB would offer a choice for consumers, rather than dictating that noisy 27MHz is the only place for CB.

The RSGB should fight to keep these bands for **all** hobby radio users, which includes potential future Amateurs to get their first step into the two way radio hobby. Indeed, can anyone give me a good reason why 934MHz shouldn't be re-legalised? To pretend that CB is somehow worthless is a big mistake, and only serves to show that some people can't see beyond the end of their own nose!

Ian Philips
Hertfordshire

Editor's comments: There are some interesting suggestions and points in Ian's letter. However, we are now getting letters of increasing length and I ask everyone to do their very best to be as concise as possible so we can publish more opinions. Thank you.

Phonetics & 'Dear Sir'

● **Dear Sir**
Carl Mason GW0VSW (April PW) makes a strong and apparently very logical case for the use of the NATO alphabet. Personally, I've endeavoured to use it ever since its introduction because, yes, it does sound so "professional".

Why is it, then, that when the going gets tough and a station is having trouble deciphering my call, substituting "Kilowatt-Mexico-Germany" for "Kilo-Mike-

Golf" always does the trick? I have proved this time and time again over the years and indeed just the other week in the ARRL DX Contest. With my call, at least, this has never caused confusion - quite the opposite!

It seems obvious that a multi syllable phonetic must be easier to understand - the brain will fill in the missing bit. Hearing "...owatt" could mean no other than "kilowatt" - an electrical term widely used and understood internationally!

Is it just my sequence of call letters, or are there other operators who could confirm my experience and conviction that the NATO phonetics are just not up to it on our busy bands?

PS: For such a friendly magazine, Dear Sir looks far too formal! Dear Editor would be better - but as Rob is the editor, why not Dear Rob? I wonder what other readers think about this suggested 'lighter touch'?

Dave Plumridge G3KMG
Consett
County Durham

Editor's comments: Interesting comments Dave! Please join me on the Keylines page for further discussion.

Problem PCBs Solved - Now It's Inductors!

● **Dear Sir**

My thanks go to all the readers who responded to my letter re p.c.b. problems. Several offers have been received, as well as various web pages worth visiting and I am looking into trying some of them out.

However, it's not all good news as **Robin Sykes G3NFW** of **Sycom** recently informed me that Toko have started to withdraw most of their 10m coils. A favourite product used by **George G3RJV** in his PW articles. The alternatives on offer are all surface mount products.

How much longer can construction of simple Amateur Radio projects survive? Hopefully iron powder toroidal inductors will remain for the foreseeable future but these products make the winding of variable r.f. inductors virtually impossible. Ever tried getting a

powdered iron screw core these days?

Geoff Sims G4GNQ
Glossop
Derbyshire

Paper Pleasure

● **Dear Sir**

I wanted to write and say how delighted I am with the paper you have chosen for the PW to be printed on, it really is so much easier to read without the shiny surface. Thank you - from a long time reader of PW.

F C Hopkins
Reigate
Surrey

Editor's comments: The feedback from readers has been very supportive on this important topic. Only a tiny minority have complained in writing or by E-mail, together with a single (albeit vociferous!) telephone complainant. I'm sure things will improve even more as we 'fine tune' the printing process. Thanks for the many messages of support readers - they're all much appreciated.

Gus Malcolm G8DEC versus Stan Brown G4LU - Final Round!

● **Dear Sir**

It's me again, having to defend myself against things I haven't said! Looking at **Dr Jones G3RNN's** letter (April PW) regarding the preservation of masts and radio sites of significant historical importance. I might suggest he actually reads my letter...I am on his side! My somewhat cynical comments are borne out of nearly 40 years in the real life experience of working for GPO/BT in the practice of communications followed some years as a museum volunteer in the same field. So, don't shoot the messenger, because you don't like the message!

If other countries national governments are willing to finance saving such sites, this can only be to the overall benefit to us all, although ours is not, and from what I can see, never has been. Our 'industrial' as opposed to our 'cultural' heritage comes in a

very poor second. In the meantime, I try to do my bit (perhaps more successfully than you). Was that really called for?

Your comments (Ken Jones) regarding railway preservation I will take up. For a start, just look along the shelves at your local WH Smith. The space given over to the numerous 'Railway' not to mention the general 'Steam' related publications. Then move over to the 'Radio' publications (apart from the various program guides). The public at large it would appear to have very little interest in our chosen field. The comments regarding volunteers doing all the work are a fallacy, yes they help and certain people with the necessary certified experience can do the welding and riveting, but most of the work is carried out by paid experienced engineers. It has to be to meet the stringent insurance and HSE requirements.

Furthermore, the 'Railways' attract a far greater pool of enthusiasts from which to draw upon. Alongside this, the public of all ages in vast numbers will willingly 'pay to ride' 'bums on seats' = cash in the bank!

Contrast this with a specialised site such as Rugby or Criggon then the interest like that of mill chimneys is only in their destruction! I am sorry but that is the way an old cynic like me sees it.

The somewhat derogatory comments regarding BT I can only say they offer and give considerable help to us. Perhaps the old saying he who hesitates is lost, you should have been a bit quicker off the mark! And got your 'artefacts' as soon as they were offered! Time and tide and all that!

To finish, I enclose the 'Rules' a volunteer with no specific training would have to abide by to meet HSE risk requirements, also a cutting from the BT house magazine.

Gus Malcolm G8DEC (head down wearing flack jacket!)
Bromsgrove
Worcestershire

Editor's ruling: Correspondence on the G4LU/G8DEC topic is now closed and I encourage the individuals involved to

contact each other. It's been an interesting debate, and let's hope people are more aware of the importance of preserving our radio history. Other opinions are most welcome and are still arriving at the PW office.

Ofcom Spectrum Review

● Dear Sir

I am sure you will have read the Ofcom Spectrum Review document. I have made an individual effort and I thought that you should have a copy of my idea, which I sent to Ofcom and also to the RSGB. We dearly need all the publicity we can get so I leave the article to be used by you as you think fit. I have to say that PW technical and constructional articles are a great feature of the magazine. **Alan Cross G0HKG Tiptree Essex**

Alan's letter follows:

Letter to the RSGB (Addressed to **Peter Kirby G0TWW**, General Manager).

Dear Sirs

I have read the RSGB reply to questions posed in the Spectrum Review and would like to congratulate you on managing to cope with the woolly vagueness of the Quango language used. That radio communications could be administered by a Quango so ignorant of the subject and so incompetent to express themselves in readable English, is frightening and very dangerous.

I did not attempt the questions asked, but instead I chose page 28 of the Review for my comments, which I have listed on the first attached sheet. The second sheet is a set of broad suggestions for a 'Lighter hand on licensing', which would increase the load and costs to the RSGB hence higher fees but lower licence costs for all 60000 Radio Amateurs. It would be worth it if only to get us out of the clutches of Icom and keep our unique callsign status. I do hope that the ITU will have a lot to say about UK callsigns. Who will talk to 'Sparky - Tunbridge Wells'?

Please use any of my comments you choose to assist our cause.

Alan Cross G0HKG

Editor's note: We don't have space to publish the complete response from Alan. Selected sections follow. However, with his permission, I can make his full response available (via E-mail only). For a copy please E-mail me at the following address **rob@pwpublishing.ltd. uk**

Edited Extracts:

Reference - Ofcom Spectrum Review - page 28, para 3

Aeronautical and Maritime Licences: This paragraph gives a clear definition of the structure and scope of Licences issued by the International Telegraphic Union for Aeronautical & Maritime purposes. Radio Communication has no international boundaries hence the ITU is the ultimate authority.

Amateur Service: This service is unique and has always been a special case providing emergency communications at short notice for a disaster on any scale. For example, the Lockerbie aircraft in the UK and countless other instances including the present Tsunami disaster in SE Asia.

National Security: Possibly all Amateurs should be vetted by the Criminal Records Bureau, before the issue of a Licence and unique Callsign. Amateur operator identity is essential and a simple licence scheme will not suffice.

Amateur Licences: The spectrum for Amateur Radio use is internationally harmonised and the technology which can be used is specified by international agreement.

The International Telegraphic Union (ITU) requires that a licence be issued to users with a unique callsign allocated and registered. The Amateur Licence is granted for the purpose of self training in Radio communication.

Amateur Radio service: This should become self-regulating under the direction of the National body, the Radio Society of Great Britain, with power to issue Licences.

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 24

Aldridge & Barr Beacon Amateur Radio Club's 6th Annual Radio & Electrical Sale

Contact: Doug G4LQY
Tel: (01543) 571269

To be held at the Aldridge Community Centre, Anchor Meadow, Middlemore Lane, Aldridge, Staffordshire. Doors open at 1030 and the entrance fee is just £1 including raffle. There will be a large free car park, refreshments and a talk-in on S22.

April 24

Kempton Rally

Website: www.radiofairs.co.uk

To be held at Kempton Racecourse, near Sunbury-on-Thames in Surrey. Lots of events are planned throughout the day, along with a v.h.f. talk-in, Bring & Buy sale and Morse assessment (provisional).

May 2

The 21st Dartmoor Radio Rally

Contact: Ron G7LLG
Tel: (01822) 852586

To be held at Tavistock College, Tavistock, Devon. This is the same location as last year, with 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, but due to extensive building work, there will be no dedicated disabled parking. However, there is adequate car parking around the college site. There will be trade stands, a Bring & Buy and refreshments, etc. Doors open 1030 (1015 for disabled visitors), Talk-in on 145.550MHz. Come and visit beautiful Dartmoor, ideal for picnics, so why not bring the family along?

May 8

Magnum Rally

Contact: Helen Mason MM0HLN
Tel: (07776) 385247
Website: www.magnumrally.co.uk

To be held at the Magnum Leisure Centre, Irvine, Ayrshire, Scotland. Trade stands for radio and computer equipment, Bring & Buy, raffle and free parking. Signposted on all major routes. Entrance fee is just £3, under 14s free.

May 8

Dunstable Down's ARC's 22nd Amateur Radio Car Boot Sale

Contact: Phil Seaford G8XTW
Website: www.ddrcbootsale.org

The Dunstable Downs Amateur Radio Club are holding their 22nd Amateur Radio Car Boot Sale at Stockwood Park, Luton, now the largest event of this type in the UK, has access via M1, junction 10. Doors open at 0900 and parking is just £2 per car. There will be full catering and toilet facilities. Details and seller's booking form can be found on the above website.

May 29

Mid-Ulster Amateur Radio Club

Contact: Ivan
Tel: (02838) 342501

The above club will be holding their Rally & Computer Fair in The Embankment, Derrymacash, near Lurgan, County Armagh, Northern Ireland. Doors open at 12 noon and there will be all the usual trade stands, Bring & Buy, pub grub and lunches, etc. Talk-in on S22.

amateur radio news & products

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

A Better Understanding

In a bid to improve the Government's understanding of the role and work of the Radio Amateurs Emergency Network (RAYNET), representatives recently met with Central Government members.

During the meeting between RAYNET's Emergency Planning Team and members of the Central Sponsor for Information Assurance (CSIA) **Cathy Clark G1GQJ**, RAYNET Chair and her team gave a presentation detailing the capabilities and current resources of RAYNET. They in turn learned about the Government Contingency operations requirements.

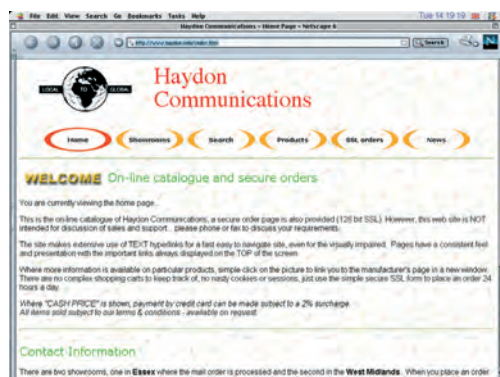
An agreement was reached that the main areas where RAYNET could assist would be between the County to District level and Emergency Services Strategic (Gold) and with the Critical National Infrastructure (CNI) Utilities. As well as at the incident level between (Bronze) and the Local Authorities and sectors of CNI.

It was agreed by all involved that the meeting had produced a worthwhile exchange of ideas. Future meetings will include the use of RAYNET as part of the communications contingency in support of the continuity of Government, how CSIA can help RAYNET discuss projects with agencies working in times of emergency, how mutual training can be undertaken, licensing matters and the use of chosen frequencies.

If you are interested in becoming involved with RAYNET activities or finding out more take a look at their website at www.raynet-uk.net

New On-Line Catalogue

Mike Haydon of Haydon Communications has notified the newsdesk about the launch of his new on-line catalogue.



The new on-line catalogue can be viewed at www.haydon.info/index.htm and offers 128-bit SSL order facility so you can order your goods with peace of mind. The site not only offers the catalogue but details on how to find Haydon's Showroom, links to manufacturers websites so you can gain more information on the products offered, as well as a news section. Please note this site is not intended as a discussion forum and should only be used to view and order products.

All enquires or requests for advice should be directed to:

**Haydon Communications,
Unit 1, Thurrock Commercial Park,
Purfleet Industrial Estate,
London Road, Averley,
Essex RM15 4YA
Tel: (01708) 862524, FAX: (01708) 868441**

Back On Air

After a spell of being off-air a repeater and beacon managed by the Wessex Repeater Group are now back in service.

The first of the repeaters to reactivate is Yeovil repeater **GB3YS**, which came back on air at 1545 hours on 2 March 2005. To access GB3YS you now need a CTCSS tone of 77Hz. It's hoped that all previous problems experienced with wideband data signals across the input frequency and in holding the repeater open are now history. The 70MHz beacon **GB3WSX** on 70.007MHz is also up and running once more.

Packet Radio Conference

If you're interested in the Packet radio mode then this could be just the thing for you.

The 4th UK Packet Radio Conference takes place on Saturday 7 May at the Poacher's Pocket, Warndon, Worcester. Admission will be free and is open to anyone with an interest in the Packet Radio mode.

The conference will consist of demonstrations and presentations, as well as ample time for informal discussions and socialising. As the boundaries between Packet Radio, the Internet, and packetised speech becoming blurred, the organisers would be pleased to include VOIP topics on the agenda if there is sufficient interest.

For further details please see the website at

<http://pzt.org.uk/pk2005> To reserve your place, add items to the agenda, or for any other queries, please contact:

Paula Dowie G8PZT

E-mail: g8pzt@blueyonder.co.uk



Ken Gibson G3WYN - New President

The Mid Sussex Amateur Radio Society (MSARS) is very pleased to announce the appointment of Ken Gibson G3WYN as its' new President.

Ken G3WYN is only the third President in the 40 years of the Society's history. Ken was one of the founder members of the Mid Sussex Society and has been totally devoted to Amateur Radio from a very early age, becoming a member of the Willesden Radio Club in 1945 before his National Service in the Royal Signals and Combined Operations as a radio engineer.

Ken's main radio interests are in h.f. operations, through which he has made many friends over the air around the world, and wire antenna design and operation plus PSK31 work with deliberately basic computer equipment. He has also been the controller of the Mid Sussex ARCs 3.5 and 21MHz nets since 1977.

As the new President of MSARS, Ken says his main aim is to bring back the magic of Amateur Radio to the many new members of the Society and to demonstrate to them that using simple, cheap equipment and antennas can give many enjoyable contacts world-wide despite the onset of modern technology!

The Mid Sussex ARS meet on Fridays at the Cyprus Hall, Cyprus Road, Burgess Hill, West Sussex between 1945 and 2145 hours. Details from **Gavin Keegan** on **(01825) 722045**, E-mail: infor@msars.co.uk, website www.msars.co.uk

Send all your news and club info to
Donna Vincent G7TZB
at the PW editorial offices
or e-mail donna@pwpublishing.ltd.uk



Braintree Radio Club Reaches 30!

The Braintree & District Amateur Radio Society celebrates a milestone in 2005 as they reach their 30th anniversary.

The Braintree & District ARS will be holding a number of special evenings and events, including an award to mark the occasion of reaching 30, so listen out for them on the air. One event you are encouraged to join in with is a contest, which they are running from May to the end of July.

The aim of the contest is to collect 30 points. Points are awarded for working the Braintree special event station - **GBOBTA** (15 points per contact), the club callsigns - **G3XXG** and **G6BRH** (10 points per contact), plus any of the club members (5 points per contact). The Special Event Station GBOBTA will be active during the weekend of 21/22 May.

Points for each callsign can be claimed for only one contact per band per day. Also a minimum of two different callsigns need to be worked. QSOs via repeaters will not count towards the contest.

The club callsigns will be active on the club nets (2nd and 4th Mondays of each month), also the meetings in July (1st and 3rd Mondays) will be operating evenings active on 3.5, 7 and 144MHz. A list of club members callsigns will be available on the Braintree club website or by sending an s.a.e. to the event organiser **G0DEC**, QTHR.

For anyone who obtains 30 or more points, a certificate will be awarded. To obtain the certificate, send a cheque for £3 to the event organiser (G0DEC) made payable to 'Braintree & District Amateur Radio Society' to cover postage and a donation to the Essex Air Ambulance.

If you are interested in joining the Braintree & District Amateur Radio Society, meetings are held at the Braintree Hockey Club on the 1st and 3rd Mondays of each month at 1930 for a 2000 hours start. More information can be found at www.badars.org.uk

Lost Direction?

Clive G4ODM of Basingstoke Amateur Radio Club informed the Newsdesk of an ongoing Direction Finding operational loophole.

Currently, in the UK, the Amateur Radio licence as detailed in *BR68* includes unattended operation on 144MHz for the purpose of Radio Direction Finding. However, it does not include unattended operation on 3.5MHz.

For over a year now Clive and members of the Basingstoke ARC have been in communication with the head of the Amateur Radio and CB department at Ofcom, aided greatly by **Colin Thomas G3PSM** Spectrum Director & HF Manager of the RSGB to get this changed. **Alan Betts** of Ofcom has recently reported that "The matter has been agreed and frequencies agreed with a small slot in the middle to protect a key h.f. installation".

A few days later, during the RSGB's meeting with Ofcom on the 23 February, it was confirmed that clearance has been given to use 3.510-3.543MHz and 3.553-3.600MHz for the purposes of Radio Direction Finding. The small missing 10kHz does **not** compromise the use of a very low cost TV XTAL that is used by many DF groups as the basis of the 3.5MHz transmitters.

Ofcom also stated that they hoped the revised *BR68* will be available in June/July of this year but they weren't promising. If you need to use these frequencies prior to the re-issue of the *BR68* please contact Ofcom who will issue a NoV for the period(s) required.

Ofcom Contact Centre
Riverside House
2a Southwark Bridge Road
London
SE1 9HA
Tel: 0845-456 3000/0207-981 3040
FAX: 0845-456 3333
Website: www.ofcom.org.uk
Email: contact@ofcom.org.uk

Building Foundations At Dover

The ever active Dover Radio Club have been busy introducing more newcomers to the hobby with their continuing programme of Foundation Courses.

The photograph (on page 14) shows the latest group of Foundation licence students. Pictured in the back row from left to right are: **Brian Joyner G8ZYZ** (Assistant Instructor), **Richard Bax**, **Albert**

Norwegians Gain Access to 5MHz

Norwegian Amateur Radio Club stations have been granted permission to operate on eight 5MHz band spot frequencies from 1 April 2005 until 31 December 2007.

The Norwegian Post and Telecommunications Authority has granted permission on the upper sideband and c.w., modes with a maximum transmitter power of 100W. The centre frequencies of the channels are: 5.28, 5.29, 5.332, 5.348, 5.368, 5.373, 5.400 and 5.405MHz, with the upper sideband 'dial frequency' being 1.5kHz lower in each case. The permission has been granted on a non-interference-basis. With thanks to NRRL HF Traffic Manager, **Tom Segalstad LA4LN**, for the original news story.

World Amateur Radio Day

World Amateur Radio Day (WARD) is celebrated by the International Amateur Radio Union (IARU) on 18 April each year and in commemoration of this why not try for the WARD 2005 Award?

The WARD 2005 Award is issued by **MK QTC**, the Polish Radio Amateurs' journal, with the support of PZK, the Polish National Amateur Radio Society. The award is issued to those making at least 10 QSOs on the h.f. bands, or five QSOs on the v.h.f. bands between 0000 and 2400UTC on 18 April 2005.

The price of the WARD 2005 Award is \$5 or 5 Euros. To enter for the award send a standard application form (log extract), including the list of QSOs to: **MK QTC, The Radio Amateurs' Journal, Suchacz-Zamek, Wielmozy 5b, 82-340 Tolkmicko, Poland** on or before **31 May 2005**.

Brighten your Radio Hobby - join Brighton RC!

The Brighton Radio Club are currently seeking new members to join them so, if you live in the area why not go along?

Brighton Radio Club's history goes back to before the Second World War when meetings were held in Hove and of course many of the members were called into service at that time. One of these, **Cyril Fairchild G3YY** worked at Bletchley Park and later went on to become Brighton RC's life president.

The club was previously known as the Sussex And District Amateur Radio Society but it was felt that with the changing face of Amateur Radio to encompass data, computers and modern communications that Brighton Radio Club suited the purpose better. In years gone by the club has also been responsible for the Brighton Amateur Fair, which used to be held in July.

The club is now looking to breathe some new life into its activities by encouraging fellow Radio Amateurs to come forth and join them. Meetings are held on the second and fourth Tuesdays of every month at the Valance Community Centre, Sackville Road, Hove and are open to anyone wishing to find out more. Entrance is free and refreshments are available.

To find out more please contact **Reg Moores G3GZT** on (01273) 503869.



Wilton, Barry Pearson, Mark Gibbinson, Sam Whitlock, Paul Cook and David Harding G0DQI (Lead Instructor). In the front row from left to right are: **Graham Cahill 2E1ITE** (Assistant Invigilator), **Katrina Barton, Samantha Evans** and **Cecil Armstrong G0OJZ** (Chief Invigilator).

The Dover Amateur Radio Club meet every Wednesday in term time, at the Boys Grammar School, in Dover, from 1930 hours. The Club holds a variety of events, which include many interesting talks. For more information contact the club via www.darc.org.uk

International Marconi Day

Make a note in your diary now that International Marconi Day (IMD) takes place on Saturday 23 April - don't miss it!

Once again, the Cornish Radio Amateur Club will be operating **GB4IMD** from the Marconi Centre at Poldhu Cove by the kind invitation of the Committee and members of the Poldhu Amateur Radio Club. Stations with a historical connection to Guglielmo Marconi who wish to register as an Award Stations for the first time are asked to contact the Webmaster as soon as possible, giving details of their connection to G. Marconi between 1896 and 1937.

The Cornish Radio Amateur Club (CRAC) would be grateful if those stations who have already registered as Award Stations confirm with the Webmaster as soon as possible whether or not they will be operating during the 2005 event.



- * The period and details of operation for IMD is: 0000UTC on 23 April 2005 to 2359UTC, 23 April 2005
- * Frequency Bands: All bands from 1.8-28MHz (Note: Contacts on 50MHz and above will not count towards the Award)
- * Modes : c.w., s.s.b. and digital

Full details of stations already registered, award costs and how to take part, etc., can be found at www.gb4imd.co.uk

Elecraft Introduces the T1

American manufacturer Elecraft have recently launched the T1, a miniature, 20W automatic antenna tuner, featuring an optional remote control adapter for the FT-817 Transceiver



Described as being not much larger than a deck of cards, the T1 is a stand-alone, 1.8 through 50MHz antenna tuning unit (a.t.u.) that can be used with any low-power transceiver. The tuner's seven-inductor, seven-capacitor L-network provides a wide matching range and power-handling capability of up to 20W s.s.b/c.w., 10W a.m./f.m./digital. There's no need to change modes as antenna matching can be accomplished using a constant carrier, s.s.b. voice, or a c.w. keyer.

Elecraft say that Yaesu FT-817 users will find the T1 especially convenient thanks to the optional T1-FT817 remote control cable. The 'smart' cable provides instant recall of per-band a.t.u. settings on any band change at the transceiver, without the need to transmit. Full details on using the remote control are provided in the owner's manual, so users of other transceivers (commercial or home-built) may also be able to make use of these capabilities.

Measuring just 11.2 x 6.3 x 22.9cm in a

'rugged' enclosure the T1 is smaller than many other compact auto tuners on the market and so could make the ideal travelling companion for Amateur Radio holidays. Powered by an internal 9V battery, which Elecraft claim could last for a year or more thanks to the use of latching relays and auto power off, the T1 self checks the battery on power-up to provide a low battery indication when necessary.

The T1 is available direct from Elecraft factory assembled and tested for U\$159, or as a complete, easy-to-build kit for U\$135. The kit version requires no alignment, and there are no surface-mount parts to install. The T1-FT817 remote control cable costs U\$49 (assembled).

To find out more or place an order visit Elecraft's website at <http://www.elecraft.com> or via:

Elecraft

PO Box 69,

Aptos, CA 95001-0069

USA

Tel: 00 1 831 662 8345 Office Hours: Monday - Friday 08.30 to 1700 California. Time

FAX: 00 1 831 662 0830

E-mail: Sales Department

sales@elecraft.com

E-mail: General Information request:

info@elecraft.com

National Mills Weekend

The annual National Mills Weekend event takes place over the weekend of 7/8th May and one club taking part is the Clacton Radio Club.

Using the callsign **GB2TTM** the Clacton Radio Club will be participating in National Mills Weekend from Thorington Tidal Mill, which is close to Brightlingsea. A special QSL card will be issued for the event.

Members of the Clacton Radio Club are pleased to be running GB2TTM from Thorington Tidal Mill as this is the first time the Mill has been aired. So listen out for them, make contact and claim your QSL card.

Further information is available from **G4AQX**, Clacton's club secretary on **(01255) 429117**.

Cushcraft Vertical

Essex based Waters & Stanton PLC have recently introduced the Cushcraft MA-8040V antenna to their range.

Small and lightweight the MA-8040V vertical antenna, as the name suggests, covers the 40 and 80m bands (7 and 3.5MHz) and has been

designed for easy construction and being ideal for portable or emergency use. Features include:

- * 1.5kW p.e.p. s.s.b power rating
- * Two sets of top loaded resonators and capacitance hats
- * >80kHz coverage on 3.5MHz
- * Full band coverage on 7MHz
- * Low s.w.r. at resonance with external matching

Cushcraft state that the MA-8040V works best at ground level but can be elevated by using the supplied radial kit. The MA-8040V is available now for £199.95 inc. VAT direct from Waters & Stanton PLC.

Waters & Stanton PLC
22 Main Road,
Hockley, Essex SS5 4QS
Tel: (01702) 203353
FAX: (01702) 205843
E-mail: sales@wsplc.com
Website: www.wsplc.com

Links With Icom UK

Icom (UK) Ltd. are offering a new service to Amateur Radio clubs and associations via their revamped website. Interested? Read on to find out more...

The link section of Icom UK Ltd's website has been divided into various market sectors, eg., Marine, Avionics, Amateur and Commercial and within those, further sub-sections designed to give others the opportunity of highlighting their services. For instance in the Amateur section there are links to clubs, events, resources and sites of other interest, which gives individual organisations the opportunity to add their name and brief description.

If you want to have your radio club, event, etc, added to Icom's link service you are invited to E-mail the details to marketing@icomuk.co.uk where they will be checked and if deemed appropriate and suitable will be uploaded.

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



National Vintage Communications Fair

If vintage radio sets and memorabilia are your passion then make a date in your diary to visit the 13th National Vintage Communications Fair (NVCF) this May.



The NVCF, organised by the British Vintage Wireless Society, is recognised as being the UK's leading vintage communications fair aimed primarily at collectors of early radios, Bakelite and Candlestick Telephones, 1950s television sets, wind-up gramophones and classic valve audio equipment, etc. The NVCF is held twice a year, attracting over 300 exhibitors from the UK, Europe, America and the Far East.

So, whether you are an avid collector or just have an enthusiasm for all things vintage, the NVCF offers an Aladdin's cave of possibilities and nostalgia. The event is taking place on 1 May in **Hall 11** at the **National Exhibition Centre, Birmingham** from 1030 to 1600 hours. Admission is £5 (under 14s free).

Terry Martin/Peter Yates,
122B Cannon Street Road,
Whitechapel,
London E1 2LH
Tel: (07947) 460161
E-mail: info@ncvf.org.uk
Website: www.ncvf.org.uk

Stop Press!

Just as this issue of PW was going to press we received the following news from ARC Ltd.

After 21 years of trading ARC Ltd., will close its doors on the 7 May. **Peter Roberts G4KKN**, **Frank G4MWM** and **Elaine** have been based in Earlestown, Newton-le-Willows in Merseyside since 1983 when ARC was known the northern branch of Amateur Radio Exchange. Then in 1988 Peter bought the business and began trading as Amateur Radio Communications Limited.

Peter has finally decided to retire this year to concentrate on his commitments at home including his smallholding. Nevertheless, Peter, Elaine and Frank will be sad to see the doors finally close on 7 May. Peter and the team but would like to thank all their loyal customers for their support over the years and hope that some will keep in touch. Also if you wish to call in and see them before the end of business on the 7 May you may even pick up a last minute bargain!

amateur radio clubs

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

BOURNEMOUTH

Bournemouth Radio Society

Contact: David Wright

Tel: (01202) 697338

Website: brswebsite.freemove.co.uk

Members of the Bournemouth Radio Society meet on the 1st and 3rd Fridays of each month at 1930 at the Kinson Community Centre, Millhams Road, Kinson, Bournemouth. A few up and coming events planned are **15 April:** Tsunami by Graham G3NIL, **6 May:** Model Jet Engines by **Simon Peckham**. Check out the above website for more forthcoming events and details.

BRISTOL

South Bristol ARC

Contact: Len Baker

Tel: (01275) 834282

Website: www.sbarc.co.uk

Members of the South Bristol Amateur Radio Club meet at the Whitchurch Folkhouse, East Dundry Road, Whitchurch. Just a few up and coming events include: **20 April:** Horticultural Evening, **27th:** On The Air Evening, **4 May:** Computer & Software Clinic, **11th:** Workshop - Morse Code. Events and dates often change, so please check with **Len Baker** for the most up-to-date information.

LONDON

Southgate ARC

Website: www.southgatearc.org

Members of the Southgate Amateur Radio Club meet on the second Thursday of the month at Winchmore Hill Cricket Club, The Paulin Ground, Firs Lane Winchmore Hill, London N21 3ER, commencing at 1930 for an 2000 start. A guest speaker is usually invited to give a talk on a subject of interest. Membership is open to all who are interested in the many facets of Amateur Radio, the numerous and varied activities and is not restricted to those who hold transmitting licences. Members range in age from youngsters to senior citizens and visitors are most welcome.

TORBAY

Torbay ARC

Contact: Peter Tanner G4VTO

Website: www.tars.org.uk

The Torbay Amateur Radio Society meet at St. John's Ambulance Hall, East Street, Newton Abbot. On the **20 May** there will be an RSGB presentation evening, video and talk. On the **17 June** there will be a talk by **Mike G4FON** on fibre optic comms. Also, don't forget a date for your diary - the **28 August** is the Society's August Bank Holiday Rally, held at the Churston Grammar School.

WEST SUSSEX

Horsham ARC

Contact: Alister Watt G3ZBU

Website: www.harc.org.uk

Meetings take place at The Guide Hall, Denne Road, Horsham West Sussex on the first Thursday of the month. Plenty of events are planned throughout the coming year, so log onto their website to see what's happening during the coming months.



Manufacturers of radio communication
antennas and associated products

Log Periodic

MLP32 TX & RX 100-1300MHz one feed,
S.W.R. 2:1 and below over whole frequency
range professional quality
(Leng h 1420mm).....**£99.95**
MLP62 same spec as MLP32 but wi h
increased freq.
range 50-1300 Leng h 2000mm.....**£169.95**



Mobile HF Whips (with 3/8 base fitting)

AM-PRO 6 mt (Length 4.6' approx).....**£16.95**
AM-PRO 10 mt (Length 7' approx).....**£16.95**
AM-PRO 17 mt (Length 7' approx).....**£16.95**
AM-PRO 20 mt (Length 7' approx).....**£16.95**
AM-PRO 40 mt (Length 7' approx).....**£16.95**
AM-PRO 80 mt (Length 7' approx).....**£19.95**
AM-PRO 160 mt (Length 7' approx).....**£49.95**
AM-PRO MB5 Multi band 10/15/20/40/80 can use 4 Bands at one
time (Length 100").....**£69.95**
SPX-100 'plug n go' multiband 6/10/12/15/17/20/30/40/80mtrs. Band
changing is easy via a flylead and socket and adjustable telescopic
whip section 1.65m when fully extended.....**£49.95**

Slim Jims

SJ-70 430-430MHz slimline design with SO239 connection.
Leng h 1.00m.....**£19.95**
SJ-2 144-146MHz slimline design wi h SO239 connection.
Leng h 2.00m.....**£24.95**

VHF/UHF Mobile Antennas

MICRO MAG Dual band 2/70 antenna complete with 1" magnetic
mount 5mtrs of mini coax terminated in BNC.....**£14.95**
MR700 2m/70cms, 1/4 wave & 5/8, Gain 2m 0dB/3.0dB 70cms Leng h
20" 38 Fitting.....**£7.95**
SO239 Fitting.....**£9.95**
MR 777 2 Metre 70 cms 2 8 & 4 8 dBd Gain
(5/8 & 2x5/8 wave) (Length 60") (38 fitting).....**£16.95**
(SO239 fitting).....**£18.95**
MR0525 2m/70cms, 1/4 wave & 5/8, Gain 2m 0.5dB/3.2dB 70cms
Length 17" SO239 fitting commercial quality.....**£19.95**
MR0500 2m/70cms, 1/2 wave & 2x5/8, Gain 2m 3.2dB/5.8dB 70cms
Length 38" SO239 fitting commercial quality.....**£24.95**
MR0750 2m/70cms, 6/8 wave & 3x5/8, Gain 2m 5.5dB/8.0dB 70cms
Length 60" SO239 fitting commercial quality.....**£39.95**
MR0800 6/2/70cms 1/4 6/8 & 3 x 5/8, Gain 6m 3.0dB/2m 5.0dB/70
7.5dB Length 60" SO239 fitting commercial quality.....**£39.95**
GF151 Professional glass mount dual band antenna. Freq: 2/70 Gain:
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Unique design - radial FREE
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(2 mts 4.5dBd) (70cms 7.5dBd) (Leng h 62")
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(2 mts 4.5dBd) (70cms 7.5dBd) (Leng h 62")
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(2 mts 6.8dBd) (70cms 9.2dBd) (Leng h 100")
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SQBM1000 Tri-Bander.....**£69.95**
(2 mts 6.2dBd) (6 mts 3.0dBd) (70cms 8.4dBd) (Leng h 100")
SQBM 100/200/500/800/1000 are **Polycoated Fibre Glass**
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(Boom 83") (Gain 12.5dBd).....**£74.95**



Yagi Beams (fittings stainless steel)

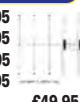
2 metre 4 Element
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(Fittings stainless steel)

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70 cms 7 Element (Boom 28") (Gain 11.5dBd).....**£34.95**
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The biggest advantage with a ZL-special is that you get massive gain for such a
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G5RV Wire Antenna (10-40/80m)

(Fittings stainless steel)

Standard (enamelled).....**£19.95**.....**£22.95**
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for G5RV.....**£19.95**

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Convert your half size g5rv into a full size with just 8ft ei her side.
Ideal for the small gaden.....**£19.95**

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● Impedance: 8Ω
● Power: 3 Watts nominal/5 Watts max
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● Lead: 2m wi h 3.5mm jack plug fitted
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● Impedance: 8Ω
● Power: 3 Watts nominal/5 Watts max
● Size: 65 x 130 x 80mm
● Lead: 2m wi h 3.5mm jack plug fitted
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● Impedance: 8Ω
● Power: 3 Watts nominal/5 Watts max
● Size: 120 x 120 x 40mm
● Lead: 2m wi h 3.5mm jack plug fitted
● Includes mute and audio noise filter



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Heavy Duty Aluminium (1.8mm wall)	
with a lovely push-fit finish to give a very strong mast set	
1 1/4" single 5' ali pole	£7.00
1 1/4" set of four (20' total app ox)	£24.95
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1 1/2" set of four (20' total app ox)	£34.95
1 3/4" single 5' ali pole	£12.00
1 3/4" set of four (20' total app ox)	£39.95
2" single 5' ali pole	£15.00
2" set of four (20' total app ox)	£49.95

Cable & Coax Cable

RG58 best quality standard per mt	35p
RG58 best quality military spec per mt	60p
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RG213 best quality military spec per mt	85p
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Please phone for special 100 metre discounted price

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N-Type plug (Large entry)	£3.00
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SO239 Chassis socket (Square)	£1.00
N-Type Chassis socket (Round)	£3.00
N-Type Chassis socket (Square)	£3.00
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SO239 to BNC adapter	£2.00
SO239 to N-Type adapter	£3.00
SO239 to PL259 adapter (Right angle)	£2.50
SO239 T-Piece adapter (2xPL 1XSO)	£3.00
N-Type to PL259 adapter (Female to male)	£3.00
BNC to PL259 adapter (Female to male)	£2.00
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Please add just £2.00 P&P for connector only orders

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MB-4X 4:1 Balun 1000 watts power	£29.95
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MD-24 HF or VHF/UHF internal duplexer (1.3-225MHz) (350-540MHz) SO239/PL259 fittings	£22.95
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CS201 Two-way di-cast antenna switch. Freq: 0-1000MHz max 2,500 watts SO239 fittings	£14.95
CS201-N Same spec as CS201 but with N-type fittings	£19.95
CS401 Same spec as CS201 but 4-way	£39.95

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AR-31050 Very light duty TV/UHF	£24.95
AR-300XL Light duty UHF/VHF	£49.95
YS-130 Medium duty VHF	£79.95
RC5-1 Heavy duty HF	£349.95
RG5 3 Heavy Duty HF inc pre set cont of box	£449.95
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RC26 Alignment Bearing for RC5-1/3	£49.95

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Turbo mag mount 7" 4mtrs coax/PL259 3/8 or SO239	£14.95
Tri-mag mount 3 x 5" 4mtrs coax/PL259 3/8 or SO239	£39.95
Hatch Back Mount (stainless steel) 4 mtrs coax/PL259 3/8 or SO239 fully adjustable with turn knob	£29.95
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Rail Mount (aluminium) 4mtrs coax/PL259 suitable for up to lynch off bars or poles 3/8 fitting	£12.95
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SO259 fitting	£12.95
Hatch Back Mount 3/8 4mtrs coax/PL259	£12.95
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Enamelled copper wire 16 gauge (50mtrs)	£11.95
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300Ω Ladder Ribbon heavy duty USA imported (20mtrs)	£15.00
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(Other lengths available, please phone for details)

Miscellaneous Items

CDX Lightning arrestor 500 watts	£19.95
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TMA-1 Aluminium mast ★ 4 sections 170cm each ★ 45mm to 30mm ★ App ox 20ft erect 6ft collapsed	£99.95
TMA-2 Aluminium mast ★ 8 sections 170cm each ★ 65mm to 30mm ★ App ox 40ft erect 6ft collapsed	£189.95
TMF-1 Fibreglass mast ★ 4 sections 160cm each ★ 50mm to 30mm ★ App ox 20ft erect 6ft collapsed	£99.95
TMF-2 Fibreglass mast ★ 5 sections 240cm each ★ 60mm to 30mm ★ App ox 40ft erect 9ft collapsed	£189.95

HF Yagi

HBV-2 2 BAND 2 ELEMENT TRAPPED BEAM FREQ:20-40 Mtrs GAIN:4dBd BOOM:5.00m LONGEST ELEMENT:13.00m POWER:1600 Watts	£399.95
--	---------

ADEX-3300 3 BAND 3 ELEMENT TRAPPED BEAM

FREQ:10-15-20 Mtrs GAIN:8 dBd
BOOM:4.42m LONGEST ELE:8.46m
POWER:2000 Watts

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

40 Mtr RADIAL KIT FOR ABOVE

HF Verticals**VR3000 3 BAND VERTICAL**

FREQ: 10-15-20 Mtrs
GAIN: 3.5dBi HEIGHT: 3.80m POWER: 2000 Watts (with radials)
POWER: 500 Watts (with optional radials)

OPTIONAL 10-15-20mtr radial kit

VR5000 5 BAND VERTICAL

FREQ:10-15-20-40-80 Mtrs
GAIN: 3.5dBi HEIGHT: 4.00m RADIAL LENGTH: 2.30m (included). POWER: 500 Watts

EVX4000 4 BAND VERTICAL

FREQ:10-15-20-40 Mtrs
GAIN: 3.5dBi HEIGHT: 6.50m POWER: 2000 Watts (with radials)
POWER: 500 Watts (with optional radials)

OPTIONAL 10-15-20mtr radial kit

OPTIONAL 40mtr radial kit

EVX5000 5 BAND VERTICAL

FREQ:10-15-20-40-80 Mtrs
GAIN: 3.5dBi HEIGHT: 7.30m POWER: 2000 Watts (without radials)
POWER: 500 Watts (with optional radials)

OPTIONAL 10-15-20mtr radial kit

OPTIONAL 40mtr radial kit

OPTIONAL 80mtr radial kit

EVX6000 6 BAND VERTICAL

FREQ: 10-15-20-30-40-80 Mtrs
GAIN: 3.5dBi HEIGHT: 5.00m RADIAL LENGTH: 1.70m (included) POWER: 800 Watts

Watts

EVX8000 8 BAND VERTICAL

FREQ:10-12-15-17-20-30-40 Mtrs (80m optional) GAIN: 3.5dBi HEIGHT: 4.90m RADIAL LENGTH: 1.80m (included)
POWER: 2000 Watts

80 MTR RADIAL KIT FOR ABOVE

(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

MTD-1 (3 BAND) FREQ:10-15-20 Mtrs

LENGTH:7.40 Mtrs POWER:1000 Watts

MTD-2 (2 BAND) FREQ:40-80 Mtrs LENGTH: 20Mtrs POWER:1000

Watts

MTD-3 (3 BAND) FREQ:40-80-160 Mtrs LENGTH: 32.5m POWER: 1000 Watts

Watts

MTD-4 (3 BAND) FREQ: 12-17-30 Mtrs LENGTH: 10.5m POWER: 1000 Watts

Watts

MTD-5 (5 BAND) FREQ: 10-15-20-40-80 Mtrs LENGTH: 20m

POWER:1000 Watts

(MTD-5 is a crossed di-pole with 4 legs)

Patch Leads**STANDARD LEADS**

1mtr RG58 PL259 to PL259 lead

10mtr RG58 PL259 to PL259 lead

30mtr RG58 PL259 to PL259 lead

MILITARY SPECIFICATION LEADS

1mtr RG58 Mil spec PL259 to PL259 lead

10mtr RG58 Mil spec PL259 to PL259 lead

30mtr RG58 Mil spec PL259 to PL259 lead

1mtr RG213 Mil spec PL259 to PL259 lead

10mtr RG213 Mil spec PL259 to PL259 lead

30mtr RG213 Mil spec PL259 to PL259 lead

(All other leads and lengths available, ie. BNC to N-type, etc. Please phone for details)

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doing it by design

This month Tony Nailer G4CFY considers further uses of the f.e.t. and m.o.s.f.e.t.s, together with diodes as a means of mixing two signals together. And as usual, there's a selection of projects for you to build!

Unbalanced mixers generally use a semiconductor device arranged so that it's non conducting without an oscillator signal applied. In general, devices, which have good mixing action have a characteristic whereby for each doubling of the applied voltage, the current conducted quadruples. This is known as a square law characteristic.

The simplest form of mixer is produced using a diode and having one or more signals forward biasing it to various degrees. This takes us back to the old amplitude modulation (a.m.) days when the received signal was a composite of a carrier; an upper sideband and lower sideband.

With the a.m. mode, a signal was received and processed through to the end of the intermediate frequency (i.f.) chain where it was applied to a germanium diode such as an OA47, OA90 or OA91. These had developed from the early cat's whisker days and had a characteristic like that shown in Fig. 1.

The curve of the forward characteristic is a good approximation to a square law. By applying the composite a.m. signal to a square law device the following signals are created;

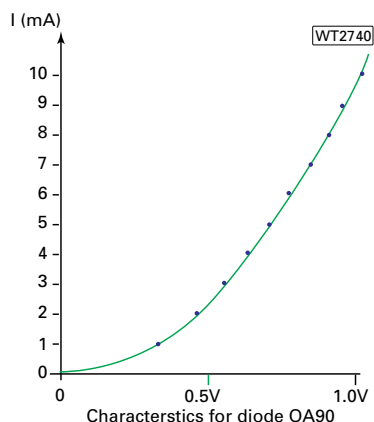


Fig. 1: The germanium diode such as an OA47, OA90 or OA91 have developed from the early cat's whisker days and had a characteristic like this characteristic curve here (see text).

audio, second harmonic of audio, and second harmonic of composite signal plus third order products.

Modern silicon switching diodes have a more abrupt characteristic and suddenly conduct when the forward bias reaches 0.65V. They are not as well suited as mixers. However, Schottky silicon diodes specially manufactured for a smoother conduction at about 0.2V are quite good as mixers.

Single Diode Mixer

The use of a single diode as a down mixer is shown in Fig. 2. This is typical of the arrangement of the older style a.m. demodulator. It also works for any other frequency arrangement such as where f_1 is 10.70MHz, f_2 is 10.245MHz, and f_{out} (frequency out) is 455kHz.

The path for the signal f_1 and oscillator f_2 is through the diode and through C3. An oscillator signal of 1V peak-to-peak (p-p) will have a positive half cycle 0.5V peak. This applied to the diode will drive it well up its conduction characteristic on positive peaks and hold the diode off during the negative half cycle.

One way of understanding the mixing process here, is that the signal passes through the diode during the times the oscillator signal causes the diode to conduct. In effect the

oscillator signal 'chops' the other signal into discrete 'packets'.

Mixing action in a diode normally results in an output signal between -6 and -10dB relative to the input level of the signal f_1 . **Note:** in other words there's a reduction of signal (a loss) because of the mixing process in this circuit.

Diode Mixer Design

Next, I'll consider a single sideband (s.s.b.) signal at 455kHz with a beat frequency oscillator (b.f.o.) or carrier insertion oscillator at 453.5kHz using the circuit in Fig. 2. **Note:** The input transformer operating at 455kHz could be a TOKO 11100AC2 with a low impedance secondary winding.

As a rule of thumb, the reactance of C2 and C3 should be less than 250Ω each at the radio frequency (r.f.) or i.f. input frequency. The capacitance value is now found from $X_c = 1 / (2 \times \pi \times f \times C_2)$, see Part 1 Calculations.

Calculations Part 1

$X_c = 1 / (2 \times \pi \times f \times C_2)$, so $C_2 = 1 / (2 \times \pi \times f \times X_c)$.
 $C_2 = 1 / (2 \times \pi \times 455 \times 10^3 \times 250) = 1 / (714712 \times 10^3)$
 $C_2 = 1 / (0.715 \times 10^9) = 10^9 / (0.715) = 1.4nF$.
 Choose 2.2nF.

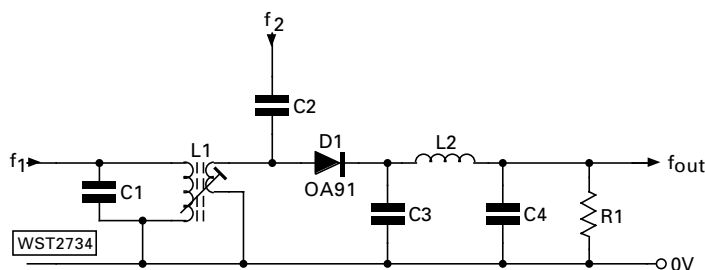


Fig. 2: Circuit for beat frequency oscillator (b.f.o.) or carrier insertion oscillator at 453.5kHz. The input transformer operating at 455kHz could be a TOKO 11100AC2 with a low impedance secondary winding (see text).

Now, a 2.2nF capacitor will have a reactance of 159Ω at 455kHz and a reactance of 15,900Ω (15.9kΩ) at the audio frequency of 4.55kHz. Likewise if L2 is chosen to have a reactance of 15.9kΩ at 455kHz it will have a reactance of 159Ω at 4.55kHz.

Calculations Part 2

$$X_L = 2 \times \pi \times f \times L, \text{ so } L = X_L / (2 \times \pi \times f)$$

$$L = 15900 / (2 \times \pi \times 455 \times 10^3) = 15900 / (2858.8 \times 10^3)$$

$$L = 15900 \times 10^3 / 2858.8 = 5.56\text{mH, use } 4.7\text{mH}$$

Let C4 also be 2.2nF with a reactance of 159Ω at 455kHz. This is in series with a choke of 4.7mH with a reactance of 13,436Ω at 455kHz. The attenuation of 455kHz at R1 will be at least 159 (13,436 + 159), a factor of 1/85 or (38.5dB). The attenuation of audio will be 15900 (15900 + 134.36), a factor of 0.99/1 or 0.07dB.

The resistor R1 ensures there is no residual build up of d.c. on the capacitors C3 and C4, which would progressively bias the diode off. Its value is typically 4.7kΩ to 10kΩ. **Note:** In the case of an a.m. detector it would normally be the track of the volume control.

The FET Mixer

Moving on now to the f.e.t. as described in Doing It By Design PW January 2005, the graph of the gate bias related to drain current, is essentially a square law characteristic. This means the humble f.e.t. would make an ideal mixer.

Please Note: In the January 2005 article the test circuit (Fig. 2) was incorrectly printed and the 4.7kΩ resistor should have been a potentiometer with the source connected to the wiper. My apologies for this error. **Editor.**

In the case of the BF256A as tested in the January circuit it was found that the drain current just about pinched off for a gate voltage of -4V with respect to source. This point is critical to each f.e.t. and differs slightly between each part, even from the same manufacturer.

Let's consider that the drain current was 0.2mA for a gate voltage of -3.7V. The source resistor would then need to be $R_2 = 3.7V / 0.2\text{mA} = 6.4\text{k}\Omega$. This would work quite well though I found the value closer to pinch off required 8k2Ω.

The circuit, Fig. 3, shows the application of such a mixer. The gate input tuned circuit C1 and L1 is resonant at the signal frequency and the output tuned circuit C4 and L2 is resonant at the required mixer product frequency.

In the arrangement in Fig. 3 the oscillator signal is applied to the source to provide

isolation between it and the other signal. Without the oscillator signal applied the source will sit at about 4V above ground and only a minute source to drain current will flow.

An oscillator voltage swing of 2V p-p will have a half cycle of 1V peak. The negative half cycle will drag the source down to 3V and allow significant source to drain current to flow.

As the f.e.t. has its gate input and drain output each connected to a high impedance point on a tuned circuit, also that the source resistor is a high value, the oscillator input point is also quite high impedance. In practice the f.e.t. only requires about one tenth of the oscillator drive power of a diode mixer.

Using an f.e.t. as a mixer is of benefit as the circuit provides some gain. Unfortunately the un-decoupled source terminal allows considerable negative feedback at the output frequency. What little gain is achieved is offset by the mixer product already being -6dB relative to the input signal.

Capacitor C2 has to be low impedance at the mixer output frequency, i.e., 10nF at 10.7MHz, 100nF at 455kHz. The resistor, R1, will have only 1 or 2mA flowing through it and should be chosen to drop about 1V across it. A value of 470Ω or 1kΩ will do nicely as the value isn't critical.

To complete the guidance for the f.e.t. mixer it is only necessary to have an input tuned circuit L1 & C1 resonant at the input frequency. Input coupling can be from the low impedance primary or from a high impedance source directly to the top of L1.

Dual Gate MOSFET Mixer

Let's now look at the dual gate m.o.s.f.e.t. mixer, where the normal configuration is similar to that of the junction f.e.t., but with both gates at ground potential. An h.f. version is shown in Fig. 4, and a v.h.f. version in Fig. 5.

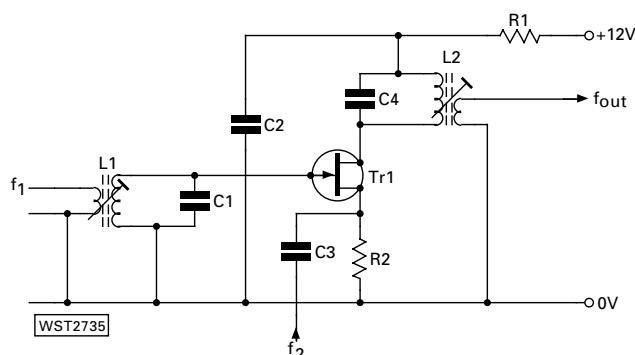


Fig. 3: The circuit, shows the application of an f.e.t. mixer. The gate input tuned circuit C1 and L1 is resonant at the signal frequency and the output tuned circuit C4 and L2 is resonant at the required mixer product frequency (see text).

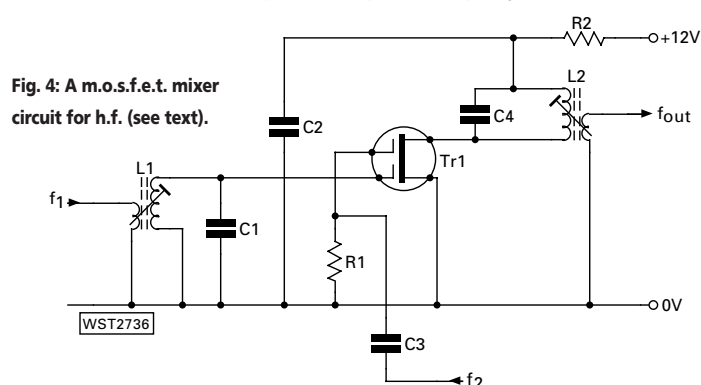


Fig. 4: A m.o.s.f.e.t. mixer circuit for h.f. (see text).

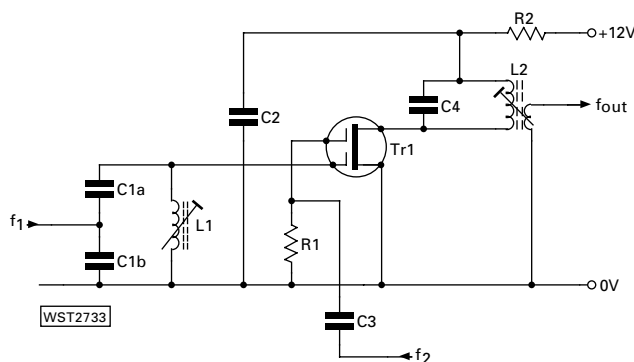
Note: A composite printed circuit board layout is shown in Fig. 6. This can be configured for either h.f. or v.h.f..

Data derived from a Telefunken data sheet for a BF961 shows that with gate 1 at ground potential the forward transconductance G_{fs} varies from 0 to 10mA/V for a gate 2 range of -1 to +1V. The relationship between gate 2 signal level and drain current is like a square law in this region. This means that with an oscillator signal of 2V p-p it is possible to achieve good square law mixing action. Furthermore the gate 2 input impedance is enormously high and therefore requires very little oscillator drive power, probably only a tenth of that required for an f.e.t.

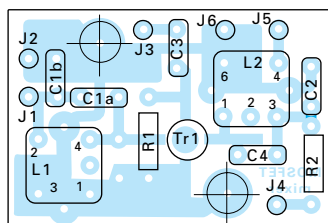
The dual gate m.o.s.f.e.t. has other advantages over the f.e.t. as its forward transconductance is typically three times greater. Additionally, as the oscillator signal is injected into a gate, the source is grounded as it would be for an amplifier. This means the full gain is achieved without the negative feedback problem caused by a high source impedance as in the f.e.t. circuit. Gains in the region of 10 to 15dB are typical for the m.o.s.f.e.t. mixer.

Choosing Suitable Components

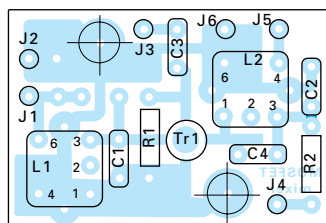
Choosing suitable components is simplicity itself. Choose an input parallel tuned circuit typical for the frequency. Inductance values of 9μH for 3.5MHz, 5.5μH for 14MHz, 1.2μH for 28MHz, 0.21μH for 50 and 70MHz, and 0.08μH for



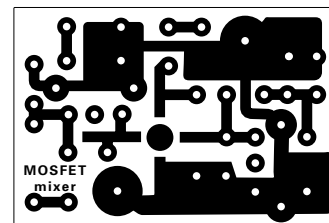
**Fig. 5: A
m.o.s.f.e.t.
mixer circuit for
v.h.f. (see text).**



VHF mixer overlay



HF mixer overlay



Track pattern

WT2741

144MHz. (Calculate the value of C1 to resonate with L1).

The output tuned circuit can use coils similarly chosen to suit that frequency or standard i.f. transformers if the frequency is 455kHz or 10.7MHz. The various standard i.f. coils usually have resonating capacitors (C4) already fitted. (For other frequencies calculate the value of C4 to resonate with L2).

Resistor R1 can be quite high value, anything from say 10kΩ to 82kΩ, it doesn't seem to make much difference. The resistor, R2, needs to drop about 1V across it and generally with 2V p-p oscillator drive the drain current averages 2mA. (A value of 470Ω) would be ideal.

Decoupling capacitor C2 is calculated to be between 1 and 10Ω at the output frequency. The capacitor C3 should be in the region of 10 to 15pF so that the input capacitance of gate 2 does not significantly reduce the effective swing of the oscillator signal.

Dual Gate MOSFET Mixer 70/10.7MHz)

For a dual gate m.o.s.f.e.t. mixer operating as a down converter from 70 to 10.7MHz, the circuit configuration will be as in Fig 5. Choose L1 to be 0.21μH, such as the TOKO coil 100076.

Calculate the total series capacitance Cs of C1a and C1b to resonate with L1. If L1 has a Q of 80 determine the dynamic resistance Rd of the tuned circuit. Estimate, then calculate the values of C1a and C1b to match 50Ω input to the dynamic resistance.

Calculate the value of C2 to be between 1 and 10Ω at 10.7MHz. (See Part 3 calculations).

Calculations Part 3

$$f = 1 / (2 \times \pi \times S_q \times R_t (L_1 \times C_s)).$$

Squaring both sides of the equation.

$$f^2 = 1 / (4 \times \pi^2 \times L_1 \times C_s).$$

Re-arranging to make Cs the subject.

$$C_s = 1 / (4 \times \pi^2 \times L_1 \times f^2). \text{ Farads}$$

$$C_s = 1 / (39.5 \times 0.21 \times 10^{-6} \times 70^2 \times 10^6 \times 10^6).$$

Farads

$$C_s = 1 / (40645.5 \times 10^6) = 0.0000246 \times 10^{-6} = 24.6\text{pF}.$$

$$R_d = X_L \times Q = 2 \times \pi \times f \times L_1 \times Q. \text{ Ohms.}$$

$$R_d = 2 \times \pi \times 70 \times 10^6 \times 0.21 \times 10^{-6} \times 80. \text{ Ohms.}$$

$$R_d = 7389\Omega.$$

$$R_d / R_{in} = S_q (C_{1b} / C_{1a}) \quad R_d / R_{in} = 7389 / 50 = 147.78$$

$$C_{1b} / C_{1a} = S_q R_t \quad 147.78 = 12.15.$$

Choose C1a as 27pF, then C1b = 27pF x 12.15 = 328pF. Use 330pF.

Calculate Cs = 27 x 330 / (27 + 330) = 24.95pF, (close enough!).

$$X_{C2} = 1 / (2 \times \pi \times f \times C_2). \text{ Let } X_{C2} = 1.$$

Re-arrange to make C2 the subject.

$$C_2 = 1 / (2 \times \pi \times f \times 1) = 1 / (2 \times \pi \times 10.7 \times 10^6)$$

$$C_2 = 1 / (67.23 \times 10^6) = 0.0148 \times 10^{-6} = 14.8\text{nF}.$$

Choose 10nF.

Finally, choose L2 as a standard 10.7MHz i.f. transformer TOKO TKACS8184A, R1 56kΩ,

C3 15pF, R2 470Ω. The oscillator will need to be 2V p-p at 59.3 - 59.8MHz. That's it - it's complete!

Kits & Bits

I'm prepared to supply kits of parts for mixers of this type using the composite p.c.b. shown in Fig 6. Kits of parts (see panel) to populate the board for an input frequency in the range 455kHz to 200MHz, and an output frequency in the range 455kHz to 30MHz will be available.

And although it would please me very much if you were to use this article to calculate the parts required, this is not essential. You'll find it rewarding if you do try!

PW

Dual Gate MOSFET Kits

The p.c.b. for the m.o.s.f.e.t. mixer costs £4. The p.c.b. and the on-board parts for your choice of frequencies is available for £7.

The m.o.s.f.e.t. amplifier kits (from DiBD March PW): The p.c.b. for the m.o.s.f.e.t. h.f. amplifier costs £4. The p.c.b. and on-board parts for the h.f. m.o.s.f.e.t. amplifier costs £7.

The p.c.b. for the v.h.f. m.o.s.f.e.t. amplifier costs £4. The p.c.b. and on-board parts for the v.h.f. m.o.s.f.e.t. amplifier cost £7, P&P 50p. Cheques payable to

**A.J. & J.R. Nailer,
Spectrum Communications,
12 Weatherbury Way, Dorchester,
Dorset DT1 2EF.**

Make a microHenry meter

In over half a century of Amateur Radio activity between 3.5 and 29.7MHz, I have amassed a number of inductors (coils) of various, but unknown inductances. So the problem arose of how to measure and label them for possible future use.

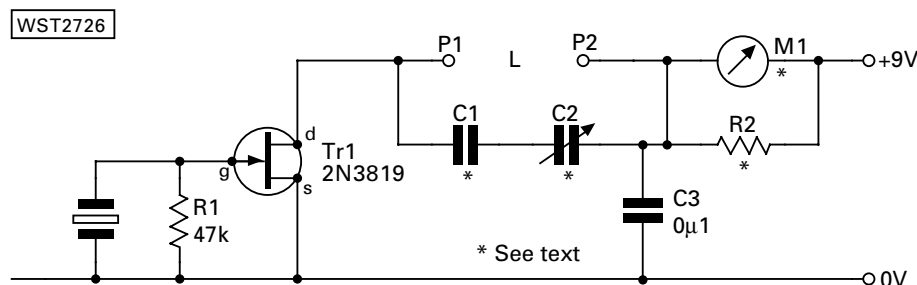
Amateur Radio literature often carries designs for inductance meters. Unfortunately, they all seem a bit complex to me! Instead, I wanted something simple, all in one box, being a **KISS*** man at heart, which would give me near enough values between 1 and 10 μ H (microHenrys).

***KISS**; keep it simple, stupid.

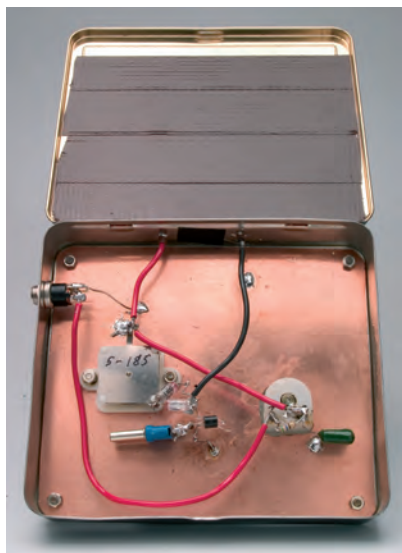
Related By Equation

An inductor of $L\mu$ H, a capacitor of $C\mu$ F (microfarad) and a frequency of f MHz are all related by the equation $2\pi fL = 1/2\pi fC$. If an oscillator is built with C fixed, a variation in L will give a variation in frequency. So, in effect, the frequency 'seen' on a suitable receiver's precise scale, providing a measure of the inductance.

Another method: a radio frequency current passed through a coil produces a potential difference (p.d.) across the coil. The greater the inductance the greater is this p.d., which after being rectified will give a reading on a high resistance digital voltmeter. But again, an external indicating device (the voltmeter) is required.



● **Fig. 1 (above): The circuit of the G3ESP microHenry meter (see text).**



● **Fig 2 (left): No p.c.b. is needed. The project was built into a Dutch cigar box, and G3ESP constructed the project in this simple fashion (see text).**

A third idea was to build a quartz crystal oscillator on a suitably high frequency. I would then insert the calibrating coils in series with the crystal, thus pulling the frequency of oscillation, so the frequency shown on a receiver dial corresponds to the inductance. It worked, but was abandoned because again it needed a receiver.

Penny Finally Dropped!

Finally, the penny dropped! In my early (valved) Amateur days to match a transmitter's power amplifier to the antenna, I first adjusted a tuned circuit until the anode current



● **The G3ESP microHenry Meter.**

meter showed a marked dip. Would this work if applied to a solid state crystal oscillator?

The idea did work and so, the final circuit, **Fig. 1**, was built. The point about tuning for a dip in a current meter is that it's sharper than tuning for a maximum in some other arrangements, and is more precise).

I had a quartz crystal for the 14.060MHz QRP calling frequency. Calculation showed that this would theoretically resonate with coils between 1 and 10MHz tuned by a capacitor of 130pF. The nearest and smallest I had on hand was a solid dielectric variable of 5 to 185pF.

By putting a suitable fixed capacitor in series, it was possible to reduce the maximum to 130pF. Unfortunately, its minimum capacitance resonance occurred with 8 μ H rather than the target 10 μ H.

Flat & Thin

The whole simple circuit was assembled inside a flat thin box (heading photograph) and **Fig. 2**,

approximately 110 x 120 x 20mm deep, which once contained Dutch cigars! The bottom was used for the panel of my microHenry meter, reinforced on the inside by a rectangle of printed circuit board (p.c.b.).

No etching was needed as the few components, **Fig. 2**, were anchored to the connecting tags on the variable capacitor and the meter, the p.c.b. acting as a general ground. There must be unknown capacitance between the circuit and the box, which increased the maximum and minimum values of the variable capacitor, which accounts for the inability to cater for inductances above 8 μ H.

My meter is scaled 1 to 10 and marked **Dry, Moist, Wet**, having been rescued from a defunct ground-moisture meter and has in fact a maximum of 250 μ A (micro amperes) full scale deflection (f.s.d.). The off-resonant current of 2.8mA was largely bypassed by soldering a 56 Ω resistor across the meter.

Setting Calibration

To calibrate I wound four toroidal coils of 2 μ H and one of 1 μ H and soldered them all in line with about 50mm between each coil, thus enabling me to mark the scale from 1 to 8 (see *PW* for March 2004 Turn on the Toroids).

In use, put the capacitor fully clockwise to maximum, attach the coil to the crocodile clips, apply 9 to 13.8V d.c. and - **slowly** - turn the large knob anticlockwise until the meter needle dips. (Ensure that the dip is at its lowest, then read off the inductance from the pre-calibrated scale).

Not bad for eight components, including the meter and the transistor!

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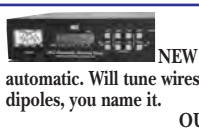
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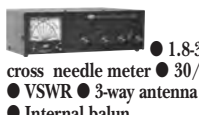
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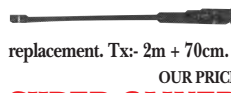
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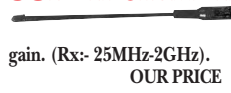
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D-308B DELUXE DESK MIC



(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.)	£19.99
A-08	8 pin "Alinco" round	£9.95
K-08	8 pin "Kenwood" round	£9.95
I-08	8 pin "Icom" round	£9.95
IM-08	Modular phone "Icom"	£9.95
KM-08	Kenwood modular lead	£9.95

KENWOOD HS-5



Superb padded professional communications headphones. Designed specifically for SWL 1/4" jack.

PRICE **£56.99** Del £5.00

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24 hour quartz clock. Major cities shown on rim. World map on face. "Know what time it is around the world".

SPECIAL **£19.99** P&P £5.00

U-120S



Superb handie speaker mic. Fits most Icom, Alinco, ADI, etc.

£19.95 P&P £2.50

MS-107K



Superb speaker mic to fit Kenwood handies.

£19.95 P&P £2.50

FIBRE GLASS POLES Del £10.00

	1 1/2"	1 3/4"	2"
1m	£8.50	£10.50	£12.50
2m	£16.00	£20.00	£24.00

Longer lengths available - phone

COPPER ANTENNA WIRE ETC

Enamelled (50m roll)	£13.95 P&P £5
Hard drawn (50m roll)	£14.95 P&P £5
Multi-Stranded (Grey PVC) (50m roll)	£11.95 P&P £5
Flexweave (H/duty 50 mtrs)	£30.00 P&P £5
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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
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BARGAIN WINCH

500kg brake winch.
BARGAIN PRICE

£59.95 Del £8.50

Winch wall bracket	£19.99
Extra heavy duty "hanging pulley"	£14.50



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

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

COAX BARGAINS

RG-213 Mil spec x 100m.

NOW **£59.99** P&P £10

RG-58 Mil spec x 100m.

NOW **£25.00** P&P £10.00

Coax stripping tool (for RG-58).....£4.50

COAX SWITCHES (P&P £4.50)

2 way CX-201 (0-1GHz) SO239	£19.95
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

LOW LOSS PATCH LEADS £2.50 P&P



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PL-259 - PL-259	0.6m	£5.99
PL-259 - PL-259	4m	£9.99
BNC - BNC	1m	£6.99
BNC - BNC	5m	£10.00

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

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

OUR PRICE: **2 for £10** (p&p £2.50)

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A superb quality ferrite ring with incredible properties. Ideal for "R.F.I." Width 12mm/OD35mm. 6 for £12.00
12 for £20.00 P&P £3.50
50 for £40.00 P&P 7.00

METAL WORK & BITS P&P available on request

2.4m/2" alloy poles	£19.99
2" Mast base plate	£12.95 P&P £5
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12" T&K Brackets	£18.00 P&P £8
18" T&K Brackets	£22.00 P&P £8
24" T&K Brackets	£26.00 P&P £8
10mm fixing bolts (needs 8mm hole)	£1.40 each
U bolts (1 1/2" 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
1 1/2" mast sleeve	£8.95
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 4.4mm/B/load 480kg	£12.50 P&P £3
132m roll nylon guy (4.4mm)	£40.00 P&P £7.50
Self amalgamating tape (roll)	£6.50
'Nylon' dog bone insulators	£1.00 each
Chimney lashing kit	£12.99



DIAMOND CP-6

A superb (diamond quality) 6 band trap verticle antenna with trap radials - "rotary" trap system allows "flat wall" mounting. 80m/40m/20m/15m/10m/6m. 200W SSB, HT 4.6m

SEND SAE FOR DATA SHEET

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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** Del £10.00

SEND SAE FOR LEAFLET

DELUXE G5RV

P&P on either full/half size £6.50

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



Double size - 200ft (160-10m).....£84.95

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

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80mtr inductors + wire to convert 1/2 size G5RV into full size. (Adds 8ft either end).....£25.00 P&P £4.00 (a pair)

Q-TEK COLINEARS (VHF/UHF) P&P £10.00

X-30 GF 144/70, 3/6dB (1.1m)	£39.95
X-50 GF 144/70, 4.5/7.2dB (1.7m)	£54.95
X-300 GF 144/70, 6.5/9dB (3m)	£69.95
X-510 GF 144/70, 8.5/11dB (5.4m)	special £89.95
X-627 GF 50/144/70, 2.15/6.2/8.4dB (2.4m)	£79.95

BALUNS & TRAPS

1.1 Balun	£25.00 P&P £4
4.1 Balun	£25.00 P&P £4
6.1 Balun	£25.00 P&P £4
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)

TELESCOPIC MASTS

6 section telescopic masts. Starting at 2 1/2" in diameter and finishing with a top section of 1 1/4" 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.
Tripod for telescopic masts.....£89.95

REPLACEMENT POWER LEADS

DC-1 Standard 6-pin/20A fits most HF.....£20.00

DC-2 Standard 2-pin/15A fits most VHF/UHF.....£10.00

YAESU REPLACEMENT MICS

MH-IC8 8 pin Yaesu mic (8-pin round)	£22.50
MH-4 4 pin fits older HF, etc. (4-pin round)	£15.00

BARGAIN MAST SETS

Set A: 5 section 21ft long (1 1/8") mast set

£23.95 Del £10

Set B: 5 section 16ft long (1 1/8") mast set **£19.95**
Del £10 (2 sets £35.00)

NEW 20' SLEEVED MAST SET

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

£49.99 Del £10.00.

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We have sets of 4 (2") poles (3 of which are swaged) that slot together to make a (approx) 20' pole. Each section is approx 5' long - some have small dents in - some have been swaged slightly off centre - hence the price.

2 FOR £35.00 DEL £12.50

3 FOR £45.00 DEL £15.00

SCRAP PRICE

£19.95

Del £10.00

The Sutton Receiver

Tim Walford G3PCJ introduces the latest of his well known 'open style' h.f. projects. In this issue he describes the overall project, and starts off with a detailed look at the receiver.



● **Fig 1: Photograph showing a completed project.**

The Sutton receiver is the heart of a new range of Somerset kits that can, depending on choices, provide multi-band c.w. or phone transceiver operation. This first article describes the concept and receiver; next month I'll describe the associated Mallet 1.5W c.w. transmitter with a.m. options, and the third article will be on the Montis 1.5W d.s.b. phone transmitter.

Incidentally, see if you can find Sutton, Sutton Mallet and Sutton Montis on the map – they are all places in Somerset! (Details of how to purchase the kits are given in the side panel).

The Receiver

The receiver is of the direct conversion (d.c.) type where the local oscillator (l.o.) is at essentially the same frequency as the desired signal. The variable frequency oscillator (v.f.o.) covers the bottom part

of the 3.5MHz band directly.

Additionally, because the v.f.o. uses medium *Q* ceramic resonators, it can also directly drive a transmitter operating on 3.5MHz without frequency pulling problems – so permitting v.f.o. controlled transceiver operation. For other bands, the v.f.o. is mixed with a highly stable source to provide good stability on the higher frequencies.

Physically, the main Sutton open style printed circuit board (p.c.b.) measuring 100 x 100mm, contains the entire 3.5MHz receiver and a l.o. mixer for the other bands.

Note: the band dependent crystal, r.f. and l.o. filters are mounted on a small band card that plugs into the rear of the receiver. This card also carries a low pass filter (l.p.f.), used by either optional transmitter (with or without the 10W linear), so that changing the band card also changes the transmitter. This arrangement provides operation on 3.5MHz alone, or alternatively, front panel selection of 80m or whatever band (1.8, 3.5, 7, 14, 21, or 28MHz) that's plugged in. The Sutton with the Mallet c.w. transmitter is shown in **Fig. 1**.

Block Diagram

The block diagram, **Fig. 2**, has three sections. The main 3.5MHz receiver takes up most of the bottom right, with the l.o. mixer above and the band card to the left. **Note:** Receiver parts are numbered from 100 up and band parts from 150.

The circuit is shown in **Fig 3**. The heart of the receiver is the product detector IC102, using a SA602 doubly balanced mixer, which is driven by a separate v.f.o. using ceramic resonators.

Using the two standard value resonators, the normal tuning capacitors cover the bottom 200kHz end of the 3.5MHz band. The resonator selected by S101 is in the feedback path between drain and gate of the field effect transistor (f.e.t.) oscillator Tr101.

In practice, the frequency depends on the capacitance across the resonator resulting from the tuning capacitors at the gate, and the capacitance at the f.e.t. drain. To reduce the tuning rate of CV100, the range of each resonator is divided into two segments by S100 activating CT100.

The drain capacity comprises fixed capacitors and that of the varactor tuning diode D101 under the control of the Fine/RIT (Receiver Incremental Tuning) tuning potentiometer RV100. This Fine control provides a few kHz of further adjustment.

An 8V low dropout voltage regulator provides a stable supply for the sensitive circuits. This, with a protection diode, allows operation on 8.5V upwards.

The push-pull inputs of the product detector IC102 permit two radio frequency (r.f.) bandpass filters to be connected. This is so that only the antenna input has to be changed over by the band relay RL100.

The 3.5MHz r.f. filter (L101/2 with C123/4/5) is on the main p.c.b. with the other filter (L150/1 with C150/1/2) on the band card. Both are double tuned to improve the rejection of strong out of band signals.

The output of the product detector feeds the op amp IC103B (half of a low noise TL072) arranged as a 'phone audio bandwidth audio pre-amplifier. This feeds either the audio frequency gain (a.f.g.) potentiometer RV101 direct, or when selected by S103, via the sharp 750Hz third order low pass c.w. filter of IC103A.

The a.f.g. potentiometer (RV101) feeds a conventional LM380 output stage IC104. This can drive a loud speaker and has facilities for muting and input of a c.w. sidetone.

For the non 80m bands, the v.f.o. is mixed with a band

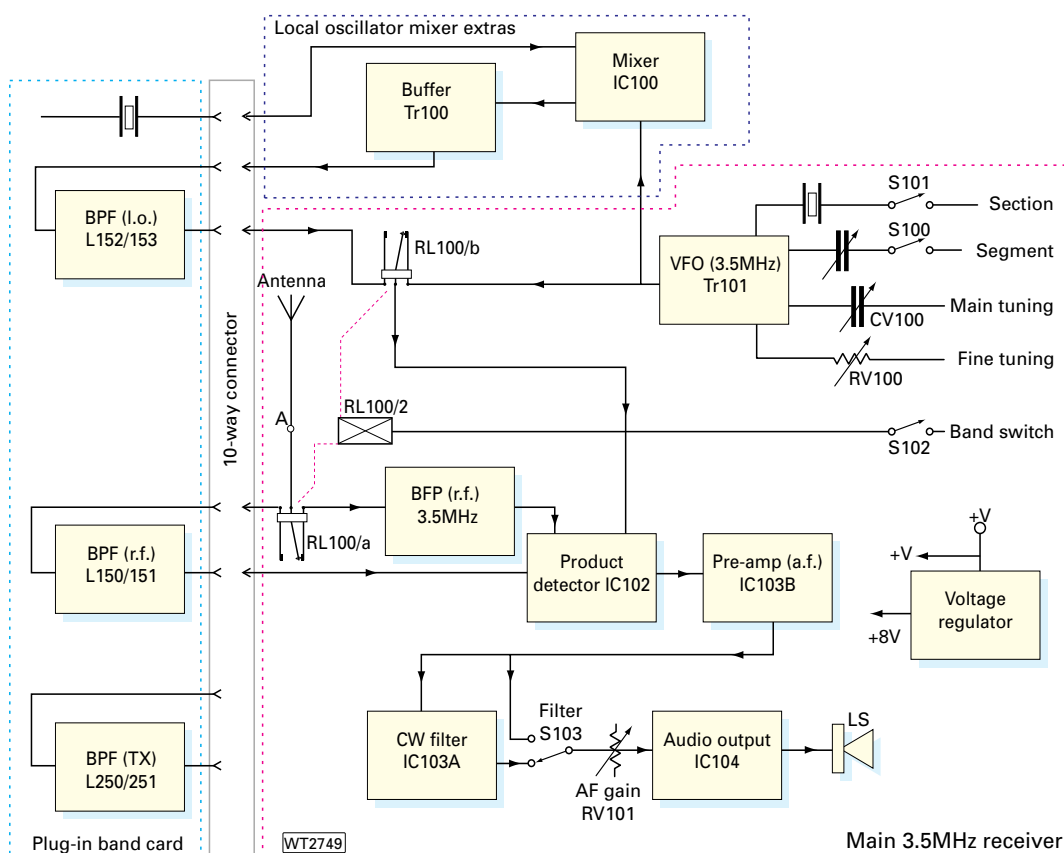
dependent frequency generated in a second SA602 mixer IC100. The controlling crystal X150 for this is mounted on the band card.

On all bands above 3.5MHz the crystal is added to the 80m v.f.o. This is so that the incremental tuning from the bottom band edge is the same as 80m.

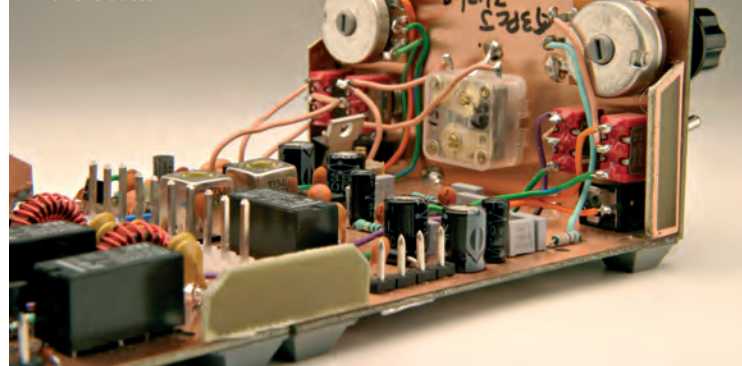
For 160m operation, the v.f.o. is subtracted from 5.5MHz so it tunes backwards – this is dictated by economics I regret! This scheme provides strong birdies (for all traditional bands 10 to 40m) at the bottom band edge – and these provide useful calibration markers!

The output of the i.o. mixer is buffered by Tr100 to feed the double tuned band card i.o. bandpass filter (L152/3 with C153/4/5) which selects the wanted i.o. mixer product. This filter's output is switched over to the product detector by the other contacts of the band relay RL100.

The band card also carries a low



● Fig. 4: Rear panel view of the Sutton.



7MHz Band card details					
L150	TOKO3334	L152	TOKO3334	L250	14t on T50-2
C150	78pF	C153	78pF	C250	400pF HV
C151	4p4	C154	4p4	C251	400pF HV
C152	78pF	C155	78pF	C252	400pF HV
L151	TOKO3334	L153	TOKO3334	C253	400pF HV
X150	3.50MHz			L251	14t on T50-2

● Fig. 2: Block diagram of the project (see text).

Use the 'screwdriver finger hum test' to check the output stage. Put your finger on the shaft of a screwdriver and gingerly apply it to the audio amplifier input, this provides enough 50Hz signal to hear if the

pass filter (L250/1 with C250/1/2/3) for either transmitter (see later articles). **Table 1**, shows the nominal values for the 40m parts. Send an A4 stamped addressed envelope (marked Sutton BC data) to Tex **Swan G1TEX** at the *PW* offices if you need the full data for all bands.

The Assembly

Let's now look at the assembly of the project. Here I recommend fitting all the controls to the small p.c.b. style front panel before starting on the main p.c.b. assembly itself. The sensitive connections to the tuning parts S100, S101, CV100 and CT100 should all be made with short stiff wires to reduce stray capacity and the chance of microphony.

To help, the photograph in **Fig. 4**, shows the general arrangement with its strengthening side braces. As each section is fitted, it is tested before going onto the next - this approach should ensure eventual success!

Start with the supply aspects followed by the output audio stage.

amplifier is working!

The audio pre-amp and c.w. filter are biased from the product detector, so you have to fit these three stages together. If all is well, the d.c. output level of IC103A should be near 6V, allowing you to repeat the screwdriver hum test, this time on C127.

Next measure the d.c. voltages of the product detector IC102; the input pins 1 and 2 should have equal voltages (close to 1.25V, and the output pins 4 and 5 should also be equal at near 6V. Then fit the 3.5MHz r.f. bandpass filter L101/2 and C123/4/5. **Note:** This cannot be tested yet.

The VFO Stage

The v.f.o. stage Tr101 is built next. Set CT100 so that its plates are about half meshed. If the oscillator is working, when you temporally ground the point T, the d.c. voltage across R103 should increase slightly as the working negative bias across D100 is removed.

After fitting the band relay RL100, add a temporary short between pin 5 of the band card and 0 volts to replace the missing

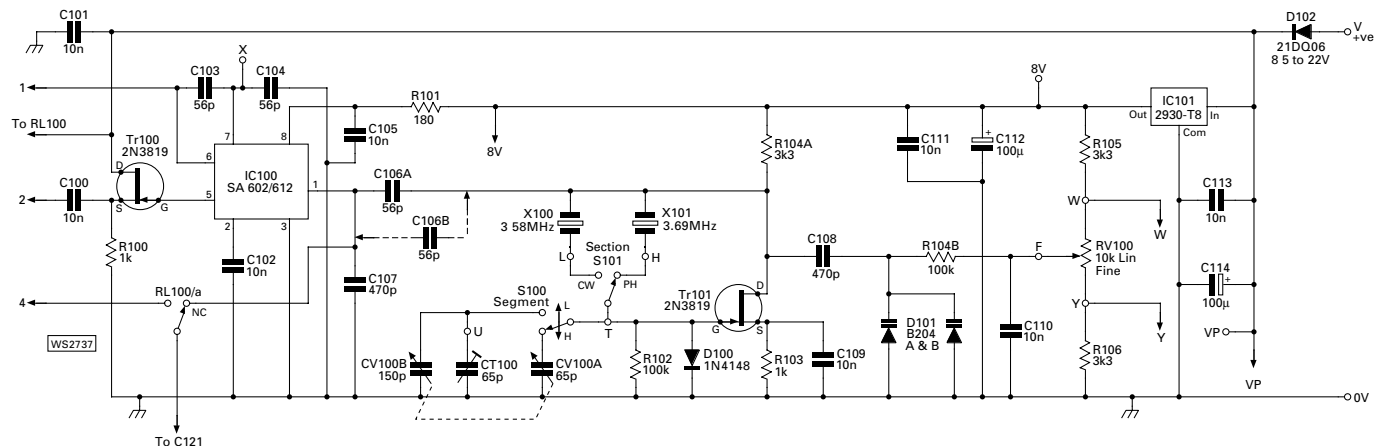
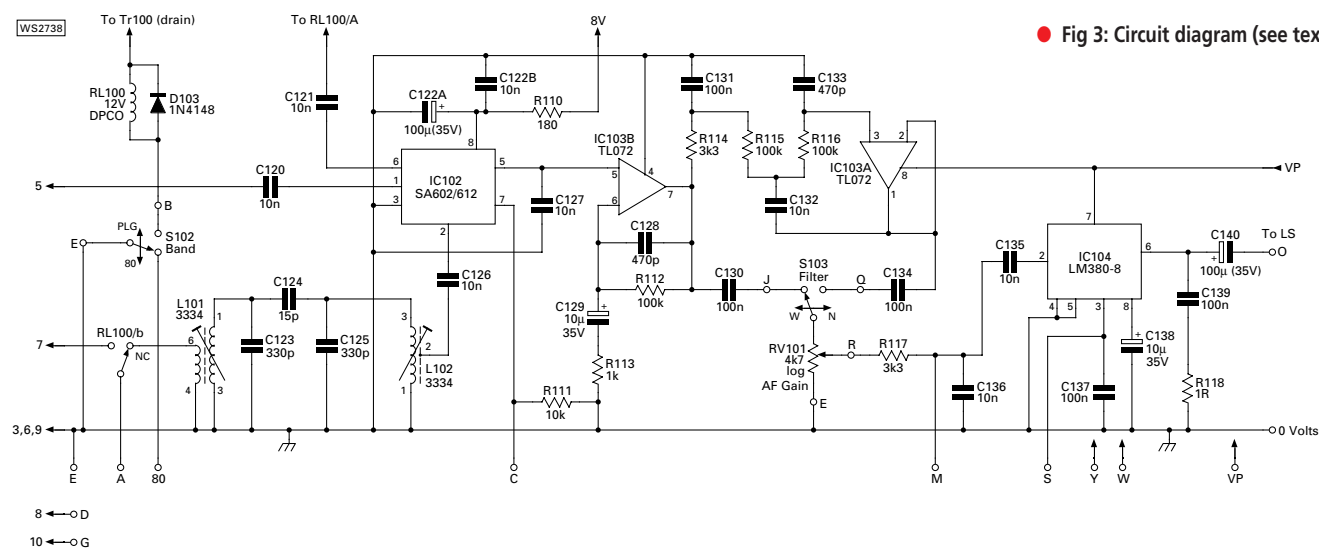
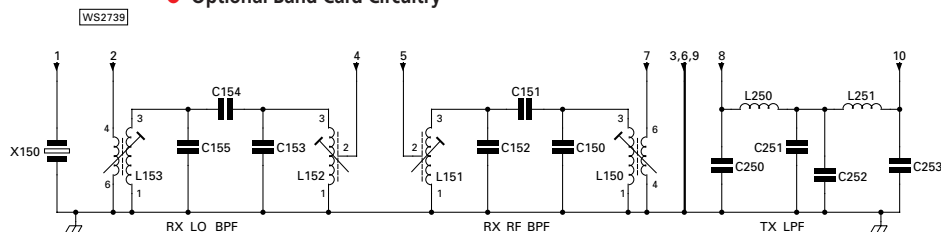


Fig 3: Circuit diagram (see text).



Optional Band Card Circuitry



band card input. You can now see if it works on 80m! Tune in a signal that is steady in amplitude and frequency, either off air or ideally from a signal generator or dip oscillator (with attenuation if there is any chance of overload). Then adjust L101/2 for maximum output.

The wide tolerance on ceramic resonators means that you might need to experiment a little with

trimmer capacitors on the back of the PolyVaricon CV100 and CT100 to obtain the whole of the bottom 200kHz of the band. Usually they will tune up to their marked frequency quite easily with low capacitance, however getting down to the bottom band edge may need extra capacitance and the fitting of the optional C106B.

Access to a frequency counter makes it much easier to adjust the v.f.o. components parts. Connect it via a 'scope type divide by 10 probe to point C (this is a buffered output of the i.o.) signal. Alternatively you can listen for the v.f.o. on another 80m receiver.

Frequency Card

Having got this far, the rest is fairly simple! Start with the easiest which will be your lowest frequency card. (Sort and store the transmitter parts L250/1 and C250-3 for later).

Continue by fitting the TOKO coils for the r.f./i.o. filters and the crystal. The capacitors do need care because the p.c.b. has several holes for each of C150 to 155 (and C250 to C153) – you might just be able to see them, in Fig 5, of a 14MHz (20m) card. This approach allows a single, or two capacitors fitted either in series or in parallel

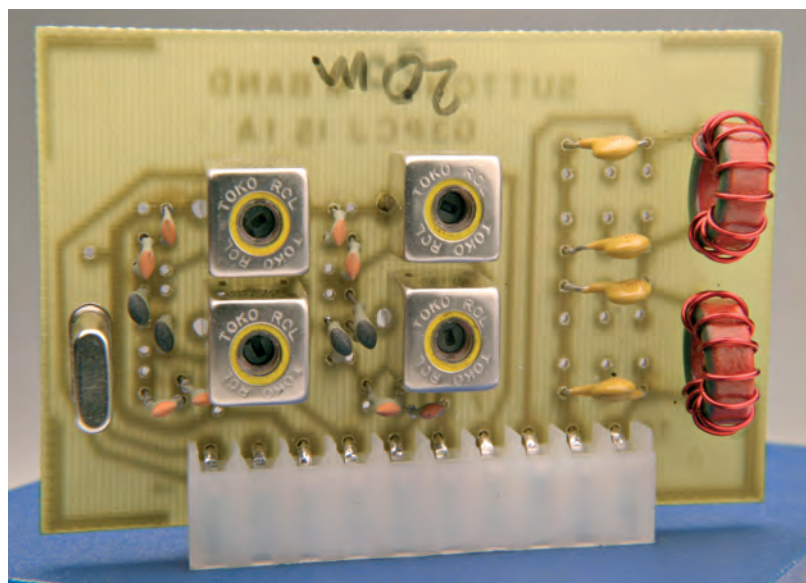
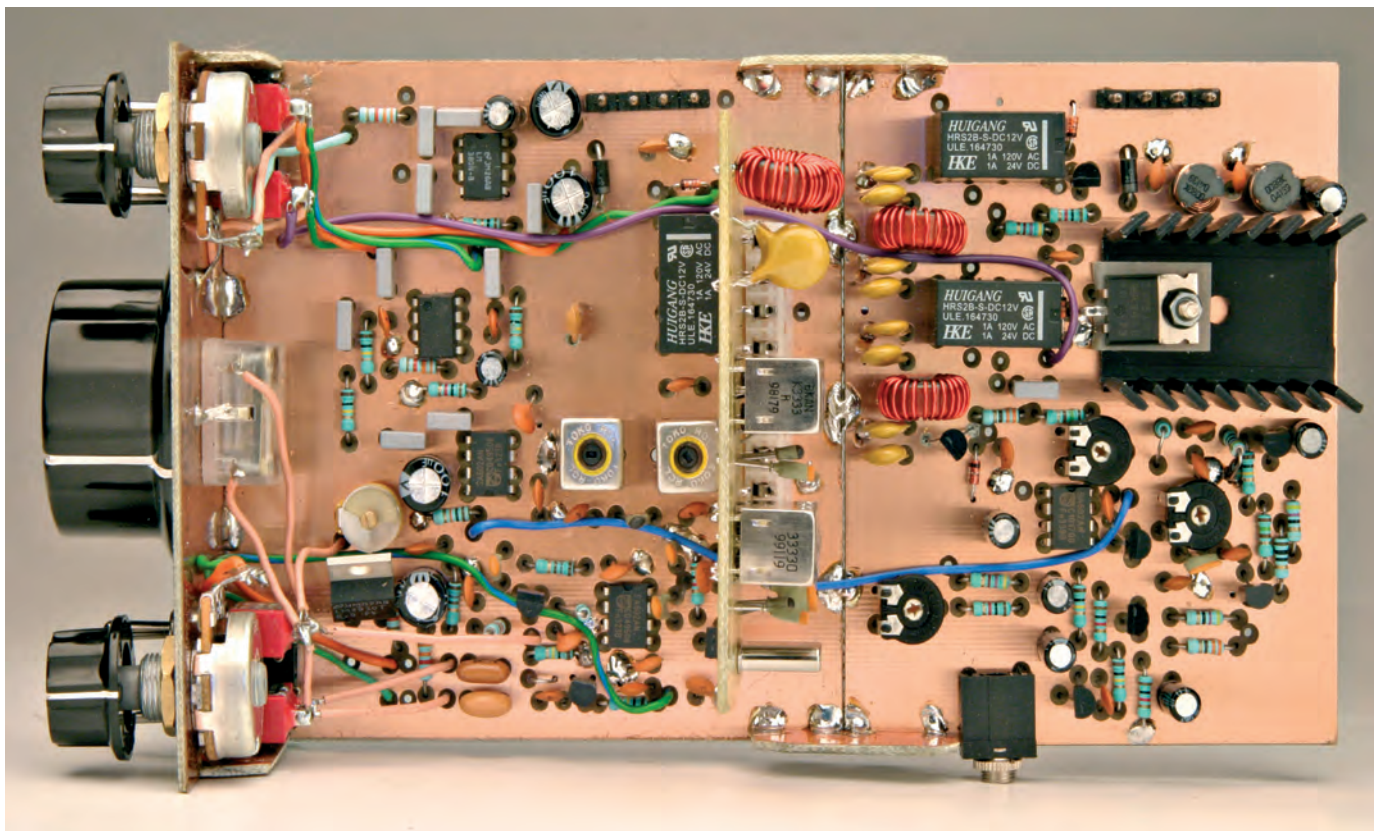


Fig 5: Photograph showing 20m band card (see text).



for each of C150-5, so that a single set of parts will do several bands. When two are fitted in series, use the small isolated linking track, but for a single or two in parallel, they are fitted over the top so as to ignore it. **Note:** If in any doubt, trace out the actual p.c.b. tracks and connections to other items as this often throws up misplaced parts!

Remove the temporary connection to pin 5 of the band card, plug it in with the parts facing backwards. Then check the crystal oscillator is working – with a counter (via divide by 10 probe) on point X or listen for it on a general coverage receiver.

You should then carefully adjust the cores of L152/3 to peak up the i.o. filter, using some form of r.f. voltage indicator, connected initially to pin 4 of the band card. This can be a simple diode r.f. detector (as described in the instructions with the kit) or a 'scope, etc.

Having found the correct i.o. mixer product, transfer the instrument to point C to reduce the capacitive loading on L152 before final tweaking. Check the i.o. frequency is correct because it may be just possible to obtain the wrong output. Having set the LO filter, tune in a steady signal and adjust the cores of L150/1 for maximum output. Repeat for other bands! The completed receiver with band card installed as shown in **Fig. 6**.

On The Air

You'll now be ready to test the receiver. And by all means start off with a random wire for the antenna, but a proper design with an antenna matching unit (a.m.u.) is worthwhile and will be needed for serious transmitter operation.

The general advice is get out lots of wire as high as possible, in a balanced scheme where the two arms of the antenna have equal length. With a good a.m.u. and sensible earthing you are unlikely to have hum problems. The rig has reasonable precautions against broadcast interference (b.c.i.), but slight detuning of the r.f. filter away from the offending source, will remove that problem, while

hardly altering the wanted signal.

For receiving 'phone signals, set the audio filter to **Wide** and S101 to **PH** (to use the 3.69MHz resonator, except for 160m) and then adjust the main tuning CV100 till the signal sounds nearly normal, making small adjustments with the **Fine** control RV100 for the best clarity.

For c.w., use either setting of S103 for tuning around, and Narrow for the least interference from other signals. Without a transmitter you can use both tuning controls as for 'phone, but for each station there will be two settings that produce a suitable beat note. You should choose which ever has least interference from unwanted stations. The RIT aspects will be explained later.

Next month I will describe the Mallet c.w. transmitter with the possibilities for amplitude modulation (a.m.). Enjoy spotting those Somerset villages on the map!

PW

● **Fig. 6: Completed Sutton receiver and band card.** **Note:** One of the additional transmitter units is attached to the rear of the receiver project. (See text).

Buying Your Sutton Kit

Kits for the Sutton project are available directly from Walford Electronics. They include all parts, including a drilled p.c.b. front panel, to build the project 'open' style as shown in the magazine article's accompanying photographs.

Prices are: Sutton 80m receiver £49

Optional band cards (any of 10, 15, 20, 40, or 160m) £15 each

Mallet 1.5W c.w. transmitter £35.

Extras for amplitude modulation (a.m.) £20.

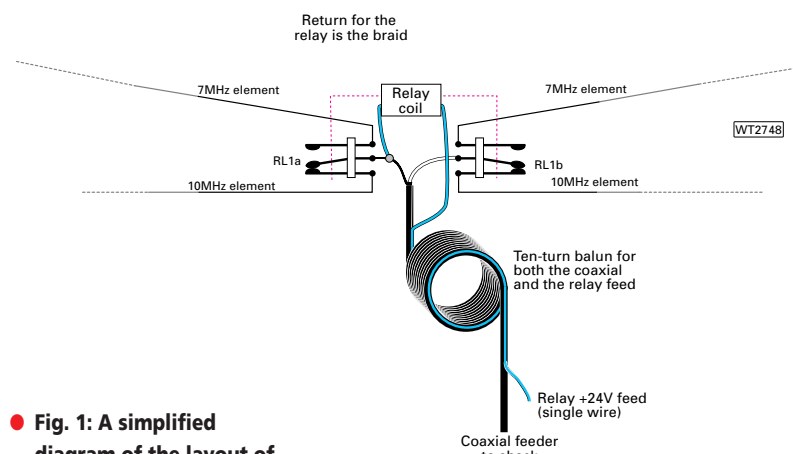
Montis double sideband (d.s.b.) phone 1.5W transmitter £35.

Special offer on P&P: If either transmitter is ordered with the receiver, there will be no P&P charge, otherwise P&P is £2 extra. Please send your orders with a cheque direct to; **Walford Electronics, Upton Bridge Farm, Long Sutton, Langport, Somerset TA10 9NJ**. Further information is available at www.users.globalnet.co.uk/~walfor

Two band dipole system

Coming back into the hobby again after some time, Pete Miller G4AAW, decided to spend no more than he had to on antennas. See what he achieved for his money!

- The h.f. antenna described here has low visual impact. Contrast the wire elements and 10-turn balun feeding both r.f. and relay, with the hi-gain Yagi antenna for higher bands.



- Fig. 1: A simplified diagram of the layout of the two-band antenna. See text for more detail.

After a house move and rest from the hobby of two years, I got the urge to 'work the world' again. My new location is somewhat cramped from an antenna point of view, so various compact systems were considered.

I've never spent much time on 7MHz and, until recently, didn't have any equipment or antennas for 10MHz. After some consideration, I decided dipoles might be a simple solution and wanted to use the same support for each, but use only one feeder. So, after looking through various articles on the subject, I'd highlighted a couple of possibilities.

I should explain fairly early on in this piece, that I very much dislike spending money. Recently, my wife asked if she could have a new dishcloth to use in the sink. I exclaimed, "I'm not made of money, woman, tear up some old towels"!

A trapped dipole was considered and this could have been the ideal solution. But the lack of a grid dip oscillator (g.d.o.) or an antenna analyser meant setting them up accurately could present some difficulty.

Moving on - as mentioned before, two feeders also seemed an unnecessary expense. An experiment, connecting both dipoles to the same feeder, was tried, but neither antenna seemed to work at all well, probably because each detuned the other! A third option would be to either use separate feeders or use some form of switching on a single feeder. See previous paragraph! The final arrangement is depicted in Fig. 1.

Slightly Detuned

The system that I constructed has the 10MHz dipole under the 7MHz one. Each will be slightly de-tuned by its neighbour. In practice the 10MHz antenna had to be pruned to achieve a good v.s.w.r. when positioned so close to the 7MHz dipole. Instead of the more usual 1:1 balun to couple the feeder to the antenna, a 'choke' balun was used. This was made by coiling 10 turns of the coaxial feeder to a diameter of 300mm.

Omitting the coiled balun, causes the flow of significant amounts of r.f. along the outer conductor of the coaxial cable. Unpredictable results would therefore occur at the transmitter when monitoring the v.s.w.r. There's also the possibility that, r.f. burns could 'wake up' the user when grabbing metallic parts of the rig during transmission!

The switching relay that I used, happened to be a 24V type, which had reasonable contact spacing. The advantage of this as opposed to a 12V type, is that there is less voltage loss between the relay coil and the control box at the operating position. This loss is, of course, due to the lower current drawn by a 24V relay, when compared to a 12V type. Obviously, any relay with two sets of change over contacts would do. However, if the power fed to the antenna is likely to be 100W or above, fairly wide-spaced contacts will avoid possible arcing.

Maximum Power

The contacts on the relay I chose, are rated at 10A and the spacing about 2mm. This seems to be sufficient, as the maximum power derived from my rig is never more than

Shopping list

Semiconductors

1N4002	2	D1, 2 or any power diode rated at 100V p.i.v. 1A
C24V	1	D3 a 24V 500mW zener diode
TIP31c	2	Tr1 Or any similar <i>n</i> pn power transistor

Capacitors

Disc ceramic 50V

1nF	1	C3
-----	---	----

Electrolytic 63V working

4700µF	2	C1, 2
--------	---	-------

Resistors 1W

1kΩ	1	R1
-----	---	----

Miscellaneous: one small r.f. (500µ-2mH) choke, a 24V dual-pole changeover relay with widely spaced (2+mm) contacts capable of carrying 10A or more, a suitable waterproof box. Single core flexible 1A connecting wire.



100W. Having selected a suitable type of relay, it was fixed into a watertight box, at the top of the mast supporting the dipoles. Any small plastic box will do. In keeping with the rest of the project, mine happened to an enclosure from a redundant power supply unit.

A switchable 24V supply was constructed to feed the relay. This comprised a scrap 12V mains adapter with a voltage-doubler circuit used on the output winding of its transformer. There are many manufacturers making these adapters to supply low power low voltage to small pieces of equipment so, you're bound to find a suitable one.

Such adapters can often be found at rallies cheaply, perhaps even your own dustbin after the equipment that the p.s.u. was designed for has failed. The adapter I used gave about 30V off-load after the doubler circuit. This, originally, was the supply to a 24V three terminal regulator i.c. The supply unit worked fine giving what looked a rock solid supply. This supply was then fed to the relay at the top of the mast.

Into Play

The arrangement I have brings the 10MHz dipole into play when the relay is energised. I noticed that after about 15 to 20 minutes of use, a background hash and noise would appear across the whole of the 10MHz band. At first, I thought that it was pure coincidence and the hash was being produced by a well meaning neighbour switching on some household appliance or other.

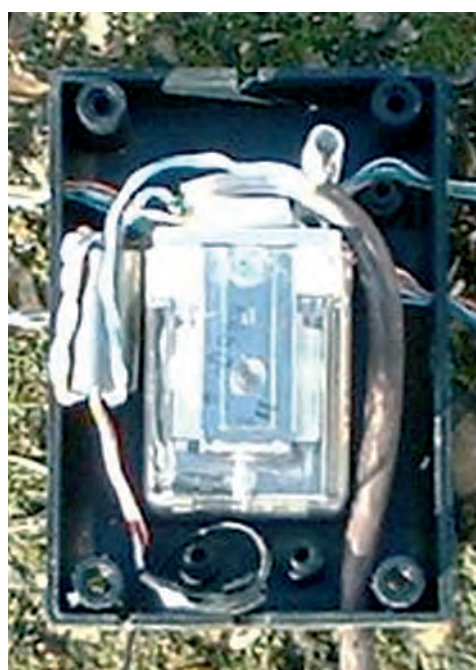
Then, when listening on 10MHz, but with the 7MHz antenna, I noticed that switching off the supply to the relay had eliminated this hash! The answer to the noise was in the regulator. Looking at the specification of a typical 24V regulator, I then noted that the quoted average noise output is in the order of 50µV. Small wonder that such an awful noise should appear and swamp the signals at the receiver.

Anyhow, I resolved the noise issue, by using an alternative regulator circuit. This comprised a zener diode 'wrapped' around a pass transistor as shown in figure two. The current drawn by the relay was 50mA, and all components in the supply were deliberately overspecified to avoid failures.

Voltage Doubler

The components, C1, C2, D1 and D2 form the voltage doubler. Transistor Tr1, zener regulator diode, D3 and R1 form the voltage regulator. The purpose of the radio frequency choke, RFC, and C3 is to filter out r.f. coming down the supply wire during transmission.

With the 24V zener diode listed, the output from the circuit will be about 23.5V. This was found to be sufficient to operate a 24V relay. If a 12V relay is used, the supply may be constructed using a 12 or 13V zener. Also D2 and



● Fig. 2 (above): As the relay's supply requirements are low, a simple 'wall-wart' supply is all that's needed.

● Fig. 3 (left): At the feed-point of the antenna elements, all contained within a waterproof container.

C2 would be omitted and the notional 0V connection from the transformer, should now be connected to the negative point of C1 and the 0V DC point in the circuit.

Transistor Tr1 can be any *n*pn transistor with a current handling capacity of 1A or above. The choke, RFC, may be constructed using a small ferrite ring, say 30mm diameter, and winding 12 to 15 turns of thin insulated wire on it. The ends can be pulled tight and secured with glue.

Standard Formula

The standard formula of 71.33 divided by the frequency in use may be used to determine the length, in metres, of each dipole arm. However, it should be borne in mind that owing to the close proximity of each dipole, the final length will be obtained by adjusting the length of each end and checking v.s.w.r. In my example, I cut the 7MHz antenna first and then added and trimmed the 10MHz version.

The results are very encouraging, even with a mast of only 5m in height. During the last year or so, I've worked 140 countries on 7MHz. Also, as an experiment, I trimmed the 10MHz dipole to resonate on the 18MHz band, taking the advantage of an up-turn in conditions on that band during the summer months.

PW

The Oscilloscope

Gordon King G4VFV continues with his look at the theory and practices of the Oscilloscope.

We have already discovered that when the Y attenuator is set to, say, 1mV/div and a sinewave of 5mV peak-to-peak (p-p) is applied to the input, the overall amplitude of the display, between the positive and negative peaks, would correspond pretty closely to five vertical divisions on the graticule. However, this calibration will only hold true within a given frequency range, which brings us to two important relationships of the Y amplifier; namely, bandwidth and rise time.

Because the Y channel (or channels) can be switched to respond right down to d.c., 'scope bandwidth is essentially the frequency range to a defined upper frequency limit, which is commonly the frequency where the response roll-off is 0.707 times its mid-band value, known as the -3dB bandwidth. If this upper frequency limit is, say, 10MHz, and the Y input control is set to 1mV/div as before, then the overall amplitude of a 10MHz display would be a shade over three and half vertical divisions with a 5mV p-p input, instead of five vertical divisions obtained at lower frequencies.

Rise Time

For the measurement and examination of pulse and transient-type signals, a 'scope must be capable of displaying fast-rising waveforms with the least distortion, which means that the rise time of the Y amplifier or amplifiers must be shorter than that of the input signal itself. So, what is rise time? Well, it's nothing more involved than the time it takes an amplifier or a network to respond to a fast-rising signal, such as the leading edge of a pulse or squarewave. By definition it is the time taken for a waveform to rise between two points on its leading edge, which correspond respectively to 10 and 90% of its peak amplitude, as shown in Fig. 1.

Because of the relationship between bandwidth and rise time, knowing one makes it possible to obtain a fair approximation of the other. For

example, bandwidth is given by $k/\text{rise time}$, and rise time by $k/\text{bandwidth}$. When the bandwidth is in MegaHertz (MHz) and the rise time in microseconds, the value for k could range between 0.3 and 0.5, depending on how the terminal frequency is determined, the characteristics of the response and the nature of the upper-frequency roll-off.

However, when the terminal frequency refers to the -3dB bandwidth, which is a common definition, the value for k is generally taken as 0.35. Based on this value, therefore, a bandwidth of 10MHz relates to a rise time of 0.035 microsecond (35 nanoseconds). Similarly, a rise time of 0.1 microsecond (100 nanoseconds) relates to a bandwidth of 3.5MHz.

The display shown in Fig. 2 represents the leading edge of a rectangular or square wave as it

may appear on the screen of a 'scope. With the timebase sweeping at the rate of 0.1 microsecond per horizontal division, a fair assessment of the time taken by the signal to rise from 10 to 90% of its maximum value can be calculated from the

graticule. This is shown to be around 0.3 μ s, corresponding to a -3dB bandwidth of about 1.16MHz.

What is Rise Time?

Answer: It's the time taken for a waveform to rise between two points on its leading edge, which correspond respectively to 10 and 90% of its peak amplitude.

Expanding X Deflection

Most of the 'scopes obtainable from rallies and similar places will almost certainly be equipped with a switch for expanding the X deflection, usually by a factor of 10. Times 10 x expansion can be very useful when assessing fast rise times.

For example, if the timebase is set for a sweep of 0.5 μ s/div, which could be the 'scope's maximum setting, switching in the times 10 x expansion will decrease the sweep time to 0.05 μ s/div, making it much easier to read off rise times against the graticule, and to examine the detail of fast occurring pulses. Indeed, the rise time displayed in Fig. 2 could well have been obtained with the timebase set to 1 μ s/div and the times 10 x expansion activated.

The expansion, of course, also has the effect of

X Deflection Expansion
Times 10 x expansion can be very useful when assessing fast rise times. Many 'scopes are equipped with switch for expanding the X deflection.

Part 5 -

Bandwidth, Rise Time, Square Waves and Ancillaries

WT2742

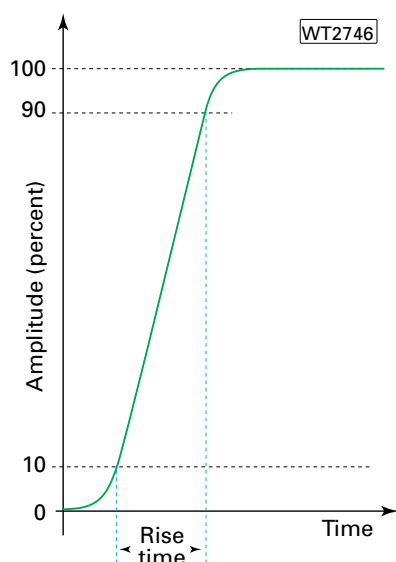


Fig. 1: By definition the rise time is the time taken for a waveform to rise between two points on its leading edge, which correspond respectively to 10 and 90% of its peak amplitude, as this diagram shows.

making the trace that much longer. With times 10 expansion (another common value is times 5) the effect is tantamount to the trace becoming ten times longer than without expansion. This might mean that when the expansion is switched on to the part of the waveform it is required to examine suddenly vanishes outside the range of the screen. This is no problem, though, as it can easily be brought back into the screen area by the horizontal shift control.

Squarewaves

The discussion brings us neatly to squarewaves! A squarewave is composed of a sinewave at the fundamental frequency plus a series of harmonically related sinewaves, and it is the addition of essentially odd harmonics in specific phase relationship and amplitude that endow the waveform with its square shape. Owing to this wideband structure, a squarewave represents a particularly potent test signal when used in conjunction with a 'scope.

Consider now the two off-screen displays at (a) and (b) in Fig. 3. The oscillogram at (a) was obtained with

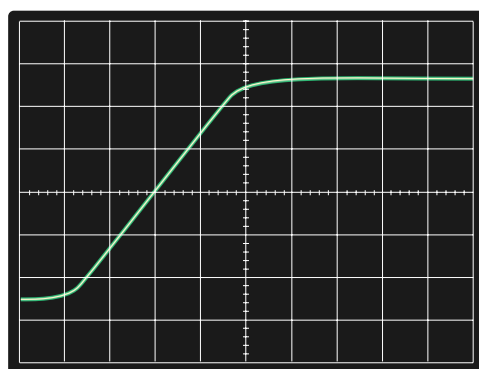


Fig. 2: Rise time of a step wave can be assessed in conjunction with the 'scope's graticule and possibly X expansion. The display shown is the leading edge of a rectangular or square wave, and with a sweep of 0.1 microsecond/div the rise time is seen to be around 0.3μs.

a 'scope connected directly to the output socket of a low distortion sinewave/squarewave oscillator, with the sweep set to 10μs/div.

Since the time taken

by a complete cycle (one half-cycle negative-going and the other positive-going) is shown to be approximately 54μs (54×10^{-6} seconds), the repetition frequency works out to about 18.5kHz ($1/54 \times 10^{-6} = 18.518\text{Hz}$). The sweep is not sufficiently fast on this display to determine the rise time, but by the application of times 10 expansion it was found to be in the order of 0.1μs, corresponding to a -3dB bandwidth of about 3.5MHz.

Since the same timebase sweep of 10μs/div was also used for obtaining oscillogram (b), the time of a complete cycle is shown to be close to 35μs, indicating a repetition

frequency around 28kHz. However, the rounded corners of this waveform point to an impaired high-frequency response, which was in the circuits through which the squarewave was passing (and, indeed, testing) - not in the 'scope's Y

channel. There was no need in this case for X expansion to determine the rise time, which can be seen to be around 3 microseconds, corresponding to a -3dB bandwidth of around 116kHz.

Ancillary Equipment

That more or less puts rise time and bandwidth in their places for now. The next article will continue to keep these themes in perspective; but to conclude this instalment, let's take a look at how the 'scope can be linked to ancillary equipment to provide spectral analysis and frequency response displays.

Squarewaves
A squarewave is composed of a sinewave at the fundamental frequency plus a series of harmonically related sinewaves.

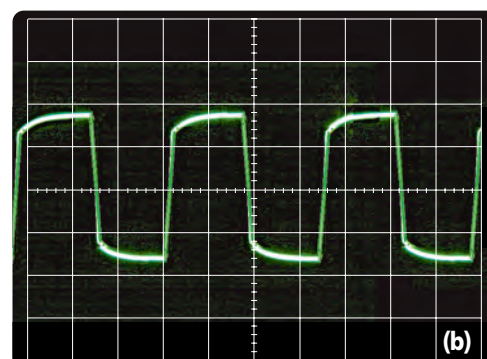


Fig. 3: Oscillogram (a) shows a squarewave taken directly from the output of a low distortion sinewave/squarewave oscillator. With the sweep control set to 10μs/div, a single cycle takes about 54μs, which means that the repetition frequency is close to 18.5kHz and the rise time about 0.1μs, but needing a faster sweep for a realistic assessment. Using the same sweep setting, oscillogram (b) takes about 35μs, putting the repetition frequency around 28kHz; but in this case the rise time is significantly longer at about 3μs.

Fairly recently Kenwood Electronics (in conjunction with Vann Draper Electronics, suppliers of Kenwood test instruments) launched an interesting 1GHz Spectrum Analyser Adaptor Model SAE 1001, which is pictured in Fig. 4 along with the Kenwood Dual-Trace 20MHz Oscilloscope Model CS 4124.

The interesting and useful Kenwood partnership, together with the Model FCE 1131 hand-held frequency counter, was the subject of a review of mine in the July 1997 issue of *Practical Wireless*. If further insight is required into the application potential of 'scopes with X-Y facilities (see Part 4), and an idea of the more advanced tests that become possible when a fairly basic 'scope is linked to ancillary equipment, then this article may be worth another read.

Who knows, one day a bargain spectrum analyser adaptor might come up at a radio rally to partner a bargain 'scope! Spectrum analysers are remarkably expensive instruments in themselves, so hooking such an adaptor onto a 'scope opens up many other channels of interest within the budget of a hobby, while certainly aiding the on-going learning philosophy of Amateur Radio.

This instalment would not really be complete without some

reference, at least, to the way in which the 'scope, again in partnership with ancillary equipment, has been adopted over the years by radio buffs, both professional and amateur, to help with the design, alignment and response tailoring of the r.f., i.f. and filter circuits of radio and television receivers and hi-fi tuners. The basic set-up for plotting the overall response characteristics of a radio receiver, for example, is depicted at (a) in Fig. 5.

The signal from the output of the swept generator is coupled to the input of the receiver under examination, while the d.c. output from the detector is coupled to the d.c. input of the 'scope's Y channel. Let us suppose that the sweep function is de-activated and that the frequency of the input signal is adjusted manually over the receiver's passband. In this case the Y deflection will be seen first to increase to a maximum as the frequency rises up the response curve to the response peak, and then to decrease as the frequency passes down the other side of the curve.

It would be virtually impossible, of course, to determine the precise nature of the response characteristic manually. But when the sweep function is activated the operation becomes entirely automatic, and because the frequency of the r.f. output is continuously swept over the passband in direct synchronism with the 'scope's horizontal X deflection, it follows that the 'scope will display a detailed repetitive image of the receiver's response curve. It is essential to ensure that the 'scope's X and Y levels are carefully set to avoid overloading, which could flatten the response curve, and that the frequency sweep of the generator is set to embrace the full frequency range of the expected response curve.

It's often necessary to identify parts of the curve in terms of actual frequency, and this is where the marker generator comes in. When the signal from this generator is lightly coupled (too tight a coupling causes distortion) a small 'pip' appears on the response curve at the

frequency to which the marker generator is tuned, as shown on the 'scope display in the diagram Fig. 5.

Diagram (b) of Fig. 5 gives more detail showing how the response display is produced from the X and Y inputs and the rising ramp voltage from the 'scope's timebase. It is likely that many of the 'scopes for sale at radio rallies will have a ramp output interface (possibly located at the rear) suitable for driving a swept generator. Although in some cases additional amplification might be necessary, depending on the type of 'scope and swept generator. It's noteworthy that the swept generator is an instrument that was vogue in radio workshops and labs not too long ago boasting the title 'wobbulator'.

When examining the response characteristics of tuned amplifiers, filters, etc. that do not incorporate a detector stage, a simple low-capacitance detector probe allows the 'scope's Y input to be picked up

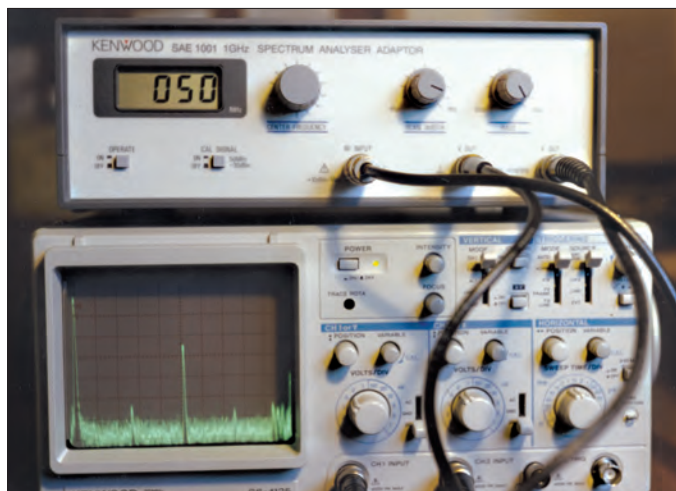


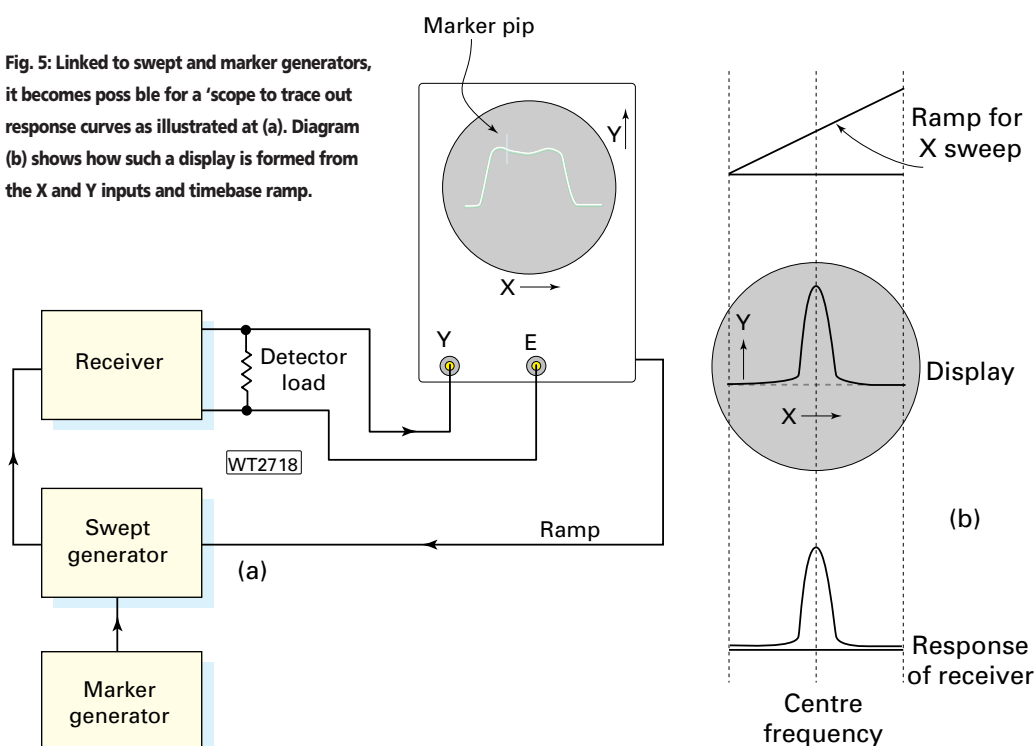
Fig. 4: A Kenwood pair. The SAE 1001 Spectrum Analyser Adaptor working in conjunction with the CS 4125 dual trace 'scope.

from almost any point in a receiver or amplifier, or even at the output of a filter circuit. Some of the early swept generators included a low-capacitance probe as an accessory, while other instruments might have included an inbuilt detector.

That just about ties things up for this instalment. The plan for the final part is to venture more deeply into the practical applications of the 'scope in the workshop and radio

shack, and to discover just what sort of displays are possible from the dual-trace instrument. Until then, keep an eye open for that possible bargain - not forgetting the ancillaries for spectrum analysis and response plotting. **PW**

Fig. 5: Linked to swept and marker generators, it becomes possible for a 'scope to trace out response curves as illustrated at (a). Diagram (b) shows how such a display is formed from the X and Y inputs and timebase ramp.



Errors & Updates

On page 23 of Part 4 (April issue) of my Oscilloscope series in the first paragraph under the subheading Lissajous Figures my 55° was incorrectly printed twice as 5°. You the reader will have undoubtedly already realised the misprint since the 55° is correctly given in Fig. 3 caption. Sorry about this mishap. **G4VFB**

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ECC81	3.00	PL36	3.00	6BR7	4.00	12BY7A	7.00
ECC82	6.00	PL81	2.00	6BR8	4.00	12DW7	15.00
ECC83	4.00	PL504	5.00	6BW6	4.00	12E1	10.00
ECC85	10.00	PL508	4.00	6BW7	3.00	13E1	85.00
ECC88	6.00	PL509/519	10.00	6BX7GT	7.50	572B	30.00
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ECH42	3.50	QOV02-6	12.00	6CD6G	5.00	812A	55.00
ECH81	3.00	QOV03-10	5.00	6CL6	3.00	813	27.50
ECL82	5.00	QOV03-20A	10.00	6CG7	7.50	833A	85.00
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EF40	4.00	UCL82	3.00	6F6G	6.00	5687WB	7.50
EF86	5.00	UCL83	3.00	6FQ7	5.00	5751	8.00
EF91	2.00	UF89	5.00	6GK6	4.00	5763	6.00
EF183/4	2.00	UL41	12.00	6J5G	7.50	5814A	5.00
EL33	20.00	UL84	5.00	6J5M	5.00	5842	12.00
EL34	6.00	UY41	5.00	6J7	5.00	6072A	10.00
EL36	5.00	UY85	2.00	6JE6C	27.50	6080	6.00
EL41	5.00	VR105/30	4.00	6JS6C	27.50	6146B	20.00
EL84	4.00	VR150/30	4.00	6K6GT	4.00	6201	10.00
EL95	2.00	Z759	10.00	6L6G	20.00	6336A	35.00
EL360	15.00	Z803U	15.00	6L6GC	12.50	6550C SVET	20.00
EL509/519	10.00	2D21	3.50	6LWGB	20.00	6883B	15.00
EM34	35.00	3B28	12.00	6Q7	5.00	6922	6.00
EM81/4/7	7.50	4CX250B	45.00	6SA7	5.00	7025	7.50
EN91	5.00	5R4CY	7.50	6SC7	5.00	7027A	25.00
EZ80	5.00	5U4G	15.00	6SG7	5.00	7360	25.00
EZ81	10.00	5U4GB	15.00	6SJ7	5.00	7581A	20.00
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Antenna Workshop

John Heys G3BDQ, brings you yet another use for the ubiquitous Slinky toy. This time it's a 7MHz antenna with the elements helically wound.

Back in the November 2001 and November 2003 issues of *Practical Wireless* you'll find my two articles on antennas featuring the helix coils sold as Slinky toys. The antennas described in those articles were only used indoors so, in the summer of 2004, I decided to make and thoroughly test an externally mounted Slinky dipole for the 7MHz band. It's straight and about half sized at only 10m (approx 33ft) long.

Building and testing the new antenna with these new ideas has proved to be an interesting and useful exercise. Earlier tests had demonstrated that a helix antenna made with the Slinky needed a 'wire' length about 70% greater than that needed for a conventional half wave antenna. A Slinky coil when purchased consists of 87 turns, each being 218mm long (a total length of 18.97m).

I had discovered that the complete Slinky had a half wave resonance slightly below 14MHz, so by using a pair of these coils, you'd then have the basis of a 7MHz half wave dipole. So, I got to work, a dipole was made, fed with good quality double screened 75Ω impedance TV coaxial cable and temporarily erected in the garden, just three to four metres above ground.

Analysers Check

A check with my antenna analyser revealed that the dipole was, as expected, resonant below 7MHz. Instead of the usual 'cut and try' method to bring the antenna up onto the band, I made up a couple of shorting leads, each with 'crocodile' clips at their ends. (Using these I could short-out some of the turns at the end of each dipole leg).

After a few excursions in and out of the house, I'd found that by shorting seven turns at the end of each leg, I'd achieved resonance within the 7MHz band. This condition was made permanent by pulling turns together in a link of three and one of four turns. Each of the bunches was bound with thin copper wire before soldering them with a heavy duty iron (my trusty and long lived 1946 Solon job!).

I found that there was perfect resonance in the middle of the 7MHz band where the s.w.r. (in 75Ω feeder) turned out to have the ideal 1:1 ratio. However, when making up the antenna, you should try to make each dipole leg a mirror image of its partner. The completed antenna, which had a total length (not wire length) of 10m was then hoisted to its operating height of around 12m. The s.w.r. at the lower band edge was 1.1:1 as it was also at 7.1MHz. At 7.2MHz the s.w.r. had risen to only 1.5:1. (This broadband characteristic meant that the antenna could connect straight into the transceiver without an a.t.u.).

I was hoping that the antenna would also show resonance on 21MHz, its third harmonic, but sadly the s.w.r. was close to 3:1 over the whole 21MHz band. Despite the problems, by using an a.t.u. I did have some DX QSOs on this band, but conditions by that time had deteriorated a lot from the sunspot maximum.



Wobbly Slinky

A Slinky just supported at its two ends presents a horrible sight, looking like a very wobbly 'U' shape. The answer to this 'sag' is to use a catenary support line. so, I employed a length of strong nylon cord, which I threaded through the helix coil.

At the antenna centre the catenary cord went through a couple of holes close to the top of the centre dipole connector (see Fig. 1). This connector and the insulators used beyond the dipole ends were made with Polypropylene. This is a whitish plastic material that's lightweight, easily cut, drilled or filed, has superb insulating properties and sheds water like the proverbial 'duck's back'.

The inner ends of the each dipole leg thread through the centre 'T' and connect to the coaxial cable feeder. Before threading the catenary cord, I'd tied large knots at about 1.5m intervals (**Fig. 1**). Close to each knot I employed black cable ties to tightly clamp the Slinky coils to the catenary. This minimises any movements of the coils along the cord and it also helps to relieve any tension at the centre connector or at the antenna ends.

Should the antenna be exposed to sunlight over a long period, it would be best to use two cable ties at each tie point, one on top of the other. Then should the ultra violet (u.v.) light disintegrate the top cable tie, there will remain an almost perfect tie to continue its work.

Black nylon cable ties were also used to clamp the coaxial

feeder to the centre 'T'. You can obtain a good supply of Polypropylene from kitchen cutting boards, to be found at most hardware stores and supermarkets. (Go on, swipe that old kitchen board and treat the XYL to a new one!).

Balanced Devices

Half-wave dipoles are balanced devices, which do not operate correctly when fed by an unbalanced feeder, such as coaxial cable. One solution to overcome the imbalance, is to wind some of the upper section of coaxial cable into a coil. This makes an r.f. choke current balun, but adds considerable weight to the feeder.

Personally, I prefer to use baluns made up from 'clamp on' ferrite cores. These are lightweight, small and impervious to weather conditions. A feeder imbalance can give rise to r.f. radiation from the feeder itself. It can make the antenna's radiation pattern 'squint' and even cause TVI.

I've found that by using a current balun, the antenna's s.w.r.

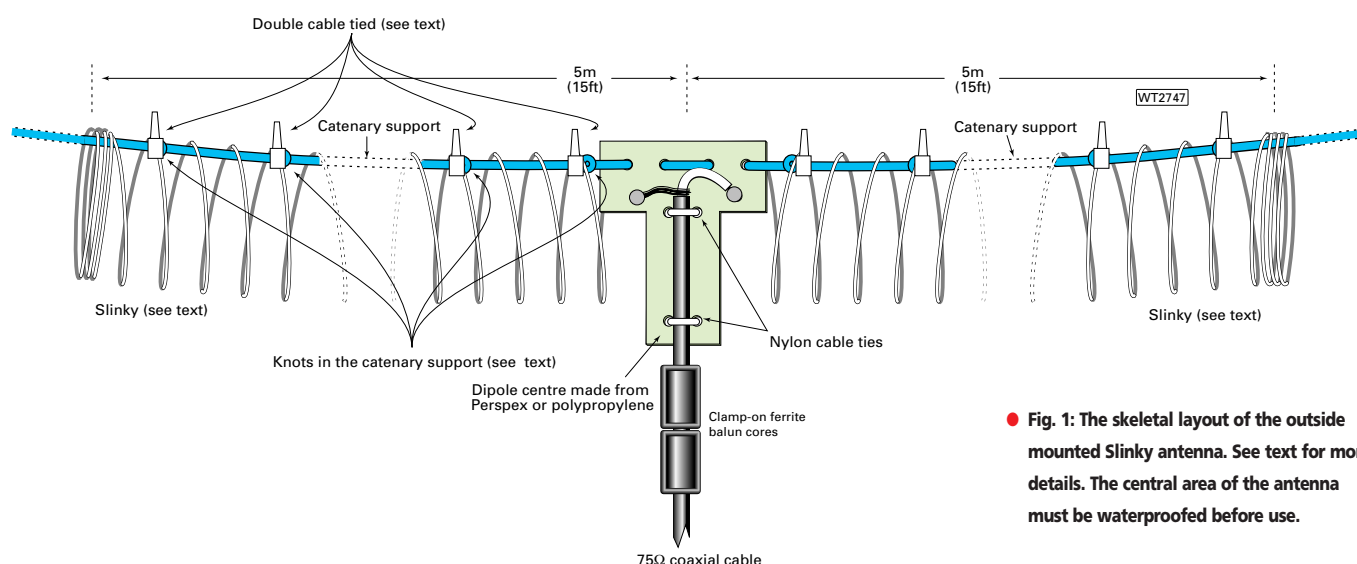
unscratched and intact.

Antennas made with the Slinky helix coils all exhibit a low Q or wide-band characteristic. No doubt this is largely due to the inherent ohmic resistance of the metals used in the helix construction.

On the plus side, though, this wide band characteristic removes the need for an a.t.u. on the 7MHz band. My long wire antenna is always tuned by an a.t.u. and this needs a 'tweak' when moving frequency over the bands. Many Amateurs that I know have a very limited garden area, and for them, dipoles for the 7MHz band and below, must have dropped ends; one or more 'dog-leg' bends, folding back; or lossy loading coils.

This Slinky antenna design should be ideal for those with space problems and if the 75Ω coaxial cable is replaced with open wire or commercial 'ladder-line' of 300 or 450Ω impedance the use of an a.t.u. would allow effective working over a wide range of frequencies, certainly on 7MHz and any h.f. band higher than this.

PW



● Fig. 1: The skeletal layout of the outside mounted Slinky antenna. See text for more details. The central area of the antenna must be waterproofed before use.

is improved. Before the dipole finally goes aloft a thorough weatherproofing of the coaxial cable ends must be carried out. A liberal coating of a silicone rubber plumbing sealant is, I've found, very effective.

Results Compared

One of my antennas is a long wire, around 80m long, that's grounded at its far end. This is used as a kind of standard to compare with other new or experimental antennas. There's provision for instant antenna switching, and to my surprise, I found that the signal strengths in and out when using the short (half normal length) dipole were normally within, plus or minus, an 'S' point of the signal strengths on the long wire. This was of course, when operating on the 7MHz band and when contacting British and other European countries.

The DX contacts I made after nightfall were always easier on the long wire with its inherent design gain and very low angles of radiation. Despite this, I did have QSOs with North America, the Middle East and the Antipodes. There have been several times here on the Sussex coast when the winds have reached gale force, but the Slinky dipole has remained

An Introduction to 'Springy'

In some places it may be difficult to find a shop which sells the Slinky toy, but there is another helix toy named Springy. This closely resembles Slinky and has the following vital statistics: diameter 70mm, number of coil turns is 77, a total conductor length almost 17m (55.6ft).

There is also a Mini-Springy. This has a diameter of 35mm and has 98 turns. Both of the Springy toys have a very shiny surface. This is a thin insulating layer and must be rubbed or filed away before soldering. The antenna I have described will need a short length of wire at each end of the 7MHz dipole if the large Springies are used.

The Springy toys are much cheaper than the original Slinky but can only be purchased by Mail Order. The supplier has a fixed charge for carriage and packing may be found at **Tobar Ltd., St. Margaret, Harleston, Norfolk**, E-mail: tobar@ukonline.co.uk

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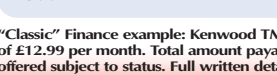
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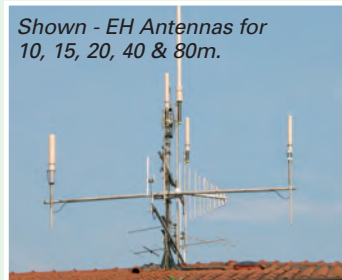
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Radio Basics

This month Rob Mannion G3XFD provides an up-date on the progress of the Radio Basics one inch oscilloscope project. He also discuss some advice from a readers regarding the uses of d.c. to d.c. high tension inverters.



Radio Basics readers have been showing much interest in the projects I've discussed recently. However, as usual, I've run into a problem because the amount of feedback from you all, leading to the inevitable delay. But, by the time this appears everyone who requested more information on the one inch 'scope project and the 70MHz a.m. transmitter-receiver, should have the information sheets.

I'm afraid there's no alternative to the delays because I'm insisting on handling all the enquiries myself. But there's method in my madness as I will then know exactly what interests RB readers. So, I'll be continuing with the system, as I'm sure the benefits outweigh any disadvantages!

Progress on Project

I've been spending much more time in my workshop recently, it's wonderful to have all the facilities again, especially after a day sitting in front of a computer at the *PW* offices. I also enjoy having a soldering iron in my hand, it's really therapeutic!

I've actually been working on two versions of the one inch 'scope project. It'll be useful to have several of the instruments available, and I'm making one version using the special bracket shown in **Fig. 1**, together with another using a chassis fabricated from synthetic resin paper board (SRPB) material, also shown in the same photograph. Incidentally, in this month's Information panel I've provided details on a useful source of the SRPB material and recommend you get some for yourself. It's extremely useful material and I've no doubt readers will remember I've featured it before in RB projects.

The SRPB version of my 'scope will have a base plate of either sheet steel or, SRPB reinforced with an aluminium plate. The sides, which will also incorporate some etched copper track work, will enclose the mains powers supply.

The main difference from the normal 'scope approach is that the miniature cathode ray tube (c.r.t.) will actually be elevated to around the 50° level. (The final angle will be decided on soon, and I'll let readers know what I've chosen).

Having the 'scope's visible screen pointing upwards towards my line of vision will help tremendously in

overcoming the small screen size. On the other hand there will be a definite disadvantage because the ambient light in my workshop (I far prefer overhead bright incandescent bulbs to other forms of lighting) will probably, depending on the level of light, help overcome the relatively low level light output from the 1CP1's screen. Fortunately, in my experiments in the workshop, I've found that the advantages of having the 'scope's screen tilted upwards, far outweigh any disadvantage.

After a few experiments I found that by providing some wrap-around screening, overlapping the end of the c.r.t., the screen trace becomes far more legible. I also discovered - after a bit of a search for something to do the job - that the foam insulation material for the large diameter 28mm copper water pipes is ideal for the job! All you need to do is stretch the insulation over the end of the tube. It worked very well indeed and along with providing screening against over-powering ambient light- it also protects the 'scope tube from possible damage.

Power Supplies

As the 'scope project requires high voltages (as compared to most semiconductor designs) to operate, the main consideration from my point of view has been deciding on the best way to set about providing h.t., in a repeatable style suitable for other constructors. And although I virtually dismissed the idea of using a d.c. to d.c. h.t. inverter (as used in the original Mullard design) I've actually had some interesting discussions with reader **Peter Hemsley** (from Somercotes near Alfreton in North Derbyshire) on the subject.

Peter first E-mailed me on the subject of inverters for generating h.t., and then we had a long chat at the **South Normanton & District Amateur Radio Society's** Junction 28 QRP Rally on March 19. Peter is an electronics enthusiast and also a professional engineer and once he attended the rally he quickly 'caught the bug' I knew that there'll soon be another Radio Amateur on the air in North Derbyshire!

Peter told me that the type of inverter used by Mullard in their original design is correctly known as the push pull forward converter. The actual circuit used is the Royer converter, named after **George Royer**, the original designer. Peter tells me that if it's constructed correctly the inverter will 'fire up' every time. He encourages readers to consider his approach for generating higher voltages for h.t. and says a 'Google' search on the internet will provide many invaluable ideas for the enquiring constructor.

Thanks Peter! I'm sure you'll encourage RB readers to have a go at building a simple inverter.

Mains Transformer

Remembering my own first successful attempts with the 1CP1 project, I made up a standard half-wave rectifier circuit using the Maplin **XP27E transformer**. Then I set about

experimenting with the power supply for the 1CP1 itself.

Despite the fact that I've seen a number of warnings (mostly in published projects) regarding the use of a h.t. supply of less than 300V for the 1CP1 c.r.t. I have not been able to find any definitive warning in the original Mullard product literature. But of course, if any reader can advise me accordingly - I'd like to hear from them as soon as possible so I can pass on the information.

My original 1CP1 project used an unregulated h.t. supply of around 300V. I

employed the old technique of using a large capacity electrolytic capacitor to work in conjunction with a half-wave silicon diode rectifier. This of course effectively 'boosts' the voltage upwards - providing there isn't much load. The voltage boost relies on the capacitor continually charging with each half-wave pulse from the rectifier. It's a useful technique but voltage regulation is obviously not good as the 'boost' effect is lost with increasing current load, because more of the capacitor charge is used by the load before it can be replaced by the pulse from the half-wave rectification.

Incidentally, although I would not recommend that novice constructors play around with rectifiers and high voltage, with large capacitors at 250V, I think it would be a worthwhile exercise to try experimenting with 12V secondary transformers, in conjunction with half-wave rectifiers. You can then observe the results of using the 'ripple' effect safely at lower voltages, and see just how high you can make the voltage rise to, with the half-wave rectifier feeding into the capacitor. Then I suggest you connect a variable resistive load on to the power supply and watch the voltage change

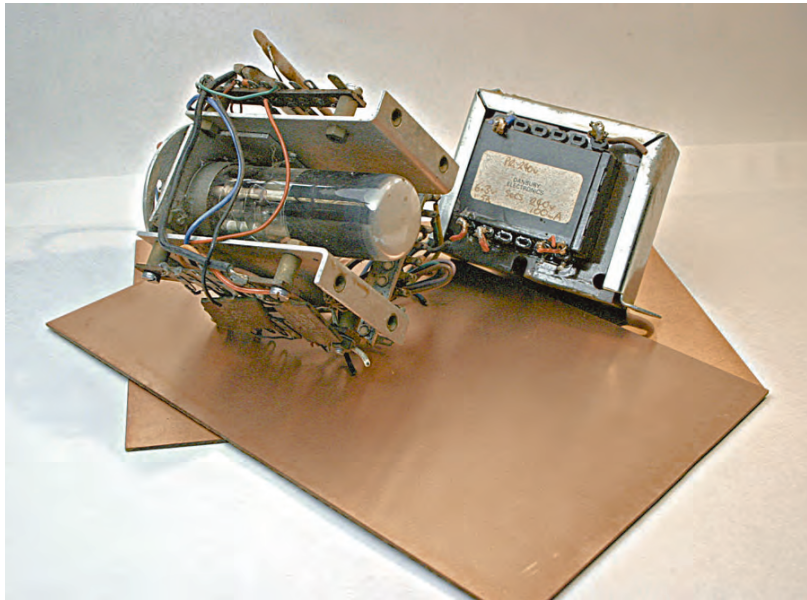


Fig. 1: The assembly holding the 1CP1 oscilloscope tube in the photograph originally held a sub-miniature power amplifier valve from a v.h.f. aircraft transmitter. It's included in this photograph to indicate how the 1CP1 can be mounted to advantage (see text). Fortunately, the one inch 'scope project using the 1CP1 tube does not require much current at high tension, during his experiments on behalf of readers, and towards building his own versions of the instrument, Rob G3XFD has discovered that the Maplin Valve Transformer (Order code XP27E) is suitable. The transformer, with a 240V a.c. input, has one h.t. winding providing 240V a.c. at 100mA (maximum) and another winding providing 6.3V a.c. 1.5A. (see text). Also included in the photograph are sheets of SRPB copper clad board, available from a supplier in Kent (see end panel and text). This material can even be used to make a combined chassis and casing for your project...as Rob mentions in this month's article, reminding readers of earlier Radio Basics projects.

dramatically as the load varies. The lighter the load - the less the voltage drop.

Although the half-wave rectifier method worked well enough with the light current demands of the c.r.t. and I obtained a bright enough trace on the 1CP1 screen - I decided to carry out more experiments. Fortunately, I have a selection of 240V to 350-0-350 full wave transformers available but I fully realise that these are nowadays probably quite rare. Unless of course you are fortunate enough to afford the specialised valved amplifier transformer on offer from Maplins at around £30 or so!

Next time I'm writing on the h.t. supply subject, I'll be discussing the use of voltage doublers and quadrupler circuits to provide the higher h.t. required for the c.r.t. Again, you never get anything for free in physics, because although we can use the technique to raise voltage levels really dramatically - voltage regulation isn't very good! But it's still a workable solution and I'm sure it will help many RB readers take advantage of 250V primary transformers. Cheerio until next time.

PW

Mystery Treasure Parcel Sender Revealed!

Those keen constructors who have been following my occasional series Setting Up Your Workshop, Part 2 Finding those vital bits and pieces April 2005, will have seen my request for help in identifying the sender of a mystery parcel of radio goodies. Following my request for information I'm pleased to say that the mystery has been solved! The sender turns out to be **David Hooker G8IIK**, from New Romney in Kent.

It appears that David sent me the parcel of radio bits and pieces but the covering letter disappeared enroute to me! I'm particularly pleased to have identified him because amongst the extremely interesting and useful material he sent he sent were sheets of synthetic resin paper board (SRPB). This material, see Fig. 1, is extremely useful for the constructor and it can even be used to form a chassis/box for the one inch 'scope project. David sent me a pack of four sheets which he sells for £1. The sheets he sends out will vary in size, but each pack will weigh the same. Please make your requirements known! (David tell me he has large quantities of SRPB - which I consider ideal for RB readers.)

However, I also recommend that readers contact him directly regarding the cost of P&P. He has much to offer, especially on the hardware side, including nuts, bolts, self-tapping screws, etc. The SRPB is a particular good buy for £1 and I recommend it to RB readers.

In the first instance please, for a full list, send a s.a.e. to

D J Hooker G8IIK, Pennywood, Clarke Road, Greatstone, New Romney, Kent TN28 8P, Tel: (01797) 362114.

Verticals-Upon-Sea

Henryk Kotowski SM0JHF shares his experience of antenna performance and selection in the C5Z operation from The Gambia.

The importance of placing your antenna can never be underestimated. Exactly the same specimen of antenna will perform quite differently when moved from one location to another. There are theories and calculations, simulations and algorithms - but all of them are based on observations. I wish to share my observations made in West Africa in October 2003 during the CQ WW 'Phone Contest.

Modest Outfit

I set up my modest outfit, consisting of an Icom IC-706 transceiver, an Icom AH-4 automatic antenna tuner and a length of wire suspended between two palm trees, just outside of Banjul (previously Bathurst) in the small country called The Gambia. The place was just perfect. For 30 years it served as a broadcast medium-wave radio station, far enough from the noisy - and I mean accoustical and electrical noise - town, very close to the waters of the

Gambia river (the river, which gives the Country its name) flowing into the Atlantic Ocean.

A year earlier the medium-wave antenna crashed down during a violent tropical storm and the radio station went off the air. When the owners of Radio Syd asked me to take care of their estate so they could visit their home country of Sweden, I agreed knowing that I could be on the air from there. Previously, having a 2.5kW 909kHz transmitter running 20 hours a day in the same pavilion would not allow being on the air on **any** Amateur Radio band, perhaps with the exception of v.h.f. satellite links.

American Amateurs

Some 10 days later a group of American Amateurs arrived in Banjul. They brought radios, amplifiers and antennas - all in suitcases. There is nothing unusual about radios and amplifiers in suitcases but carrying antennas (for all six bands from 1.8-28MHz) this way is quite novel. Particularly, if you are going on a contest DXpedition with the sole aim of winning it!

The group consisted of nine operators, mostly members of **Southern California Contest Club** and their total Amateur Radio experience amounted to well over 300 years. Unfortunately, in spite of spending a fortnight with them, I did not get to know them well enough to get some background and other personal information.

The first thing the members of the Southern California Contest Club did after arriving at Radio Syd from the airport was getting on the air. In a matter of minutes, the first set of vertical dipoles for the 21MHz band was assembled and attached to the fallen antenna mast of Radio Syd.

In the realm of antenna towers there's sometimes life after death. I was sceptical whether a simple shortened vertical dipole would outperform my 45m long wire hanging at least 15m above the ground. So, the next day, when the 7MHz vertical was pegged temporarily to the lattice tower resting on the ground, I decided to do some comparisons later that night.

All the verticals were temporarily placed close to the building, and some distance from the water, for two reasons. The first being that logistics planning had been made upon the presumption that the coastal erosion, which by the way caused the collapse of the tower by weakening the anchoring points of guy wires, was unchanged since November 2002 when I took some photographs. The pictures showed that this location met the criteria of placing the antennas no more than a quarter of a wavelength from the water.

Two weeks before the group had arrived, a full-scale coast restoration project was started. Suddenly, the house

Phil N6ZZ running the 21MHz band before the contest.



Marty N6VI working on one of the Beverage wires for listening on low bands.



of Radio Syd was 100m away from the water and six lengths of coaxial cable were missing.

The other reason that the verticals were close to the building was that bulldozers were spreading the sand of the newborn beach day and night. Both problems were eventually overcome "with a little help from some friends".

Phil N6ZZ contacted his friend **Juha OH9MM** in Finland to find where the coaxial cables, left by Juha's team a year earlier, were stored. **Art W6XD** became friends with the manager of the coastal operations and the result was that bulldozers were off duty for the contest weekend.

Comparing Antennas

I fed the coaxial cable from the 7MHz vertical to my room. Art W6XD lent me a two-way coaxial switch and in the evening I connected both antennas. There is always a lot of evening activity on 7MHz so I had no difficulty, as usual, in creating a small pile-up in Europe.

The Force12 vertical was in all cases two S units better than my high and long wire in free space. On very weak signals the difference of signal strength and signal-to-noise ratio was even more significant.

Later, when the propagation path to the USA was good, I experienced the same phenomena - the vertical was, in spite of running at least a 100m length of lossy (RG58) cable to it, consistently two S units better. If I were more orderly, I'd probably take notes of my comparisons, register the type of antenna and its installation on the other end in each QSO. But I am not systemised!

I know my resonant, single-band, Force12 vertical is superior to my random wire. But my random wire is superior on WARC bands because the single-band verticals do not resonate at all on other bands. Coming to this positive deduction, I spent most of my air time on 24, 18 and 10MHz during my remaining stay in The Gambia, using my callsign **C56JHF**.

The contest team used a much shorter callsign C5Z and rigged up six operating positions. Being in a 'phone contest, it was quite appropriate to use the real sound-proof studios of Radio Syd. The antennas were all very close to the sea, as recommended by the manufacturer and other Amateur Radio operators who had tested this approach.

In spite of a power-line surge, that damaged most of the mains connected equipment, and a gale, after sunset, that knocked out every antenna, the contest activity started on time. Forty-eight hours later and with more than 14,000 QSOs in the log, the team was pretty much exhausted. According to the preliminary results they did win the Multi Multi category.

Final Comments

When taking part in a contest pertinent selection of the antenna and its location is crucial. Even relatively simple antennas can work efficiently thus saving cost and labour.

Moving the operation closer to the Equator is a wise decision, particularly at sunspot minimum. Being the only station on the air in the contest from a country or zone is another advantage. But most of all, selecting the team of experienced and purposeful people who really want to make an effort and do it for sheer pleasure.

For the record, the C5Z team consisted of **Dick N6AA** (The Guru), **John AB6BH**, **John K6AM**, **Terry K6JL**, **Larry**



The old Radio Syd antenna tower serves as temporary support for Force12 verticals.



Most evenings were calm and scenic but not the one when the contest commenced!



Larry K5OT running 10 meter band from Studio B of Radio Syd.



Art W6XD on 7MHz.



The final picture after the contest, Mary Ellen the XYL of Art W6XD takes the picture, standing between the antenna suitcases on the ground.

K5OT, Jorma OH2KI, Marv N6VI, Art W6XD and Phil N6ZZ (The Liaison). The final score was 14,252 QSOs and 36,466,794 points.

I am sure these guys are going to show up somewhere for the next contest, they are addicted! So, listen out for them on the bands.

PW

Valve & Vintage

This month Ben Nock G4BXD travels (via his collection) to China, France and Russia as he admires the latest additions to the G4BXD 'Kidderminster Kollektion'.

Hello once again - and it's nice to be manning the Valve & Vintage shop as spring bursts forth. Lots to get through this time, it was a busy few weeks at the end of 2004 and many new additions to the G4BXD collection have been delivered.

Chinese, French and Russian sets have arrived this time. They include items you may not see at the local rallies this year.

Chinese Cracker

First arrival is a real 'cracker', a Chinese v.h.f. manpack set, which arrived still in its vacuum-sealed bag, obviously unissued. This Chinese Communist supplied backpack radio was state-of-the-art in the late 1960s and early 1970s when issued to the North Vietnamese Army and the Viet Cong.

The radio is complete and came with a whip antenna, a wire Rhombus type antenna, its handset and some spare parts. It also has the original cover and accessory bag.

The Chinese Type 884 v.h.f. radio, **Fig. 1**, was designed for short range field communication, and could also be used in net conditions in battle field operations. Apparently, the Viet Cong acquired a large number of these radios during the Vietnam War from what I have been able to find out.

Consequently in the 1979 China-Vietnam border conflict,

Fig. 1. The Chinese 884 v.h.f. set. The tuning window is just left of centre, the whip antenna fixes to the top right, with handset at the lower right (see text).



Vietnam had a good stock of these radios. So, both sides were using the same field radio, so friend and foe often heard each others transmissions!

The Type 884 can transmit f.m. voice and even Morse signals by using a built-in simple Morse key, although I still have to find out if this is via a tone m.c.w.) on the f.m. signal or conventional on/off keying of the carrier. The set has a quoted maximum transmitting power of 750mW.

In use, the radio can be powered from a special battery pack or one made up from D-cells. The set operates from 45 to 50MHz; frequency is adjusted by turning an analogue dial, the tuning knob being in the centre of the set as pictured. The dial can even be calibrated using a built-in crystal oscillator, the calibrating spot frequencies being 49.5, 48.5 and 45MHz and are marked on the dial by a special triangular sign.

Calibration is achieved by turning the mode switch to the calibrating position. Then the operator tunes the analogue frequency dial to the marked frequencies and next, by using the screwdriver in the spares kit, adjusts the calibrating screw until zero beat is heard.

I still have lots to find out about this interesting set. Obviously though, it will take a few more trips to my local Chinese take-away before I can get the manual fully translated!

Chinese HF Manpack

Another Chinese arrival here in Kidderminster, and perhaps a little more useful, is the Type 73B h.f. manpack set shown in **Fig. 2**. Again, it arrived complete with covers, microphone, Morse key, headset, whip antenna and straps.

The Type 73B is designed and built for field communication, is apparently a transistor version of Type 71B that served in the Korean War. The prototype was approved for mass production in May 1973 serving in the Vietnam War for Viet Cong troops.

A primary h.f. set, the Type 73B was for use with regiment units. It has a built-in antenna tuner, separate transmitter and receiver tuning and operates on a.m. or c.w. The claimed c.w. power is greater than 2W and greater than 1W on the a.m. mode.

The radio has two ranges for both transmitter and receiver, independently switched by band selection switches. Band 1 covers 1.7 - 3.2MHz and Band 2 covers 3.2 - 6MHz. As in the previously mentioned unit, the analogue frequency dial can be calibrated using a built-in crystal oscillator.

In use, the Type 73B was designed to be powered by two 12V dry-cell batteries in series connection and a 1.5V D-cell for the dial lighting. The original 12V drycell batteries have long been out of production, but the generous space in the battery compartment means alternative batteries can easily be accommodated in a compartment beneath the main set.

Arriving in virtually new condition this set also came with one 44m long wire dipole, a 15m slanting wire antenna and a most extraordinary whip antenna. Also provided were a Morse key, two pairs of headphones (one of them having a push-to-talk [p.t.t.] unit with microphone for a.m. mode), schematics including a p.c.b. layout. It even has both summer and winter protective canvas bags!

The whip antenna is standard in that it is a

multi-sectional push together type common to many manpacks. However, this version has the added bonus of having a centre-loading coil, which is even tapped for use at different frequencies. In addition, the whip comes with a top hat; a petal-like device which fans out. And when it's mounted on top the whip provides a decent capacity hat.

There are two large transistor packages, 2N3055 presentation style, mounted on the top right of the front panel. One is the power amplifier (p.a.) transistor and the other is a spare for field repair. You really have to hand it to these Chinese designers!

First trial with the set one Sunday Morning from G4BXD produced a 5&9 contact on a.m. with **Eddystone User Group (EUG)** founder **Ted Moore G7AIR**. He was operating **GW3EUG** from The Great Orme in North Wales. The power meter in my shack indicated 2W of r.f. going to my long wire antenna and reception of Ted's signal was equally as impressive.

Incidentally, although the set is called a 73B in the notes the plate on the front clearly states 702. Yet another problem to be solved down the local takeaway!

French Connection

Another manpack now but this time it's from France, much nearer to home! The French set in question is made by Thomson is the model THC 471B, shown in **Fig. 3**.

It's a c.w./s.s.b. transceiver capable of operating between 3 and 15MHz using plug-in modules. Operating off 6, 12 or 24V supplies the set will deliver 3W peak envelope power (p.e.p.) into a whip antenna.

The plug-in frequency units can be tuned to any frequency within the whole range but as various links need to be pre-set for different parts of the spectrum then the separation of the two crystal controlled channels is limited. For instance, the operator could not have one channel at 4MHz while the other is at 14MHz. A chart in the manual clearly shows which links need selecting for each part of the range.

The ranges are roughly divided into 3 to 6MHz, 6 to 9MHz, 9 to 12MHz and 12 to 15MHz. The single sideband suppressed carrier (s.s.b.) is generated at 455kHz and then mixed with the crystal oscillator to give the required operating frequency. Upper or lower sideband can be selected by choosing the crystal frequency above or below the operating frequency.

Transmission of c.w. (Morse) is achieved using an audio tone generator to key the modulator. While it's an easy option in practice, the stability of the tone generator leaves a lot to be desired. The whole set has quite a 'cheap' feel to it, the circuitry is quite basic, and the facility of only two channels per module does limit its use in the Amateur Radio role.

Russian Heavyweights

Our local parcel delivery man heaved quite a heavy package, on my doorstep the other day commenting on the weight. I didn't have the heart to tell him there was a bigger one coming later in the week! Sure enough, a couple of days later he turned up puffing and wheezing with the really heavy item, **Fig. 4**.

The P-407, or R-407 as the P in Russian script is equivalent to our R, is a 52 to 60MHz v.h.f. transceiver, operating on

f.m. Despite the weight, not helped by the fact it uses two lead-acid batteries, the set probably only delivers a watt or so into its whip. I use the term transceiver but it may well be a receiver transmitter as there are separate tuning controls. Other than the Russian script operating instructions in the lid at the moment I don't have any technical information on the set.

Most of the controls are self-evident by their actions but there is a strange plug board behind the small door at the lower right of the set that has me baffled. Luckily, the set is working and will just tune into the top of the 50MHz band so, I am looking to try it out when I can find someone suitably equipped and living locally.

Well once again that's all the space I have for now. As always, you can write to me at **62 Cobden Street, Kidderminster, Worcestershire DY11 6RP**, or via my E-mail at **military1944@aol.com**, web pages still at **www.qsl.net/g4bxd**. Cheerio for now.

PW



Fig. 2. The Chinese 73B h.f. manpack set. The receiver tuning is on the left, with the transmitter tuning on the right. Key and headphone sockets are on the lower right. The handset plugs in at the top of the set (see text).



Fig. 3. The Thomson THC471 transceiver with optional plug-in frequency unit on the left. Note the very simple controls (see text).



Fig. 4. The Russian P-407 v.h.f. set, the two glass windows are the tuning scales. The handset connects to the lower right with facilities for telephone line connection lower left (see text).

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Bands 6m/2m/70cm
Gain 2.15/6.2/8.4dB
Power 200W (50W 6m)
Type 1/2, 2x5/8, 4x5/8
Length 2.5m

£69.95

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Bands 80/40/30/20/15/10
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Weight: 12 lbs (5.4 kg)
Impedance: Nom 50 ohms
VSWR: 1.5:1 or less

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5 Bands - 80-10m
Height 7.64m - Weight 7.7kg
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Tonna - 20655
23cms (1296 Mhz) 55
element 21.5 dbi gain "N"
4.64m long



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Tune - Approx SWR Rating of 10:1

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£49.95**

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Improve the TALK
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£57.95**

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with One Big Punch
Speech Compressor
included.

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£229.95**

Replace two filters in
the space of one.
OBF includes the two
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**Collins Mechanical Filters
for the Yaesu FT-817, 857 & 897.**

500 Hz CW - £94.95 2.3kHz SSB - £94.95



This is the option that many, many FT-817 owners have requested. The OBF utilizes Collins Mechanical Filters that are the same as used in the optional Yaesu filters for the FT-817. The bandwidth of the 7-pole CW filter is 500 Hz and the 10-pole SSB filter is 2.3 kHz. The One-Board Filter is NOT available for installation by FT-817 owners. This is not a "do-it-yourself" option. The One-Board Filter must be installed by RADIO WORLD, or a competent engineer. If in doubt please call for details.

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It requires no external
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Walk-
about
PL-259
£47.95**

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(including WARC bands) from 80-6m, 5W
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The Miracle Whip



RX - 0.6 to 460 Mhz
TX - 40,30,20,17,15,12,
10, 6, 2m & 70cm

Power Limits 25W PEP
10W Cont.

£127.95

In Stock*

* The Miracle Whip will transmit on almost any
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** The Miracle Whip is optimized for best
receive rather than lowest swr on 80 and 160,
as no short antenna will present good
transmitting opportunities at these frequencies

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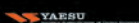
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Practical Way

This month the Rev. George Dobbs G3RJV says he's undertaking a bit of 'Radio doodling'. Discover what he's doodled after reading the appropriate quotation!

"There are three roads to ruin; women, gambling and technicians. The most pleasant is with women, the quickest is with gambling, but the surest is with technicians".

**Georges Pompidou
1911-1974** (French
Politician & former
President)

Fig. 1: George G3RJV based his 'circuit doodles' on the 3.58MHz VXO and the frequency doubler described in February. The VXO is based upon a Colpitts circuit

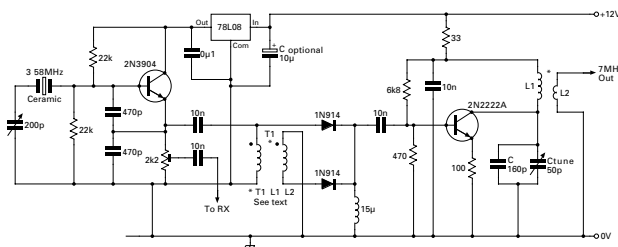


Fig. 2: A power amplifier for a 7MHz transmitter. The driver stage is shown using a 2N2222A device (see text).

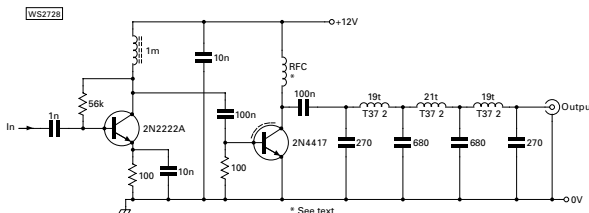
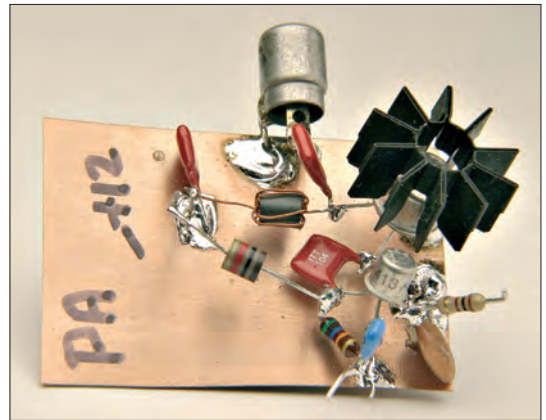
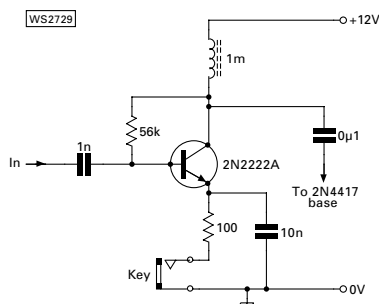


Fig. 3: Keying the transmitter for c.w. operating. The easiest method is to connect the key in the emitter circuit of the driver stage as shown in this diagram (see text).



This little project, a 7MHz VXO transmitter, started off as a 'circuit doodle' on G3RJV's workbench (see text).

Circuit Doodling

Much of what I do in my little workshop area could be described as 'circuit doodling'. This is because I enjoy looking at little circuit ideas, trying them out and investigating their possible applications.

My doodling often makes for a pleasant way to round off a busy day. There's so little in modern life that is under our own control and there are so few opportunities to take a practical task to completion, that a hobby like Amateur Radio, provides a breath of fresh air.

But please don't assume I have a lot of space or very special equipment here in the Vicarage! My actual construction area is only about 24 by 18 inches (600 x 500mm) cleared at the end of my cluttered radio bench.

Over the years I have gathered some useful test equipment but most bought second-hand at radio events and some of it home-made. These days it would be perfectly viable for an amateur constructor to do their work on a large tea tray, which could be packed away at the end of the evening. That could even be a better alternative for me!

Doodling On 7MHz

So, after playing with the circuits featured in the February issue, a week or two later I decided to take the ideas a little further. What follows is a blow-by-blow account of my circuit doodling with the 7MHz transmitter.

The basic VXO worked well and the doubler circuit produced a nice signal on the 7MHz band. However, the power amplifier really required rebuilding to a better design capable of low power output on 7MHz.

The diagram, **Fig. 1**, shows the 80 metre VXO and the frequency doubler described in February. The VXO is based upon a Colpitts circuit. (The variable capacitor allows enough frequency swing on 3.5MHz to cover the whole of the 7MHz band when the signal is doubled).

The frequency doubler is a typical two diode circuit followed by a tuned amplifier on 7MHz. The capacitors (C and Ctune) tune 7MHz with L1, with L2 providing a lower impedance output. The VXO has an additional output for the receiver mixer.

The simple power amplifier described in the February issue produced a useful output but the problem was to provide effective heat sinking for the VN10KM m.o.s.f.e.t. It continued to work even when it became hot enough to melt solder but

that is far from satisfactory! Although resourceful readers may be able to provide effective heat dissipation to the diminutive tab on the device, I worked on a more conventional circuit.

The diagram, **Fig. 2**, shows a useful little power amplifier for a 7MHz transmitter. The driver stage is shown using a 2N2222A device, although any similar silicon *npn* transistor would probably do the job. Possible alternatives would include the 2N3904 and the BC107, BC108, BC109 family. The power amplifier shown here is the 2N4417, similar devices (such as the 2N3866) would also work in the circuit.

The power amplifier, which I built 'ugly' style, runs in Class C so the greater the drive; the greater the output and requires a heat-sink. There is an advantage gained in choosing a 'gainy' transistor for the driver. The radio frequency choke (r.f.c.) in the collector of the power amplifier stage is home-made. It uses 10 turns of small gauge 0.25mm enamelled copper wire (32 or 34s.w.g.) wound through a small ferrite bead.

Low-Pass Filter

The low-pass filter I've used for this month's project is an old friend to *PW* readers of this column. It's a seven element filter based on the work by **W3NQN**. I've used his filter design tables for over 20 years, always with successful results.

The W3NQN design material uses standard value capacitors and allows for the home winding of appropriate inductors for the filter. This is very useful as many filter designs come out with non-standard values of capacitance which have to be contrived with arrangements of parallel, or even series, capacitors.

Regular readers will remember that I keep a set of W3NQN filters; each band is on its own small p.c.b. with phono plugs for input and output. So when I experiment with little transmitter circuits - I have a filter for instant use!

The next task is keying the transmitter for c.w. operating. The easiest method is to connect the key in the emitter circuit of the driver stage as shown in **Fig. 3**.

I lifted the 100Ω resistor in the emitter of the 2N2222A transistor and connected a key. This simple solution worked quite well. Listening to the keyed signal on a nearby receiver tuned to 7MHz, seemed to show that the keying action sounded fine on receive. That's one of the advantages of c.w. operation (the original digital mode). All you need to do is switch the transmitter on and off - but nicely!

The more fastidious constructor might like to add a series keying circuit using an extra transistor as a switch. A circuit to do this is shown in **Fig. 4**. Note that the transistor is a *pnp* type.

A whole variety of *pnp* silicon transistors would work in the Fig. 4 application. The important thing is that they must be able to handle the series current to the power amplifier. The limiting resistor in the base of the *pnp* transistor needs to be in the range 1 to 2.2kΩ. The 47μF capacitor provides some decoupling on the 12V input to the keying circuit.

So, by this time I had a useful little QRP transmitter on the 7MHz band. In fact more than useful because it covers the whole of the band without the need for a variable frequency oscillator (v.f.o.) at 7MHz. Many constructors experience difficulties trying to build a stable variable frequency oscillator. Nor does the transmitter require an expensive, or difficult to find, crystal for the band. The common, cheap, ceramic resonator at 3.58MHz is doubled to produce a stable signal tuneable across the whole band.

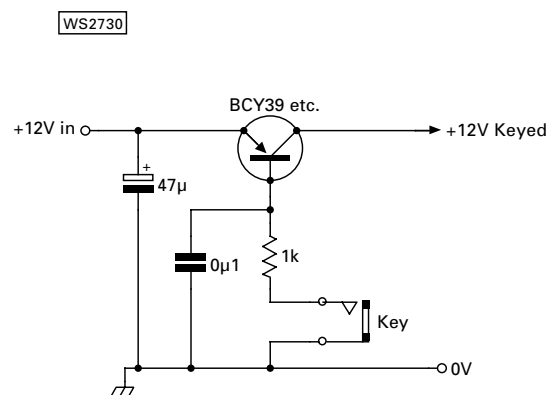


Fig. 4: Illustrating a series keying circuit using an extra transistor as a switch. Note that the transistor is a *pnp* type. A whole variety of *pnp* silicon transistors would work in this application (see text).

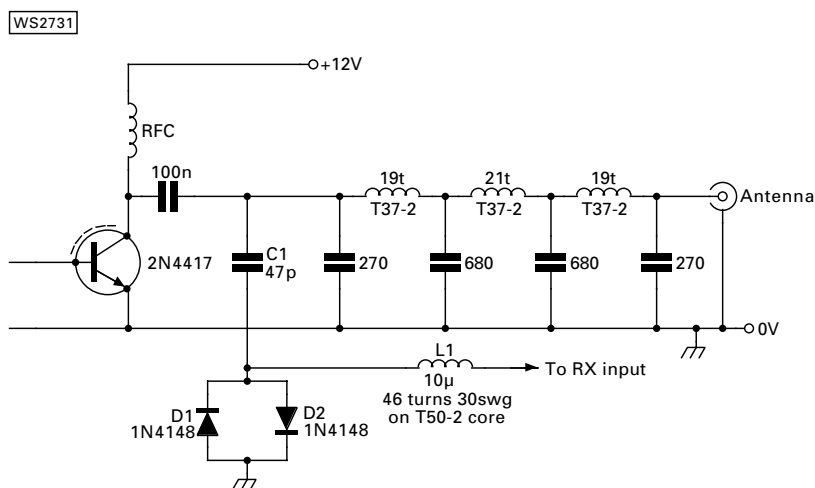


Fig. 5: The circuit shows a common method used to obtain transmit/receive break-in; a rapid change between transmit and receive (see text).

Having built the transmitter, the next stage might be to use it alongside an existing receiver to have some contacts on the 7MHz band. In order to do this some method of changing from transmit to receive is required. A simple physical switch would do the job but these days Radio Amateurs expect a non-physical, electronic, method of changing from transmit to receive. The circuit, **Fig. 5**, shows a common method used to obtain transmit/receive break-in; a rapid change between transmit and receive.

There is a direct r.f. (radio frequency) connection between the transmitter output and the receiver input via the capacitor (C1) and the inductor (L1) at all times. The two back-to-back diodes (D1 and D2) prevent the r.f. signal of more than a level of 700mV reaching the receiver.

The capacitor is connected directly to the output of the power amplifier allowing the low-pass filter to remain in the circuit on transmit and receive. This provides extra filtering on the input of the receiver.

Values for C1 and L1 are appropriate for the 7MHz band with equal inductive and capacitive reactance (450Ω). The ideal calculated value for L1 is 10μH and this can be achieved by winding 46 turns of 0.25mm (30 - 34 s.w.g.) enamelled wire on a T50-2 core. In practice, using a 10μH moulded inductor worked just as well as the home wound inductor.

The outcome is a useful little transmitter for the 7MHz band. A little project, which is well worth taking the time to build it. My next doodle may be to add the sub-harmonic receiver and produce a transceiver!

PW



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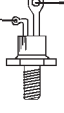
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Alinco DJX3 Handheld Scanner c/w accessories & book	£159
Bearcat UBC120XLT Handheld Scanning Receiver	£90
Bearcat UBC60XLT 80ch. FM Scanning Receiver	£59
Icom R2 Wideband AM/FM/WFM Handheld Scanner	£95
Sony SW7600 Shortwave Radio	£79
Yupiteru MVT9000 MK I Wideband Scanning Receiver	£229
AOR AR5000 +3 HF/VHF/UHF Base Receiver	£1095
Icom PCR100 AM/FM Computer Receiver	£129
Icom R75 0-60MHz Receiver inc PSU	£499
Icom R8500 Wideband All Mode Communications Receiver	£995
Joyear WS0110 Worldspace Radio	£95
Kenwood R5000 HF Receiver All Mode 0-30MHz	£399
Sangean AT3303 Portable Receiver 13 SW bands & FM/MW	£39
Yaesu FRG8800 General Coverage Receiver	£299
Yaesu FRG8800V HF Receiver + VHF Converter	£325
Alinco DX70 10 HF/6m 100w Mobile Transceiver	£399
Icom IC7400 HF/6M/2M100W Transceiver	£1095
Kenwood TS2000 HF/VHF/UHF Transceiver w th DSP & ATU	£1195
Kenwood TS-430S 100W HF T ansceiver	£349
Kenwood TS850SAT 100W HF Transceiver with Auto Tuner	£695
Kenwood TS870SAT 100w DSP HF Transceiver with Auto Tuner	£999
Realistic HTX-10 10m 25w All Mode Mobile	£145
Perstel Bluenote Personal DAB Radio	£59
Alinco DX77E Desktop HF Transceiver - 100w	£399
Amdat ADC60 Frequency Standard Clock	£99
Aor CT8200 CTCSS Card	£55
Dewsbu y S/TUNER Super Tuner	£25
Hei Prose Plus Studio Headphones	£119
Hitachi KH-YG1 Worldspace Yagi Kit	£39
Icom AT160 Coaxial Auto ATU	£179
Icom AT180 Automatic Antenna Tuner (matches 706) HF/6	£245
Icom SM20 Base Microphone	£110
Icom SP21 Speaker	£49
Jim M75 Preamplifier	£49
Kent Paddle Paddle Keyer	£59 95
Kenwood HSS Communications Headphones	£30
MFJ 934 Antenna Tuner & Artificial Ground	£129 95
MML144/40 2M 40W Amplifier & PreAmp	£69
Samlex 1223 20amp Switch Mode Power Supply	£79 95
SGC Mac200 Auto Tuner	£229
Tokyo HL50B 50W Amplifier 3.5-29 & 50MHz (suits FT817)	£215
Trio TL922 HF Amplifier	£895
Vibplex Key Deluxe Chrome Hand Key	£119 95
West Mountain Rigblaster Pro Multimode Terminal Unit	£149
Yaesu FC107C Antenna Tuning Unit	£175
Yaesu FC20 Auto Tuner	£150
Yaesu FC20 Auto Tuner	£199

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WATERS & STANTON

01702 206835

Alinco DR-MQ3X 10m FM Mobile 10W	£159
Alinco DR-610E 2m 70cm Mobile,50/35W Ful Duplex	£249
Icom IC-82 H 2m, 70cm All Mode Base 45/40W 12V	£799
Icom IC-3230H 2m 70cm FM Mobile,45/35W Ful Duplex	£249
AOR AR-7030 0-32MHz All Mode Receiver 12V+ psu	£449
Optoelectronics R-10 30MHz-2GHz FM Nearfield Receiver	£129
Kantronics KAM plus Multimode Dua Por Data Controller + Pactor	£199
Linear Amp UK Explorer 1200 10-160m Linear 10-130W in, 100-1300W out	£995
MFJ MFJ-486 G andmaster II Contest Memory Keyer	£169
MFJ MFJ-784B Tunable DSP Audio Noise Filter	£189
MFJ MFJ-1276 HF/VHF Packet TNC + Precision Tuning & Pactor	£129
SGC Power Clear DSP Audio Noise Filter + 5W amp, Band Pass Filter	£179
Icom IC-M11 VHF Ma ine FM H/held Transceiver 6W + sp mic	£149
Icom IC-2SRE 2m FM H/held t ansceiver + 25-950MHz AM,FM,WFM receiver	£129
Icom IC-2100H 2m FM Mobile transceiver 55W, CTCSS & 113ch	£149
SGC SG-237 1 8-60MHz Microprocessor Controlled 100W ATU	£249
AOR AR-5000 10kHz-2.6GHz All Mode Receiver 1000ch. 12V + psu	£999
LDG AT-11MP 1 8-30MHz automatic ATU 150W + Meter	£169
Yaesu FT-690R II 6m All Mode Portable t ansceiver 2.5W	£249
Welz RS-655 13 8V Variable 6 5A (max) PSU + A/V meter	£39
Icom IC-82 H 2m, 70cm All Mode Base 45/40W 12V	£699
Icom IC-R72 100kHz-30MHz SSB,AM,CW Receiver AC	£399
MFJ MFJ-784B Tunable DSP Audio Noise Filter	£189
Alinco DJ-190T 2m FM H/held t ansceiver + CTCSS	£99
Heil Classic 5 Dual Inset Deluxe Desk Microphone + HC-5	£129
Lowe HF-250 30kHz-30MHz All Mode Receiver 12V + psu	£329
Kenwood TM-451E 70cm FM Mobile 35W + 2m RX, Ful Duplex	£199
Icom IC-R7000 25MHz-2GHz All Mode Receiver 99ch. AC	£399
AOR AR-8200 II 530kHz-2040MHz all mode Receiver 1000ch. Alpha	£249
Icom IC-7400 HF6m,2m All Mode Base + DSP, ATU & Gen Cov. 12V	£949
Icom IC-2100H 2m FM Mobile 55W + CTCSS	£149
Yupiteru MVT-9000MKII 0 5-2039MHz All Mode 1000Ch. + voice inverter	£249
Mirage D-3010 N 70cm 5-45W IN 100W Out	£249
Icom IC-756 HF6m All Mode Base + ATU, DSP & Gen Cov. 12V	£899
Alinco DR-150 2m FM Mobile 50W w/ h Airband RX	£185
Uniden UBC-220XLT 66-956MHz (w th gaps) AM, FM 200Ch	£79
Kamtronics Kam-XL Multi Mode DSP Controller	£269
Yupiteru MVT-7300 521kHz-1320MHz All Mode + 8 33kHz step	£159
Realistic Pro-2036 29-956MHz (w th gaps) AM, FM Desk Scanner 200ch. 12V DC + psu	£149
AOR AR-2002 25-550 800-1300MHz AM,FM,WFM 20Ch. 12V	£149
Kenwood VC-H1 Visual Communicator,Colour LCD , SSTV	£169
Yaesu P-1030A 13 8V 25A Protected PSU w th meters	£139
Yaesu VR-500 100kHz-1300MHz All Mode Receiver 1000Ch Alpha	£169
Yaesu VR-5000 100kHz-2600MHz All Mode Receiver 2000Ch. 12V	£429
Lowe HF-125 30kHz-30MHz All Mode Receiver 12V	£199
Yupiteru MVT-7300 521kHz-1320MHz All Mode + 8 33kHz step	£159
Roberts RC828 Portable Receiver w/ h SSB and Cassette	£125
Icom IC-W2E 2m/70cm FM H/Held	£119
Fai haven RD-500VX 10kHz-1750MHz All Mode Receiver w/ h PC interface, CDROM 12V + psu	£525
Icom IC-756 HF6m All Mode Base + ATU, DSP & Gen Cov. 12V	£899
Allinco DJ-G5 2m/70cm FM + Wide RX, DTMF keypad & CTCSS	£169
JRC NRD-5455 100kHz-1999MHz All Mode Receiver inc. VHF/UHF converter + DSP Audio Filter	£1,099
Kenwood VC-H1 Visual Communicator,Colour LCD , SSTV	£169
SGC QMS-37 3 5-60MHz 100W Mobile Smarttuner System	£349
MFJ MFJ-989C 1 8-30MHz 3kW Roller ATU Balun , Dummy Load	£249
Watson W-20SM 13 8V 20A (max) Switch-Mode PSU	£49
Palstar R-30HF 100kHz-30MHz All Mode Receiver 12V DC	£329
Roberts R-827 Portable 0-30MHz w th FM Stereo & SSB via BFO	£119
Yaesu FT-5 R 2m/70cm FM Dua Display Wide RX 80Ch	£199
Icom IC-735 HF Base T ansceiver + Gen Cov RX 100W 12V	£349
Uniden UBC-3000XLT 25-1300MHz AM,FM 400Ch	£129
Kenwood TS-850S AT HF All Mode Base T ansceiver w th Gen.Cov. RX and ATU 100W, 12V	£649
Ga min Stree Pilot Colour 12Ch. GPS "street map" upg adable system + CD	£399
Icom IC-R20 0.150-1304 999MHz handheld receiver plus usb connection	£249

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REPORTS & INFORMATION BY THE LAST SATURDAY OF EACH MONTH.

From reports received it appears that very little in the way of v.h.f. DX was worked via conventional means during February. Two auroral back-scatter openings were reported on 7 and 16 February, but both were very weak and restricted to stations located in the north of the UK.

A two-hour long 50MHz Sporadic-E opening was reported around 1900UTC on 13 February with contacts being made to stations in Italy and Slovenia. Tropospheric conditions on the 144MHz and higher bands were rather poor with no long distance contacts being reported. All-in-all there was very little DX to talk (or write!) about during February. However, some stations reported world-wide contacts on the 50MHz band with stations in Japan, New Zealand, South Africa and USA.

Other Six Metre operators reported making daily contacts with stations throughout much of Europe. Surprisingly it was a similar situation on the 144MHz band with operators reporting contacts with stations as far away as Australia, Cyprus, Japan, New Zealand and the United States of America.

Similarly another group of UK stations report making daily 144MHz contacts with European stations up to 2000km away. So how did they accomplish these contacts when v.h.f. propagation was so poor? The answer is that they were using WSJT digital modulation techniques.

WSJT COMMUNICATION

Written by **Joe Taylor K1JT** is *WSJT*, a computer program for weak-signal v.h.f. and u.h.f. communication. The most recent version of *WSJT* supports four principal digital operating modes: JT6M, FSK441, JT65 and c.w. JT6M is used for meteor scatter and ionospheric scatter and is optimised for reflections that occur on the 50MHz band. The FSK441 mode is designed for meteor scatter communication on other v.h.f. and u.h.f. bands and uses the very brief reflections from meteor trails.

The JT65 mode is not used for 'intermittent' meteor propagation, but is designed for extremely weak, but slowly varying signals such as those found on troposcatter and Earth-Moon-Earth (e.m.e.) paths. This mode can provide an enhancement

of up to 20dB compared to a very weak c.w. signal.

The c.w. mode is used for automatic e.m.e. contacts using 15w.p.m. Morse code sending in 60, 120 and 150 second sequences. The real advantage of *WSJT* digital modulation is that it can convert inaudible signals into solid copy. This means that you can effectively run much lower power or use a smaller antenna than would normally be acceptable for DX communication.

THIS MONTH DAVID BUTLER G4ASR TAKES A LOOK AT METEOR SCATTER AND MOONBOUNCE CONTACTS USING DIGITAL TECHNIQUES

In addition to these communication modes, *WSJT* offers a measuring mode for testing sun noise and an e.m.e. calculator to help you predict the maximum strength of your own and other stations echoes from the moon. There is also an EME ECHO function, which is used for detecting your own echoes from the Moon.

SYSTEM REQUIREMENTS

So, what equipment do you need to participate in this state-of-the-art communication technique? First and foremost you will require an s.s.b. transceiver and antenna for one of the v.h.f. or u.h.f. bands. Medium power 50-100W will produce good results via meteor scatter (using JT6M or FSK441) especially if coupled with an optimised antenna and low-loss feeder cable.

Many of the latest all-band transceivers are capable of running this power level. Of course an amplifier always helps! Some form of beam antenna is recommended as it's necessary to rotate it towards selected activity areas or even the Moon.

You'll also need a computer using Microsoft *Windows*, a 200MHz or faster processor, 32MB of available memory and a *Windows* compatible soundcard. The software is available free of charge from <http://pulsar.princeton.edu/~joe/K1JT> or from the European mirror site at <http://www.vhfdx.de/wsjt/>

After installation the only hardware you

need are audio connections between the soundcard and s.s.b. transceiver and a computer-to-radio interface to key your p.t.t. line, although it is possible to use VOX facility if you have it on your transceiver. The interface is exactly the same as that often used for the popular PSK31 or SSTV modes.

Short messages, conforming to meteor scatter or moonbounce procedures are then typed into the computer. The computer soundcard then generates various tones in a

format depending on which modulation system is chosen and sends these to the transmitter's microphone socket. Similarly, audio signals from the receiver are applied to the soundcard, detected signals are analysed and the received messages displayed on the PC monitor screen.

CONTACTS WITH WSJT

To show how effective both JT6M and FSK441 machine generated modes are for meteor scatter (m.s.) work, I've picked out some contacts that were reported during February. The reason that I've chosen February is because it's the only month that doesn't contain a major meteor shower and it's also the time of year when the daily count of sporadic meteors are at a minimum.

Traditionally very few m.s. tests were scheduled during February due to the poor reflections, but that's all changed now. Some typical JT6M contacts made on and around 50.230MHz during February include the stations of CT1EKD (Portugal), EH7HG (Spain), HB9QQ (Switzerland), LA1TV (Norway), LX2SM (Luxembourg), OE5MPL (Austria), OH6KTL (Finland), OK1KRY (Czech Republic), OZ3FYN (Denmark), SM7FJE (Sweden), SP6VGJ (Poland) and 9A8A (Croatia).

There's much more m.s. activity on the 2m band with operators using FSK441 on and around 144.370MHz. Here's just a very small selection of stations worked during February. It includes the stations of EA2KP/7 (Spain),

HA5LV (Hungary), IW1BCV (Italy), LA8G (Norway), LZ5UV (Bulgaria), OE3FVU (Austria), OH6JKW (Finland), OK1DFC (Czech Republic), OZ8FR (Denmark), RX1AS (Russia), SM0EPO (Sweden), SP2JYR (Poland), S53J (Slovenia), T98GTH (Bosnia & Herzegovina) and YU7AA (Yugoslavia).

Many stations are now successfully making meteor scatter contacts on 50MHz (JT6M) and 144MHz (FSK441) thanks to the use of the WSJT program. An increasing number of stations are now also making e.m.e. contacts and they're finding that the use of JT65 allows such contacts to be made with relatively low power and a small antenna.

The station of ZS6WB (South Africa) reports that he contacted the station of W5UN (USA) via the Moon on the 144MHz band. What made this contact remarkable was the low power and small antenna used at the South African end of the path. The output power used at ZS6WB was only 50W and the antenna a small 7-element Yagi on a 2.75m boom at a height of 5m above ground. The station of W5UN mentions working the stations of OZ1PIF who was using a Yaesu FT-847 transceiver driving a small amplifier into a single 9-element Yagi, PE1OPK running 80W into a 15-element Yagi and DL1GGT with a 9-element Yagi.

According to the DX Cluster a number of UK stations have recently made JT65 e.m.e. contacts on the 144MHz band and these include the stations of EA6VQ (Balearic Islands), I2FAK (Italy), JF4TGO/8 and JH2COZ (Japan), OK1DFC (Czech Republic), RA0FCA, RU1AA, RA3AQ, RK3FG, RN6BN, RV9JD (Russia), S52LM (Slovenia), YO4FNG (Romania), VK2AWD (Australia), ZL3TY (New Zealand) and 5B8AD (Cyprus).

Although most digital e.m.e. activity is carried out on the 144MHz band there have also been a number of contacts made on the 50MHz band. Making e.m.e. QSOs on this band though has always been difficult due to the high background noise at this frequency and also to the mechanical problems associated with large antenna arrays previously thought necessary. Even if you did run very high power into a big antenna system the received c.w. signals were invariably extremely weak and contacts were always unpredictable. However, that's all now changed with the use of JT65.

Ian Williams M0BCG (Wiltshire IO91) has been experimenting with this mode for some time and reports that he managed to make a 50MHz moonbounce contact in 2004 with the station of W7GJ. Ian used an Icom IC-756 transceiver driving a modified Heathkit SB220 amplifier. The amplifier is run on the lower voltage settings and is provided with additional air cooling. This is necessary because the 100% duty cycle of JT65 (also JT6M and

FSK441) means that amplifiers can get very hot!

An external 20dB gain low-noise preamplifier is located near the antenna as Ian found that this was essential to enable signals to be heard with his 8-element Yagi antenna. No antenna elevation was provided and it was necessary to wait for the Moon to appear within the beamwidth of the horizontally polarised antenna during moonrise or moonset.

Since that initial contact Ian has made significant changes to his antenna system. He has built a 4-Yagi system, each beam consisting of 5-elements on a 6.2m boom, giving a total gain of 15.1dBd. A new tower has been installed, a heavy-duty elevator system constructed and a large H-frame welded together to support the antennas.

In addition to the mechanicals a large amount of cabling has been carried out. A total of 32m of Andrew LDF450 (1/2in heliax), 30m of Andrew LDF550 (7/8in heliax), 27m of RG11A coaxial cable and 12m of Westflex H100 cable has been used for the antenna combining and receive and transmit feeders.

The work took over three months to complete, but on the day it was all finished a large winter gale developed and the system had to endure 100m.p.h. winds overnight. Fortunately, all that suffered was one of the top Yagis which rotated out of line on top of the H-frame. Phew!

Using a JRC JST-245 transceiver, Heathkit SB220 amplifier and low-noise pre-amplifier the 50MHz e.m.e. station of M0BCG made his first QSO using the new antennas with IW5DHN (Italy). This was followed by digital contacts with the stations of W7GJ, W1JJ and K7BV/1 (USA) and ZS6NK (South Africa).

Since 2002 Ian has attempted 10 scheduled contacts with the station of ZL3TY (New Zealand), but has never been able to complete a contact although on one occasion he did receive an 'RO' report. (An RO report means that both call signs and a report has been received.) With his new antenna system up and running, Ian requested another sked with ZL3TY, but that station reported having antenna system problems. Ian then found out that the station of Rod ZL3NW was also active on 50MHz and able to use JT65 modulation.

Rod runs a Trio TS-670 transceiver driving an amplifier consisting of three 4CX250B tetrodes and a 15m long 10-element Yagi. As ZL3NW had previous experience of e.m.e. operation a series of three schedules were set up. Very little was heard of ZL3NW during the



● The impressive 50MHz antennas at the QTH of Ian Williams M0BCG.

first two skeds although the station of M0BCG was heard very well in New Zealand.

During the third schedule on 24 January the receive signals suddenly shot up in strength and lasted long enough for a full QSO to be completed. Working stations in New Zealand is an achievement no matter what band it is carried out on. To achieve it on the 50MHz band is truly remarkable. Congratulations to both stations. Following that remarkable QSO further 50MHz moonbounce contacts have been made by M0BCG with the stations of JH2COZ (Japan) and NL7Z (Alaska, USA).

Kevin Forster NL7Z reports that he is using a Yaesu FT-920 transceiver with a tunable cavity filter and GaAsFet pre-amplifier in the receive line. His amplifier runs 1500W output from a pair of 3CX800 into a pair of 6-element Hygain 66DX Yagis mounted with vertical polarisation. His recent JT65A digital e.m.e. contacts made on the 50MHz band have included the stations of ES6RQ, M0BCG, IW5DHN, OH7PI, SM7BAE, W1JJ, WA4NJP, W7GJ and ZS6NK.

The latest version of WSJT includes a 4dB additional sensitivity for the JT65 modes. This is an amazing improvement and it really works. It brings e.m.e. and meteor scatter operation within the reach of many more stations. If you can run 100W to a good Yagi then you can literally work the world!

DEADLINES

That's it again for another month. Now download the WSJT program and see how far you can work on the v.h.f. and u.h.f. bands. Good luck with your DX contacts and please let me know what you managed to work or hear. Send any reports or news, preferably by E-mail, to reach me by the last weekend of the month.

73 David G4ASR

HF HIGHLIGHTS

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

Geoﬀ Pendrick, a PW reader, was first licensed as **GW6BEI** in 1981 whilst living in Carmarthen, South Wales. A job move back to England meant the callsign changed to **G6BEI** and he operated mainly mobile on v.h.f. and u.h.f. for a number of years.

In 2000 Geoff upgraded his licence and was issued with the new callsign **M5GAC**. Geoff now enjoys operating on all bands and has recently obtained his DXCC and is presently an active member of the Nunsfield House Amateur Radio Group and the Derbyshire Branch of RAYNET. His h.f. station consists of the Icom IC-746 for the h.f. bands together with a trusty Yaesu FT-101ZD, which is mainly used on 7MHz.

Geoff's antenna system at home in Spondon near Derby consists of various wire antennas that include a G5RV, W3DZZ and a Tri-band dipole for 14, 21 and 28MHz, all supported by a Strumtech tower. On the 23 to 31 July Geoff will operate from the Island of Mull EU-008 as **MM5GAC/P** on 7, 14 and 21MHz and looks forward to working as many readers as possible.

THE NUNSFIELD HOUSE ARG

The **Nunsfield House Amateur Radio Group** began over 50 years ago when a number of like-minded individuals who shared an interest in the then 'new' science of radio communication got together and formed the Derby Short Wave Experimental Group. As time moved on and the hobby became more popular the group found room for its meetings in and out building of Nunsfield House and later within the main building itself.

The Nunsfield House Amateur Radio Group was born and for more than 40 years has been the biggest and most successful in Derbyshire! The group caters for a variety of interests runs various courses including the Foundation Licence and encourages all students to progress on towards their Full Licence.

Each year, on the 2nd Sunday in June, the Group organises the now famous Elvaston Castle Radio Rally and also has licensed its own DX Cluster **GB7NHR** or **DXNUN**. This provides DX information to the local area by

Packet Radio and to Amateurs around the world by Internet Telnet Link. Check out their informative website at www.nharg.org.uk/ and the latest rally news at www.elvastonrally.co.uk/

DO YOU NEED A QSL MANAGER?

Do you need the services of a QSL Manager? Well two Amateurs, **Scott Petty KA3QLF** and **Graham Ridgeway M5AAV** have volunteered their services to any operator that needs them. Scott, who can be contacted at petty@teisprint.net says "I have no special requests or conditions, I just

DX NEWS

In Nepal **Stig LA7JO** is Regional Telecoms Officer for the UNICEF Regional Office for South Asia (ROSA) is now operating from Kathmandu as **9N7JO** using s.s.b., c.w. and RTTY. He can be found on all bands from 1.8-21MHz and expects to be in the country for more than a year. QSL direct to **Stig Lindblom, Jum Changphimai, 147/1 Moo 3, Tambon Boot, Ban Ta Bong, Phimai, TH-30110 Nakhon Ratchashima, Thailand.**

The DXpedition to Peter I Island in Antarctica in February had to be cancelled after problems prevented the group from

DO YOU NEED A QSL MANAGER? WELL, CARL GW0VSW HAS NEWS THAT
MAY HELP YOU...

want to lend a QSLing hand to all. Closer to home Graham is already QSL Manager for G6PZ, GB6MD, Z21KF, TX4PG, ZK3SB and 6O0CW as well as being the RSGB QSL Sub-manager for the M5 series of Callsigns. He can be contacted at m5aav@zetnet.co.uk

While on the subject of QSL Managers I thought the following may be of interest to you. **Maurice Charpentier F5NQL** continues to receive QSL cards for the following stations for which he is **not** the QSL Manager and has supplied the correct routes, 5V7C via F5TVG, HW6SIA via F5SM, TM5SM via F5SM, 9Q/F5LTB via F5LTB, HY3SIA via F5SM, TM5SRA via F5SM, F5KCC via F5LBR, HY5SIA via F5SM, TM60SA via F6GXL, F8UFT via F6ICG, TM5AUX via F5SM, TM6BFY via F5NII, HW1SIA via F5SM, TM5SIA via F2WS, TM7OXR via F2WS, HW5SIA via F5SM, TM5SIR via F5SM, TM9AF via F5SM.

Maurice also has a manager for his current call F5NQL and his previous callsigns FB1NQL, F89/FB1NQL, FD1NQL, F1NQL, FBC1NQL and all of his portable operations IOTA operations from Corsica. They should go via **Albert Nadot F3GJ, 28 rue Principale, F10800 Cormost, France.**

getting to the island. Team co-leaders **Ralph Fedor KOIR** and **Bob Allphin K4UEE** said "We learned that our charter vessel, *The Cavendish Sea*, had not departed on time from the port of Comodoro Rivadavia. The vessel was to sail to Ushuaia to pick up the DXpedition team and their equipment on Friday 18 February. We were then to sail before noon that day but they had delayed their arrival until Sunday and with a projected Monday departure, we simply ran out time. This latest setback had been on top of numerous previous delays and simply makes it impossible for us to spend a sufficient amount of time on Peter I to justify the DXpedition this year. We have no choice but to postpone the DXpedition until 2006 and believe it is essential to allow enough time on Peter I to justify the monetary investment made by the team members, our sponsors, individual contributors, DX Clubs and DX Foundations. Our sincerest thanks to everyone for the encouragement and support you offered us during this time".

YOUR REPORTS

Geoff Powell M1EDF/M3UXB in Seckington near Tamworth, Staffordshire is a keen s.w.l. and h.f. operator using an Icom IC-746 and



● M3KWI QSL Card.



● Geoff Pendrick M5GAC in his shack.



● ZF2NT QSL card.

60m dipole antenna. h.f. activities on 10MHz this month include c.w. contacts with LA5AD (Norway) 1210, SM5APS (Sweden) 1230, UR5MZ (Ukraine) 1615, OE9SLH (Austria) 1700, OH3MK (Finland) 1735, HB9KX (Switzerland) 1752, CU2JU (Azores) EU-003 at 1920, R1ANC (Antarctica) AN-016 at 1930, PA2PKZ (Netherlands) 2110, W1MK (USA) in Boxford, Massachusetts 2050, J88DR (St. Vincent and the Grenadin) NA-109 at 2150UTC.

New reporter **Keith Winward M3KWI**, Middlesbrough is a former Army Signaller and now a keen Radio Amateur working h.f. with a Yaesu FT-840 and soon to be delivered Yaesu FT-897. His antenna at present is the half-size G5RV, which is inverted but he is looking to change this for a full size doublet fed with 450Ω ribbon via 4:1 balun.

Using s.s.b. and 10W output Keith worked 7MHz stations YU1XA (Serbia & Montenegro) 1214, 9A2YM (Croatia) 1216, RSGB HQ station GB3RS at 1418, SN2IARU (Poland) 1612. This was a special call to celebrate the 80th anniversary of IARU and the 75th anniversary of PZK, the national IARU Society for Poland.

The QSL route is via SP2Y, either to the bureau or direct to **Marek Klonowski, ul. Staszica 58/20, 82-500 Kwidzyn, Poland**. Later in the evening 7X5VRK (Algeria) 2230 and finally V25BO (Antigua & Barbuda) NA-100 at 2345 both made the log.

On the Isle of Sheppey, Kent **Ted Trowell G2HKU** found the band in reasonable shape working Y19KT (Iraq) 1900, YB0DPO (Indonesia) at 1900 followed later at 2100UTC by CO8LY (Cuba), 9H3JR (Malta) EU-023 QSL via DJ0QJ, VE2IM (Canada) in Ontario and ZF2NT (Cayman Islands) NA-016 using a Ten-Tec Omni V and G5RV or Butternut HF-6 vertical antenna.

THE 14 & 18MHz BANDS

Moving to the 14MHz band and **Martyn Medcalf M3VAM** in Chelmsford, Essex who worked YT80AT (Serbia & Montenegro) 0903, LZ1YG (Bulgaria) 1017, EA3BFX (Spain) 1141, IK8XO (Italy) 1318 and S58M (Slovenia) at 1432UTC on s.s.b. using a Yaesu FT-897 and Buddipole antenna.

The 'Lightening Bolt' 2-element Delta Loop antenna mentioned in this column last

month and owned by **Keith Handscombe**

G7DNT in Ipswich, Suffolk is working well even though conditions have not been so good. Keith had contact with FM5AN

(Martinique) NA-107 and LA7CI (Norway) and both were worked during the day with 5/9+ signals!

Improving his antenna farm was **Owen Williams G0PHY** in Biggleswade, Bedfordshire who has erected a new pole at the bottom of his garden to support his dipole. "This has certainly improved things" says Owen who logged VE3CFD (Canada) in Calgary at 1612 and slightly later at 1635 LA5SJA (Norway) on EU-141 Vardo Island, which is part of the Finnmark County East Group.

Up a band to 18MHz and mobile operator **Mark Taylor G0LGJ** in Dereham who used a Kenwood TS-480 for a change and an Outback antenna in his new car to catch s.s.b. stations VR2XMT (Hong Kong) AS-006 at 1208 and WP4U (Puerto Rico) NA-099 at 1358UTC.

THE 21MHz BAND

In Derry City, Northern Ireland **Steve Gillespie M13ATK** has replaced his Kenwood TS-850SAT with a Yaesu FT-1000MP and uses this with a Mydel 4 leg trap dipole. Despite packing his belongings for a house move Steve managed to work three s.s.b. calls on 21MHz. These were US4AS (Ukraine) 1227, YU1XA (Serbia & Montenegro) 1230 and I18MDC (Italy) on Dino Island EU-144 and a special call used by Mediterraneo DC Club members.

Moving to Chelmsford, Essex **Rob Hastings M3AHH** decided to spend most of his time working on 144MHz but dropped to the h.f. bands to log voice contacts with CU3EQ (Azores) at 1435 and CT3MD (Madeira Island) AF-014 a little later at 1442UTC using



● New reporter Keith Winward M3KWI.

a Kenwood TS-50, MFJ-945E Tuner and inverted Carolina Windom special.

Mark G0LGJ's log shows just two QSO's on the band. The first was with XW3DT (Laos) 1146 and 9G5OO (Ghana) at 1600UTC QSL via DL4WK and on the key again Ted G2HKU found TO0O (Martinique) NA-107, QSL direct only via KC0W, CX5BW (Uruguay), V51AS (Namibia), HC2SL (Ecuador) and PY2CJ (Brazil) around 1600UTC with one QSO on 24MHz, EA8/DI8KWS (Canary Islands) AF-004 a little earlier at 1500UTC.

SIGNING OFF

Well that's about it again for another month though there is one thing I should mention before I close. I had an E-mail from **Steve Bridgeman M3WBS** from Chippenham querying the 28MHz reports from regular reporter Rob Hastings and the use of his M3 call there. As you are all well aware M3's do not currently have the privilege of this band, but Rob holds two call signs **M3AHH** and the Novice call **2E0BOB**. It is the later that Rob uses when DXing on that band using a maximum power output of 10W p.e.p.!

As usual my thanks go to all our reporters and to **Tedd Mirgliotta KB8NW** editor of the *OPDX Bulletin* for the DX information. Until next time have a good DX filled month.

73, Carl G7WQSW

DATA BURST

TEX SWANN G1TEX/M3NGS
C/O PRACTICAL WIRELESS
TEL: 0870 224 7810
E-MAIL: TEX@PWPUBLISHING.LTD.UK

As I write this column we are just about to send out the many copies of the Free *PW Callsign Directory*. This version has been upgraded and now runs direct from the CDROM. But for speed increase it can install itself to your hard disk. The UK and Ireland callsign information is in the form of a searchable database and various electronic 'magazines' that runs on a home PC running *Windows95, 98, ME and XP*.

The CDROM, as supplied has been set-up to run automatically from the CDROM drive after it is inserted. If you do not have the autostart CDROM facility enabled on your machine, you can manually run the software (*pwcallbook.exe*) from your CDROM or DVD drive. Although the software now runs directly from the CDROM drive, you may wish to start by installing the *PW Callsign Directory* to the hard drive, which will result in a considerable performance increase when accessing the database. So let me start with this function first.

On first running the program from the CDROM, displays the screen shown in **Fig. 1**. Install the software to your hard disk (it needs a little under 10Mb of disk space). Take the mouse pointer to the 'File' drop down menu, **Fig. 2**. On clicking the left mouse button to both highlight and run the 'Install to Hard Disk' option, you'll be asked to choose a location on your disk **Fig. 3**.

If you're unsure then I suggest that you just click on the "Install" option to choose the default location of "C:\Program Files\PW Callsign Directory" **Fig. 4**. In **Fig. 4**, you should also see that I've clicked the option to add a shortcut icon on the desktop, making subsequent starting very much easier. If you're more confident at using your PC, please note that, it's also possible to manually copy all files (*db.dat*, *Logo.bmp*, *PWCallBook.dll*, *PWCallBook.exe*, *pwcallbook.ico*, *readme.txt*) from the CDROM to a sub-directory, on the hard drive

of your choice. And after completing the transfer of files by hand, or automatically, **Fig. 5**, you can start using the software for 'real'!

BASIC SEARCH MODE

Basic Search Mode is the simplest of searches, and is active when the small small indicator under the words 'Search Mode' is shown **Fig. 6**. To perform a simple or Basic search, for a callsign or group of callsigns. Let's assume that you want to find all callsigns with the figure '3' in them. First take

the Surname field. Finally put 'usa' into the Country field, press the search 'button' and wait a few seconds. Just one callsign pops up. But what a search capability - and that's just the 'easy' Basic mode.

SEARCH+ MODE

In the Search+ mode the new *PW Callsign Directory* is capable of even better searches, you just need to know how to drive it and how to slip in a * character or two. Although there's no

TEX SWANN G1TEX/M3NGS TAKES HIS TURN TO 'BURST' YOU WITH DATA! AS WE'VE JUST RELEASED OUR LATEST, NEWEST AND FASTEST PW CALLSIGN DIRECTORY CDROM, HE TALKS YOU THROUGH GETTING STARTED AND GETTING THE BEST FROM YOUR COPY OF THE CDROM.

the mouse cursor over the callsign box, then click the left mouse button and overwrite any text that's there with the character '3'.

You'll see that text boxes that have been changed will become 'search criteria', indicated by a light red highlight in that box. Click 'Search' or press 'ENTER' to perform the search. You'll find there are 13 068 callsigns in the database with the figure 3 in each - from EI3A to MW3ZZU.

Before we leave the simple search method, let's just look at a more complex search. Let's say (for instance) that I've heard a G3??? who is called 'smith', but who I know has an American address. So, put '3' in Callsign, 'smith' in

'wildcard character' in the Basic search mode, it's implied. The wildcard character is normally an asterisk (*) and is taken as meaning any character and any number of characters (including a space or no characters at all).

The * or wildcard character comes into its own when you choose the 'Search+' mode of operating. Click on the small button again the Search+ just underneath the main Logo windows. Each time it starts, *PW Callsign Directory* will remember, which type of search you were using as it's next loaded.

Suppose for instance, that I've heard a G-something-three, and the town had 'pool' in it somewhere. Ordinarily, this

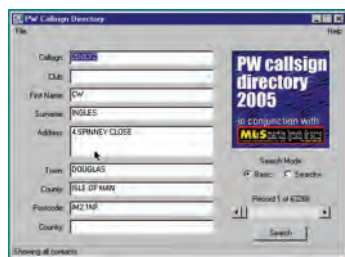


Fig. 1.

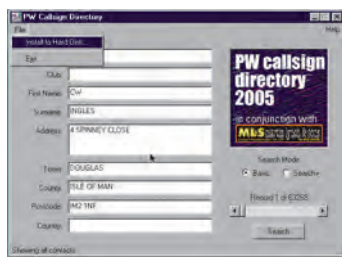


Fig. 2.

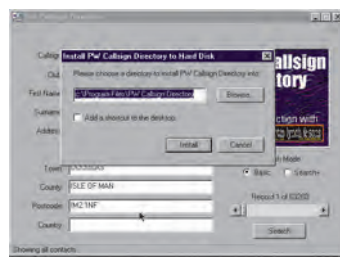


Fig. 3.

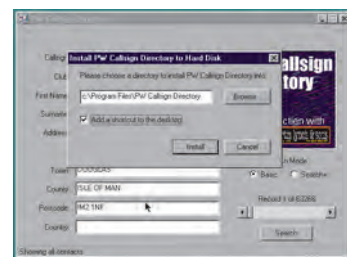


Fig. 4.

would be a hopeless case. But try this one in the new software. Try entering g*3* in the Callsign field and *pool* in the Town field, **Fig. 7**. Before I say how many callsigns I found with this query, let me explain what I've asked for.

The Callsign data request g*3* asks for any instance of a G3 in any callsign area. And of course the Town data should contain any instance of the sequential letters 'pool' anywhere within the town name. I had a possible 19 callsigns to try out, including stations in Blackpool, Liverpool, Pontypool and of course in Poole itself. Great possibilities from such a simple program!

Type in part of a name such as (*son) into the name field, then type a county (or part of a county name) into the County field. You can use most of the data fields, but please note: the address box data in the main window is not searchable in either mode. Or try just typing your main postcode into the Postcode data field (try BH* for all station in the Bournemouth area for instance).

The number of positive search results are shown in the status bar at the lower right of the Callsign Directory window. Then the first of these results matching the requested information is shown in the data fields. You may step through the results by mouse-click on the small arrowheads or via the **PgUp** (page up) and **PgDn** (page down) keys.

When searching for all clubs, due to limitations of the database, you must use a double wildcard (**), otherwise just part of the name as shown below. To return to displaying the full database, press the 'ENTER' or click 'Search' button without changing any text.

HELP FILE

The new *PW Callsign Directory* has a help file (Readme.txt) that is transferred

across onto the hard disk along with the other programs. But is is rather simple and is written merely to 'get you going'. But it can grow with your skills if you follow these steps. Firstly navigate to the folder on your hard disk (the *PW Callsign Directory* space) to find the file Readme file. Then highlight the file (single left-mouse click) then with a single right mouse-click, select 'Properties' from the list.

Now you must change the 'Read-only' status of the Readme file, by a single left mouse-click to remove the tick in the box. On closing the window, by accepting 'OK', you can edit and save your own words of how to do something, so that you will understand what needs to be done. You can make it an aide-memoire or as 'wordy' as you like, **Fig. 8**.

The only data field that's not searchable is the address field itself - a minor price to pay I think! There are two other small points to note: You can start multiple sessions of the software, each with its own query running (and it's own mode too until you close the window. Secondly, when using another program, such as *Ham Radio Deluxe*, you can link into *PW Callsign Directory* and use it as an 'in-line' callbook as another session without disturbing any queries that you're already running. Nifty eh?

ELECTRONIC MAGAZINES

Now let me turn to the various electronic 'magazines' that are to be found on the CDROM. To read these, you'll need to have a program called the *Adobe Acrobat Reader* installed. There are several versions of this software that would be suitable to view the various magazines.

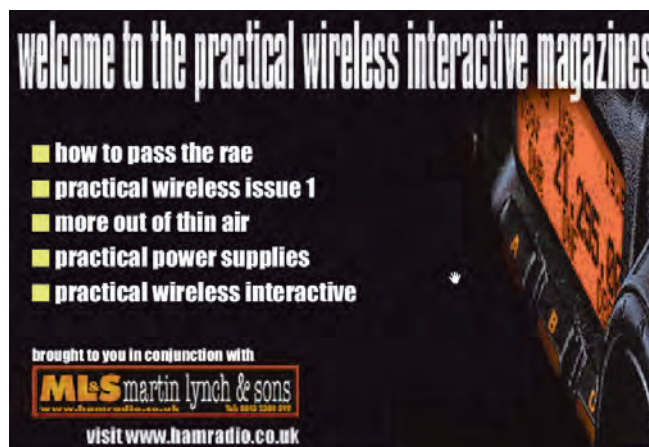


Fig. 9.

We have provided suitable software (version 4 and 5 of the *Adobe Acrobat Reader*) on this CDROM if you are running *Windows95* or *Windows98*. The complete installs are to be found on the CDROM in the sub-directory **System_Installs/Acrobat Reader**. Either version will read the PDF files on this CDROM, but each may report problems that 'the files contain data that may be incompatible' with the version of *Acrobat Reader* you're using. This error message can safely be ignored, as there are no known problems.

If you're using *Windows2000* or *WindowsXP* and you do not already have an *Acrobat Reader* installed, I suggest that you go to the Adobe website at: <http://www.adobe.com> and download the latest suitable version of the *Adobe Acrobat Reader* for your system.

Start from the *Acrobat Reader* and from 'File>Open', go to your machine's CDROM drive and load the file 'Magazine-Start'. From this start point page, **Fig. 9**, you'll be able to look at Four electronic (PDF format) magazines, and a full reprint of the 'How To Pass The RAE' series from our sister magazine *Radio Active*. If you haven't ordered your copy, 'phone **Clive** on **0870 224 7830** to ask how to go about it. Or you can ask via E-mail: clive@pwpublishing.ltd.uk
Enjoy!

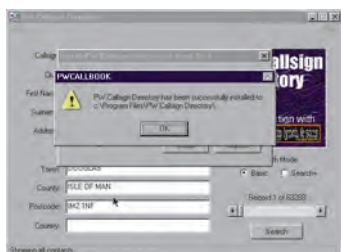


Fig. 5.

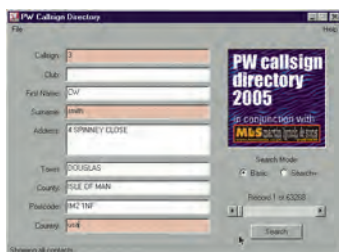


Fig. 6.

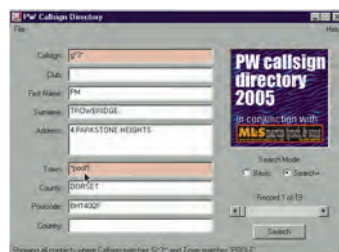


Fig. 7.

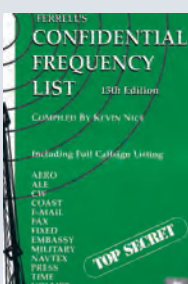


Fig. 8.

RADIO BOOK STORE

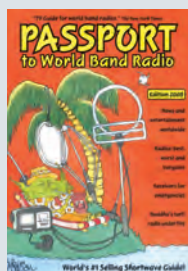
Ferrells Confidential Frequency List

The 13th Edition of 'The Definitive HF Utility Guide' has been updated and includes MIL-STD-PSK modes, high speed HF E-mail services, extensive callsign listing, international call allocations, utility abbreviations and much more. £21.50



Klingenfuss 2005 Guide to Utility Radio Stations

One of the most comprehensive, reliable and up-to-date manuals containing over 11,200 frequencies, 1900 stations, meteor radiofax, radiotelex and NAVTEX schedules, abbreviations, frequency allocations and radio regulations. £31.50



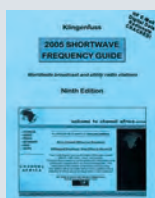
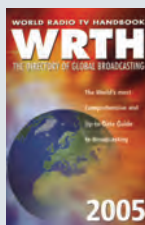
Passport to World Band Radio 2005

This book includes what's on world band radio, what to buy, how to get started and is written to make interesting reading. It contains a mix of articles from an idiot's guide to a five-minute start and ten easy catches to best times to listen. It also has a channel by channel guide to what's on the

air. Everything the short wave broadcast listener needs to know. £17.50

World Radio TV Handbook 2005

A handy reference book that contains the names, addresses, programmes and frequency details of radio stations all round the world. Radio stations are listed under the country and all countries are split up into continents making it much easier to turn to the station you need. Also included are articles on HF broadcasting conditions, radio reviews and a section on how to use the book. £22.50



Klingenfuss Shortwave Frequency Guide

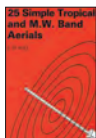
This 2005 edition contains a new, clearly arranged alphabetical list of stations and user friendly listings in convenient frequency order. There are over 10,000 entries covering broadcast stations world-wide and 11,000 entries covering utility stations world-wide. £24.50

Radio Listeners Guide

This handy annual publication contains radio product reviews and general information for listeners. Frequencies and locations of radio stations all over the UK and Ireland are given for BBC and commercial radio stations, as well as DAB services. All-in-all a very handy reference guide. £5.45

25 Simple Tropical & MW Band Aerials

This concise book describes how to build 25 simple and inexpensive antennas for operation on the medium wave broadcast band (550 - 1600kHz) and on the 60, 75, 90 and 120 metre tropical bands. There are also designs for the 49m band. £1.75



An Introduction to Radio Wave Propagation

This book provides a broad, yet clear picture of radio wave propagation in a concise way without the use of too much technical language or mathematics. Included are explanations of the phenomena that is propagation dealing with everything from the Sun, through the ionosphere to noise. £3.95

ARRL Yearbook

Radio amateurs and professionals rely on The ARRL Antenna Book for current antenna theory

Antenna Toolkit

This book acts as a miniature antenna manual with very good technical explanations without ever over-doing the maths for the not-so-keen mathematicians! The drawings and illustrations are very clear and the section on instrumentation is very helpful. £25.00

RSGB Yearbook

There are almost 500 pages in the 2005 Yearbook, eight more than last year, but only a



Airband

	Pages	Price	Code
AIRWAVES 2005 (Photavia)	.144	£10.95	AIR25
AIRBAND RADIO GUIDE (abc) 6th Edition		TBA	ABRG6
AIRBAND RADIO HANDBOOK (Sutton) David Smith	.190	£12.95	ABRHB
AIR TRAFFIC CONTROL		£9.99	ATC9
AIRWAVES SELCAL CIVIL & MILITARY DIRECTORY (Photavia)	.176	£11.95	AIRSEL
CALLSIGN 2005 (Photavia)	.2005	£10.95	CAL25
CIVIL AIRCRAFT MARKINGS 2005 (abc) Alan Wright	TBA	TBA	CIVAIR
FLIGHT ROUTINGS 2004 Williams	.180	£8.95	FR24
MILITARY AIRCRAFT MARKINGS 2005 (abc) March & Curtis	TBA	TBA	MILAIR
BRITISH ISLES ATLANTIC TRANSITION CHART (AERAD)	.1020x520mm	£9.00	UKH6
BRITISH ISLES LOW ALTITUDE CHART (AERAD)	.1020x520mm	£9.00	UKL2
NORTH ATLANTIC ROUTE CHART (AERAD) ..	.1020x520mm	£9.00	NATHL1

Frequency Guides

FERRELL'S CONFIDENTIAL FREQUENCY LIST 13th Edition	.540	£21.50	FERR13
KLINGENFUSS GUIDE TO UTILITY STATIONS 2005	.552	£31.50	KFUT1
KLINGENFUSS SHORTWAVE FREQUENCY GUIDE 2005	.504	£24.50	KFSWFG
KLINGENFUSS SHORTWAVE FREQUENCIES CD 2005		£17.70	KFSWCD
PASSPORT TO WORLD BAND RADIO 2005 (IBS)	.592	£17.50	PASS25
RADIO LISTENERS GUIDE 2005	.160	£5.45	RLG25
WORLD RADIO TV HANDBOOK 2005 (WRTH)	.688	£22.50	WRTH25

Scanning & Short Wave

BUYING A USED SHORT WAVE RECEIVER 4th Edition F. Osterman	.78	£5.95	BUSWRX
RECEIVING (VALUE) STATION LOGBOOK (RSGB)	.80	£4.95	RXLOG
SCANNER BUSTERS 3 D.C. Poole (Interproducts)	.92	£5.00	SCANB3
SCANNERS 4 SCANNING INTO THE FUTURE Bill Robertson	.245	£9.95	SCAN4
SHORT WAVE COMMUNICATIONS 1991. Peter Rouse (PWP) WSL	.187	£4.50	SWCOM
SHORTWAVE RECEIVERS PAST & PRESENT 3rd Edition F. Osterman	.450	£25.95	SWRXP
THE SUPERHET RADIO HANDBOOK I.D. Poole (Babani)	.104	£4.95	BP370
THE ESSENTIAL GUIDE TO SCANNING Martin Peters	.108	£6.00	EGTS

Antennas/Transmission Lines/Propagation

25 SIMPLE INDOOR & WINDOW AERIALS E.M. Noll (Babani)	.50	£1.75	BP136
25 SIMPLE TROPICAL & MW BAND AERIALS E.M. Noll (Babani)	.54	£1.75	BP145
ANTENNA FILE (RSGB)	.285	£18.99	ANTFIL
AN INTRODUCTION TO RADIO WAVE PROPAGATION J.G. Lee (Babani)	.116	£3.95	BP293
ANTENNA TOOLKIT (inc. CD ROM) Joseph J. Carr	.214	£25.00	ANTOOL
ARRL ANTENNA BOOK (inc. CD ROM) 20th Edition	.944	£32.00	RRAB20
BACKYARD ANTENNAS Peter Dodd G3LDO (RSGB)	.200	£18.95	BYANTS
BASIC RADIO PRINCIPLES & TECHNOLOGY Ian Poole G3YWX	.262	£15.99	BRPRIN
EXPERIMENTAL ANTENNA TOPICS H.C. Wright	.70	£3.50	BP278
HF ANTENNA COLLECTION Edited by Erwin David G4LQI (RSGB)	.233	£19.95	HFANTC
MORE WIRE ANTENNA CLASSICS (ARRL)	.200	£10.50	MWANTC
PHYSICAL DESIGN OF YAGI ANTENNAS (Hardback) David B. Leeson W6QHS (ARRL)	.200	£15.50	PDYAGI
RADIO PROPAGATION PRINCIPLES & DESIGN Ian Poole G3YWX	.102	£14.95	PROPPR
RECEIVING ANTENNA HANDBOOK Joe Carr (HighText)	.189	£17.50	RXANHB
UNDERSTANDING BUILDING & USING BALUNS (CQ Publications) Jerry Sevic	.125	£18.95	BUBALS
VHF UHF ANTENNAS Ian Poole G3YWX (RSGB)	.128	£13.99	VUANTS
WIRE ANTENNA CLASSICS (ARRL)	.200	£10.50	WANTC

very small handful are the same. Everything you need is covered within its pages: contact names, addresses, phone numbers, websites and E-mail addresses. A major new feature for this Yearbook is the RSGB Contesting Guide, which was formally published in RadCom. £16.95

Receiving Antenna Handbook

Your receiver is only as good as your antenna or so says the author of this book. It is a complete guide to high performance receiving antennas for long wave all the way to the upper end of the short wave spectrum. The designs aren't slightly modified amateur transmitting antennas but ones intended specifically for receiving purposes. £17.50



licensing changes and the ubiquity of PCs and the internet. To deal with these, the author has taken a completely new look at the content and approach. For example, some of the traditional demarcations between HF and VHF and between the various operating modes have been overturned, but new and comprehensive chapters on topics such as PCs in the shack and Operating Modes added. £16.95

VHF/UHF Antenna

With both the basic theory and constructional details for many antenna designs, the reader is taken through the essentials in an easy-to-understand way. All kinds of antennas are described from dipoles to Yagis and verticals to log periodic designs. £13.99



The Amateur Radio Operating Manual

This new edition of the RSGB Operating Manual reflects the huge impact in the past few years of

mail order...huge range in stock...fast delivery...

Beginners/Licence/Manuals

ADVANCE! THE FULL LICENCE MANUAL		
Alan Betts G0HIQ & Steve Hartley G0FUW (RSGB)	104	£9.95 ADCFLM
AMATEUR RADIO EXPLAINED. Ian Poole G3YWX (RSGB)	150	£9.90 AREXPL
AN INTRODUCTION TO AMATEUR RADIO I.D./ Poole (Babani)	150	£4.99 BP257
AN RAE STUDENTS NOTEBOOK Bob Griffiths G7NHB	76	£6.95 RAESNB
FOUNDATION LICENCE NOW! Alan Betts G0HIQ (RSGB)	32	£3.95 FLNOW
HF AMATEUR RADIO. Ian Poole G3YWX (RSGB)	120	£13.99 HFAR
INTERMEDIATE LICENCE BUILDING ON		
THE FOUNDATION Steve Hartley G0FUW (RSGB)	76	£5.75 INTLIC
SECRET OF LEARNING MORSE CODE Mark Francis (Spa)	84	£6.95 SOLMC

Foundation Licence Now!

A 32-page soft-covered book that takes you through the syllabus, reinforcing what you will learn on the foundation Course. The course has been designed and introduced for people of all ages and abilities. To take the course you need no formal qualifications. £3.95

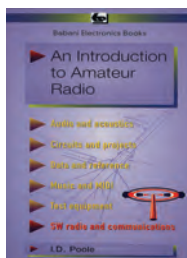


HF Amateur Radio

This could be the considered as the natural 'follow-on' volume to accompany Basic Radio Principles & Technology. Aimed at the more active radio amateur who is just beginning to get to grips with their new HF transmitting station, it will also appeal to the newcomer. £13.99

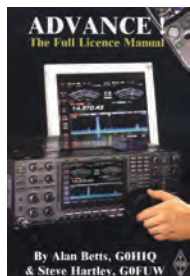
An Introduction to Amateur Radio

Amateur radio can be a fascinating hobby that has attracted many people all around the world. It encompasses a wide range of subjects from the historical to the latest technology and from operating to construction. Perfect for the fledgling enthusiast. £14.99



Intermediate Licence Building on the Foundation

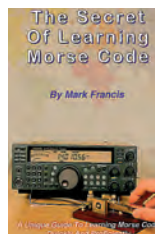
The second course book in the RSGB's series, which is structured to progressively obtaining an Amateur Radio Licence, this book contains practical exercises, broken down into half-hour worksheets. The ideal companion book for all Amateur Radio Intermediate Licence students. £5.75



Advance! The Full Licence Manual

This is the third course structured to obtain an Amateur Radio Licence. Advance is the final stage in gaining the licence and has been updated to suit the new syllabus structure. Broken down into logical sections, it's

presented in an easy-to-understand way, making it perfect for home study. £9.95



Secret of Learning Morse Code

Don't be fooled, the requirement for Morse may have been removed, but Morse code still has a place in the scheme of things for the radio amateur. It can be consistently be used to 'talk' to others around the world, you don't even need to speak their language to hold a conversation. £6.95

Binders

PW	£6.50	BINDPW
SWM	£6.50	BINDSW

Design & Construction

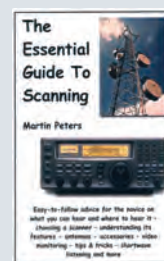
COIL DESIGN & CONSTRUCTION MANUAL (Babani)	106	£3.95	BP160
LF EXPERIMENTERS HANDBOOK (RSGB)	112	£18.99	LFEXHB
PRACTICAL PROJECTS G. Brown M5ACN (RSGB)	208	£13.95	PRPROJ
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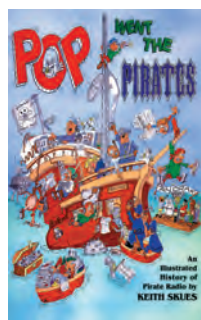
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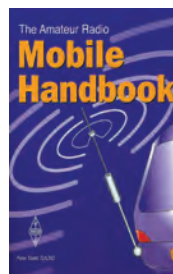
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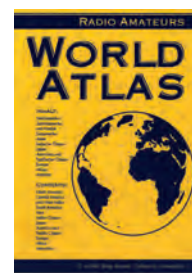
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rob mannon's topical talk

This month Rob Mannion G3XFD, as usual, takes a look at a topical subject, which has caught his attention. This time, it's a letter from Geoff Sims G4GNQ mentioning the TOKO inductors made in Japan and the forthcoming change from lead-based solder to other forms of the alloy.



An endangered species?

G Geoff Sims G4GNQ is an old friend of mine and I know just how keen he is regarding home constructional work and he's a leading light in the **British Railways Amateur Radio Society** of which I'm proud to have been one of the founder members in 1966.

Personally, I feel that Geoff is right to be concerned regarding the loss of standard wire ended and non surface mounting components, especially inductors. Indeed, as industrial requirements demand more forms of miniaturised components, particularly those intended for automatic, production line placement machines - the traditional wire ended/pinned and identified component will become more difficult to purchase.

Last month, in the Setting Up Your Workshop series I briefly mentioned a source of axial lead type ferrite cores. These are available from a specialised dealer who has a knack of finding these components at reasonable prices. The dealer I mentioned doesn't advertise in *PW* (maybe he'll eventually promote himself, so that more readers will discover what's on offer) but other specialists do advertise.

Hopefully, as finding and buying traditional components does become more difficult - we'll be able to find sources to keep us going.

Traditional wire ended and other lugged/pinned components are still being made - although we rarely know of the manufacturers. A few are here in these Islands of ours, but many are based in what we term the 'Third World' and are made extremely cheaply. (I dread to think of the conditions their employees work under, particularly in Mainland China).

Perhaps the time is coming when the Amateur Radio hobby should consider a setting up a 'Buying Co-operative' to seek sources of new components? I think that - at the very least - those specialised traders who advertise in *PW* might consider buying traditional components in the way I suggest. You never know, they may be doing so already?

Lead Based Solder

I'm now (almost certainly) going to make life difficult for myself by reminding readers that traditional lead-based solder is soon to be made illegal. This is mainly due to the fears of the health problems associated with heavy metals - particularly lead.

The reason why I think I may be making things difficult is that once readers are reminded that traditional tin/lead solder is to disappear - all the bargains at rallies will be snapped up! But joking apart, I wonder if many have seen the prices of non-lead solder? It's quite significantly more expensive than the traditional lead/tin alloy.

Within the European Union (EU) industry was expected to have changed to lead-free solder at the end of 2004. The final date where the use of lead-based solder becomes illegal within the EU is July 2006. So, I wonder, will there be problems ahead for us using the new soldering alloys? A quick look on the Internet shows that there are companies already providing training in the use of the replacement alloy material. Perhaps those of us involved in hobby radio and construction will also need re-education?

I will of course provide an update on the situation as soon as I can. But in the meantime - lets hope there's not too much of a crush whenever traditional tin-lead solder is offered for sale for private use!

PW

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