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practical Wireless

SEPTEMBER 1997 £2.20

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The Chixie
G3RJV's One Chip
Transceiver!

A Matchbox Midget
Receiver

Plus:

RAE Course List &
Discovering
Amateur Radio

Reviewed:

Pocket Miracles!
The Alinco DJ-C1 & C4 Transceivers

The Icom IC-756
A New Perspective On The Bands

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*antennas
in
action*





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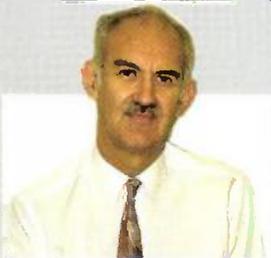
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£1049
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PHONE

or £1097 inc 5yr Wtty.

160-6m 100W 2m 25W + + +

We are pleased to endorse the performance and design of the IC-706 Mk II transceiver as the best compact hf mobile bar none. It out performs and out specifies any other model. The only choice left is which dealer you buy it from! We offer you an unbeatable price and an unbeatable back-up service plus optional extended 5 year warranty for an extra £98!

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Yaesu FT-8100R



W&S
£399

or £467 inc 3yr Wtty.

Yaesu's new dual band mobile makes the competition look old and out-dated. Now you can buy a rig ready equipped with 12.5kHz and 25kHz filtering. You get a detachable head, 300 memories, true dual same band rx, CTCSS encode and the best display in the business.

TOP 2m/70cm Handy



W&S
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ADI AT-600

or £314 inc 3yr Wtty.

**Reviewed
PW August**

PW says: "an incredibly well priced radio - amazingly sensitive - audio - worked very well with 12.5kHz channel spacing - An Absolute Cracker"

- CTCSS encode/decode
- Full DTMF + 1750Hz tone
- Alphanumeric memories
- Full duplex
- CTCSS tone reader
- 29 programmable features
- AM airband receiver
- Rx up to 990MHz
- Nicads and charger

Mobile FM Rigs



ADI FULL CTCSS

Our best selling 2m Mobile

W&S
£249

AR-146 2m 50W

Both rigs feature:

- 3 Power levels - Wideband receive
- 40 Memories plus call channel
- 7 Programmable steps
- Channel or frequency display
- The best sensitivity in the business
- Keypad mic and mounting kit
- CTCSS Encode and Decode!



FULL CTCSS

AR-446 70cm 35W

W&S
£269

3W Novice version available

ADI AT-201 2m FM Handy



NEW
W&S
£149

- 40 Channels
- CTCSS Encode
- CTCSS Decode
- DTMF
- Channel Reasout or
- Frequency Readout
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Look at the Features
Compare the Price

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Value
W&S
£169

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- 5W on 13.8v
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- Illuminated keypad
- Ultra sensitive
- Wideband Rx
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- Keypad entry
- DTMF
- Uses AA cells

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Now the standard radio for Novice hams. It's sensitive, cost effective and was featured on Anglia TV

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FAX 01702 205843

ALINCO DR-150E 2m FM



W&S
£269

- 100 memories
- 50 / 25 / 10W
- CTCSS encode
- 1750Hz tone
- Wideband Rx
- Time out etc.
- Mic. and mount
- 12 month wtty.

We can beat any price on new ALINCO
Compare our prices with others in this magazine!

Yaesu FT-50R 2m/70cms



Our price goes
up next month!

W&S
£249

- Wideband Rx (AM Airband)
- FM Broadcast receive
- CTCSS & 1750Hz
- 112 Alphanumeric Memories
- Dual Watch - Military rated
- 5W from 12v DC input
- Ni-cads and AC Charger
- One of our top 5 sellers!

Lowest
UK Price!

CT-30 Mic Adaptor - - - - - £9.00
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DJ-G5 2m & 70cm



W&S
£269

Lowest
UK Price!!

- Up to 5W output
- CTCSS & DTMF
- 1750Hz tone
- Electronic controls
- 100 Memories
- Extended receive
- Full scanning
- Ni-cads and charger

Lowest
UK Price!

Standard 6m-2m-70cm Mobile



NEW
W&S
£799

45W 6m, 50W 2m &
35W 70cm. 80 Memos
remote head option
FULL CTCSS

SGC Auto ATUs - in stock



W&S
£329

SG-230 1.6 - 30MHz

Feeds long wire or whips. Just connect 12V, earth and end fed wire. RF sensing does the rest! Tunes any length over 8ft. Units



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We guarantee this will kill all QRM caused by strong out of band signals - - - or your money back!

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Selectivity: -68dB at 136MHz
Power: 200 Watts

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Selectivity: -47dB at 415MHz
Power: 200 Watts

ICOM IC-207H 2m/70cm Mobile



£389
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- * 2m & 70cm
- * 50W / 30W
- * Detachable head
- * Packet 9600 bps ready
- * 180 Memory channels
- * CTCSS & 1750Hz tone

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W&S
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TM-V7E

- * 144 & 430MHz 50/35W
- * Dual Rx on same band!
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- * Detachable front head
- * CTCSS & 1750Hz Tone
- * Large clear display

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Save £300

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Our famous brass and natural wood Morse key at a sensible price

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Fibre glass single band whips approx. 7ft long - 2 sections - telescopic adjust. All fitted 3/8" stud thread

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| * PHF-40 7MHz £19.95 | * PHF-12 24MHz £19.95 |
| * PHF-30 10MHz £19.95 | * PHF-10 28MHz £19.95 |
| * PHF-20 14MHz £19.95 | * PHF-6 50MHz £19.95 |

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- * Clips on to dash vent (no sticking!)
- * Adjustable angle
- * Sprung fingers grip handy
- * Single handed quick release
- * Accommodates all modern handys.
- * Ideal for portable phone / GPS

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£9.95

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£6.95

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The best book on the subject and the surest way to get your A licence

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- 10 day no quibble equipment approval.
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- Fast Mail Order - 24 hours delivery on major items.
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- Best prices with "Advertised Price Match Promise"
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£699

PRICE DOWN

We've purchased a quantity at this special price. You won't get a base station rig any cheaper!

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£69.95

NEW

- * Packet, AMTOR, CW
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- * NAVTEX, SYNOP
- * Transmit and receive
- * Needs PC 286 or better
- * Includes software
- * No external power required
- * Connects to RS-232

WATSON W-7900 Super Antenna



The best value in high quality antenna design we have ever seen! Similar models sell for £49.99 - ours doesn't

W&S
£34.95

- * 144 & 430MHz
- * 5dB on 2m
- * 7.6dB on 70cm
- * Length: 1.58m
- * Power: 150W
- * Sprung foldover design
- * PL-259 connector

Kuranishi BR-200 Analyser

- * 1.8-170MHz
- * VSWR 1.1:1 to infinity
- * Impedance 12.5 - 300
- * Dual Gate Times
- * Slow Motion Dial
- * 4 decimal places
- * Bright digital display
- * 6 x AA or 12V external
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£329

A professional class instrument from Kuranishi of Japan. Supplied with 50 Ohm dummy load calibration device and very attractively housed.



TOP HF Base Station

NEW Yaesu FT-920

Price Match



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Yaesu FT-1000MP

Price Match



W&S
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5 Year Warranty on FT-1000MPs £115

- | | | |
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- * 160 - 6M
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- * Auto ATU
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- * CW Memory keyer
- * 100% duty cycle
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- * DXers choice in the USA

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Filters
SSB & CW
£57.95 each.

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TOP VHF Base Station

ICOM IC-821H 2m/70cm

Price Match



£1395
Or Better!
PHONE

- * 2m/70cm All Mode
- * 45/40W adjustable
- * Full duplex
- * Satellite features
- * 160 Memories
- * 9600bps capability
- * Electronic keyer
- * IF shift, noise blanker

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Or Better!
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MFJ

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MFJ-784B Filter

£239

Price Down!



- Works with any rx. or tcvr.
- DSP filter, fully programmable
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- Drives speaker or headset
- Requires 12v at approx 500mA

MFJ-1278DSPX Data Unit

£399



- Multi-mode
- Packet
- Amtor
- Pactor
- Colour SSTV
- 10 Modes total
- DSP filtering
- Tuning scope
- Simple to us
- Software

MFJ-948 HF ATU

£129

Price Down!



- 300 Watts PEP 150W CW
- 1.8 - 30MHz - with ease!
- Wire, coax or balanced line
- Balun included for best match
- 30 / 300W power meter - PEP / RMS
- Antenna selector, by-pass etc.

MFJ-781 DSP Filter

£139



Just arrived, this new DSP filter that is specially designed for CW and data modes.

- Digital Audio Filter
- CW 50, 100, 200, 500Hz
- Amtor, fax, GTOR, PACTOR
- RTTY, SSTV, We-FAX

MFJ-949 HF ATU

£149

Price Down!



- 160 to 10m 300W PEP 150W CW
- Wire, coax or balanced feed
- Built-in Dummy Load
- 30 / 300W power meter - PEP / RMS
- Antenna selector, by-pass etc.

MFJ-914 Auto Match

£59.95



Your Auto ATU will now match any aerial when used with this.

Auto-Tuner Extender

Connect between auto tuner and transceiver - no more problems with G5RVs and all those difficult antennas - 160 to 10 metres

MFJ-812B 2m VSWR

£36.95

Price Down!



- 144 - 148MHz 30 / 300W
- Forward & Reflected Power
- Reads field strength
- Easy to use - convenient size
- Low cost - efficient accessory

MFJ-921 2m ATU

£69.95

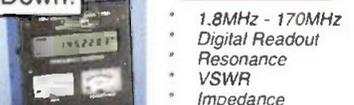


144MHz 200W antenna tuner that helps you get a perfect VSWR every time. Includes VSWR and power meter and fitted SO-239 sockets.

MFJ-259 HF Analyser

£229

Price Down!



- 1.8MHz - 170MHz
- Digital Readout
- Resonance
- VSWR
- Impedance
- AA batteries or 12v external

Connect to aerial or coax and adjust it in seconds. Turns hours into minutes and ideas into antennas!

MFJ-864 160M to 70cm

£79.95



- All bands from 1.8MHz to 440MHz
- Cross needle meter - 30 / 300W
- Comprehensive user calibratable
- Separate HF and VHF/UHF sensors
- Illuminated meter (ext. 12V)
- Everything you need in one box.
- 185 x 65 x 75mm

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Price Down!



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- 1 kW linear 9dB Gain
- Like a 5 element Monobander!
- Uses low cost 811A tubes
- Built-in rugged AC Supply
- Instant by-pass switch
- PA V/A meter + Grid meter
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- Very efficient - 600W output
- Easy to tune and connect
- Size 16" x 13.75" x 8"

160 to 10M of DX-Getting Power
Perfectly matches all 100W rigs

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Price Down!



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- Wires, Coax and Balanced Feed
- Cross Needle VSWR & Power
- 3-Way antenna selector
- By-pass position - Dummy load socket
- Internal Balun - 30 or 300W position
- 260 x 180 x 70mm

MFJ-260C 300W

£34.95

- Dummy Load
- 50 Ohm
- 300W
- OK to 450MHz
- Air cooled
- SO-239
- Totally enclosed
- Essential item



MFJ-264 1kW Load

£64.95

- Dummy Load
- 50 Ohm
- 1.5KW
- OK to 650MHz
- Air cooled
- SO-239
- Ideal for linears
- Ruggedly built



MFJ-704 LPF Filter

£39.95

- Low pass filter
- 1.8 - 30MHz
- Cleans up output
- Reduces TVI
- 1KW rating
- SO-239 sockets
- Fully shielded



MFJ-16010 Wire Tuner

£44.95

Price Down!



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MFJ-418 CW Tutor

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MFJ-713 Internod Filter

£64.95

Price Down!



A three section high-Q bandpass filter for 145MHz handhelds. Includes rf sensing.

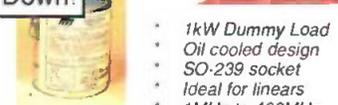
- 144 - 148MHz
- Up 20 50dB rejection
- Defaults to "thru" when off
- Minimum r/T/R required: 50mW
- BNC termination
- Power: PP3 (not supplied)
- Size 70 x 50 x 45mm

- Displays words, letters and numbers
- 3 to 35WPM with natural CW note
- Various modes including Farnsworth
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- Actually sends complete QSO
- Characters or groups
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MFJ-250X 1kW load

£34.95

Price Down!



- 1kW Dummy Load
- Oil cooled design
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* Oil is not supplied

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- 0 - 5 Watts
- BNC Handheld fitting
- Reads power out
- Checks all handhelds

Waters & Stanton

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Fax. 01702 205843

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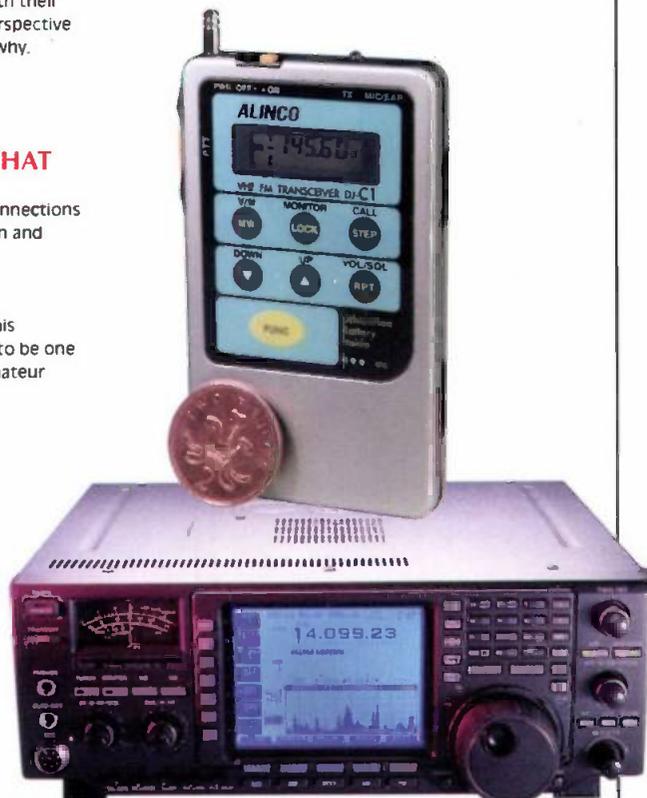
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Call our sales teams now for advice and prices on any equipment from these manufacturers.

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** Free Pack - Win software*

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Modems

1200 baud Plug in for USCC.....	£39
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COMET ANTENNAS

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ABC23	3 x% Base Collinear	£55.00
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EDITOR'S Keylines

Rob Mannion's viewpoint on the World of Amateur Radio

Recently in 'Keylines' (July *PW*) I was encouraging readers to write for us while at the same time explaining the procedures we have to adopt when working on a very busy magazine with a relatively small editorial team. Since then there has been some interesting feed-back from budding authors and quite a few requests for copies of our *Author's Guide*.

However, this time I'm specifically asking for help from potential authors working in rather special branches of the communications engineering 'market'. In fact, I need to hear from a licenced Radio Amateur working in the mobile telephone and/or the 'wide area paging' services. If you have experience in these specialised services, I'd be grateful if you would contact me as soon as possible.

American Mistake

As I write this, it's come to my attention that the American Radio Relay League (ARRL, the American National Society) is planning a big mistake! I say this because the ARRL has publicly announced that in the near future they're planning to cease publication of the famous (and very weighty!) *American Call Book* as a book - and publish it in CD ROM form only.

I heard of the ARRL's intention from Dick Ganderton G8V FH, the Editor of *Short Wave Magazine*, after reading the news in his Editorial in *SWM*. To say I was astounded at the revelation is an understatement and I wrote to Rodney Stafford KB6ZV President of the ARRL immediately to register my dismay at their decision.

Admittedly the ARRL has a real problem in publishing the mighty *Call Book*! It really is huge and there's certainly no doubt there's a demand for it to be available on CD ROM disk. However, by making it only available in this form immediately removes it from many readers shelves (including mine) because they don't own CD ROMs and computers.

Although I sit for many hours in front of an Apple Macintosh computer - it's a dedicated journalistic machine - not a PC. Without it I could not carry out the necessary work to help produce *PW*. I



work on it all day and then take my 'homework' with me to finish off after tea! However, as I've been working 'upright' most of the day my relaxation is not to be found sitting in front of a computer again. Instead I enjoy sitting in my favourite armchair reading a traditional book!

Certainly, in the future, I've no doubt a handy small book-sized computer will be produced that you can open (just like a book) and it will electronically 'turn pages' on either side for you, with the added ability of enlarging the typeface size for me when I find the going too difficult. Your book or information will arrive in a miniature disk or cartridge - but until then (and until they only cost the same as the equivalent books) - surely publishers must continue to produce information in book form?

If you listen, read or watch the media 'hype' it may appear that everyone has a computer at home. It may also appear that everyone is connected to the 'Internet'. Neither is true and I think it will be a very long time before even 50% of radio and electronic enthusiasts have access to such services (and that's even before considering the general (non-specialist interests) public's access to the 'electronic media' mentioned).

Like Dick G8V FH stated in his editorial, I'm not a 'Luddite' either (although everyone who knows me well, realises that computers don't arouse my interest at all - apart from their use as yet another 'tool' in my 'writer's toolbox'). I fully realise that

without computers my work would nowadays be impossible. But information presented in book form does have a tremendous future and takes some beating!

You can take a book anywhere - and I do! Relaxing in the bath with a cheap paperback version of a good novel is marvellous (it doesn't matter when they get soggy!). You can read them on the train, aircraft or even in the middle of the desert. And when it comes to deserts I'm reminded of developing countries - just how will they fare?

No ARRL I really do think you've made a fundamental mistake this time! And I hope that I, along with your many hundreds of thousands of readers, will be able to continue all your publications in traditional book form for many years to come. There's room for both 'paper' and 'electronic publishing' and long may it remain so!

Packet Panorama

'Packet Panorama' written by our specialist author Roger Cooke G3LDI has been running for a long time in its present form. And our dedicated author is now planning to increase the coverage of his column to include other data modes.

Roger - he's still keen on those beautiful old, noisy and smelly mechanical Radio Teletype machines! - will be expanding the coverage of his bi-monthly column and as a result it has been relaunched in this issue as

'Data Diary' to reflect the wider interests covered in the column.

So, with your support Roger and the Editorial team think that the new Data Diary column will go from strength to strength. And it's up to you to get those streams of data flowing now!

Amateur Radio's 100th Birthday

Next year sees the 100th 'birthday' anniversary of Amateur Radio. And in this context it's the purely the hobby activities (ie non-professional radio experimentation) that's 100 years old.

To celebrate the centenary various articles and special features will appear in *Practical Wireless*. We are also looking for and making contact with our oldest known reader. Do you know anyone who fits into this category?

I'm hoping to contact our oldest known reader (when we find out who it is!) especially as *PW* approaches its own 65th anniversary year in September 1997. And in this respect I'm pleased to say that on 15th July 1997 I worked Tom McCrossan E17A on 3.702MHz during a regular 'natter nite' with friends in County Donegal. During the QSO Tom found his *PW* No. 1 copy and promptly read the contents page out to everyone over the air!

Needless to say, everyone in the QSO (Willie E14EK, John E19GB, John E16FF and I) were most impressed that Tom has been reading *PW* from 1932! So, I hope to get a photograph from Tom E17A to help us tell his story in *PW* as a tribute.

If you're a reader from the 1930s...we'd also like to pay you a tribute and we'll be delighted to do so, if you contact us with your details, photographs and memories. This is because if you remember seeing *PW* No. 1 when it was originally published, it means that you have been 'on the radio scene' for well over half the life of our hobby! So, in rounding off this month's 'Keylines' I'm looking forward to hearing from you as Amateur Radio approaches it's new century.

Rob Mannion
G3XFD

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

RECEIVING YOU

PW's Postbag. If your letter is published you'll win a prize.

Letters Received Via The 'Internet'
Many letters intended for 'Receiving You' now arrive via the 'Internet'. And although there's no problem in general with E-Mail, 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 don't forget to include your full postal address and callsign along with your E-Mail hieroglyphics! Editor

This Month's Star Letter

Vintage Style 'Speedbrush'

Dear Sir

Many issues ago you published a design for a novel Morse oscillator - 'The Speedbrush' with the key an integral part of the printed circuit. I have made up the item on a varnished softwood base with the speaker housed in a 1930s style assembly.

It's a slightly zany design, but local amateurs find it amusing. I suggest that your readers might be pleased with a published photograph.

James Glanville G3TZG
Coventry

Editor's applause: Well done James!

The Editorial team were most impressed with your 'vintage' style handiwork. Does the Morse have a 1930s 'style' to it as well? Readers interested in the project by Steve Ortmayr G4RAW can find it on pages 49 and 50 of the May 1991 PW (but the 'vintage' speaker is an optional 'extra!').



Just A Listener?

Dear Sir

Whilst reading the excellent article 'On Secret Service with G6TW & Skyrainger' by Leon Platt in the July issue of PW, I was moved to write to 'Receiving You'. The reason for this was because one particular sentence in the article struck a chord with me.

The sentence in question was "But in the early days, I was just a short wave listener". 'Just a short wave listener'? This sentence pretty much epitomises the way in which a considerable number of our fellow radio enthusiasts have regarded themselves over the years.

Why is it that short wave listeners feel they must demean their role in the hobby by adding 'just' or 'only' to the description

when talking to others? A lot of licensed amateurs wrongly assume that everyone within the hobby is desperately seeking a licence and that short wave listeners are just frustrated amateurs who either can't or won't take the RAE. This is a very popular misconception.

Just because an individual decides to listen to rather than talk on the radio doesn't make them any less intelligent or any less knowledgeable about the subject. Can we not accept that there are enthusiasts out there who do not want to talk to other enthusiasts over the radio.

The fact that someone, when asked what their callsign is, feels that they have to reply by saying 'Oh, I'm not licensed, I'm only a short wave listener' is a sad reflection on the way in which an enormous group within our hobby is treated by a good percentage of the rest. I feel it's time the value of the short wave listener was recognised and appreciated by the hobby.

The short wave listener is a precious asset providing Radio Amateurs and professional Broadcast Stations with unbiased and accurate information about transmitter performance, propagation, antenna performance, etc. An immense contribution is made to the hobby, each and every day, by the listener.

It's time the short wave listener could say they were a short wave listener without feeling like they were some sort of lesser being. A wise man once said that 'All amateur's are listeners for at least half of the time'.

Chris Carrington G0IYZ
Derby

Cost Of Components

Dear Sir

Your notes in the May 1997 PW 'Radio - Discover The Basics' about Bob Kent's bags of electronic bits at very low prices prompts an observation about the cost of parts for radio projects. As a keen constructor and supplier of kits, I am always looking out for bargains when sourcing components, the problem is that I must source them from suppliers who can deal with repeat orders so that the item will physically fit an existing p.c.b. design and perform as specified.

For example, not all 100pF ceramic plate capacitors have the same temperature characteristics. I cannot go to a rally and buy 100 of something at huge discount because that supplier/source will not be available when I want some more, thus all kit manufacturers have to buy from reputable sources and often from the same manufacturer.

The cost of simple mechanical parts like knobs, connectors, feet, etc. are very high in comparison with the common electronic parts, this accounts for the apparently high cost of some kits. The trend in professional electronics is for greater use of surface mount components which are totally unsuitable for nearly all amateur builders, leading to increasing difficulty in sourcing parts for home building.

The specialist parts that are needed for radios are now very expensive and becoming scarcer, such as (for example) air spaced variable capacitors. Similarly, if you want an f.e.t. intended for r.f. service, even the cheapest producing a few watts, now cost about £12 at the 25 off rate! These sorts of parts cannot be used in kits where the perception is that anything over £75 is too expensive! We need readers to buy more products using these specialist parts and then the price might come down!

Tim Walford G3PCJ
Somerset

Editor's comment: Having to 'buy to build' has always been relatively expensive unless the buyer is fortunate to get 'special deals'. And Amateur Radio - not being a 'bulk interest' pastime suffers as a consequence. However, when anyone complains to me about the price of kits - I point out the price (around £16 for a colourful, cleverly packaged and marketed basic 'crystal set') of the 'Grandad's Crystal Set' often promoted in the weekend newspapers. The component costs of these can rarely exceed £2. They usually employ 'slide tuning' using an inductance, a diode and an inadequate earpiece and they're what I call a 'rip-off'!

Editor's reply: I agree with every word you say Chris...so well done that man! We introduced the *PW* 'Listening & Operating Watch' to 'HF Far & Wide' because it was obvious that s.w.l.s were rather 'left out of it'. And I can assure you that I try very hard to correct s.w.l.s (when I meet them at shows, rallies and clubs) that they are not 'only just a listener'! In fact I try to tell them I'm a listener too - but I also have the privilege of being able to transmit although in common with most operators I do more listening than transmitting.

100 Years Of Amateur Radio

Dear Sir

In 1988, the scientific hobby of amateur radio will have been going for 100 years. The first amateur radio station in the world was in 1898 and was the station of MJC Dennis, who years later had the callsign EI2B and was the first President of the Irish Radio Transmitters' Society. The equipment used in 1898 was a spark transmitter and a coherer receiver.

Since 1898, radio amateurs have often led in the development of radio transmission. In the early 1920s, it was mainly through the efforts of amateur radio that national broadcasting started in Britain. Also, in the early 1920s, radio amateurs were way ahead of the professionals in the discovery and development of trans-world short wave radio communication.

After the Second World War, radio amateurs pioneered the use of a single sideband suppressed carrier radio transmissions. And in February 1954, the Yeovil Amateur Radio Club made what is almost without doubt the first long distance radio contact to be made with a transistor transmitter.

So, how is Amateur Radio going to celebrate its centenary next year? On January 1st, the Yeovil Amateur Radio Club plans to start the centenary year

by staging a working demonstration of home-made pre-First World War type amateur radio receivers (there was a Radio Amateur in Yeovil in 1913) and on January 8th, I will be giving a talk at the Yeovil Amateur Radio Club about the hundred years of Amateur Radio.

Whatever ways are chosen to celebrate the amateur radio centenary, planning needs to start now as 1998 will soon be here.

**Rob Micklewright
G3MYM
Somerset**

Editor's reply: As part of our own plans to celebrate the centenary I have asked Rob (anyone who has attended a lecture given by G3MYM will know how good he is!) to write an article for us. Of course, *PW* plans to mark the year with special features and we're also very interested in locating our oldest reader!

Protection For Plug-Ins?

Dear Sir

Whilst using one of the commonly used 'plug mounted' p.s.u.s to a 13A socket the thought entered my mind, what protection do we have should a fault occur within the p.s.u. or even a NiCad battery charger being used in a similar manner? The answer of course is the possibility of tripping a 30A circuit breaker controlling the ring main circuit or in the other locations perhaps a 30A fuse.

I have only come across one voltage controller burning up. This could have caused considerable damage being hidden away behind a curtain feeding a small domestic radio, with the possibility of causing a fire.

If the p.s.u. or charger is fitted with a trailing lead and a 13A plug top, the appliance could have an appropriate rated fuse fitted 2/3A for safety. The same problem also arises with some alarm systems being provided with a facility for batter charging back-up, once more being plugged

Electrostatic & Electromagnetic Hazards

Dear Sir

The following information is from published data as I remember it. Sources are from magazines, TV, radio, etc. (References forgotten). Basically, electromagnetic fields are believed and are used to promote healing and are produced by or generated by electrical currents (at low voltages in this case).

Electrostatic fields are generated by electrical voltages and can cause physical damage if the voltage is high. Research on failed high voltage cables showed that the insulation failed due to the equivalent of metal fatigue. The cause being that the electrostatic stresses caused the molecules to elongate along the lines of stress. Thus, in a high voltage, a.c. electrostatic field, to oscillate between spherical and ovoid in step with the mains frequency and in this way tearing the molecules apart.

The same cause is responsible for insulator failure on high voltage overhead power lines. Infra-red photographs show a temperature gradient progressing along the insulators as they degenerate. An odd effect (reported I think in *Wireless World*) indicated by research, that lightning flashes could not happen, because the individual droplet charge would be too low to jump the gap to the next droplet. However, the elongation effect (on the droplets) was noticed, due to the overall electrostatic stress, so the flash path was not impossible (as we all know of course) as at first appeared or calculated.

It's important to keep an open mind than to grow old gracefully. When considering dangers from electromagnetic and electrostatic sources you should decide for yourself if you want your brain molecules doing the 'twist' or perhaps 'booms-a-daisy', etc. In comparing other possible hazards, chemicals (supposedly harmless), e.g. nonal-phenol (used as a plastics lubricant) caused fish and reptiles to mutate and become sterile at 1 part per billion.

Gordon Pirie, Northern Ireland

directly into a 13A socket.

If a portable domestic appliance is purchased or even a range of power tools it's usual for the manufacturer to supply the appliance with a suitably rated fused plug top. I wonder whether or not you have received previous comments on this issue, in ten years readership of *PW* (and many failed competition entries!), my memory fails me. But then time goes by.

**Charles Nock 2EIAMT
West Midlands**

Editor's comment: All the 'plug type' chargers I've come across (using transformers) seem to incorporate fusible-link protection which melt, making the mains primary go 'open circuit'. But I have not had a failure yet! Readers' comments are welcomed on this topic.

Dayton Trip, Articles & Enamelled Wire

Dear Sir

It was nice chatting to the *PW* team at Dayton again. I really like the little 'British village' that was made up of *PW* & *SWM*, the RSGB and G-QRP Club. I also note in the July *PW* that you comment about folk

offering articles elsewhere first. I can imagine how you may feel hurt when you aren't the first, but rest assured, having the pleasant experience of working with the *PW* folk to produce the 'Spectrum Wavemeter' article, it's not a mistake I'll make a second time.

The enamelled wire problem and how to strip is one that many constructors face eventually. Having tried all the methods mentioned so far, the most successful I found, is to use a needle file. Just lay the wire across the file and rest your thumb on top. With the barest of pressure pull the wire through. Rotate the wire and repeat until the enamel has gone.

**Tony Fishpool G4WIF
Kent**

Dear Sir

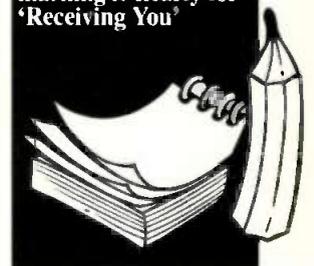
The effective method for Litz wire stripping is to pass the wire through the flame of the methylated spirit and quickly into the liquid methylated spirit in the tin lid. Trial and error soon tells you how long the passage through the flame should be before pulling the hot wire out - quickly. Wear goggles, and mind your fingers! My problem is finding a source of Litz wire. Hope this helps reader **John Noble**.
**G. A. Taylor G8AKN
Manchester**

Dear Sir

Having read of John Noble's continuing difficulties of removing the enamel from winding wire for soldering, I went out to the shack to see if my hand had lost its cunning after 40 years in the trade. Taking a tin lid, about 30mm diameter and 20mm deep I filled it with methylated spirits and lit it. Then I took a length of 0.315mm (about 30s.w.g.) enamelled wire and heated it in the methylated spirits flame, plunging it through the flame as soon as it glowed red right into the methylated spirits.

Result: clean bright copper. I can remember in the 1950s girls winding i.f. transformers doing this with 42s.w.g. multi-strand enamelled Litz wire, now they were really deft!
**Stewart Sims G3WQW
Nottingham**

Send your letters to the *PW* Offices, marking it clearly for 'Receiving You'



NEWS

1997

Compiled by Donna Vincent G7TZB



Silent Key - Bob Stone G4FPC - A Man of Quiet Courage

It's not often that it's necessary to feature a photograph of two people when writing an obituary to Commemorate a Radio Amateur but in the case of **Bob Stone G4FPC** who died on the 7th of June aged 62, it's very necessary to do so, because of the devoted partnership between husband and wife Wendy over many years of suffering.

Bob Stone was born in Kenton, Middlesex, but was brought up in Sussex and spent

his married life in Winchester. An inquisitive and ingenious man he was into everything from printing machines and printing to radio and became a very 'natural' Radio Amateur. He was delightfully friendly and possessed one of the happiest and gentlest natures I've ever come across. He also suffered from chronic illness for 27 years - but that never stopped him smiling.

After starting his own printing business - which he excelled at - Bob was struck down by complete kidney failure following an infection. This led to dialysis and frequent trips to London with Wendy. A kidney transplant was carried out but by the time I met Bob in the mid-1970s he was back on home dialysis - operating G4FPC from the portable building unit in the back garden which housed the home-dialysis (kidney) machine. He never was known for wasting any time!

Eventually another transplant provided him with another long spell of relief and the former home dialysis unit became his shack and printing room. But over the 27 years he was ill, the anti-rejection drugs took their toll on his immune system. This brave and quiet man of courage underwent 25 operations including four complete hip replacements, and three separate shoulder replacement operations and a knee joint. Yet he was never heard to complain.

Nothing was ever thrown away by G4FPC and he showed his determination by never giving up on a repair job. Always on the look out for bargains, he also tried to assist a certain magazine editor who needed specialist help...and often succeeded. He was certainly the 'Amateur's Amateur' and even printed friend's QSL cards for them - never charging the correct price either!

It was perhaps ironic that Bob died the week before I was due to visit the Winchester Club to provide a talk (he'd been made an honorary member). However, despite his absence the memory of his wonderful personality was felt during the silence we kept to mark his passing before the talk itself began.

Friends and family, and Radio Amateurs from all over the south gathered at Southampton Crematorium on Wednesday June 18th. But it wasn't a sad occasion because everyone had so many marvellous memories of this exceptionally brave and quiet man of courage who was always supported and backed up by Wendy and the children. It was an honour to know him and count the Stone family as friends. My sympathies and admiration go to his widow Wendy and their son and two daughters - who like their parents are achieving much in their own fields.

Rob Mannion G3XFD

Amateur Radio Still Exists In Leeds!



The Leeds Amateur Radio Communications Centre in Leeds have recently had their franchise agreement with Lowe Electronics discontinued and this has led to confusion over whether they are still trading or not.

As can be seen from the photo, Tom and Hazel are still very much in business and their shop, which has been trading for 21 years, is still thriving. The LAR Communications Centre are approved dealers for Icom, Kenwood and Yeasu products as well as a wide range of other amateur radio products.

So, if you are in the Leeds area why not call in to **Leeds Amateur Radio, LAR Communications Centre, 12 Station Road, Crossgates, Leeds LS15 7JX** or give them a call on **0113-232 8400** for details of their full range of products.

Novice Forum

During this year's **International RSGB HF/IOTA Convention**, which is being held over the weekend of 26/27/28 September 1997, a Novice Forum will take place. The Forum will be held on the 28th and will include thoughts on how the Novice system can be better integrated into main-stream Amateur Radio with the overall aim being to encourage newcomers to the Amateur Radio Hobby.

The Conference takes place at the **Beaumont Conference Centre, Old Windsor, Berks** and will offer those attending the chance to discover more about the world of h.f., meet old friends, attend lectures, visit trade stands and see a working demonstration station. For more information please contact **Fay Huxley 2E1EUA** or **Marica Brimson 2E1DAY** on (01707) 659015 or FAX: (01707) 645105.

Awards For AOR

At the Friedrichshafen rally held over the weekend of July 27, 28 & 29th in Germany AOR were awarded the Golden Microphone award from the readers of *Funk* magazine. The award was given for the AOR AR7030 being nominated as 'Best short wave receiver'.



The photograph shows **Richard Hillier (AOR's UK Sales Director)** and **Jun Oshima (Overseas Sales Director, AOR Japan)** jointly accepting the Golden Microphone award. In addition to this the AOR AR5000 received the *Funk* award for 'Best wide band receiver' with **Boger-Funk (German distributor)** accepting the award on behalf of AOR.

If you'd like to find out what makes AOR equipment worthy of awards like the Golden Microphone why not contact them direct at **AOR (UK) Ltd, 4E East Mill, Bridgefoot, Belper, Derbyshire DE56 2UA. Tel: (01773) 880780. FAX: (01773) 880788 or E-mail: info@aor.co.uk** Leaflets and price lists are available on request and if you have internet access you might like to visit the AOR Web site [ite at http://www.demon.co.uk/aor](http://www.demon.co.uk/aor)

Golden Call

The **International Short Wave League (ISWL)** would like to thank

Join In With JOTA's 40th Anniversary

Have you got happy memories of your Scouting days? If so perhaps you would like to help today's Scouts discover Amateur Radio by running your own Jamboree On The Air Station during this year's JOTA event. And this year's event is very special as JOTA celebrates its 40th year - and don't forget life begins at 40!

The *PW* Newsdesk has been sent an excellent annual report on JOTA in the form of the *Jamboree On The Air (UK Report 1996)* which makes interesting reading and provides much information. The A4-sized booklet is well illustrated with reports from participating stations in the 1996 event and leads off with 'editorial reports' from **Geoff Dellbridge G0PMF** the Scout Association Specialist Adviser for Amateur Radio and **Clive Catton G1BSN** the Association's Specialist adviser for the JOTA.

So, if you would like to join in and set-up your own JOTA station the Scouting Association would be pleased to have your support. To help, and in answer to a suggestion from *PW*, the JOTA team are making the *JOTA (UK Report 1996)* available for £2 (including postage) so that you can see what's going on before, what you're letting yourself in for and what you've missed in the past!

You can join in with JOTA by sending a cheque for £2 (made out to the Scouting Association) to: **The JOTA Team, Gilwell Park, Bury Road, Essex E4 7QW.**

Jamboree on - the Air



United Kingdom Report
1996

all those stations who took the time to work **GB50SWL** during their 50th Anniversary year in 1996. Over 9000 contacts were made, which all went to towards helping to make the ISWL's Golden Jubilee year a resounding success.

If you're interested in finding out more about the work of the ISWL you should write to them at **The ISWL HQ, 3 Bromyard Drive, Chellaston, Derby DE73 1PF.**

Television Anniversary

Over the weekend of 6 - 7th September **Ray Herbert G2KU** will be activating **G2TV** in commemoration of the first licence to be issued to **J. L. Baird** specifically for the transmission of television. The activation of **G2TV** marks the 70th Anniversary of the Royal Television Society.

In addition to this **Ralph Barrett G2FQS** will present 'Baird - The Man and His Television' at the **White Rock Pavilion, Hastings** on **Wednesday 15th October** at **7.30pm.** The White Rock Pavilion opened 70 years ago and **John Logie Baird** gave a talk on television there in October 1927.

Yaesu Winner



Photo courtesy of Ray Knight

Rob Mannion G3XFD (right) is pictured here at the Longleat Rally with **Ray Webber G7PWW** who was the lucky winner in the Yaesu FT-800R competition as run in the March 1997 issue of *Practical Wireless*. Ray travelled to the Longleat Amateur Radio Rally, which was held on 29 June, from his home in Kent to be presented with his prize by Rob on behalf of Yaesu UK. The *PW* team would like to thank **Barry Cooper G4RKO** of Yaesu UK for donating the FT-800R dual-band mobile transceiver as a prize and wish **G7PWW** hours of happy operating with his new 'toy'!

Success At S.R.P.



Mary Pink who works for **S.R.P. Trading** has recently passed her Radio Amateurs Examination on the first attempt. Mary's success means she now holds the callsign **M1BUB**, of which she is no doubt very proud. Mary has been in the retail amateur radio business for over 17 years and passing the RAE with a Credit is a worthy string to add to her bow.

Birmingham based **S.R.P. Trading** are manufacturers and

distributors of all types of communications equipment, so why don't you call in to congratulate Mary on her success and to sample the full SRP radio range? They can be found at **1686 Bristol Road South, Rednal, Birmingham B45 9TZ.** Tel: 0121-460 1581/7788 or FAX: 0121-457 9009.

Oops!

In last month's News pages a report appeared about the Sinclair X1 Button Radio. After the issue 'went to press' we were informed that the telephone number given was incorrect.

The number you should call if you're interested in purchasing an X1 is **(01933) 279300.** Apologies go to all those concerned for any inconvenience caused by the mix up.

Licence Revocation

The Radiocommunications Agency (RA) have informed *PW* that the Amateur Radio Licence issued to **Mr I Macpherson G4ZPZ** has been revoked. **Mrs Karen Scott** of the RA was unable to offer any further details on this case at the time of going to press.

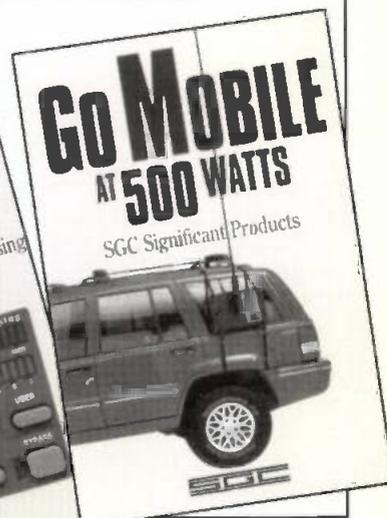
PLEASE SEND YOUR NEWS
TO DONNA VINCENT G7TZB
AT THE EDITORIAL ADDRESS

New Publications

The **SGC Corporation** of Washington State, USA, have recently published two guides which should prove of interest to many readers of *PW*.

The first of these is a 80-page guide entitled *Go Mobile At 500 Watts* which covers all aspects of mobile radio from the transceiver to the antenna and from installation through noise suppression to practical uses. The second is a 48-page guide to *Digital Signal Processing Facts And Equipment* which gives a very thorough and informative to DSP and its applications.

Both of the SGC guides are available free of charge from **Waters & Stanton Electronics, 22 Main Road, Hockley, Essex SS5 4QS.** Tel: (01702) 206835 or FAX: (01702) 205843.



Zoë says:
"keep the News and
those Club magazines
coming!"

CLUB Spotlight

Compiled by Zoë Crabb

These are your pages and I want to hear about your stories! Have you moved into a new club room, won a contest, got a funny story or news of a special event station? Then send it into me, I want to hear all about it. If you have pictures to accompany the story too, then even better! So, get writing and who knows, you might even recruit new members at the same time!

AMSAT-UK

For all satellite enthusiasts, don't forget AMSAT UK produce *Oscar News* which is published bi-monthly. The AMSAT-UK club call is G0AUK and Nets are held frequently on h.f. and v.h.f.

The AMSAT organisation is a world-wide group of amateur radio operators who share an active interest in building, launching and then communicating with each other through non-commercial amateur radio satellites. But you don't need to be budding satellite designers to join.

Set-up in the early 1970s with just an occasional newsletter, AMSAT became larger and demanded more time from the volunteers involved. Then, in 1978 **Ron Broadbent G3AAJ** became the Honorary Secretary and started to organise the group on a more formal basis.

When Ron retired from his job in 1985 he worked full-time for AMSAT. Ron's hard work on behalf of radio amateurs and AMSAT was rewarded at the beginning of 1995 when he was awarded an MBE (see photo).

The AMSAT-UK Colloquium, an event held each year, enables the members of AMSAT to enjoy a few days of technical education, a few beers and a natter with friends, plus being able to meet and discuss your problems with the 'stars' of the satellite world. Lectures are middle of the road and talks and demonstrations enable newcomers to get the most out of the hobby. It is also a fun weekend!

The Hon. Sec. & Treasurer **Ron Broadbent G3AAJ** is retiring from his official duties in support of the society at the end of 1997. Ron and his wife Beryl have between them provided enormous service to AMSAT-UK and the Amateur Satellite Service for more than 20 years.

Over the course of the last two years, the AMSAT committee has been steadily planning and implementing a gradual and smooth hand-over of the range of tasks, previously undertaken by Ron and Beryl, to other members.

All enquiries for AMSAT-UK including orders for supplies, etc. should be addressed to the Secretary, 94

Herongate Road,
Wanstead Park,
London E12 5EQ.
This includes the
payment of
donations.

Ron G3AAJ's hard
work was rewarded at
the beginning of 1995
when he was awarded
an MBE.



Novice Licence Course

The Siemens Amateur Radio Club will again be running a Novice Licence Course this autumn for anyone interested in getting started in Amateur Radio. The course has run for a number of years now and continues to have a 100% pass rate.

The club will be holding an introductory meeting on Wednesday 10 September for people to find out more about the course. The course starts properly on the following Wednesday (17th September) and runs on both Wednesday evenings and Sunday mornings through until the Christmas exam.

This year, the club have four instructors: **Paul G0SPA**, **Alan G7LNV**, **Doug G7KSL** and **Keith G6PRK** to help new recruits get through the exam. To get more information about the club, either turn up at the introductory session at the Radio Shack on South Road, Beeston, Rylands, or telephone Paul Benson G0SPA on 0115-922 7279 or E-mail the Club Secretary G4VFK on chrisarcher@compuserve.com

New Rally Venue

The Bishop Auckland Radio Amateurs Club (BARAC) Rally takes place on November 23rd at Spennymoor Leisure Centre. Please note this is a new venue, ideally suited for both trader and disabled

RAE Course

The Ynys Mon Amateur Radio Users Group (Wales) will be starting the next RAE course on the 29 September at their venue at 7pm for the May '98 exam. Any persons wishing to attend or require more information, please contact **Tony** on (01407) 832197 anytime before the date of commencement.

The Group hold their meetings every three weeks at the Scout Hall, Llangefni (opposite Kwik Save) at 7.30pm and they are from 27/8, 17/9, etc.

visitors as it boasts good parking and easy access to a large ground floor.

There will be the usual radio, computer, electronics and Bring & Buy stalls as well as catering and bar facilities. As you can imagine, there's lots to do for all the family within the confines of the leisure centre for those of the family not quite interested in radio.

Doors open at 11am (10.30am for disabled visitors). Admission is £1, under 14s are free of charge if accompanied by an adult. Talk-in on S22.

More details from the Rally Organiser, **Mike G0PRQ** on (01388) 766264.

Halkyn & District ARS

The well attended inaugural meeting of a brand new Society in North Wales took place back on Wednesday 4 June 1997. **Eddie Hewins GW3GSJ** and **Albert Thompson GW0IZR** were elected Caretaker Chairman and Secretary/Treasurer respectively.

Eddie & Albert's duties will be to get the Society

'up and running', pending elections for a full committee in September. A full range of activities is envisaged, but as with all new projects, may take a little time to achieve.

The Society welcomes all radio amateurs, short wave listeners and kindred spirits, and have within the current membership a wealth of enthusiasm and expertise which typifies amateur radio.

Meetings take place on the 2nd and 4th Wednesday in the month at **Halkyn Cricket Club, Nr Holywell, Flintshire** at 8pm. Visitors and prospective members are very welcome.

Further information can be obtained from **Eddie GW3GSJ** on (01352) 780334.

Military Wireless ARS

'Club Spotlight' has recently heard from **S. McKinnon G0TBI**, Net Controller of the Military Wireless Amateur Radio Society (MWARS) who has sent in a photo taken at the NEC in May of this year at the National Vintage

Club Reminders

Members of the **Hambleton Amateur Radio Society** meet at Allertonshire School, Northallerton at 7.30 to 9.30pm. Lots of future events are planned, so why not contact **John G0VXH** on (01845) 537547.

Meetings are held on alternate Thursdays at the Conservative Club, Rye Road, Hoddesdon for the **Hoddesdon Radio Club**. Lots of meetings are already planned. Find out more from **Don G3JNJ** on 0181-292 3678.

The **Stroud Amateur Radio Society** meet every other Wednesday at 8pm at the Minchinhampton Youth Club, Stroud, Glos. Find out more about future club events from the Club Secretary **Stuart Goodfield M1BFA** on (01453) 752411 or visit the Web page at: <http://ourworld.compuserve.com/Homepages/M1BFA>.

Members of the **Itchen Valley Amateur Radio Club** meet on the 2nd and 4th Fridays of each month, except August, at the Scout Hut, Brickfield Lane, Chandlers Ford, Hants (just up the road from SMC) at 7.30 for an 8pm start. Contact **Sheila G0VNI** on (01703) 813827 for more details.



Communications Fair. The photograph features members of the **MWARS**, which, like the **NVCF**, grows from strength to strength, with a membership currently standing at 289!

The Society exists for like-minded individuals who collect, restore and operate ex-military radio equipment. The Society are fortunate to have a wealth of technical expertise emanating from all points North, South, East and West of the country, including members in Europe, Africa, America, Australia, New Zealand and even one in Thailand!

A newsletter is produced bi-monthly by Editor and founder member **John Taylor-Cram**

2E1COC and contains many an interesting article on the repair, operating and restoration of ancient modulation equipment. The Newsletter also provides free ads to its members.

The Military Wireless Amateur Radio Society meet every Saturday morning at 0930 local time on 80m on a frequency of 3.625kHz \pm and, of course, in the a.m. mode. Anyone interested in calling into the Net, preferably with some kit, would be made more than welcome, and who knows, they may even become members of the group.

Details of membership can be obtained from the Secretary **John Taylor-Cram**, 7 Hart Plain Avenue, Cowplain,

Yeovil ARC QRP Convention Success

The 13th QRP Convention, which was held back on the 18 May, in Sherborne, was again highly successful, with all three lectures having capacity attendance. The introduction of 'Morse Tests On Demand' resulted in five successful passes and the peripheral displays of vintage radios, (including the **W1BCG** transatlantic contact re-enactment receivers), Novice equipment, Packet radio and **WX** Satellite reception created a large amount of interest.

Although a long time off, advance notice of a major shift of date for the 14th QRP Convention has been issued. The date is 19 April 1998. (See Radio Diary for further information at a later date).



(L to R) **YARC** Chairman **G7SDD**, **G3ROO**'s **XYL**, **Ian Keyser G3ROO** and **G3GC**. **Ian Keyser G3ROO** was the guest of honour at the 13th Yeovil QRP Convention held back in May. 'ROO' addressed the club's annual dinner and joined colleagues **G3MYM** and **G3CMK** to lecture in a hall packed with low power enthusiasts.

Waterlooville, Hampshire PO8 8RP.

Cheshunt Club On Web

The **Cheshunt Club** now has a World Wide Web page. The page contains the club information, programmes and also the latest copy of the club magazine *Hamster*.

The page may be accessed from two sites: <http://uhars.herts.ac.uk/~g40aa/cadarc.html> or <http://freespace.virgin.net/dennis.french/cadarc/cadarc.html> To read the *Hamster* it is necessary to have a Browser with Acrobat as a plug-in, as the *Hamster* magazine has been converted to the Acrobat format. It is in

colour and future issues will include the pictures in colour.

The Club meet at the **Church Room, Church Lane, Wormley, Hertfordshire** every Wednesday at 2000. Further information from **Dennis French G3TIK**, Hon. Sec. on (01920) 461711.

Bangor Rally Report

'Club Spotlight' has recently received a Rally Report Special from the **Bangor & District Amateur Radio Society**. The 30th anniversary rally was held in the Clandeboye Hotel back on the 22 June and was officially opened by the **RSGB** President **Ian Kyle G18AYZ/M10AYZ**.

Stewart G14OCK, Chairman, said that the rally was an unmitigated success with traders vowing to return next year. Apparently, a total of 372 people attended, which together with the club's own members, bought the number of people at the rally to over 400!

There was a slight downside, says Stewart, as several traders who had promised to come didn't show up, but all was not lost as on the other hand, a couple of traders who weren't invited did! Also, the hotel was not really geared up for providing bar snacks, though the management have promised to rectify this for next year.

Stewart would like to say a special thanks to the many traders who donated items of equipment for extra ballot prizes, thanks to **Martin Lynch & Son** for the first prize of a hand-held and to our very own **Rob Mannion** here at *PW* for the prize of a year's subscription. Keep an eye on these pages for news of next year's rally date!

Ian Kyle G18AYZ, **RSGB** President (right) at the opening of **Bangor & DARS's** 30th anniversary rally. He was introduced by **Keith Burnside G14IYO**, a club committee member.



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- 2 Watts RF out (9V)
- UK Repeater offsets
- Dual watch function
- CTCSS
- Scan functions
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- Supplied with 8 cell AA battery case (batteries not included)

Optional Extras

KH6/NP	NiCad pack (12V)	£29.95
KH6/HF	Flexi Higher Gain Whip	£12.95
KH6/CC	Soft Case	£9.95
KH6/PSU	NiCad Mains Charger	£9.95

only
£149

Antenna Tuners



AT300 150W compact tuner

A new compact high quality antenna tuner that provides adjustable impedance matching for all types of antennas. The AT300 also measures power and SWR using an illuminated frequency compensated SWR/Power meter. Using a 48 position switched toroidal inductor with silver plated double contacts it is possible to easily adjust for the lowest SWR Ratio on the selected transmit or receive frequency. A built in dummy load allows for off air tuning and testing.

- Matches dipoles, centre fed doublets, G5RV's, Balanced feeders, Verticals, Single wires, Delta loops, Beams, Windoms and Inverted V's.
- Built in 4:1 Balun for open wire feeders or balanced line fed antennas.
- Bypass position for quick straight through antenna connection but still with SWR/Power monitoring.
- 8 position antenna selector switching. • Built in dummy load.
- 4 way antenna switching including:
 - Direct coax 1, coax 2, bypass & dummy load.
 - Tuned coax 1, coax 2, wire and dummy load.
- Average power reading to 200Watts.
- Standing Wave Ratio measurements with easy set function.

SPECIFICATIONS

Frequency 1.8-30MHz
Power Maximum 150W continuous
 150W for 15 sec (dummy load)
Dimensions 8.7cm H x 18.2cm W x 23cm D (approx)
Weight 1.364kg

£129.95



AT1500 1500W high power tuner

The AT1500 is a solidly constructed high power antenna tuner using heavy gauge materials for the case and a "Beefed up" roller inductor constructed from 10 gauge wire on a Delrin low absorption former. Designed by Paul Hrivnak (founder and former owner of Vecronics in Canada) this unit is built to last!

- Matches dipoles, centre fed doublets, G5RV's, Balanced feeders, Verticals, Single wires, Delta loops, Beams, Windoms and Inverted V's.
- Built in 4:1 Balun for open wire feeders or balanced line fed antennas.
- Bypass position for quick straight through antenna connection but still with SWR/Power monitoring.
- 6 position antenna selector switching.
 - Direct coax 1, coax 2, bypass.
 - Tuned coax 1, coax 2, wire.
- For balanced feeders select wire and link on back panel.
- Average power reading to 3000Watts.
- Standing Wave Ratio measurements with easy set function.

SPECIFICATIONS

Frequency 1.8-30MHz
Power Maximum 1000W single tone, 1500W PEP
Dimensions 12.9cm H x 32.2cm W x 34cm D incl. terminals (approx)
Weight 4.82kg

£365.95

Accessories



AA30
Active Antenna Matcher
 A NEW shortwave listener antenna tuner using active electronics to give high selectivity & variable gain. The tuneable input peak control ensures best possible weak signal reception and interference rejection. Suitable for random long wire, dipoles, beverages, Delta loops, inverted V's, Verticals, G5RV and most receiving antennas.
Frequency 100kHz-30MHz
Power 12V DC or internal battery
Antenna Telescopic whip included for use as an active antenna if required
Dimensions 5.3H x 14.3W x 15.5Dcm
£69.95



VR28
High power roller inductor
 Solidly constructed using 10 gauge wire & Delrin low loss former this roller is suitable for use in high power applications up to 2000W (when matched).
Power 2000Watts
Inductance Variable to 28µH max
Dimensions 8H x 22.5W x 7Dcm
£59.95



VC220
High Power Variable Capacitor
 220pF high power commercial grade air variable capacitor, 4.5kV wkg. Suitable for 1.5kw tuners, amplifiers etc.
Dimensions 6.5H x 19W x 6.5D cm
£34.95



FL30 Low Pass Filter
 A low loss heavy duty filter that suppresses harmonics above 35MHz by up to 70dBs. Using a 9 pole inverse Chebyshev design and high quality construction this unit will substantially help to reduce TV interference etc. at source.

£49.95



DL1500
Dummy load
 High quality dummy load with built in fan cooler. Enables short term off air testing up to 1500W for freqs up to 500MHz.
Dimensions 7H x 22W x 7.7Dcm
£59.95



PB1500
High Power Balun
 High power balun using Ruthroff Voltage design to give efficient 4:1 matching of open wire or balanced feed systems. Designed for internal mounting
Ratio 4:1 Balun
Power 1500 Watts peak
Frequency 2-30MHz
Dimensions 6.3H x 6.3W x 4.2Dcm
£19.95

Precision Turns Counter
£59.95



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SG-230
200W RF
£349

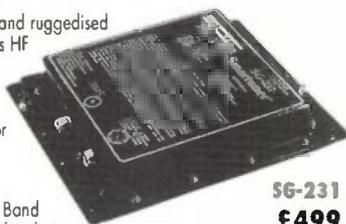
- 1.6MHz 30MHz
- Tunes random wires from 8ft to 300ft
- Multiband with a single wire
- Keeps the RF away from the shack
- Ideal for HF Mobile or Marine multiband operation with a single 7ft whip



SG-235
500W RF
£1195

HF-VHF SmartTuner® SG-231

A new low profile metal cased and ruggedised Wideband auto ATU that covers HF plus 6 mtrs! Designed for use either at the masthead (as the centre of a multiband wire antenna) or in mobile, marine or base station operations.



SG-231
£499

- 1 - 60MHz ● 100W PEP
- Waterproof ● Covers 6 mtr Band
- Multiband with a single mobile whip
- Multiband any length of wire end or centre fed (min 8ft for 160mtrs)

PowerTalk™ SG-2000

A ruggedised HF Transceiver with advanced DSP features

- PROFESSIONAL USERS ● AMATEUR HF ● AMATEUR/INTERNATIONAL MARINE

Built to Military standards the receiver uses state of the art Digital techniques that offer Adaptive Signal Processing ADSP® and SNS® Spectral Noise Subtraction.



SG-2000 £1495

- 1.50W PEP ● Remoteable head
- 1.6MHz-30MHz TX ● 500kHz-30MHz Rx
- Send for full details

SmartPowerCube™ SG-500

500W Mobile HF linear amplifier

- 500W RF output ● 12V operation
- 1.6 - 30MHz ● Microprocessor controlled
- Ideal for fixed - Mobile & Marine

Monitors your power needs and antenna condition and automatically in less than 1.5 milliseconds - selects the right bandwidth filter.



SG-500 £1150

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Slim line, efficient, single whip multiband mobile antennas. No extra resonators, "porcupine" extenders or coffee jar size coils are required! All WARC bands are built in.

These models now with HF plus 6mtrs and 2mtrs!

OUTBACKER® JUNIOR PLUS

A single whip - only 3' long that covers 80 through 10 metres plus 6 and 2 metres. No larger than a VHF/UHF colinear whip

Price **£225.00**

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A 6ft antenna covering 80 through 10 metres PLUS 6 metres and 2 metres. Rated at 100W PEP. Low profile.

Price **£249.00**

OUTBACKER® 8

6ft 300W PEP. 8 bands 80-10m. The standard mobile antenna.

Price **£199.95**

OUTBACKER® 8 (T)

The famous OUTBACKER® 8 antenna above but with the addition of the 160 mtrs band.

Price **£219**

OUTBACKER® 8 SPLIT

6ft 300W PEP 8. Breaks down into two 3ft sections for easy storage. 8 bands 80-10m. Storage pouch included.

Price **£219.95**

OUTBACKER® 8 TRI SPLIT

A three section splittable version (3x2ft sections) of the popular Outbacker® 8. 6ft long 300W PEP covers 80-10m band.

Price **£229.95**

OUTBACKER® PERTH

The PERTH has a 4ft shaft with a 3ft whip, low resistance and hatch mountable with high performance. Rated at 150W PEP, with a 80 through 10 metres.

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OUTBACKER® PERTH (T)

The famous low profile PERTH antenna above but with added 160 mtr coverage.

Price **£235**

OUTBACKER® JUNIOR

Low profile 4ft antenna 150W PEP covers all bands including (WARC) from 80 through to 10 mtrs.

Price **£179.95**

OUTBACKER® SPRING BASE

The OUTBACKER SPRING BASE has standard 3/8-24 threads. The spring is made of zinc plated steel. The base is nickel plated machined brass with an SO-239 female connector. Requires 1/2" hole for mounting.

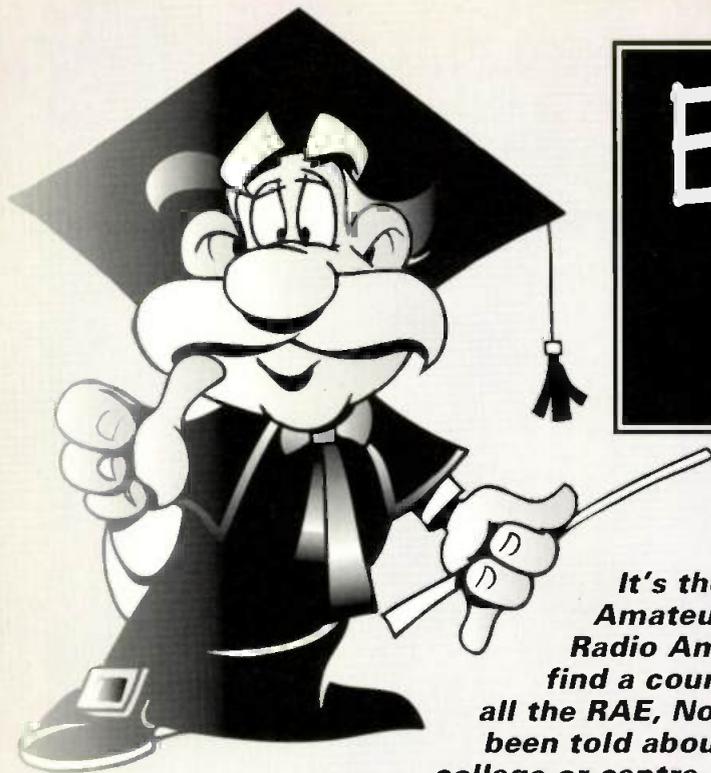
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Examination Time!

Rounding-Up To The RAE

It's the time of year when all budding Radio Amateurs should be thinking about enrolling on an Radio Amateur's Examination course. To help you find a course in your area we've put together a list of all the RAE, Novice RAE and Morse courses that we've been told about. The list is laid out alphabetically by college or centre.

Of course, the PW list is not exhaustive and there are many courses that are not mentioned here. For details of other courses that are running this year contact the **City & Guilds** at **1 Giltspur Street, London EC1A 9DD. Tel: 0171-294 2468** or **FAX: 0171-294 2400.**

For more information on becoming a Radio Amateur contact the **Radio Society of Great Britain** on **(01707) 659015** or if you have a query regarding licencing, etc., then please get in touch with the **Radiocommunications Agency (RA)** on **0171-215 2150.** The RA can also supply a range of leaflets of the services they provide, to find out more contact their **Information and Library Service** on **0171-211 0502/0505.**

And finally don't despair if there isn't a course running in your area or if you're unable to get to a college or centre, you can contact the **Rapid Results College** on **0181-947 2211** for details of their correspondence courses.

So, what are you waiting for? Look at our list, pick a course and make sure your name is among the next batch of new licensees!

21 Willow Walk,
Culverstone,
Meopham, Kent DA13
OQS.

Len Buck G0DLR, who's been helping students through the RAE for 15 years, will be running an **RAE** course starting on **Friday 3 October** running through until the May 1998 exam. Arrangements have been made for students to sit the exam at the **North West Kent College of Technology, Dartford.** If you're interested in joining Len's course, you should write to him at the above address or call him on **(01732) 823483.**

Bradford & Ilkley
Community College,
Hanson School,
Sutton Avenue, Five
Lane Ends, Bradford
2, West Yorkshire.
An Adult education
Morse Class will start

on **Wednesday 17 September** from **7 - 9pm.** The course will run for 30 weeks in preparation for the 12w.p.m. Morse Test. All are welcome including beginners. For more information contact the course tutor **Vicky Turner G0RJC** on **(01274) 586882** before **25 August** or from **9 September** onwards.

Bexley College, Tower
Road, Belvedere, Kent
DA1 6JA.
An **RAE** course will commence **September 1997** in preparation for the May 1998 examinations. The course tutor will be **Colin Turner.** Anyone interested in enrolling should telephone the **Guidance & Admissions Centre** on **(01322) 442331 Ext. 3888/3833** and leave their **name, address and telephone number** so an enrolment form can

be sent to you during the summer break.

Bury Radio Society,
Mosses Centre, Cecil
Street, Bury,
Lancashire BL9 0SB.
The Bury Radio Society will be running an **RAE** course commencing in **September.** Interested parties should contact the Honary Secretary **Steve Gilbert G3OAG** at the the above address for details of how to enrol, etc.

Darlington & District
ARS, The Grange,
Hunworth on Tees, Nr.
Darlington, Co.
Durham DL2 2BN.
New **RAE** and Novice **RAE** courses are about to start at the above club. The starting dates are imminent so anyone interested in enrolling should contact either of the club's two instructors, **Fred Coles G7TKB** on **(01325) 465523** or **Pat Fox-Roberts G0TZU** on **(01325) 461962**

immediately. The only cost to those enrolling is to become a club member.

Highfields ARC, 26
Allensbank Road,
Cardiff, Wales.
An **RAE** course will start on **Thursday 11 September** at **7pm** and will run weekly through to the May 1998 exam. The cost of the course is **£35** which includes full club membership until December 1998. Tutored by former RSGB president **Clive Trotman GW4YKL** the course is open to both able bodied and disabled people. For more information contact **Richard Hale GW0SKO** on **(01222) 750856.**

Hilderstone Radio
Amateurs Course.
Starting in **late September** an **RAE** course centered on East Kent will run on

Tuesdays from **7 - 9pm.** This course, tutored by **Ken Smith G3JIX** will contain practical projects and demonstrations given in 'JIX's inimitable style. Contact **Vince DeRose G0CLO** on **(01843) 869812** to get your name on the course list.

Kelghley College,
Harold Town Building,
Dalton Lane, Kelghley,
West Yorkshire.
Beginning on **Tuesday 16 September,** **Ralph Turner G3VRX** will once again be running an **RAE** class at Kelghley College. The classes will run from **7 - 9pm** and enrolment for the course is taking place from **Wednesday 3 to Saturday 6 of September.** For more details you are invited to contact **Keighley College** on **(01535) 618556** or **Ralph** direct on **(01274) 586882.**

Murray Park Community School, Murray Road, Mickleover, Derby DE3 5LD.

An RAE course starts on **24 September** and the tutor will be **Frank Whitehead G4MLL**. For further details either contact Murray Park School on (01332) 515922 or Frank direct on (01332) 512080.

Newstead Woods School, Avebury Road, Orpington, Kent.

An RAE course will begin on **Monday 15 September** at 7.30 - 9.30pm running through until the May 1998 exam. To enrol on this course please write to **Bromley Adult Education College, Church Lane, Prince's Plain, Bromley BR2 8LD** or telephone 0181-462 9184. To find out more about the course you're invited to contact the course tutor **Alan Betts G0HIQ** on (01689) 831123.

Newbury Technical College.

On **Thursday 11 September** an RAE course starts and will run from 7 - 9pm on subsequent Thursdays (Course no: 99018A). In addition to this, a 12w.p.m. Morse course will start on **Tuesday 6 January 1998** from 7 - 8.30pm (Course no: 99208B). Contact **Newbury College** on (01635) 35353 or **Ray Oliver G3NDS** on (01672) 870892 for more details.

Northfields School, Dunstable, Bedfordshire.

An RAE course will start on **September 24** with **R. A. Joyce G3WLM** as the course tutor. More details from **Mrs J. Enright** on (01582) 868285.

North Trafford College, Talbot Road, Stretford, Manchester M32 0XH.

An RAE course will begin in **September** and run on **Monday evenings** from 6 - 8.30pm through until the December exam (a new course will begin after the Dec exam).

There will also be an RAE course running for half a day on Wednesdays aimed at unemployed and retired people, etc. Enrolment takes place from **2 - 5th September** inclusive. For more information please contact **John Beaumont G3NGD, North Trafford College, Talbot Road, Stretford, Manchester M32 0XH. Tel: 0161-886 7070.**

Nunsfield House Amateur Radio Group, 33 Boulton Lane, Alvaston, Derby DE24 0FD.

Beginning on **6 September** the **Nunsfield House ARG** will be running an **Novice RAE** course. The course tutor will be **Frank Whitehead G4MLL**. For further details either contact Nunsfield House ARG on (01332) 755900 or Frank direct on (01332) 512080.

Palmers Green, London N13.

In association with the Southgate ARC **Steve White G3ZVW** will be tutoring a 30-week RAE course starting on 1 September. For enrolment and further details contact Steve on **0181-882 5125.**

Sawston Village College Community Centre, Cambridge.

Peter Buchan G3INR is tutoring an RAE course which starts in September. For more information please call (01223) 834492.

South Notts College, Graythorn Drive, West Bridgford, Nottingham.

An RAE course starts on **10 September** and will run on subsequent Wednesdays from 7 - 9.30pm in preparation for the May 1998 exam. Enrolment takes place at the college during the two weeks leading up to the start of the course. Interested parties should contact the course tutor **Alan Lake G4DVW** on 0115-9382509 or via E-mail on: **100775.730@compuserve.com**

Swindon Technical College.

On **Monday 15 September** an RAE course starts and will run from 7 - 9pm on subsequent Mondays (Course no: UFF30S). Contact **Swindon College** on (01793) 498300 or **Ray Oliver G3NDS** on (01672) 870892 for more details.

Tile Hill College, Tile Hill Lane, Coventry CV4 9SU.

Morse, RAE, and a post RAE & Short Wave Listener's course will be starting in September at the above centre. More details can be obtained from **Mike Dixon G4GHJ, Student Services, Tile Hill College, Tile Hill Lane, Coventry CV4 9SU. Tel (01203) 694200 Ext. 221.**

Trowbridge & District ARC, Southwick Village Hall, Wiltshire.

Starting in **September** the **Trowbridge & District ARC** will be offering prospective Radio Amateurs the chance to take the RAE by joining their course. For more information contact **Chris Parnell G0HFX**, the course tutor on (01225) 764874 (evenings) or **Ian Carter**, the club secretary on (01225) 864698.

West Notts College, Derby Road, Mansfield.

An RAE course starts on **8 September** and will run on subsequent Mondays from 7 - 9.30pm in preparation for the May 1998 exam. Enrolment takes place at the college during the two weeks leading up to the start of the course. Interested parties should contact the course tutor **Alan Lake G4DVW** on 0115-9382509 or via E-mail on: **100775.730@compuserve.com**

Widnes & Runcorn ARC, The Beacons, Simmons Lane, Frodsham, Cheshire. Enrolment for **RAE & Novice RAE** courses takes place on **Friday 5 September** from

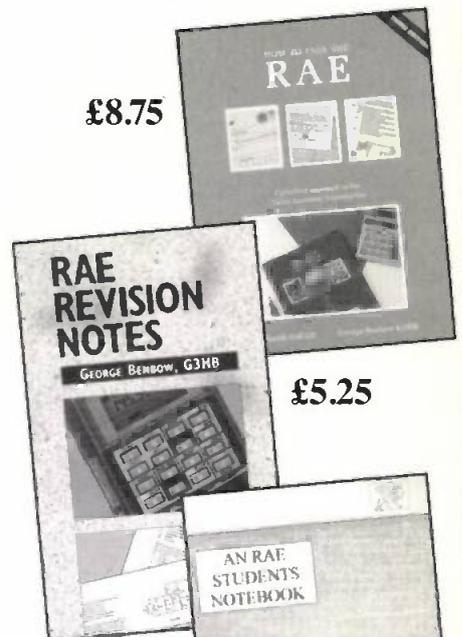
7.30pm for courses beginning in September. The course tutors will be **Dave Bibby G1PIZ** and **Dave Wilson G7OBW** who can be contacted for information on (01928) 591 401 or (01270) 761 608 respectively.

White Hill Centre, Chesham, Bucks.

An RAE course will start at **7.30pm** on **Tuesday 16 September** and a Morse course will begin on **Thursday 18 September** at **8.00pm**. More information can be obtained from **Shirley G4HES** or **Ron G3NCL** on (01494) 776420.

Don't forget that if you need text books to supplement your RAE learning the **PW Book Store** stocks a comprehensive range (see pages 88 & 89) of this issue for a full list). To order a book use the **Order Form** in this issue or call the **Credit Card Hotline** on (01202) 659930. And while you're studying for your RAE make sure you don't miss **Rob Mannion G3XFD's** bi-monthly 'Radio - Discover the Basics' column here in *PW*.

£8.75



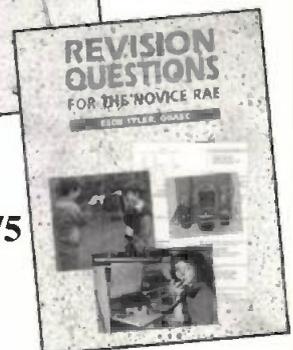
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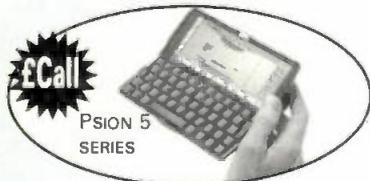
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RADIO DISCOVER THE BASICS

By Rob Mannion G3XFD

Rob Mannion G3XFD suggests you get your magnets on stand-by - as he's going to show how you can generate electricity and learn at the same time. But be warned - you won't be able to compete with your local power company!

Further Reading

Pages 9-7, 9-9. Chapter 9 of *Understanding Basic Electronics* (Published by ARRL) available from PW Book Store for £16.50 plus £1 P&P UK, £2 P&P overseas).

Learning to solder is important: To help the PW Bookstore stocks the Babani book *The Art Of Soldering* which costs £3.99 plus £1 P&P UK, £2 P&P overseas).

Last time (July) I described one of the very basic methods of generating a flow of electrons - which we think of in terms of an electrical current - by chemical means. Hopefully by now many of you will have shrivelled up lemons lying around after your successful experiments!

This month I'm going to describe one of the mechanical means of generating electricity using 'permanent' magnets. Nowadays, efficient permanent magnets are very easy to obtain. And one of the convenient sources is the so called 'fridge magnet' reminder device.

The fridge magnet devices use 'ceramic' magnetised material and they're cheap and usually very efficient. But please ask permission if you're going to 'hi-jack' a fridge magnet rather than buy one!

Remove the magnet from the display fronting (usually aluminium) and you'll see that you have a flat disc magnet. This is called a permanent magnet because it has been placed in an extremely powerful magnetic field and retains a magnetic field of its own.

The term permanent differentiates the type of magnet you're going to use from the other commonly used type - the 'electromagnet'. This form of magnet can be switched on and off and as I'll demonstrate later in the series - is an amazingly useful device and very easy to make.

However, before getting started with the experiments, I'm going to describe some facts about the magnet. And I should at this point make you fully aware that the ceramic magnet is made from a very

brittle substance. Take care not to drop in on a hard floor - otherwise you could have lots of little magnets or a magnet which has lost some of its magnetism!

Magnetism Miracle

Magnetism is a true 'miracle'. To even begin to understand what it is you'll have to become an expert on physics! But that won't stop you understanding what they do and what we can use them for.

The diagram, Fig. 1, shows a typical 'bar' magnet and its associated magnetic field. The 'invisible line of force (as illustrated in the diagram) can be identified by using iron or steel filings. **But be warned - if you place iron or steel filings in the magnetic field of a magnet - make sure you place a sheet of paper over it first because otherwise you'll spend the proverbial 'month of Sundays' trying to remove them from the magnet's surface! You have been warned!**

Incidentally, the shape of the magnetic field from a flat disc magnetic is interesting to see with the method I've described. So, take a look for yourself!

The 'North Pole' and the 'South Pole' ends of the magnet are named because they align themselves approximately with the Earth's magnetic field. And if you were to be able to see the particles of metal within the magnetic - you'd see they were made up from (in effect) lots of little magnets all aligned North-to-South.

Hundreds of years ago before modern methods of producing strong magnetic fields were known, there were basically only two methods of producing a magnet. The first (mentioned thousands of years ago in ancient Chinese documents)

magnetic field.

The second method was discovered by ancient blacksmiths. They discovered that iron would become magnetic as they hammered it into shape. This was because the metal particles were literally 'shaken' into alignment - thus producing a useful magnetic field (and it's also one of the reasons why a magnet can lose some of its effectiveness when dropped onto a hard surface).

Making Electricity

Now you understand a little bit about magnets - let's use them to make electricity! And to do so all you need is your small magnet, a length of small diameter enamelled copper wire, a flat topped metal nail (a steel wire nail is best) and a test meter.

Wind enough of the enamelled wire onto the nail to make two layers (this is called a 'solenoid' winding). Connect the ends to your test meter (set it onto the lowest current range) and slowly pass the magnet over the nail head and watch the meter scale.

As the magnetic field from the ceramic magnet approaches the top of the 'solenoid' the nail actually helps to 'focus' the field to within the coil. By doing so it literally disrupts electrons from their natural 'orbits' in the atomic particles of the metal. The effect is then basically the same as I described in Fig. 2 on page 18 of the March issue of *PW*.

You'll notice the meter pointer moves first in one direction as the magnet approaches the nail head, and then reverse direction. This is caused by an alternating current (a.c., as it flows in alternate directions) In fact you'll have created a very simple form of alternator!

If you want to be adventurous you can experiment and make much more efficient alternators. With magnets mounted (securely) on bicycle wheels with a carefully wound 'pick-up' coil you can generate enough current to illuminate cycle lamps. And if you do - you'll learn a tremendous amount about a.c., and the difficulties and techniques of generating current.

Next time I'll explain about how a.c. is converted into direct current (d.c.) using something called a rectifier. And although you may not believe it - it can be compared to the valve on a bicycle tyre!

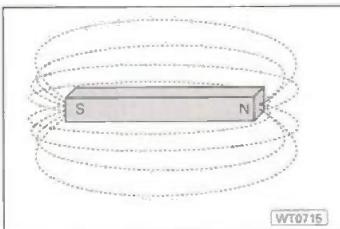


Fig. 1: The magnetic force field associated with a simple bar magnet (see text).

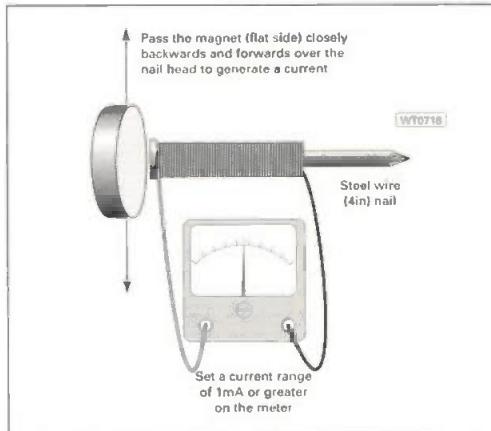


Fig. 2: Making a simple alternator and producing electricity with a magnet, wire and a nail! (see text).

involved stroking metal needles against naturally magnetised metallic ore 'stones'. The metal particles in the needles then gradually aligned themselves North-to-South and thus developed a useful

Discovering Amateur Radio

By Mike Lawton GW4IQP

Just discovered radio as a hobby? Well...as it's rapidly approaching the time of the year when newcomers to Amateur Radio are wondering how to get going, Mike Lawton GW4IQP provides some helpful background, tips and advice on the successful 'road to radio'.

If you have recently become interested in something, your first move is to find out some more about it. In the case of a hobby, one obvious course of action is to visit your newsagent and look for a magazine on the subject.

Having found one however, your problems are just beginning, since you will be confronted with a wall of apparently meaningless jargon - and this is particularly so with Amateur Radio - and a few clues to its meaning!

In addition, there will be a selection of features (of course they won't make sense at this stage), readers' letters bemoaning the current state of affairs, lots of advertisements for unaffordably but obviously essential equipment, reports and editorials. My article aims to 'climb that wall' to dispel some of the mystery and terror that fences the world of amateur radio against the newcomer!

communications facility. It uses radio sets of low power and approved design and manufacture. (See end panel on how to get your CB licence).

On the other hand, the Amateur Radio service provides the opportunity to use many different forms of radio communication, both local and international and encourages the modification, construction and design of the equipment - but at the price of having to sit and pass an approved examination.

If your desire is to talk to other people with the minimum of bother and without worrying about what your radio does or how it does it, then CB is probably for you. The CB hobby can provide you with a fascinating insight and introduction to amateur radio communications. If, however, you wish to go a little further, then Amateur Radio itself may well hold something for you.

Three Basic Requirements

If you want to communicate by radio, there are three basic requirements. These are a transmitter, which sends the radio signals, a receiver for listening to signals from other people and an antenna or aerial for getting the signal out of your set.

Sending signals, in this country as in most others, requires a licence issued on behalf of the Department of Trade & Industry (DTI) by their subcontractor Subscription Services Ltd. (See end panel for SSL's telephone service number).

However, simply receiving Amateur Radio transmissions or Short Wave Broadcasting stations does not. (You should be aware that receiving any signals other than Amateur Radio and broadcast entertainment is strictly illegal unless you hold the appropriate licence).

Taking the City & Guilds (C&G) Radio Amateur's Examination (RAE) or Novice Radio Amateur's Examination (NRAE) is not as terrifying as it may sound. It's only intended to make sure that people who are permitted to design and construct their own transmitters have some idea of what they're doing. And recently in *PW* readers were told of a very happy

88 year-old Amateur who's passed his RAE at first attempt!

An Amateur Radio station can operate in several different ways. It can transmit ordinary speech, which is the most popular method or 'mode'. It may send Morse code, in which the message is sent as a series of dots and dashes (although this is the oldest method, it is still very popular).

The station may transmit typescript, by means of a teleprinter (remember the beginning of the old 'Grandstand' programme? No? Oh well, age gets all of us) or by means of a home computer which can also send and receive 'Packet' radio (literally little 'packets' of encoded computer information via radio). And for the specialist, it may transmit television pictures, either still (slow scan TV) or moving (Fast Scan).

On The Air

While on the air most Amateurs operate from their houses (the 'base station') but many have mobile transmitters in their cars, or carry hand-held 'walkie talkies'. Amateur radio can, under the right conditions, reach any country in the world, and almost every country has licensed Radio Amateurs.

It's sometimes possible to talk to Russia one minute and New Zealand the next, and in this lies one appeal of the hobby.

Amateur radio is allowed to operate on a number of different 'wavelengths' or 'frequency bands'. There are nine bands available in what is called the high frequency (h.f.) area, three in the v.h.f. portion and three in the u.h.f. portion. In addition, there are a number of microwave frequencies allocated to Amateurs, but these are for the specialist.

An urgent question in the minds of many people is that of the cost of the hobby. Magazines are full of advertisements for incomprehensible multi-knobbed machines at staggering prices, often thousands of pounds, and the second-hand columns often aren't much better. Well, you can breathe again. Not only is it not necessary to spend money like that, it's not desirable at the beginning, either.

For many people, the best part of Amateur Radio is making and talking to their friends, locally, nationally or internationally (although with widely differing time zones, the later may make you unpopular with other members of your family). For others, it's tinkering with their gear or developing new techniques or a countless number of combinations available in the hobby!

Some enjoy contacting new countries and collecting the special acknowledgement cards (QSL cards) that operators send to each other. For



"...You'll visit your newsagent and look for a magazine on the subject. Having found one however, your problems are just beginning, since you will be confronted with a wall of apparently meaningless jargon...!"

The Hobby

The hobby of communicating with other people at a distance, using neither wires, semaphore, smoke signals or telepathy, is broadly divided into two basic parts. One is the Citizens' Band Radio service (CB) and the other is Amateur Radio Service.

The difference between the two services lies in the fact that CB provides an 'instant access' (well...almost!) on payment and issue of a licence short range personal

the competitively (or combatively) minded, radio contests are held frequently, in which the purpose is to contact as many stations as possible, as far away as possible, in a given time.

Rallies are frequently held at various locations around the country, at which you can meet other enthusiasts, see what new developments are about and buy and sell equipment.

Often Asked

Another question that is often asked is 'What do you talk about?' and there's no short answer to this one. Religious and political matters are barred, since it's much too easy to give offence unwittingly and so are business matters, since the licence is granted for Amateur use only.

A new contact normally begins with operators exchanging call signs, names, locations and details of equipment used, and goes on from there. It may stay technical or wander anywhere at will.

The oddest contact I can remember was arguing with a Venezuelan station, in very bad French (used as a common language) about how to cook a Christmas pudding. At least that was what I was arguing

about!

If you've reached this far, you're probably thinking 'well, that sounds all right, but how do I have a go? All that stuff about exams and licenses, I haven't taken an exam in years'. Well, it's a bit easier than it sounds. Stage one is to read the rest of this magazine from cover to cover and see how much, if any, of it you can understand.

Local Library

Next, see if the local library has any helpful books. Thirdly, find out (again from the library) where your local Amateur Radio club is and go along to see them. Most Amateurs are friendly souls and only too willing to talk (the problem is usually stopping them!)

Age, disability, colour, sex, creed or race is no bar and many clubs run beginners groups or lectures. If, after all that you feel sufficiently adventurous to follow it up, find out about courses for the RAE (Page 16 and 17 in this issue: Editor). They are frequently run by the local Technical College at night classes, and the lecturer is usually a club member.

The C&G RAE two part multiple choice exam has been held twice a year, in May and December. But from May 1998 it becomes a single paper of

80 multiple choice questions. (Full details were published on page 16 of the April PW).

The RAE syllabus covers basic electronic theory, operating techniques, licence conditions and preventing interference. Like the driving test, it is designed to give you the minimum knowledge necessary to let you loose on the airwaves and it doesn't matter how many times you fail.

If you pass, you may then apply for the Amateur Licence B, which allows you to operate on all v.h.f., u.h.f. and microwave bands. If you wish to operate on the h.f. bands, where most of the world-wide contacts occur, you must also learn to send and receive Morse code at 12 words (60 letters) a minute and pass the appropriate test.

Remember, these tests are for a transmitting licence. No licence or examination is necessary for receiving only and many people spend all their air time listening to the amateur bands, often constructing their own equipment and have no desire to transmit. It depends entirely on your own preferences. After all, it's only a hobby!

Licence & other

information: Licence Information and Radiocommunications Agency booklets *How To Become A Radio Amateur* and details on the Novice Licence can be obtained from **Subscription Services Ltd.** in Bristol (part of the Post Office) by telephoning **0117-925 8333**. Along with providing the Amateur Radio Licence fee collecting and issuing service, SSL also control the issue of CB radio licences.

Full information on either the Amateur or CB licence will be sent on request. Current cost for the CB licence is **£15 (no concessions)**, with the Amateur A and B licence also costing **£15**. The Novice Amateur Radio licence (A or B) also costs **£15**, but for anyone **under the age of 21** the licence is **free**.

Stop press: The RA have announced that as from **1st July 1997** the Amateur Radio Licences (A&B) are to be **free** for anyone **under the age of 21 years**. This concession only applies from 1st July and is not retrospective.

City & Guilds & The RAE: You can contact the C&G for more information on the RAE, procedures, examination on **0171-294-2468**.

PW

August 15: The Cockenzie & Port Seton Amateur Radio Club are holding their 4th Annual Radio Junk Night at the Cockenzie & Port Seton Community Centre, South Seton Park, Port Seton, near Edinburgh. Doors open 1830 to 2130. Bring along your own junk and sell it yourself. Tables will be provided on a first come first served basis (no charge for the table). Raffle at approx. 2100. Refreshments will be available. Disabled persons access. Entrance fee is £1 for all persons. All money raised is donated to the British Heart Foundation. Further details from **Bob Glasgow GM4UYZ** on (01875) 811723.

August 16: The Crawley Computer Fair will be held at The Hawth Centre, Hawth Avenue, Crawley, West Sussex. The Hawth is signposted around Crawley with brown signs. Usual computer bargains to be had. Doors open 1000 to 1600. Admission is £1.50 adults, 75p for OAPs and under 16s. **Steve Bealch** on (01342) 842966.

August 17: The Kings Lynn Amateur Radio Club are holding their 8th Great Eastern Computer & Radio Rally at a new venue, this is at **Wallington Hall, between Kings Lynn and Downham Market, Norfolk**. Features include a spacious indoor area with major exhibitors, outdoor car boot area (unlimited space available), Bring & Buy, free parking, talk-in on S22, refreshments available and easy access for disabled persons. For booking or more information call **Ian G0BMS** on (01553) 765614 or @GB70PC Packet BBS or E-mail **Ian** on **ian@g0bms.demon.co.uk**

August 17: The 2nd Cardiff Amateur Radio & Computer Fair will be held at The Star Sports Centre and Recreation Centre, Splott, Cardiff. Open from 10.30 to 1500. Further details from **Stuart Robinson GW0WMT** on (01222) 613070.

August 23: The Hove Computer Fair is being held in the 'Great Hall' of Hove Town Hall, East Sussex. This 8000 square foot event will be filled with computer stands, with impressive bargains offered for sale, including systems, monitors, printers, an enormous range of business and games software. Doors open at 1000 and close at 1600. Admission is £2 adults, £1 for OAPs and under 16s. **Steve Bealch** on (01342) 842966.

August 24: The Torbay ARS are holding their rally at the Torbay Leisure Centre, Paignton. Doors open at 1000. Talk-in on S22 by **G8NJA/P**. Further details can be obtained from **Alan G7UEK** on (01803) 214445.

August 24: The Galashiels & District Amateur Radio Society's Open Day & Rally will take place at The Volunteer Hall, St John's Street, Galashiels, Scotland from 1100 to 1600. There will be traders present along with a Bring & Buy stall, a raffle, refreshments and a bring & sell feature. Talk-in on S22. Tel: (01896) 850245 or (01896) 755943 (evenings only).

RADIO Diary

Compiled by **Zoë Crabb**

1997

*Practical Wireless & SWM in attendance

If you wish to have your Rally featured in Radio Diary, all you have to do is to put together as much information about the Rally as possible, ie. date, location, time, who to contact, etc., and send it to Zoë Crabb at the PW Editorial Office.

August 25: The Huntingdonshire Amateur Radio Rally (held Bank Holiday Monday) is to be held at **Ernulf Community School, St Neots, Cambridgeshire** (near Tesco Superstore on A428). Doors open at 1000 and admission is £1. There will be hot and cold refreshments available. Also features include a car boot sale on hardstanding. Talk-in on S22. **David Leech G7DIU** on (01480) 431333 (between 0900 and 2100).

August 30: The Annual Wight Wireless and Computer Rally will be held at the National Wireless Museum, Arreton Manor, Nr. Newport, Isle of Wight. Open 1000 to 1700. Free entry and plenty of free parking. Free stalls for both private and business use. There will be refreshments, exhibitions and collections for RAIBC Talk-in on S22. **Douglas Byrne G3KPO** on (01983) 567665.

August 31: The Telford Rally in Shropshire is 20 years old this year. The rally will be held, as usual, in the Telford International Centre. There is plenty of parking in Telford Town Centre car parks. There will be major dealers, a flea market and much more in two purpose built exhibition halls with plenty of room to enjoy the day. Also, disabled visitors will be well catered for. **Tony MOAMP** on (01743) 235619 or via **GB7PMB**.

September 6: The Ballymena Amateur Radio Club are holding their annual rally at **Ballee High School, Ballymena, Northern Ireland**. Doors open to the public at around 1200 noon. More info. from Club Secretary **Jeffrey Clarke G14HCN** on (01266) 659769.

September 6: The Redhill Computer Fair will be held at the

Harlequin Theatre, Warwick Quadrant, London Road, Redhill, Surrey. Situated in the centre of Redhill, all manner of computer bargains for sale by a wide range of exhibitors. Doors open 1000 to 1600. Admission is £2 for adults, £1 for OAPs and under 16s. **Steve Bealch** on (01342) 842966.

September 6: The 3rd Northampton Radio Rally & Car Boot Sale is to be held at the heart of the Shires Shopping Village Showground on the A5, just two miles north of Weedon, Northamptonshire. There will be a Bring & Buy, organised by the Northampton Repeater Group. Bring the family as they can spend the day in the 'old world' shopping village. Refreshments and toilets are also on site. Car parking only 50p. All enquiries on (01604) 32478.

September 7: The Andover RAC are holding their 2nd Annual Radio & Computer Boot Sale at the Army Air Corps Museum at Middle Wallop Airfield, near Andover, Hampshire. Talk-in on S22 - 144.550MHz. (01264) 391383 for further information.

***September 7:** The Lincoln Hamfest will be held at the Lincolnshire Showground, four miles north of Lincoln on the A15. There will be the usual trade stands, Bring & Buy, Morse test with two passport size photos required, refreshments, bar and ample free parking. Talk-in on S22 and SU22. For further details contact either **John** or **Sue** on (01522) 525760.

***September 7:** The Bristol Radio & Computer Rally is to be held at Brunel Centre, Temple Meads Station, Bristol. Doors open at 1030 to 1600 (disabled visitors 1015). Admission is £1. There will be a large Bring & Buy, under £30 Bring & Buy, refreshments, 100+ tables, (table hire at £15 each). **Muriel Baker G4YZR, 62 Court Farm Road, Whitchurch, Bristol BS14 0EG** or 'phone on (01275) 834282 (24hr answerphone).

September 13: The Reddish Rally is to be held at St Mary's Parish Hall, Reddish Road, Stockport, Cheshire. Doors open at 1000, and there is parking. Talk-in on S22. Further details on **0161-477 6702**.

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

The Editorial staff of PW cannot be held responsible for information on Rallies, as this is supplied by the organisers and is published in good faith as a service to readers. If you have any queries about a particular event, please contact the organisers direct. Editor



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antennas in action

■ NEWS & PRODUCTS ■ QUESTIONS & ANSWERS ■ ANTENNA WORKSHOP ■ REVIEWS ■

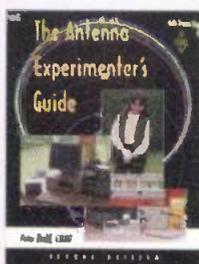
Your Design?

John G0JVR and Carolyn M0ADA of Cornish Kites can supply kites of all designs including one of your own if you have one you'd like made. How about getting a personal or club callsign embossed on the kite to make your kite stand out from the crowd? All kites are supplied with full instructions for assembly and flying.

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The Antenna Experimenter's Guide by Peter Dodd G3LDO (£15) is a splendid book on the techniques and equipment needed to start 'messing about with antennas'.

HF Antenna Collection by Erwin David G4LQI (£10.99) consists of nine chapters and over 230 pages of various types of antenna and test equipment. Six appendices cover data and materials for making antennas.

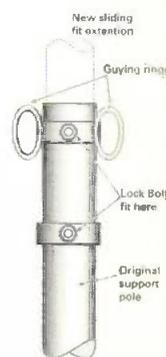
Practical Wire Antennas by John Heys G3BDQ (£8.95) is a 95 paged book is packed with wire antennas of all types, end-fed, balanced and Windom style.

Practical Antennas For Novices by John Heys G3BDQ (£6.30) don't make the mistake of thinking that 'For Novices', means that it's inconsequential. Novices have a power limit of 3W which means efficient antennas are a must, and there are designs for all the lower Novice bands in this book.

Xtend-A-Rings

Tennamast (Scotland) Limited have come up with the Xtend-a-ring system of adding height to a mast or pole. Available in pairs (one of which has guying rings attached), there are only two sizes to remember. Use the small size Xtend-a-rings on poles up to 52mm diameter, or the large size on poles from 52-67mm diameter.

In use you slip in a sliding section of extension pole, drill two suitable holes, fit and the two rings locate themselves, securing the extension in place by a proven method and with the minimum of fuss. As with all



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PAGE 30

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**8 pages of
antennas**

welcome to AiA!



Welcome to the fifth issue of 'Antennas in Action', the bi-monthly section of *Practical Wireless* featuring radio related items that start after the r.f. output socket of your rig: including cable, feeder, accessory as well as antennas.

This month Trevor

Talboys G2ATK creates a wide-band 'tune-free' matching unit with his Match-Box, while in 'Antenna Workshop' Allan Wightman offers some advice when working up aloft. There's some A-i-A news of course, and 'Tex Topics' starts off by giving away another copy of *More Out Of Thin Air*, before turning to more ideas about previous A-i-A articles.

But don't forget, to make A-i-A successful, we want your ideas. The first ideas have been rewarded. Will your idea be the next one? If you don't write in, it never will be! G1TEX

G2ATK's Match-Box

There are, and have been, various antenna 'matching units' offered to the amateur and professional user which the makers of same have specified that it enables an antenna to be coupled to a transmitter (that has an 50Ω output) and the resulting s.w.r. will be less than 2:1 on all frequencies between 1.8 and 30MHz.

However, no information is forthcoming of what the various units consist of in the way of components, etc. The vast majority are also encapsulated to prevent any visual examination, so it can only be assumed that somewhere in the enclosure is a 50Ω 'load'. I decided to experiment to see if I could find such a device that worked. When built it had to cost less than the Icom and Antiference units. The last time I checked some three or four years ago, prices were around £100 plus!

Various Combinations

After many hours of trying various combinations of circuits consisting of inductances of different types, built around a 50Ω load, the result was finally the circuit shown in Fig. 1. This circuit was tested in two forms, i.e. an 18-turn trifilar wound 1.2mm (18s.w.g.) enamelled copper wire on a T130/6 toroidal former. The second form was also wound with the same number of turns and type of wire on a T200/2 Toroid. The smaller version unit was tested at my location where I have a 13.5m centre fed antenna with 13.6m of 300Ω feeders.

Trevor Talboys G2ATK passes on some of his many years of experience to help you get the perfect antenna match.

The resistors are soldered into two pieces of printed circuit board material.

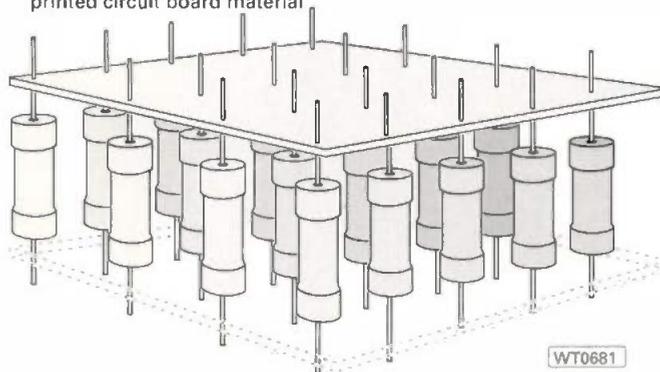


Fig. 2: A 40W 50Ω non-inductive load can be made from 20 1kΩ 2W resistors as shown here.

The set-up at G2ATK is the maximum length of antenna that the plot of land allowed me to erect. The rear garden is only 13m long and 11.5m wide. The second, and larger unit, was tested by my very good friend G4OHJ at his location. Although he only has a 21.4m centre-fed antenna, although again fed with 13.6m of 300Ω feeder. In each case, one leg of the antenna was used as a random length single wire antenna, the resulting s.w.r. was better than 1.5 to 1 on all bands.

Now look at the drawing of Fig. 2.

showing the method used to construct the 50Ω load that I've used on the unit. I've experienced no trouble with this setup when used with transmitters of up to 100W s.s.b./c.w. output. This method of construction allows plenty of air to circulate over the load keeping it at a reasonable temperature.

The switching circuit shown in Fig. 3 is a simple one that could be built into the box housing the Match-Box circuit of Fig. 1 itself. But if you prefer a more comprehensive switching circuit, I've shown one in Fig. 4. This shows a later

switching arrangement that allows four methods of using a centre fed antenna with the 'Matchbox'.

It's well worth trying all of these methods as owing no doubt to polar 'foot-prints', one of these methods may be advantageous to and from the station you are in contact with. This more comprehensive circuit enables different connections of the centre fed antenna to be tried.

On 1.9 and 3.7MHz the best results, from received reports, were with the antenna connected as shown in the diagram of Fig. 5. While on 7MHz and upwards the better balanced feed of Fig. 6 is used. As I'm sure it's obvious, the antenna is used in a balanced feed set-up as shown the earth connection merely ensures safety.

One drawback of the Match-Box is that in use, there is an insertion (or through) loss, which I've estimated at around 5dB. However, the convenience of not needing an a.t.u. and its attendant 'fiddling' to get on-tune should appeal to blind and disabled operators. And of course there are other times when the box would be also be useful, such as there are inexperienced operators of transmitters on board private yachts for instance.

Start Building

But enough talking about the Match-Box, let's start building one! Firstly the unit should be housed in a metal case, and I suggest that the 119 x 93 x 52mm Eddystone die-cast box is ideal for this

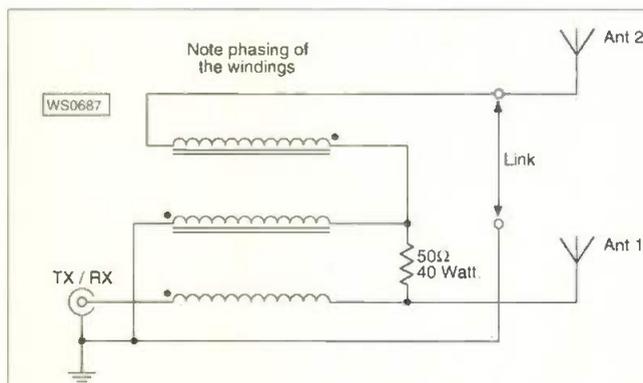


Fig. 1: The original - or simple G2ATK Match-Box circuit.

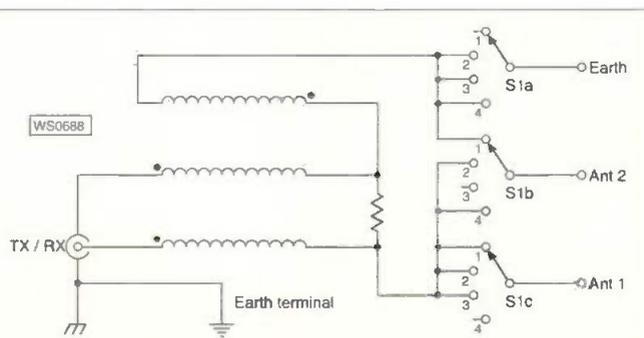


Fig. 4: A slightly more complicated switching circuit. See text for more details.

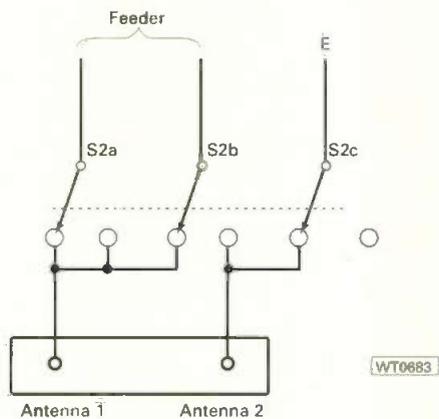


Fig. 3: A simple switching circuit giving either a top-loaded combination for 1.8 and 3.5MHz (as shown) or a balanced

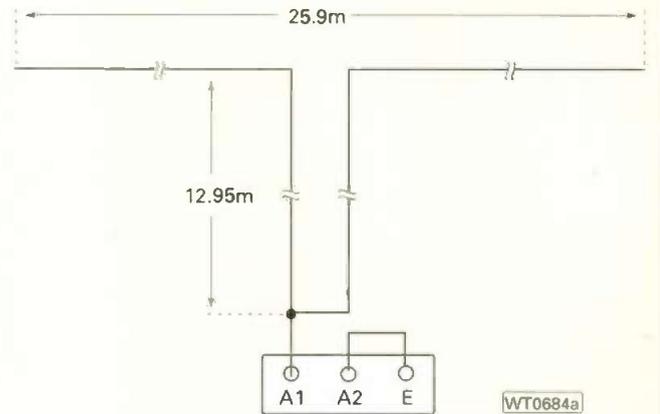


Fig. 5: A top-loaded vertical antenna for the lower two amateur bands of 1.8 and 3.5MHz.

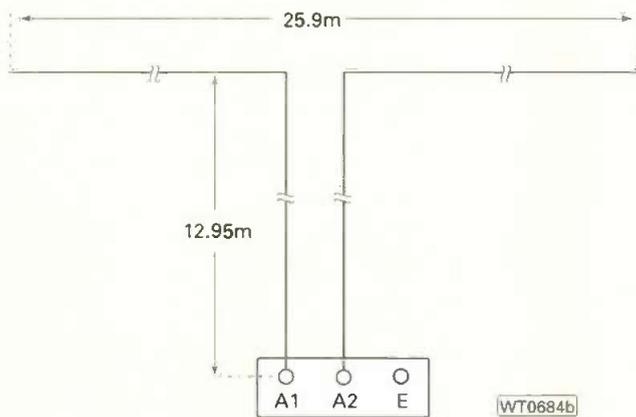


Fig. 6: This is the 'normal' layout for use on 7MHz and upwards.

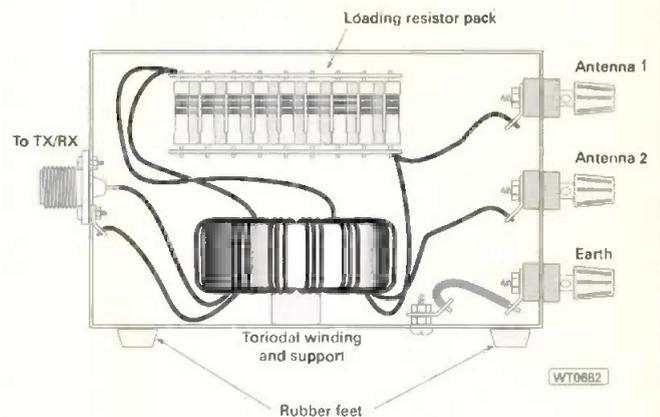


Fig. 7: The overall layout of the Match-Box in the recommended metal box.

purpose. And in Fig. 7 I've shown a layout that works in my case although, I've not shown the insulated material supports for the 50Ω matching load. The toroidal winding is made up using three lengths of the enamelled copper wire wound in a trifilar manner around the core.

To complete the windings three lengths of the copper winding should be laid side by side to form a 'flat' three wire form. Then wind the 18 turns through the toroidal core keeping the three wires together but separated from the next

'turn' as much as possible. When making the interconnections try to keep the wires as short as possible.

The s.w.r. diagrams of Figs 8a and 8b show the relationship between bands and s.w.r. of the two prototype G2ATK Match-Boxes. So you can see how efficient the units are. A price well worth paying to get such an even loading without fiddling don't you agree?



Silent Key - G2ATK

It's with regret that we have been informed that Trevor Talboys G2ATK the author of the preceding article has died. However, we are grateful to his family for permitting us to publish the article as a fitting tribute to his many years of Amateur Radio experience.

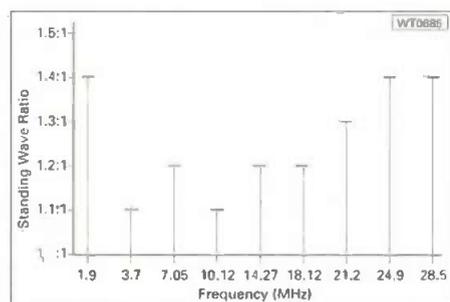


Fig. 8a: The s.w.r. curves of the smaller Match-Box.

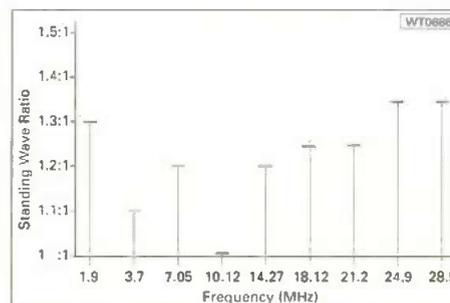


Fig. 8b: The s.w.r. curves of the larger Match-Box.

antenna workshop

Although I don't spend as much time 'aloft' as I used to (keen young lads do it under my supervision nowadays!), I'm still exceedingly careful when working 'up the ladder'. I've never had a fall myself and it grieves me when I read of the horrific spinal injuries incurred when keen d.i.y. enthusiasts make a simple mistake which will affect them (and their families) for the rest of their lives. So this time I'm aiming to pass on a few safety tips and advice and several suggestions to help you 'get aloft' safely and with minimum difficulty.

Basic Rules

Fortunately, there are only a few basic rules to remember when you're working at height: the first is that you can never be too safe (think about it!) and that you must always double the time (at least) when estimating how long the job's going to take you to do. My advice about never being too safe may be considered 'over the top' advice to some people, but having seen other people fall - where they need not have done - I know you cannot be complacent with safety matters. You really do have to 'play safe' and I'll tackle this further 'up the



Fig. 1: No...he's not 'jet washing' but using a portable electric drill! This portable American-made telescoping mini-tower could prove useful in antenna maintenance and helps improve safety (see text).

Radio & TV Antenna Engineer Allan Wightman has been in the business for many years and this time has some advice to help you maintain your antenna systems efficiently, easily and in safety. And although Allan's not a Radio Amateur, he's sure the specialist safety advice applies just as much to us when we work 'up the ladder'.

ladder' so to speak! The second basic rule I have mentioned (estimating the time to do the job and at least doubling it) is not a mercenary thought. It's much more important than that because many other factors - including the safety aspect - come into play. For example, if you decide you've got to replace the antenna halyard attached to your TV antenna 'stub' mast or chimney before the winter comes - when should you do it? The decision, using common sense, is easy enough...but when pressurised, many of us are tempted to take short cuts and then the shortest distance down to the ground from the ladder is without the benefit of the ladder!

Hesitate & Estimate!

My rule for those 'little jobs' (re-sealing mast-head amplifier boxes, etc.) is to 'hesitate & estimate'. And I ask you to do the same. Let's set the scene: You want to re-fix your long wire antenna back on to the chimney stack mount. "It'll only take five minutes" you think! **But you're wrong**, it's getting dark, it looks as if it's going to rain and you are in a mighty hurry. A recipe for disaster!

You hurriedly erect the ladder, climb up and one side starts to sink into the ground: **Danger point 1**. At the top you haven't bothered to arrange a roof ladder and intend to either walk or crawl up the tiles or slates: **Danger point 2**. Finally, as you cling to the chimney and re-lash the halyard, it starts to rain and the light fails because you've underestimated the length of time to do the job. You

finish the job with a struggle and as you descend (no roof ladder...remember!) you find the roof is incredibly slippery: **Danger point 3**.

All the points I've just mentioned are avoidable. By 'Hesitating & Estimating' you could save your life, a great deal of pain, wasted time and repair damage when the damaged roof has to be repaired (no roof ladder!). To return to the estimation of how long a particular job aloft is going to take, you may think I'm overstating the case. But you really do have to 'over-estimate' the length of time needed because looking at a potential job from 10m or so below - is vastly different to actually doing the job up the ladder. So, please take my advice seriously.

Final Point

And a final point on 'working aloft' - don't be worried if you think the job up the ladder is beyond your capabilities or 'head for heights' - don't worry because that's the time to discover it...not when you've 'frozen' with fear while on the roof and have to be rescued. That's the time to call people like me in to help and you don't have to worry...I've no doubt that most 'Aerial Engineering' contractors have done unusual jobs for customers. My unusual jobs have ranged from fixing miniature 'weathercocks' on roofs, to small weather stations for customers. These devices, when connected by cable to the house below, provide up-to-date wind direction and speed for specialist use.

As you asked, the weather station was for a pigeon-fancier! If the wind speed was too high or from the wrong direction the pigeons stayed at home. So, you don't have to hesitate in

calling for expert help either. A quick look in the *Yellow Pages* will provide a list of contractors. Some belong to the Confederation of Aerial Industries (CAI) - their logo is a satellite dish antenna and they follow an agreed code of conduct.

Give your local contractor a call and you'll probably find they have other things to offer too - such as lashing kits, metalwork, useful stub masts, etc. Another bonus is that you could find some of the contractors to be radio 'hams' themselves. If you do...you will have really met a kindred spirit.

Special Equipment

Nowadays special equipment for working on a roof or high up on the sides of building (or antenna masts) is relatively easy to hire. It certainly wouldn't be economical for the individual to buy unless they were planning to go into business and it's doubtful whether or not your local Amateur Radio club could afford the gear - but it can be hired and they'll even deliver it for you in some cases.

The photographs in **Figs. 1, 2 and 3**, show a very unusual example of 'overhead working' equipment that I saw in use when I called into the *PW* offices in Broadstone. Having a professional interest (but not having a camera with me) I asked **Tex Swann G1TEX** the *PW* photographer to take the shots for use in my article. (Thank you Tex).

Despite the warning notice displayed the maintenance people working on the sports centre swimming pool roof and guttering weren't using 'jet washing' equipment. Instead they were carrying out general maintenance. The American-made machine (it operates from a 240 to 115V step-down and isolating transformer) is ideal for safe working on antenna support structures especially as 'ham' radio masts rarely seem to exceed 40 feet of so in height.

Although not really suitable for my work, I think these portable units will be extremely useful for mast maintenance and other d.i.y. jobs.

antennas in action



Fig. 2: The operating platform on the tower is adequate for one person. Note the control cable which stretches up with the platform (control buttons on the operator platform).

They're now available for daily and longer rental from plant hire companies throughout the UK. And if they turn out to be more than your budget for antenna work - you could easily share the hire with a friend - providing you don't underestimate the time you need to use it for!

Modern Roofs

Many modern roofs use synthetic composition 'tiles'. These can be very brittle. And be warned...so can the substantial looking pottery type tiles (the type with a 'grainy' surface) on houses built since the Second World War. It's essential for your own safety and to minimise possible damage to the roof tiles that you employ a roof ladder.

Many house-owners already have ladders or easy access to them. However, very few have roof ladders or 'roof crawlers' which hook over the ridge and provide a secure method of reaching up to a chimney. Again these can be hired, but please take care when using them - they are not easy to place in position for 'first timers' and need care in use (possible damage to the roof ridge and tiles/slates on the far side for example).

If your house is close to the road or you have a driveway, another possible access for maintenance is one of the 'man in a bucket' lifting arms. I recently saw an innovative householder using one of these to clear his guttering out. He, not being able to place a ladder in the road outside his terraced house in Portsmouth - hired a lifting arm based on a vehicle and completed the job in half a morning!

Overhead Cables

Overhead cables can prove to be a hazard when you're erecting ladders or masts. And it's not only the amateur that gets into trouble here! Some years ago I saw the Engineer in an Independent Broadcasting Authority Range-Rover, equipped with a pneumatic mast (for u.h.f. TV field strength surveys) misjudge the

camber of a road.

As the mast was raised the side of the mast touched overhead power cables and there was an amazing fireworks display. Neither of the two engineers in the vehicle were injured but the holes melted in the aluminium mast by the electrical arcing stopped it from telescoping back down to its lowered height. It took the engineers two hours to unbolt it from the vehicle floor and work it up through the roof and lower it to the ground.

So, be warned, if professionals can be caught out so can you! It very easy to bring down telephone wires with the wildly swinging end of a ladder. The consequences of doing the same to a power cable (with you holding the ladder) could be much worse. The rule should be that when using a ladder - have someone to help you. And when you put the ladder up - especially at the foot of a mast if you are to work on it (I know few people can afford fully telescoping masts or sliding towers) at a height - ensure the ladder is safely 'bedded' or mounted on a 'standing plate'.

Another point regarding ladders on slim masts is that they can slip either side and topple the climber. So, if you don't have a purpose-built ladder with a 'narrow' nose' or special 'loop' to engage the top of the pole either hire one or make something suitable or (being extremely careful when you climb) lash the ladder to the mast on your first ascent. Safety belts (often called 'climber's belts') can be hired or you can buy one for regular use. **But avoid leather belts** nowadays especially for infrequent use and don't be tempted to make one for yourself - it's really not worth the risk.

Hard Hats

You might consider 'hard hats' a bit of a joke in the context of a small repair job on your mast/tower or roof antenna system. But take it from me...even a pair of pliers dropped from 20 feet can be lethal! I dropped a pair of pliers from my work belt (another good idea) when my hands were cold and they slid down the roof, overshot the gutter and hit the roof of my van parked below in the

road. The resultant hole in the steel roof of the van I disguised later by fitting a rotating ventilator! So - please be careful.

One weekend when I was working, I noticed what must have been a group of 'hams' in a field erecting a very large steerable short wave antenna. One chap (a very brave man) was up at the top of a telescoping lattice tower trying to sort some problem out. Interested, I stopped and watched as all his colleagues shouted advice and help while gathered around the base of the tower. It wasn't until I drove away did I realise that the chap working aloft had no hard hat on or safety belt. Neither did his friends have hard hats on. And as it was quite windy...I wondered why they weren't using hand-held transceivers rather than shouting at each other!

While on the subject of dropping things when working aloft, I should point out that you really do have to protect your hands, knees and posterior from the elements. A pair of cold hands (and a 'numb bum') could make things extremely dangerous. Cold feet negotiating ladders rungs are equally 'dodgy'. Whenever I pass building sites and see roofers working with just shorts, shoes and hard hats on (they are compulsory on building sites) I literally cringe. I do this because at times you can literally see the skin peeling off their back as the ultra-violet rays from the sun burns them. The rule should be - keep covered.

Working at a height can be quite misleading when it comes to weather protection. I know to my cost that even on what appears to be a dull day - the ultra-violet rays are penetrating the cloud layer. A trip to my van for tea and sandwiches proved that - because even with the windows open it was stiflingly hot, and my sandwiches were warm soggy lumps and I was sun-burned. Heavy gloves (you can't let go when you suddenly touch something heated by the sun as you climb) and protection for your knees, back and shoulders are essential.



Fig. 3: Even with the outriggers in place the tower takes up little space and can reach up to 12m. The system operates from 115V via an isolating transformer which is hired along with the platform (see text).

Personally, I used to take a leaf out of the keen and sensible motorcyclist's log-book. They use 'leathers' to protect themselves from the elements and road surface abrasions. And although I didn't climb in leathers of course...I wore thick gloves, army surplus thick denim trousers which also had an added 'padded' advantage to keep my posterior warm! In rounding off my advice, I hope you won't be discouraged from working aloft by what may be overstated safety advice. The advice is based on experience - from someone with many years of working on ladders, antenna masts and towers.

I just want you to enjoy your hobby and keep safe in the same way I have for over 30 years. And armed with my tool-belt, younger helpers, self-amalgamating tape, good weather and enthusiasm we'll get the job done safely between us as we've always done.



win..win..

Win yourself a copy of the new *More Out Of Thin Air*. Get writing, the next one we give away may be yours - but without an idea - it can never be yours.

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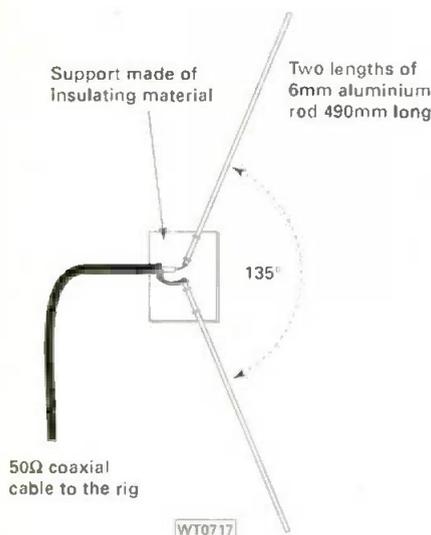
Send your ideas and tips to: **Antennas in Action, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW.**



The winner of this month's copy of *More Out Of Thin Air* is **Dennis Green ZS4BS** who sent in a simple idea for a quick and cheap antenna for the 144MHz band. Dennis says that the whole antenna took less than 10 minutes to make from old bits of metal tubing he had 'lying about in the garage'. The centre piece can be made of almost any insulating material that will withstand the ravages of its environment - if it's up in the loft then ordinary plywood will be adequate. If it's to be outside as Dennis has his antenna on the tower, then the centre piece should be made from a good rigid plastic material.

When assembled as shown the antenna should be a good match to 50Ω coaxial cable and will have a slight bias towards the right as shown in Fig. 1. The antenna was designed

Fig. 1: A very simple and cheap antenna for 145MHz f.m. working (see text for more details).



■ SEE WHO HAS WON THIS MONTH'S PRIZE. THEN SEE WHAT EVERYONE HAS TO SAY ABOUT ANTENNAS

tex topics

to be resonant in the middle of the 144MHz band and Dennis says he notices no movement from the v.s.w.r. meter. The bandwidth of the antenna is dependent on the thickness of the tubing used in making the elements and he uses the formula of $L = 285/(4 \cdot F)$ in calculating the length of each length of tube. (This is 95% of a free-space quarter-wavelength. Tex.) where F is in megahertz and L is in metres. Well done Dennis, and who will get the next copy of *More Out Of Thin Air* for an idea?

More Correspondence

The article on the T2FD antenna has prompted still more correspondence than I anticipated. From the Netherlands **Dick Rollema PA0SE** sent in a letter with some interesting concepts in it. The overall layout for the T2FD, which Dick suggests stands for 'terminated two wire folded dipole' rather than the normally assumed 'terminated tilted folded dipole'. Dick goes on to say "The antenna was successfully used by stations of the American Navy and Air Force. The fact that the antenna is supposed to be wide band and need only one mast for support obviously were important considerations for using it".

Dick then mentions that the original by W3HH used 600Ω open wire feed and a loading resistor of 650Ω but the antenna seems to have become like that shown on Fig. 2. As to the statement that the T2FD antenna is multi-band in operation, Dick is not so sure. He says "In the past this was not easy to ascertain. Also transmitters then could match a wide range of impedances at the output, so the exact value of the impedance at the input of the feedline was not so important. And judging the performance of an antenna by reports

received can be very misleading".

Dick then went on to say that he had analysed the T2FD antenna as shown using the *Antenna Optimizer (AO)* software by **Brian Beezley K6ST1**. The results for the 3.5MHz band are included in **Table 1** because

W3HH said that the antenna was useful on that band too. Now that I've had a look at the supplied data, I'd be tempted to think only that perhaps the T2FD antenna needs more work on it to fit in with most modern 50Ω output rigs. What do you think?

The EWE Antenna

Back in the May 1997 issue of 'A-i-A' **John Heys G3BDQ** wrote an article on the WA2WVL 'EWE' antenna and John (who called his antenna the 'U') suggested that the antenna was suitable for receiving only, due mainly to the very low wattage of the terminating resistor. Reader **Peter Welch G3OFX** says 'Surely it is only the low power rating of the load resistor that creates this difficulty. Overcome it and you should have the advantages of RX/TX changeover along with some directivity'.

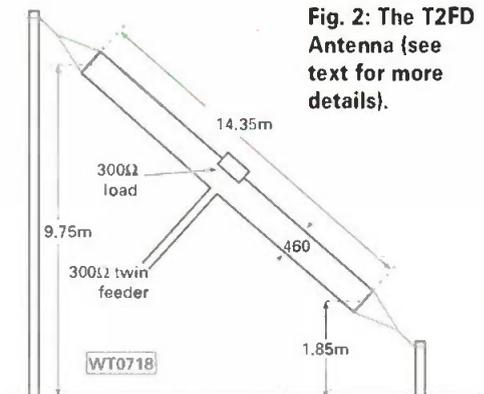


Fig. 2: The T2FD Antenna (see text for more details).

Peter's suggestion is to use a similar matching transformer at the resistor end which would allow the use of a 50Ω dummy load resistor (say 25 or 30W). Or for greater power a load resistor made up from smaller components. For example, if the quoted 1000Ω is exactly correct then an identical 9:1 step-down ratio toroidal transformer would require a load resistor of 111Ω (1000/9), which is easily achieved with standard components. According to the *Radio Communications Handbook* (6th edition) toroidal cores could withstand this sort of c.w. (or slightly more) s.s.b. power without undue heating".

Peter then suggests that 9 2W 1kΩ metal film resistors would be just right and would dissipate 18W allowing the use of up to 30-40W of r.f. power be used. He puts this forward as an idea to try though he

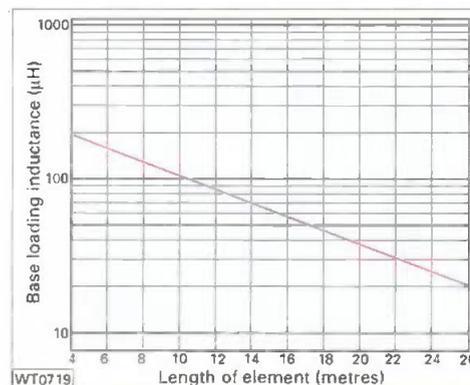


Fig. 3: Denis Payne has produced this graph to help find the resonating coil needed for a short antenna (see text).

antennas in action

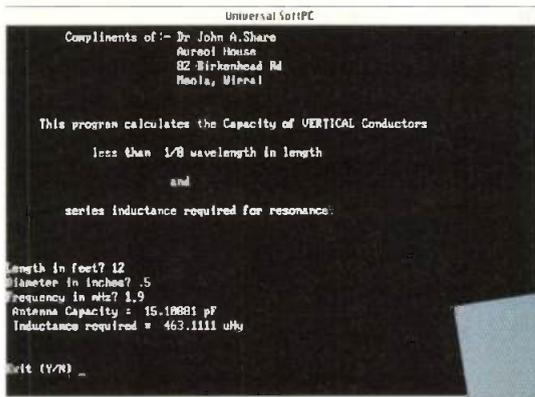


Fig. 4: A screen grab of John Share's computer program to calculate the base loading coil for a short antenna. See text for more details.

hasn't had time to try it out (Peter, like Rob G3XFD, has recently just become a doting grandfather. (*Your troubles start when they recognise that radio is a super plaything and 'grumpdad' has to keep it hidden away during visits, along with the computer.* Tex).

Base Loading Coils

Perhaps some readers may like to try Peter's idea out and let us all know of the findings. Turning now to another try out idea. In the July 1997 issue of 'A-i-A', Gordon Lines G0ROH, asked for information about how to calculate the value of base loading a coil to resonate a short vertical antenna on the low amateur frequency bands. And what a good postbag I've had on this one.

Reader Denis Payne G3KCR, writes to say the formula is in the ARRL Antenna Book Page 6-6. Denis also included a graph of his own which I have reproduced in Fig. 3. This graph is based on a 1.9MHz centre frequency and may be scaled for other bands. (*Denis Has written two excellent articles on shortened antennas in PW, 'Multi-Delta Antennas in August 1995 and 'Winding Up Top Band' in February 1997.* Tex)

Denis also suggests "To increase the feedpoint resistance and the efficiency, a coil can be placed further up the antenna. Halfway up would require about double the inductance, but this is not a proportional scale. My graph, shown in Fig. 3 is based on a 6mm conductor. Larger conductors would, of course, require slightly less inductance" (*this is due to the increased capacitance of a thicker element needing a lower inductance to achieve resonance.* Ed).

A computer assisted solution is offered by John Share who sent in a short program for an IBM, or compatible, computer to do most of

the hard work for you. John's program seems to take the 'calculate the capacitance of an element and find the inductor that resonates with it' route. Running the program from the DOS prompt asks for the length of the element (with the limit of than $\lambda/8$) in feet and its diameter in inches. After typing in the design frequency the program displays the element capacitance and the value of inductance to bring it to resonance.

John's program (a 'screen grab' is shown in Fig. 4) works well on a 'real' IBM or clone, it also works under the MSDOS emulator on an Apple Macintosh (and I assume other MSDOS emulators, such as Acorn or Amiga versions too). If you would like a copy of the programs, send me an IBM formatted 3.5in disk and a self addressed label to the editorial offices, marking your envelope 'A-i-A Coil Program Offer'. Tex.

A Cautionary Tale

Now let me tell you of a cautionary tale of what I thought would be some cheap twin feeder. Recently I was standing in my local electronics supply shop and I spotted some flat twin flex on a roll. The flex was very cheap but extremely high in copper

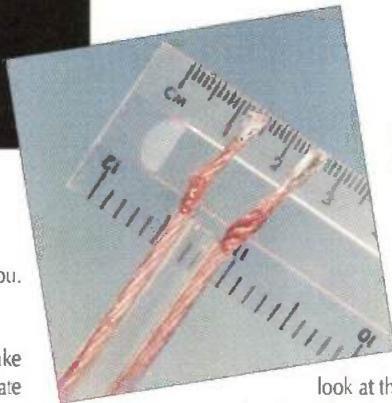


Fig. 5: Beware, audio loudspeaker cable may not be as good when used as r.f. feeder. See text for more details.

content. Have a look at the photograph of Fig. 5 where I've shown the flex against a ruler. As you can see the very flexible multi-strand cable has a conductor diameter of over two millimetres. And at only about 40p per metre I thought that I'd replace the club's ageing doublet and use twin feeder to improve the efficiency to boot.

On getting the 10m length home, and, out of interest, I used my trusty MFJ antenna analyser to try to find out the velocity factor of the unknown twin feeder and its characteristic impedance. I measured its length exactly and using an adapter with crocodile clips on the end I looked for the resonant points as an open ended quarter wave stub (look for a 'zero' impedance, it's quite sharp). I found that at 5.34MHz the feedpoint resistance was about 3-6 Ω (it's difficult to be accurate, just look for the dip). This frequency (5.34MHz) has a free space wavelength of some 56.2m, making the quarter wave about 14.05m. As the twin flex was some 10.1m long that would mean a velocity factor of 10.1/14.05 or 72%.

To check the accuracy of my reading I found another dip at 16.15MHz which agreed with the first quite well.

However, The dip was not so pronounced this time so, I tried for other 'dip' points. And I found them at 27.3, 38.56, 49.64, 60.86 and several 'twitches' further up in frequency. The problem however, was that at each one the impedance rose until at 60.86MHz and above the line had a very low s.w.r. and no real dips in the impedance reading.

Extremely Lossy

The line was, at r.f. anyway, extremely lossy. And so, I had to give the original idea up as a bad job. Still the cable is heavier than my present loudspeaker cables (its original task) so, I suppose I can always rewire the hi-fi for more thump at the speaker. What about the original loudspeaker cable you may ask? Well it's worse than the new one at r.f. so no luck there I'm afraid, but my speakers do sound better than before.

Sign-Off

So I've come to the end of 'Tex Topics' once more, just time to sign-off and wish you good DX. I'd like to thank all of you who took the trouble to write in by E-mail, or conventional methods. Keep those questions and comments coming in that way we all learn something from the column. But most of all I want your ideas about antennas and related topics. So get your thinking caps on, or sketch out that antenna idea you've 'been using for years'. You never know it might get you a *More out Of Thin Air* (or an equivalent value voucher to spend in the PW Bookstore if you already have a copy. So get writing.



Table 1: These are the figure produced when Dick PAOSE did some analysis on the T2FD antenna of Fig. 2.

Table 1

Frequency (MHz)	R _{ant} (Ohms)	X _{ant} (Ohms)	SWR (At 300 Ω)	Wire Loss(%)	Load Loss(%)	Efficiency (%)
3.65	863	783	5.44	0.7	99.0	0.32
7.05	1186	-674	5.27	0.6	86.9	12.5
10.125	759	269	2.91	0.6	52.4	47.0
14.200	1517	-1124	7.86	0.7	47.5	51.8
18.118	345	-449	3.66	0.9	72.5	26.6
21.225	359	80	1.36	1.0	82.3	16.6
24.94	1126	421	4.33	1.0	75.2	23.9
28.850	807	-108	2.74	0.9	52.6	45.5

Tennmast products, the Xtend-a-rings are fully galvanised and cost £18 (small) or £21 per pair for the large ones. These prices include VAT and mainland UK P&P.

For more details of the Xtend-a-ring and Tennmast's other products contact then at: **81 Mains Road, Beith, Ayrshire KA15 2HT. Tel./FAX: (01505) 503824** or E-mail to **D0054613@infotrade.co.uk**

Sandpiper Still Chirping



The 'boss', Jane, of Sandpiper keeps her other half Chris (right) and their son Mathew (left) in order at the London rally earlier this year.

Sandpiper Communications have let 'A-i-A' know that in spite of a hectic summer of rallies they're still cheerfully busy. Chris has told us that he has a new multi-band h.f. vertical antenna kit almost ready for release. The release date was to have been sometime in July, but full order books and a busy rally schedule has put it back some time, and he apologises for the delay.

For details of Sandpiper Communications huge range of products see them at a rally near you or contact them at: **Unit 5, Enterprise House, Cwmbach Industrial Estate, Aberdare, Mid-Glamorgan CF44 0AE. Tel: (01685) 870425** or **FAX: (01685) 876104.**

Dunstable Doings

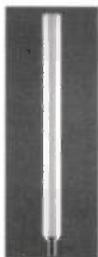
Dunstable in Bedfordshire is the place to head for when considering building your own kite. Dunstable Kites say they're the leading supplier of Ripstop material and parts for making kites. Started in 1989 Dunstable Kites carry a vast range of Ripstop Nylon material in many colours. They also stock glass fibre reinforced tubing from 2-12mm diameter, and carbon fibre tubing from 1.5-10mm diameter.

The company also supply a complimentary range of 'X' and 'T' pieces, 'rings' of all shapes and sizes, plus adjusters, kite lines and all the paraphernalia needs for building and flying your kite. For an up-to-date list of their product line contact Dunstable Kites at **23 Great Northern Road, Dunstable, Bedfordshire LU5 4BN. Tel: (01582) 662779, FAX: (01582) 666374.**

Cushcraft's Latest

Cushcraft are prolific producers of antennas. And here are just a few of their commercial band models: For more details of these and Cushcraft large range of commercial and amateur band antennas contact **Cushcraft, PO Box 4680, Manchester, NH03108 USA. Tel: 603-727-7877** or on **FAX: 603-627-1764**

S1803B - This is one of the PCS linearly polarised omnidirectional antennas for 1.85-1.9GHz band. The S1803B a v.s.w.r. of less than 1.5:1 over the band and 50Ω impedance.



Directlink Wallmount Series - A range of medium gain waterproofed antennas available for the 1.71-1.88, 1.85-1.990, 2.3-2.5,

5.15-5.35 and 5.75-5.825GHz bands. They feature a low-loss microstrip construction giving good efficiency with low weight antennas suitable for internal or external mounting.

S2407HVP - This is a vertical and horizontally polarised microstrip antenna for the 2.4-2.5GHz band. Featuring a 6.5dBi gain antenna system within the weatherproof 150x150x25mm box it's suitable for locations where multi-path reflections can cause problems.



SX450 - This 450-470MHz band design features a significant gain and an s.w.r. of less than 1.5:1 on a 50Ω system. The antenna is specified over the range of -40 to +135°F.

S24012P - An linearly polarised antenna with 12dBi gain in the 2.4-2.5GHz band, it features five broadband microstrip antenna elements. Suitable for transmission or reception with a beamwidth of 90 x 10° and an s.w.r. of less than 2.0:1 over the band.



antennas in action

Barenco Bits

Earlier this year when 'wandering' around a rally I came across the Barenco stall with all manner of items for assembling and erecting antennas. The catalogue I picked up at the time, although not particularly thick, is

packed full of hand items from simple 'U' bolts to complex assemblies. For a catalogue contact Barenco at **27 Park Road, Barnstone, Nottinghamshire NG13 9JF. Tel: (01949) 860607** or **FAX: (01949) 860773**, asking for an Amateur Antenna accessories catalogue.

W&S News

From Waters and Stanton comes news of several products now in stock at their shop in Hockley. On the filter front the **DCI-145-2H** (144MHz) and the **DCI-435-10C** (430MHz) are passive high quality band-pass filters. Each of the filters is a coupled four-chamber type. With a v.s.w.r. or less than 1.5:1, the **DCI-145-2H**, the smaller of the two, features a 144-146MHz pass-band with a 200W capability in its 305x80x130mm size.

The physically larger **DCI-435-10C's** pass band is 430-440MHz, which also has a power limit of 200W. Both units have an ultimate rejection of better than -70dB to reduce outgoing 'sprogges' and reject incoming out-of-band 'rubbish'. The **DCI-145-2H** costs **£89.95**, with the **DCI-435-10C** at **£119.95**.

Two power band-pass filters from the MFJ stable and suitable for use on the 144MHz band are the **MFJ-713** with BNC connectors and internal power is suitable for many handheld rigs. The **MFJ-714** with SO239 sockets and an external power socket is suitable for the base station.. Both units are available at **£64.95** each.

For use at h.f. the **MFJ-712** low-pass filter has a rejection of better than -50dB at 54MHz. The 200W power capable unit costs only **£29.95** could be a cheap way of limiting TVI from your h.f. rig.

On the test equipment front and again from MFJ is the **MFJ-224**, 144MHz FM Analyser. Covering 144-148MHz this instrument is a signal strength meter, with a sensitivity of -90 to -40dbμV, which makes antenna setting up very easy. It also offers a deviation check on any 144MHz f.m. signal present at the SO239 socket.

The Japanese built **BR-200** standing wave analyser covers from 1.6 to 170MHz and gives the impedance and the s.w.r. of the antenna when working from a 50Ω source.

For details of these and other items stocked by Waters & Stanton, contact them at **22 Main Road, Hockley, Essex S55 4QS. or Tel: (01702) 206835/204965** or **FAX: on (01702) 205843.**



MFJ-712



MFJ-713



MFJ-714

That's all I have time for this session. See you all in the next issue of A-i-A.

Tex



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73 from Dave G4KQH, Technical Manager.

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The Icom IC-756

A New Perspective On The Bands



By Rob Mannion G3XFD

Rob Mannion G3XFD reports on his activities with Icom's newly-introduced IC-756 h.f. and 50MHz transceiver with a 'Spectrum scope'...an innovation which he thinks provides an exciting new perspective to h.f. operating conditions.

I'm in a privileged position as Editor of *PW* in that I get to try many different transceivers and other equipment. And I'm often quite taken aback - or sometimes less impressed - by what the manufacturers come up with in new equipment.

Modern manufacturers produce some very innovative ideas (and occasionally zany gadgets and features) to encourage us to buy their equipment. Mostly I take these in my stride and wonder how long they'll last in production - but in the case of the IC-756 I must say that Icom have sprung a real surprise and I've been left wondering how much has been missed on the bands because previous h.f. transceivers I've used have not been fitted with a 'spectrum scope' screen.

What am I talking about? - only the most innovative and useful idea I've ever come across in an h.f. Amateur Bands transceiver! In fact, after using the IC-756 intensively for three weeks or so I think Icom may well have set an h.f. precedent with the 'Spectrum Scope'.

The Icom IC-756

The Icom IC-756 is a modest sized h.f. and 50MHz 'main station' transceiver and the manufacturers have wisely aimed at producing a rig which can fit comfortably on most operator's desks without dominating it too much. But despite the fact the transceiver is what I call "an ideal size" (it's also very convenient to carry, having a built-in carrying

handle) it packs an enormous number of features within the package.

Obviously, the innovative 'Spectrum Scope' (literally a basic 'Spectrum Analyser') is the most obvious feature of the IC-756, but after using the transceiver for many hundreds of QSOs I can say I appreciated the 'on screen' annunciators telling me the state of various functions. There's a lot more to the IC-756 than the superb 'Spectrum Scope' screen!

In essence, the IC-756 is a triple conversion superhet (all modes) with digital signal processing taking place at 15.625kHz. In common with Kenwood (with the TS-870) Icom claim the transceiver to be (in effect) a quadruple conversion receiver in the published specifications by listing the

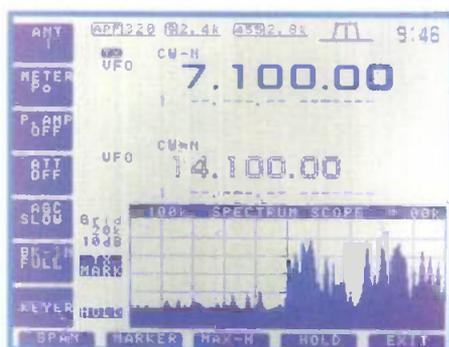


Fig. 1.



Fig. 2.



i.f. frequencies as (there are very slight variations in i.f. frequencies, dependent on the mode) of 69.0155MHz (1st i.f.), 9.0115MHz (2nd i.f.), 455kHz (3rd i.f.) and 15.625kHz (4th i.f.).

Personally, I don't agree with considering the DSP section as an i.f. stage and regard this to be a debatable point. However, as more and more manufacturers are referring to the final DSP stages as an i.f. perhaps it will be adopted as common thinking! But of course, my disagreement with Icom's claim in the specification does not detract from the equipment and its performance!

So, back to the rig itself! The general coverage section of the IC-756 is more sensitive than the specifications imply, particularly on l.f. and m.f. For example, the Icom specifications state a 13µV sensitivity on a.m. from 500kHz to 1.799MHz understate the performance, as I was able to prove with my (calibrated) Broadcast Engineering standard portable field strength meter. This clearly showed (in comparison) that the IC-756 provided 10dB S/N with an input of less than 10µV.

Generally speaking I found that the sensitivity and selectivity on the general coverage specifications were better than the manufacturer's claimed results. The receiver performed extremely well and I found myself doing far more listening than I do on average.

On the Amateur bands (including 50MHz) I found that the published specifications seemed to agree broadly with what I experienced, although generally the receiver seemed to be more sensitive than quoted. I certainly did not need to use the switchable r.f. pre-amplifiers any near as often as I expected to do when on the air - although when they were used they proved to be excellent.

Features & Controls

I'm not going to list all the features, controls and their functions - to do this would take up far too much room in the review - you want to know how the transceiver performs! However, I

will outline the main controls - particularly those I found to be very good, helpful or unusual. But if you're tempted to find out even more about the IC-756, I strongly recommend you visit a dealer and read through the excellent manual. You'll find everything listed where it should be!

The main tuning control was smooth and comfortable to use, although the combined AF Gain/RF Gain/Squelch control is an unusual combination! It works well but it took me a little time to get used to it in operation. Several times during the early part of the review period I turned the squelch up and lost the audio - without realising what I'd done. However, as I have criticised Icom in the past for omitting continually variable r.f. gain controls...I'm loathe to slate them on this point!

The IC-756 continually variable RF Power control adjusts the power output for 2 to 100W. Very neat and accessible. And it's amazing how many QSOs you can complete on 2W!

For the many operators who complain about those of our Southern European friends who run their transmitters with too much compression 'on board' the combination of the Compression Level Control and the Spectrum Scope are very helpful. As I've got a loud voice anyway I was pleased to be able to see the results of lowering compression to stop 'spreading' and 'splatter'. (The Spectrum Scope graphically showed me the difference on the transmitted waveform. Very useful indeed).

Monitor control: This feature allows you to monitor your transmitted i.f. signal.

Tuner: The built-in automatic antenna tuner was extremely quick in operation and worked well into my long wire antenna and the trapped dipole. However, I mostly used the long wire antenna as this is my 'reference antenna'. (Anyone can work DX with a steerable beam!).

The Twin PBT (pass band tuning control) is a useful electronic aid to reducing interference. The dual

control electronically alter the i.f. pass band widths - often to great effect. The result of the operator's adjustments are shown on the top right of the main l.c.d. screen. A natty and helpful idea!

The APF function: The Audio Peak Filter alters the received frequency response by 'boosting' a particular frequency to help c.w. reception. I found it to be helpful and the boost frequency width can be selected from either 80, 160 or 320Hz.

The CW Pitch control: A simple and effective idea this as it allows the pitch of the incoming signal to be adjusted to suit the operator without worrying about changing frequency (adjustable from 300 to 900Hz).

Digital Signal Processing

The DSP on the IC-756 is very effective and you have to experience it in operation to believe what the technology can do. The DSP noise reduction is very good and easy to use and the 'auto notch' facility is extremely useful indeed.

In my opinion it's worth having DSP just for the 'Auto notch' and noise reduction facilities alone. Static crashes and general noise on the band can then be minimised and the strange people who delight in moving an unmodulated carrier on and about your frequency (sometimes with a bit of microphone scratching thrown in for good measure) cease to be a problem!

With DSP 'auto notch' the effect on the 'swishers and scratchers' is dramatic - they promptly disappear. And it's only when you switch off the facility you realise that they're still around (wasting their time and not yours!).

The noise reduction facility is also very helpful on the bands. As I had the transceiver during the summer you'll probably realise how bad the static 'crashes' and general noises were. At times (when using my Alinco DX-70 on the lower h.f. bands) QSOs were impossible. On the other hand, using the DSP-equipped IC-756 made operation perfectly feasible.

Continued on page 37.

Fig. 1: The Spectrum scope l.c.d. screen is the major feature on the IC-756. In this illustration the receiver is set to the very top of the 7MHz band. The centre line represents the tuned frequency (in bold, 7.1MHz) and clearly demonstrates where the broadcasting stations are, with Amateur Radio transmissions appearing to the left. The second frequency (the 14.1MHz international beacon frequency) indicates the selected second channel.

Fig. 2: Showing the IC-756 tuned into a local radio station on medium wave. The carrier (not quite tuned in!) and the sidebands are clearly displayed. Display 'Hold' is selected to 'freeze' the display. The l.c.d. annunciator to the left of the time display indicates the setting of the twin passband tuning controls (see text).

Fig. 3: Receiving on the 31m broadcast band. The display clearly shows the regimented spacing of the various broadcasting transmitters. The left-hand side of the screen shows the state of various controls. The Boxed '9' accompanied by 15k indicates selected filter at 9MHz and '455' accompanied by 9k the selected 455kHz filter.

Fig. 4: An interesting signal just outside the six metreband allocation. On an apparently 'dead' band G1TEX found this signal (it resolved as noise). Tex's location is plagued by QRM on 50MHz, most of which he thinks originates from electronic cash registers in nearby shops! Note the bandwidth selected on the display and that Pre-amplifier 2 is selected.

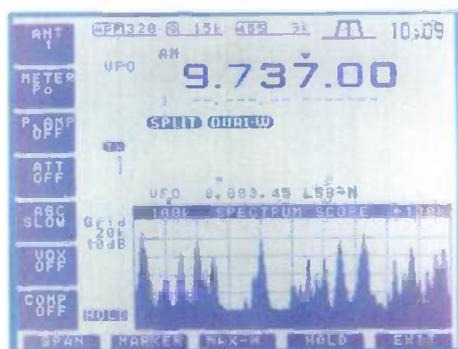


Fig. 3.

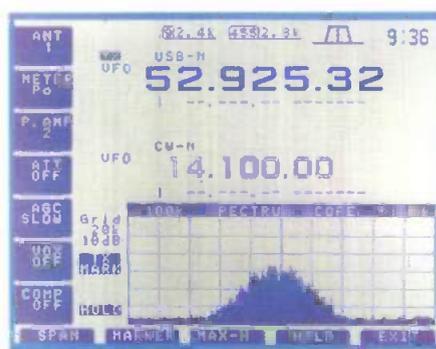
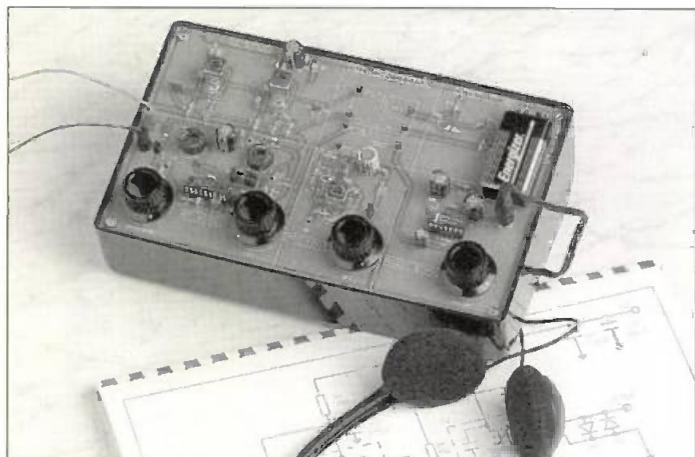


Fig. 4.



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The Icom IC-756 - A New Perspective On The Bands

Continued from page 35

On The Air

During the month or so I had the IC-756 on loan for review I had over 300 QSOs on the bands. I was active on all h.f. bands from 1.8 to 28MHz, but concentrated on 3.5, 7, 14, 18 and 21MHz.

The Spectrum Scope feature really came into its own on 18 and 21 and particularly on 28MHz. If a station suddenly 'popped-up' some 50kHz or so away - the l.c.d. display clearly showed it up. And on 14MHz it enabled me to get in first to work Jose on the ZP241 DXpedition in Paraguay before the pile-up started (I 'saw' him come on...call 'CQ'... and then I pounced and got a signal report before the bedlam started!). Very impressive and very helpful - particularly for the DX hunter.

For the 'On Air' tests I have arranged for a regular contact, Max G3WMB to help provide audio comparison tests whenever I carry out reviews. For this purpose Max (he lives in Ware, Hertfordshire) has a audio test cassette - prepared on professional equipment) with my recorded voice to compare my 'off air' voice quality. His comments on the tests (on 3.5MHz) were "the audio is very good, and compares very well with the test tape". The advantage being of course that he's got access to a 'reference voice'.

Approximately 150 QSOs I had with the IC-756 were on s.s.b. and some were under very difficult conditions. And recently I have been having long QSOs with the 'Donegal Gang' consisting of Willy EI4EK (who consistently puts an incredibly strong signal into Dorset!), John EI9GB, Johnny EI6FF and Micky EI6HY.

Perched up in the north west of Ireland Willy EI4EK is one of the most consistently heard EI stations I received in the USA during the Dayton HamVention. Last year (1996) he was so strong in New York when I was listening to his 3.702MHz transmission on my portable (modified broadcast receiver with b.f.o.) I only had to use the telescopic antenna!

However, despite the fact Willy and the 'Donegal Gang' (we talk about everything ranging from radio to the County Donegal narrow gauge railways and civil engineering, to our respective beautiful countrysides) QRM on the 3.702MHz channel is frequent. Very often a 'carrier twitcher' and 'microphone' scratcher and blower' attempts to disrupt the

QSO. But with the 'Auto Notch' facility on the IC-756 the attempts are worthless.

The 'scratcher' and heterodyning merchant has ceased to cause me any problems since I've started using DSP fitted equipment and the same applies to the unfortunate person who often joins in on c.w. on the same frequency (sending continuous meaningless words). So, you'll realise that the DSP facilities provide many advantages because the c.w. disappears completely when the 'auto notch' is on.

The standard filters fitted on the IC-756 are adequate (see section on Spectrum Scope display) and I was able to minimise QRM from adjacent channels with the pass-band controls, and adjustment of the r.f. gain and attenuators. However, I felt that the receiver would benefit even more if the filters were fitted.

In total, I think I worked just over 150 stations on c.w., with the best DX being New Zealand and many stations in Chili and on the Pacific coast of South America. And it was while on c.w. that I found that the selectivity of the IC-756 would again be bettered with the extra (optional) narrow band filtering. Under the busy band conditions (yes the h.f. bands ARE livening up now!) the receiver needed the extra selectivity that would be provided by the narrow filters.

The IC-756 came into its own on the quieter bands and I really became a DX hunter! While listening (hopefully for a reply to my 'CQ' on 18.135MHz) and hearing nothing on what appeared to be a 'dead' band - I suddenly 'saw' a signal appear higher up the band on 18.150. I quickly retuned and worked the other station who turned out to be in Chile!

On 21MHz I was also able to use the IC-756's 'hunter's vision' to great advantage also because I was able to quickly tune to 'possibles'. However, the great advantage in this respect was on 28MHz. It was here that I was able to pounce on the DX c.w. beacons as they appeared, which then gave me an idea of what to expect. So, when the DX stations did pop up on this particularly wide band - I was quickly on frequency. The bands aren't really 'dead' you know...it's just that we don't usually 'see' the activity!

On 50MHz

One of the weekends during the review period coincided with an 'opening' on 50MHz. I had a ball!

At the moment I don't have any permanent v.h.f. antennas and to work on 70 and 144MHz I use mobile type whip antennas with groundplanes. However, for 50MHz use I have erected an old modified Band I v.h.f. TV dipole on a pole 5m above the ground and horizontally polarised. Fitted with a 75-to-50Ω balun I had it matched very well, although the built-in automatic antenna tuner matched it very well anyway (I tried it).

Using the Spectrum Scope to advantage I joined in the fray and worked stations in through-out Europe (okay DXers...no big deal on 50MHz but at least it's the farthest I've worked!). The receiver worked very well indeed on 50MHz and the switchable pre-amplifiers weren't needed.

I suddenly realised I was hearing TV signals (I didn't realise how many countries are still using Band I for this purpose) and on switching to a.m. I was able to hear (and see) the TV transmissions. However, although I could detect the sound signals within the composite transmission - I couldn't identify the origins of the transmissions. But all in all - with 30 QSOs on 50MHz under my belt I think the IC-756 proved itself very well - I don't think 'Six' metre types will be disappointed.

Spectrum Scope

The Spectrum Scope really deserves part of the review to itself because it's such an important feature on the IC-756. And far from being a 'gimmick' it proved itself to be extremely useful.

For example, I'd proved it was very useful in setting up the speech compressor. When I had too much compression in - the results clearly showed on the l.c.d. 'spectrum analyser' type display.

Although the display provides relative values (in other words it's not calibrated as a true analyser would be) it's extremely useful. The bandwidth can be switched from ±12.5kHz (from the indicated centre frequency, which incidentally displays the RIT divergence when this is selected) to ±25, 50 and 100kHz.

The display will 'hold' ('freeze') the current display for comparative purposes. I was very impressed with the facility and the only suggestion I have for improvement is that the display 'up-dating' scanning rate be increased or be adjustable by the operator.

I don't have the space to delve too much into the various things I

The Icom IC-756 - A New Perspective On The Bands

Continued from page 37

Manufacturer's Major Specifications (Abridged from full specifications)

Frequency coverage (receiving):	30kHz to 60MHz
Transmitting:	All Amateur Bands 1.8 to 29.7MHz Plus 50 to 52MHz.
Modes:	c.w., a.m., i.s.b., u.s.b., f.s.k. and f.m.
Memory channels:	101 (99 regular plus two scan edges)
Frequency resolution:	1kHz/10Hz
Power supply:	13.8V ±15% (negative ground)
Current consumption:	
Transmit (max):	20A
Receive (stand-by):	2.5A
Dimensions:	340 x 111 x 285mm
Weight:	10.5kg
Receiver	
Receiver design:	Triple conversion superhet with DSP at 15.625kHz.
Intermediate frequencies (s.s.b.):	1st 69.0115MHz, 2nd 9.0115MHz, 3rd 455kHz
Intermediate frequencies (c.w. f.s.k.):	1st 69.016MHz, 2nd 9.106MHz, 3rd 455kHz
Intermediate frequencies (a.m.):	1st 69.0100MHz, 2nd 9.0100MHz, 3rd 455kHz
Intermediate frequencies (f.m.):	1st 69.0115MHz, 2nd 9.0115MHz, 3rd 455kHz
Sensitivity: s.s.b., c.w. and f.s.k. for 10dB S/N	0.16µV (1.8-29.99MHz) With pre-amplifier 2 on 0.13µV (50 to 54MHz) with preamplifier 2 on
Sensitivity (a.m.) 10dB S/N	13µV (500kHz to 1.799MHz) 2µV (1.8 to 29.99MHz) with pre-amplifier 1 on
Sensitivity (f.m.) for 12dB SINAD	0.5µV (28 to 29.99MHz with pre-amplifier 1 on 0.32µV (50 to 54MHz) with pre-amplifier 2 on
Squelch threshold s.s.b., c.w., f.s.k.:	<5.6µV
Squelch threshold (f.m.)	<1µV
Selectivity s.s.b., c.w., f.s.k.:	>2.4kHz @ -6dB 3.8kHz @ -60dB
Selectivity (a.m.)	>9kHz @ -6dB 20kHz @ -60dB
Selectivity (f.m.)	>15kHz @ -6dB 30kHz @ -60dB
Spurious and image rejection ratio	>70dB (except i.f. through in 50MHz band)
Receiver incremental tuning range:	±9.999kHz
Audio output:	>2W @ 10% distortion with 8Ω load.
Transmitter	
Output power: f.m.	Continuously adjustable 2 to 100W s.s.b. c.w., f.s.k.
Modulation system:	Continuously adjustable 1 to 40W (a.m.)
Modulation system:	PSN modulation (a.m. & s.s.b.)
Spurious emissions:	Variable reactance (f.m.) 50dB down (h.f. bands) 60dB (50MHz band)
Carrier suppression:	40dB
Unwanted sideband suppression:	55dB
Transmitter incremental tuning range:	±9.999kHz
Automatic Antenna Tuner	
Matching impedance range:	16.7 to 150Ω (h.f.) unbalanced (v.s.w.r. < 3:1)
Matching impedance range:	20 to 125Ω (50MHz) unbalanced (< than 2.5:1 v.s.w.r.)

Far Right: **Inside (underside) view of the underside of the IC-706. The transceiver although offering a large number of facilities is of compact size and convenient to carry.**

discovered with the Spectrum Scope, but two things are very much of interest. The first involves the 'spread spectrum' signals which I detected on 3.5MHz as they showed up on the screen (but were not of course audible - apart from the noise- on the receiver) and the second involved the 'mobile frequency sweepers' I often hear.

I've no doubt other operators often the signals that suddenly (and rapidly) 'sweep' across the received signal, almost as if a v.f.o. had suddenly decided to drift like mad! Well, in my opinion these

transmissions are frequency agile ionospheric 'sounding' transmissions linked to a propagation research laboratory. They do no harm but are very puzzling indeed... but show up on the Spectrum Scope very clearly.

The display scanning rate is just fast enough to catch the 'sweepers' in action and it's absolutely fascinating to see the signals traverse the bandwidth selected on the screen. And it's also fascinating to see the wideband effect of lightning 'static' and those annoying thermostats (and gas boilers as their automatic ignition switches in).

Trend Setter

Personally I think the Icom IC-756 is going to be a trend-setter for h.f. transceivers. In future I consider it very likely indeed that Icom and other manufacturers will introduce the feature to many more transceivers. I was fascinated when Heathkit first introduced their 'Panoramic Adaptors' to the Amateur Radio market over 30 years ago and now that we have efficient l.c.d. screens it's even easier and I think many operators will demand the feature on other rigs.

In use I found the IC-756 to be very 'comfortable' to use for very long periods. Features such as the electronic keyer, dual watch and the host of other items I don't have space to mention - make me think that this receiver will appeal very much to anyone looking for a transceiver at the 'top end of the market' price range.

Personally, to put the final touches

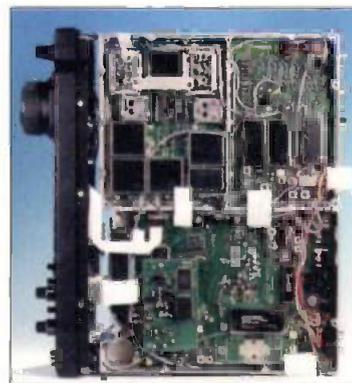
to an otherwise excellent transceiver, **I would have the optional extra narrow filters fitted. I believe this is a necessity on today's crowded bands.** In my opinion no amount of DSP and other filtering techniques can achieve their best without the aid of good r.f. crystal filtering.

Perhaps I should finish the review with some of the reaction of **Tex Swann G1TEX** who does the photography (amongst other things!) for *PW*. Tex found himself drawn to the receiver to do more listening and watching and felt that if he had an IC-756 the 'spectrum analyser' installation would be put to very good use!

Yes Icom, I really do think you've produced an exciting new 'Perspective on the bands'. Congratulations on producing what should be a trend-setter.

My thanks go to **Icom (UK) Ltd., of Sea Street, Herne Bay, Kent CT6 8LD, Tel: (01227) 741741, FAX: (01227) 741742**, for the loan of the review transceiver. The IC-756 is available from Icom approved dealers at the recommended retail price of **£2195.**

PW



The G3XFD Top Three Choices

In this and future h.f. transceiver reviews, I intend to leave readers in no doubt as to what my own personal 'top three' tried and tested choices are. All will be from evaluation on the air, my own tests and take into account the cost of the equipment and the information will be up-dated as I review equipment.

No. 1: (Top choice) The Kenwood TS-870 h.f. with DSP h.f. transceiver, offering absolutely superb performance and excellent operator facilities in 'the top of the range' price bracket. Would be G3XFD's ultimate choice.

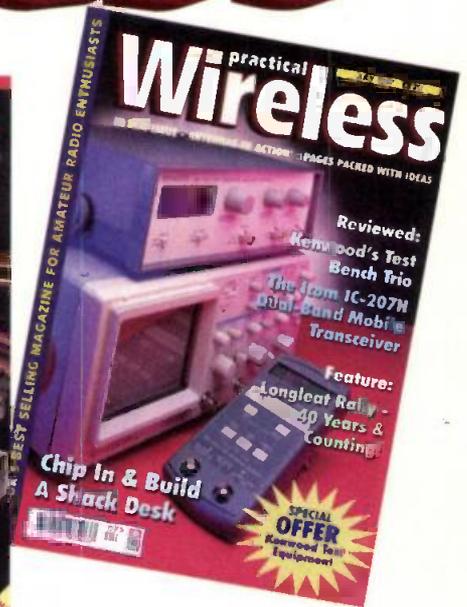
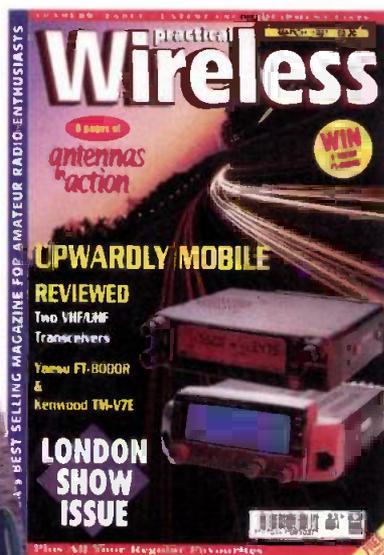
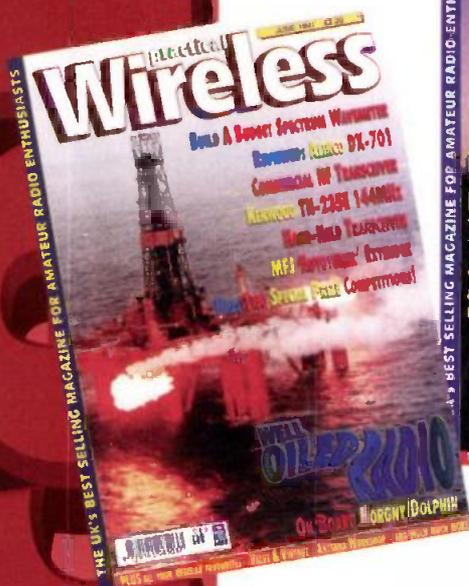
No. 2: (Second choice) The Icom IC-756 DSP equipped h.f. and 50MHz transceiver. This innovative, very neat and tidy transceiver proved to be a delight to use. The Spectrum Scope screen has proved to be an extremely significant innovation, providing the operator with a large amount of information and aiding operation in ways not possible before. Equipped with the optional extra narrow band filtering this transceiver would be a strong contender for my No. 1 choice because of ease of use, facilities and presentation. I think this transceiver will be a trend-setter on the h.f. market.

No. 3: (Third choice) The Alinco DX-70 h.f. and 50MHz transceiver (Present main rig owned by G3XFD). Superb value-for-money transceiver offering facilities and performance of equipment costing twice as much (built-in narrow filtering). Overlooked and under-rated (unfairly) by many operators due to the manufacturer not being previously known for h.f. equipment.

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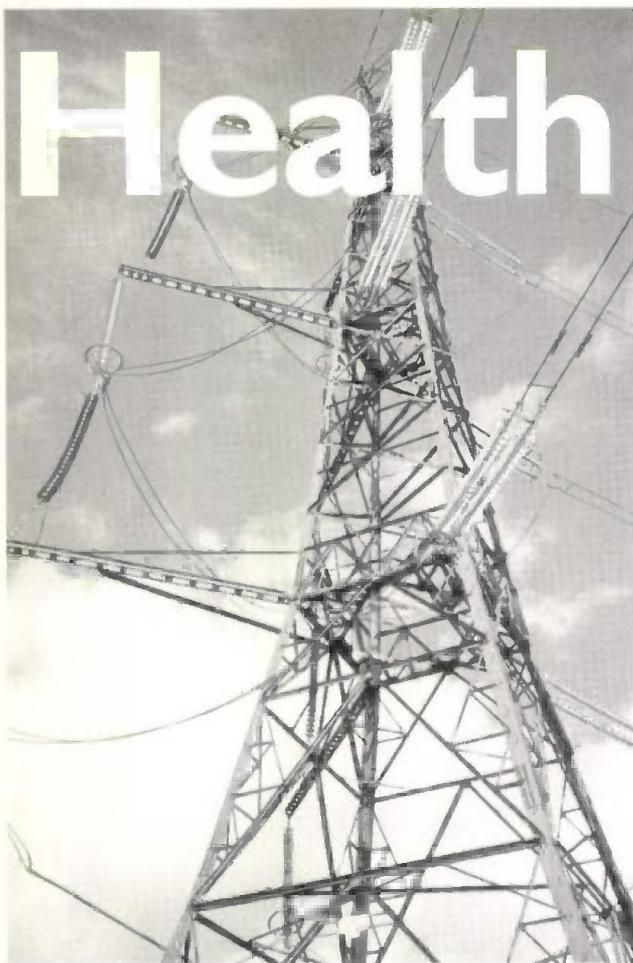
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Health Hazards

What Level Radiation?

By Gordon King G4VFV

Gordon King G4VFV looks into a subject that's often in the news regarding health hazards and electromagnetic radiation. It's something we cannot ignore because it's very close to us all even if it's mostly only at low levels!

Fig. 1: At the power supply frequencies listed in the table, it is a recommendation of the NRPB that humans should not be exposed to current densities in the head, neck and trunk exceeding 10 mA/m². This is called the 'basic restriction' which is met provided the exposure field strengths in the table are not themselves exceeded. At 73kHz the basic restriction works out to 750 mA/m².

In recent times, much has been made by the lay media about possible connections between human health and electromagnetic fields or e.m.f.s. There have been disconcerting reports about tens of thousands of pounds being knocked off the value of houses located within 100 metres of overhead power lines, of difficulty in obtaining a mortgage and of residents living in fear of an increased risk of cancer and degenerative diseases because of their exposure to the radiation.

Many radio enthusiasts will have also read about radar signals spoiling television reception and affecting hearing aids in coastal areas. And, again, will have heard of the apprehension of people living nearby, about the possible health risks.

Then there was the report and tabloid headlines about a "Heart

Girls' Hell". This covered a story about a girl living 400 yards from the Crystal Palace television and radio transmitter. The 1,000kW (e.r.p.) emissions from which were blamed for stalling of the girl's pacemaker, palpitations and blackouts.

Health & Hand-Helds

Nowadays the public are hearing much about health issues related to the use of hand-held radiotelephones. There are also comments about base transmitters and about a seemingly high incidence of leukaemia in homes next to a railway line where the cause is being attributed to 25kV overhead power lines for traction supply. The large mains distribution transformers next to houses are also receiving similar attention - the list is endless.

The Radio Amateur has not been overlooked either! There have been a number of reports endeavouring to link health problems of "radio hams" to their own derived e.m.f.s.

So, let's face it, whether we like it or not we are all living in an environment which is constantly irradiated by e.m.f.s of all frequencies from extra low frequencies (e.l.f.) mains frequencies to super high frequencies (s.h.f.) radar frequencies and above. In addition, there are all the natural radiation arriving on our planet from space.

Apart from blocking the hole in the ozone layer, there's little we can do about the natural radiation. But what about man-made radiations - do these represent a hazard to mankind?

Health concerns, particularly at mains power frequencies, have received increased attention by the media since the 1970s. This following a case-

controlled investigation in Denver, Colorado in the USA which claimed to reveal a link between childhood cancer mortality and the e.m.f.s from nearby mains power configurations.

Since the Denver investigation, an incredible number of epidemiological studies have been activated along with laboratory studies looking for possible biological effects of power supply e.m.f.s, etc. But in neither area have the results yielded conclusive evidence as to the possibility of a potential hazard to health.

Fuelled By Media

Nevertheless, concern continues to increase, fuelled by dramatised media activity. However, both epidemiological and biological studies are continuing world-wide in an endeavour to obtain conclusive and repeatable scientific evidence of possible health risks from e.m.f.s.

The studies are including exposure to e.l.f. and very low frequencies (v.l.f.) e.m.f.s as well as to electromagnetic radiation at frequencies up to 300GHz. Because of this the investigators are therefore taking into account all of the amateur radio bands and thus have a particular interest to our fraternity.

There are internationally a number of organisations which have been established for conducting research and guiding the public with respect to radiation protection - both ionising and non-ionising. **And you should remember that ionising radiation is a definite health hazard unless carefully controlled and this type emanates from X-ray, nuclear, gamma sources, etc.**

Ionising radiations arise when electrons are knocked out of orbit around the atomic nuclei, which yields charged particles called ions. These can certainly result in DNA mutation and damage to the immune system, leading to the formation of cancers which may

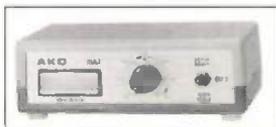
Frequency (Hz)	Electric Field		Magnetic Field (A/m)	Magnetic Flux Density	
	(dB μ V/m)	(V/m)		μ T	mG
50	201	12000	1280	1800	16 000
60	200	10000	1066	1333	13 000
100	196	6000	640	800	8000
120	194	5000	533	666	6666
150	192	4000	426	533	5330
180	190	3333	355	444	4400
73 000	180	1000	64	80	800

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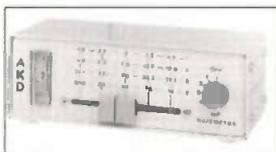
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Health Hazards - What Level Radiation?

Frequency (MHz)	Electric Field		Magnetic Field (A/m)	Magnetic Flux Density		Power Flux Density W/m ²
	(dB μ V/m)	(V/m)		μ T	mG	
1.8	170	315	4960	6.34	83.4	*
3.5	164	164	1351	1.73	17.3	*
7.0	158	85	362	0.46	4.6	*
10.1	155	59	176	0.22	2.2	*
14 to 144	154	50	130	0.16	1.6	6.6
430	160	100	260	0.31	3.1	26
1240 to 1325	164	160	423	0.51	5.1	67
2310 upwards	166	194	520	0.62	6.2	100

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Fig. 2: At frequencies below 12MHz the electric field and magnetic fields are investigated separately. The levels tabulated are rounded and correspond to those of the midband frequencies. The variation in level is less than 1dB over any band. At frequencies below 10GHz the power density is subject to time averaging (see text).

not manifest until years after exposure.

It's important, therefore, that the potentially lethal effects of ionising radiation are not associated with the seemingly benign nature of non-ionising e.m.f.s and electromagnetic radiation. Indeed, it seems as though science in general is better versed in the effects of ionising radiation than the non-ionising.

Radiological Protection

Looking after the radiation picture in the UK is the **National Radiological Protection Board (NRPB)**, which was established by the Radiological Protection Act of 1970. Other countries have their own organisations which tend to

limit of the radio spectrum at 300GHz is embraced.

It's possible for us to obtain a feeling of the scheme firstly from Fig. 1. This is constructed from data issued by the NRPB, but I have deliberately focused on the power supply frequencies and their harmonics, as well as on the 73kHz amateur band. The higher frequency bands are considered in a separate table.

At 50Hz, for example, the investigation levels are 12kV/m electric field, 1280A/m magnetic field and 1600 microTelsa (μ T) magnetic flux density. In addition I have included the electric field in decibels above 1 μ V per metre and the equivalent magnetic flux density in milliGauss (mG).

Now, it's a recommendation of the NRPB that any individual should not be subjected to current densities in the head, neck and trunk greater than 10mA/m². This is the basic restriction over the frequency range 10Hz to 1kHz, and this basic restriction is satisfied provided the investigation levels are not exceeded. The actual value of the basic restriction changes over the frequency spectrum or segments of the spectrum to relate to the way the body tissues respond to the fields.

At 73kHz, for instance, the basic restriction works out to 750mA/m². However, provided

exposure does not exceed the investigation levels, then the NRPB basic restrictions are satisfied. Exposure at the lower frequencies tends to produce an alternating surface charge, resulting in induced currents through the body tissue to earth, an effect of this being a disconcerting

an induced current density limit of 100mA/m².

There's no NRPB basic restriction for static electric fields. But above about 25kV/m, the biological effect may again also be perception.

In the shack, I have measured magnetic fields up to 3 μ T at 400mm from a fully loaded power supply unit at 50Hz (plus harmonics). I also measured 10 μ T peaks from an audio system and around 4kV/m at 200mm from the screen of a cathode ray tube.

A television monitor gave 5 μ T at line timebase frequency at 200mm distance. While outside the shack I have measured 10 μ T from my electric razor at 30mm, 0.4 μ T from the alternator of my car while in the driving seat and a maximum of 0.5 μ T in the kitchen with all the appliances running!

Overhead Cable

The highest reading I obtained during tests was beneath an overhead power cable which yielded 5kV/m at 20 μ T (see Fig. 1). And along one road in proximity to a large mains power transformer and underground distribution cables, I obtained a variable reading up to 0.2 μ T. Anyway, all these measurements were 'miles below' the NRPB investigation levels!

With the frequencies so far looked at (excluding 73kHz) the wavelength is massive and hence the radiation negligible. Any measurements must therefore be in the near field and (excepting multiphase networks) the fields falling as the reciprocal of distance.

At the higher radio and microwave frequencies the electric and magnetic fields couple together in the far field distance. This is defined as $2D^2/\lambda$, where D is the largest dimension of the antenna and λ the signal wavelength, provided that the distance is no less than $\lambda/2\pi$ and are propagated through space.

As the frequency is increased the exposure effects on the body change from the induced current already described to thermal (expressed as Specific energy Absorption Rate or SAR in Watts per kilogram of tissue). Here the NRPB detail various basic restrictions, depending on frequency segments, from 1kHz to 300GHz, which are meant to limit the whole body heating resulting from the exposure to levels comfortably

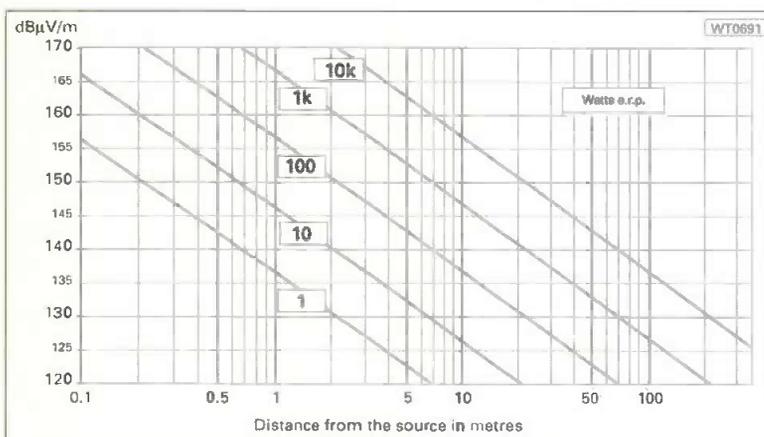


Fig. 3: The graph provides a fair approximation of the level of the electric field at a distance from source in metres (see text).

work in harmony together, though not always coming up with identical results!

In the area of non-ionising radiation, the NRPB has established two primary parameters, which are basic restrictions exposure and investigation levels which are linked to the basic restrictions. The whole spectrum from static fields to the

magnetosphere flicker in the peripheral vision.

High Static Fields

High value static magnetic fields can also incur biological disturbances in the form of impaired mental function, vertigo, nausea, etc. The NRPB recommendation here is for

handled by the human thermoregulatory system (our built-in 'thermostatic control system').

The SAR is also time-averaged to take account of thermal recovery of the whole body or specified parts, including the head, neck, trunk and limbs. Compliance will also protect embryo and foetal development in the pregnant mother. It's also mentioned that pulse modulated radiation around 200MHz to 6.5GHz might be perceived as a sound, possibly caused by rapid thermal expansion of the head!

Amateur Bands

The diagram in Fig. 2, is unique in that it covers all the amateur bands in terms of the NRPB investigation levels. These levels, which if not exceeded will ensure compliance with the basic restrictions.

I've arranged the table in the diagram to match the parameters of the Table in Fig. 1, but with the addition of power flux density. Time averaging is applied to power flux density below 10GHz over six minute periods.

For example, if in c.w. mode, a power flux density of say $2W/m^2$ is produced in the 'key down' situation, then when Morse is being transmitted and the duty cycle is, say 50%, the average power density is $1W/m^2$.

If there are alternate one minute periods of transmit and receive the transmit average over any six minute period is again 50%. This results in an overall average of $0.5W/m^2$. (Similar ruling is applied in the other modes).

A field strength meter is required for an accurate assessment of the radiated field in proximity to a radio station, and these often give the results in $dB\mu V/m$.

Measurements should be made in the 'far field', which may be only two or three metres from an antenna at 430MHz or four metres at 144MHz, depending on the antenna dimensions.

The far field from a half-wave dipole at 14MHz would start around 10 metres, but at 3.5MHz the far distance would be (at least) 40 metres.

Electric Field

A fair approximation of the electric field can be gleaned from the graph in Fig. 3. If the legal maximum of 400W peak envelope power (p.e.p.) is fed to a Yagi system in the 144MHz band whose gain is 14dB relative to a dipole, the effective

radiated power (e.r.p.) would be around 10kW and the electric field at seven metres (distance about $100V/m$ or $160dB\mu V/m$ in the beam of the antenna.

The level of the electric field from the antenna would then be some 6dB higher than the appropriate NRPB investigation level. This means that the basic restriction would be exceeded on an exposed body. This could never be tolerated without time averaging the resulting $26.52W/m^2$ power density, but even so, the exposure might well exceed this high value owing to local reflections adding in-phase to the direct antenna signal!

Levels associated with the $dB\mu V/m$ value are given below in the graph. But the field relationships are valid only in the far field.

Relationships in the far field are as follows: $A/m = (V/m)/377$. $W/m^2 = (V/m)^2/377$. $\mu T = V/m \times 1.26/377$. $mG = \mu T \times 10$.

Incidentally, the NRPB does allow for slightly relaxed investigation levels from 10MHz to 1.55GHz when there's no possibility of small children being exposed to the radiation.

Fields & Power Densities

The fields and power densities related to the investigation levels and hence the basic restrictions of the NRPB are in general significantly in advance of those likely to be evoked by amateur radio stations. However, an exception exists to this (possibly) in close proximity cases of the highest e.r.p.s, mainly at v.h.f. and above.

A large number of epidemiological* assessments have been activated since the seventies, some of which have indicated a statistical relationship between e.m.f.s and health risks. Even so, one must not conclude that it is the e.m.f.s which are responsible. The science of epidemiology is basically a statistical indicator of relationships - not an actual proof of cause!

**Editor's note: Epidemiology basically means the study of disease in the population. The statistics come later!*

One report in America suggests that mains power e.m.f.s. at significantly lower levels than the NRPB recommendations are still likely to suggest health risks. This report suggests a safety limit of a mere $0.2\mu T$ at power supply frequencies.

Under Active Consideration

Electromagnetic radiation is still under active consideration yet no reduction to the NRPB's basic restrictions have been advocated. Indeed, the NRPB Advisory Group has concluded that there's no convincing evidence that e.m.f.s cause cancer, but there's an indication of a need for further research - much of which is in hand.

However, with respect to hand-held radio telephones the NRPB have stated the following: "on the basis of current safety standards for r.f. radiation, the use of such telephones does not present a health hazard".

With regard to Amateur Radio, again there's no clear evidence of a health risk, although in the USA Leukaemia has been termed the 'Hams disease'. Despite this, we must steer clear of 'electrophobia' - the irrational fear of e.m.f.s.

Clearly it is unwise to use more e.r.p. than necessary for a contact. A cut from 50W to 5W cuts the electric field at 10 metres distance from 4.9 to 1.5V per metre, which, at the contact end, corresponds to a reduction of a mere 1.5 'S' points! (And QRP is fun!).

As a final point, from 1930 to 1980 radiated r.f. increased from 0.5 to 70.2MW (MegaWatts) in England and Wales. And during the same period the male life expectancy increased from 59 to 71 years!

PW

Electric Field ($dB\mu V/m$)	Magnetic Field (V/m)	Magnetic Flux Density		Power Flux Density (W/m^2)	
		(mA/m)	μT		mG
120	1.0	2.65	0.003	0.03	0.002
125	1.78	4.72	0.006	0.06	0.008
130	3.16	8.38	0.01	0.10	0.026
135	5.62	14.9	0.018	0.18	0.083
140	10.0	26.5	0.033	0.33	0.265
145	17.8	47.2	0.059	0.59	0.840
150	31.6	83.8	0.105	1.05	2.648
155	56.2	149.0	0.187	1.87	8.377
160	100.0	265.0	0.334	3.34	26.52
165	178.0	472.0	0.594	5.94	84.04
170	316.0	838.0	1.056	10.50	264.80

WT0692

Fig. 4: Table indicating $dB\mu V/m$ to V/m conversion and associated parameter. The $dB\mu V/m$ electric field strength is in decibels reference $1\mu V$ per metre, V/m electric field strength in volts per metre, mA/m magnetic field strength in milliamperes per metre, μT magnetic flux density in microTesla, mG magnetic flux density in milliGauss, W/m^2 power density in Watts per square metre.

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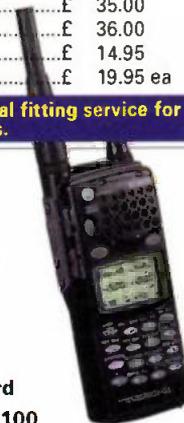
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Operating Abroad

By Bruce Muscolino W6TOY

Bruce Muscolino W6TOY/3 says that operating from foreign shores is one of the most exciting aspects of amateur radio - read on to find out why and share his experiences.

Is it the guy on vacation? The one with the exotic call and the 'pile-up'? Or maybe it's the guy enjoying the beaches in Italy or the snow in Switzerland? Actually it's all of them, they're enjoying one of the most interesting and exciting aspects of amateur radio - operating from another country! I've done it, and I can assure you about the only comparable experience in amateur radio is your first contact.

Operating abroad is much more than having an exotic callsign, it's a whole new cultural experience of different sights, different sounds, different smells. It's about different people, speaking a different language with a whole different attitude towards life. People eating different foods and living in different style houses. Vive la difference!

In 1978, I was sent to the Netherlands to establish and operate a repair centre at Fokker Aircraft, it was a three year assignment. It was one of

and was actually able to supply the necessary forms. I'd certainly advise that you start with your national radio club to see what assistance they can provide.

I also suggest looking into contacting embassies or consulates to see if they could help. As a last resort, I'd try to contact an amateur in the country I was visiting, either on the air or by mail.

However you do it, apply early! Processing a licence request takes time.

My move to the Netherlands was planned for mid-June, and despite applying in early March, my licence had not arrived by the time I left for the airport! Anxious as I was to get started, this actually turned out to be a blessing.

After I arrived I called the Dutch PTT offices and asked about the status of my application. I was told my reciprocal licence had been issued and I could begin operating at once.

I asked what my callsign was. This led to a discussion of "Did you want a Dutch call?" "Yes please!", I said. Then, after pointing out that Dutch calls were no longer issued to reciprocal licensees, I was given PA3AIC.

While I lived in the Netherlands, I made two trips to the Isle of Man with my friend Paul Vogel PA3APA. Here again, although we applied for our reciprocal licences several months in advance, we had not received our licences three weeks prior to departure.

In the United States, amateur radio licences have traditionally been free, and no licences are required for home radios or televisions. This, however, is not always the case in other countries, I paid fees for both my Dutch and British reciprocal licences.

Equipment Location

Getting yourself and your equipment to a new location is almost as important as arranging for a licence. After all, without a licence, just take the camera, the skis or the snorkel, and be done with it!

Your shipping arrangements will depend on whether your move is permanent, semi-permanent, or a vacation. My employer paid to ship

my household goods, but I was reluctant to commit my precious radios to 'the movers'.

So, I cheated and took my radios to work and had them packed and shipped with my workshop supplies. This, of course, created a minor panic when I had to 'smuggle' them out of the moderately secure aircraft factory where I worked!

The trips to the Isle of Man when I was based in Holland were vacations, and since Paul and I were going to be there for a week or so, we didn't want to waste operating time waiting for shipments. Our first trip was by car and car ferry, with the radios packed in the back. The second trip was by air, and my Kenwood TS-520 rode under the seat!

On every trip away from Holland with radio equipment I took the precaution of getting customs paperwork allowing me to temporarily export and reimport my equipment. Wherever you go, and however long you intend to stay, you should do the same. Determine import and export procedures for your equipment well in advance by contacting a reputable international freight company or your customs service.

When you pack your radio equipment for shipping, either as baggage or via a freight company, repack it in plain boxes. It is not wise to advertise that the box contains a \$3000 'superwhizbang 18' transceiver.

Even if you have the original boxes, find a sturdy box 6 to 8in larger than the original box in every dimension. Then fill the extra space with packing material (crumpled newspaper works well, as do 'bubble pack' or 'foam plastic peanuts (maggots)').

You might also consider having your equipment professionally packed and shipped. Here in the United States there are several large 'pack and ship' companies who offer this service for a reasonable price.

And finally don't forget to take along tools and materials for an antenna and ground system, plus enough test equipment to solve simple problems. A limited spares set and a flashlight should also be in your travel kit.

Amateur Friends

If your trip is a vacation you might want to contact the country's national



"I got on the air a few days after moving into my house, my household goods hadn't even arrived!"

the greatest adventures of my life. I held the exotic calls and operated from the exotic locations.

First Priority

After you've chosen a place to go, your first priority should be arranging for a licence. I was fortunate as the United States had reciprocal operating agreements with the countries I was visiting. This reduced the procedure for getting my licence 'over there' to filling out a form.

My national radio club - the American Radio Relay League - was able to advise me of the licencing procedures for reciprocal operating

radio club for advice about hotels or other places to stay that are friendly towards amateur radio operators.

My first inquiries about the Isle of Man were made through Anne **GD4GWQ**. I'd met her when I attended the RSGB Show at Alexandra Palace one year, and there she was, 'manning' a booth.

Since I'd worked Anne on the air I went up and introduced myself, and while I was there, I asked about the possibilities of operating from the Island. We followed this up by making more formal plans, and she arranged lodgings for myself and Paul with a 'radio friendly' family.

If you're going to be at your destination for a while, carefully explain the unique features of the radio hobby to your rental agent. For example, I told mine that I must be able to erect outside antennas and that I did not want to live in close proximity to another radio amateur!

As it was, I ended up with two very strong Dutch amateur stations close to my house. One lived a few blocks away, at the end of my street, the other, the Dutch national station **PA0AA**, was about a kilometre away.

Meeting Local Amateurs

A very enjoyable aspect of living and operating abroad is meeting local amateurs. I met my first one just a few days after moving into the Holiday Inn in Leiden.

As I was leaving for dinner one evening a VW camper bus drove in. It took a count of three before I realised the VW had California call letter licence plates! A short walk through the parking lot after I got back re-located it, with its call plate of **KH6IMX**.

I left a QSL card and we got together the next evening for a beer. His name was **Bob Meurer**, an American Navy Lieutenant Commander who was beginning a three year assignment with the Dutch Navy!

Bob was there along with another American Navy amateur, **WA4MBG**. Small world, isn't it!

I also began to meet Dutch amateurs very quickly. An American engineer who was an amateur, and was returning to the United States as I arrived, sold me an antenna and introduced me to **Lou von Boeckel PA3AFU**.

Lou passed my name and telephone number to an amateur in my village, and shortly after that I had a 'phone call offering me a ride to a meeting of the Leiden section of the **VERON**. The **VERON** is the Dutch equivalent of the RSGB or ARRL.

The meeting was my introduction to amateur radio as practiced in Europe. Of course I couldn't follow

the lecture, but the idea of serving beer at intermission struck me as highly civilised!

Working European

The thrill of working European stations as easily as I'd worked Pacific stations from California and the incredible diversity of callsigns I heard every day are the two experiences that remain firmly implanted in my head. There were French, Italian stations, and a whole spectrum of Eastern European and Russian stations, along with my countrymen, the Americans, all fighting it out for bandwidth. It was like being the proverbial kid, locked in the candy store (sweet shop)!

I got on the air a few days after moving into my house, my household goods hadn't even arrived! Setting-up was a 'snap'. I put the **TS-520** on its packing crate and strung a vertical wire up the stairwell and bingo, two **SMs** and a **G** helped celebrate my arrival on **3.5MHz**.

Soon my back garden sprouted a tri-band vertical, and **DX** chasing began in earnest. While not a serious contester, my first full Saturday afternoon on the air I found myself cluttering up the bands. Seeing it as a quick way to find out what I could expect from my new station, I quit 16 hours later! A precedent has been established and contests soon became a big part of my operating agenda.

Rig Problems

Probably the worst thing that can happen to an amateur operating away from home is to have a problem with his rig or a neighbour. Those of you who set-up in hotels should remember how strongly the management will disapprove of any attempts to replace the **TV** or the mini-bar as the dominant form of in-room entertainment!

Remember whether you're moving permanently, or just on vacation, take along enough spares to fix radio-threatening problems. Even if you're going to be there for a long while. They will cover you until you find a local radio store. During my time in Holland I came to depend on **Firma Schaart**, in **Katwijk**, for bits, pieces, and Thursday evening coffee sessions!

The principle radio problem I faced, other than a lack of operating time, was **TVI**. A totally different set of regulations governed interference problems in the Netherlands than at home.

In the United States, the owner of the set being interfered with is responsible for purchase and installation of filters for his set. In Holland, however, the radio amateur was responsible for everything, and

could be taken off the air by the **PTT** if he failed to resolve an interference problem.

My first experience of **TVI** turned out not to be my fault. My neighbours in the row of houses immediately behind mine were using a broadband signal amplifier for their community antenna system and these were illegal under the then current Dutch law.

Nevertheless, I asked the local **TV** shop to install appropriate filtering at my expense. My neighbours and I became much better friends after that!

The second time around came as I began to really get serious about **144MHz** c.w. I had a 17-element **144MHz** beam and rotator installed on my chimney, and within a week or two a neighbour from about five blocks away came knocking at my door.

It seemed I was interfering with his enjoyment of German television. He had an array of four 15-element **Yagis** on a tower in his garden to support this 'habit'.

I pointed out that Dutch laws were only concerned with interference with Dutch radio and **TV**, and that the **PTT** might take a dim view of his interest in German **TV**. But in the end I mostly gave up **144MHz** operation in the interest of improved international relations!

Going Home

The most difficult part of any trip, for me, is returning home. But even good things must end, it is said, and so my Dutch adventure came to an end.

My employer wanted me back, if only to hold me accountable for having enjoyed the assignment! There was the invariable round of parties, beers, and goodbyes, and then one day I got on an aeroplane bound for home.

In about three years I had made over 8,000 contacts, about 6,000 of them in contests. I also made about 1,200 contacts from the Isle of Man operating as **GD5DPA**.

Lest I mislead you, among the non-contest contacts, **QSOs** were made up of many delightful chats with friends, some from back home and some newly made. All of which will remain with me forever.

The logs of my Isle of Man operation were lost during my move from Europe. They eventually surfaced during my move from California to Maryland.

One last item. I've always been an avid **QSL** collector and tend to pride myself on **QSLing** every contact. And I'd like to assure everyone that I worked during my travels, that a **QSL** card will be forthcoming, if they haven't already received one.

PW



PROFILES

It's that time of year again - the time when potential NRAE and RAE candidates are looking for courses to join and books to help them on their way. And as usual the PW Editorial team have gathered together a selection of interesting and helpful books to provide the essential information to help you pass the exam. Additionally, some of the titles described will prove to be very useful for established listeners and operators.

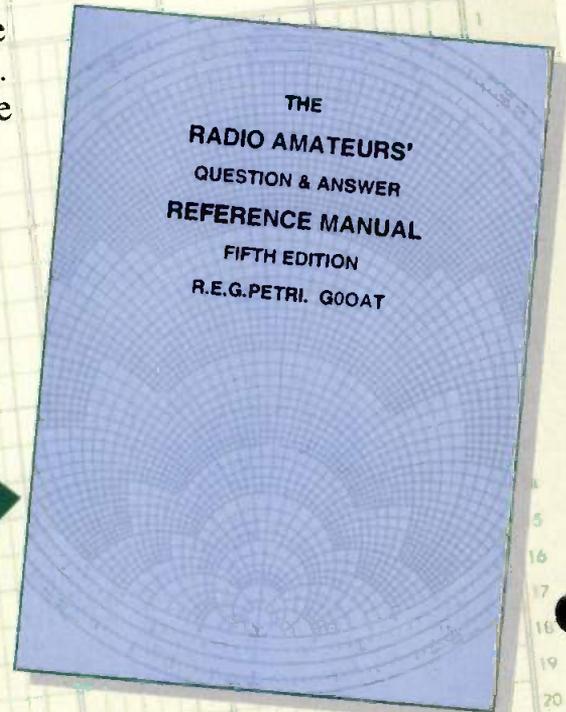
The Radio Amateurs' Question & Answer Reference Manual (5th Edition)

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In effect, Ray's book provides a comprehensive course. Many RAE course instructors use his book as the course textbook and it's just as useful for the student working alone.

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This book, unique in its approach, is proof that mathematics can be fun! Ray Petri undertook a very difficult task when he decided to write this book, but his hard work has produced an extremely useful handbook and electronics textbook.

Anyone contemplating buying the book should also consider buying the Casio FX-115s calculator too, as together they provide a powerful working tool. The author carefully leads the reader through the techniques involved in using the mathematics and provides the information on the necessary keystrokes for the scientific calculator.

Packed with worked problems and answers, this book could help many people overcome a completely unnecessary fear of mathematics and clearly demonstrate that maths is just another useful item in the 'toolbox'. **Very highly recommended.**

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**OPERATING
MANUAL**

Edited by Ray Eckersley, G4FTJ



**Amateur Radio Operating Manual
Fourth Edition**

Edited by Ray Eckersley G4FTJ

Even if you are well established in the Amateur Radio hobby this RSGB published book should be on your operating desk as it's an extremely comprehensive source of information for transmitting operators and listeners alike. Although the book is promoted as being an 'operating manual' - it goes much beyond what the title suggests and provides guidelines and introductory sections on everything from c.w. operating (and procedures) and Packet radio operating to contest working, h.f. and v.h.f. portable and mobile operating and the latest craze of 'Islands on the Air'.

Many operators who already have a copy of the book will confirm it's worth having just for the very comprehensive international callsign (and areas) list alone. The rest of the information comes as a welcome bonus. **Highly recommended at £12.25.**

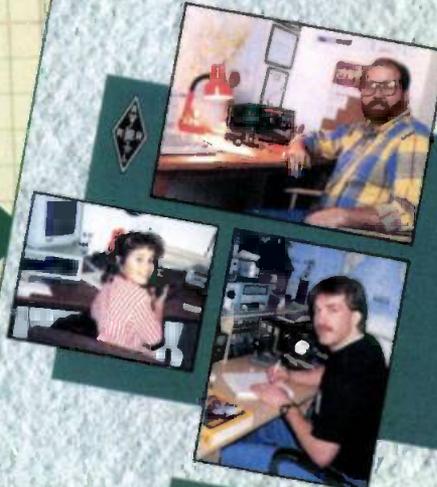
WIFB's Help For New Hams
By Doug DeMaw W1FB

Although it is very American in approach this book will prove to be extremely useful on both the practical and theoretical information aspect of 'getting going' for new and relatively inexperienced operators anywhere. In effect the book is a 'mini beginner's manual' as it provides practical help and advice on antennas, interference, operating equipment (and is also one of the few books that provides information on all those complicated controls on modern equipment!).

All the information is provided in an easy-to-read style which passes on the information as though Doug W1FB was sitting next to you in the shack. Very readable, enjoyable and an ideal gift for someone starting (or wishing to start) in the hobby. **Highly recommended.**

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Practical Wireless, September 1997

What Voltage?

By Alec Melville

Alec Melville shows you how to analyse a typical transistor circuit in terms of the expected voltages.

From time-to-time the enthusiast may come across circuits which have developed a fault. In many cases, even when a circuit diagram is available, it won't include voltages. This makes it very difficult to test the circuit in order to find the fault.

However, from the circuit diagram it's quite easy to calculate the voltages in the circuit and then test the circuit to find the actual voltages present. This will usually enable the fault to be pin-pointed and the failed component or components replaced.

Calculating the voltages often requires nothing more than an understanding of Ohm's Law along with a few 'rules of thumb' concerning semiconductor characteristics. For example, Fig. 1 shows a simple common emitter amplifier without the voltages included and could be a small section of a typical circuit diagram.

The voltages at point A, B and C can, however, be calculated quite easily as I'll show in the following paragraphs. I'll reference all voltages to the lower 0V rail of the diagram unless I mention otherwise.

Let's start with the base voltage at point A. This is dependent on the individual voltage drops across R1 and R2. These two resistors are connected as a potential divider so, the voltage drop across R2 is:

$$\frac{1.8k\Omega}{1.8k\Omega + 10k\Omega} \times 9V = 1.37V$$

The voltage at point A (the base) is therefore 1.37V. The voltage at point B (the emitter) can now be calculated from the base-emitter voltage drop of the transistor. Here is one of those rules of thumb that I talked of before.

For a typical small signal silicon transistor the forward biased (normal operation) voltage drop is about 0.7V. Since the transistor is an *npn* type, the base voltage (point A) must be positive with respect to the emitter voltage (point B) by about 0.7V (or conventionally the emitter voltage is 0.7V less than the base voltage). So, the voltage at point B must be (1.37-0.7)V or 0.67V.

The current through R4 (the emitter current) can now be calculated by simply using Ohm's Law. The current through R4 is:

$$I_e = \frac{0.67V}{200\Omega} = 3.35mA$$

Now for the second rule of thumb that you need for the solution to this problem. And in general, with most transistors, the collector current may be assumed to be the same as the emitter current.

So, you can assume that the collector current (the current through R3) is also about 3.35mA. The voltage drop across R3 (due to the collector current) is therefore:

$$V_{R3} = 3.35mA \times 1000\Omega = (3.35 \times 10^{-3}) \times (1 \times 10^3) = 3.35V$$

Knowing the nominal voltage drop across R3, you can find the voltage present at point C by subtracting V_{R3} from the supply voltage. So, the voltage at point C (the collector voltage) is therefore: (9-3.35)V or 5.65V.

The calculation of the collector voltage is only approximate due to circuit variations. The largest influence on the actual voltage will be due to

the base-emitter voltage. Since the base-emitter voltage can vary between about 0.65 and 0.75V, giving a collector voltage that could lie between 5.4V and 5.9V, provided the transistor is functioning correctly.

In making measurements, it is important to verify that the base-emitter voltage lies in the range 0.65 to 0.75V for a silicon transistor. To confirm this voltage, measure the emitter voltage and then the base voltage and then subtract the emitter voltage from the base voltage.

If the base-emitter voltage is markedly different from 0.70V, then the transistor is suspect and should be removed for testing, preferably by replacement. The exact value of the voltages measured will probably differ slightly from the calculated values. This is because of the tolerance of the resistors and possible loading by the meter.

The effect of the base current on the potential divider can usually be ignored, since the base current is normally only about one-tenth of the current through the potential divider. Similarly, the emitter current and the collector current can usually be taken as being equal, since the base current will represent only a small fraction of the emitter current.

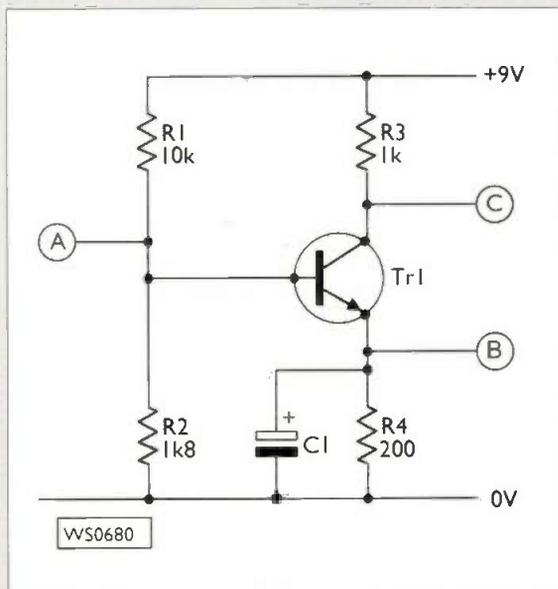
Where there is a diode in the circuit, provided the diode is forward biased, ie, the anode positive with respect to the cathode, again the voltage drop across the diode will be in the range 0.65 to 0.75V. So, once the voltage at one terminal of the diode has been calculated, the voltage at the other terminal can be derived.

If the diode is reverse biased, so that the cathode is positive with respect to the anode, then the diode can usually be treated as an open-circuit for the purpose of calculating the voltages.

Analysing circuit voltages is easy when taken a step at a time.

PW

Fig. 1: The simple circuit to be analysed in terms of voltage.



Micro Power Fun

The Alinco DJ-C1 144MHz and DJ-C4 430MHz

By Dick Pascoe G0BPS



Dick Pascoe G0BPS looks (very closely!) at the latest in miniature transceivers from the Alinco stables and discovers that size isn't everything!

The new Alinco mini DJ-C1 and C4 transceivers may at first sight be seen as 'fun' devices. And measuring just 56 x 94 x 11mm they may appear to be not for the serious operator. Let me dispel this thought immediately. I used the two hand-helds loaned to me for review during my ten day trip to the huge radio rally held in Freiderichshafen, Germany.

I had been asked by PW to check out the new DJ-C1 and the DJ-C4 from Alinco. The '1' for the 144MHz band (and Airband) and the '4' for the 430MHz band.

During the drive down to Germany from Folkestone I used both sets to keep in touch with the second car during the whole of the first morning. It may first appear that a simple morning operating was not much, but the transceivers had arrived charged and I'd used them for at least an hour the previous day chatting to friends through the local repeaters 6.4km away.

The early results were promising. Mick G4MIX thought it sounded great with good clear audio that sounded like me. John G40JG also said it sounded (unfortunately) like me too (his words!) but the rig sounded good.

Alan G4YFP was entranced by such small transceivers (the photographs give a good indication of size, and the coin is a two pence piece) whilst Stan G6ZNW thought them to be too small to be of real use. Ian G3ROO thought they would be

a boon to the flyer, 'cos it fitted inside the breast pocket of the flying suit'!

Rusty M0AJX in Eastbourne was astounded to be told that I was in Folkestone and only running 300mW to access the 144MHz Hastings repeater some 48km away. But it should be remembered that I do live on high ground.

Using the DJ-C4 I managed to access the 430MHz repeater, also in Hastings, but only just. The audio not being readable enough for a QSO with Stan G6ZNW.

However, reports on the transmitted audio through the more local repeaters were reasonable. But it should be remembered that most repeaters expect at least 5W of power from the transmitter.

Clear & Uncluttered

The rigs themselves have uncluttered front panels with just nine controls plus the display and the microphone. Four of the controls have dual operation when used with the function key.

As usual with many rigs the VFO/Memory button was also the Function/Memory write button. A press of the monitor button keeps the squelch open until it is pressed again.

When the monitor button is used with the function button it locks the set. I often use this facility when travelling or at rallies, as it is often so easy to nudge the frequency a bit and lose touch with your companion on air.

The Call Button, when pressed, takes you to the first programmed frequency, which I set to my own 'favourite' for local chats at home. This also uses the Function Key enabling the 'step' mode to be used.

The up/down buttons are self-explanatory but the vol/sql (squelch) button was a first for me to use. When pressed, the display shows the setting of the volume control by number.

The up/down buttons then controls the level of audio fed to the supplied earpiece. A setting of 1 being the lowest and 8 the highest. A second press of the vol/sql button

shows the squelch level setting which was variable from 0 Squelch open, to 5, when left for four seconds the rig reverted to the frequency display.

Repeater Offsets

Setting repeater offsets in some hand-held radios can be very frustrating with several buttons having to be pushed. But on the Alinco DJ-C1 and C4 it's very easy.

One push of the function button then the RPT button shows the offset. On the C1 this was of course 0.6MHz, and could be changed by using the up/down buttons.

Pressing the RPT button changed the offset from minus to positive and then to off. A very easy and straightforward operation.

Even setting the tone was easy but not obvious unless you had read the manual. A long press of the function button followed by a press of the RPT enables the operator to change the tone frequency. The transceivers have CTCSS capability.

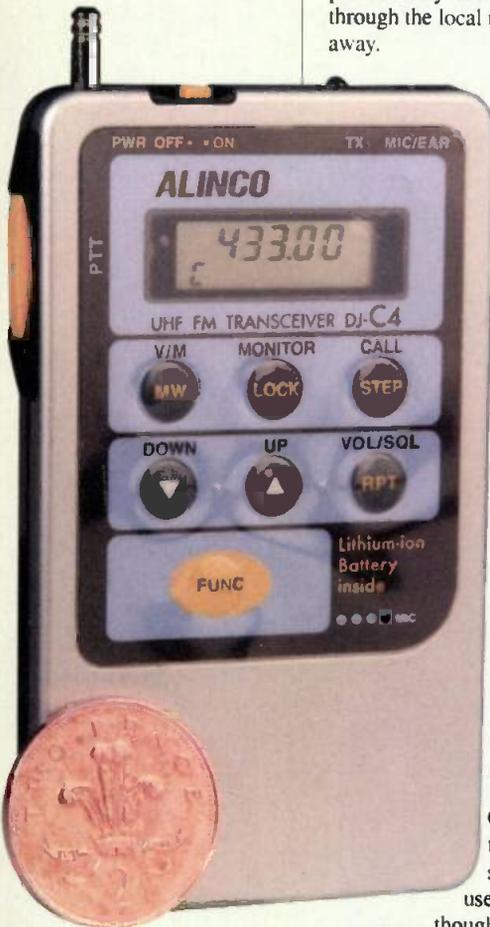
Other Features

The bright yellow on/off switch was set into the top of the unit with a large push to make switch as the push-to-talk on the side of the rig. The display on the DJ-C1 and C4 is just 25 x 7mm, which may at first appear small, proved very adequate in use.

The antenna is small and extends out from the body of the rig for just 105mm. The extra whip antenna supplied is purely a length of wire that's clipped onto the top of the housed antenna so that the rig can be used in the pocket without poking an eye out, (an excellent idea).

The fitted lithium-ion battery provides up to 300mW out with F3E modulation. The double conversion superhet receiver works very well with clear good audio into the supplied earpiece.

Although selectivity could be a little better, as my own Packet station (on 430MHz) could be heard occasionally. Sensitivity is



Hand-Held Transceivers Review

quoted as being -16dB μ V.

The current drain is given as 240mA on transmit and 30mA when on receive providing long life operation backed up by very fast charging in the charger unit. The best of all the specifications though is the weight: just 75g including the battery!

Other Opinions

So, what were the other opinions of these miniature Alinco radios? And with this in mind while I was at the Freiderichshafen rally I asked friends there to give me their opinion of these two great radios.

Norman DL7NEE commented with "Quite neat, much better than the big ones and it will fit inside a shirt pocket". While Sylvia 2E1CYL thought them to be "Neat, tidy and ideal for the purse or handbag. It's so tiny it wouldn't be noticed in a ladies pocket!"

Glen K5HGB and his wife Gail KASJBH loved the little rigs, but were a little upset, as like me they had bought the older version, the DJ-S11 which we all thought was small! Sheldon GW8ELR thought they were great, but asked "where do we go from here?"

George G3RJV and wife Jo-Anna G0OWH who I travelled to Freiderichshafen with were very impressed with the little DJ-C1 and C4 sets. Jo thought it very useful and ideal for the lady operator.

George was also impressed but admitted that he had enough trouble keeping track of his IC-2SE without having to look for a rig as small as the DJ-C1 and C4. He did like their style though!

Most other people I showed them too thought they looked very good, some thought they were toys, but soon changed their minds when they saw the transceivers in use.

The Bottom Line

The bottom line on these two Alinco transceivers is simple, they are not toys but are complex, well thought out additions to the hand-held range of small transceivers. Their battery life is good considering the power out but of course there is a drawback in that this rig will not be used to work DX. However, they will be excellent on the rally scene or when out shopping.

I found the DJ-C1 and C4 very easy to use and managed without the manual after the initial read-through. Everything is so simple and a degree in computer technology is not required to operate them!

But, as with everything there is a down side and on these rigs it's the lack of a speaker. The supplied small earpiece must be used at all times.

At first I found the lack of a speaker to be a bind, but after a while found that I could listen to the normal chatter around me and got every call for me to return to the G-QRP club stand (Yes, as usual I was working again for the club). These little beasts also

qualify easily for QRPP as they are well under the 1W level!

The speaker microphone that is available to be used with either the C1 or C4 for under £20 I think will enhance this little rig into the 'I really must have one' league.

Value For Money?

So are the Alinco DJ-C1 and C4 miniature transceivers value for money? Well, at a retail price of £189.95 you will have to look long and hard to find anything of the same size for the same price.

Would I buy one? Again, long and hard thoughts but my elderly Icom 2SE, and my newer Alinco DJ-S11 will have to suffice for now.

Finally my thanks go to Nevada of 189 London Road, North End, Portsmouth, Hants PO2 9AE. Tel: (01705) 662145 for the loan of the review rigs, which are available from them or any of their approved Alinco dealers.

PW

Wafer thin and incredibly small - but where does Amateur Radio go from here?

Manufacturer's Specifications

	DJ-C1	DJ-C4
Frequency coverage	144 - 145.995MHz	430 - 439.995MHz
Mode	F3E (f.m.)	F3E (f.m.)
Transmit output	300mW	300mW
Modulation	Reactance modulation	Reactance modulation
Spurious emissions	Max -60dB	Max -60dB
Receiver type	Double-conversion superhet	Double-conversion superhet
Sensitivity	Max -16dB μ V	Max -15dB μ V
Audio output	Max 20mW (32 Ω)	Max 20mW (32 Ω)
Microphone impedance	Approx 2k Ω	Approx 2k Ω
Current consumption		
Transmitting	Approx 240mA	Approx 300mA
Stand-by	Approx 30mA	Approx 40mA
Grounding	Negative	Negative
Rated voltage	3.7V	3.7V
Operating temperature	-10°C to +50°C	-10°C to +50°C
Intermediate frequency	20.8MHz 450kHz	21.7MHz 1st IF 450kHz 2nd IF
Dimensions	56 x 94 x 10.6mm	56 x 94 x 10.6mm without projections
Weight	75g	75g including battery

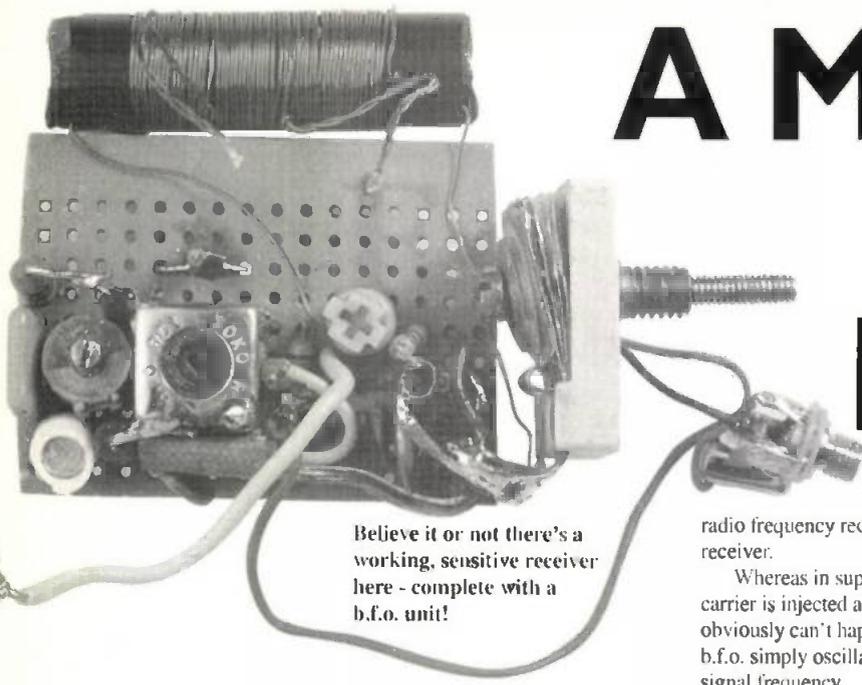


Two types of antenna are supplied, the standard one extends from the main body, while the extra whip antenna is simply a length of wire that's clipped onto the top of the housed antenna.



A good indication of size - when pictured with Dick G0BPS's Alinco DJ-S11 and Icom 2SE you get a good idea of just how small the Alinco DJ-C1 and C4 really are!

A Matchbox Midget Receiver



Believe it or not there's a working, sensitive receiver here - complete with a b.f.o. unit!

By David Rowlands G6UEB

David Rowlands G6UEB strikes back into PW's history to re-create an interesting concept using up-to-date technology to make a simple 'Match Box' radio capable of reception on the medium and short wave bands. The project will certainly bring back memories for anyone who read PW in the 1960s!

In a recent *Practical Wireless*, I saw an article by Steve Ortmyer G4RAW, for a medium wave radio using the Ferranti ZN414 integrated circuit (i.c.). Steve pointed out the low current consumption of the chip which makes it ideal for use in a miniature radio.

Unfortunately, the chip was designed and optimised for use on the Long and Medium wave broadcast bands. Above medium wave, gain therefore falls off dramatically. 'Top Band' on 1.8MHz was in reach just about, but 3.5MHz was, if conventional thinking were to be believed, out of reach.

A 'big brother' chip, the ZN416 has identical characteristics but includes a small amplifier to enable the use of miniature 'Walkman' type headphones

A short wave receiver without a b.f.o. is of somewhat limited value. So a low current b.f.o. capable of miniaturisation had to be developed. Herein lay my challenge!

The result is in this article - a very stable small receiver capable of a.m. reception on m.w. It's also capable of s.s.b. and c.w. reception of both 1.8 and 3.5MHz.

Only a short antenna is needed. Current consumption is less than 500µA when using a crystal earpiece. The use of a magnetic high impedance earpiece or headphones dramatically increases current consumption. To assist with those really weak signals, it is recommended that two crystal earpieces in parallel are used.

Simple In Principle

The operation of the circuit, Fig. 1, is simple in principle (the complexity is hidden within the i.c. itself). The ZN414 acts as a straightforward tuned

radio frequency receiver (r.f.) receiver.

Whereas in superhets, the b.f.o. carrier is injected at the i.f., this obviously can't happen here. So, the b.f.o. simply oscillates at the incoming signal frequency.

The b.f.o. is coupled to the receiver through a loose coupling formed of C5 as well as through the power supply rails. If the set is built to fit into a matchbox, then unfortunately there is no space for a jack socket although I've shown a socket for completeness.

The earphone(s) are soldered directly to the circuit. Removing and inserting the battery turns the set on or off as required. If a slightly larger case is used, a stereo jack socket is utilised, enabling battery power to be cut by the removal of the earphone plug.

The tip is the audio output, the ring goes to the receiver's negative, whilst the sleeve goes to the battery negative. As the mono earphone plug is inserted, this shorts the sleeve and the ring, turning the set on.

Start Building

Now let's start building! You can 'hard wire' this project on a board, build it in G3RJV's 'Ugly bug' style or make your own p.c.b. design. Alternatively (it's that flexible) you can - if you so choose - build the receiver on Veroboard. If you opt for this method mount all the components on the Veroboard, except C4 in the b.f.o. section.

Bear in mind good r.f. layout principles, as the ZN414 may become unstable. Don't forget it has tremendous gain (in the region of 70dB).

If using the Veroboard method, cut the copper strips in the appropriate places. The amount of copper conductor connected to pin 2 of IC1 and the base of Tr1 should be kept to a minimum. The Tr1 collector will be found to need a long stretch of conductor to make all the connections - but this too should be minimised as far as is practical.

The case of T1 is connected to the

positive supply line. When putting C3 into position, bear in mind that the connection that is the adjusting screw must go to the positive. This minimises, if not eliminates the problem of the frequency altering when the trimming tool is taken off C3.

Leave enough space for an additional capacitor to be connected between Tr1 collector and C3 should this be necessary (to broaden the tuning - see later). The screw in the compression trimmer is replaced by a 6BA 1 to 1.25in screw, with a locknut and nut or terminal head to be used to hand tune the set.

The positive battery connection is a loop of stiff wire, whilst the negative is provided by a phosphor-bronze strip. This enables the cell to be inserted and removed readily.

Layout on the board can be altered so that the battery positive rests on the case of T1. On/Off switching can be provided by using a stereo socket for the earphone(s) as I mentioned earlier.

When mounting T1, the leads will have to be carefully and slightly bent to fit the Veroboard. The centre tap will have to be removed.

Wind the receiver coil L1. The ferrite rod should be 10mm diameter, 50mm long, and the copper wire of 30s.w.g. (0.32mm). The 3.5MHz tapping is at 17 turns, 1.8MHz at 30 turns, whilst the full coil is used for medium wave at 55 turns.

Make the tapping wires about 15mm long. Connect to the receiver, remembering that the start of the coil is at the 'hot' end (ie that end which is connected to pin 2 of IC1).

Leaving the tappings unconnected, check that the set works as a straightforward m.w. receiver. If it fails, check connections. Frequency coverage should be from about 600 to 1550kHz.

If you have a signal generator and frequency counter, check the coverage on short wave. Use a piece of wire on the signal generator to act as an antenna and connect about 2m of wire to the 'hot' end of C8 as the receiver antenna.

Make sure that R3 is set for

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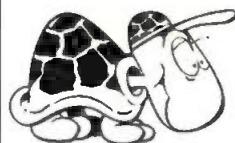
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A Matchbox Midget Receiver

Continued from page 56

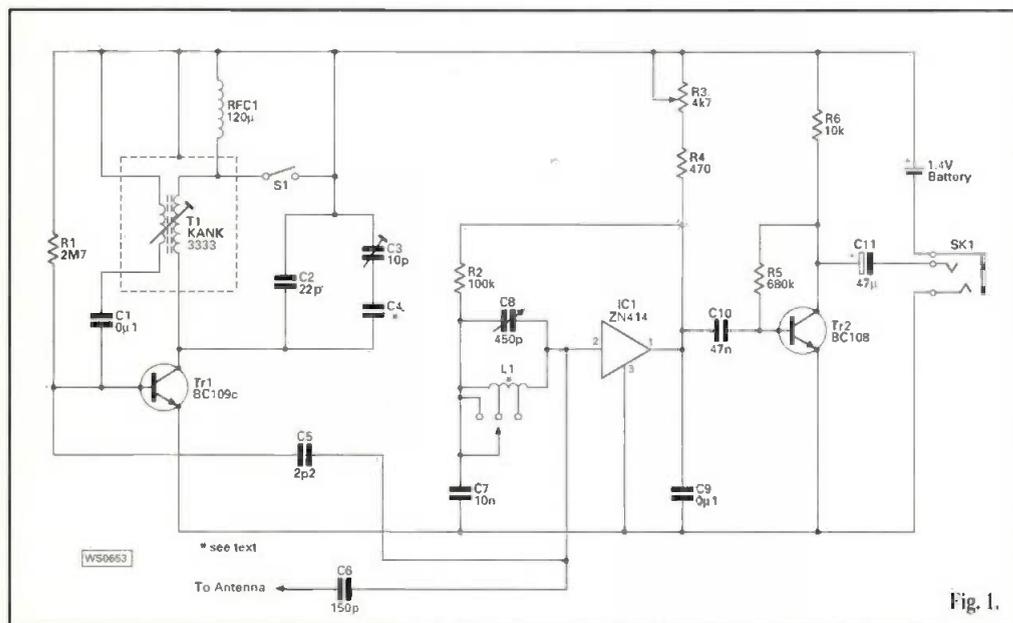


Fig. 1.

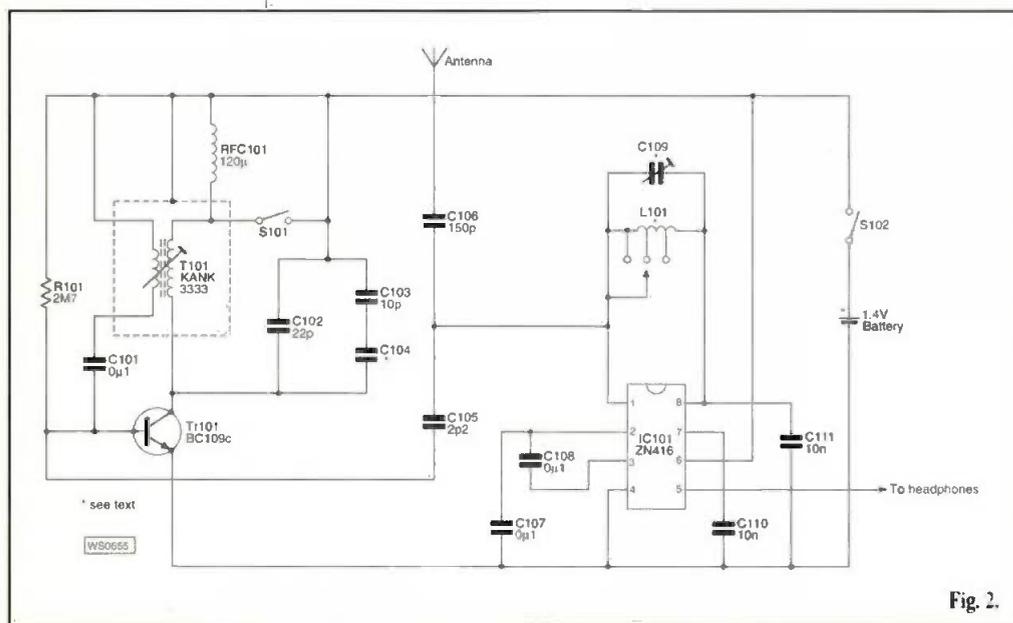


Fig. 2.

Fig. 1: Circuit of the ZN414 receiver with b.f.o. developed by David Rowlands.

Fig. 2: An alternative circuit using the ZN416 i.c. (see text).

maximum volume. Temporarily solder each tap in turn to the earthy end of C8. You may hear the odd external signal, but don't worry if at this stage you aren't able to hear very much apart from your own signal generator. (Modulate the signal generator if possible).

Frequency coverage should be such that each of the Amateur Bands falls near the middle of the capacitor sweep. Starting with the 3.5MHz tapping, coverage should be from about 2.75 to 4.6MHz.

If you don't have a signal generator and frequency counter, use a crystal oscillator working between 1.9 and 3.7MHz. Simply check that the signal from the oscillator falls appropriately within the coverage of the receiver.

If coverage is incorrect, undo the coil and move the tapping. Repeat the exercise with the 1.8MHz tapping connected. Coverage here should be from about 1.5 to 2.7MHz.

If coverage is incorrect (and this is only likely if a different diameter ferrite rod is used) alter the tappings and try again. It should be noted that the frequencies quoted above are a rough guide as to where reception should fall and are not critical.

Having found the correct position for the tappings, rewind the coil with fresh wire, having noted the positions of the taps. Solder different coloured leads to each tap, and put a connector at the end of the leads.

A receptacle made from phosphor bronze strip coiled around can be made and attached to the earthy end of

C8. Alternatively, a mini crocodile clip can be kept with the receiver and used to hold the tap leads in place.

Next Stage

Having built the receiver and confirmed coverage, you can start the next stage. Remove the battery and pass on to the b.f.o. Insert capacitor C4, and temporarily short out RFC1 with a short piece of wire.

Set the receiver up for 3.5MHz, by plugging in the relevant tap. Adjust C8 to see if oscillation is occurring. A fairly strong carrier signal should be found that fully quiets the set. Set C8 to one side of this signal.

If oscillation is not forthcoming, temporarily connect a 100kΩ resistor in parallel with the 2.7MΩ. If this still fails, check connections within the b.f.o., Tr1 and T1. Replace if necessary.

Having obtained oscillation, disconnect the 100kΩ resistor. If this causes loss of oscillation, check the 2.7MΩ. Reduce the value if necessary, and/or try different BC109C transistors.

I suggest that the BC109C type is adhered to as other transistor types were found not to oscillate at such low voltage and on such a low current. Oscillation should be possible with a base resistance of up to 3.9MΩ. This will obviously vary between transistors, the prototype resistor was reduced from 3.9 to 2.7MΩ to ensure reliable oscillation on both bands.

Setting-Up

To start the setting-up, with a trimming tool, set C3 vanes fully open. Then set the ferrite slug in T1 to just below the top of the can. Adjust C8 to the L.F. side of the b.f.o. signal.

Now with an unmodulated signal generator or oscillator, tune around to find out the frequency the set is now responding to. Adjust the ferrite slug of T1 to set the frequency to just over 4MHz.

Close the vanes of C3, and readjust C8 and the frequency of the signal source. Coverage should be about 3.4 to 4MHz. I should be point out that tuning on short wave is mainly by means of the b.f.o. trimmer, C3. The trimmer C8 effects fine adjustment as you tune through the band.

Having established correct coverage on 3.5MHz, remove the shorting wire from RFC1, connect the 1.8MHz tapping in place of the 3.5MHz tapping, and check the coverage there.

Coverage should be correct, about 1.7 to 2.1MHz but if it's not, the value



of RFC1 will have to be adjusted accordingly. This is unlikely, although it is as well to keep a range of coils handy just in case.

At this point, S1 can be installed, to switch RFC1 in and out of circuit. Both C8 and S1 can now be fitted onto the small 'front panel' that strengthens the matchbox (or other suitable housing). A tag washer, with a small wire soldered to the negative line is put on C8 to earth the front panel.

On Air

To test the receiver 'on air', drape the antenna wire over a radiator, clip it to a water pipe, or even wrap it around the soldering iron lead if nothing else is possible. And you should start with the vanes of C3 fully open to place the set at the top of the band.

Next, adjust C8 so that the b.f.o. signal is received. Slowly turn the adjusting screw of C3 with a trimming tool until an amateur signal is found. You should not have far to go, particularly on 3.5MHz (80 metre band) in the evenings.

Peak C8 for optimum signal, then re-clarify with C3. **Don't adjust C3 too far without also adjusting C8 as otherwise you are no longer receiving the b.f.o. signal.** There is a knack but it's not that difficult and c.w. should be very easy to receive.

If you require reduced tuning coverage on 3.5MHz (to make tuning less sharp), then a small polystyrene capacitor C4 (try 20pF) should be fitted between C3 and the collector of Tr1. The value should be adjusted so

that full coverage is obtained on 1.8MHz.

The slug of T1 would have to be readjusted and RFC1 might also need to be changed. Alternatively, C3 could be reduced to 5pF. More parallel capacitance may have to be added if T1 could not be readjusted to compensate. Some coverage, particularly on 1.8MHz would then of course be lost. Experiment for the spread/coverage that best suits your needs.

Having included a b.f.o., what of Medium Wave Reception? To prevent desensing, as there's no space for an extra switch, the b.f.o. should be set to 3.5MHz to avoid this problem.

Current consumption is so small as to be not worth the provision of a switch. I didn't bother to fit one!

Having tested the set on air and you've confirmed that all is functioning correctly, the unit can be placed into the matchbox. The nuts holding C8 and S1 to the front panel will have to be removed as they are fitted outside the matchbox (or whatever case is used).

The earphone leads would need to be unsoldered and threaded through the end of the matchbox opposite to C8 and S1. An 8BA screw is also passed through with the nut on the outside. A tag washer connects this to the 'hot' end of C8.

The antenna wire, which is only required for short wave operation simply clips onto this with a small crocodile clip. Your receiver is now complete ...happy listening!

PW

Shopping List

Resistors

Miniature 0.25W 5%

470Ω	1	R4
10kΩ	1	R6
100kΩ	1	
100kΩ	R2	
680kΩ	R5	
2.7MΩ	R1	

Variable miniature rotary

4.7kΩ	1	R3
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Capacitors

Miniature (almost any type will do)

2.2pF	1	C5
22pF	1	C2
150pF	1	C6
10nF	1	C7
47nF	1	C10
100nF	2	C1, 9

Miniature Polystyrene

10-27pF	1	C4 (adjust on test if needed)
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Miniature Electrolytic 6.3V working

47μF	1	C11
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Compression types

10pF	1	C3
450pF	1	C8

Semiconductors

BC108	1	Tr2
BC109c	1	Tr1
ZN414	1	IC1

Miscellaneous

Toko coil KANK3333, interconnecting wire, 1.5V battery very high impedance headphones (crystal type recommended) a short section of ferrite rod, 0.32mm enamelled copper wire, a suitable box to house the project and finally a bit of patience for fiddly components.

Transmit & Receiving Operation

Although the receiver was designed to work alone, transmit-receive operation is no problem. During transmission the receiving antenna wire can simply be grounded out. The b.f.o. could be used to drive a simple transmitter but buffering with substantial amplification would be required.

Fig. 3: Fitting a volume control on the ZN416 version (see text).

Use of ZN416 or ZN414E

The ZN416 chip contains a ZN414 plus a small (18dB gain approximately) amplifier designed to drive a pair of 32Ω type headphones (portable cassette player types). Like the ZN414, it runs on 1.2 to 1.6V, current consumption is about 5mA. It may still be possible to fit the set into a matchbox, if you are good at cramming everything in! But accommodating the jack socket would not be possible. The headphones would thus have to be soldered directly to the circuit. The headphones are operated in series to give the correct output impedance for the ZN416. Construction and setting up is generally the same as for the ZN414. The b.f.o. circuit is of course identical, so component numbering in this part of the circuit is similar to the ZN414 version

Long, Medium & Short Wave Receiver

The ZN414/6 chips can of course cover Long Wave. The ferrite rod would be a 200mm long. Long Wave coil, 250 turns of 30s.w.g. or preferably thinner. This can sit at the opposite end of the rod to the m.w./s.w. coil. To provide band switching, a 3-pole 4-way switch can be employed. This also alters the b.f.o. band and can switch the b.f.o. off entirely on Long and Medium wave. If desired, additional amplification could be provided to give loudspeaker reception. However, due to the odd output impedance of the ZN416* I recommended that the set be built with the ZN414, the additional amplifier replacing Tr1. The regulator circuit shown can be used to enable the ZN414 and the amplifier to be run from the same power source.

*Editorial note: Constructors should not be discouraged from using this version of the i.c. as it can provide very loud headphone volume. In practice it matches extremely well into a telephone type moving coil 'dynamic' insert which can act as a small loudspeaker on strong stations.

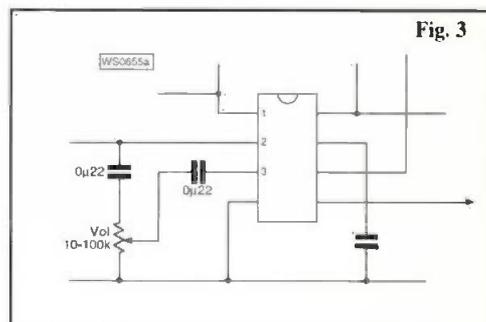
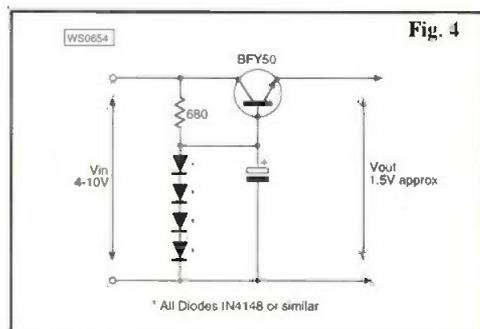


Fig 4: It's really possible to go 'Green' and run this receiver on solar power. This regulator can work in conjunction with a solar panel unit but the author disclaims any responsibility for loss of programmes when the sun is hidden by clouds!





Valve & Vintage

By Phil Cadman G4JCP

Phil Cadman G4JCP brings back memories of Eccles, Moriarty and Bloodnock this month. But even if you can't remember the BBC's 'Goon Show' Phil's idea is very interesting!

"Stand by your soldering irons for the September edition of the highly esteemed 'Valve and Vintage' column brought to you this month by Phil Cadman G4JCP".

Those of you who are reminded of 'The Goon Show' by my 1950s 'BBC Style' introduction this time, may also remember that some time ago I promised to show you how to receive BBC Radio 2 v.h.f. transmissions on an a.m. radio.

At the time I told you how to cheat by using a modern v.h.f. radio to drive the loudspeaker in an old 'wireless-type' radio set. This time we're going to do the job properly by actually making a tiny a.m. transmitter/converter unit.

But first, I'm interrupting this column to remind you that the autumn National Vintage Communications Fair is being held at the National Exhibition Centre in Birmingham. Informed sources tell me it'll be found in Hall 11 on Sunday, October 26.

Low Power

But now back to the job in hand and fortunately there's no shortage of suitable circuits for low-powered transmitters. My only problem was one of being spoilt for choice!

Then I came across a rather interesting circuit in an old copy of the *Radio Constructor* magazine (June 1956 issue, Page 716, 717, no name credited). It used a single ECH81 valve as both an r.f. oscillator and a.m. modulator but not in the configuration you might imagine.

I've updated the RC design to use current components and modified the circuit so that it can operate from a h.t. of around 120V. The reduced h.t. voltage requirement allows the use of a readily available low-voltage

transformer in a voltage-doubling circuit.

Before I describe the transmitter/converter unit a note about the choice of valve. The diagram, Fig. 3, shows a UCH81, although an ECH81 can be used. Both valves are electrically equivalent, the difference being solely in their heater requirements. The UCH81 has a 19V, 100mA heater and is intended for series connection in transformerless or a.c./d.c. sets. The ECH81 has a standard 6.3V heater.

For best results the h.t. should be at least 120V and this necessitates a 20-0-20V transformer, as shown in Fig. 1. Using a UCH81 allows one of the 20V windings on T1 to power the valve heater (albeit with a small series resistor, R3). Not only does this save the cost of a separate heater transformer, the UCH81 is usually cheaper to buy than the ECH81!

If you have an ECH81 to hand and want to use it then you will need a separate heater transformer, as shown in Fig. 2. The transformer, T2, should have a 6V secondary rated at 300mA or more. A 3 or 6VA component will do fine. The h.t. transformer, T1, should be rated at 6VA or more if a UCH81 is used, otherwise a 3VA component will suffice.

Used Extensively

The UCH81/ECH81 is a triode-heptode frequency changer once used

extensively in a.m./f.m. receivers. When tuned to an a.m. station the triode section is used as a local oscillator and the heptode section as a mixer.

In the circuit shown in Fig. 3, the triode section of the valve is not used as an oscillator but as a simple audio amplifier. The audio is fed into

the grid, via C10, from the modulation control (all right then, volume control), R14. The amplified audio is then fed to the third grid of the heptode section. This is the grid to which the local oscillator signal is normally applied.

Using the triode section as an amplifier means that the audio output from even the smallest transistor portable is sufficient to fully modulate the transmitter. Simply connect the audio input terminals to the headphone output of your chosen radio. Of course, CD players and

tape recorders can be used as signal sources in exactly the same way.

However, if your signal source has a stereo jack don't simply short the left and right channels together. Put a low-value resistor (say, 47-300Ω) in series with each channel before shorting them together to feed the top of R14. You should always use this approach when connecting a stereo output to a mono input. Ideally, each series resistor should not be less than the recommended load impedance of the stereo source.

The actual r.f. oscillator comprises the cathode and the first two grids of the heptode section. Grid one behaves as the control grid, as normal, but grid two is wired to act as an anode. Feedback from this 'anode' to the control grid causes the circuit to oscillate at a frequency determined (primarily) by L1 and C11.

Of course, not all the electrons that leave the cathode are collected by this second grid. Many travel on to the real anode and on the way are influenced by the voltage present on the other grids. Specifically, the instantaneous voltage on the third grid influences how many electrons are finally captured by the real anode. As the number of electrons reaching the anode increases and decreases so does the amplitude of the r.f. signal that appears at the output.

If you use an ECH81, it might be possible to 'borrow' the h.t. and 6.3V heater supply from your radio. But,

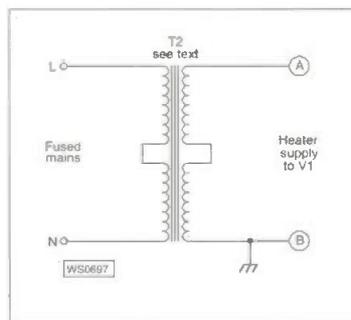
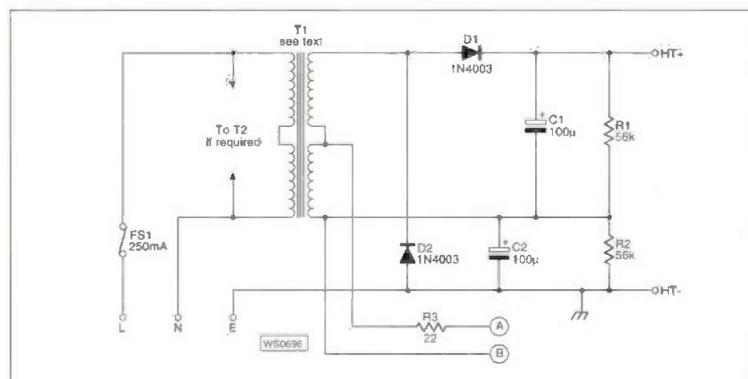


Fig. 2: Heater transformer for ECH81.

Fig. 1: The 120V power supply (see text).



don't try this with a transformerless or a.c./d.c. set. And don't attempt this unless you are confident you know what you are doing. If you do try it then remember to use 0.5W resistors throughout, with the exception of R13 which should be rated at 2W. And all capacitors, save for C9, should be rated at 350V working, minimum.

The Frequency

The frequency of the transmitter/converter unit depends on the resonant frequency of L1 and C11. At these low r.f. frequencies stray inductance and capacitance in the circuit can largely be ignored. As the 'Medium Waveband' is rather crowded, particularly after dark, I chose to use the 'Long Waveband' instead. This meant that L1 required an inductance of around 2500µH.

My prototype coil was wound much the same as the one I used for my l.w. t.r.f. receiver a while back. That coil was 5.2 inches long wound on a 1.8 inch diameter (kitchen roll) cardboard former.

You'll need four layers of 0.05 inch diameter insulated wire giving 416 turns in total. You can use the formulae I gave in my June 1996 column to work out other combinations of coil dimensions and number of turns.

Should you want to operate the transmitter on m.w. then the coil will need an inductance of around 200µH. Try a single-layer of 140 turns of the same 0.05 inch diameter wire on the same 1.8 inch diameter tube. In either case L2 should have about one-fifth of the total number of turns of L1 and should be wound over the 'earthy' end of L1 wherever possible.

You may wish to use a m.w./l.w. ferrite rod assembly *(See Editorial note panel). Use the main m.w. or l.w. winding for L1 and the coupling winding for L2. However, this may not always work as the coupling winding may have insufficient turns or may give feedback of the wrong phase. If that's the case then you can always wind your own feedback winding using a length of thin enamelled copper wire.

Setting-Up & Adjustment

Very little setting-up and adjustment is required. The only things that can really cause any problems are the phase of L2 and the valve itself.

If the circuit is oscillating correctly you should get between 200mV and 400mV d.c. developed across R7, that's between TP1 and TP2.

IMPORTANT EDITORIAL COMMENT AND WARNING:

Strictly speaking, and to remain within the law, anyone using this circuit to re-broadcast BBC services from Band II v.h.f. f.m. to an a.m. only 'vintage' receiver should not let the circuit radiate as such (there's no provision for un-licensed low power long wave transmissions (or medium waves for that matter) for this purpose in the UK, as there is in the USA).

In practice it would be safer to couple the 'transmitter' and the receiver by screened cable and coupling loop (coaxial cable is preferable because of the possibility in an indoor environment of the 'balanced feeder' radiating when it becomes 'unbalanced' when furniture is touched, etc.). Additionally, with 'AC/DC' style receivers, precautions would have to be taken to avoid electrical shock due to the possibilities of an electrical pathway between the two units. My advice to readers is that such receivers should only ever be operated via an isolating transformer.

Editor.

Note that TP1 will be negative with respect to TP2. If the circuit doesn't oscillate or behaves erratically try reversing the connections to L2.

I found that the choice of valve is important in this circuit running, as it does, with a rather low h.t. If all else fails, change the valve!

In use, simply adjust R14 to give the loudest signal on your receiver without distortion. Unfortunately, this circuit doesn't seem to want to produce anything like 100% modulation. Therefore, the receiver's volume control will probably have to be turned up a little further than usual. Trying to increase the modulation level beyond the optimum will result in upward modulation with all the distortion that entails.

The whole unit should be enclosed in a screened box else there may be significant radiation from L1. This radiation will be largely unmodulated so all you'll hear is a carrier with little, if any, modulation regardless of the setting of R14.

Place the unit adjacent to your radio and run a few feet of wire (no more) from the r.f. output socket and along the rear of the radio. That ought to provide sufficient coupling to the radio's internal aerial. Radios without internal aerials can have their aerial terminals connected to the r.f. output

socket of the transmitter via a small capacitor. Try 5- 15pF to begin with.

The circuit is susceptible to supply ripple and is also somewhat critical in terms of layout. Good r.f. practice should be followed even at these low frequencies.

I also noticed a tendency to l.f. oscillation due to the two halves of the valve sharing the same h.t. supply. If l.f. instability does appear...try reducing R13 (although this will increase the supply ripple and hence the hum level).

You will have to find a compromise between the place you tune-in the unit on the dial, the modulation level and the placement of the coupling wire.

With just a few feet of wire connected to the output terminal the range of the transmitter is very strictly limited and so you shouldn't be worried by the Wireless Telegraphy Act* (or whatever it's called these days). However, those of you who live in flats and semi-detached houses should really keep the transmitting 'antenna' away

from shared walls to prevent your neighbour picking up the signal.

***Important warning: Please see Editorial comment panel regarding operating this circuit.**

Many recordings of old light entertainment shows are now available on cassette. So are recordings of significant events in recent history, such as the D-day landings. So what better way to listen to them than on a contemporary radio using this little transmitter/converter?

Signature Tune

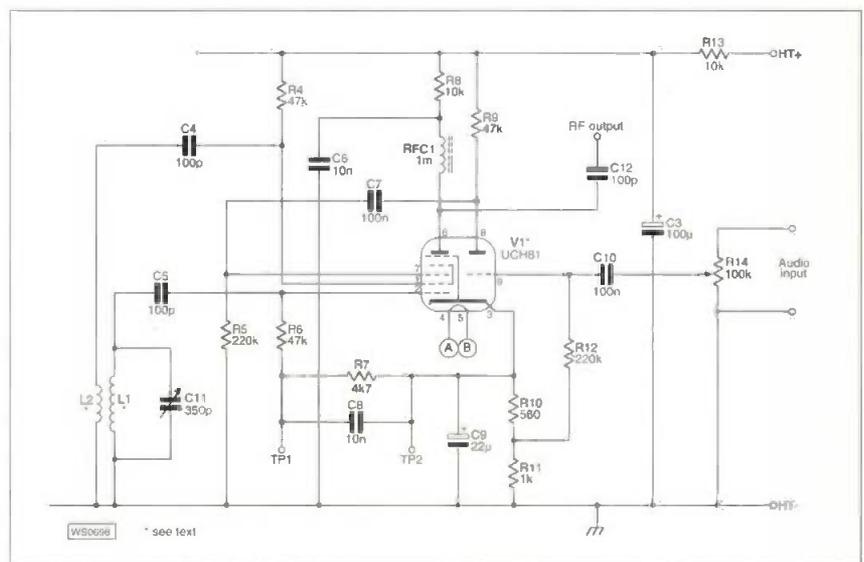
Ah, I hear the orchestra playing my signature tune! So, until it's my turn 'in the shop' again, I'll say cheerio and good luck with the transmitter/converter.

Should you decide to build the project - remember to send your comments and letters to me either via the PW offices, via E-mail to phil@oldpark.demon.co.uk or direct to: Phil Cadman G4JCP, 21 Scotts Green Close, Scotts Green, Dudley, West Midlands DY1 2DX.

Shopping List

Phil G4JCP has provided a full 'shopping list' for the project featured this month. This is available (free) from the Editorial offices in Broadstone on request, by sending a stamped self-addressed A5 sized envelope.

Fig. 3: The transmitter/converter circuit.



Cheerio from Phil, see you in December.

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G5RV	Half Size	40/20/15/10m	51' long	£24.95	4.95

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SLS-40K	40m	38' long	£86.95	5.95 p&p
SLS-80K	80m	69' long	£77.95	5.95
SLS-160K	160m	100' long	£83.95	5.95

Receiving Dipole

SRD	46' long	£49.95	4.95 p&p
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Trapped Dipole Antennas*

SD-32	20/15/10m	2 Trap	27' long	£83.95	p&p 5.95
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SD-42	40/20/15/10m	2 Trap	55' long	£89.95	5.95
SD-44	40/20/15/10m	4 Trap	47' long	£147.95	7.95
SD-52	80/40/20/15/10m	2 Trap	105' long	£103.95	7.95
SD-54	80/40/20/15/10m	4 Trap	97' long	£181.95	7.95
SD-56	80/40/20/15/10m	6 Trap	82' long	£219.95	9.00
SD-68	160/80/40/20/15/10m	8 Trap	154' long	£267.95	10.00
SD-610	160/80/40/20/15/10m	10 Trap	148' long	£349.95	10.00
SD-162	160/80m	2 Trap	208' long	£125.95	7.95
SDW-34W	30/17/12m	4 Trap	32' long	£139.95	7.95
SDW-46W	40/30/17/12m	6 Trap	46' long	£199.95	8.00
SDW-58W	80/40/30/17/12m	8 Trap	85' long	£274.95	9.00
SDW-610W	160/80/40/30/17/12	10 Trap	152' long	£315.95	10.00

Trapped Sloper Antennas*

SVS-31	20/15/10m	1 Trap	14' long	£49.95	p&p 4.95
SVS-32	20/15/10m	2 Trap	13' long	£79.95	5.95
SVS-41	40/20/15/10m	1 Trap	28' long	£52.95	5.95
SVS-42	40/20/15/10m	2 Trap	24' long	£81.95	5.95
SVS-51	80/40/20/15/10m	1 Trap	53' long	£59.95	5.95
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Carrying on the Practical Way

By George Dobbs G3RJV



Always on the look-out for something 'different' the Rev. George Dobbs G3RJV describes the 'Chixie' a 'one chip' transceiver this month! And as usual he starts his 'sermon' with an appropriate quote!

Right: Quite a challenge! The PW Chixie one chip transceiver.

The regular readers of this column (there must be several somewhere!) - may have tired of seeing circuits for very simple transceivers. But I offer one parting short (for now!) on this theme.

An interesting diversion on the ultra-simple transceiver idea is to see if a complete transceiver can be made from one integrated circuit. Long time readers of *Sprat*, the journal of the G-QRP Club, may recall a design by Mike King G3MY, called the Unichip. This was a complete transceiver based upon a single chip.

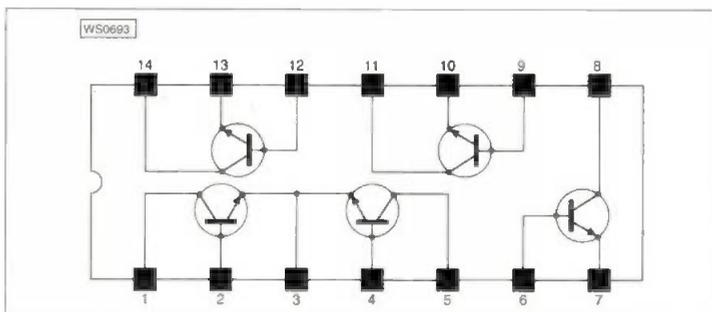
The chip in question was the CA3046. This is a transistor array chip containing a differential pair of *npn* transistors plus three separate *npn* transistors.

The CA3046 represents quite a few active devices in one package and offers the possibility of enough stages to make a basic transceiver. Incidentally - the CA3086 is a more recent direct replacement for the CA3046 and may be used for the circuit below.

Unichip Project

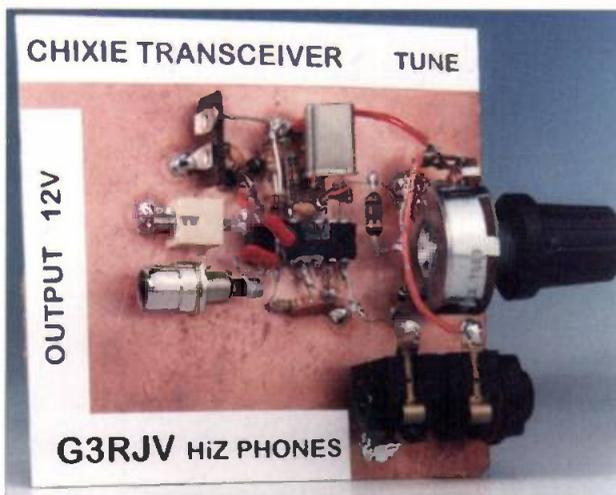
Mike's Unichip project used two of the transistors to form a VXO (variable crystal oscillator) and power amplifier, two stage transmitter.

Fig. 1: Diagram showing the 'internals' of the CA3046 multi-transistor array i.e. (see text).



The receiver was a direct conversion design which used a pair of diodes as a mixer feeding the differential pair and the remaining transistor as an audio amplifier. I believe several people built it and had a lot of fun. (Although I hesitate to say it -

"The shortest way to do many things is only one at once"
Samuel Smiles 1812 - 1904



perhaps the addition of the two diodes is a bit of a cheat? - as it adds two extra active devices to the circuit.

In the Benelux QRP Club's journal *Newsbrief* for March 1997, Arjen PA3GCY, used some of Mike's ideas to make a single chip version of the Pixie Transceiver. This project was loosely based on the WA6BOY circuit.

Arjen's circuit is very neat so I decided to try a slightly amended

version following on the PWixie in last month's (August 1997) column. I wondered - was it possible to make a viable transceiver using one inexpensive chip? The answer can be seen in my circuit offered here follows the PA3GCY design with some

component changes and a more conventional transmitter output circuit.

The diagram, Fig. 1., shows the contents of the CA3046 chip. The easy way to go would be to build the transmitter down one side of the chip and the receiver on the other side.

Ignoring the differential pair and only using one of the transistors in that pair, the result is two sets of two transistors to form the entire transceiver. Following the Pixie transceiver idea does have the great advantage that the transmitter power amplifier is also the receiver mixer. So in

effect the constructor has the advantage of five active stages to build the transceiver.

Transceiver Circuit

The transceiver circuit is shown in Fig. 2. It's a Pixie type design based on a single chip...so it seemed appropriate to call it the Chixie!

The transmitter section is a VXO (variable crystal oscillator) followed by a power amplifier. The oscillator is a Colpitts circuit using a crystal, made variable in frequency by a varactor diode D1.

In the circuit the crystal is loaded with a 100µH inductor (L1) to produce greater frequency swing. The transceiver operates on 3.5MHz so the actual amount of frequency shift is quite limited. How much depends upon the

Continued on page 67

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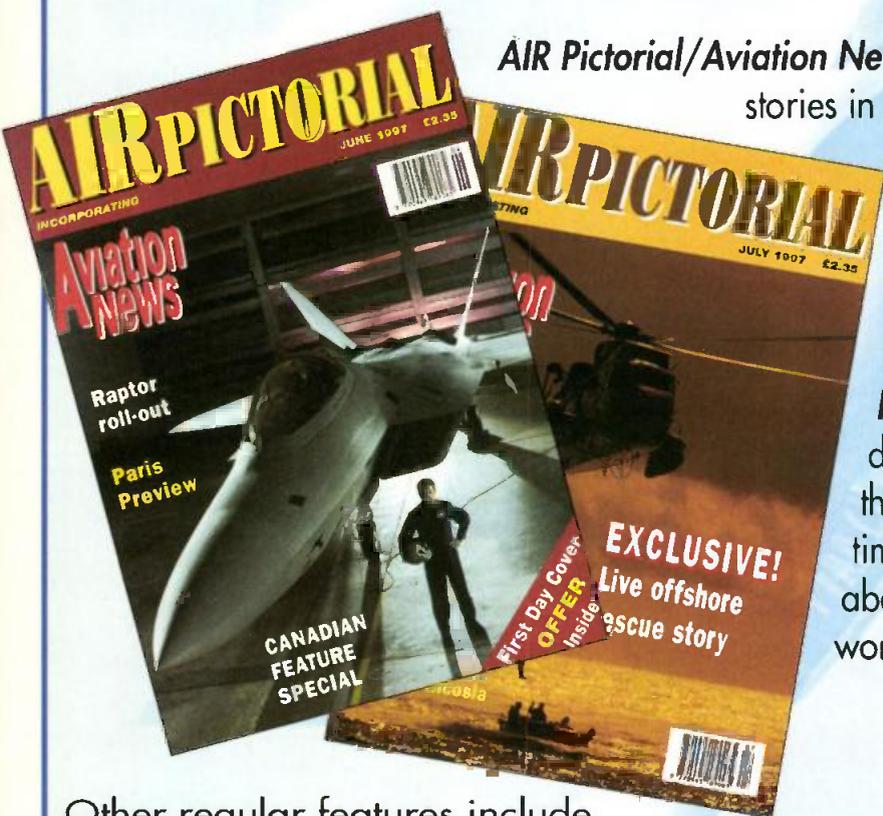
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Carrying on the Practical Way

individual crystal but will not be more than a few kHz. And capacitor C3 couples the oscillator to the amplifier.

Another of the transistors in the CA3046 acts as a power amplifier. 'Power' might be an overstatement because these devices are only capable of a few hundred milliwatts!

A 1mH choke, RFC1, provides an r.f. load for the amplifier and RFC2 provides some r.f. loading on the base of the stage. Note that only the power amplifier is keyed, the oscillator runs the whole time.

The transmitter is connected to the outside world via a lowpass filter. Once again I have used the W3NQN 7-element lowpass filter data for this filter. And as I've said before it **may seem** overkill for such a small r.f. output, but even little QRP transmitters produce harmonic output and this filter is all that separates the transceiver and the antenna on both transmit and receive.

I keep a selection of plug-in 7-element lowpass filters (see Carrying on the Practical Way - PW March 1997) and used one of these with the Chixie transceiver.

Almost Nothing!

The receiver is almost nothing! Like the PWixie (Carrying on the Practical Way - PW August 1997) the 'power amplifier' acts as the mixer for a direct conversion receiver.

In use the oscillator runs all the time feeding into the base of the amplifier. The collector of the amplifier is connected to the antenna via the lowpass filter. When the key is up, the amplifier functions as a diode mixer giving a resultant audio signal on the emitter.

To complete the receiver a simple audio amplifier is formed by another two of the transistors in the CA3046. These are arranged in a Darlington Pair circuit to give enough (just!) audio gain to drive a pair of high impedance headphones. There is no audio gain control as there's really not enough audio to merit a control!

High Impedance

In recent years it has not been easy to obtain high impedance (1,000 to 2,000Ω) headphones. Although most seasoned radio amateurs

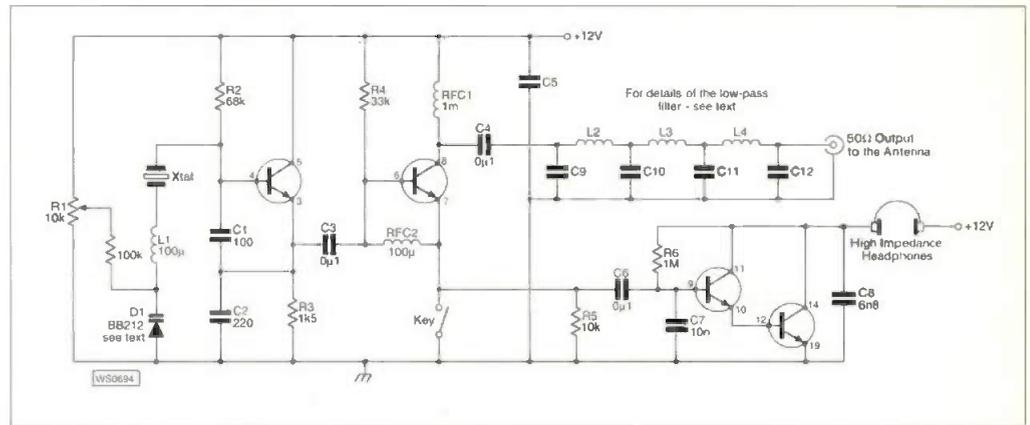


Fig. 2: Circuit diagram of the 'Chixie' one chip transceiver (see text for comments).

probably have a pair around the shack, the more recent entrants to radio construction may have problems finding suitable headphones. To help, Fig. 3. shows an alternative output circuit.

The audio output transistor is given a fixed load (2.2kΩ). Audio output is taken from the collector via a capacitor to an impedance matching transformer.

A classic transformer for this job is the LT700 which is designed for a push pull output stage of some 2kΩ to match an output of 8Ω. The whole of the primary winding is used (any similar audio matching transformer will do the job).

Building The Chixie

When building the Chixie the idealist may like to try a printed circuit board but this is one example where 'ugly' construction is very much easier. The transceiver has been arranged so that the receiver and transmitter are on opposite sides of the CA3046 chip.

In practice it's very simple to wire point-to-point. Start by mounting the CA3046 chip above a piece of blank p.c.b. material and solder all the grounded connections directly to this board.

'The Dead bug' construction technique, with the chip mount on its back (legs up), is common for this method. However, this approach can cause confusion because all the pin numbers are the other way round.

To overcome the drawback I bent out the i.c. pins outwards (so they're horizontal to the chip) and attached it to the board with a blob of 'Blutack' adhesive. It's then best to wire in the link wires between pins on the chips first, then add the other parts.

Does It Work?

At the beginning I asked if it was

possible to make a complete transceiver from one inexpensive chip and wondered 'does it work?' The answer is yes it does work (well...just about!).

The transmitter output is low. My prototype gave about 200 milliWatts.

However, 'Milliwattling' is a branch of QRP operating where stations using power **much less than 1W** seem to achieve remarkable results. So, with a decent, well matched antenna, this transmitter will **work other stations**.

The receiver is crude. It also has no real input tuning and to be honest barely enough overall gain. But you are likely to hear all the stations who will hear you and a QSO will be achievement and challenge!

So, there's another little fun project which will cost very little in money or time to build. Give it a try!

If you have any improvements please let me know and I will share them with other readers. But remember there's a limitation to additions to very simple circuits. If you want a sophisticated transceiver - start somewhere else!

PW

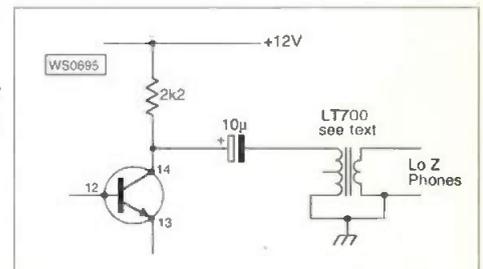


Fig. 3: This circuit enables modern low impedance headphones to be used with the Chixie project.

The CA3046 chips can be obtained from:

JAB Electronic Components, PO Box 5774, Great Barr, Birmingham B44 8PJ

Crystal for the 3.5MHz band can be obtained from:

The QRP Component Company, PO Box 88, Haslemere, Surrey GU27 2RF.

Kanga Products, Seaview House, Crete Road East, Folkestone, Kent CT18 7EG.

Quartslab Marketing Ltd., PO Box 19, Erith, Kent DA8 1LH.

VHF REPORT

David Butler G4ASR has reports of some excellent Sporadic-E openings on the 50 and 144MHz Bands and details of recent DXpeditions.

After a number of months of relatively poor propagation on the v.h.f. bands, events took a turn for the better with the onset of summer. There were some excellent tropo openings, especially at the beginning of June, creating much activity on the v.h.f., u.h.f. and microwave bands.

On the 50MHz band there were Sporadic-E (Sp-E) openings every day during June allowing contacts to be made all around Europe and into Africa, Asia and on occasions into North America. Conditions on the 144MHz band were equally good with a number of very good Sp-E openings into eastern Europe being recorded during the month.

Tropo Openings

First I'll turn to your reports of tropo openings on the various v.h.f. bands and according to your letters the best conditions occurred in the period June 1-5. With a high pressure weather system located over the UK, northern Europe and Scandinavia the scene was set for some enhanced conditions. On the 144, 430MHz and 1.3GHz bands contacts were being made from many parts of the UK (and as far west as GI and EI) to stations located in DL, LA, ON, OZ, PA and SM.

Contests on the 144MHz band during the weekend June 14-15 also provided an opportunity to work some good DX. Stations in southern Germany (DF1SE/P in JN57, DK0ND/P in JN59) and the Czech Republic (OK1XFJ/P in JO60) were working into central England on June 14. Conditions for the PW contest on June 15 were not particularly helpful but nevertheless there was still some good contacts to be made.

To the west of the UK the stations of EI2CA/P (IO62), EI4FJB (IO64) and EI6ARB/P (IO63) were making many contacts in G, GM and GW. An expedition to Rathlin Island (IO65) by the Westnet DX group, GI/EI7NET/P, created a flurry of excitement on both the 50 and 144MHz bands.

Derek Green G7DKX (IO93) was pleased to notice that the 144MHz band was open to Scandinavia during the evening of June 3. Using an FT-290 transceiver, a 100W Microwave Module amplifier and a 9-element Yagi he made a number of s.s.b. contacts with stations in DL, PA and

OZ. On June 4 Derek contacted the stations of OZ5AGF (JO56), LC1JAT (JO59), SM4SCF (JO69) and SM7TUG (JO76).

Andy Markham G8RZA (JO01) made QSOs with DG8LG (JO44), OZ6ABA (JO57) and SM6LIF (JO67) on June 4. He uses an FT-290 transceiver, 40W amplifier and a 4-element Cushcraft Yagi. Andy mentions that he also worked F6FZS/P on the Spanish border at 59 both ways on May 29.

At my QTH (IO81) recent contacts on the 144MHz band have included HB9RDE (JN37) 880km on May 27, LA2PHA (JO38) 915km on May 28 and F6FZS/P (IN92) at 1014km on May 29. On June 3 a total of 15 s.s.b. contacts were made at distances in excess of 800km with stations located in DL and OZ. The longest distance contacts that I made during the evening were with the stations of OZ1KLB (JO55) 1008km, OZ1IPH/P (JO47) 1032km, OZ6ABA (JO57) 1042km and OZ1HLB (JO55) at 1049km.

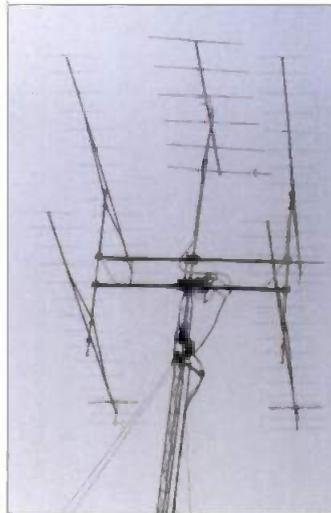
It's not often that I receive a report of good tropo on the 50MHz band so I'm pleased to record that John Desmond EI7GL (IO51) has been making some good contacts recently via this mode. Distances in excess of 400km can often be achieved, particularly when the barometric pressure is reasonably high (above 1010mb).

Contacts have recently been made with stations in IO81 at 404km, IO83 at 448km and IO91 at 446km. John mentions that he often hears the GB3BUX beacon (20W e.r.p. from a turnstile antenna) over a 467km path. As there are relatively few EI stations active on the 50MHz band it may be worthwhile beaming west when tropo conditions look favourable.

Sporadic-E

Apart from a slight lull at the end of the month there were some excellent Sp-E openings on the 50MHz band during June. Most of these openings were of the 'single-hop' variety allowing contacts to be made up to 2000km or so around Europe.

A number of DXpedition stations were active giving many stations a new DXCC country. The station of OJ0/DL5IO (JP90) was operating from a lighthouse situated on Market Reef.



The group made over 300 contacts with UK stations on the 50MHz band.

A joint Russian/Finnish expedition operated from the island of Malj Vysotskij (KP40). This rare DXCC country is situated almost at the limit of single-hop Sp-E propagation from the UK. (It's 2168km from my QTH.) Fortunately the group, using the callsigns R1MVI and OH5AB/MVI, had a number of lengthy openings into most parts of the UK.

The island of Crete is also a separate DXCC country and apart from the resident operator SV9ANK the station of SV9/DL8SET was also active during June. Other European stations worked from the UK included UA1WJ (KO47), UR4LL (KO70), UX0FF (KN45) and 4L50.

Regrettably two stations, one operating from Corsica (TK) and the other from the Balearic Islands (EH6) did not have permission to operate on the 50MHz band. No activity is allowed from TK (not even for residents) and only Spanish nationals are allowed to operate on the 50MHz band. The moral is to check first before taking your 50MHz equipment away with you on holiday.

Four stations, all counting as the continent of Africa, were easily worked from the UK during June. These were CN8LI (IM64), CT3FT (IM12), EH8BPX (IL18) and EH9IB (IM85).

With the exception of EH8BPX all stations would have been made via single-hop Sp-E. At times during the month double-hop propagation existed to areas of the Middle East, enabling many stations to work into the continent of Asia.

On June 1 between 0725-0900UTC the beacon stations of OD5SIX (KM75) and 5B4CY (KM64) were audible in central England. Some lucky stations, including

The 70 and 144MHz band antennas at David G4ASR's QTH.

G40BK (IO94), found OD5SB (KM74) operating from the Lebanon on 50.109MHz.

Two days later, on June 3 between 0820-0900UTC, the stations of SU1ER (KM50) in Egypt and JY4MB (KM71) in Jordan were being worked on s.s.b. by operators in southern England. It was equally as good on June 14 when three Israeli stations, 4X6UJ, 4Z4TL, and 4Z5AO (all in KM72) were making contacts into northern England and Wales between 1145-1345UTC.

The beacons OD5SIX and 5B4CY were heard at the same time as was the expedition station 5B4/DF2UU (KM64). Conditions on June 18 were excellent with a number of openings to the Middle East being reported between 0545-1745UTC. The stations of 4X1IF, 4Z5AO, 5B4JE and 5B4/DF2UU were active and appeared in the log book of many 50MHz DXers.

Transatlantic Opening

The first transatlantic opening of the 1997 Sp-E season took place on June 8 when VE1PZ (FN85) made contacts with stations in OK, ON and PA between 1200-1400UTC. On the following day, June 9 at 1300UTC, the Canadian station was heard at the QTH of GW3JXN (IO72) but no QSOs were reported.

However, on June 11 VE1PZ had a good opening into the UK. At my QTH (IO81) he was heard between 1215-1305UTC peaking 57.

It was two weeks before another transatlantic opening was detected in the UK. And yes, it was that Canadian again! The brief opening on June 20 commenced at 1240UTC and lasted for only 20 minutes.

You've got to be really dedicated to catch these type of multi-hop openings. Unusually the beacon station FP5XAB (GN16) located on St. Pierre and Miquelon was heard in the UK at 1844UTC on June 22 and again at 1454UTC on June 24. The beacon was temporarily located at the QTH of FP5EK awaiting a suitable site and had been left beaming towards Europe during the summer Sp-E season.

Even more unusual was a report that two stations, one in JO00 and the other located in IO83, heard the

Continued on page 72

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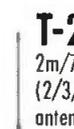
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Here are the first entries for my Annual Table.

Annual Table

	50MHz		144MHz	
	Loc.	DXCC	Loc.	DXCC
G3KIP	22	10	15	6
G4ASR	42	35	35	23
G7NMQ	**	**	91	25
G7RAU	**	**	91	19

VE6XIS (DO21) beacon between 0855-0910UTC on June 25. The beacon (and yes it is XIS not SIX!) is located over 7000km from the UK.

An expedition to St. Lucia (FK93) by Jimmy Treybig W6JKV was fortunate to make a few contacts with G and GJ considering the relatively poor propagation that existed at the end of the month. The station of J6/W6JKV had UK openings on June 24 between 1335-1350 and 1545-1635UTC and on June 25 between 1120-1200 and briefly at 1315UTC.

The last reported 'sighting' of J6/W6JKV was on June 28 during an evening opening between 2200-2215UTC which favoured stations in I083 and I093. Not so rare but still DX, was reception of the JW7SIX beacon on Svarbard (JQ78). It was heard by Clive Davies G4FVP (I094) at 2250UTC on June 29.

James Roff 2E1EMK (I091) reports that he has been working around Europe on the 50MHz band. However, with only 3W and an HB9CV antenna it is often difficult to make contacts especially as many good openings occur when he is at work (me too James!). His best contact so far via Sp-E has been into Sicily (IT9).

DX On 144MHz

During the month of June I recorded six days when Sp-E openings reached the 144MHz band. These events occurred on June 3, 4, 5, 11, 18, 19. (This is in addition to the opening on May 28 which I mentioned last month).

The opening on June 3 was very brief lasting only six minutes. The station of G4FUF (J001) heard EB5GNT (I1M98) and EB6AOG (JM08) on the s.s.b. calling frequency (144.300MHz) around 1115UTC.

At 0754UTC on June 4 G4FUF heard LZ1ZX (KN32) but he was on the periphery of the opening as the main propagation path from LZ was into PA and DL. For example, PE10GF worked seven LZ stations and DH8NAA managed to contact 11 of them and was also surprised to hear two Turkish stations on f.m.!

An interesting opening to Byelorussia (EU), (Lithuania) LY and Poland (SP) occurred on the very next day, June 5 between 0630-0820UTC. At the QTH of David Edwards G7RAU (I090) s.s.b. contacts were made with EU1AA (K033), LY2MW and LY2WR (both in K024), SP4MPB (K003) and SP4SKA (K014).

Other stations known to have worked EU1AA included G0MJW, G00FE, G1HWY, G1ZJP, G4RKV, G8RZA and G8XVJ. Over in Holland the station of PA3FJY was very pleased to work EU1AA and LY2MW as he did it whilst operating from his car. He was using an FT-290 transceiver, 25W amplifier and a halo antenna 400mm above the car roof.

The next Sp-E opening on the 144MHz band was on June 11. It commenced at 0940UTC and lasted

for over an hour with stations in G and GM making contacts into Portugal (CT) and Spain (EA).

The opening stretched through much of the UK with Miguel Angel EA4EOZ (I1M69), for example, contacting operators in I075, I081, I091, I092, I093, I094 and I095. Among the stations being worked from the UK were CT1CAD (I1M67), CT1DMK (IN50), CT2GLU (I1M59), EA1DDU (IN73), EB4BAP (I1M69) and EA7AGW (I1M77).

Len Boston G7NMQ (I083) fortunately was in the right place at the right time. Between 0937-1040UTC he worked three CT and six EA stations in locators IN72, IN80, IN90 and IM09. Len uses a Trio TR-9130 transceiver, a 25W amplifier and a 14-element MET Yagi at 18m above ground.

Proving it was not a lucky fluke G7NMQ also managed to catch the next (and arguably the best) opening of the month on June 18. Actually it wasn't one opening but two, the first between 1050-1200UTC to Italy (I), Slovenia (S5) and Croatia (9A) and the second between 1350-1440UTC to Italy, Croatia, Austria (OE) and Malta (9H).

In the first event Len contacted 25 Italian stations and in the second opening of the day he worked three Italian, one Sicilian (IT9) and one Croatian station. Ela Martyr G6HKM (J001) did equally well catching 14 Italian stations in the first opening between 1048-1122UTC.

To whet your appetite some of the callsigns spotted on the DX Cluster system included IK0FTA (JN61), I1SBU (JN44), IK3JAW (JN65), I4CIL (JN64), IW5DAN (JN53), I6WDY (JN72), IC8FAX (JN70), S55VV, 9A1CEI (JN65), 9A4NF (JN73) and 9H1CD (JM75). The opening was so intense that GD3TNS (I074) even heard an Italian f.m. repeater on 145.675MHz!

And so to the last reported Sp-E opening during June and this was a most unusual event. Normally most Sp-E openings (on the 144MHz band) lie between the south and east of the UK.

However, on June 19 around 1830UTC there was an opening to Finland (OH). Although the southerly end of the path was focused on ON and PA there were brief occasions when propagation touched into East Anglia (J001 and J002). Ilkka OH5IY (KP30) running 120W into a 4 x 15-element Yagis reported working G3LQR (J002), PE1DTU, JA3DDL (both in J022) and PA3BGM (J033).

Meteor Scatter

The DXpedition group to Market Reef (JP90), mentioned earlier, were also active on the 144MHz band primarily via meteor scatter (m.s.). Between

June 1-6 the group, using the callsign OJ0/DL3YEL, completed 88 m.s. contacts.

Random contacts (that is those made without a schedule) included the stations of G0FIG, GOKAS, G1HWY, G4FUF, G4RKV and G4YTL. Ulli DL3YEL reports that at 0510UTC on June 5 when working random m.s. he heard a weak high speed c.w. signal. It turned out to be G0JUR (I092) coming in via tropo!

Contact was then made at normal c.w. speed with 539 reports being exchanged both ways over the 1445km path. At 0712UTC a similar occurrence took place only this time it was a Sp-E opening and the signals were S9!

Ulli of course took full advantage of the 55 minute opening working 27 stations in DL, I, OE, S5 and 9A. I bet they were pleasantly surprised to work Market Reef on the 144MHz band!

Station Activity

During the recent openings on the 50MHz band a few European enthusiasts were heard calling for cross-band contacts on the 70MHz band. One such station was DK0ALK, a club-station often operated by Mike DL1GNM. Although their equipment is simple, a quarter-wave whip antenna and receive converter, the results during Sp-E openings can be very encouraging. On June 18, for example, 50/70MHz cross-band contacts were made from DK0ALK (JN38) to the stations of G0JLL and G8XVJ (both located in I083).

Now for news of further activity on the 70MHz band. After a three year absence from the band Brian Howie GM4DIJ (I085) is now active from his new QTH in Edinburgh. He is running 40W of c.w. and s.s.b. into a 4-element Yagi.

Brian can also run a.m. on 70.260MHz if you need it. Over in Northern Ireland Darrell Mawhinney G1KSO (I064) has now got a permanent 70MHz installation in his shack.

Darrell intends to be more active from home rather than just in contests as has been the case in the past. He runs 100W of c.w. and s.s.b. into a 3-element Yagi. If you want a schedule you can contact him via packet radio at G1KSO @ GB7TED.

If you fancy something a little more ambitious then you should try beaming in a southerly direction. Operators in South Africa (ZS) have now been granted an allocation between 70.000 - 70.200MHz. Power limits are 400W p.e.p. on s.s.b. and 150W on c.w. and f.m. The only viable way of contacting ZS on the 70MHz band will be via trans-equatorial propagation (t.e.p.) in a few years

time.

The other possibility is a mixed-mode path consisting of t.e.p. over the African continent plus a Sp-E extension at the European end of the path. This occurs quite often on the 50MHz band and will be present, to a lesser extent, on higher frequencies.

If you have Internet access and are interested in the 70MHz band then point your web browser to <http://wkweb1.cableinet.co.uk/gm4uk/4m> These new web pages are written by Stewart GM4AFF and Allan GM4ZUK with input from Derek G3NKS.

Phase 3D Delayed

The launch of the Ariane 502 flight scheduled to carry the AMSAT Phase 3D satellite has been delayed until September 30. This is the second delay announced this year for the Phase 3D vehicle.

In March, the launch date was moved from early July to mid-September. The European Space Agency (ESA) announced that the Ariane 502 launch was delayed because a faulty component was detected in the liquid oxygen turbo-pump of the Vulcain engine.

Teledata Group Rally

Just a reminder that the British Amateur Radio Teledata Group (BARTG) are holding their annual rally at the Sandown Park Exhibition Centre, Esher, Surrey on **Sunday September 14**. The gates open at 10.30am with admission costing £3 for adults, £2.50 for OAPs and free for accompanied children under 14.

In addition to the rally a series of lectures, under the title DataStream 97, will also be held. The planned programme includes talks on data communications for beginners by Steve Jelly G0WSJ, advanced data communications by Chris Lorek G4HCL and satellite data communications by AMSAT UK. There will also be a question and answer session with a panel comprised of representatives of the BARTG, the RSGB Data Communications Committee, G4HCL and others.

Deadlines

That's it again for another month. Don't forget to send me your list of locator squares, counties and countries worked for the 1997 table. Forward any news, views, comments or photographs to reach me no later than **Saturday 30 August**.

Send them to me at Yew Tree Cottage, Lower Maescoed Herefordshire HR2 0HP. You can also contact me via Packet radio @ GB7MAD, the UK DX Cluster @ GB7DXC or E-mail via davebu@mdlhrl.agw.bt.co.uk Alternatively you can telephone me on (01873) 860679.

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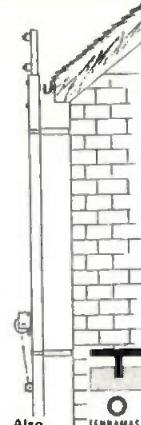
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IMPORTANT ANNOUNCEMENT

Leicester Amateur Radio Show 1997

Despite many rumours to the contrary the 1997 Amateur Radio Exhibition WILL be held at the GRANBY HALLS, Leicester on Friday 17th October and Saturday 18th October.

All the usual facilities will be available including the excellent car parking provided during last year's exhibition.

Further details may be obtained from Frank on 0116-287 1086.

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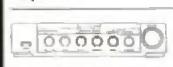
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- 4: Make sure you describe the problem adequately, with as much detail as you can possibly supply.
- 5: Only one problem per letter please.

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HF FAR & WIDE

Leighton Smart GWOLBI presents his monthly round-up of YOUR activities on the h.f. bands.

I'm writing this month's column in the month of June, although the wind, rain and generally bad weather would make you think that we're in November! However, I'm glad to say that propagation conditions on the h.f. bands have fared rather better than the weather, as our reporters show this month.

Mind you, one good thing about June, whatever the weather, is the annual rally at Longleat. This is, as far as I'm concerned, an annual 'pilgrimage' for many amateurs, myself included, and it's one of the rallies which I genuinely look forward to. With a bit of luck I may have met a few of you there!

Certainly, being June, the Sporadic-E season is well and truly with us, with massively strong signals from Europe being received on the 28MHz band. Some of these have come from as far as Russia and the eastern European countries at remarkable strengths.

Although, as is expected with 'Es', openings can take place at almost any time, and for an indefinite period of time. And as usual I guess it's about being in the right place at the right time!

One of our reporters, Steve Locke GW0SGL, has reported working 'G' stations on the east coast of England at S9, whilst at the same time working Japanese stations at the same signal strengths. Looks like a case of E and F layer propagation at the same time, Steve! Possibly the best of both worlds, depending on your point of view, of course!

Here's The DX News

News from the RSGB's *DX Newsheet* now. From Ghana, there's news that PA3AWW will be operating from there as 9G1AA, whilst working at the Dormaa Hospital, mostly on c.w. (QSLs go to home call).

In the Bahamas, John WZ8D is active as C6AIE from the 1st to 16th of August. Though primarily on 6m (50MHz), he will also be on the h.f. bands.

From Granada, IV3NVN and IV3TMV plus a YL operator will be active as J38AHG and J38AI during late August, with QSLs to go to IV3TMV.

Meanwhile one for the diary is Albert F05JR, who will be active from Rimatara Island, French Polynesia over the Christmas holidays. He will operate on 7.010, 10.010, 14.010, 18.110, 21.010, 24.910, and 28.101MHz c.w. only of course.

Your Reports

Time for your monthly reports now, starting with the 1.8 and 3.5MHz bands. Just a couple of reports for 1.8MHz but worth mentioning are firstly Ted Trowell G2HKU on the Isle of Sheppey in Kent.

Ted has come up with a rare (for Ted) s.s.b. contact with mobile station F/G0WQY/M in France at 2000 - a good signal for mobile operation says Ted.

Secondly comes Eric Masters GOKRT in Worcester Park, Surrey, with a 5W c.w. contact with PA6WPX (Netherlands) at 2253UTC.

Up to 3.5MHz now, and Steve Locke GW0SGL of Matthewstown, Mid-Glamorgan, who has certainly been well and truly bitten by the '1.f.' Dxing bug! Using 100W and a trap dipole antenna he's been busy.

Steve's report for the 3.5MHz band includes s.s.b. contacts with VK3DZM (Australia), VY2RDB (Prince Edward Island), K2ABC (USA), VE3YJ (Canada), CE8EIO (Chile), GW4ZYG/MM off the coast of Portugal, and VE9NCC (New Brunswick, Canada), all contacts between 2230 and 0200UTC.

Next it's on to John Constance G0VGD/2E0ANZ in Aylesford, Kent, whose huge log includes 3.5MHz s.s.b. contacts with our very own PWE editor Rob G3XFD, at 1505, and TM6HUN on Utah Beach D-Day Landing site in, Normandy, at 1952, ON5NU (Belgium) at 2005. Meanwhile whilst operating as 2E0ANZ on the band, (under the accepted Novice conditions of course!), John also worked DJ3TS (Germany) at 2055, and S57AJC (Slovenia) at 0104UTC.

The 7MHz Band

Up to good old 'Forty' now and over to the 7MHz band receiving log from Charlie Blake M0AIJ in Milton Keynes.

Charlie has not operated from

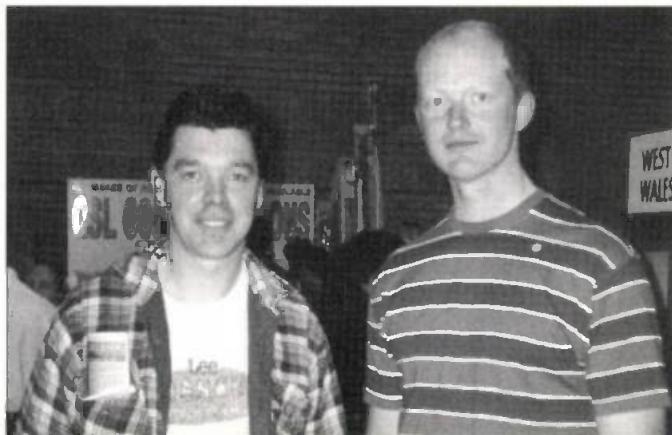


Fig. 1: Leighton GWOLBI (left) meets Carl Mason GW0VSW at the Swansea Rally. Leighton's over 6ft tall himself and wonders how many times even taller Carl bumped his head during his submarine service in the Royal Navy!

home a great deal due to local planning restrictions (more on this from Sean Gilbert, later). Nevertheless, Charlie has listed reception of HB9ARC (Switzerland) in contact with G3RPC) at 0645, ZL2AJR (New Zealand) working DK2PS in Germany at 0511, YV5NTP (Venezuela) working IN3ZNR in Italy at 0536, XE1VIC (Mexico) in contact with HB9IQ at 0517, and GW0ABL working F6DXW in France at 0541UTC.

Ted G2HKU has been 'up with the larks' on 7MHz of late, and reports two c.w. contacts with W1CW, and K2MW, both in the USA at around 0500UTC.

Eric GOKRT on the other hand worked K3Z0 (USA) with his 5W of c.w. at 2305, as well as W3BTN (USA) at around 2207UTC.

Steve GW0SGL 'had a crack' at 7MHz and hooked up with LU5FAO (Argentina) and HR2MDP (Honduras) at around midnight, whilst John G0VGD made it to CO3BN (Cuba) at 0154, and ND9E (USA) at 0145UTC.

Planning & 10MHz Report

Like Charlie Blake, Sean Gilbert G4UCJ, who recently met up with Charlie to compare notes, has been suffering from the very same 'planning consentitis' and has recently discovered that some, no doubt, thoughtful soul had made a telephone call to the planning department regarding Sean's antennas.

It transpired that all amateur radio antennas, whether free standing or attached to the house require planning permission, but CB

antennas, if less than 3 metres in height do NOT require ANY planning consent in Milton Keynes! As Sean says "How's that for persecution"? That says it all I reckon! Our sympathies lie with you Charlie & Sean.

However, on to Sean's long report now, which shows, amongst other things, his 10MHz c.w. contacts with TA2DA (Turkey) at 0854, UA3QDX (Russia) at 0912, US2WV (Ukraine Republic) at 1621, and OY1CT (Faroe Islands) at 1022UTC.

The 14MHz Band

Now it's over to Don Mclean G3NOF, and his monthly propagation report. Don says "Although conditions have been good, I don't think they've been as good as last month - 14MHz has again been the best DX band, with good conditions to Asia at around 1500-1900UTC. North and south Americans were strong in the late evenings and during the night on the band. On 18MHz, the band was patchy, with north America heard between 1130 - 1400, and again in the late evenings around 2200UTC. Some Asian stations were heard around 1300-1600, and Africans came in around 1500-1700UTC.

On 21MHz some Africans and South American countries came in at 1600-1800, while only a few openings were apparent on 24MHz. While 28MHz saw mostly Europeans, there were a few openings to south America at around 1500UTC".

On to Don's log now, which shows s.s.b. contacts on 14MHz with A92FZ (Bahrain) at 1944, BV7GA

(Taiwan) at 1544, FY5YE (French Guiana) at 2022 (QSL to W5SVZ), HR2MDP (Honduras) at 2308UTC. Also logged were HS2NGR (Thailand) at 1904, JT1FBVW (Mongolia) at 1738 (QSL to G3YBO), SU0ERA (Egypt) at 1617 (QSL to SU1ER), and V26BA (Antigua) at 2304 (QSL to N2BA). Finally there was VU2WAP (India) at 1610, 4S7BRG (Sri Lanka) at 1600, 5X1T (Uganda) at 1851, and 9Y4SF (Trinidad and Tobago) at 2327UTC.

Down to Skewen in West Glamorgan now, and Carl Mason GW0VSW, who I was pleased to meet up with at the Swansea Rally a couple of months ago. Carl says band conditions seemed to vary this month, but there was some good DX about nevertheless.

Carl's log for this month includes 14MHz contacts with 4X6UO (Israel) at 2003, and 8S6PFP (Sweden) at 1125 on s.s.b., while c.w. gave him contact with VS97UW (Hong Kong - due to be back under Chinese rule as I write this), QSL via VS6UW, and OZ7V (Denmark) at 1749UTC.

New reporter MOAUF who lives on the Wirral Peninsula, Merseyside (no name on the letter so I'm sorry I can't welcome you properly!) has been digging out some juicy stuff on the 14MHz band it seems.

Our keen new reporter's log shows contacts with XU2FB (Cambodia), JA7XBS (Japan), HS1BNP (Thailand), HK3BO (Colombia), 9Y4GR (Trinidad & Tobago), HR2MDP (Honduras), CP2OL (Bolivia), and finally XE3RT (Mexico). Please note that **All reports to 'HF Far & Wide are welcome and will be used, but please include time, modes, antennas, etc., AND your name - thanks!**

Having a whale of a time on 14MHz was 'our Ted' G2HKU, bashing away on the key as usual with SV5/HA6PS/P (Rhodes Island), VE3DZZ (Canada), K6KM (USA) and JA2DHF (Japan) at round 1500UTC. Then at around 1900 came contacts with TA2BS/MM aboard a 12,500 ton ship carrying coal, and ET3BN (Ethiopia). Evening work bagged Ted contacts with ZL3RG (New Zealand), K1ZZ, the publisher of QST magazine and WB8APR (both USA).

Steve GW0SGL has also been working the world on 14MHz, as his log shows. Using 100W of s.s.b. into a TH-7 beam antenna, Steve's long log includes contacts with VU2TAM (India), FM5DN (Martinique Island), A41KY (Oman), S79MAD (Seychelles Islands) and HS1NGR (Thailand). Also worked were JH2CLU (Japan), YN1XC (Nicaragua), DU9RG (Philippines), FG5FC (Guadeloupe), VS97KM (Hong Kong), V85GA (Brunei), XE2TZP (Mexico), 9J2GA (Zambia), and C6AGR (Bahamas).

The 18MHz Band

Although conditions were patchy on the 18MHz band for Don G3NOF, he nevertheless managed to work a sackful here. These included

PW Listening & Operating Watch List All times in UTC

Charlie Blake M0AIJ listens: 0500-0700 on 7.061MHz s.s.b. with an NRD 525 receiver & Sloping Wire antenna.

Steve Locke GW0SGL operates: 1100-1500 most days around 14.180MHz s.s.b. using a Kenwood TS-940 & TH-7 beam antenna, normally beaming to other countries.

Don Mclean G3NOF operates: 1030 Saturdays on 3.685MHz on the ISWL Net or 1030 Sundays on the Yeovil ARC.Net 3.665MHz s.s.b. using a Kenwood TS-950 & trapped dipole antenna.

Steve Locke GW0SGL operates: Most afternoons around 14.200MHz s.s.b. using a Yaesu FT-1000 and TH-7 beam antenna.

Leighton Smart GW0LBI operates: Most Sundays (and some weekday evenings) at around 1000-1300 on 1.933 or 1.949MHz s.s.b. using a FT-747 transceiver and a long wire Marconi antenna.

Rob Mannion G3XFD listens and operates: (weekdays & weekends) 1800-1830 on 3.7MHz (or thereabouts) 100W s.s.b., & 3.530 and 3.560MHz QRP c.w. using an Alinco DX-70 transceiver (or whatever rig is on review) and trapped dipole/long wire antennas. Also at 2300 on either 3.530, 3.6 or 7.025 (c.w.) or 3.7MHz (or thereabouts) on s.s.b.

Sean Gilbert G4UCJ operates: around 1030 to 0200 (on and off) most weekdays and weekends on 14 and 7MHz, using a FT-307 transceiver at 70W maximum and a G5RV dipole antenna.

Terry Ibbitson G0VTI operates: each evening between 1900-2000 on or around 7.020 c.w., or 14.035MHz c.w. using a Ten-Tec Scout at 50W.

AP2JZB (Pakistan) at 1603, CX6FP (Uruguay) at 1934, DS5USH (South Korea) at 1540, H16CAZ (QSL to Box 381, Puerto Plata), JA3QGI (Japan) at 1000UTC.

Also logged were K4TS/AM (Aero-Nautical Mobile) over the mid-Atlantic at 1207, S79MAD (Seychelles Islands) at 1830 (QSL to GW4WVO), Z21CS (Zimbabwe) at 1744, and 9M2RI (West Malaysia) at 1524UTC. Not bad for a patchy band, eh Don!

The key was responsible for quite a bit of DX for Carl GW0VSW on 18MHz this month. These included calls such as 6W1/F5PHW (Senegal) at 1916, 9H1AL (Malta) at 1949, TU4FF (Ivory Coast) at 1742, and ZP6CW (Paraguay) at 1924, although his s.s.b. reached out to 4Z5GV (Israel) at 1840, 5B4ASF (Cyprus) at 1311, 9K2QQ (Kuwait City) at 1838, and OD5NJ (Lebanon) at 1539UTC (QSL via EA5BYP).

Here, Ted G2HKU lists 5B4/G3LNS (a new resident in Cyprus) at 1400UTC, whilst operating after 1500UTC brought him contacts with N4AR (USA), SV5/SM0CMH (Dodecanese Islands), IS9/OK1RR (Sardinia), VP8CTR (Antarctica), as well as KG9N, WQ9N (USA) and finally for this band PY7WX (Brazil), all on the key of course.

The 21MHz Band

The 21MHz band was where the action was at for Sean G4UCJ this time around, with an extensive log of juicy DX worked!

All c.w. is Sean's game, and this produced 9J2DR (Zambia) at 1718, 6W6.K31PK (Senegal) at 1727, LU1EPQ (Argentina) at 2017, J87GU (St Vincent Island) at 1950, ZZZE

(Brazil) at 1707 and TU4FF (Ivory Coast) at 1716. Then he went on to work NP3A (Puerto Rico) at 1818, CE3FIP (Chile) at 1923, then came WP2Z (US Virgin Islands) at 1939, HP3XUG (Panama) at 2313, ZD8Z (Ascension Island) at 1402, and finally YV5ANT (Venezuela) at 2045.

Over on the Isle of Sheppey, Ted G2HKU wielded some pretty mean c.w. as well, logging contacts with 4Z4FW (Israel) at 1500, and 9X5HF (Rwanda). Next came LU1EWL (Argentina), TU4FF (Ivory Coast), 9K2RR (Kuwait) and CE3F (Chile) at around 1900UTC.

Eric G0KRT offers a single contact for 18MHz, in the shape of HG1H (Hungary) with his 5W of c.w. Whilst back in Wales, Steve GW0SGL using s.s.b. hooked up with 6Y5DA (Jamaica), 9J2GA (Zambia), BA4TA (China), HL1CG (South Korea), and FG5HR (Guadeloupe) - no time provided - (QSL to F6BUM).

The 24 & 28MHz Bands

Now for a few reports from two bands which have not featured in the column for some time now. Firstly, Ted G2HKU reports 24MHz contacts with EA6/DL1KBQ (Balearic Islands) at 1000, whilst a later operating period brought in ES4RC (Estonia), LA40GA (Norway) and SP2UKB (Poland) at 1500UTC. A spell on 28MHz provided D2M (Angola) at 1400, as well as ZW2L (Brazil) at 1500, and 6W6/K31PK (Senegal) at 1800UTC.

Don G3NOF lists 24MHz contacts with CQ4FM at 1713 (QSL via CT1FMX), OJQ/DL1IAN (Market Reef) at 1645, RA9FEL (Asiatic Russia) at 1633, T77C (San Marino) at 0858, and 9H1MF (Malta) at 1202UTC.

On 28MHz, Don hooked up with

FM5DN (Martinique Island) at 2123, and PY2GY (Brazil) at 1545UTC.

John G0VGD also tried his luck on 28MHz, and lists s.s.b. contacts with LW9EBP (Argentina) at 1845, as well as EA3EDM (Spain) via Sporadic 'E' at 1404. However working as 2E0ANZ, with 3W of s.s.b., John also hooked up with OY3JE (Faroe Islands) at 1435, HA7BF/5 (Hungary) at 1130, and EA3ACI again in Spain at 1115UTC.

At long last 28MHz is showing real signs of being able to support long distance DX traffic again, although at the time of writing, in the current Sporadic 'E' season, we've been experiencing two types of propagation, both 'Es' and 'F' layer propagation. Sporadic 'E' is a subject in itself, as any v.h.f. operator would no doubt confirm!

Signing-Off

Well that's it for this month folks it's signing-off time! Thanks once more for your support for the column, it's good to read about your exploits on h.f. every month, as I'm sure that many of our readers are new to h.f. operating, or are interested in getting onto the bands.

Your words are certainly a great incentive to new (and potential) operators, I have no doubt. So keep up the good work, and good operating! As usual, reports and information (and photos!) by the 15th of each month to: **Leighton Smart GW0LBI, 33 Nant Gwyn, Trelewis, Mid-Glamorgan CF46 6DB, Wales. Tel: (01443) 710749, FAX: (01443) 710789 (9am - 6pm).**

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Talk 360	£75.00	360 minutes
Talk 540	£100.00	540 minutes

All phones sold are subject to a 12 month contract, connection fee at £30 + VAT and subject to status

BITS & BYTES

Mike Richards G4WNC devotes his column to a new DSP program that should appeal to radio amateurs and short wave listeners alike.

If, like many, you've wondered if it's really worth splashing out on that all singing, all dancing Digital Signal Processing (DSP) filter, help may be at hand, if you have access to a PC. Brian Beezley K6STI has released a remarkable program that turns your PC and sound card into a pretty impressive DSP filter.

When you think about it, Brian's program, called *DSP Blaster*, is a logical step forward, as a DSP filter is just an analogue to digital converter followed by a processor and a digital to analogue converter to complete the cycle. Most modern PC sound cards have the basic hardware required for a DSP filter, so combining this with the immense computing power of the PC itself looks like a jolly good idea.

Where Brian's program scores is in its well thought-out user interface and very practical functionality. So, having whetted your appetite, what do you need to run it?

As *DSP Blaster* uses a lot of processing power to carry-out the calculations in real-time, you will need a 486 or better processor with a maths co-processor (486DX processors and Pentiums have this built-in). You will also need a VGA display, mouse and DOS 3.0 or later.

As far as the sound card goes, you will need a genuine SoundBlaster 16bit card. This is because *DSP Blaster* directly accesses the hardware on the card rather than using the conventional DOS vectors.

If you don't have a SoundBlaster 16bit card, you should find you can pick one up reasonably cheaply either new or on the second-hand market, as many users are changing over to the newer 32bit cards. Installing the software was just a question of copying the program files to an appropriate directory on your hard drive. Ideally this should be C:\db so that the supplied PIF file works correctly.

Making the connection to your rig is dead easy. All you have to do is use a screened audio lead to link from the line-out of your rig to the line-in on the SoundBlaster board. It's best to use the line-out rather than the external speaker feed because the line-out uses a fixed level that's independent of the rig's volume control setting.

If you find that your rig's output is too low to properly drive the sound card just connect-up to the sound card's more sensitive microphone input. For the output connection from the sound card, you can either use a set of PC speakers running off the headphone/speaker output or you could use a separate external amplifier and speakers fed from the card's line-out jack.

If you do use a pair of headphones directly from the sound card you do need to make sure you've got some form of volume limiting in place as you can get very high sound levels if the system should crash. One well thought-out extra is the provision of a DSP by-pass that can be triggered by your rig's p.t.t. line.

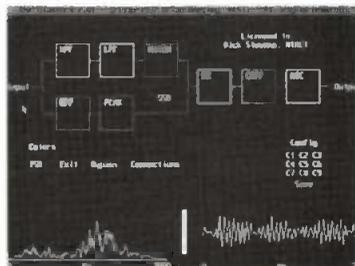
All you have to do is connect this line to the CTS pin on a spare serial port. This will then automatically by-pass the DSP filtering when you switch to transmit. This is necessary because the DSP filter actually puts in a slight delay and if this gets back to you while you're transmitting it makes it very difficult to talk.

Program Presentation

When you start the program you're presented with a detailed block diagram showing the various filter blocks that are available. To set or adjust the action of any block you just use your mouse to click on it, then use the drop down menu to make the changes.

You can also use the system to set-up the input levels to the DSP unit. This is made very easy thanks to a bargraph display that shows the optimum input level. You can also carry out a similar set-up with the output level. This really is an excellent way to control a DSP filter and makes it very easy for those new to filtering to see the effect of various changes.

In addition to the functional block diagram, there's a spectrum analyser that shows the spectrum between 0 and 3kHz (0-1500Hz for c.w.). This is great for monitoring the input signal and for checking the effectiveness of the chosen level of filtering. This is further supplemented by a form of synchronised oscilloscope display that's very good for checking compression levels, automatic gain control (a.g.c.), overshoot, etc.



Upper side-band signal received using DSP Blaster.

The range of filtering included in *DSP Blaster* is really very impressive. In addition to the conventional high, low and band-pass options, it included an excellent multi-tone tracking notch filter. When used with speech signals this is a really powerful way to knock-out interfering heterodynes.

Noise Reduction Filter

Perhaps even more impressive is the noise reduction filter. This uses a Widrow-Hoff LMS algorithm to adaptively match an FIR filter to the incoming signal! This, translated into English means that the filter finds the spectral peaks of the wanted signal and takes out all the mush from the gaps. This provides a general reduction in random noise that can't really be achieved by conventional analogue circuitry.

Like all complex systems there are compromises and the higher noise reduction settings do cause distortion in the wanted signal. However, there are sufficient adjustments in *DSP Blaster* to enable a good compromise to be made.

The c.w. peaking filter uses a completely different technique to achieve a similar result for c.w. signals. In this case the filter needs to track the speed of the incoming signal. Once it's locked it then suppresses the noise from the gaps between the character elements. It's really obvious when you describe it, but requires some smart programming to get it right!

The filter characteristics in c.w. mode are really very sharp and the signal drop-off is 2.4dB when just 5Hz off tune. To help compensate for this the filter includes an automatic fine tune system.

Finally, comes the Coherent Band-pass filter. This is another one designed for c.w. signals but in this case it's best used to finally tidy-up a c.w. signal after filtering by one or two of the more conventional filters.

If you've ever used a conventional DSP filter you will no doubt have noticed how the audio level drops considerably when the more severe effects are turned-on. The *DSP Blaster* has an answer to

this by employing the sound card's automatic gain control system. This has a very wide range and can be set to provide gain enhancement of up to 60dB.

If you want to run *DSP Blaster* with other programs it even includes the facility to run as a Terminate and Stay Resident (TSR) program. As you have probably guessed by now, I rate *DSP Blaster* very highly. It's a very well thought-out practical system that will find favour with all who use it. To get a copy just follow the links on my Web site or go direct to <http://www.megalink.net/~n1rcr> That's all for this month, so until next time 'happy computing' and keeping

Special Offers

If you'd like a copy of Hamcomm/JVFX, etc. I've arranged a very special offer with the Public Domain and Shareware Library (PDSL). They have put together a library set of all five disks for just £12, all inclusive. Using PDSL also makes ordering simpler as they accept all the usual credit cards so you can order by 'phone - you don't even have to write a letter.

Please direct all orders and enquiries about this disk set to PDSL, Winscombe House, Beacon Road, Crowborough, Sussex TN6 1UL. Tel: (01892) 663298 and request library volume: H008739abcde. The software is only available as a set of five disks as follows: IBM PC Software (1.44Mb disks): Disk A - JVFX 7.1, HAMCOMM 3.1 and WXFAX 3; Disk B - DSP Starter plus Texas device selection software; Disk C - NuMorse 1.3; Disk D - UltraPak 4.0 and Disk E - Mscan 1.3 and 2.0.

sending your news and views to me Mike Richards G4WNC at PO Box 1863, Ringwood, Hants BH24 2ZD or via E-mail to: mike.richards@dia1.pipex.com. Don't forget to visit my Web site at <http://dialspace.dial.pipex.com/mike.richards/>

BROADCAST

ROUND-UP

This month Peter Shore reports on lots of station activity and has news of the closure of Radio Australia's Darwin transmitting station.

The **Voice of the Mediterranean** is on the air from its studios in Malta via transmitters in Germany every day at 1900 for an hour on 9.765 and 12.06MHz. The station also broadcasts to the Far East and Australia in English on Sunday at 0200 for 90 minutes on 15.55 and 17.57MHz, followed by a 90 minute programme in Maltese on the same frequencies. A Japanese-language programme, aimed at potential tourists to Malta, is beamed towards Japan on Sunday at 0500 on 17.57MHz only.

Transmitters in Germany are increasingly being used by broadcasters to reach audiences world-wide. **Deutsche Telekom**, Germany's state telecommunications monopoly, runs the short wave facilities at Nauen, Wertachtal and Julich and hires out capacity that's not used by **Deutsche Welle**.

Deutsche Telekom has recently appointed a new sales force to market its short wave facilities and as part of the deal throws in free ISDN digital 'phone lines to link studios overseas to its transmission centres. This makes the deals highly attractive to many broadcasters, so watch for more stations broadcasting from Germany, including some clandestine operations like the **Democratic Voice of Burma**.

Other clandestine stations on the air at present include the **Democratic Voice of Iran**, which launched on 12 May. This station is carried from a transmitter in a Central Asian country, and according to reports shares the facility with the **Voice of Tibet**. The service is on the air daily at 1730UTC on 5.90MHz. The station announces a mailing address in Paris.

The **Voice of Free Nigeria** started on 12 June, and can be heard for an hour on 11.68MHz at 1900UTC on Saturdays only. The station can be reached at **PO Box 441395, Indianapolis, Indiana 46244, USA**, and by E-mail at fnm@ix.netcome.com

Voice of Free Nigeria is the second major clandestine opposition station beaming to Nigeria from overseas. **Radio**

Kudirat, which also beams opposition programming to Nigeria, has been running for the past year, transmitted from South Africa's Meyerton station.

Station Closed

Radio Australia's Darwin transmitting station closed at the end of June when neither the ABC nor the Australian government would agree to fund transmissions from the station. As a result, services are now limited to senders at Shepparton (which has 100kW transmitters) and Brandon (where there are two 10kW transmitters in use).

Some commentators say that as a result, **Radio Australia's** much listened to Vietnamese and Mandarin services will barely be audible in Vietnam and China. This is ironic since the closure of Darwin (which had new equipment installed as recently as last year) came on the day Hong Kong reverted to Chinese rule.

The current schedule for **Radio Australia's** English broadcasts (with frequencies in MHz and including the antenna bearings) is now:

0000-0400 on 15.415 (Shepparton, 329°)
 0000-0800 on 13.605 (Shepparton, 353°)
 0600-0830 on 21.715, 17.75 and 15.415 (Shepparton, 329°)
 0800-0900 on 15.365 (Shepparton, 90°), 12.08 (Darwin, 80°), 9.71 (Shepparton, 353°) and 5.995 (Darwin, 10°)
 0800-1400 on 9.58 (Shepparton, 30°)
 0830-1000 on 11.64 (Shepparton, 329°)
 1100-1400 on 6.08 (Shepparton, 339°)
 1200-1600 on 11.80 (Shepparton, 70°)
 1200-1700 on 5.995 (Shepparton, 50°)
 1400-1800 on 5.87 (Shepparton, 30°)
 1400-2130 on 9.415 (Shepparton, 30°)
 1500-1700 on 11.66 (Shepparton, 329°)
 1500-2200 on 9.615 (Shepparton, 329°)
 1600-1900 on 6.08 (Shepparton, 339°)
 1700-2130 on 6.355 (Shepparton, 50°) and 11.88 (Shepparton, 65°)
 1800-2000 on 7.24 (Shepparton, 30°)
 1900-2000 on 6.08 (Shepparton, 5°)
 2100-2200 on 12.08 (Darwin, 8°), 7.24 (Shepparton, 30°) and 9.66 (Darwin, 10°)
 2100-0200 on 15.365 (Shepparton, 90°)
 2130-0000 on 11.695 (Shepparton, 355°)
 2130-0200 on 13.755 (Shepparton, 30°)
 2200-0600 on 17.795 (Shepparton, 50°)

2200-0000 on 15.365 (Shepparton, 90°)
 2300-0200 on 12.08 (Darwin, 80°), 9.66 (Darwin, 10°)
 2300-0400 on 17.75 (Shepparton, 329°)
 There is a relay of **BBC World Service** from Darwin between 2200 and 2300 daily on 9.66 and 12.08MHz. I would like to hear from any reader about how well - or how badly - **Radio Australia** can now be received on short wave in the UK and Europe.

New German Service

The recently rerieved German service of **Radio Vlaanderen Internationaal** will be among a number of German language programmes that join **World Radio Network's** new German service - **WRN3** - when it launches on 31 August at the Internationale Funkausstellung in Berlin.

International services in Sweden, Poland, Finland, the Vatican and Hungary have also said they will join. The **WRN3** service will join the world-wide English Service **WRN1** and the multilingual channel **WRN2** which is beamed to Europe and North America. (**WRN3** will be carried on an analogue subcarrier on Astra and via Astra Digital Radio).

If you like listening to South American stations, you may like to try catching **Voz de Venezuela**, reported to be back on the air at around 2100 every day on 9.54MHz.

Change Of Name

A change of name for **Radio Yerevan** from the former Soviet Republic of Armenia. On 7 July, the Armenian Prime Minister renamed the broadcaster **Armenian National Radio**. You can hear English at 0830-0900 on Sundays only on 15.27MHz, and weekdays at 1745 until 1800 on 4.81, 4.99 and 7.48MHz.

There is a daily transmission for half-an-hour at 2030 which can be heard on 7.48, 9.965 and 11.615MHz. Write to **Armenian National Radio** at: **Alek Manukyan Street 5, Yerevan 75025, Armenia**.

Unusual Location

Look out for the **Voice of Greece's** multi-lingual programmes beamed from an unusual location. From late summer, the Greek broadcaster will use **Voice of America** transmitters at Greenville on the East Coast and Delano on the West Coast of the USA.

Around 12 hours daily will be transmitted from the USA, part of a reciprocal arrangement established several years ago when **VoA** transmitting stations were installed in Greece. A prize for the first **PW** reader to hear the station's North American relay and get a QSL card!

That's all this month. Join me again in my next column for the latest news from the international broadcast bands.



The video control room for the world-wide 24-hour television programme broadcast by DW-tv.

END

DATA DIARY

As from this month Roger Cooke G3LDI's column widens its appeal with a new title and a change of tack to encompass all data modes.

Whenever I give a talk at a radio club on data modes, the normal comment is that a large wallet is needed in order to get started, and there is very little help available on the way. But it doesn't have to be this way, and I hope to dispel some of this assumption with some information to help the raw beginner, a youngster wishing to try data modes or somebody who wishes to operate at a minimum of cost.

However it is true that the more sophisticated and expensive the equipment is, the more fruitful the results that follow will be. But, it is also true that even with inexpensive and relatively simple equipment, satisfying results can also be obtained.

So, before embarking on any data mode for the first time, it would pay the beginner to obtain some reading matter, plus make some enquiries from other operators, and if possible visit their stations and see the equipment in action. Questions can then be asked and the experienced operator will guide the beginner along the correct route.

Basic RTTY

One of the basic data modes, aside from Morse (c.w.), is RadioTeLeType (RTTY). The easiest and cheapest way to gain experience on this mode is to use a real RTTY machine.

Some of the more experienced operators are delighted to see their old machines go to good homes, so ask around. One of the best things to

do would be to join a dedicated group.

The obvious one to choose is the **British Amateur Radio Teledata Group**, (BARTG). Membership costs £12 per year in the UK and for that you will receive a quarterly magazine, *Datacom*, running to some 90 pages.

Topics covered in *Datacom* include RTTY, Teleprinters, computers, AMTOR, Packet, PACTOR, FAX and other data related subjects. Hardware and software are both catered for, and I would suggest that this would be an ideal first step to take.

The BARTG Committee are shown in Fig. 1. Left to right, back row, is **Sam Hallas G8EXV**, **Bill McGill G0DXB**, **Dick Whittering G3URA**. Front row, **Alan Hobbs G8GDJ**, **John Barker GW4SKA**, and **Ken Goodwin G0PCA**. The photograph was taken by the elusive **Ian Brothwell G4EAN**.

The respective committee positions of the BARTG group are: **Bill G0DXB** is the Membership Secretary, **John GW4SKA**, is the Chairman and Contests Manager, **Ken G0PCA**, is the Publications Sales and Rally Co-ordinator, **Alan G8GDJ**, is the President and Mechanical RTTY Expert, **Dick G3URA** is the Treasurer and **Sam G8EXV** is the Internet Manager.

Yes, they are even on the Internet You can find the BARTG Web pages at www.bartg.demon.co.uk

Ian Brothwell G4EAN, used to be the Secretary and always managed to avoid a camera! However, he kindly sent along a picture of his shack as shown in Fig. 2.

Ian's equipment includes an FT-757GX for h.f., an FT-690R, FT-290R, FT-790R and a KAM multi-mode. He uses a Commodore C64 computer.

BBC B Computers

If you don't favour the mechanical method for RTTY, another very good computer to look out for is the BBC B.

One BBC user is **Stan Casper G3XON**. Stan has been using a BBC B computer for RTTY and another for Packet for some time.

Stan is very enthusiastic about the BBC B and has a group of friends using them. They are known as the

Fig. 1: The BARTG Committee (see text).



'Beeb Babes'. Stan regularly has contacts on RTTY with Tasmania, New York and New Zealand.

For Packet, Stan uses the PacComm Tiny-2 TNC fitted with an internal clock. Packet activity is limited to 144MHz and the software used is the well tried Amrac TNC304M which is easily fired up from Disk, or in Stan's case, a resident Eprom.

The connections between the computer, TNC and transceiver are straightforward. On the BBC B, connections are made via the User Port underneath the case which is a standard 20 way IDC connector.

Reference to the BBC User Guide indicate the Ground, Input, Output and PTT connections go to pins 0V, PB0, PB1, and PB2 respectively. The connections from the BBC B go direct to the TNC but here the connections to the TNC obviously will have to be made according to the handbook for the TNC used.

The BBC B is also very suitable for RTTY. The In and Out data connections to/from being very much the same as for Packet but remember that Terminal Unit connection points can again vary considerably.

Stan uses a home-brewed version of the well known ST5 Terminal Unit, once marketed by BARTG. Connections again are fairly simple, output to the microphone socket, input from the transceiver audio out plus the usual PTT and ground connections.

The BBC B can also be used for AMTOR and Slow Scan TV. But be careful when purchasing one at rallies however. As some machines may be quite old and may not have the essential Disk Drive upgrade chips fitted.

A disk drive to go along with the BBC B is essential. Particularly so with Packet if you want to load software with ease, record incoming messages and maybe prepare messages with a word processor prior to transmission. The same comment would apply to RTTY use as well.

The BBC Master computer is a later model of the BBC B and can also be found at rallies at reasonable prices. Use of these computers is

quite adequate for these modes and these computers can also be used for AMTOR and Slow Scan TV too.

There is also a benefit to be obtained by joining the established BBC Computer Club known as 8-Bit Software. Membership is entirely free and details can be obtained from: **C. J. Richardson, 8-Bit Software, 17, Lambert Park Road, Hedon, Hull, East Yorkshire HU12 8HF.**

Beeb Babes

If you are interested, then the BBC B forms a very economic entry into data and is a very acceptable computer. Stan G3XON says that RTTY and Packet play an important part of his life. He receives packet messages daily, RTTY contacts all over the world, and has obtained RTTY DXCC using the BBC B.

If you are young and impecunious, then this is an ideal entry point. If you have just retired and consider you are 'over the hill' as far as data is concerned then take note of what Stan has done. He is now 82 years young!

Stan can be contacted at **G3XON @ GB7GFD**. There is also another Beeb Babe, willing to answer questions and that is **Bill G0VW @ GB7GFD**.

If you're interested in finding out more about RTTY then the BARTG Rally would be a good place to go and talk to those involved in all data modes. The rally takes place on **Sunday 14 September** at Sandown Park Exhibition Centre, Esher, Surrey. Doors open at 1030 - 1700 and admission costs £3 for adults or £2.50 for OAPs. There will also be a talk-in on by **GB4ATG** on 144 and 430MHz.

That's all I've got space for this month. Don't forget if there are any aspects of Data Modes you'd like covered in this column contact me via the Internet at mtaylor@uk.md.is.comor, QTHR or by Tel: (01508) 570278.



Fig. 2: Ian G4EAN maybe able to avoid the camera but his shack equipment can't!

END

Due to the fast turn around of popular secondhand items, readers should check on availability of advertised stock. In other words...if you spot something you fancy...don't delay or you could miss it!

Traders

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KENWOOD TH-28E 2m handheld £199
KENWOOD TH-78E 2m/70cms handheld £259
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B+W 300W HF Antenna tuning unit £79
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DATONG D-70 Morse tutor £49
DEWSBURY SUPA-TUTOR v2 Morse tutor £49
DIAWA CL-22 Receiving antenna coupler £39
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KENWOOD DSP-100 DSP unit for TS-850 £349
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DATACOMMS

Kantronics KAM Multimode TNC £185.00

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ICOM IC505 6m Portable SSB Only £250.00
ICOM ICW2E Dual Band Handheld £249.00
Kenwood TH205E 2m Handheld £159.00
Kenwood TH78E Dual Band Handheld £290.00
Kenwood TM732E Dual Band Mobile / detachable front panel £380.00
Kenwood TR2500 2m Handheld £140.00
Yaesu FT290R 2m Multimode £250.00
Yaesu FT470R Dual Band Handheld £259.00
Yaesu FT2200 2m FM Mobile £289.00
Yaesu FT4700R11 Dual Band Mobile with detachable front £375.00
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Sony ICFSW55 World band Portable £229.00
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ICOM ICR7000 Base Scanner £650.00
ICOM ICR1 Handheld Scanner £199.00
Yupiteru MVT7000 Handheld Scanner £200.00
Yupiteru MVT7100 Handheld Scanner £225.00

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Alinco DJ180 with keypad £129
Kenwood TH79E 2m/70cm wide RX £299
ICOM ICP2ET 2m handi with spare batt £149
Yaesu FT50R 2m/70cm handi £249
Yaesu FT8500 2m/70cm mobile £399
Alinco DR610E 2m/70cm mobile £399
ICOM IC260E 2m mult mode 10 watts. £269
ICOM IC820H 2m/70cm base station £1099

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Sony SW7600G £139
Realistic DX 394 £199

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ICOM ICR7000 25 to 2000MHz £699
ICOM ICR7100 25 to 2000MHz £949
Bearcat 9000XLT 25 to 1300MHz £249
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Bearcat 3000XLT 25 to 1300MHz £179
Bearcat 220XLT 66 to 956MHz £129
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Bearcat 100XLT 29 to 512MHz £99

STATION ACCESSORIES

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MFJ 949E 300 watt tuner with dummy load £109
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ICOM PS55 20 amp power supply £149
Yaesu FRV7700 VHF converter £65
Diawa LA2080 2m 80watt amp £69
Mirage 160watt 2m amp 10watt input £229
Opto 3300 frequency finder £99
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Traders' Table

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LX FT890AT Yaesu HF 100W.....	£1250
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RX FT212RH Yaesu 2mtr FM.....	£175

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PX AR8000 AOR Scanner.....	£299
PX AR2800 AOR RX M/base.....	£359
PX AR1500ex AOR Scanner.....	£225
PX AR3030 AOR HF RX.....	£399
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Saturday 23rd August

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Sunday 24th August

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Monday 25th August

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Sunday 31st August

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Saturday 6th September

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6m (50MHz) transverter RN Electronics, £95. FTV-707 transverter for 2m (144MHz), would suit FT-707 or FT-77. £60. Scope, £20. Tel: (01926) 403214.

70cm (430MHz) PFX ex-p.n.r. handle, converted as per HRT article, all repeat and simplex channels, 1.5W o/p, inc. ant, NiCad, etc., £100. EPROMS 70cm (430MHz) and 4m (70MHz) to convert your own, £15. Tony G4XIV, York. Tel: (01904) 330502.

Ailco 144/30W amplifier, £40. TS-700G 144/145 multi-mode base radio, £225. Realistic 2001 base scanner, £50. Discosce antenna, unused. £40. FT-757II f. panel, £15. TS-780, 2/70 base, slight fault but works fine. £45. Tel: (0468) 756762 anytime.

Ailco DJ-190E, one month old, perfect working order, £130 or exchange for h.f. a.t.u., e.g. Vectronics VC300 DLP or similar. Tel: Aberdeenshire (01975) 563833.

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AR881.F in cabinet, £110. R1155 with internal p.s.u., £60. R1155 transit-box (wooden), original, circa WWII, £60. Canadian 52 receiver, including p.s.u., £85. Eddystone 840C 480kHz to 30MHz, £85. Racaal s.s.b. adaptor, £60, all g.w.o. Tel: Yorkshire (01482) 869682.

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Commodore disk drive 1541-2, mint condition in original packing, including handbook and power pack. £30. Tel: Homdean (01705) 643401.

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CR70A, £30. Also Icom IC-U16T, £60. PRO-27 scanner, £20. Tel: (01606) 559562 after 5pm.

Cushcraft antenna model A35, freq. 28, 21, 14MHz, 3-elements, never been erected, only assembled on lawn to check complete, list price, £399, offer price £275 o.n.o. Armstrong, 64 Colwell Drive, Witney, Oxon OX8 7NQ. Tel: (01993) 704433.

Datong automatic r.f. speech processor, £40, with instructions. Microvitec 14in only, three months used, as new, open to offers. Derick G4XKF, Nr Brighton. Tel: (01273) 418713.

Double-beam oscilloscope, £135. SGB/low impedance headphones, £5. Morse key, £5. Large quantity of components, transformers, valves, etc., £10. Miniature double-beam oscilloscope (faulty), £15. v/u, h.f. receiver (front end dead), £35. 13A 8-way strip, £5. G4FZG, QTHR. Tel: Cheltenham (01242) 254634.

Drake 4A receiver with matching MS-4 speaker, £295. Also MN-4 aerial matching network, max 300W, built-in s.w.r. meter, £95. Shure 444 microphone, £25. Drake TR4-TX AC4 power unit, offers. Tel: (01872) 862291.

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Farnell engineers de-luxe tool case kit, as new (£440 + VAT retail), accept, £175. Also TEC DM1249, one year's warranty, retail £182, accept, £95. Mark, Leeds. Tel: 0113-262 1021.

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Heatherlite 144MHz QRO amp (4CX350), £500 as new. BNOS ZPM 432MHz amp, 10 in, 50 out, as new, £85. Tonna 21-element 432MHz beam, £25. Cushcraft ARX2B Ringo Ranger II (145MHz), £25. Yaesu SP102 filter speaker, £30. Tel: N. Somerset (01934) 815239 after 6pm.

Hewlett Packard 54501A state-of-the-art digitising oscilloscope, 100MHz, 4 channel, excellent condition with manual and probes, new cost £4000, accept £2000. Tel: 0181-371 9661.

HF station for sale, Icom 740 with internal p.s.u., f.m. unit fitted, 240V, 12V, with manual, 1kW a.t.u., HF6VX vertical with manual, can be seen working, £600 o.n.o. Tel: London 0181-670 7397 anytime.

HF-225 receiver, a.m., f.m., s.s.b., e.w., keypad, p.s.u. and handbook, £250 o.n.o. FRG-9600 v.h.f./u.h.f. receiver, 60-905MHz H/B internal h.f. converter to 60MHz, p.s.u., mobile mount, service manual, boxed, £230 o.n.o. John, W. Midlands. Tel: (01384) 371246.

HF-225 with a.m./f.m. board, home-brew keypad, with all documentation and original box, £300. Mike on (01903) 770325 after 6pm or weekends.

HRO receiver, full set of coils, £80. Butternet vertical antenna, £85. Tony G0CZV, E. Yorks. Tel: (01430) 422657.

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Icom 7000, 25MHz, 2G + h.f. coverage and remote, excellent condition, boxed, £650. Grundig Satellit 650 international, handbook, excellent performance, £200. Global 1000 a.t.u., v.g.c., £45. B42-D, very sensitive, £60. Tel: 0181-813 9193.

Icom IC-271E 2m (144MHz) multi-mode, MuTek front-end, 25W, £475. ICPS15 power supply, 20A, £70. ICSP3 speaker, £35, all boxed and mint. Icom IC575A 6/10m (28 & 50MHz) multi-mode 26-56MHz RX, £525. HL66V 6m (50MHz) amp, 60W, £70. Heatherlite explorer 2m (144MHz) QRO amp (4CX350), £500, as new. Tel: Weston-Super-Mare (01934) 815239 after 6pm.

Icom IC-451E 430MHz multi-mode base station, mains or 12V, 10W output, good condition, complete with microphone, leads and handbook, collect or carriage extra, £325 o.n.o. Bob G8VOI, Waterlooville. Tel: (01705) 250830 after 6pm please.

Icom IC-740, £400. ICAT500, £200. Ailco EDX2 auto tuner, new, £190. Superstar 360, 10m (28MHz) with paperwork, £90. HQ mini beam, 10, 15, 20, 6 (14, 21, 28, 50MHz), £50. Watson W50 colinear, 70, 2m, £30. TET vertical 10-80m (3.5-28MHz), £15. Tel: Lincoln (01522) 542509.

Icom IC-R10 all-mode scanner receiver, less than one month old, used only to test latest model, with leather case in original packing, immaculate and excellent performer, offers or might exchange. Tel: Bournemouth (01202) 430043.

Jay-Beam Minimax tri-hand ant., e.w., 10-15-20m (14, 21 & 28MHz), turning radius 2.85m, good condition, £150 o.n.o. Jack, Bolton. Tel: (01942) 813863.

Kenwood TS-430 h.f. TX/RX, compete with mic. and manual. Icom P555 p.s.u. Kenwood TS-120 loud speaker, all in good condition, £550. G4ANW, Hampshire. Tel: (01730) 261859.

Kenwood TS-440S with auto tuner, hand mic., manual, boxed, as new, £700 o.n.o. R7000 + 80m (3.5MHz) add on kit, brand new, £80, carriage extra. Tel: (01462) 631370 evenings.

Kenwood TS-520S h.f. transceiver with a.t.u. used as standby, £225. Icom IC45E 430MHz, £125. Both excellent condition, would swap for 100MHz+ computer with cash adjustment. Tel: London 0181-360 8467 evenings/weekends.

Kenwood TS-680S 6m (50MHz) h.f., v.g.c., box, manuals, etc., can be seen/hard working, £595 o.n.o. Please no time wasters thank you. Jason G0WRB, Yeovil. Tel: (01935) 428716.

Kenwood TS-850S, 0-30MHz RX/TX, g.c., £850. Set of GEC 6146B plus 12BY7A. £25. Barry G00NH, Halesowen. Tel: (01384) 565614.

Kenwood TS-850SAT with DRU-2 YG-455C-1 c.w. crystal filter, VS-2 TCXO unit, 50-2 c.w. narrow filter, YK-88CN-1 s.s.b. narrow filter, YK-88SN-1, mint condition, boxed, £1000. Icom 726 h.f. + 6m (50MHz) unmarked, boxed, £475. Gary, Coventry. Tel: (01203) 559702.

KW600 linear, worth £150, but no reasonable offer refused. Tel: Wisbech (01945) 589669.

Lowe HF-225 c/w options, mint and boxed, £335. Hammarlund HQ170A, excellent, £165. Eddystone 770R, £115. KW201 RX, £75. Eddystone 888A, £145. Many early books and magazines, s.a.c. for list. Simon on (01434) 633913 evenings and weekends.

Marconi marine Morse key type 365EZ, £50. Somerset 'Wedmore' 80m (3.5MHz) QRP c.w. TX/RX, £35. R5 vertical, £65. Two brand new traps for R5, £10 each. 6m (50MHz) module for FT-767, £175. Pete, Bristol. Tel: (01454) 887461.



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Murphy B40D in v.g.c., buyer collects, very heavy, £85. B. E. Viney GW4KDP, 7 Pentre Bach, Barmouth, Gwynedd LL42 1HT.

Nine 1924 valves, new in boxes, also other early valves. Tel: 0113-240 3496.

Osker SWR200, s.w.r. and power meter, 3 to 200MHz, £20. G8AHE, QTHR. Tel: 0121-458 2406.

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Racal 1792 RX, latest model, bucklit 1Hz read-out, seven i.f. crystal filters, 100 channel memory, pass band tuning, excellent condition, complete with operator/workshop manual, £1350 o.n.o. Martin G3NGC, Glos. Tel: (01242) 519281.

Racal RA17 receiver, good condition, £125. FT-101B trans: YC601 digital display, r.f. clipper

module, new, unused valves, manual, £250. Microwave Module RTTY trans: M4000 keyboard, £55. Buyer to collect. Tel: (01993) 898237.

Realistic PRO-2039, 200 channel base scanner, 68-960MHz with gaps, boxed with manual, little used, broadband magnetic antenna, bargain at £100, postage extra. Roy Siddall, 17 Park Rise, Holmesfield, Sheffield S18 5WU, Tel: 0114-289 0192.

Reel to reel tape recorder, Grundig, Philips valve car radios, valve and transistor domestic radios, service sheets, goniometer, mains transformers, s.a.c. for lists, no 'phone. Alderson, 43 Bronpton Road, Northalerton DL6 1ED.

Rexon RL-102 2m (144MHz) hand-held transceiver, fully synthesised, extended receive, scanning functions, boxed as new, with instructions, NiCad pack and charger, £90. Tel: Nottingham 0115-946 4802.

Saisho SW5000, 150kHz to 30MHz receiver (Sangean AT5803A clone) p.l.l. circuitry, nine memories, s.s.b., scan mode, narrow filter, r.f. control, mains adaptor, boxed with manual, excellent condition, £55 plus carriage. Tel: Gloucestershire (01285) 656787 after 6.30pm.

Sangean AT5803A, boxed, good condition, £50. Also Sony ICF 7600A receiver, £40. Wanted Hallicrafters or R1155 receiver in good order. Tel: 0121-444 8230.

Silent key G0CXE: Collins KWM2 OK TX but fault on RX, £150. Trio TS700G hand mic., instructions book, £250. Please come and try out then offer. Keith G4NPY on (01543) 685737 or Ralph G3HVV on (01543) 674301.

Silent key G0CXE: Icom IC-735 with Icom power supply, hand mic., instructions book, believed never used on TX, £600. Yaesu FT-101 hand mic., instructions book, believed good, £150. Ring for trial, either Keith G4NPY on (01543) 685737 or Ralph G3HVV on (01543) 674301.

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Sony ICF SW7600G receiver, excellent condition, boxed, complete with compact antenna and manual, £90. Mr Wilkinson on (01983) 854766.

Sony ICF-PRO80 scanning receiver, h.f., s.s.b., separate converter, up to 228MHz, very good condition, case and handbook, £140 or swap, w.h.y.? Tel: (01507) 358195.

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SX200 scanner receiver, f.m., a.m., 26.000-57.995MHz, 58.000-88.000MHz, 108.000-180.000MHz, 380.000-514.000MHz, £40. Buyer to collect. Tel: Oxon area (01993) 898237.

T30AM TX, R7AM RX in 19in rack mount with PW conversion info for 144MHz-0.5W 50W amp, has 2 valves QV03-10, QV06-40A, open to offers, ask for Brian. Tel: 0181-500 9716 up to 6pm or 0181-501 4104 after 7pm.

Ten Tec Corsair, matching p.s.u., mic., c.w. filter, manual, £350 plus carriage. Bill, Devon. Tel: (01823) 680778.

TM251E, £300. Yaesu YD844, Shure 201, offers. EL40X DID (for 3.5 and 7MHz), £35. Pair of traps for W3D22, £20. Wanted NYE VKI-6 master key, G3XZF, QTHR. Tel: (01945) 588102.

Trio R2000 receiver, coverage 150kHz to 30MHz plus v.h.f. conversion, excellent condition, £275. Tel: Northiam (01797) 252335.

Trio TS-120S 100W h.f. transceiver, in original box, power lead, mic., c.w., not working hence price, £295. GW4PCX on (01437) 781265.

Trio TS-830S 160-10m (1.8-28MHz), Kenwood remote VFO230 with five memories, both boxed with handbooks, £500. ERA Microreader with instruction tape and booklet, £70. Tel: Hartlepool (01429) 234011.

TS-520 h.f. TX/RX, also matching v.f.o. speaker, aerial tuner, £350 o.v.n.o. FT-290 all-mode, new NiCads, £180 o.v.n.o. FT-23R hand-held, charger, £100 o.v.n.o. Tel: Tamworth (01827) 52889 after 6pm.

Two 'Slogets' two channel valve f.m. receivers plus assorted valves, circuit diagrams, professionally built, £75 o.n.o. Tel: Middlesex 0181-941 6796.

Two sectioned 25ft steel mast, rotator, control unit, two eight element 2m (144MHz) Yagis, £275. DRAE power unit, Microwave Modules 30W pre-amp, v.s.w.r. meter, £175. Yaesu 290R complete with charger, £195. John Mirams, 33a The Moors, Kildington, Oxon OX5 2AH, Tel: (01865) 374868.

Vintage book set: Modern Practical Radio And Television - 1948 edition - reprint 1952. Three volumes plus *Radio Circuits And Data* book, very good condition, ideal reference for restoring old radios, £25. Mr Gardiner M0AGC on (01264) 773730 or E-mail gradko@compuserve.com

Yaesu desk microphone MD1, immaculate, £50. Jaybeam VR3 10/15/20 (14, 21 & 28MHz) vertical, £35 with instruction book, infra-red cordless headphones, new, £20. Datong r.f. speech processor with instructions, £25. Derick G4XKF, Nr Brighton. Tel: (01273) 418713.

Yaesu FRG7, good working order,

£100 plus carriage, handbook. Tel: Andover, near King Arthur's Way (01264) 363481.

Yaesu FT-290 MkII 2m (144MHz) multi-mode TX/RX with NiCads, carry case, p.s.u. and manual, mint condition, not used mobile, original receipt confirms age, boxed, as new, £320 o.n.o. Colin Thornicroft, 47 Finstall Road, Finstall, Bromsgrove, Wores.

Yaesu FT-290 with MuTek Yaesu FL2010 10W linear NiCad charger and carry case, £275. Trio R600 h.f. receiver, £200. PK323 TNC, compact HP terminal plus printer, £200, all good condition. Tel: Surrey (01276) 25925.

Yaesu FT-736R multi-band v.h.f./u.h.f. all-mode transceiver, 6m (50MHz), 2m (144MHz), 70cm (430MHz), 23cm (1296MHz), 10-25W ultimate DX radio, superb, mint condition, £1200, no offers, ring after 6pm. Tony M0ATV, Liverpool. Tel: 0151-280 0882.

Yaesu FT-747GX, complete with f.m. board, fist mic. and mobile bracket, this rig is virtually unused and complete with all boxes and instructions and packing, reluctant sale, £450 o.n.o. Tel: Plymouth (01752) 660376 after 5pm.

Yaesu FT-757GX 100W h.f. transceiver, with general coverage receive, £490. Trio TR-9130 25W all-mode 144MHz transceiver with 12.5/25kHz channels on f.m., inc. mobile bracket, £250. Ted G0WYU, Cornwall. Tel: (01209) 211689.

Yaesu FT-77 + FV-700DM v.f.o., £275. Yaesu FC-707 a.t.u., new MHB8 hand mic., up/down scanning, offers, whole system inc. Yaesu FP-707 power supply, spkr, £425. Please write to: G4OLC, QTHR.

Yaesu FT-77, 100W h.f. multi-mode mobile, base TX/RX plus FC-700 a.t.u., £450. No splits, might except swap, w.h.y.? G4XPP, QTHR or 'phone after 1730 on (01388) 747018.

Yaesu FT-790R MK1, manual, fist mic., NiCads (new), charger, rubber antenna, leather case, mint, sell for, £275 o.n.o. Wanted rotator and Tiny 2 TNC, wanted hand-held dual-band with wide RX. Mike on (01226) 742971, QTHR.

Yaesu FT-8000R, as new, £350. Watson 20A power supply, new, £60. Watson triple band antenna, £60. Aiwa cassette recorder, £80. Morse key, £15. Morse mags (*Morsum Magnificans*), £5. Tel: Prestatyn (01745) 852691.

Yaesu FT-890AT, 14 months old, immaculate condition, £650. Yaesu FT-102, £300. Ask for John. Tel: Darford (01322) 285273.

Yaesu FT-902DM, good working order with YP1502 dummy load, SP901 and SP901P speakers, many accessories included, complete package with manuals, £850. Tel/FAX: (01295) 253742.

Yaesu FT-980 (CAT) TX/RX, immaculate condition, complete with all handbooks, 240V CAT lead incl., £550 o.v.n.o. Telescop mast 8m and 12m Clarke Ltd nilspec. £120 and £150 respectively, all complete. Chris on (01474) 329324 after 7pm please.

Yaesu FT-990DC, additional 500Hz c.w. and 2kHz s.s.b. filters,

microphone handbook and box, one owner, £1150 o.n.o. Buyer pays carriage or collects. Allow for cheque to clear. Roger G0HAE, QTHR. Tel: (01703) 455777 evenings.

Yaesu NiCad battery for the FT-50R d.c. 9.6V, 110mAh, produces 5W power, boxed, as new, £45. Tel: 0181-767 7780.

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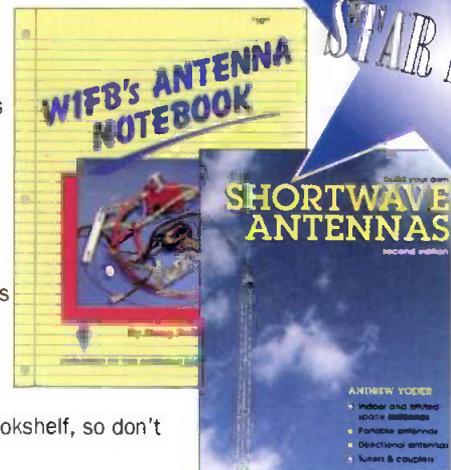
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