

THE UK'S BEST SELLING MAGAZINE FOR AMATEUR RADIO ENTHUSIASTS

# practical Wireless

## Lasers Leading Lights In Communications

## Radio Discover The Basics

## Bargain Basement

## Busby's Box Goes Stateside

## Bits & Bytes

## & all your regular favourites!

8 pages of

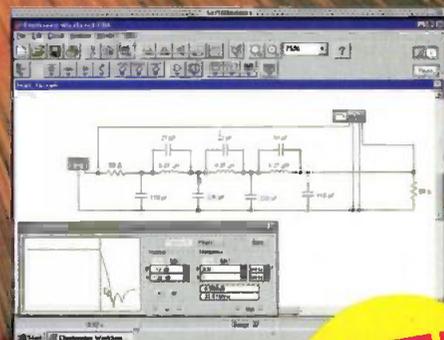
## antennas in action

Reviewed

## Tackling TVI With Semaht



## Electronics Workbench EDA Software



**FREE  
READERS'  
ADS**

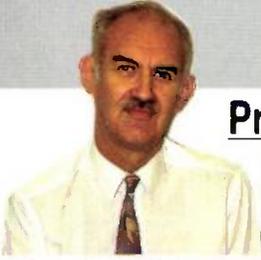
**Reviewed**



**MFJ-490  
Memory  
Keyer**

# Waters & Stanton **NEW** FREE-PHONE ORDER LINE 0500 73-73-88

22, Main Road, Hockley, Essex. SS5 4QS



## Price Match - and 10-Day Approval!

We Promise to try and match or beat our competitors' prices. Most of our staff are licensed either class A or B - so we understand your needs. G3OJV / G0PEP

Orders: 0500 737388  
01702 206835  
Enquiries 01702 206835  
01702 204965  
FAX 01702 205843  
Open Mon-Sat 9.00AM - 5.30PM

### Standard C-156 2m Handy



**W&S**  
£149.95

**Lowest UK Price!**

Now with ni-cads and AC charger!

- \* 2m FM Handy
- \* 2.5W Output
- \* 1750Hz tone
- \* 100 Memories
- \* Keypad Entry
- \* LCD Readout

### Yaesu FT-50R 2m/70cms



Includes WFM Broadcast

**OFFER**

**W&S**  
£259

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

Save £70!

### ADI AT-200 2m FM



**W&S**  
£129

- \* 2m FM Handy
- \* 2.5W output
- \* 5W on 13.8v
- \* 1750Hz tone
- \* Illuminated keypad
- \* Ultra sensitive Wideband Rx
- \* 20 memories
- \* Keypad entry
- \* DTMF
- \* Uses AA cells

Free Mini-mag mobile antenna when you send back your warranty card. During May

This has proved to be our most reliable handheld. It has a very sensitive receiver and is built to professional standards.

### ADI AT-400 70cm FM



**W&S**  
£169

- \* 70cm FM Handy
- \* 2W output
- \* 5W on 13.8v
- \* 1750Hz tone
- \* Illuminated keypad
- \* Ultra sensitive Wideband Rx
- \* 20 memories
- \* Keypad entry
- \* DTMF
- \* Uses AA cells

Free Mini-mag mobile antenna when you send back your warranty card. During May

This has become the standard radio for Novice hams. It's the most sensitive and cost effective way of getting on 70cms.

### ADI AR-146 2m Mobile

"Beats the Japanese Rigs for Sensitivity and Adjacent Channel" *QST Nov. 1996*

Now with Full CTCSS



**W&S**  
£249

### ADI AR-446 70cms Mobile

Now with Full CTCSS



**W&S**  
£269

### ALINCO DR-610 2m & 70cms



**W&S**  
£475

**Lowest UK Price!**

- \* Detachable front head unit.
- \* 2m & 70cms (50W 2m & 35W 70cms)
- \* CTCSS Encode, 1750Hz tone
- \* 100 Memories, 9600 bps for Packet

### Alinco DJ-191 2m Handy



**Lowest UK Price!**

**W&S**  
£139

- \* 2m 1.5W from ni-cad
- \* 5W from ext. 12v supply
- \* Rx 135 - 174MHz
- \* 40 Memories
- \* CTCSS built-in
- \* 1750Hz tone
- \* DTMF built-in
- \* Battery saver
- \* Programmable offset & steps
- \* Ni-cads and charge included.

### ALINCO DJ-G5EY 2m/70cm

Latest "EY" European version just arrived!



A compact dual band handheld that is offered by us direct from factory. Why pay more?

**W&S**  
£269

**Latest Model**

- \* Up to 5W output
- \* CTCSS & DTMF
- \* 1750Hz tone
- \* 100 Memories
- \* AM airband
- \* Channel scope
- \* Programmable steps
- \* Extended receive
- \* Full scanning
- \* Ni-cads and charger

## 50W of Pure Performance Lowest UK Price

QST reviews are respected and accurate! This rig beat the more expensive ALINCO DR-150 for sensitivity and adjacent channel performance - the most important features that customers look for. Ask for laeflet. (Source QST).

### Both rigs feature:

- \* 3 Power levels - Wideband receive
- \* 40 Memories plus call channel
- \* 7 Programmable steps
- \* Channel or frequency display
- \* Now with full CTCSS (Decode / Encode)
- \* 24 months warranty
- \* Keypad mic and mounting kit

### ADI AT-600D Dual Bandner



**W&S**  
£279

**Alpha Numeric Display**

- \* 2m & 70cms tcv.
- \* 5W on 13.8V
- \* Full duplex
- \* 200 Memories
- \* AM/FM Rx
- \* Rx up to 990MHz
- \* DTMF fitted
- \* CTCSS fitted
- \* 1750Hz tone
- \* Batt. volt meter
- \* Illuminated keypad
- \* Battery saver
- \* Ni-cad & charger

Just Attived!

Wonder why other dual banders have dropped in price price? - Because ADI offers more for less!!

### WILSON Dual Band Amp.



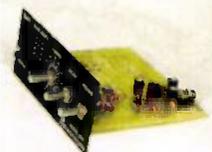
**W&S**  
£139

**30W**  
**2m & 70cm**

Completely auto switching, this dual band amplifier is an absolute bargain. Ideal for all modern dual band handhelds. Requires 13.8v and 1-6W input

### Largest Range of Kits

**Ramsey**  
**MFJ**  
**Ten-Tec**  
**Howes**



We have a huge selection of kits covering receivers and ham radio. Please ask for full details - special discounts for schools and colleges



**DJ-S41 70cms**



Price Match

**W&S £119**

- \* 430-440MHz
- \* 340mW output
- \* CTCSS
- \* 1750Hz tone
- \* 20 memories
- \* 6 Steps
- \* 3 x AA cells

PRICE DOWN

**Allinco DJ-180 2m Handy**



**Lowest UK Price!**

**W&S £119**

- \* 2m 2W (5W on 12v)
- \* 10 Memories with scanning
- \* Low battery indicator
- \* Rotary frequency control
- \* Programmable steps
- \* 1750Hz tone
- \* Auto power off
- \* Ni-cad pack
- \* AC Mains charger

**Alinco DR-430 70cm Mobile**

Clearance Price



**W&S £199**

- \* 430 - 440MHz
- \* 20 Memories
- \* 25W output
- \* 20 Memories
- \* CTCSS Encode
- \* Time out feature
- \* Wideband Rx
- \* Inc. Mic and kit

**WATSON FC-128 Counter**

**1MHz - 2.8GHz**

This model has a wide frequency range and is powered by internal ni-cads. The BNC socket with aerial makes it very sensitive. Supplied with AC charge.



**W&S £69.95**

**WATSON Base Mic. WM-308**

Built-in buffer amplifier provides matching. Modern rigs will power it direct from mic socket - otherwise use 2 x AA cells. Includes connecting cable for 8 pin rig sockets wired ready for Kenwood - info provided for Yaesu & Kenwood changes.



**W&S £59.95**

**WATSON Super Antennas**

**Fibre Glass Base Antennas**

Pre-tuned, solid construction and completely weather proof.

FREE Carriage During May

W-2000	6, 2, 70cm 2.1/6.2/8.4sB	£89.95
W-300	2m/70cm 6.5/9dB	£69.95
W-50	2m/70cm 4.5/7.2dB	£54.95
W-30	2m/70cm 3/6dB	£39.95

**Mobile Whips - High Quality**

W-285	2m 5/8th long whip	£15.95
W-770HB	2/70cm whip 1.1m long	£24.95

**WATSON GPS-150 Car Antenna**



**W&S £39.95**

Half the price of identical units of other brands!

**HF RIGS We've got the DEAL PHONE!**  
**"BEST PRICE" ORDER LINE 0500 73 73 88**

**ICOM-706 Price Down**



SAVE £366!

**W&S £839**

- \* 160 - 10m
- \* SSB - CW - FM - AM
- \* 100W inc 6m
- \* 10W on 2m
- \* Remote head unit
- \* Superb performance
- \* Large LCD display
- \* The most popular mobile!

**ICOM IC-702H 2m/70cm Mobile**



NEW

**W&S £389.95**

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

**ICOM IC-756 HF Rig**



**W&S £Phone**

- \* 100W of pure Magic
- \* 160 - 6M
- \* SSB - CW - AM - FM
- \* Spectrum display
- \* Auto ATU
- \* Superb DSP built-in
- \* CW Memory keyer
- \* 100% duty cycle
- \* Keypad entry option
- \* DXers choice in the USA

**NEW TM-V7E KENWOOD**



**W&S £599**

- \* 144 & 430MHz 50/35W
- \* Dual Rx on same band!
- \* 280 Memories
- \* Detachable front head
- \* CTCSS & 1750Hz Tone
- \* Large clear display

**Diamond VSWR Meters**



PRICE DOWN

**SX-200 £69.95**

- \* 1.8-200 MHz
- \* 5W,20W,200W
- \* Case 155 x 63 x 103mm
- \* Weight 540g

£79.95



PRICE DOWN

- \* 140-525 MHz
- \* 5W,20W,200W
- \* Case 155 x 63 x 103mm
- \* Weight



PRICE DOWN

**SX-600 £129.95**

- \* 1.8-160 MHz
- \* 140-525 MHz
- \* 5W,20W,200W
- \* Case 155 x 63 x 103mm
- \* Weight 540g

**Garmin GPS-45XL**



The Best!

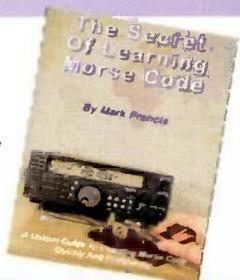
**W&S £225**

- \* Position Indicator
- \* Forward speed
- \* Moving map and road
- \* Destination ETA
- \* Compass & Altitude
- \* 250 waypoints
- \* Build your own map
- \* 20 hours from 4 AA cells
- \* Built-in antenna
- \* External BNC socket
- \* NMEA interface

Plus FREE Case

**Books**

**"Secret of Learning Morse Code"**



Back in stock

**£6.95**

**YAESU PRICES DOWN**  
 We've smashed Yaesu Prices until end of May!

**NEW FT-920 HF Transceiver**



Just Arriving!

**NEW**

**Our Price £1595 - £1395**

The new FT-920 has been released and offers some great features at a great price. 1.8MHz to 54MHz plus wideband receive, 33 MPS Digital signal processor, Digital IF shift, Auto notch filter, Dual VFOs, 100 Memories, Band Stacking VFO system, Break-in CW with electronic keyer, TNC interfacing, Digital voice recorder, 13.8v DC operation.

FT-1000MP	£2849	£2149
FT-1000MPDC	£2599	£1999
FT-900AT	£1299	£1049
FT-840	£959	£695
FT-3000	£479	£359

**KENWOOD HF RIGS**



PRICE DOWN

**NEW TS-570**

**TS-570 RRP £1499 but PHONE!**

It's causing a lot of excitement, and rightly so. A lovely clear display with full DSP built-in. This is a serious rig. **TS-870 RRP £2300 - £1949**

This is the big "daddy" of Kenwood's latest offering. It's got so many features that you first need the brochure and then you need a demonstration.

**WATSON WMM-1 Modem**

Review last month

**W&S £69.95**



**NEW**

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

# MFJ

## Ham Radio Accessories

ORDERS ONLY ON:  
**FREEPHONE**  
0500 73 73 88

### MFJ-784B Filter

£239

Price Down!



- Works with any rx. or txvr.
- DSP filter, fully programmable
- 16 Factory pre-sets
- Plugs directly into audio out
- Drives speaker or headset
- Requires 12v at approx 500mA

### MFJ-1278DSPX Data Unit

£399

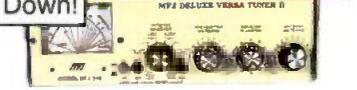


- Multi-mode
- Packet
- Amtor
- Pactor
- Colour SSTV
- 10 Modes total
- DSP filtering
- Tuning scope
- Simple to us
- Software

### 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.

### Windows Software

NEW

£36.95



Just arrived, the latest Windows Software for MFJ TNCs and Multimode modems. Now you can operate in a familiar environment with much improved software.

- MFJ-1286W TNC software £36.95
  - MFJ-1289W Multimode software £63.95
- All supplied on 3.5" size discs.

### 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-781 DSP Filter

NEW

£139



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

### MFJ-9406 6M Trancvr.

£249

Price Down!



- 50 - 50.3MHz 10W SSB
- RF speech processing
- 10MHz xtal filter
- Super performance
- Ideal way to 6M DXing

### MFJ-914 Auto Match

NEW

£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-906 VSWR / ATU

NEW

£79.95



- 50MHz - 54MHz
- ATU and VSWR power meter
- Matches all coax systems
- 100W CW/FM 200W SSB
- Tuner by-pass - SO-239 sockets
- Size 203 x 63 x 76cm

### 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!

### Ameritron 811 1kW

Price Down!



The only currently available HF linear to have passed a full lab. CE test

- 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
- Over rated variable capacitors
- Fan cooled for long life
- 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

£799

### MFJ-441 Keyer

£59.95

NEW



- 2 - 65 WPM - suits all transceivers
- Adjustable tone, volume and weight
- Semi-auto, auto and lmbic
- 37 character memory
- Use AA cells or external 12v
- 105 x 88 x 35mm approx

### MFJ-969 HF+6m ATU

NEW

£179.95



- 1.8MHz - 50MHz 300W ATU
- "T" match with roller inductor
- Coax, balanced and wire
- True PEP electronic meter (9v batt)
- Internal 50 Ohm load - 3 way switch
- Size 268 x 242 x 95mm

### MFJ-941E Atu

£109

Price Down!



- 160m to 10m ATU - 300W
- 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-1118 Dis. Board

Price Down!

£69.95



- Complete 12V distribution system
- 5 Output terminals - RF by-passed
- Built-in 0 - 25V Volt meter
- Fused input and outputs
- Master switch and LED indicator
- Super heavy guage DC input cable
- Max current 35 Amps
- Heavy metal shielded case

### MFJ-250X 1kW load

Price Down!

£34.95



- 1kW Dummy Load
- Oil cooled design
- SO-239 socket
- Ideal for linears
- 1MHz to 400MHz
- Oil not supplied

### Mirage 100W 2m Amp

NEW

£199.95



Fan Cooled

- 144 - 148MHz 100W Out FM & SSB
- Input 1W - 8W - ideal for handhelds
- GaAsFET switchable pre-amp
- RF sensing with 1 sec delay on SSB
- Supply - 13.8V at 15Amps approx

### MFJ-260C 300W

£34.95



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

Price Down!

### Mirage 160W 2m Amp

NEW

£199.95



NEW

- 144 - 148MHz FM & SSB 160W out
- 40-50W input - ideal for modern FM rigs!
- GaAsFET switchable pre-amp + lo-high
- RF sensing - Adjustable SSB delay
- VSWR & temp. protected
- Supply - 13.8v at 25 Amps approx

### MFJ-702 LPF Filter

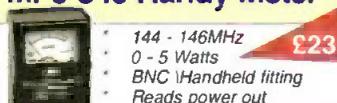
NEW



- Low pass filter 1.8MHz - 30MHz
- 200 W pep - 50dB down at 54MHz
- Loss less than 0.5dB
- SO-239 size 150 x 25 x 38cm approx

### MFJ-840 Handy Meter

£23



- 144 - 146MHz
- 0 - 5 Watts
- BNC Handheld fitting
- Reads power out

# Waters & Stanton

Enquiries: Tel. 01702 206835 / 204965

Fax. 01702 205843

22, Main Road, Hockley, Essex SS5 4QS

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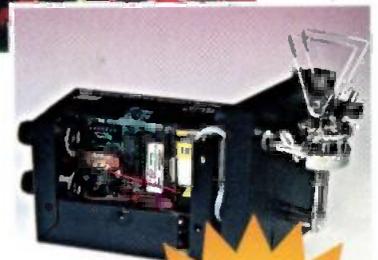
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Electronics  
Workbench® EDA

antennas  
in action

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AOR \* KENWOOD \* DAIWA \* COMET \* YAESU \* STRUMECH VERSATOWER \* LAFAYETTE \* HY-MOUND \* CUSHCRAFT \* TAIWAN \* ICOM

## THIS MONTH'S SPECIAL OFFERS

**Yaesu FT-5100**  
2m/70cm mobile transceiver

save  
**£280**

only  
**£399**

**Yaesu FT-10R/A06**  
2m ultra handi compact transceiver

save  
**£70**

only  
**£179**

**NEXT WORKING DAY DELIVERY £9.50. FULL MANUFACTURERS 12 MONTHS WARRANTY**



Cushcraft Antennas are one of the best range currently available. They offer superb performance, innovative design, excellent build quality and outstanding value for money.

### HF Antennas

R5	10/12/15/17/20 vertical	£295.00
R7000	10 thru to 40m vertical	£369.00
R80	Radial kit for R7000	£129.00
AV-3	14-21-28MHz vertical 4.3m long	£99.00
AV-5	3-5-7-14-21-28MHz vertical 7.4m long	£169.00
APBA	8 Band Vertical	£229.00
APR18A	Radial Kit	£54.00
40-2CD	2-ele 40m Yagi	£499.00
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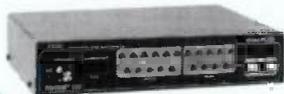
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# EDITOR'S Keylines

Rob Mannion's viewpoint on the World of Amateur Radio

**A**s I'm writing this edition of 'Keylines' in mid-March, the *PW & Short Wave Magazine* teams are just back from the Picketts Lock Show in London. And as usual the 'London Show' was extremely busy, very crowded and enjoyable...with one or two exceptions!

As the very successful London Show grows from strength-to-strength, it's good to see the increasing number of visitors from all over the UK and abroad. The Channel Tunnel seems to have made a difference there! And one day perhaps we'll even see Ponders End station (a short distance from Picketts Lock) open at the weekends to the benefit of travellers - specially those coming in from Stansted Airport.

Additionally, the Radiocommunications Agency's (RA) stand at the show was always busy. The RA's staff were accompanied by representatives from Subscription Services Ltd. (SSL) in Bristol who handle our licences. So, I've no doubt that they were kept busy answering questions...and they certainly seemed to be on the occasions I passed the stand.

For myself, the show was very busy indeed. The queue of readers waiting to talk to me, pass on their ideas, suggestions, etc., almost broke the 'Leicester Record'. At one point I had 28 readers waiting to talk to me, the 'record' (and I apologise to those readers who gave up waiting to talk to me and for keeping them waiting) stands at 32 for a Leicester show!

I appreciate that for many of you, the London show might be the only opportunity to meet the *PW* team and myself. Because of that I do my best to find time for all of you and unfortunately this means there's a queue sometimes. But please bear with me and don't give up because I really do want to meet and talk with you.

And in closing on this topic I must say a special 'thank you' to the two kind gentlemen who insisted on bringing me extra refreshments! One supplied two cups of fresh tea

and another a welcome cold drink. The gesture was much appreciated!

## Conditions Improving

Over the years (We've been attending from the very first show) conditions have been improving at Picketts Lock. Toilets and wash room facilities - always a problem at major shows - are now excellent and very clean. And now the organisers have only got to solve the ventilation problems caused by large numbers of people attending and the very small number of people who continue to smoke within the building (despite the ban on smoking in the main halls).

I spoke at length to Bernie Godfrey G4AOG of Radiosport Ltd. (the organisers) on the thorny subject of people smoking in the main exhibition halls during the show. I did this not only because I found the smoky atmosphere uncomfortable on both days myself - particularly on the Saturday - because readers waiting to chat to me in my little 'Editor's Corner' were also finding the cigarette, pipe and (would you believe it...people smoking cigars in such conditions!) cigar smoke very objectionable. (Even two of my colleagues - both regular smokers - thought it unreasonable for people to smoke in the main halls).

So, on behalf of the many people who complained directly to me, and to my own discomfort, I asked Bernie Godfrey if the 'no smoking' rule (there are no smoking notices throughout the main halls) could be enforced. And fortunately, I'm pleased to say that I have the personal assurance of Bernie Godfrey that the 'no smoking' rule will be enforced in 1998...mainly because of another rather unfortunate incident.

It's an 'ill wind that blows nobody any good' and it's because of the second major overnight theft at the London Show (several thousands £s worth) from the



Waters & Stanton (stand) that Radiosport Ltd. have been able to

persuade the Picketts Lock management to allow a private security firm to operate during the period of the show.

Bernie Godfrey states that up until the latest overnight theft from the Picketts Lock centre during the show, they could not get an agreement regarding the provision of a security company. This is all now overcome and from the next Radiosport Ltd. event at Picketts Lock...security will be ensured overnight and during the day by a private security service.

So, it's good to know that in future Radiosport Ltd. along with checking to see that we've all paid to get into the show, will also be taking extra care to look after our well-being once we are within the Picketts Lock Centre. I'm sure their kind attention will be appreciated by the majority and the extra care shown to their 'customers' will lead to this very popular event becoming even more popular in years to come.

## Club Spotlight Magazine Competition 1997

Have you sent in your club's entry for the *Practical Wireless* Club Spotlight Magazine Competition yet? Sponsored jointly by *PW* and Kenwood UK, the 'Club Spotlight' cup was presented for the first time in 1996 and was won by the Hoddesdon Club in Hertfordshire.

Dave Wilkins G5HY of Kenwood UK presented the beautiful trophy to the Hoddesdon team at the Leicester show. This year we're hoping that many more clubs will be entering...so why not send your club magazine in for consideration?

You don't have to be a local club to enter. There are many specialist 'national' clubs throughout the UK and these include the RAIBC, BARTG, WAB, BATC to name just

a few. The 'Club Spotlight' trophy has been introduced to reflect on the importance of the club magazine. If you enter...there's a chance some of that reflection will be from your proud club! (Please contact Zoë Crabb for further details or see 'Club Spotlight' for information). The closing date is Friday 25 July 1997.

## Get Well Soon

I've recently written a personal 'Get well soon' greeting to one of the longest 'serving' contributors to *PW*'s h.f. bands column - Don MacLean G3NOF. Unfortunately, Don has been unwell since well before Christmas 1996.

Along with contributing his usual report on his h.f. activity, Don also provides a generalised propagation summary. Everyone on *PW* misses his input and support very much. So we hope you recover quickly Don and we look forward to hearing from you on the bands. Get better soon!

## Leicester Show 1997

I've no doubt that many readers, along with myself, will be very pleased to hear that the Leicester Show 1997 dates have been fixed for Friday 17 and Saturday 18th October. Frank Elliot G4PDZ from the organising committee brought the news to everyone attending the London Show.

Frank informed me that the 1997 Leicester event will be certainly be the last at the Granby Halls venue. Long past their own 'sell by' date the Halls are to be demolished very soon after the Leicester Show.

And although I always enjoy the Leicester Show (I've only missed two since they started) I'm sure that with a new venue in the vicinity, the Leicester show will - like the south's London Show - will get even better. We look forward to seeing you there for our last meeting at the Granby Halls venue in October.

*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

**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

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

## Plea For Help (Another Rescuer!)

Dear Sir

In reply to Richard Pigg G4MHW's plea for help (*PW* - February '97 issue) with regard to Morse code, for what it is worth, here follows my 'words of wisdom'.

Before I impart these though, I must confess that when I first contemplated jumping in on the dubious landscape of h.f. communications I too was amazed at how some people could copy c.w. at 25w.p.m. plus! But not only that, how long did it take to achieve such an amazing ability?

What is even more amazing is that I subsequently found out later that many of these c.w. speed freaks (allowing for the odd person who appeared to have been given the gift of a natural talent for the receiving and sending of Morse code) had trodden the route that I was about to embark on - progressive learning techniques.

Yes, you probably know what I mean, start out at 5w.p.m. and work your way up the ladder until you reach 12w.p.m., then say a prayer and take the Morse test. I was lucky, I passed first time. Unfortunately, many people don't.

However, although I said I was lucky, this statement is slightly untrue. Because in the 'nick' of time I discovered completely by accident a sure-fire way to almost guarantee the ability to copy c.w. at whatever speed one desires. Yes, even 30w.p.m. And what's more, if I can do it anyone can because at the time I hated c.w., but as a consequence of my serendipitous discovery,

I've mellowed in my feelings towards it.

So, Richard, here is the good news. First forget the notion that 'some lucky people can, within a year of taking a 12w.p.m. test, rattle away at 25w.p.m. or more'. Because if it had taken them a year of struggle to reach 12w.p.m., they're certainly NOT lucky. Far from it. Indeed, if you're determined to clear your mind of all the misconceptions put about by so-called c.w. gurus, you will be copying at any speed you wish within a month!

I must say though, before I reveal the sure-fire method, that I was totally 'gobsmacked' to read that Richard had performed years of practice to reach 20w.p.m.! He must be dedicated to the point of self-inflicted masochism. I salute him for his dogged enthusiasm.

What he, and many others have given into and what keeps them from achieving high c.w. speeds is the inculcated learning methods (inculcate: to instill by frequent admonition or repetition) they willingly embraced when first introduced to practice the 'art' of c.w. It surreptitiously poisons their progress.

Throw away most of the books as nearly all of them teach the progressive learning technique in one way or the other. Here is the revelation: start listening at the speed you want to become proficient at. Simple, eh?

Forget the 10w.p.m. 'plateau'. It's self-inflicted. At first, forget about writing it down, just listen! I know you're going to hate this. I was copying 25w.p.m. in a week using this system. So can you!

Put it this way, so far as writing it down is concerned,

when we're engaged in a conversation, do we write down what the other person says? Of course not. Yeah, it's all in the head. Writing it all down will impede your progress - terminally. If you have access to a Morse tutor, turn up the wick to 25w.p.m. and concentrate - you can do it!

Ray J. Howes G4OWY  
Dorset

## Particulars Withheld

Dear Sir

Those emotive words 'Particulars Withheld', found often in the *RSGB Amateur Radio Callbook*, are a bone of contention regularly discussed both at my local radio club and on the airwaves. Generally speaking, details withheld, seems to irritate the average, (dare I say modern?) radio amateur.

But I was licensed back in 1987, and it was the 'in thing' then, believe me. It was the fashion of the day back then. So I opted to be one of those 'Particulars Withheld' jobbies, and, boy, am I sorry now!

Indeed, so keen was I to correct my mis-demeanour, I wrote to SSL and the RSGB, over six months ago, requesting the release of my details and WAB square, etc. Because if an Amateur somewhere wants my information, I think they should have it.

Guess what? Not a thing have I heard from either of those auspicious organisations! Indeed, the new callbook still lists me as 'details withheld'. What a waste!

I will try again when I send off my renewal chaps, perhaps in a year or two they may get it sorted out, and then, I may just possibly end up in the *International Callbook* where not even my

callsign is listed!

Meanwhile, I plead with you *PW*, please release my details for me. I know this magazine gets read worldwide and people may realise I am not a pirate, spy, mysterious type or 'odd ball', but just one more Amateur who is details withheld - against my will!

73 de Brian Smith  
GOIER (Packet @ GB7SDN), 48 Colchester Road, Swindon, Wiltshire SN5 8AG. Locator: IO91CN. WAB Square: SU-18. ISWL Member: G-1607.

**Editor's comment:** It looks as though you missed the 'deadline' for inclusion in the last callbook Brian, don't forget callbook editors (like *PW*) have very tight schedules. Better luck next time and whatever you do...don't move house!

## This Month's Star Letter

### Amateur Radio Not Cheap

Dear Sir

On reading Matthew Lawrance's letter in 'Receiving You' (*PW* March 1997), I find myself in agreement with the points he makes. Amateur radio is not a cheap hobby, and seems more expensive for those on a modest budget or youngsters setting up for the first time.

Home construction can go a long way to help reduce equipment costs, but unless there is a local 'Elmer' nearby, those interested in home construction can easily be put off with jargon and construction technique. While I will admit that in the past there have been a number of very good articles in *PW* dealing with the basics of home construction, there appears to be a gap between simple and more advanced projects.

As a *PW* reader of long standing, it may well be in the interests of new readers to obtain back copies of some of the excellent projects that have been published in the past. Or for the Editorial Team to trawl back issues for suitable items and re-publish them.

Colin Topping GM6HGW  
Fife

**Editor's comment:** The *PW* team strive to keep a 'balance' in project complexity and the wishes of readers (expressed via surveys) Colin. However, I hope to introduce suitable simple projects in my new 'Radio - Discover The Basics' series.

## Non Linear Scales

Dear Sir

I read with amazement the article 'Non Linear Scales' in the March 1997 issue of *PW*. I have successfully rescaled several meters without resort to a computer or trigonometry or the skills of a top draughtsman.

A few years ago I made a QRP 50Ω dummy load and power meter, requiring the voltage developed across the load to be rectified to move a d.c. meter. Simple calculation converted sixteen power levels between 50mW and 7W to d.c. volts.

The meter (1.5in square) was opened up and the scale removed and a piece of blank paper stuck on. The needle length was measured with a ruler and an arc was drawn on a slightly larger radius.

The blank scale was then replaced. As the calculated voltages were applied, a pencil dot was made at the end of the pointer, these later to be marked and labelled in black ink. For more details, one is referred to pages 50/51 of the *G-QRP Club Circuit Handbook*: 'RF Wattmeter' by Ade Weiss K8EEG.

Final comment: KISS!  
Walter Farrar G3ESP  
W. Yorkshire

Dear Sir

With reference to the *PW* Article 'Non Linear Scales' (March 1997).

After reading Andy Gayne G7PKF's article about producing non-linear scales using computer and laser printer I had an idea. I thought about the process and the maths involved and came up with the idea that the built-in printer command language (PCL) in many printers is capable of drawing the lines and curves required to create the scale.

I have written a basic program to draw a meter scale (log or linear) similar to G7PKF's, using a laser printer that supports PCL5 or above as their command language (PCL, developed by Hewlett Packard, is an industry standard for most laser printers). All that is required is that the values are substituted to suit the meter

to be 'scaled' and the program is run. This was written using Microsoft QuickBasic but will undoubtedly work for other flavours of Basic also.

Should anyone want a copy, please E-mail me at 100442.1637@compuserve.com and I will send the listing by return.  
Nick Ray G7UFG  
(Address Supplied)

**Editor's reply:** Thank you Nick. Judging by the correspondence we've received on the article your E-mail 'postman' will be busy!

## Morse Surplus?

Dear Sir

Having followed the argument for and against the abolition of the Morse code in the RAE, I was appalled to hear on the television that it is proposed to do away with the Morse code altogether. It is argued that modern technology makes the Morse code surplus to requirements.

As Shakespeare once said 'Parting is such sweet sorrow'. During the Second World War I spent many a weary hour learning the Morse code in preparation to becoming a Wireless Operator. The monotony of hours and dashes and dots surging through my head only to be relieved by the realisation one day that I was able to write page after page without consciously listening. I had arrived. I was finally there!

Despite my success, I must admit I never touched another Morse key after 'demob'. The 'sweet sorrow' part is probably the nostalgia bought back whenever I listen to Morse. I find myself thinking 'He's a good operator' or 'He needs a bit more practice'. And the memories are brought back, of incidents and people I knew, now far distant.

My humble opinion is, for what its worth, that to do away with the Morse code would be reckless indeed. I have a feeling that those who are against the Morse code being included in the RAE

are those who find it difficult to cope with. It's not easy, that is a certainty.

Quite a few of us during the war blanked out at periods between twelve words a minute and sixteen and were relegated to the next class below, but I can't recall anyone failing completely. The Morse code is a very useful thing to have under your belt and though a little rusty, I can still understand the majority of what I listen to. I dread to think what my sending would be like after all these years.

So, I say keep it! You never know what dire emergency might occur when it will come in handy. With the Morse code you can send messages on so many different things, lights and audible means.

These modern satellites are taking away all the joy and excitement of amateur radio. Fighting through the atmospherics and interfering neighbouring stations were all part and parcel of what amateur radio was about plus the thrill of picking up your first signal, no matter how faint, on a radio you had built yourself. No matter what money I had I think I would still go on building my own.

I see no fun in walking into a shop and buying a modern, over the odds, 'super-doooper radio' that not only selects the stations for you, but probably cooks your dinner and turns down our bed sheets at night! There's nothing more exciting than handling the components, inserting them into a p.c.b. or an 'ugly' style circuit and soldering them in place, hooking up a battery and switching on.

There are so many people today who have no idea what 'Amateur Radio' really means. I operate a simple home-brew t.r.f. and am quite happy with its performance.

John Noble  
Kent

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

## RAE On Demand - City & Guilds Reply

Dear Sir

In reply to Paul Collins' letter and your comments with regard to the Radio Amateurs Examination 'On Demand' in the February 1997 edition of *Practical Wireless* I would like to clarify for readers the current situation and future changes surrounding the RAE administered by City & Guilds.

The City & Guilds RAE is an internationally recognised licensing examination, which has been used as a model by many countries all over the world. Its high standards and quality are respected world-wide.

City & Guilds ensures an effective quality control over the RAE, which is available twice every year by means of an Examining Committee which includes representation from the Radio Society of Great Britain. It is important to note that all questions are written by active Radio Amateurs and that all examination papers and results are closely scrutinised and monitored by the committee, which entirely consists of Radio Amateurs.

A City & Guilds RAE 'On Demand' would not be able to receive the necessary time and attention resulting in a marked lowering of standards and overall credibility. It would also raise costs.

City & Guilds is however conscious of criticism in terms of RAE availability, cost and speed of releasing results. In response, the RAE is available every May and December at a wider number of centres (over 400) throughout the UK and results for their examinations are now more speedily released for candidates by the end of June and January respectively.

A revised RAE consisting of a single

multiple choice paper of 80 questions will be introduced in May 1998. This will not only facilitate access and bring down costs from £38.80 to approx £25 for candidates, but will also reflect an increasingly realistic and modernistic approach whilst maintaining present high standards. The decision to introduce the revised examination has been agreed by the Radio Communications Agency, Dept. of Trade & Industry, in consultation with the Radio Society of Great Britain (RSGB) and City & Guilds.  
Roger Bone  
Administrator RAE & NRAE  
City & Guilds of London Institute  
1 Giltspur Street,  
London EC1A 9DD.

**Editor's comment:** The letter from Roger Bone arrived too late for inclusion in the April issue of *PW* (this fact was mentioned in the 'Editor's comment' at the end of the original letter from Chris Edntonson VK3CE who was also replying to Paul Collins).

Reader's letters intended for publication in 'Receiving You' must be original and not be duplicated. Letters are accepted on the understanding that they have only been submitted to *Practical Wireless*. Please ensure that your letter is clearly marked 'for publication in Receiving You' and that it has not been submitted to other magazines. We reserve the right to edit or shorten any letter. The views expressed in letters are not necessarily those of *Practical Wireless*.



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

# CLUB Spotlight

Compiled by Zoë Crabb

## Club Name Change

The GPT Amateur Radio Club based in Beeston, Nottingham, has now changed its name to the **Siemens Amateur Radio Club**. The change of name has come about as a result of the formation of a new joint venture company between GEC of England and Siemens of Germany.

The new company will be a world class force in business communications systems for both the UK and in certain international markets. The change in name will not affect the radio club's programme of events and new members are always welcome.

The club will continue to meet on Thursday nights at 7.30pm and Sunday mornings at 10am. The first event under the new name was the inter-club quiz night in the Siemens Social Club back on the 5th February with teams from the Amateur Radio Club of Nottingham (ARCON), Lace Web, Loughborough and Siemens Radio Clubs competing. The winning team was ARCON.

New members are always welcome to join the club and further information can be obtained from the club secretary **Chris G4VFK** on 0115-922 6321 or E-mail on 100346.217@compuserve.com

## Keighley's New Secretary

As of Thursday 30 January 1997, the new Secretary of the **Keighley Amateur Radio Society (KARS)** is **Jack Birse, G4ZVD**, 178 Long Lee Lane, Keighley, West Yorkshire BD21 4TT, E-mail: tanar@legend.co.uk The previous Secretary, **Kath**

## Special Events

**It's getting to that time of year again when many clubs are getting ready to commemorate the centenary of Marconi's first ever transmission across water. Read on and find out what's happening where and when!**

'Club Spotlight' has recently heard from **Glyn Jones GWOANA** who has sent information in of two special event stations that the **Barry Amateur Radio Society** will be putting on in May 1997. The Society will be running the first **GB100** Marconi stations to commemorate the centenary of Marconi's first ever transmission across water on 13 May 1997.

The two stations being set-up are **GB100LP** at Lavernock Point, South Glamorgan. This station will be active on all bands from May 10 until May 17, 24hrs a day.

The Barry Amateur Radio Club welcome all amateurs to attend the site and take part in the operation and be part of radio history. On May 13, members of the club will be in period costume to re-enact Marconi's successful transmission across water.

From May 12 until the 16th, **GB100FI** from Flatholm Island will be operating again on all bands, s.s.b., c.w. and the data bands **RITY, AMTOR, PACTOR** and to include **SSTV**. There will be 20 operators on Flatholm Island, which includes four from Germany and hopefully a member returning from **VK ex GW4BCB, now CK4BCB**.

The very special double event is the first to have two **GB100** calls and it commemorates the first **IOTA**, this

**Conlon GORLO** held the position for 11 years, but due to work commitments had to give up.

**Kath** did a tremendous job whilst holding the Secretary's position and will be missed, though the club did manage to get her to accept a committee position!

## New Officers For Spalding

At **Spalding & District Amateur Radio Society's** recent AGM, the following new officers were elected. Chairman: **Mick Pell G1APV**, (01775) 840521, Secretary: **John Flowers G0JLF**, (01775) 840445 (evenings and weekends only) and Treasurer: **Dennis Hoult G400**,

(01775) 750383.

The club meets every Friday at 7.30pm for a natter/activity night at its clubroom, which is at **The Old Firestation, Double Street, Spalding**. Refurbishment of the club facilities is currently taking place to improve antenna systems, equipment and workshop facilities available to club members.

Speakers, meetings and special events are planned for every third Friday of the month. New members and visitors are always welcome. Membership costs £7.50 per year.

The club will be holding Novice and RAE classes later in the year. Please contact one of the committee listed above for further information.

being **Flatholm Island (EU124)**, the first DXpedition as Marconi was an Italian and he came to Wales for this experimentation. The QSL route for both stations is via **GWOANA**. Chairman, **Barry Amateur Radio Society, QTHR**. Tel: (01446) 774522.

**PS:** A reminder to all amateurs, if you want to call in at Lavernock point to operate, call Station Manager **Jim GW3PYX** on (01222) 708403 to arrange operating times.

The **Weston-Super-Mare Radio Society** meet twice a month, usually on the first and third Monday at the **Woodspring Inn, High Street, Worle, Weston-Super-Mare**. The first meeting in the month includes a talk or other activity and the second is normally a 'Workshop' discussion evening.

A course for the RAE is run in association with the Society. Assistance can be also be given with learning the Morse Code.

On May 17/18th, the Society are celebrating the centenary of Marconi's wireless communications across the Bristol Channel by operating a special event station **GB100BD** on Brean Down, near Weston-Super-Mare. A station is also being set-up between the 12 and 25th of May at 'The Time Machine', Weston's museum, which will be using the club calls **G4WSM** and **G8WSM**.

The issue of special certificates is being co-ordinated with the Barry Society, see above. For further details, contact **Graham Pinder G8WAR** on (01934) 415700.

## Torbay's 50th Anniversary

The year 1997 is the 50th anniversary of the **Torbay Amateur Radio Society**, which was founded back on the 22 February 1947 at the local YMCA in Torquay. Holding monthly meetings, with a membership of about 25, in 1965, a more permanent HQ was found.

The new HQ, (just a radio shack), was made and **G3NJA** became the society's callsign. Then, in 1985, the society moved to Newton Abbot. This is the society's present location, and the club is located at the English China Clay Social Club.

Both **G3NJA** and **G8NJA** are active from HQ on a Friday 'Club Nite'.

However, membership now stands at 223 members, quite a difference from 50 years ago!

Part of Torbay's celebrations is an award scheme, where anyone submitting a list of TARS Member Stations Worked/Heard between 1 January and 31 December 1997 with any TARS Member, Society stations or the Special Anniversary Station **GB50TR**, which will be active throughout the year from various



members' QTHs.

To celebrate Torbay's 50th Anniversary, a certificate is offered to anyone who obtains a minimum of 50 or more points. Points for the award are: 25 points for working GB50TR, 10 points each G3NJA, G8NJA and 2 points per TARS Member.

The award is open to all licensed or s.w.l. operators. All you have to do is send a list of stations worked/heard showing Date, Time, Band, Mode and Callsign for your claim (no QSLs needed).

Endorsements for a single band or mixed award, etc., will so be credited if stated on the claim. Please include £3/\$7 or 7 IRCs for cost and postage of the award, cheques should be made payable to TARS. Send all claims to: TARS Awards Manager, Mr D. Webber G3LHJ, 43 Lime Tree Walk, Newton Abbot, Devon TQ12 4LF.

## Postponed Sponsorship

The Cardonald College is being extensively refurbished during 1997. And as the majority of the noisy construction work is scheduled for weekends, it will not be available for the Scottish Amateur Radio Convention, which the West of Scotland Amateur Radio Society (WOSARS) had planned to sponsor in September.

The committee of the WOSARS has now decided that no other venue in Glasgow would be affordable, available or as well suited to the type of event they wish to sponsor. So they have had to postpone sponsorship until 1998, when they hope to return to Cardonald College for a repetition of the successful Convention, which was held back in September 1996.

## Mexbrough & DARS

Meetings are held at Harrop Hall, Dolcliffe Road, Mexbrough every Friday at 7.30pm for members of the Mexbrough & District Amateur Radio Society. Visitors are always welcome.

The Mexbrough club has around 250 members and is very active in all aspects of the hobby. Members can either sit in or join any of the courses of instruction currently in progress. It is possible to join as a s.w.l. and to progress within the club beyond examination standard and by joining the current construction project. Students can even obtain equipment at reasonable cost.

The RAE class is well supported with 22 students and the club also run the examination which is open to external candidates. About ten students sat the December exam. Novice and Morse classes are also well supported, there is a Morse Net on 144MHz. As well as the usual field days NFD/JOTA, the club also do school visits.

More information from Roy Oxley on (01977) 645691.

## Pontefract & DARS

Members of the Pontefract & District Amateur Radio Society meet every Thursday at the Carlton Community Centre, Carlton Road, Pontefract at 7.30pm, when members meet to discuss and work on their current construction projects. The club rooms are open to members at any time so that they may use any of the club's facilities.

Novice and Morse tuition is held and the society join the usual annual events such as JOTA/Thinking day on the air, etc. Each year, the society hold an Annual Component Fair, which this year is at a new venue with better disabled parking and lots of space to spread out for seating, food, licensed bar and, last but not least, the traders!

The new venue is at Carlton High School, Carlton Road, Pontefract, which was the overflow car parking area for the old venue. The Components Fair will be held on Sunday 23 March 1997. More details from Roy Oxley G0FYM on (01977) 645691.

## Yeovil's 13th QRP Convention Funrun

In May of each year, the Yeovil Amateur Radio Club hold a QRP Convention. Prior to the Convention, the club hold a small contest known as 'CW QRP Funrun' in which QRP operators take part.

The event runs for four evenings after the May Bank Holiday on 3.5 and 7MHz. However, it is not meant to be a serious contest, just a bit of fun before the QRP Convention on Sunday 18 May 1997, hence it's name!

### Funrun Bonus Stations

GB2LOW from G3ICO in Yeovil on 3.558 and 7.028MHz  $\pm$  2kHz  
GW3JSV near Welshpool, Powys on 3.563 and 7.023kHz  $\pm$  2kHz  
GD0LQE in Laxey, Isle of Man on 3.553 and 7.033kHz  $\pm$  2kHz

### RULES

#### When:

Tuesday 6 May to Friday 9 May 1997  
8pm to 10pm UK clock time each evening

#### Frequencies:

3.560 and 7.030MHz both  $\pm$  10kHz

#### Contacts:

Contacts must be between QRP stations, maximum 5W output

All stations may be worked once each evening on each band  
Funrun Bonus Stations will be operating each evening randomly for one hour on each band

#### Call:

'CQ FR'

#### Scoring:

Each QSO with another QRP station scores 10 points  
Each QSO with any Funrun Bonus Station (inc. GB2LOW) scores 25 points

All duplicates must be marked and no points claimed. Points will be deducted for unmarked duplicates at twice that particular QSO score

#### Exchange:

RST, Serial Number (see below), Output, Power and Name

#### Serial Number:

The three figure serial number must start at any random number of your choice, not less than 100 and must then be incremented by one for each QSO throughout the whole of the contest. However, the Funrun Bonus Stations listed above will all commence at 001

#### Entry Sheets:

Separate log sheets for each band, with sub-totals for each evening, preferably in the RSGB format. A separate signed RSGB style cover sheet stating the Rig, Power Output and Aerial. Entries should be sent to Eric H. Godfrey G3GC, Dorset Reach, 60 Chilton Grove, Yeovil, Somerset BA21 4AW to arrive no later than Thursday 15 May 1997

#### Awards:

Certificates will be awarded for the highest score for any three evenings out of the four on each band and also for the highest total overall score for any three evenings on both bands. These evenings do not necessarily have to be the same on 3.5MHz as 7MHz.

A certificate will also be awarded to the station consistently using the lowest power.

All four certificates will be presented at the Convention on 18 May 1997 immediately after the lunch break

#### SW Listeners:

Listener reports will be appreciated and a certificate will be awarded to the listener who submits the most comprehensive report.

Apart from the club's GB2LOW Funrun Bonus Station, this year like last year the other Funrun Bonus Stations have been selected from amongst last year's entrants. This provides not only variety, but also allows a geographical spread of their locations.

This year, to try to sustain interest over the whole period of the contest, all stations may work all other stations again every evening. Further information from G3GC on (01935) 475533.

Don't forget to send in two of your most recent club magazines to me, to be entered into the Spotlight Club Magazine Competition. Closing date is 25 July 1997, so you'd better get a move on!

Zoë



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CSL4 Internal SSB & CW Filter for our RXs	£10.50	ST2 Morse Side-tone/Practice Oscillator	£9.80
DCS2 "S Meter" for direct conversion RXs	£10.90	SWB30 SWR/Power Indicator. 30W 1-200MHz	£13.90
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(Please enquire about hardware packs to suit the above kits - there is not enough space to list them here)

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**HOWES KITS** contain good quality printed circuit boards with screen printed parts locations, full, clear instructions and all board mounted components. Sales, constructional and technical advice are available by phone during office hours. Please send an SAE for our free catalogue and specific product data sheets. Delivery is normally within seven days.

73 from Dave G4KQH, Technical Manager.

SPECIAL OFFER SPECIAL OFFER SPECIAL OFFER SPECIAL OFFER

**SPECIAL OFFER!**

# Pick-Up A DIRECT CONVERSION RECEIVER For Under £50!

*This month we've teamed up with Howes Communications to bring you a VERY special offer on the Howes DC2000 s.s.b./c.w. receiver kit.*

The DC2000 is a direct conversion receiver kit, which, when built gives you an Amateur radio receiver covering all the short wave bands by using plug-in modules. **Dave Howes G4KQH** describes the DC2000 as a great little receiver ideal for both the first time builder and for those wanting a receiver for portable or holiday use. It can also be interlinked with many of the other kits in the Howes range and can be expanded into a complete transceiver by using the LM2000 and TX2000 kits.

Normally the DC2000 receiver kit would be supplied with just one

band module (normally 3.5MHz) at a cost of £22.90, the hardware pack at £18.90 and

extra band modules at £7.90 each however, with

our offer you get **two** modules (of your choice!), the kit and hardware all for the special price of **£45.80!** including P&P (UK only, overseas readers please apply for postage

## DC2000 SPECIFICATIONS

<b>Frequency Coverage</b>	1.8 - 30MHz (determined by band module in use).
<b>Modes</b>	s.s.b./c.w.
<b>Sensitivity</b>	-118dBm (0.3µV) for 10dB S/N
<b>Audio Output</b>	1.2W in to 8Ω
<b>Power</b>	10 - 15V d.c. at 200mA 22mA quiescent
<b>Tools Needed</b>	Small 25W electric soldering iron; Resin cored solder; Small side cutters; Wire strippers; Long nosed pliers; Trimming tool for oscillator coils.



rates). That means you are in effect saving £7.90 and getting the second module completely free!

To take advantage of this great offer just fill in the form provided or call the **Credit Card Hotline on (01202) 659930**. Don't forget when ordering to state which band modules you would like.

Please send me ..... **DC2000 kit(s)** at the special offer price of **£45.80** including P&P (UK only).

I would like my DC2000 kit to be supplied with the following two modules (please tick as appropriate):

- |  |                                       |
|--|---------------------------------------|
| <input type="checkbox"/> 160m (1.8MHz) | <input type="checkbox"/> 80m (3.5MHz) |
| <input type="checkbox"/> 40m (7MHz)    | <input type="checkbox"/> 30m (10MHz)  |
| <input type="checkbox"/> 20m (14MHz)   | <input type="checkbox"/> 15m (21MHz)  |
| <input type="checkbox"/> 10m (28MHz)   |                                       |

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**OFFER OPEN UNTIL FRIDAY 30 MAY 1997.**

A review of the DC2000 kit was published in the February 1997 issue of our sister publication *Short Wave Magazine*, copies are available from the *PW Book Store* for £2.60 (please order separately using the form on page 82 of this issue).

# NEWS 1997

Compiled by Donna Vincent G7TZB

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SEND YOUR  
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## Equipment Recovered

Worcester police have recently recovered a Kenwood amateur radio hand-held transceiver which they believe to have been stolen. Anyone claiming the transceiver should contact **DC Griffiths** at Worcester Police Station on **(01905) 723888 Ext. 4938** stating the model and serial number of the transceiver so that arrangements can be made to return the radio.

## Rugged Radio

New from **Kenwood** and available in the early Spring is the **TH-235E** v.h.f. f.m. hand-held transceiver which is specifically aimed at the 'rugged' end of the market.

The press release from Kenwood states that the TH-235E is aimed at

appealing to the Radio Amateur "Looking for a tough v.h.f. radio". Main features of the TH-235E for the Amateur Radio market include: 60 non-volatile memory channels.

The transceiver comes fitted with a built-in CTCSS encoder. The TH-235E is also fitted with Dual-tone squelch system (DTSS).

Set-up for Amateur Radio use (p.m.r. use is also possible) the transceiver covers 144-146MHz and requires a power supply in the range of 7.5 to 16V. Maximum power output is 5W at 13.88V. Weighing in at 365g approximately the new hand-held costs **£199.95** from approved Kenwood Dealers.

Further information on the TH-235E can be obtained from **Kenwood (UK) Ltd., Kenwood House, Dwight Road, Watford, Hertfordshire WD1 8EB. Tel: (01923) 816444, FAX: (01923) 212477.**

## Picketts Loss

**Waters & Stanton Electronics** were the unfortunate victims of a burglary which took place on Saturday 9 March at the Picketts Lock Amateur Radio Show. Goods worth £7000 were stolen and included a **Yaesu FT-1000MP** transceiver, 20 **Yupiteru** scanners

(including seven **MVT-7100s**), various Morse keys and some second-hand goods.

Unfortunately not all of the serial numbers of the stolen goods are known, however those that are include: **Yupiteru MVT-8000s** Nos: **60600016** and **60600020**; **MVT-7100s** Nos: **60700322, 323, 324, 326, 327, 328** and **329**. Other traders at the show also suffered losses and the Police are still investigating to try and recover the goods.

If you know of or have any information that may assist with Police enquiries please contact **Waters & Stanton** on **(01702) 206835** or your local Police station.

## Alinco Addition

The **Alinco DX-701** is an h.f. s.s.b. transceiver which has very recently been introduced to the commercial h.f. market. The **DX-701** offers 100W output, is an all-band radio with general coverage receive and therefore suitable for both home or mobile use.

Features of the **DX-701** include 100 memories, microphone speech compressor, detachable front panel, noise blanker and RX pre-amp and attenuator. There is also the facility for having c.w. operation as an optional extra.



For further details on the **DX-701** contact **Nevada** on **(01705) 662145** who are selling the Alinco transceiver for **£599**.

## Marconi & Martin

On **International Marconi Day** on **Saturday 19 April 1997** **Martin Lynch** is holding a 'Sale Day' to mark the momentous occasion. After all as **Martin** says without **Mr Marconi** we wouldn't have Amateur Radio would we?

**Martin** and his 'Mob' will be opening the doors to the Amateur Radio Exchange Centre at 9am and will be offering discounts and deals across their full range of equipment. Also on offer will be the chance to get your own equipment 'health checked', free **Martin Lynch & Son** special edition T-shirts with every order over £200 and the opportunity to take a **Northfields** Pleasure Trip in the company's own **Reliant 3-wheeler!**

In addition to all this **Barry Cooper** from **Yaesu UK** will be on hand to demonstrate the latest **Yaesu** products and free refreshments will be available throughout the day. So, why not make a date in your diary to visit **140-142 Northfield Avenue, Ealing, London W13 9SB** and get yourself a bargain?

## Leicester 1997

The dates for the **Leicester Show** for this year have finally been fixed for **Friday and Saturday 17/18th October**. **Frank Elliot G4PDZ** has informed **PW** that despite uncertainty as to the venue for the show it will again be taking place at the **Granby Halls**. However, this really will be for the last time as the Halls are to be demolished very soon after the **Leicester Show**.

## Stop Press!

Just as this issue of **PW** was going to press we received details of a new **Yaesu** radio. The new addition is the **FT-920** which is an h.f. and 50MHz transceiver which will be available in the UK during April. A full news report on the **FT-920** will appear in June issue.

## Globe Trotting G3LHM - Silent Key

News of the passing of **Andy Whetstone G3LHM** - a professional sound recordist latterly working in outside broadcasting, has reached 'Newsdesk'. **Andy**, who was still working professionally at the age of 70 was always on 'stand-by' for that urgent call to fly to South Africa and other parts of the news-world at a moment's notice - died on Christmas Day 1996. Always a keen Radio Amateur, he was actually enjoying a brief spell at home in his 'shack' when he died.

Never quite knowing where he would end up for recording interviews - perhaps it would be 10 Downing Street or in America, **Andy** often recounted his early days from the time his Army radio experience led him - through a friend - to a career in sound recording/broadcasting from studios in New Bond Street and then into outside broadcasting.

A qualified light aircraft pilot he achieved much. **Andy** said he would never retire and never did. And only days before he died he was working with his friend and cameraman **Denis White** on the 'Evita' premier. A keen Radio Amateur who was also a professional **Andy** leaves a proud family and many friends. Our belated sympathies and wishes from his Amateur Radio and professional broadcasting friends throughout the world go to his wife **Jean** and family.

G3XFD

## A Collection Of Catalogues

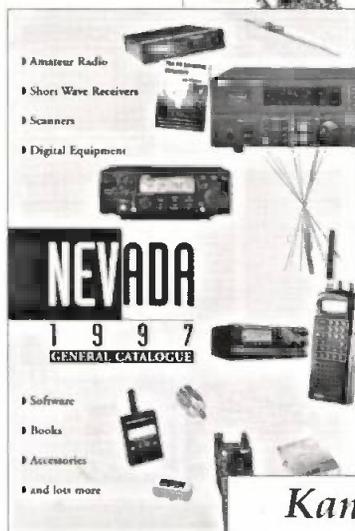
It seems to be the time of year for new catalogues to be published as several have landed on the 'Newsdesk' in the past month. Here is a taste of three from well known manufacturers.

**Kanga Products** celebrate their tenth year in business this year. Kanga have been supplying kits to Radio Amateur QRP enthusiasts since February 1987 when Dick Pascoe G0BPS set-up the business after retiring from the Kent Fire Brigade.

The new *Spring Kanga Catalogue* features the complete range, together with new kits which include a Termination Wattmeter, Medium Wave Radio and an Active Antenna that fits inside a film canister!

To get your copy of the Kanga Products Spring 1997 Catalogue contact Seaview House, Crete Road East, Folkestone, Kent CT18 7EG. Tel/FAX: (01303) 891106.

**Mike Devereux G3SED** and the Nevada team have just published a general catalogue featuring selected



## Radio Kit Catalogue

1997



C.M. HOWES COMMUNICATIONS



**Kanga Products**  
Ten years of  
great QRP kits

Spring 1997

Sally@kanga.demon.co.uk  
http://www.kangaproducts.co.uk

Kanga's  
QRP kits

products from their vast range of amateur radio equipment, short wave receivers, software, accessories, books and much more. This A4 sized 24-page catalogue not only contains details on products and accessories but also provides a little background information on the Nevada set-up and mini profiles on the 'key' team members.

If you'd like a copy of the *Nevada 1997 General Catalogue* please send an A4 s.a.e. to 189 London Road, North End, Portsmouth, Hants PO2 9AE.

The *1997 Radio Kit Catalogue* from C.M. Howes Communications contains within its pages the full range of Howes products including short wave receivers, a.t.u.s. Morse kits, accessories and antennas to name a few.

Also featured are the new easy-to-build Howes '2000' range of kits which, as with all kits in the range, offer a challenge as well as giving great satisfaction and pleasure to use when built. Copies of the *1997 Radio Kit Catalogue* are available by contacting Dave or Chris Howes at Eydon, Daventry, Northants NN11 3PT. Tel: (01372) 260178.

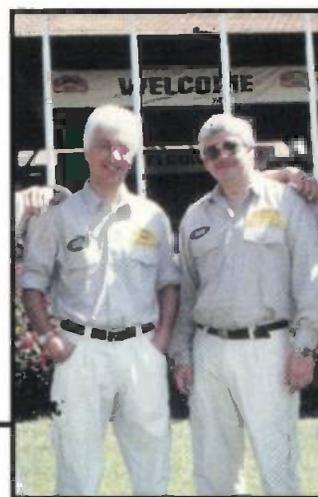
## Increased Challenge

**Linear Amp UK** have up-graded their Challenger h.f. linear amplifier along with their Explorer and Hunter models. Changes to Challenger include a new softer grey front panel which now features flush-mounted backlit meters.

In addition, the band switch now has nine positions so each band has its own individual setting. The manufacturers say this provides better and easier tuning on 28, 24, 21 and 18MHz.

The mains cable is now directly wired into the amplifier allowing heavier duty cable to be used. Other changes to the Challenger include refinements to the circuitry giving better operation.

The 1997 Challenger costs £2095 and is available direct from Linear Amp UK, Field Head, Leconfield, Beverley, East Yorks HU17 7LU. Tel/FAX: (01964) 550921. Why not give Gwen or Peter G3ZRS a call for more information on the full Linear Amp range?



## Richard Diamond G4CVI - Silent Key

**Richard Diamond G4CVI** died in tragic circumstances on January 24th 1997. Well known in the 'Amateur Radio Trade' DX and 'moonbounce' circles he was the proud owner of a majestic looking 'antenna farm' that was featured on the Nevada Catalogue and was clearly visible from the M27 motorway in Hampshire. Here **Mike Devereux G3SED** pays tribute to his friend:

Richard was born in Liverpool July 29 1954. He studied Radio and Electronics at Southampton College before joining the BP tanker fleet as a Radio Officer. Later he left to become Sales Director of **South Midlands Communications** in Southampton.

During his many years with SMC, Richard was involved in both the Amateur and commercial

Radio divisions of the company. He travelled the world extensively and was well known throughout the Radio Communications industry.

It was whilst he was at SMC that I first met Richard some 18 years ago, we shared a common hobby, Amateur Radio and were both involved in the radio business. Over the years we became close friends and I came to know him very well indeed, admiring his many talents both in business and electronics. He was a thoroughly selfless person, ready willing and able to offer help and assistance whenever it was required.

Richard always wanted to be the best at what he did and he very often was. He set his mind on becoming a Helicopter pilot and did. He was a qualified sub-aqua diver, a lover of fast motorbikes and had a passion for Jaguar cars, particularly his E-type!

Richard built one of the most sophisticated Amateur Radio Stations in the world. He had 'moonbounce' capability on at least three v.h.f./u.h.f. bands with a special high power permit. He had huge antenna arrays for the h.f. bands, including a full size four element beam for 7MHz at 80ft above ground. He was never satisfied and would spend hours planning and working to further improve his station.

Richard's skills that had him regularly travelling the world overseeing major communications projects. He was responsible for a number of 50MHz amateur beacons, obtaining the necessary permissions and installing the equipment whilst working in Malaysia and Belize.

During the past five years I was privileged to work alongside him, providing global communications for the Camel Trophy expeditions.

We travelled together through the jungles of Sabah Malaysia, Central and South America, up over the Andes mountains and through the Attacama desert of northern Chile. He showed outstanding skill when working under pressure in difficult conditions.

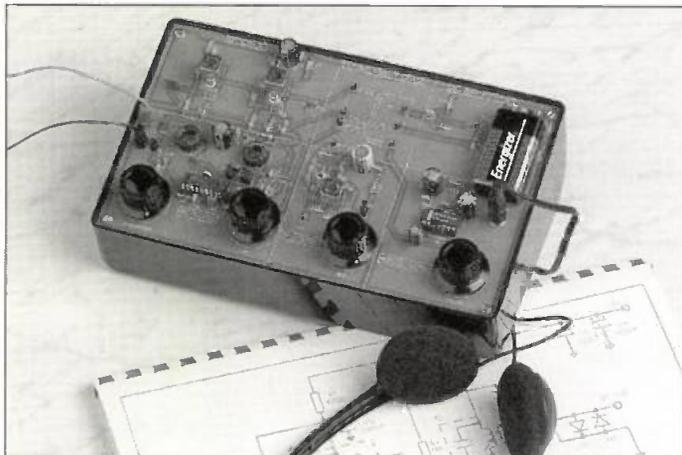
I cannot really express the grief I feel for the loss of my closest friend - the help and encouragement he gave me over the years is beyond measure. I'm sure that Richard's many friends in the Amateur world will wish to join with me in expressing our sympathy and condolences to his son Michael, mother and father, Winifred and James.

**Mike Devereux G3SED**  
Managing Director  
Nevada Communications



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# RADIO

## DISCOVER THE BASICS



By Rob Mannion G3XFD

*Because of positive reader response to his new series aimed at the beginner, Rob Mannion G3XFD breaks off (for this month only!) for a little while to pass on several items of good news. One news item solves an education problem and the other can save beginners a lot of money!*



Fig. 1: All these components for £1! (plus postage by mail-order). The photograph above shows the selection of resistors available in the 'Bargain Bags' and the photograph top right the corresponding bag of capacitors (see text).

Although I enjoy writing and researching 'Radio - Discover The Basics' I must admit I've been completely overwhelmed by the response from readers. Although I knew there was a need for the new column I just did not expect you all to be so keen!

Thank you for all your letters, E-mail, personal telephone calls and comments passed on at club visits and the London Show. And in return...I've several items of really good news for you and the first solves a very great problem for beginners and myself.

What comes over most strongly in your letters and comments is 'practical' approach to the theory side of our hobby. And many readers have also said they look forward to 'doing things' later in the series. I promise you that aspect will not be overlooked!

As I have said in the column, the idea is to provide simple explanations and analogies which you can then 'back up' with further reading. And if you've been one of the readers looking for the book recommended in the 'further reading' list published in the magazine - and also sent in for the expanded list.. I had a real problem in recommending really good titles with the right approach to support 'Radio Discover The Basics' introduction to the subject.

### Ideal Books

In my mind the (no longer published) 'Common Core' books *Basic Electricity*, *Basic Electronics*, etc., were ideal books for the beginner and the instructor to work through together. The problem was that they're out of print and unless you were able to get them from a library or get a second-hand set, you'd be out of luck.

In the meantime I was struggling hard to find a replacement 'recommendation'. Fortunately, the ARRL have come to the rescue with a brand new book - *Understanding Basic Electronics*.

The new book - only just available - is in my opinion absolutely superb. It's ideal for the beginner and more experienced reader who wishes to reinforce their learning.

And also I'm very pleased that the ARRL obviously think along the same lines as myself because the new book is very similar in concept as the old 'Common Core' books and uses the same techniques (including helpful cartoons and 'bite size' chapters and sections covering all the topics needed. The other benefit of course is that the solid state theory and techniques (including digital) are right up to date.

What a marvellous job the ARRL have done! My congratulations go to their editorial team for providing the ideal 'entry level book for anyone interested in starting off in radio, electronics and even a career. And to help readers who obtain a copy, I'll provide direct references for 'further reading' from the book as the series progresses.

### Learning & Building

Once you have laid your foundation and started learning - the building starts. And in the case of our particular interest this means building simple projects and circuits.

However, as anyone who has bought individual components, to build a circuit 'from scratch' knows - they can be enormously expensive compared to buying something 'ready made'. Fortunately, good fortune has come our way and I'm pleased to announce an excellent source of 'bargain goody bags' of components.

'Bargain Bags' of electronic components have been available for many years - especially at radio rallies. I was (and still am) a keen buyer of components sold in this form, and can honestly say that I've never been disappointed.

The bags of components, Fig. 1, contain a good mix of either resistors or capacitors of many different sizes and values. And on checking them I've discovered that amongst many other useful type and values you'll probably find they contain **ONE** capacitor - which when bought new from a catalogue - would cost you more than the cost of the whole bag!

It's the same with the bag of resistors. This also contains an excellent

selection and variety of value, sizes and types. And although no 'bargain bag' can ever promise to provide you with all the components you need for a project...I know from experience they do provide really excellent value for money.

The bags are available from **Bob Kent G4POY** on the Kent Keys stand at the major rallies and shows for a just **£1**. However, even if you can't get to a rally or show this year you can still get the components to start you off by post. Yes...there is the penalty of postage to pay...but even then they still offer superb value for money.

### First Come First Served

Bob Kent has a 'lorry load' of the surplus components but he says they're selling well so it's a case of 'first come first served! Bob also points out that the bags of resistors and bags of capacitors are not sold by weight, so individual bags will vary a little depending on the mixture of components. But - as I can assure you...they still offer excellent value-for-money.

By mail-order a bag of mixed resistors (average weight in the strong polythene bag) is 700g (approximately 1.5lb) and the total cost including postage is **£2.95**.

The corresponding bag of mixed value (and types) of capacitors weighs 1kg (approximately 2.2lb). Cost of this package including postage is **£4.25**.

However, if you buy a bag of resistors and a bag of capacitors the two together with postage are available for **£6.20** (a saving of £1 in postage).

Orders and enquires should go direct to **R. A. Kent (Engineers Ltd.) 243 Carr Lane, Tarleton, Preston, Lancashire PR4 6BY. Tel: (01772) 814998, FAX: (01772) 815437.**

So there you are, some components to get your 'stock' going. I hope you enjoy sorting them out and I look forward to continuing 'back on course' next time! Cheerio for now.

PW

# Tackling TVI With Semaht

By Gordon King G4VVF

*Gordon King G4VVF looks at a commercial portable TV & Radio field strength meter as an interference tracing aid for Radio Amateurs. Gordon thinks that it should prove useful to a club...ready to help trace those TVI and BCI problems.*



Recently I've been enjoying testing the portable Semaht u.h.f./v.h.f. digital field strength meter. It's a British made device marketed by Aerial Techniques of Poole in Dorset.

Although intended primarily for domestic antenna 'rigging' operations in the u.h.f. TV Bands IV and V and the f.m. radio Band II, the instrument can be of assistance in these days of electromagnetic compatibility (EMC) for tracing the cause of radio and television interference in the above mentioned bands.

## Frequency Coverage

So, let's take a look at the frequencies the instrument covers. The actual coverage is 460 to 860 and 85-110MHz with a press-switch changing between u.h.f. and v.h.f. There's a main tuning control knob and a second knob for fine tuning, while the frequency tuned is displayed on a four-digit liquid crystal display (l.c.d.)

The strength of the signal tuned into is indicated in Decibels (dB) relative to a microvolt ( $\mu\text{V}$ ) on a 55mm width meter whose scale can be illuminated by operating a switch. The scale has five indicating points at zero, 35, 40, 45 and 50dB, with a separate battery test mark, thereby providing a basic measuring range from zero to 316.2 $\mu\text{V}$  of input signal (see later).

Fortunately, the basic range can be extended by 10 or 25dB by push buttons, allowing the range full scale to go to either 60 or 75dB $\mu\text{V}$ , corresponding to 1mV or 5.6mV respectively.

The front panel is finished in bright blue. The complete instrument measures 245 by 80mm with an overall depth of some 240mm.

## Internal Battery

Powering is by an internal NiCad battery pack retained to capacity by an integral charger connected to the mains supply by a side socket and cable. Maximum capacity is 0.7Ah and since the consumption is around 150mA, a fully charged pack will run the instrument for in excess of four hours.

A full charge from scratch takes eight to ten hours while the pack's life span is given as 300 to 400 charge/discharge cycles. A useful feature is an in-built detector, audio section and loudspeaker, allowing possible identification of the signal under measurement.

Although demodulation is a.m., it is also possible to resolve f.m. signals merely detuning slightly and adopting the so-called 'slope detection'.

The signal being tested is fed to an ordinary television type antenna socket on the top panel. This also includes a volume control, Battery Test button, On/Off button, a low battery indicator, instrument-on indicator and a yellow button which when pressed, contacts 12V d.c. to the antenna socket!

The 12V feature to the antenna socket can be useful for line powering a masthead amplifier when signal testing. It has a 75mA current capability and in the event of a short circuit across the antenna socket, there is an auto-shut down action, which is indicated by the indicator light for this feature extinguishing.

## Standard Tuner

The field strength meter's (f.s.m.) design is based on a standard Mullard u.h.f./v.h.f. varactor TV tuner and 39.5MHz i.f. channel. The digital display is driven by a prescaler and logic counter board.

A standard envelope detector, which is slightly forward-biased for low level linearity, drives the meter movement and feeds the audio section. A pin

diode attenuator circuit is employed for extending the range of measurement.

For convenience of field use, the instrument comes complete with a sturdy carrying case and shoulder strap. This includes a handy side pocket for storing related accessories, such as extra plug-in attenuators.

## Practical Paces

Before putting the Semaht through its more practical paces, I thought it would be a good idea first to subject it to one or two lab tests. The aim was to assess the accuracy of frequency read-out and signal measurement.

Judged by the 'off air' frequencies of the signals from my local radio and television transmitters, the accuracy of read-out was found to be within  $\pm$  one count of the final digit or  $\pm$ 100kHz. This was confirmed by instrument tests and is within the published specification.

The accuracy of signal strength measurement was measured at 90MHz (Band II v.h.f. broadcast band). For these tests I used a Marconi signal generator whose switched attenuators and r.f. level control are known high accuracy.

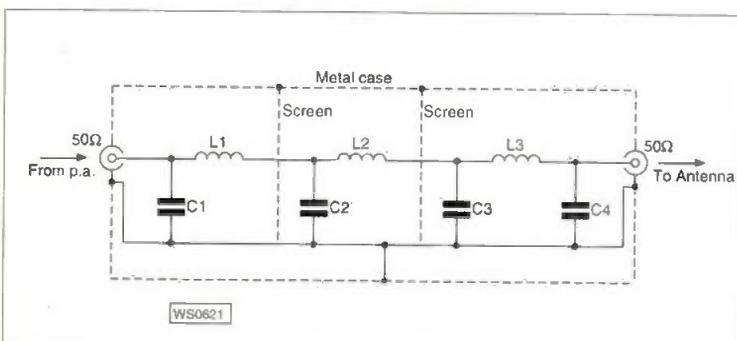
I found that the signal level required across the 75 $\Omega$  input socket to secure a deflection on the meter of 45dB was 125 $\mu\text{V}$  plus 1dB, which works out to close to 43dB $\mu\text{V}$ . This indicates an error of a mere 2dB.

The test results are good, bearing in mind the nature of the meter movement calibration and possible slight attenuation in the test circuit. It should also be noted, of course, that this is the potential difference (p.d.) across the input socket when properly terminated to the 75 $\Omega$  pad of the signal generator.

The source electromotive force (e.m.f.), with respect to an unterminated antenna, for example, would be twice the p.d. value. Consider a 100 $\mu\text{V}$  (40dB $\mu\text{V}$ ) e.m.f. in series with 75 $\Omega$ , then with a high impedance voltmeter the reading would also be close to 100 $\mu\text{V}$  (the so called open circuit voltage).

However, when any such source is loaded externally, the voltage across the coupling interface will fall. When the

Fig. 1: Home-brew low-pass filter. Inductors L1, L2 and L3 are each 0.27 $\mu\text{H}$  and can be made by winding a six turn 14mm diameter air-spaced coil using 12s.w.g. tinned copper wire stretched to a length of 20mm. Capacitors C1 and C4 are 110pF and C2 and C3 are 220pF. The efficient 'earthy' bonding of the capacitors to the input and output sockets and to the metal case is essential.



loading exactly matches the 75Ω source, the voltage with decrease to half the e.m.f. This is commonly referred to as the p.d. across the load, which of course, is 50μV or 34dBμV in this example.

The input impedance of the Semaht is said to be 75Ω, and the results given in Table 1 are based upon this assumption. A slight variation from the 75Ω of the Marconi matching pad would not change the results much.

Based on the initial 35dB calibration of the meter movement and the final one at 50dB and taking account of the 10dB and 25dB attenuator buttons, the instrument has a dynamic range of 40dB (100 times voltage and 10 000 times power). The Table shows the minimum indication as 45μV, but there is some deflection of the meter (though uncalibrated) at a smaller voltage than this.

### Handy Instrument

It's handy having an instrument like the Semaht available in the shack or radio club. It's capable of responding to and indeed, measuring quite definitively, the signals in and around the v.h.f. f.m. and u.h.f. television bands.

The possibilities of radio and television interference being a problem to the transmitting amateur are significantly diminished as the strength of the signal from the antenna feeder is increased.

Firstly then, you can employ the instrument for ensuring that the antenna system of a neighbour suffering from interference is yielding the highest possible signal to the affected receiver. It's often the case for a television signal (for instance) to be increased by as much as 10 to 12dB by finding a better position or orientation for the antenna.

*Note: Solving a TVI problem with a f.s.m. and antenna orientation was discussed in 'Up The Ladder' by Allan Wighman on page 28, PW March 1997, Editor.*

However, a poor signal situation may be worsened by a poorly connected feeder or plug at the end of the feeder. Check, too, that the feeder is properly terminated at the antenna.

The f.s.m. will also help you find problems caused by water in the coaxial feeder...a very common problem which can cause high signal attenuation which varies with frequency. Poor connections and oxidation on the feeder (often caused by the ingress of water) can also encourage cross modulation and interference!

### More Signal

With a reasonable signal strength meter such as the Semaht, it shouldn't be impossible to squeeze in more signal...at least an extra 6dB from the antenna. This would double the signal voltage and quadruple the signal power and hence cut the interference proportionally - or more!

As is now fairly well known by some of the operators I've worked on the bands, the antennas at G4VFV are all located in the roof space of my house, including those for f.m. radio and TV. Despite the nearness of these to my h.f. and v.h.f. transmitting antennas (the distance between them only a couple of metres or so!), the distaff side receivers remain totally free from r.f. interference up to a transmitter e.r.p. of around 50W.

My operating conditions fall well within this power as I rarely work h.f. above 5W to the antenna. Working QRP c.w. being my favourite challenge!

### Using The Meter

Using the Semaht meter, I can now understand why I am so fortunately disposed. The vision carriers of my local u.h.f. TV transmitter (Beacon Hill, Station No. 136.00), which is located above and slightly inland from Torbay, transmitting on Band V channels 53, 57, 60 and 63 at present with an e.r.p. of 100kW) is providing me a feeder signal no less than 80dBμV (p.d.), corresponding to 10 000μV (p.d.) or 20 000μV (e.m.f.)!

In order to measure the high signal level, it was necessary for me to include an in-line attenuator of 12dB in addition to the instrument's switched 25dB attenuator. (Perhaps this is the reason for the side pocket on the carrying case - to provide accommodation for a set of in-line attenuators!)

My local Band II v.h.f. f.m. transmitter yields around 3 000μV (p.d.) or 70dBμV (p.d.), which the instrument is able to handle without extra in-line attenuation.

### Spurious Signals

Despite the instrument's not particularly sharp skirt selectivity - around 800kHz - (which is adequate for signal strength measurement) it's possible to use the device to locate and identify spurious signals from transmitters.

Spurious signals can be responsible for radio and TV interference. And indeed, while in my possession the instrument helped to trace several cases of radio and TV disturbances.

For example, a 'DNT' f.m. CB transceiver (converted to the 28MHz f.m. section of the band) was causing problems. The transceiver's basic 4W was driving a dubious 50W power amplifier, coupled to a 5λ/8 vertical, was found to be causing a remarkably high level of over-deviated 'breakthrough' at the BBC 'Radio Two' end of the Band II f.m. band (around 88MHz).

The instrument identified the problem as the third-harmonic of the 28MHz operating frequency. It was still vaguely audible with the p.a. removed, but no way was it possible to employ the p.a. without the interference. This one had a happy ending because I found that the p.a. was devoid of any sign of low-pass filtering!

The problem was completely cured by using the type of home-brew filter shown in Fig. 1, built in a tobacco tin - as per some of my earlier devices, such as preamplifiers, etc., published in PW back in the 1950s!

### Six Metre Problems

There can be problems on 'Six' metres as the second harmonic of the 50MHz band falls over the range 100 to 104MHz and is another potential source of Band II f.m. interference. This corresponds to that section of the band carrying local radio programmes and 'Classic FM'.

The instrument would certainly bring any 50MHz problems to light. And as a bonus it provide definitive assistance for reorienting (or re-siting) your Band II antenna for the best possible wanted-to-unwanted signal ratio.

A distinct attribute of the wideband broadcast f.m. system is that provided the wanted signal is a little more than 6dB stronger than the unwanted one on the same frequency the interference is completely overcome in practice. This is known as 'the capture effect', which is diminished as the bandwidth is decreased. For the same result on a m., the wanted signal needs to be getting on for 28dB stronger!

### Two Metre Problems

The 'Two' metre band at 144MHz also has the potential to cause problems when amateur signals create interference patterns on TV pictures coming from



Table 1

Signal Strength Meter		Signal Generator	
Reading (dB)	Error (dB)	dBμV (pd)	μV (pd)*
35	+2	33	45
40	+3	37	71
45	+2	43	141
50	+1	49	282
With +1-dB button on			
45	+1	44	158
50	+1	49	281
55	+1	54	501
60	+2	58	794
With +25dB button on			
60	+2	58	794
65	+3	62	1258
70	+1	69	2818
75	+2	73	4467

\* rounded values

Table 1: Signal measuring test results of Semaht u.h.f./v.h.f. signal strength meter at 90MHz input frequency. They refer to signal voltage (p.d.) across the signal (antenna) input socket of the instrument when correctly loaded with the 75Ω matching pad of the Marconi signal generator. The average error over the entire dynamic range is only 1.75dB.

# Tackling TVI With Semaht

Continued from page 19

transmitters operating on channels towards the top end of Band IV. This is especially likely to occur in locations where the TV signal is somewhat screened and hence rather weak, or where the TV set is working from an indoor antenna, which is beaming in the direction of the Amateur station operating on 144MHz.

Interference is more likely to occur when the transmission causing the interference lies at the low end of the 144MHz band. It normally results from the transmission's fourth harmonic and is exacerbated by an external linear amplifier being driven rather hard - to full power or more!

The problem harmonic can be detected by the signal strength meter provided it is not totally swamped by the TV signal itself (bearing in mind the overall 8MHz bandwidth of a u.h.f. TV channel). Indeed, it may help to remember that the CCIR System 1 used in the UK has an a.m. video bandwidth of 5.5MHz and that the f.m. (inter-carrier signal) sound carrier is 6MHz above the nominal vision carrier.

(This corresponds to the simple expression of  $8n + 303.25$ , where  $n$  is the

channel number. The instrument permits a precise measurement of the interfering signal strength when the affected TV station goes off the air).

Another possibility of TVI is the fifth harmonic at the low end of 144MHz. This falls around 720MHz and might well affect Channel 52 (718-726MHz).

The test sample meter tuned to below Band IV (to 436MHz) and above Band V (to 873MHz) so it was possible to detect spurious falling a little outside the u.h.f. TV bands. This could prove useful because a strong signal, although removed somewhat from a TV channel, could still affect reception by a desensitising effect, manifesting as a decrease in contrast (and also, perhaps, sound volume) and increase in picture 'grain' (noise), impaired synchronising or even colour 'suckout' (where a colour picture suddenly changes to monochrome!).

## Installation Engineers

Perhaps a trifle outside radio amateur interest, the Semaht will be of particular value to antenna installation engineers, with the coming of the 5th TV channel

related to the consequential shift of, perhaps, video and satellite receiver conversion channels there are potential frequency clashing problems!

The Semaht has a price tag of £349 including VAT and is available from: Aerial Techniques, 11 Kent Road, Parkstone, Poole, Dorset. Tel: (01202) 738232, FAX: (01202) 716951. Another model handled by the firm is TC402D, which covers 45-170, 170-450, 450-862MHz and measures from 20µV to 10mV in seven ranges. The TC402D is more expensive at £399.

My thanks go to Aerial Techniques for the loan of the review field strength meter and I think that both the Semaht and the TC402D would be an interesting and very useful purchase for a radio club. You never know when TVI or BCI will surface to cause problems and an f.s.m. could prove very useful indeed!

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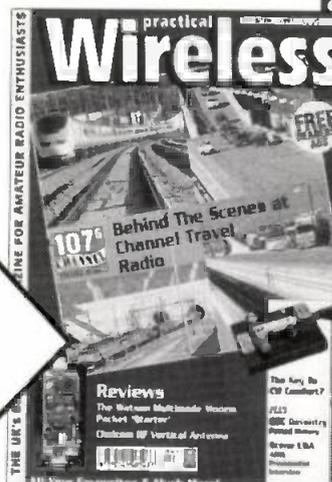


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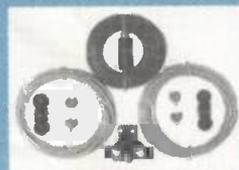
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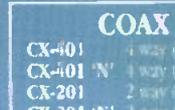


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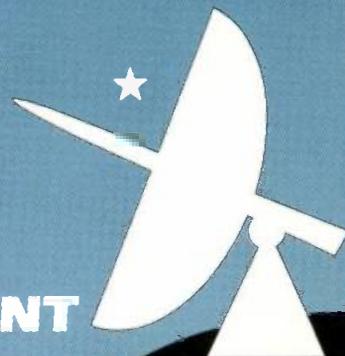
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# Busby's Box Goes Stateside!

By Roger Cooke G3LDI

*A group of radio amateurs from Norfolk sent a British telephone box 'across the pond' - here Roger Cooke G3LDI takes up the tale.*

**Fig. 1:** Radio Amateurs at your service! The journey begins - Steve G0UYA and Martin G7PDO help load the telephone box onto the transporter.

This is the story of the Big Red British Telephone Box and how it managed to journey to Seattle, Washington, with the help of some English radio amateurs.

Sounds like a typical childrens fantasy? Well, it started out as a fantasy, or a joke maybe, but luckily for the Vintage Telephone Equipment Museum (VTEM) in Seattle, it's reality. They now have a British Telecom (BT) Red Telephone Box as a working exhibit, taking pride of place among their countless other exhibits.

It all started when I took a holiday in Seattle with **Bev and Dick Bendicksen N7ZL**, during May of 1995. Dick spends time at the Vintage Telephone Equipment Museum every week, cleaning, repairing and maintaining all the equipment.

The VTEM is essentially a working exhibit museum and visitors are encouraged to use the equipment, all of which is in working condition. Bearing in mind that some of the gear dates back to the early 1900s it's a credit to the people who donate their time every week, and is a wonderful place to spend time.

I jokingly said it would be good to see a BT red phone box in the museum and Dick retorted it would be wonderful. That's how it all began.

When I arrived back in the UK after my holiday I spoke to a couple of local amateurs, **Steve Chamberlin G0UYA** and **Martin Galea G7PDO**. Both Steve and Martin work for BT and during the course of our conversation I asked about the possibility of obtaining a telephone box.

## Box Free

The reply from BT was encouraging as long as the 'box' was for a charitable organisation, then one could be donated free. All I would have to do is obtain a letter from the museum confirming the fact that they would like a telephone box. What better encouragement did I need!

The main problem was going to be the transport of the box to Seattle. Nearly a ton of cast iron and glass is no easy task!

I was discussing the transportation problem locally with **Paul Turnham G4VLS**, and I suggested that a few enquiries should be made. We have a USAF base at Mildenhall just down the road from Norwich and I wrote to the station commander.



I was very surprised at the curt reply I received stating that they were not available for transporting equipment of the non-military variety. They indicated that they were not a charitable organisation and this surprised me, especially when the Telephone Box was intended for the benefit of the American public!

## Prime Minister

In jest, Paul suggested that I write to the Prime Minister, John Major. Nothing ventured, nothing gained. I decided to do just that, the first time in my life I have ever written a letter to 10 Downing St!

In the meantime, I received a letter back from the museum which I duly sent on to BT. Time passed and one day a vehicle with a 'Hiab' crane on it appeared outside Paul Turnham's home in Norwich.

A telephone box was then deposited on Paul's front lawn, causing somewhat of a stir in the neighbourhood! A cardboard box containing the telephone and coin-box was also delivered.

To my surprise, one morning the post brought a letter from Downing St. It stated that my original letter had been passed to the Foreign Office for attention and I would be hearing from them in due course. Another first for me, a letter from Downing St!

A few days later, I received a 'phone call from a **Mr. Wayne Tranmer** from **Rolls Royce Aero Engines** in Derby. He explained that The Foreign Office in London had contacted the British Consulate in Seattle, to ascertain if any heavy-lift transport was due into Seattle at all.

The British Consulate in Seattle contacted Boeing and hey presto! There was a shipment of aero engines due into Seattle very shortly. They then FAXed **Rolls Royce** in Derby who were supplying the engines and they then contacted me.

Then came the shock. The shipment was due out of Derby on the Thursday of that week. This was Monday morning! Panic ensued.

How were we going to get this monster up to Derby by the Thursday? There was only one thing to do.

## Radio & TV Help

We contacted the local Radio station, **Radio Norfolk**, and **BBC** local TV for help and told them of our predicament. Crews from both appeared that morning and did a story on the Big Red Telephone box. These stories were broadcast on both radio and TV that day.

The RAF at **Neatishead** came to the rescue, offering us free transport to Derby on the Wednesday morning. **Group Captain Titchen** and **Flt. Lt. Minshill** turned up, spot on time, 1000 hours, on the Wednesday morning with a heavy duty lifting vehicle.

The telephone box was duly hoisted from Paul's front garden onto the back of the transporter and strapped down securely ready for the journey up to Derby. The transporter was driven by **Cpl. Julia Scarff** accompanied by the crane operator, **Cpl. Paul Edwards**.

The necessary documentation had been taken care of and it was cleared for Customs. The helpful BBC TV and Radio Norfolk crews turned up again for the send-off and it was featured on TV that night. The telephone box was due in Derby on the Thursday morning when it would be put onto a Russian **Antonov 124** Heavy Lift aeroplane.

**Bill Gray** of the Boeing Company in Seattle was the point of contact for **Rolls Royce**. He contacted **Don Ostrand** from the Museum to check on the documentation.

Arrangements were frantically made following several telephone calls, and Don had to complete a 'Power of Attorney' form. This was duly completed and at last the flight took off a 1800UTC London time with an estimated time of arrival in Seattle of around 1500UTC on **Thursday 7 September**.

## Holiday Arrival

By coincidence, Paul and Pearl Turnham had arranged to stay on holiday with Dick and Bev Bendicksen that very week, so Paul was going to be the lucky guy to see the telephone box's arrival! Members of the Museum crew were contacted and told

of the arrival, as were the local TV station.

A film crew duly arrived along with several members of the Museum and they went out to meet with Bill Gray from Boeing. Upon arrival at the field, they found the plane had already landed so they went out to see it.

The rear cargo doors opened up and a Rolls Royce engine bigger than anybody could imagine was all that was visible. The Rolls Royce components were unloaded first and the 'lowboy rig', a tractor and trailer unit to transport the engines, looked like a toy beside the Antonov. Numerous photographs were taken along with lots of video.

The telephone box was finally unloaded and put onto a truck with sling straps holding it in place. The final journey to the museum was all of a few hundred yards from the Antonov.

On arrival, it was obvious that the telephone box would have to go in via the second floor door. This was duly opened and a crew waited for the box to be slid in.

Bill Murphy, the driver of the truck, slowly raised the eagerly awaited box to the second floor equipment door. Once at that level, it was grabbed and slowly pulled into the second floor.

It was at this point that a near catastrophe struck. The sling strap at the inboard end came in contact with the building above the door preventing the box from being pulled fully into the

building. The strap came off and the pallet started to break. That was the only momentum needed and the box fell off the second floor into space, doing a sort of crazy dive toward the ground!

After 8000 miles and all that effort, was it going to end up as a pile of scrap iron? As luck would have it, the second sling and the winch line were still attached and 'lassoed' the call box by the slight flair of the base. A substantial glancing blow to the first floor door helped to break the fall of the box and it ended up looking like the end of a 'bungie' jump about two feet from the ground!

Another attempt was more successful and the box finally made it into the museum. The next day, it was hoisted, following a lot of effort and mechanical assistance, into the vertical position. Then it was hastily made ready for the Champagne reception, by fitting the telephone, glass, floor and a light.

### Guests Arrived

At 1600UTC the guests arrived, among them were Mike Upton and Roberta Stayte from the British Consulate in Seattle, several from the Boeing company, a photographer and reporter from the *Seattle Times*, and a TV crew, plus Pat Moran, the British Telecom Rep. at Microsoft USA. Of course just about all the Museum crew were there too!

With brief words from Mike Upton and a toast, in Champagne no less, Frances Tomlinson removed the British flag that had been draped over the booth and the entire Museum crew officially welcomed the Big Red Telephone Box.

More chatter and photo opportunities and lots of video followed. Paul, Roger, Mike and Dick were all presented with TPA key chains and Chapter pins as souvenirs. The museum crew had all aged about ten years after watching the telephone box do its 'bungie jump', but aside from that all were unscathed!

On the following Tuesday, work continued on the installation. A line out of the office was connected into the telephone and calls were able to be placed on the internal network.

The final resting place for the telephone box is shown in Fig. 2, with Dick N7ZL on the phone and Paul G4VLS. So, if ever you are in Seattle and you visit the museum, you too will know the story of the Big Red Telephone box.



Fig. 2: Some 8000 miles later the 'big red telephone box' comes to rest in Seattle.



PW

# In Search Of Better Signals

By Terry Brown G0NSA

*Terry Brown G0NSA had enjoyed success with his 'trusty' G5RV...but he thought it was 'time for a change' and set off searching for those better signals. The result has a certain 'Scottish Flavour'.*



The idea for a better antenna system came at the same time as plans were drawn up for an extension at the rear of my home QTH. I'd tried various methods over the years to get the best out of my trusty G5RV, but I felt that the time had come for a more competitive antenna for my station.

During the building of an extension to the house, I asked the builder to incorporate extra strengthening within the rear wall to support a wind-up mast. He also used more beams than normal in the flat roof to give a firm base to work on when maintaining the mast and antenna.

I had decided at an early stage that a beam of any sort wouldn't fit into what was left of my garden. As the antenna would encroach over neighbouring properties as it was rotated, I decided that the mast should support only a CobWebb antenna.

An enquiry to Tennamast up in Scotland confirmed that one of their Adapt-A-Mast range would be suitable for my site and antenna idea. The order was sent off and whilst awaiting delivery, I assembled the hardware needed to fix everything together.

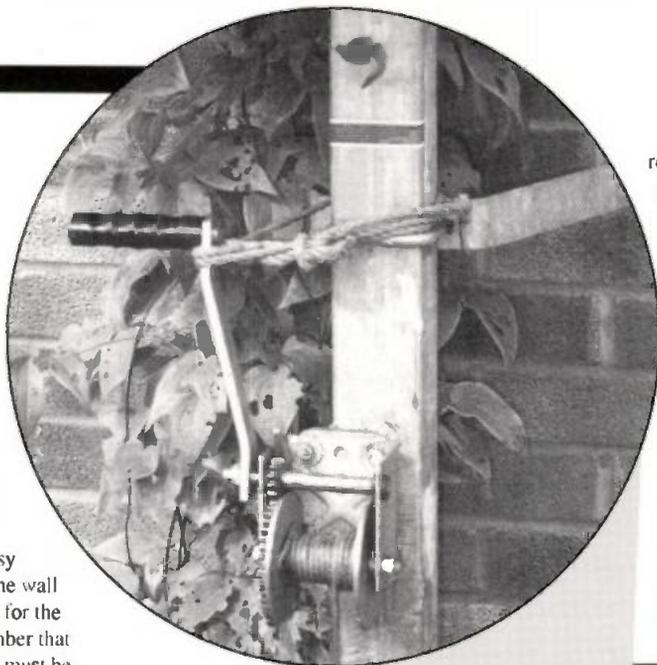


Continued on page 26

# In Search of Better Signals

Continued from page 25

Fig. 2(right): For safety, GONSA secures the winch handle up in everyday use.



recent gales the structure has withstood 60kt (100+kph) winds and showed no signs of undue movement or damage.

At the time of writing the short Adapt-A-Mast costs £228. carriage £25. A longer version is available, along with a friction brake if this is required. Tennamast Scotland Ltd may be contacted

## Two Brackets

Two brackets hold the mast to the wall and M10 'Rawlbolts' fix the brackets to the building. Never having had much to do with Rawlbolts, I was very surprised how big they were. The drill needed to make the required holes in the wall was an even bigger shock. (Not only its size, but the price!)

I found that it was an easy task to fix the brackets to the wall once the holes were drilled for the bolts. It is as well to remember that the holes for the Rawlbolts must be drilled into the brick of the wall, not the mortar joints (Fig. 1). Also you must remember not to over tighten the bolts or the brick will split. Powerful things these Rawlbolts.

A reference to the mast's weight had come in a telephone call from Tennamast to advise of its delivery date. They advised that due to its size and weight (50kg) it would be preferable if help was at hand on delivery.

The mast arrived a few days later on a lorry driven by a young man, who with the best will in the world, couldn't shift it out of the back on his own. But living in a small cul-de-sac meant that the delivery had been observed and I found that willing hands soon turned up to see what I was up to.

With help, the mast was deposited on the back building site (once an immaculate lawn!). By means of ropes pulled from the flat roof extension, and guiding the mast from the ground, it was soon up and presented to the brackets.

The 'U' bolts to hold the mast to the brackets were put in place and the winch attached to the mast. Everything was tightened up and made secure ready for the next part of the job, putting the antenna up in the air.

The same willing hands made light work of mounting the

antenna on the mast. After a short rest, the antenna was wound up to its full height of 12m and found to be rock steady in all but the worst winds.

When fully closed the Tennamast is about three and a half metres high. Standing on the flat roof gave easy access to the securing rings that hold a stub mast to the base mast.

The 37mm (one and a half inch) diameter 3m pole stub mast was one I had to hand. But to give added strength a wooden insert was push fitted inside the metal tube together with a nylon rope.

In time, the wooden insert swelled to trap the nylon rope securely inside the pole. If the pole should snap it will at least stay in the air and not come crashing down, as it's held aloft by rope. The top of the pole is sealed with a plastic cap.

The 3m stub mast has a collar half way between the mast and antenna to which guy lines are attached. These are secured to various structures at the boundary of the property. I'd found that in the wind and without guy ropes, the top section of the mast rattled inside the bottom section.

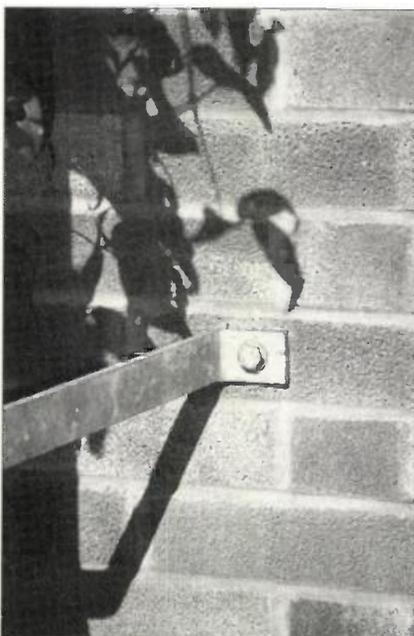
The photograph of Fig. 2 shows the method I use to secure the winch handle in everyday use. On a cautionary note, the winch supplied by Tennamast does not have any means of braking when the mast is being lowered.

Great care is needed during lowering of the system to avoid serious injury. Should you let go of the handle, while lowering the mast, it will spin out of control, possibly leading to serious damage.

In conclusion, the mast, constructed of square section galvanised steel, certainly gave the impression of a quality item. And in

Fig. 3(below/right): A little bit of 'greenery' hides the impact of the mast at ground level. The bracket make a good lashing point for the ladder.

Fig. 1(below): The hole for the Rawlbolt should be made in the body of the brick, not the mortar joint. But do not over tighten the bolts, or you'll split the bricks!



at: 81 Mains Road, Beith, Ayrshire KA15 2HT. Tel: (01505) 503824.

For details of the price and availability of the CobWebb antenna contact Steve Webb G3TPW of SRW Communications Ltd., The Green, Swinton, Malton, North Yorkshire YO17 0SY. Tel: (01653) 697513.

PW



# Memory Morse Keyer - The MFJ-490



By John Goodall G0SKR

*Morse enthusiast John Goodall G0SKR assesses a menu driven Morse keyer and it's obvious he enjoyed the job!*

Among the many Morse keyers I've had the pleasure of assessing, some I liked and some I didn't. And the MFJ-490 Menu Driven Memory Keyer/Bencher Paddle assembly was a keyer I really liked.

The MFJ-490 is a combined memory keyer built onto a Bencher paddle. The final of the unit is not much larger than the Bencher paddle itself. Measurements, excluding the protrusions of the volume, speed knobs and paddles, are 105 x 112 x 75mm.

The housing containing the keyer unit and controls, sits comfortably on top of the Bencher paddle's base. The front of the unit rests against the pivot ring assembly of the paddles.

On the left side of the housing are located the push On/push Off power switch, and two rotary controls. One controls the volume of the unit and the other the keying speed.

And on the top surface of the unit you'll find six push-to-make switches along with three red and one green I.e.d.s. These control the Menu driven Memory Unit.

At the rear of the unit is where the external d.c. power connection, along with the keyer output is mounted. The d.c. connection is of the standard 2.1mm type of coaxial plug, and the output from the keyer is the familiar phono socket.

The external d.c. voltage supply requires a minimum of 250mA at 12-15V. However, it can be powered from a standard 9V PP3 battery mounted



internally (this isn't supplied).

## Host Of Features

I think the MFJ-490 is compact and 'tidy' and the unit has a host of features available to the operator. These include four dedicated memories, each allowing a total of 48 characters and a built-in Morse Code Tutor.

The tutor provides random letters, words, numbers and procedural signals. (The random words are up to and including eight characters in length).

Other features provided on the MFJ-490 include: Auto-increment serial numbers along with adjustable sidetone frequency and volume controls. There's also an Output tune mode, to allow for the tuning up of the transmitter and positive or negative keying can be selected.

The operator can also select Enable/disable active output from the keyer. This is to allow practice with the unit still coupled up to the transceiver.

Adjustable parameters include the sending speed. This is variable from 5-100w.p.m. (that's knocking on a bit folks) with weighting adjustable from 5 to 95%.

The MFJ-490 keyer can be used with modern solid state transceivers, and also with the older bottle fed

(valved) variety. The simple moving of an internal jumper is the only modification needed to enable the unit to be used with the latter.

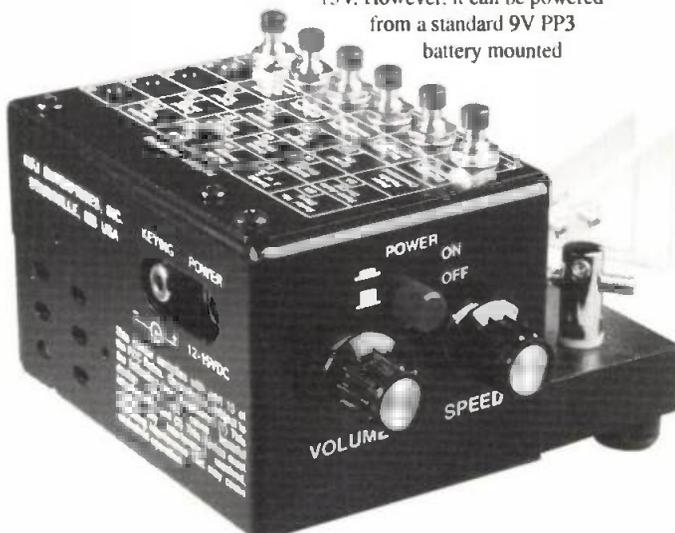
## Sophisticated Simplicity

Even for such a sophisticated piece of technology, the MFJ-490 is simplicity in itself to operate. On the top surface of the unit are situated the single row of push-to-make switches. These function buttons are marked F1 - F5, with a sixth marked Menu.

In a row above the Menu button are four I.e.d.s, marked A, B, C and D. The A I.e.d. being green and the others being red.

Pressing the Menu button one or more times, activates one of the I.e.d.s. To the left of each I.e.d.s are five items that can be selected, simply by depressing one of the function buttons.

For example, with I.e.d. B illuminated and pressing button F4, allows you to pre-set the frequency of the sidetone. All the functions clearly listed on the top of the unit be similarly set or adjusted.



Continued on page 28

# Memory Morse Keyer - The MFJ-490

Continued from page 27

Four messages of up to 48 characters in length can be stored in the MFJ-490. When Menu A i.e.d. is illuminated, Functions F1 - F4 can be used for storing and replaying messages.

Pressing and holding briefly one of the F1 - F4 buttons, prompts the unit to send 'GO' to you in code. The MFJ-490 is then ready to accept your message.

Whilst sending your message with the paddles, the unit recognises spacing between words. It then sends 'W' to you, indicating such a space.

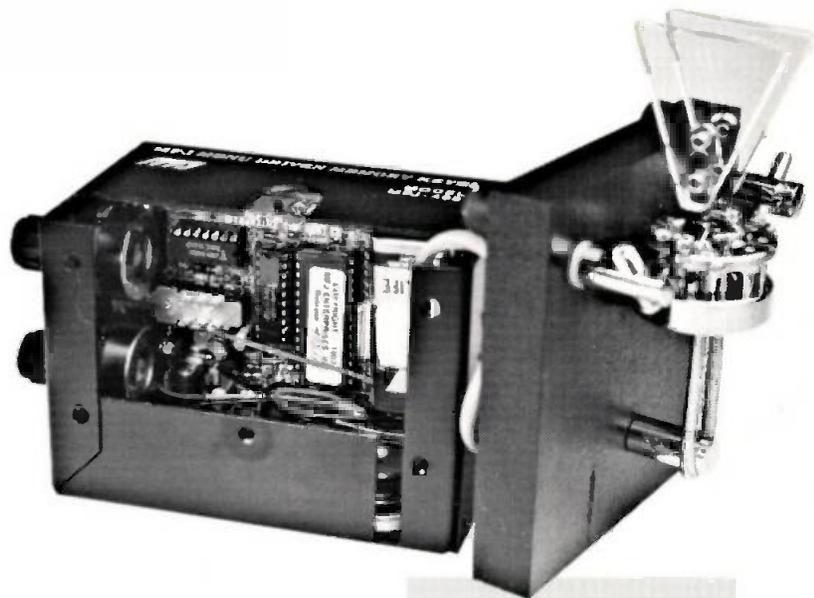
Upon completion of your message, simply press (briefly) the relevant function button, and the job is complete. The unit responds by sending the end of message character AR barred.

If a mistake is made while entering the message, simply enter the correction character (8 dits) and the unit corrects the error. If the message is too long, the unit responds by interrupting with the end of message character.

## Keyer & Tutor

The MFJ-490 is not just a memory keyer, but also a Morse tutor. By simply entering the Random Code mode, F5 'D', the unit becomes a tutor.

Random letters, numbers, punctuation and procedural characters, words, can all be sent from this unit. Even the Farnsworth



mode can be used. (This method sends the characters at a set speed and only the gap between characters is lengthened or shortened).

The MFJ-490 also has the ability to send random selected characters, selected from groups of six letters, numbers, punctuation or procedural. The following list is a selection of some of the items that the MFJ-490 allows the operator to vary: (see list in panel on the right).

## Joy To Use

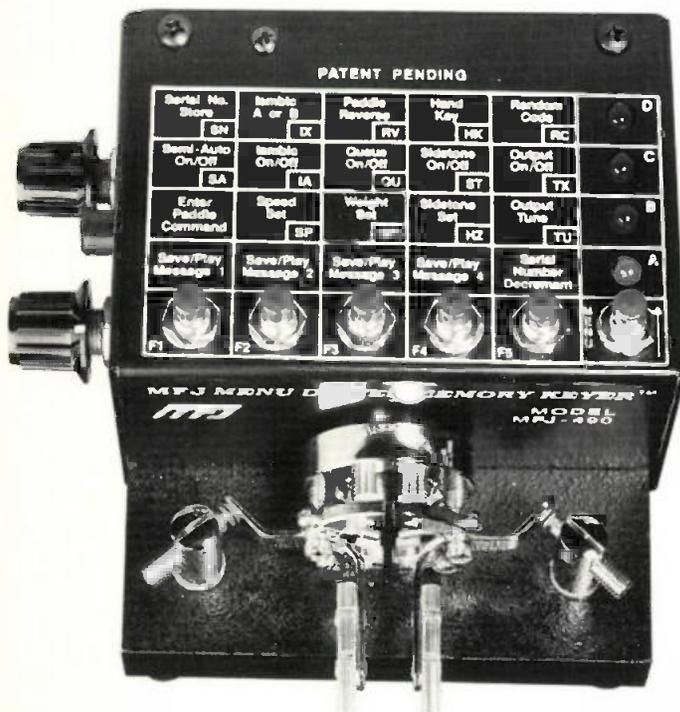
I found operation of the MFJ-490 unit to be exceedingly easy and a joy to use on air. The whole unit is nice and heavy it weighs in at over 700gm (approaching 2lb), so there's no need for any Blu-Tac or other such medium to keep the paddles from wandering all over the shack!

I've a birthday coming up shortly, and have deliberately left the MFJ-490 lying around the shack, kitchen and lounge to drop subtle hints to the 'station manager'. I was highly impressed with this unit and feel it would be an asset to any well equipped shack.

The MFJ-490 Menu Driven Memory Keyer Paddle is available from Waters & Stanton of 22 Main Road, Hockley, Essex. Tel: (01702) 206835, FAX: (01702) 205843 and I thank them for the loan of the review model. The MFJ-490 is priced at £169 plus £5 P&P (there is also a version available without the paddle key in the form of the MFJ-409X for £109 plus P&P) and in my opinion is well worth every penny.

PW

<b>Speed</b>	Allows the unit to be programmed to whatever parameters of speed the operator wishes to use. This varying between 5 and 100 wpm.
<b>Weight</b>	Allows the unit to be modified as to weight of code.
<b>Sidetone</b>	Allows the frequency of the sidetone to be fully varied to suit the operator.
<b>Tune</b>	Allows a constant key note to be sent to the transceiver to facilitate tuning.
<b>Semi-Auto</b>	Switches between bug and normal mode of operation.
<b>Iambic</b>	Toggles between Iambic and Non Iambic.
<b>Queue</b>	Switches internal buffer on or off.
<b>Sidetone</b>	Switches internal speaker on or off, but not affecting the normal unit responses.
<b>Output</b>	Allows the unit to be isolated from the transceiver to allow practice.
<b>Serial No.</b>	Allows a current serial number to be programmed.
<b>Iambic A/B</b>	Toggles between Iambic A or Iambic B.
<b>Paddle Rev.</b>	Changes the relevant paddle dit or dah assignment.
<b>Hand Key</b>	Allows the unit paddles to be used as a straight key.



# antennas in action

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

## Pump-Up The Volume

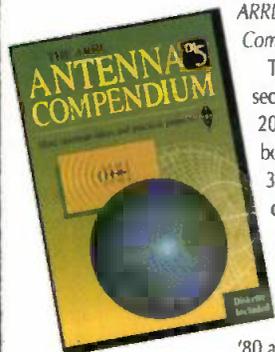
The very popular *Antenna Compendium* series from the ARRL has now reached volume 5. Editor **Dean Straw N6BV** and his assistant editor **Rich Roznoy KA10F** have managed to find more antennas and techniques to publish in the ongoing series of antenna books *The*

ARRL *Antenna Compendium Vol 5*.

There are eight sections in this 200-page A4 sized book as well as a 3.5in IBM PC (or compatible) disk with antenna data and programs. The sections are

'80 and 160-Meter Antennas', 'VHF/UHF Antennas', 'Antenna Modelling', 'Multiband Antennas', 'Propagation and Ground Effects', 'Measurements and Computations', 'Special Antennas' and 'Antennas Tuners, Baluns and Transmission Lines'.

There are many new designs of antenna appearing in this, the latest in the series, book. Find out how to build



## Handbag Mobile



Sandpiper Communications can now supply a 'handbag' sized portable antenna that can be used to cover all bands from 3.5 - 144MHz with just the one antenna. The new Sandpiper Mobile - Portable Base antenna now has a telescopic top section and a wider, but shorter, base loading coil.

The new antenna would make an ideal holiday antenna with the addition of a clamp to fit on an Hotel balcony. The 'Handbag-sized' portable antenna costs £65 and is available from Sandpiper Communications at **Units 5/6 Enterprise House, Cwmbach Industrial Estate, Canal Road, Aberdare, Mid-Glamorgan CF44 0AE** or Tel: (01685) 870425.

the 'Hentenna' a new 'miracle' wire antenna from JF6DEA, a full sized discone for h.f. working or a trapped delta loop for 3.5, 7 and 10MHz working. These antennas and many more may be found in this new addition to the 'Antenna Compendium' series.

*The ARRL Antenna Compendium Vol 5* is available for **£16.50 +£1 P&P** from the **PW Book Store** on (01202) 659930.

## Hiyo Silver!

A new silver plated brass PL259 is now available from **Westlake Electronics**. Manufactured in high quality silver plated brass, the PL259 plug is made to accept all 10mm diameter coaxial cables. To counter the problem of poor insulation materials found on many cheaper PL259 plugs, the gold-plated centre contact pin is set into a pite block. The new pite insulator withstands the heat of repeated soldering very well, and doesn't absorb

water if used outside.

As some of the larger diameter coaxial cable may be difficult to wire up, the gold-plated centre contact pin has a slightly larger hole through it, making it much easier to assemble and solder up. Suitable for coaxial cable such as: RG8U, RG213U, RG214U, URM67 and Westflex 103, the plugs are available from **Westlake Electronics, West Park, Clawton, Holsworthy, Devon EX22 6QN** at a cost of **£1.50** each plus **£0.75p P&P** for any quantity.

Or you can telephone them on (01409) 253758, or FAX on (01409) 253458.



**Silver and gold make a good contact in a PL259 Plug.**

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**8 pages of antennas**

## welcome to AiA!



Welcome to the third 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: be it cable, feeder, accessory or antenna.

In 'Antenna Workshop', **John Heys G3BDQ** features a small antenna to cope with

high levels of noise on 'Top-Band' reception. There's an article on getting the best signal from a Kite line, just right for that field day you wanted to try, and of course there's some A-i-A news, but I start 'Tex Topics' by wearing sack-cloth and ashes.

But don't forget, to make A-i-A successful, we want your ideas. To learn we have to listen, but someone has to talk while we listen. Let's do both in this section.

**G1TEX**

# high as a kite

The first thing to consider, when thinking about using a kite to haul an antenna up, is the frequency band, or bands, which are to be worked. A single band antenna is the simplest but requires changing if a band change is required. When using kites to haul the elements into the air, weight becomes the greater problem.

With a kite as a support, no end insulators are required, and even the centre insulator at the feeder termination need only be basic and lightweight. The centre insulator I've used over the past years is the standard small 'choc block' type. This type of connector is also useful when making quick repairs. The next problem is wire type. With my system, I use aluminium wire of approximately 1.5mm (16-18s.w.g.). Soft wire is possibly the best, but can stretch, but there is a hard drawn aluminium wire readily available in the form of metal-inert gas (MIG) welding wire.

By and large the greatest weight problem is the antenna feeder. I've seen UR67 being used to feed kite lifted antennas, needless to say it wasn't very successful, a large expensive kite

*Kites are a superb method of erecting temporary antennas of various types, Alec Adams G3YOA get to grips with hoisting the antenna by kite.*

had to be used. I usually use slotted ribbon feeder which is both lightweight and has a low wind resistance reducing drag. I decided to construct a windom antenna requiring a 300Ω feeder with a 6:1 balun between feeder and coaxial cable feeder the overall idea is shown in Fig. 1. But let's start with the antenna and lifting line. Select a braided line of 50-75kg breaking strain, and about 2mm diameter. Fold back the wire for a length of about 300mm and press the fold to the width of approximately 2mm. This gives a rounded end to act as bobbin to prevent snags

inside the braided nylon line. At a point some 15-20m from the kite end of the line, open up a hole in the braided line. In the direction away from the kite end start thread the wire into the line. After about 28m of wire, bring the wire through the wall of the line. This is going to be the feed point of the antenna.

Make another entry hole about 4mm along the line and reinsert the

told end of the wire. Push a further 14m of wire into the braided line, then bring the wire out again. Now the wire can be clipped off at the original entry point, leaving just the wire in the braided line.

To re-tension the line to bring out any slack which may have occurred, tie the kite end to a convenient post and with a gentle tension on the whole line, work any slack and wrinkles out. Once this is done the line is then pulled to pre-stretch back to the original shape, this is needed mainly when soft alloy wire is used to prevent further stretching in use. Any change in length changes the resonant frequency. At last, when this is done, the antenna tuning can start.

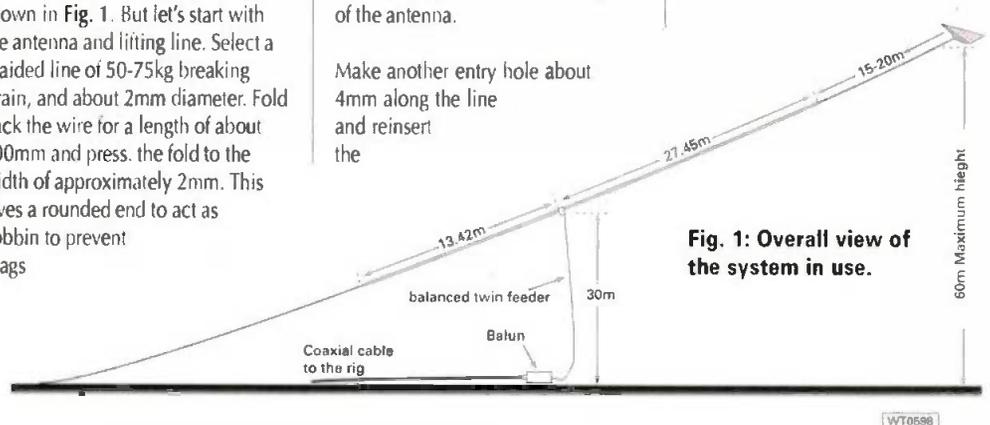


Fig. 1: Overall view of the system in use.

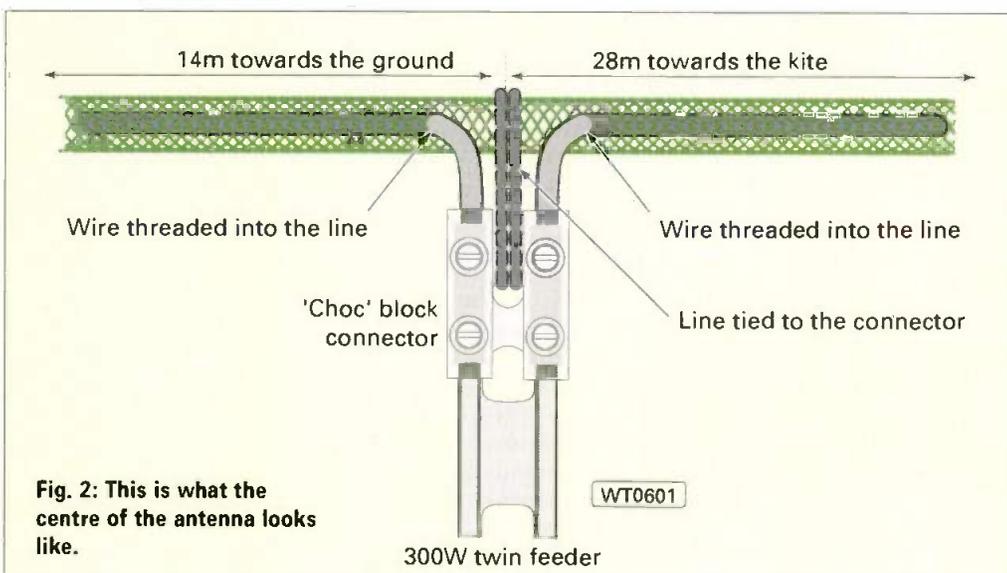
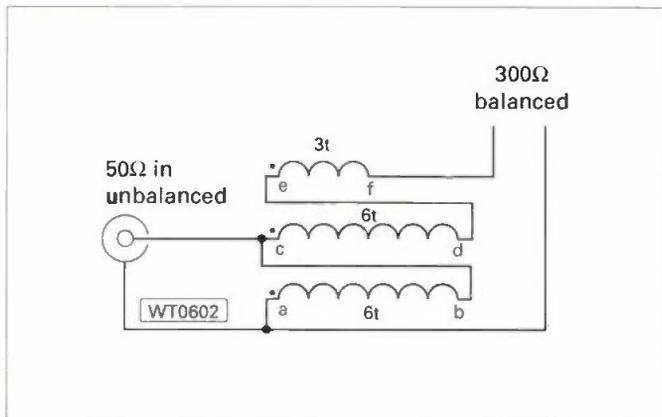


Fig. 2: This is what the centre of the antenna looks like.

Tuning the antenna really just means cut to the correct length measuring from the centre point. Measure in both directions the required length for the antenna as shown in Fig. 1. At these points mark the line with pen and prising the braid apart, find and cut the wire and remove the surplus. The braid is then pulled over the cut end. These steps are then repeated at the other end.

The centre is simply cut and the loose ends fed into a choc block right through both screws and then cropped off. The choc block can be tied to the braid between the two wires to take the strain off the feeder, Fig. 2.



**Fig. 3: The 1:6 balun consists of three windings.**

## Make A Balun

Now we need to make a balun because we're using a 300Ω twin line, fed from a 50Ω coaxial cable. The impedance stepup requires a 6:1 balun, although often a 4:1 is used. Here's a good design for a 6:1 balun, shown in Fig. 3, using two 37mm toroids (the type used in r.f.i. filtering). These are bound together with either four layers of glass fibre transformer tape or two layers of tightly wound insulation tape. The windings require three lengths of 1.6mm (16s.w.g.) enamelled copper wire.

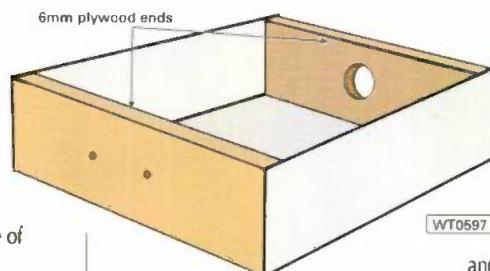
Each winding is put on separately and covers approximately 3/4 of the

core. First, six turns of wire spaced evenly, then the second winding is put close, approximately 1 wire thickness away from the first and then the third winding is put on starting from one end and finishing approximately in the centre. After making sure the windings are equidistant from each other and the tails are shaped to come off the centre of the edge of the toroid, Fig. 4.

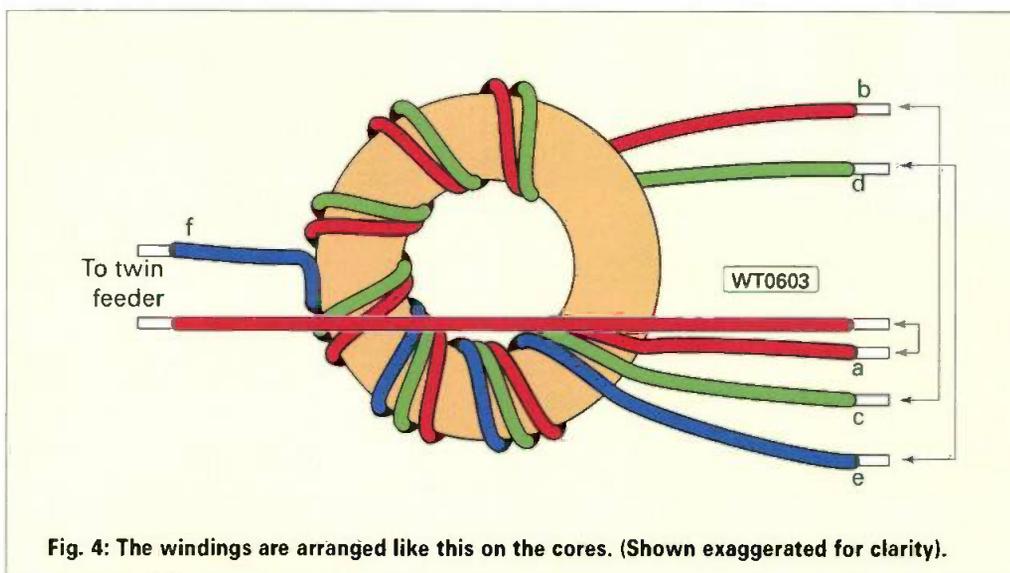
The joints should be cleaned and whipped using thin copper wire and then soldered, making a neater joint.

After checking the balun dip it into varnish, given three coats to prevent moisture affecting the coils. I found that my prototype had a very low s.w.r. over the 1.8-30MHz range.

The final assembly can now be carried out, the balun should be put in a box or container. The ideal box is the type used for potting assemblies. But I've found that a box made from old plastic conduit with plywood ends works well, Fig. 5. Two holes are made in the lid for 300Ω feed. The box could be sealed using mastic tape sealer. Be careful not to get any of the sealant on the copper wire as some contain acetic acid that could etch away the copper.



**Fig. 5: A suitable box to contain the balun in use. It should be sealed completely against moisture.**



**Fig. 4: The windings are arranged like this on the cores. (Shown exaggerated for clarity).**

## Make A Kite

Now let's make a kite, which is easy to construct and fairly stable in flight. I've found that the best overall capability is the Delta. The Delta is made basically from a square piece of Ripstop nylon, (from sailmakers). It is cut diagonally giving two equal triangles as shown in Fig. 6. The outline and dimensions given include seams and hems.

The leading and trailing edges are sewn first, making sure that the two wings are mirror images, eg. the two seams are facing upwards when they are laid out flat, side by side in their final positions. Next, three strips of Ripstop cut 100x40mm make the 'D' ring anchors and tail anchor, Figs 7 & 8. The strips are folded four times and sewn along each side and finally giving a re-enforced strip 100x10mm.

The leading edges are folded over making a pocket 20mm wide for spars through the whole length of the leading edge, also sewing across the end of the pocket to seal it

and preventing the spar from falling out. Two cuts, one on each side are made in the pocket 165mm from the trailing edge to allow the spars to be fitted or replaced if broken at a later date.

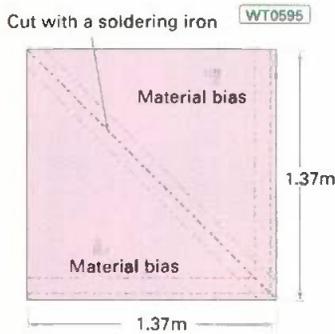
The cross spar loops are then sewn in position being careful to have the measurements the same on each side. The loops are placed either side of the pocket and sewn along the previous seam and then a box where the 'D' ring strip meets the kite, see Fig. 2, but don't forget to fit 'D' ring first!

The keel is next, a piece of spare Ripstop is sewn using zig-zag stitch onto the area where the towing eyelets are fitted, this gives strength, Fig. 9. The next step is to hem the two leading edges, also folding the extra reinforcing.

The three towing eyelets are fitted, the holes are made using a soldering iron, this method reinforces round the hole and prevents fraying. The two wing sections and the keel are

# high as a kite

# antennas in action

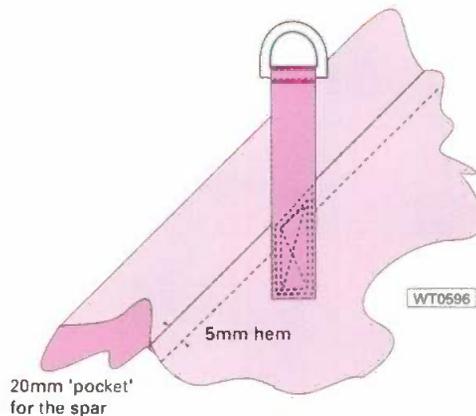


**Fig. 6:** The kite wings are made from a square of Ripstop Nylon cloth. The hems are shown dotted.

placed on top of each other with the keel in the centre and the wing hems facing inwards, the three sections are then sewn together, pins may be used to hold them together as Ripstop is fairly slippery.

The wings are then folded back so they lay on top of each other with the keel in the opposite direction and a second seam is now sewn 20mm from the first seam, remembering to insert the third strip of Ripstop into the trailing edge end of the pocket, before sealing up the pocket by sewing across the seam, see Fig. 4 and Fig. 5.

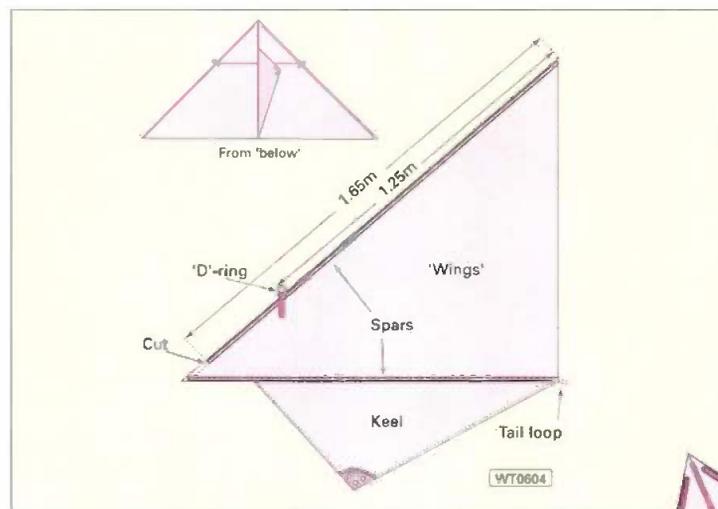
The two leading edge spars are now fitted to the wings and the spine down the centre pocket from the front point of the kite. The end is now sewn across to prevent the spine from coming out in flight. The cross spar is now measured for a good fit



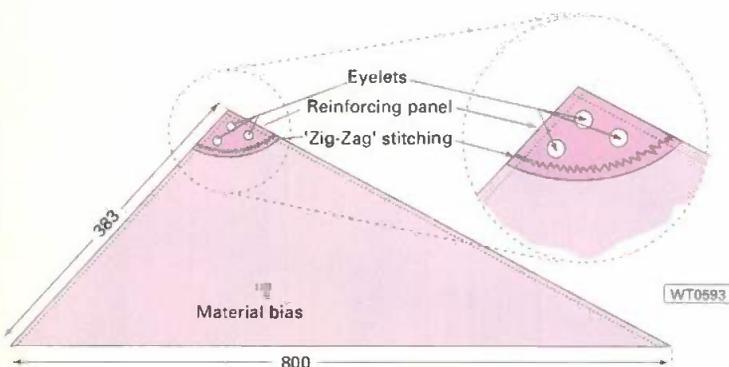
**Fig. 7:** The 'D' rings are fitted onto the wings like this. Make sure it's a mirror image on the other wing.

between the 'D' rings and is cut 20mm longer with a 10mm cut in each end for the 'D' rings to fit in. The ends just below the cut are whipped with thread to prevent the

cross spar from splitting. It is then coated in varnish for protection. The three anchor eyelets are to be used in different wind strengths, this gives extra stability. A tail can also be



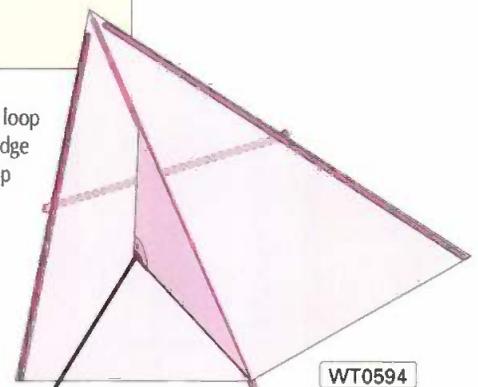
**Fig. 8:** Two views of the kite to help with visualising what it should look like before the bracer spar is fitted. Folded up in this form it occupies little space.



**Fig. 9:** The layout of the keel of the kite. See the text for method of making it.

fitted for stability to the extra loop on the centre of the trailing edge and a tail can consist of a strip of Ripstop 50mm wide and approximately 10 times the length of the spine.

Another type of tail can be made of strips of Ripstop 150x50mm tied onto a length of braided nylon, this looks like the traditional bow tie and this is also approximately 10 times the length of the spine. The illustration of Fig. 10 should



**Fig. 10:** From below, in flight the delta kite looks like this.

give you an idea of what the kit should look like in flight.

Remembering once again that, without CAA clearance, a kite may be flown at a maximum height of 60m (200') above ground. **Do not fly near overhead wires or fly over public roads** and also make sure that if the kite should land on its own there is sufficient room to do so.

So.....get flying on the bands!



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# tex topics

I'D HOPED TO KEEP THE NUMBER OF ERRORS IN THIS SECTION OF PW TO ZERO, BUT AN ERROR CREPT PAST ME. TO MAKE MATTERS WORSE IT WAS IN THE FIRST ISSUE OF A-I-A. IN THAT FIRST ISSUE (JANUARY 1997) ON PAGE 28 THERE WAS A CIRCUIT DIAGRAM, FIG. 1, THAT WAS TO SHOW A SMALL CHARGING MODIFICATION TO THE MFJ ANTENNA ANALYSER. ON THAT DRAWING THE DIODES WERE SHOWN THE WRONG WAY ROUND.

Look at the circuit diagram of Fig. 1 on this page, the two highlighted diodes are shown the correct way round. I apologise to everyone for the mistake, and thank **Godfrey Manning G4GLM** for letting me know of the error. (*I'm sorry that that one got past me.* Ed.)

In the last issue (March 1997) of A-I-A, **Glen Ross G8MWR** showed us how to make a T2FD antenna, a broadband antenna covering 7-29.9MHz on h.f. with a low standing wave ratio (s.w.r.) over all the bands. In response to the article we've had letters from three readers asking for further details about the antenna. The letters from **Jan Rijkmans PA3GTW**, **Ray Dix**, and **Michael Troy EI6HA** are so similar, or have questions that touch on common points, I'll deal with them together.

From the Netherlands, **Jan PA3GTW**, writes to ask if he could use a 1:4 balun at the junction of the coaxial cable and the 300Ω twin feeder and, is there a maximum or a minimum length of twin feeder used in the design? Let me deal with them in reverse order Jan. There is no real limitation on the length

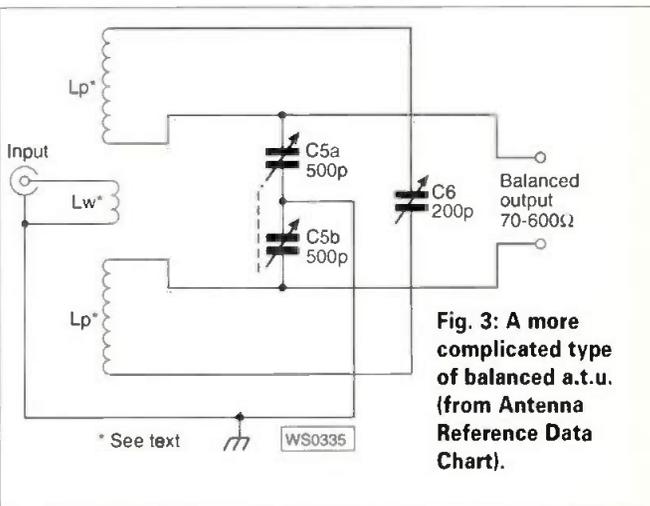
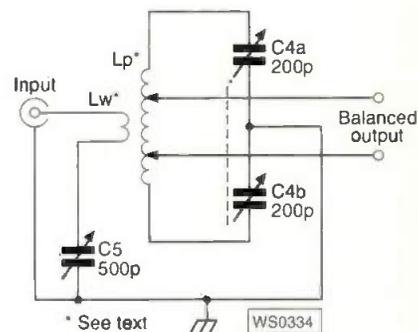
of 300Ω twin as the feedpoint of the antenna is a nominal 300Ω (set by the spacing and the 390Ω terminating resistor). To match perfectly to a 50Ω coaxial cable a 6:1 impedance ratio balun would be needed.

## A Degree Of Mismatch

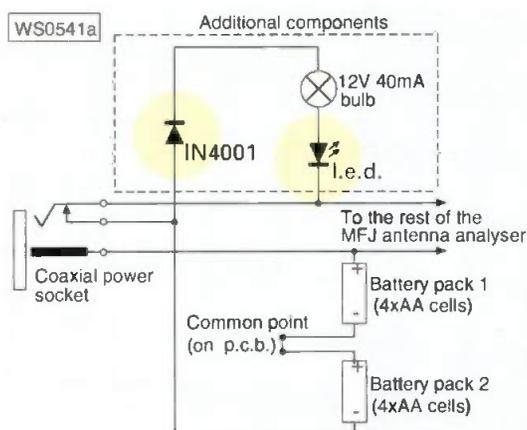
When using a 1:4 balun, in the system described this would give a 200Ω impedance when using 50Ω coaxial cable. A degree of mis-match will occur, but to give a better match into 300Ω twin feeder with a 1:4 balun, the feedpoint (coaxial cable) should be 75Ω. To find the amount of mis-match divide the 75Ω (referred impedance) by 50Ω (actual coaxial cable impedance) and you end up with a figure of 1.5:1.

As the antenna system, as described, has a mismatch of 1.5:1 as well I'm not sure of the combined overall effect. Depending on the various lengths of cable involved, there may be bands with a low s.w.r. and others with a higher s.w.r. Or you may need an a.t.u. to make the whole system useable on all bands. But I see no problem in any case in setting the system up as you suggest, but use an a.t.u. to keep the

**Fig. 2: One type of balanced a.t.u. (from Antenna Reference Data Chart).**



**Fig. 3: A more complicated type of balanced a.t.u. (from Antenna Reference Data Chart).**



**Fig. 1: The corrected diagram of the modification to the MFJ antenna analyser. See text for details.**

s.w.r. at the rig end within acceptable limits.

Reader Ray Dix also asked about the balun and what ratio it should be. I hope that my reply to Jan answers that one of your questions Ray? The other questions asked by Ray was, can he use an a.t.u. that consists of a coil and two variable capacitors and could the antenna be fed using coaxial cable completely? I'm unable to answer the first one easily Ray, but I wouldn't recommend using coaxial cable

throughout, as it's likely to make the antenna less useful overall. I've shown two possible balanced a.t.u.s in Fig. 2 and Fig. 3 for you to look at Ray. They appeared on the Antenna Reference Chart given away with the May 1996 issue of PW (Try to get one if you haven't already got one Ray).

## Suggested System

But perhaps I can suggest a system that both Jan and yourself could try out. Let me assume that you both build the

# antenna workshop

**M**y best efforts in 'Top Band' DXing have often been bedevilled on the 1.8MHz band by QRM from strong European stations to the east of my QTH. Couple this with a poor signal-to-noise ratio and you can imagine the problems I've experienced when straining to copy weaker North American signals.

In an effort to improve the signal-to-noise ratio I even tried a 1.5m square tuned loop antenna (made from coaxial cable) mounted in my loft. Whilst this loop antenna had a fairly good signal-to-noise ratio it did however, have a very low signal output and needed a low noise pre-amplifier between it and the transceiver.

When looking for ideas to improve the situation, I came across an article, written by WA2WVL, in the February 1995 issue of QST. The idea appealed to me, so I decided to try out his design for a low noise but small receiving antenna for the l.f. bands. In the original article in QST the antenna was called a 'EWE', but it is really an inverted

## 'U' Listens On Low Bands

'U' (rather than a female sheep!). Some 'Top Band' DXers are fortunate in having enough land available to run out a decent low band antenna. Take for instance the Beverage antenna, a long low wire which should be at least two wavelengths long to be really effective. Two wavelengths at 1.8MHz would mean a straight wire run of 320m (and then of course the house/shack has to go somewhere at the end).

### Most Gardens

By contrast the inverted 'U' antenna will fit into most gardens, for it's only 10m long. No high masts are needed either. The only supports are just a couple of non-metallic poles a little over 3m long. Or you could just use the end of the house and a tree, as these should suffice for supports.

The modern method of computer modelling was used by WA2WVL when designing his 'EWE'. The

antenna's operation is based upon the fact that two or more parallel wires carrying similar r.f. currents will produce some directivity. The directivity is **regardless** of the amplitude or phase of the currents, so long as the wires are separated by more than 0.05 of a wavelength. This distance is about 8m at 1.8MHz (where the wavelength is 160m give or take a little).

The two vertical wire sections, Fig. 1, of the inverted 'U' described here are a little more than 9m apart. A phase shift of about 135° between the vertical end pieces of the antenna results in the r.f. currents in the far end wire leading those in the vertical section connected to the output feed line. This makes the far wire a reflector.

Maximum signal pick-up is therefore towards the feed point. The antenna front/back ratio is determined by the resistance R, Fig. 1. When its value has been set

at the optimum value, the front-to-back ratio will be about 20dB. The antenna's small physical size means that there is no antenna gain and about 25dB must be made up by the receiver. In practice I've found that my transceiver has plenty of gain in hand on both 1.8 and 3.5MHz, and no additional amplification is needed.

The horizontal part of the antenna has a sensitivity some 20dB below the vertical element gain and picks-up signals which arrived at high angles at right angles on both sides of the wire run. The useful vertical sections have their maximum pick-up at an elevation angle of 30°, which is fine for DX working on 1.8MHz.

### Making The Antenna

When setting about making the antenna, first decide which direction you would like to have the maximum signal strengths. My inverted 'U' runs NW to SE with the output feeder end at the NW end. This is fine at my Sussex location for the reception of North American stations and additionally

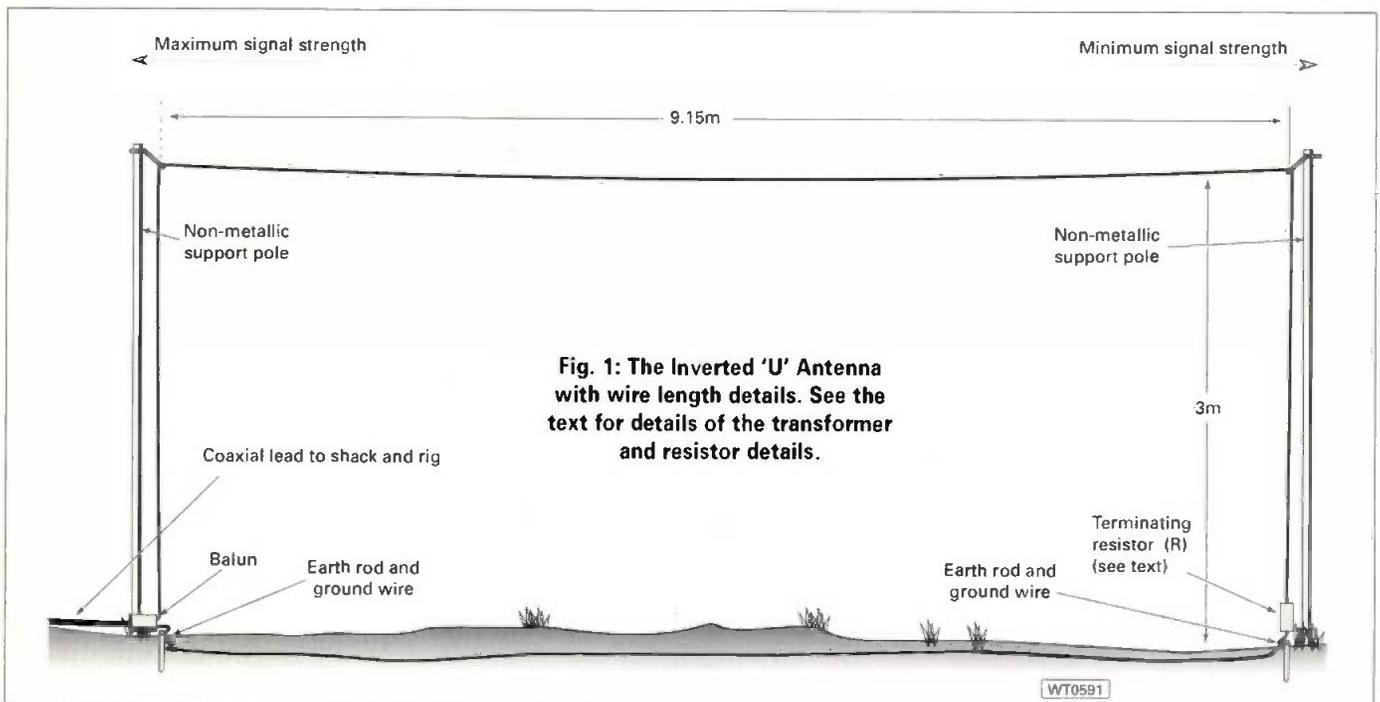


Fig. 1: The Inverted 'U' Antenna with wire length details. See the text for details of the transformer and resistor details.

UK stations to the Northwest and North.

For the two vertical sides and the top run of the antenna a length of tinned multi-strand insulated wire is needed. And as shown it must be supported by non-metallic poles. You could use long garden canes lashed together with bracing lines at the top as a cheap option. A more expensive but more robust solution to the support poles is to use glass reinforced plastic (g.r.p. or fibre-glass) sections.

The terminating resistor shown in Fig. 1, must be non-inductive and have a value of 1000Ω. Having a resistor connected to ground at the bottom end of the antenna makes the antenna broad band and it works well over a frequency range of 1.8 to 4MHz. Use either a single component or you could make one up to the correct ohmic value (within 1%) by having a series or parallel combination of similar values.

The resistor (or resistors), which must be well protected from the weather, should connect to the antenna element and to a copper earth rod that has been driven down to a depth of about a metre (preferably more if possible). The earth rod is connected to a similar rod at the feeder end of the antenna. The interconnecting wire is best buried just below the surface and will be more effective if bare copper wire is used. Hard drawn copper wire has better corrosion resistance than the normal multi-strand wire used in electrical wiring.

The antenna feed impedance of 450Ω has to be transformed by a factor of nine to allow the use of a 50Ω impedance coaxial cable feed line. A simple 3:1 step-down transformer, Fig. 2, can be made using a ferrite ring. The transformer shown was wound on the ferrite rings sold by the RSGB to make up into EMC filters. In spite of the fact its design was a little empirical, the finished transformer worked well.

These rings I used for the transformer are a type described as 'FAIR-RITE' made from a 'type 43'

ferrite material \*. I'm fairly sure that almost any ferrite ring about 25mm diameter and designed to be effective between 1.4 and 4MHz will be suitable. The transformer windings were made using single conductor pvc insulated wire.

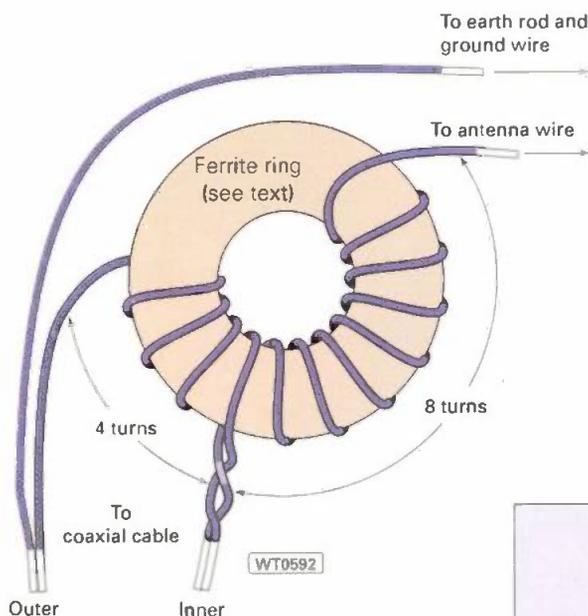
The inverted 'U' antenna's low noise characteristics allowed 1.8MHz c.w. contacts with many stations in the W7 and W6 call areas. I've noted that the antenna seems to have a cardioid, or heart shaped, horizontal polar diagram. A plus point is that it also remains useful when receiving stations that

operation of a fellow amateur is needed.

Listening tests should be carried out while one of you adjusts a temporary variable non-inductive resistor. at the far end of the loop. When you are happy with the adjustment, measure the value of the variable resistor and this can be replaced by a fixed component (or combination of components).

A word of warning though. The antenna is designed for reception only, do not transmit into the antenna. Should you do so (even inadvertently) you will almost certainly destroy its terminating resistor. However, if the resistor has a dissipation rating of several watts, a momentary blast of r.f. power should do no lasting damage.

Why don't you try out an inverted 'U'?



**Fig. 2: The 9:1 impedance matching transformer showing winding details. The toroidal core should be about 25mm diameter and be suitable for 1-4MHz. The inset diagram shows how the 50 to 450Ω impedance matching is achieved.**

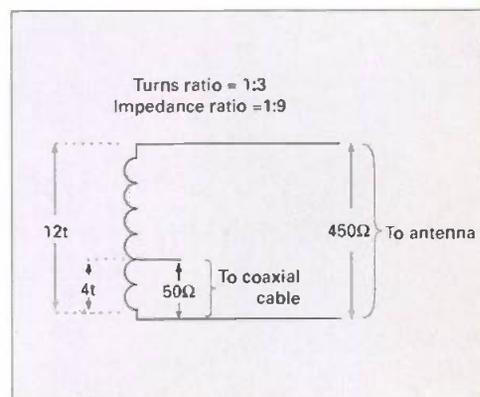
Like the terminating resistor, the transformer should also be housed in a weatherproof plastic box. Where the various wires and coaxial cable goes through the box wall should be sealed with silicone rubber or similar waterproof material.

### The Results

As to the results of using the inverted 'U' as a reception antenna. Well all I can say, is that for a few months in late 1996 I was testing another antenna and had to take down my inverted 'U'. I soon noticed that my reception of 1.8MHz was degraded, so much so, that I was very pleased when I had the opportunity to put the inverted 'U' antenna back into operation.

are at right angles to the run of the antenna.

Other dimensions for the top section may be tried, but when the horizontal section exceeds 12.5m the front-to-back ratios diminish. The ohmic value of the terminating resistor also affects the front-to-back ratio. To discover the value for your particular location, the co-



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# tex topics

antenna exactly as described by Glen Ross. Use a length of 300Ω twin feeder to a convenient point, then into a 4:1 balun for h.f. At the coaxial side of the 4:1 balun the 300Ω feed impedance of the twin now appears to be 75Ω. Now this is a coaxial cable that may be bought easily and cheaply. I'd recommend that you use the type with 100% screen cover designed for satellite TV download. Use this 75Ω coaxial cable to connect to the a.t.u. which now is doing the proper job of transforming the 75Ω of the coaxial cable to the 50Ω input of the rig. The advantage is that the 75Ω coaxial cable is operating into its correct impedance and will screen the signal properly.

From Ireland, Michael Troy asks about the resistor and what dissipation should it be for a 100W transmitter? In the original article Glenn G8MWR suggested that the terminating resistor (390Ω) should be capable of dissipating 35% on c.w. but if you were using s.s.b. then perhaps only 25% dissipation would be adequate.

I'll be honest Michael, I'd go for the 35%, or 35W, dissipation if possible every time. Now the problem is how to get a 35W 390Ω resistor that is non-inductive. Let's look at the suitability of the various type of resistor. The modern metal film resistor is the poorest type to pick. It's far too inductive (being a spiral track on a tubular body). Carbon film type are far less inductive, and may be used. But the best types are the old carbon composition or carbon rod type, but they may be difficult to find.

Occasionally you may find the older r.f. load resistor at rallies. These look like the baton used in a relay race. If you can find a 390Ω one it's ideal. But as you're unlikely to find one that's ideal, we have to make a terminating resistor pack up. To make up a resistor pad with minimal inductance we can use many resistors in parallel. And I'd recommend that you use 1W carbon film resistors.

### Three Series Elements

A 36W 375Ω resistor pack could be made up from three series elements

each made up of  $12 \times 1.5k\Omega$  (5%) resistors (36 in total) in parallel. By paralleling the resistors, the individual inductance is reduced by a factor of the number of resistors. When the terminating pad is made up it should be placed in a sealed weatherproof non-conducting box to minimise any change due to rain and moisture. The mismatch from using 375Ω instead of 390Ω is very low and may, for all practical purposes, be ignored.

As to the best angle for the antenna, and to its radiation pattern and direction Michael, the answers I've come up with are that the radiation pattern is almost circular, but with a slightly better sensitivity towards the 'low' end. As to the angle, the information I have is that anywhere between 20 and 40° will do, and that this will change the matching and radiation pattern slightly.

Finally, on the subject of the T2FD antenna, Jan asks "why, if the antenna has a 4dB advantage over a Marconi antenna, is it not a popular one". He failed to find any information at all in his, or his club's library on the T2FD. My honest answer Jan has to be: I don't know - but maybe some of our readers could throw a light on the subject. Over to you readers!

### Impedance Matching

I touched briefly on using coaxial cable as a method of impedance matching for stacked or bayed Yagi antennas in the last issue of A-i-A. Reader Stuart Newsham G7KKC said in a letter "according to my maths a centre impedance of  $112.5\Omega/2$  (56.25Ω) is produced (when using 75Ω coaxial cable) and in reality 70.7Ω coaxial cable should be used (if it were available for the sections)".

Stuart went on to say "This is a mismatch of over 12% - does it matter? Also how would this mismatch affect performance of the suggested phasing and matching switch for a crossed Yagi using using  $\lambda/4$  sections of 50 and 75Ω coaxial cable"? My answer to Stuart's question, has to be that yes it does matter, but in mitigation, a 12.5% mismatch is far better than the original

mismatch. I think that in the real world that most of us have to live, it should offer an improvement over other options.

When building a power splitter 'T' matching system as described slight differences in the lengths of the coaxial cable, or variations in the velocity factor from the specification will also create mismatches. What mismatch will exist on any one system, I'm afraid I couldn't say as each system is going to be different. The chances are though, that the s.w.r. of the overall system would increase, but with the slight increase in antenna gain some improvement should still be seen.

If the same power splitter 'T' matching system were applied to crossed Yagi antennas, then the same arguments would hold, although the radiation pattern would change somewhat depending on the positioning of the two antennas in relation to the incoming signal. The system I suggested as a power splitter, was a method of trying out an idea with minimal cost. Then, if the idea worked, a properly designed and built power splitter could be bought or made.

### Those Plugs Again

On the subject of the 'is it a 50 or a 75Ω BNC socket or plug' in the last two issues of A-i-A, Stephen Harding G4JGS sent me a long E-mail on the subject. In the missive Stephen mentions that any good-quality 'Tee' connector will have the impedance marked on it. I agree Stephen, but those plugs and sockets I obtained from both Farnell and RS Components were devoid of any impedance information!

Stephen also says "One of the easiest ways of recognising 50Ω connectors is that they are more ruggedly constructed than 75Ω items that are

usually used in the video world where the maximum voltage is TV swing and the current carried is relatively low. So in spite of the temptations about being able to buy connectors cheaply at rallies, my general advice would be don't unless they come in the manufacturers bags clearly stating what value they are.

"The problem is further compounded by the fact that there are thousands, even millions of 50Ω connectors around which were designed for computer networks using 50Ω coaxial cable. They are low power connectors and not suitable for anything other than QRP use limited at five watts power transfer".

I think Stephen's final comment is a good one where he says "The damage that can be done to rigs, especially those with a solid state p.a. is by the use of the wrong impedance connectors is generally expensive. My rig is worth much more than the few pence saved on an unknown connector".

Thank you for all those readers that have taken the time to contact me with comments about coaxial plugs and sockets, I hereby declare the subject closed - unless you know different of course!



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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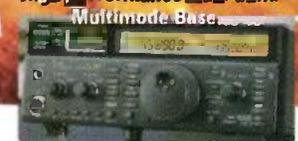
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# Lasers

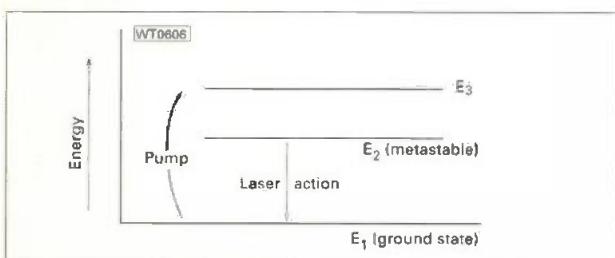
## Leading Lights In Communications

By Brian Dance

*Brian Dance regularly wrote for PW in the 1960s and 1970s when he was a Physics lecturer, but nowadays specialises in 'high technology' journalism including lasers and associated fields. Here Brian sheds a little light on this fascinating subject.*

Heading Picture: Doctor Stuart Butterworth of the Optoelectronics Research Centre, University of Southampton, demonstrates an optical parametric oscillator that provides a high power tunable laser source.

Fig. 1: Energy levels in a three level laser (see text).



When *PW's* Editor asked me to write on the vast subject of Lasers (Light Amplification by the Stimulated Emission of Radiation), I envisaged many staff working for years on something comparable in size with the *Encyclopaedia Britannica*. However, on being asked for about 2,000 words, it was clear it would be a much simplified explanation of basic laser operation.

So, here's the result: a brief overview of the common types of laser and new developments in a few selected topics related to electronics. And as you'll see...it's a fascinating subject.

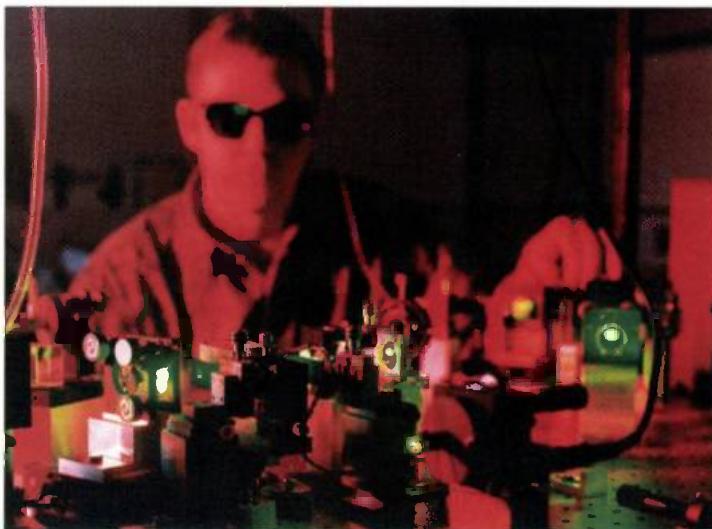
### Laser Operation

To help you understand laser operation I'll start from the basics. This is best achieved by looking at the energy of a single electron.

The energy of each electron in an atom can move between various definite energy levels determined by quantum theory. No electron can have an energy in between these levels, so it can gain or lose only certain definite amounts of energy.

Energy is lost if a photon of electromagnetic (e.m.) radiation is emitted. The energy of this photon is equal to the difference between two energy levels of the atom and to  $h\nu$  where  $h$  is Planck's constant ( $6.6 \times 10^{-34}$  J.s) and  $\nu$  is the frequency of the emitted radiation. The frequency of e.m. radiation, and therefore the photon energy, decreases from X-rays through ultra-violet (UV), blue, green, yellow, orange, red, infra-red (IR), and microwave radiation to radio waves.

An atom may emit at more than one specific frequency, since it has various permissible electron energy levels. However, this explains why light from



yellow sodium street lamps is of a different colour from that of blue-green mercury lamps or red neon lamps.

Emission of this type is known as **spontaneous emission**. The resulting atom can absorb radiation of the same frequency to raise its energy back to the previous level.

In 1917 Einstein realised that if a photon with an energy equal to the difference in the energy levels of the atom strikes an excited atom in the upper energy level, it could **stimulate** the atom to emit an additional photon of the same energy as the incident photon.

The process of stimulated emission occurs in an extremely short time. Both photons have the same frequency and travel in the same direction and their waves have the same plane of polarisation, so the beam is highly 'coherent'.

Each of the photons can, in turn, cause stimulated emission from other excited atoms so that the number of identical photons is further amplified. This is the basic principle of the Laser which is an acronym for 'light amplification by the stimulated emission of radiation'. It followed on from 'MASER' or 'Microwave Amplification by the Stimulated Emission of Radiation'.

### Energy Levels

Electrons in the diagram. Fig. 1 show that, laser material can have three energy levels. Stimulated amplification

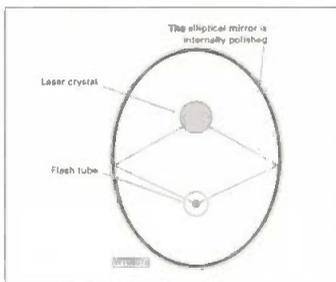
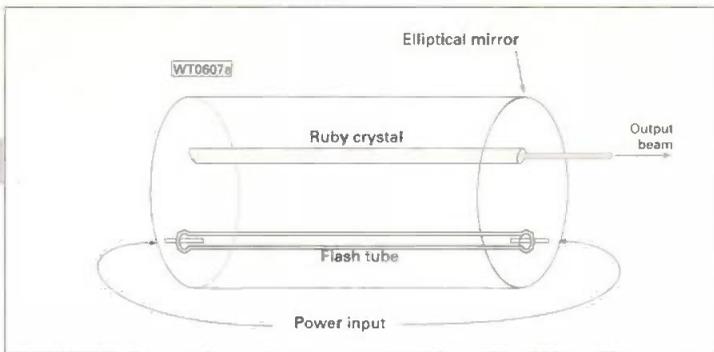
can occur from  $E_2$  to the 'ground state'  $E_1$ , but atoms in the  $E_1$  level can absorb photons of the same energy and are raised to the  $E_2$  level.

Stimulated amplification is only obtained if the probability of stimulated emission exceeds that of absorption. In other words if there are more atoms in the  $E_2$  level able to emit than absorbing atoms in the  $E_1$  level. Thus the level  $E_2$  must be more densely 'populated' with atoms than the level  $E_1$  to achieve lasing.

In nature you never get anything for nothing! So energy must be put into the system to obtain an output laser beam. This energy is used to make the  $E_2$  level more heavily populated than  $E_1$ .

Heating the laser material does not help either! This is because heating always leaves a higher energy state less densely populated than any state below it (for the technically minded, this follows from the Maxwell-Boltzmann theory of energy distribution). The required 'inversion of the population' is achieved not by sending everyone to the antipodes, but by suitably 'pumping' the laser material with energy so that there are more atoms in the upper state than in the lower state.

In Fig. 1, the pumping must raise atoms from the 'ground' state  $E_1$  to the  $E_3$  level, perhaps by directing a beam of e.m. radiation of frequency  $(E_3 - E_1)/h$  at the laser material. Atoms in the  $E_3$  state almost immediately lose energy, falling into the  $E_2$  state. This is



a metastable level where energy is not quickly lost, so pumping builds up a greater population density in  $E_2$  than in  $E_1$ .

### Pump Power

The 'pump power' is comparable to the power supply of an electronic oscillator. Pumping is often inefficient and takes place in various ways in different laser types. (Most lasers have a more complex system of energy levels than those of Fig. 1.)

The photon gain (per cm) in a gas can be very small. Because of this the material is normally placed between two mirrors that form a 'laser cavity' with a Q factor like that of a tuned circuit. The photons pass back and forth many times between the mirrors, increasing in numbers as they do so.

The mirrors act just like a feedback system of an electronic oscillator. This feedback is positive if the path length between the two mirrors is an integral number of half-wavelengths - so a minute movement of a mirror changes the frequency - the basis of a potential sensor.

If the gain/cm is small, the reflectivity of the mirrors must be extremely high at the lasing frequency concerned. One mirror allows a small fraction of the light to pass through it to form the output beam. This coherent beam has the advantage of having low divergence and has an extremely narrow frequency spread.

### First Laser

The first laser, made in 1960, was a ruby laser. It's one type of 'doped crystal laser'.

Nowadays, instead of a ruby crystal, a rod of Nd:YAG (neodymium in yttrium aluminium garnet) or a rod of

Nd:glass (glass doped with neodymium) is more commonly used, as the efficiency can be higher.

In practice the rod has mirrors at each end and is 'pumped' by the light from one or more flash tubes. The rod may be at one focus of an elliptical mirror and the flash tube at the other focus as in the diagram, Fig. 2, since it's a property of the ellipse that all of the light from one focus is reflected to the other focus. (The output is pulsed at the same repetition rate as the flash tube discharge).

Modern Nd:YAG lasers can be made with output power levels of the order of 1kW and emit radiation in the near infra red at a wavelength of 1.06micrometre ( $\mu\text{m}$ ). This wavelength can be conveyed along fibre optic cables to a work place that may be 10m from the laser itself.

The radiation may be used to cut metal (an expensive way of 'chassis bashing'!), welding, deep drilling, etc. This type of laser is also used at lower power in surgery.

### Q-Switching

A technique known as 'Q-switching' enables most of the energy stored in the laser rod to be emitted in a very short time. This can be perhaps 10nanoseconds (ns) and give very high power levels, maybe hundreds of megawatts for an instant.

In such a system only one end of the laser rod has a mirror, so the Q is low and energy builds up in the rod. A device using a rotating prism or Kerr cell very suddenly returns the radiation emitted from the end back into the rod to raise the Q to a high value.

### Gas Lasers

The pumping of a gas laser is usually performed by a continuous (d.c. or r.f.) source or by a pulsed electrical discharge. A mirror of very high reflectivity is placed at each end of the gas tube.

Gas lasers include the helium-neon laser which usually operates at 633nm (in the red region), but can also operate in the infra red region. Such lasers were used in laboratories and as pointers in lecture theatres, but many have been replaced by semiconductor lasers.

Carbon dioxide lasers can give very high power (up to tens of kW) at the mid-infra red wavelength of 10.6 $\mu\text{m}$ , but radiation of this wavelength cannot be conveyed to the workpiece by optical fibres. A complex system of mirror arms must therefore be used for the heavy welding and cutting of thick metal by such means.

Copper vapour lasers (CVLs) emit at high pulse rates in the green and yellow spectral regions. They can be used in such diverse applications as cutting metal or drilling minute holes in a silicon wafer. The firm Oxford Lasers specialises in this type of laser and it has also been involved with gold vapour lasers.

Excimer (excited dimer) lasers emit pulsed ultra-violet radiation. The wavelength depends on the gas filling which contains an inert gas that can form an excited dimer.

*Explanatory Note: Dimer - A Dimer is a molecule formed from two parts, in this case two atoms, in the same way that organic monomers form the polymers we know as plastics. Editor.*

The Titania KrF (krypton fluoride) laser (wavelength 247nm) at the Rutherford Appleton Laboratory (RAL, Oxfordshire) is the most powerful ultra-violet laser in the world.

### Demand For Lithography

As the demand for ever finer patterns on semiconductor chips increases, even shorter wavelengths are used for lithography. Experimental work with ArF (argon fluoride) lasers emitting at 193nm in the deep ultra-violet has started.

As wavelengths become shorter still, a fluorine excimer laser can be considered. But established quartz optics will then have to be abandoned for calcium fluoride optical components.

At the RAL in Oxfordshire, Edmond Turcu has developed a 'soft' X-ray source. This uses picosecond excimer laser pulses which are focused to a 10 $\mu\text{m}$  spot on the back of a moving magnetic audio tape to produce an extremely high power density.

A plasma is formed above the tape which is extremely hot (about 5 million  $^{\circ}\text{C}$ ) and emits X-rays with a wavelength of about 1nm. These 'soft' X-Ray pulses have been used for many purposes, such as investigating the repair of X-ray damaged DNA by a Birmingham University group.

Turcu's soft X-ray source is being used for semiconductor lithography. In collaboration with Edinburgh University, field effect transistors have been produced with 200nm

Fig. 2: (a) A ruby laser employing an elliptical mirror. (b) Cross section of the laser and its mirror.

The laser as popularly visualised (especially by James Bond film fans!). Drilling holes over 20mm deep using 20kW peak power from a Lumonics JK700 pulse-shaped Nd:YAG laser with fibre delivery.



Continued on page 48

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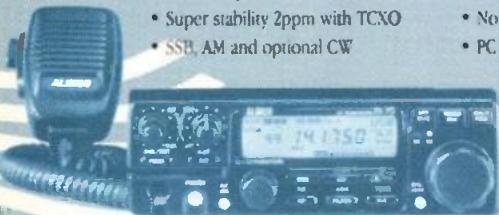
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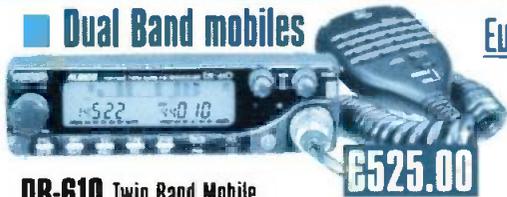
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# Lasers - Leading Lights In Communication

Continued from page 45

Laser transformation hardening of a vehicle camshaft.  
(Photo courtesy of The Welding Institute (TWI).)



Laser cutting of thick section steel with an AF5 laser.  
(Photo courtesy of TWI.)

gates. These devices provide a similar performance to those produced by electron-beam lithography (which is far too slow for commercial device production, as each pattern is separately 'written' by an expensive electron-beam system).

## Ultra Fine Resolution

It seems that X-ray lithography may offer the best way of obtaining the ultra-fine resolution required to produce future 1 Gbit and 4 Gbit DRAM devices, etc. But synchrotrons that can be used as X-ray sources have price tags of some \$10 million. Such synchrotrons typically offer some 20 beam lines, each of which may be suitable for the high volume production of ultra-fine devices.

However, economical laser-plasma bench-top sources should find a place in small scale production and in pilot lines at large facilities so that R&D does not take up costly synchrotron time.

## Semiconductor Lasers

The first semiconductor laser was made in GaAs (gallium arsenide) in 1962. Basically it's a p.n. junction with

two opposite edges of the junction region highly polished to form a very narrow laser cavity.

Free electrons from the n-type material pass into the junction where they combine with (or fall into!) holes, when some of their energy is converted into photons. This is the 'pumping' process.

Laser action occurs if the current density is above a threshold value at which a photon stimulates further photon production. The GaAs

These carry infra red wavelengths from complex laser diodes based on InP (indium phosphide) to remote fast detectors.

The fibre optic cables use ultra-pure silica fibre having minimum losses at wavelengths of 1.3µm and 1.55µm. Its wide bandwidth has led to a current standard data rate of 10Gbit/s, with a goal of 1,000Gbit/s.

Sub-oceanic erbium-doped fibre optical amplifier relays directly amplify the infra red signal without converting it into an electrical signal, as in the past. These amplifiers are like a laser, but without the mirrors that provide feedback for laser oscillation.

The relays offer the major advantage that the fibre system is 'transparent'. So that if (for example) a wider bandwidth is to be transmitted for bandwidth multiplexing, it's unnecessary to raise the cable from the ocean bed to modify the optical amplifiers.



## Very Efficient

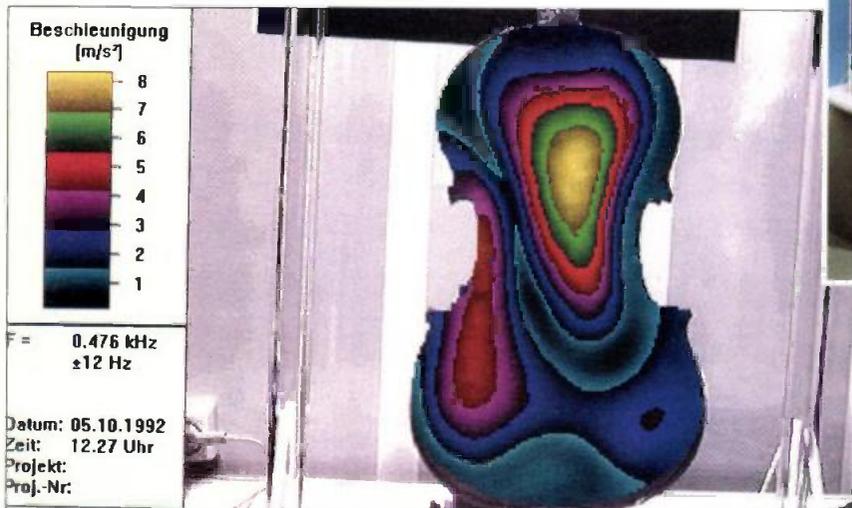
Having read this far, you'll now realise lasers offer a very efficient, albeit fairly costly, way of delivering high power at a well-defined chosen wavelength to an accurately defined area. Thus they have a wide range of industrial applications, surgery and other medical applications and lithography for semiconductor manufacture.

The ability of a laser to deliver high power means its radiation is hazardous, especially to the eye. **So suitable spectacles must be worn if there is any doubt about safety.**

How things have changed since the discovery of the laser when it was said to be an invention in search of an application. Humorists even suggested that 'laser' was an acronym for 'Lolley Acquisition Scheme for Expensive Research'!



Photographs of a He:Ne laser scanning vibrometer installation being used to investigate the vibration pattern of a violin, and the resultant pattern.  
(Photo courtesy of Lambda Photometrics Ltd.)



PW

# Virtual Electronics



## A review of Electronic Workbench Version 5

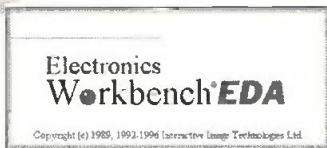
By Tex Swann G1TEX

*Looking for a use for that new computer you've got sitting in the corner? Look no further, 'Tex' Swann G1TEX, our technical sub-editor, has found something that might be more than entertaining!*

We are now well within the era of the computer, as we learn of computers being able to do all sorts of tasks. And I think I've found a task for which the computer is admirably suited and of great use to all involved in electronics.

I've been involved with computers for over 20 years now and during that period I've seen ideas appear and disappear. But as the computer is in essence only an expensive calculator I've felt their use was limited, although they have fascinated me all along. Then several years ago along came Electronics Workbench (EWB) and I felt at least a use had been found for the computer.

I was offered an opportunity to try out a new version of Electronics Workbench Version 5 and so this review is based on a late 'beta' version of it. For those new to computing, a 'beta' test version is software that is almost ready for sale, and is undergoing a final test by a selection of users.



offer? - What is EWB?

### Simulation Package

Electronics Workbench EDA is an electronics simulation package. You can design and 'lash-up' a circuit, then run a series of tests on it, measuring the circuit's responses without moving from the computer screen. Have a look at the various 'screen-grabs' shown on these pages and I'm sure you'll grasp an idea of what it can do.

But let me take you through a simple and yet typical task that we may all find useful. In Gordon King's review, on page 18 of this issue, of the Semaht Field Strength meter, he shows a typical low-pass filter, employed by radio amateurs world-wide as a means of reducing radio and TV interfering signals from their transmissions.

The circuit is shown ready to analyse in Fig. 1. In the middle of the shot is the filter circuit itself. On the left is a virtual signal generator with a 50Ω resistor (its output impedance) feeding into the filter then into a 'Bode Plotter'.

The Bode Plotter is an instrument that cannot exist in reality, it's a composite of several items. The nearest piece of test equipment is a spectrum analyser, but it's more than that! It is also a swept frequency signal generator (that's why it must always be coupled with the virtual signal generator).

The frequency response of the filter can be seen in the lower left hand corner of Fig. 1. The vertical line represents the -3dB point which is at almost 40MHz. Note the gradual fall-off response of this simple filter. In an effort to 'steepen' the skirts of the low-pass filter I started adding small capacitances across each of the three inductances.

The results of the new pass-band shape are shown in Fig. 2. It would have taken many hours to have achieved the same results with conventional methods. So EWB can save time in this case. It has also probably saved the filter because I would only place the small capacitors into circuit once to verify what EWB had shown me. I hate to

think of how many times I would have bumed myself swapping capacitors the old way.

But as the Bode Plotter is an instrument that does not exist in real life, let's turn to some that do! And a very special instrument that I find extremely useful in real life is an oscilloscope. Shown in Fig. 3 is a small LC oscillator circuit with the virtual 'scope in place on the output. High on the right in the screen grab is the mouse pointer poised over the 'Go' switch with the helpful pop-up legend 'Activate Simulation'.

On setting the simulation in motion the screen of the virtual 'scope remains with a steady trace for several virtual microseconds. Then a faint 'twitch' appears on the trace leading to the sustained trace shown in Fig. 4. (I've enlarged the screen of the 'scope now so that the trace occupies almost half of the PC's screen).

### Storage Oscilloscope

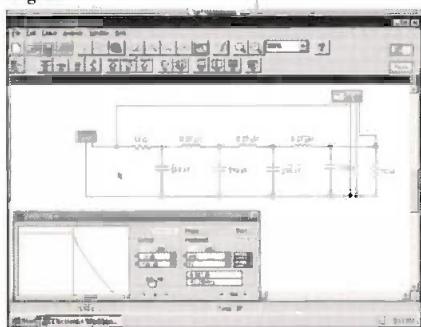
Then I discovered that the oscilloscope was a virtual storage unit, but with special capabilities. The display screen has a scrollbar at the bottom and on pulling it to the left (with the mouse pointer of course) the screen displayed the trace that had occurred earlier. In fact I could scroll all the way back to the moment that the oscillations started to build up. Wow! How I'd like that in real life!

But to get back to the circuit building side I looked at the various types of circuit elements that were contained in the many drop down menus. You could combine some of the several hundred individual components into sub circuits into your own circuit elements, to be used in further circuits.

I've shown a 2kHz band-pass filter (b.p.f.) element in Fig. 5. Simply draw the circuit, simulate it, to check that it did what it should and selected all the items. Then you just tell EWB to make a sub-circuit from the items and a small box appears in the 'Favourites' menu. Now any time you want this in the circuit drag it from the favourites and pop it into place.

Each of the 14 drop-down menus,

Fig. 1.

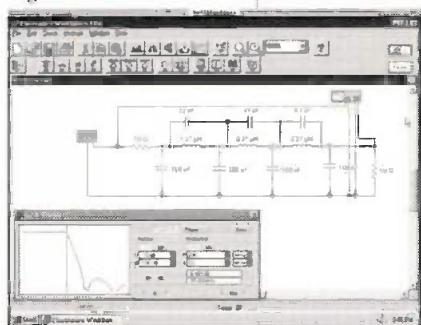


### Practical Way

Learning electronic principles the practical way is neither easy or cheap. Starting from scratch to make even a small amplifier and check it out would take a fair amount of money. You'll need power supplies, voltmeters, ammeters, oscilloscopes, indicators, hook-up wire, tools and you haven't even bought a component yet.

power supplies, voltmeters, ammeters, oscilloscopes, indicators, hook-up wire, tools and you haven't even bought a component yet.

Fig. 2.



Electronics Workbench though not cheap to buy, can reduce the overall cost of learning electronics. But EWB isn't just for learning electronics, it's a very good 'tool' for professional users too. So what is on

Continued on page 51

including 'Favourites' has many more 'drag-and-drop' choices available from selection boxes (Fig. 6). The hundreds of circuit elements may be either DIN or ANSI (or BS) standard types and come in a bewildering array.

There are many transistors and f.e.t.s by the manufacturer's part number. There are v.f.e.t.s by the same method. There seemed to be several hundred 7400 series logic gates. In fact there's so many, that they're broken into five sub-groups 0-99, 100-199, 200-299, 300-399 and over 400. The 4000 series c.m.o.s items are also in there too, along with the theoretical logical symbols in profusion.

Fig. 3.

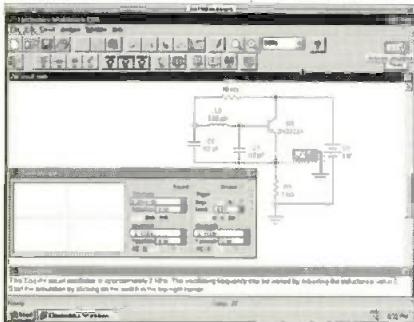


Fig. 4.

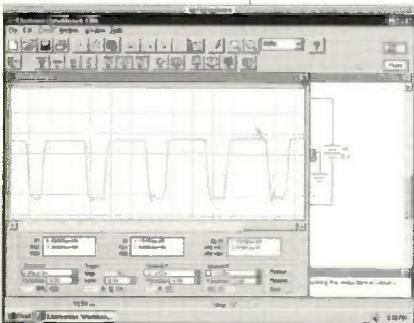


Fig. 5.

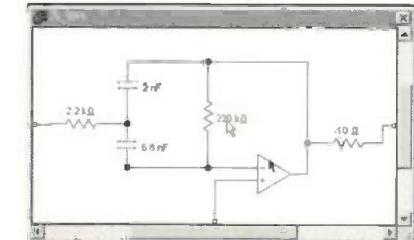
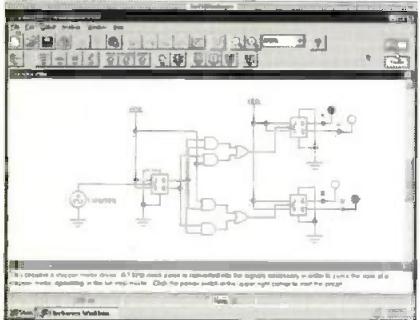


Fig. 7.



### Faults Built-in

Each of the individual circuit elements is not only synthesised but may have a fault built into it. What a wonderful way of training technicians in the intricacies of fault-finding! A virtual fault (that can even be due to a virtual temperature rise) can be programmed into one or more components.

I remember the hours that were needed to 'doctor' components for the students training, when I worked at a school of electronics many years ago. What would I have given for that ability then!

There was a lump in my throat when I spotted that,

under 'Miscellaneous', even valves had been catered for. But it was a shame that only triodes were in evidence in the copy I had. Oh for a few 807s and PL500s just to create the days of my youth, the smell of a hot glass envelope, with the crackle of high voltage arcing over to say 'move that knuckle'!

On the 'sources' drop down there are a.c. and d.c. sources as well as frequency sources, a.m. signals, f.m. signals f.s.k. sources, sine, square and triangular wave generators. All of the various signals that I knew would be needed to test out a circuit were there, including one or two I hadn't come across before.

So far I haven't even touched (other than briefly) on EWB's ability with digital signals. But it works quite happily with those as well. They may be developed as easily as analogue signals circuits. In fact, in this version digital and analogue signal analysis may be carried out on the same circuit, no longer are the two separate programs.

The circuit shown in Fig. 7 is one of the sample digital circuits and illustrates a stepper motor driver. The indicators (circular items on the right hand side) indicate the logical state of the outputs and may be attached anywhere to show logic states, just like little l.e.d. indicators. Wonderful!

A list of the facilities within this new version of Electronic Workbench would take up most of the space I have to describe the whole program. Even after a month of evaluating EWB I feel there are some 'dark' corners - I've not even seen, let alone explored so extensive are EWB's facilities and capabilities.

But there has to be a down side to the equation. And what might that be? you may ask Well the program's so powerful it really needs a brute of a processor to do its best. Although, I've tried it on the equivalent of a 33MHz '486 machine running Windows 3.11 it was a little sluggish. Running Windows 95 on this machine helped the overall speed a little.

But put EWB on a Pentium class

machine with 16 or more megabytes of memory (mine has 32Mb) running Windows 95 and it becomes almost instantaneous. Change a component during a simulation and the 'scope display, or the Bode Plotter changes almost before you're aware of it. (Now it was showing what it could do).

I found that with the ability to simulate 'what-if' changes to circuits made me want to try many more changes to try to improve the circuit under test. And with this ease and ability there is a danger that you could make many changes just 'out of interest'. But you would not be wasting time as the first unit you build would perform as it should.

Electronic Workbench will interact with many other development programs from 'SPICE' simulator to p.c.b layout programs. The Electronic Workbench Version 5 program is destined to become part of an integrated electronic development environment.

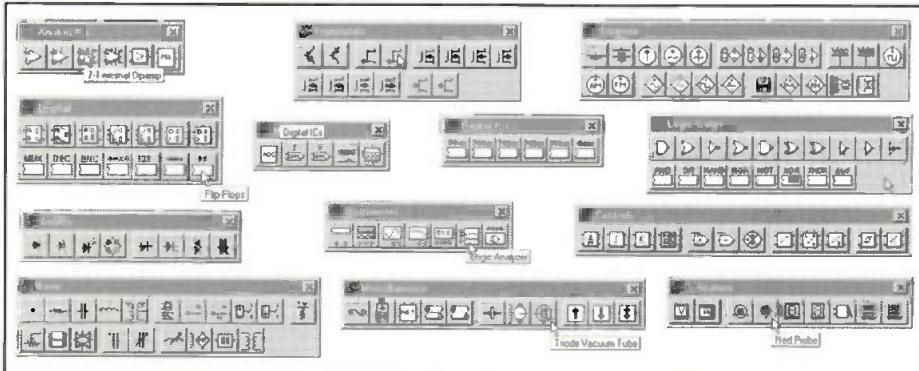
For professional designers, EWB has a 'big brother' in the form of EWB EDA with 14 more analyses available. Being aimed at the professional market it does however, cost more.

Without a doubt either version (v5 or EDA) EWB is a remarkable tool for anyone interested in electronic development, either as a student or as a professional designer. I can imagine that for colleges and even radio clubs, EWB would quickly become an indispensable teaching aid.

My thanks go to Robinson Marshall (Europe) PLC, Nadella Building, Leofric Business Park, Progress Close, Coventry CV3 2TF, for supplying the review copy of Electronic Workbench Version 5 which costs £199+P&P and VAT. The 'big brother' version, Electronics Workbench EDA costs £795+P&P and VAT.

PW

Fig. 6.



# Dip Meters - Dutch Style!



By Wim de Ruyter PA0PRW

*Dutch reader Wim de Ruyter PA0PRW knows that PW readers like old 'favourite' ideas brought up-to-date. Wim thinks his 'Dip meter' suggestions are in this category and will be of interest to everyone who uses this most versatile instrument.*

As a keen supporter of the useful 'dip meter' - whether valved or transistorised - I thought *PW* readers might be interested in some of my ideas.

My interest in taking advantage of the 'dip' meter or 'dip' oscillator (call it what you will...it's known under many a different name!) started after I'd read an interesting article in *The 1948 ARRL Handbook*. It was here that I realised that the author of so long ago had really emphasised how useful the 'dip' meter could be.

In the *1948 ARRL Book* I found a series of really fascinating articles on using the 'dip' meter. Bearing in mind how few Radio Amateurs in those days had easy access to test equipment I'm sure that what I read was truly 'state of the art' for the Radio Amateur of almost 50 years ago.

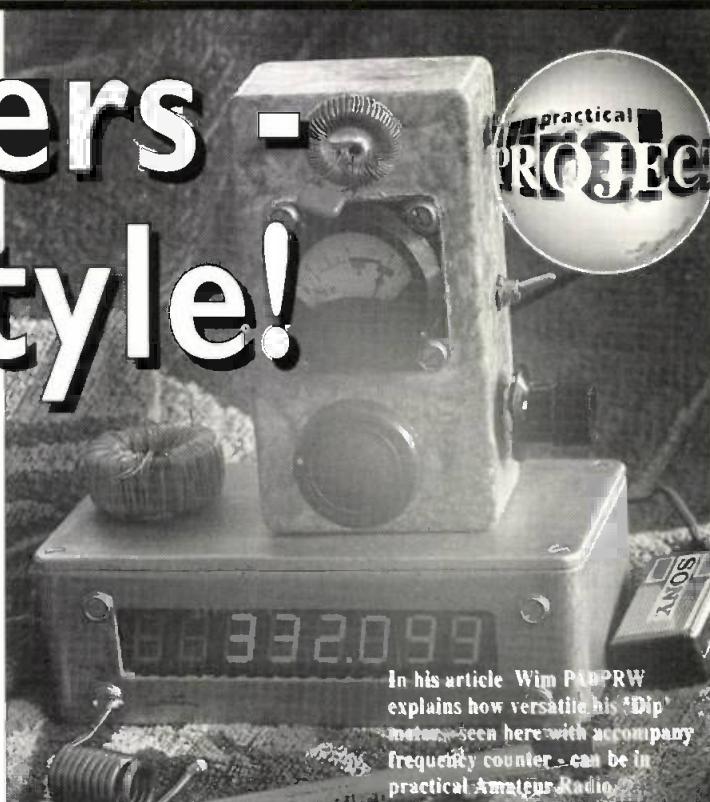
Obviously, the circuits used in the original article used valves and my ideas use transistors. But despite the fact I have used semiconductors - valved 'dip' meters are still very useful tools. There's no doubt in my mind that many of you still have a

valved 'dipper' in the shack...they tend to be very long lived instruments!

So, having described where I got my first inspiration here I go...describing my 'Odd Job Man' oscillator...a most versatile instrument. My ideas are laid out as a series of suggestions rather than one single article in the hope that you will use the ideas of interest to you, and placing the others to one side.

The simple instrument I'm describing can serve as an audio generator, r.f. generator, 'gate' dipper, comparative 'Q' meter or an

In his article Wim PA0PRW explains how versatile his 'Dip' meter - seen here with accompanying frequency counter - can be in practical Amateur Radio.



absorption meter covering from about 200kHz to about 80MHz.

## Basic Circuit

The heart of the basic circuit behind my 'universal dipper' arrangement, Fig. 1, is a matched pair of 2N3819 field effect transistors (f.e.t.s). The 'pinch off' of the individual 2N3819s must lie between 1.5 to 2V. This is necessary for use on a 9V supply and a high impedance load for Tr1 is provided the constant current source Tr2.

To help identify a 'matched pair' of 2N3819 f.e.t.s I suggest you use the circuit in Fig. 2. In use (a meter calibrated 0 to 10V or a multimeter can be used) this circuit helps identify 2N3819s with a similar 'pinch off' voltage (Vp).

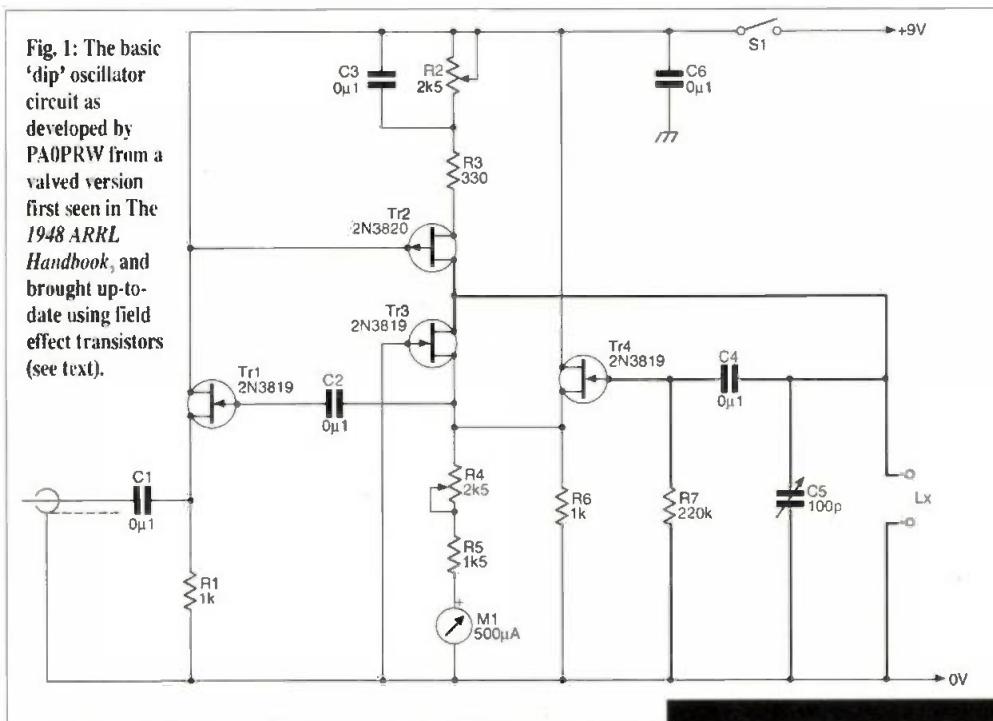
I included the 2N3820 device (Tr2) to overcome difficulties with poor phase noise properties of bi-polar transistors. I originally used an AF239 transistor in this location, but the f.e.t. used in its place cured the problems of poor phase noise performance I encountered.

The Vp of a device used in the location of Tr2 must be about 1V. And the typical value of a stock quantity of 10 2N3820s in my workshop had turned out to be surprisingly low...at 1.4V! However, in most cases I feel sure you'll only have to buy five or so (they're not very expensive fortunately!) to find the right device for the job!

A further improvement comes from the symmetrical 'soft' clamping of the signal, which is achieved by the

**Continued on page 52**

Fig. 1: The basic 'dip' oscillator circuit as developed by PA0PRW from a valved version first seen in *The 1948 ARRL Handbook*, and brought up-to-date using field effect transistors (see text).



# Dip Meters - Dutch Style

Continued from page 51

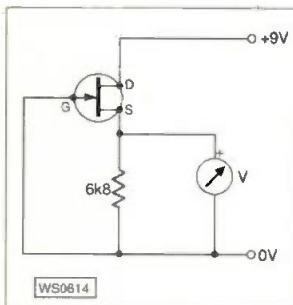


Fig. 2: Circuit used by PA0PRW to measure individual 'pinch off' voltage of 2N3819 devices to provide 'matched pairs' (see text).

means that a very good quality audio waveform can be obtained, especially when a resonant circuit with high C value is applied.

Incidentally, the core of the audio coil must (preferably) be a solid type, so a pot-core type could be used. If you decide to use a toroid, you'll certainly find a 'shuttle' type bobbin very helpful.

In use, the 'shuttle' type bobbin carries the wire through the core very easily, with minimum effort and has the advantage that it also acts as the spool carrying the wire to wind the coil. Take it from me...if you ever have to wind fairly large coils onto a toroid...it's worth making a 'shuttle' type bobbin!

For use as a signal generator the amplitude of the 2N3819 oscillator must be 'peaked' by R4. The adjustment is critical and it will need to be re-

adjusted as the battery voltage drops during its working lifetime.

It's important to bear in mind that - in my opinion - a dip oscillator must oscillate weakly. The weak oscillation ensures that you'll get the most pronounced 'dip' when energy is

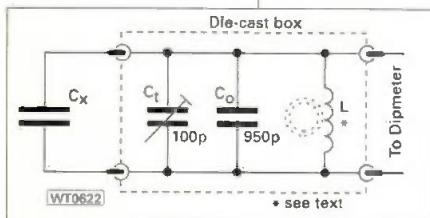


Fig. 3: Circuit of the capacity measuring module as suggested by Wim de Ruyter (see text for explanation of technique involved).

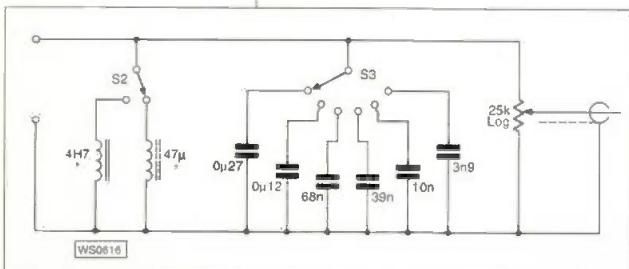


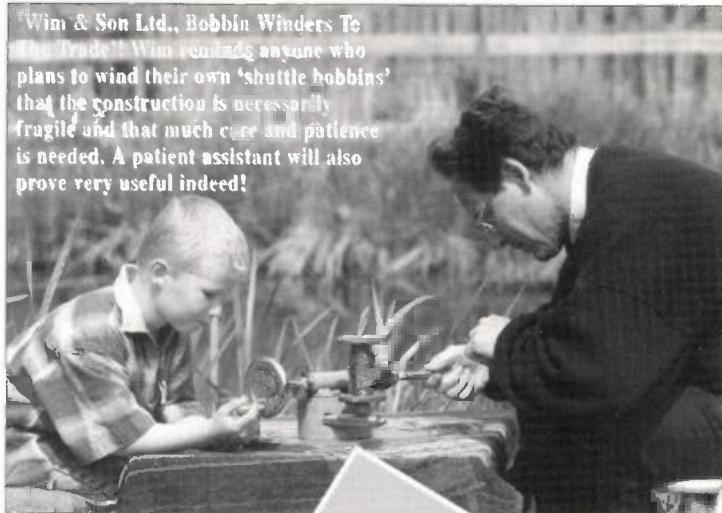
Fig. 4: The audio module for use with the 'dip' meter. This is built in a separate aluminium die-cast box. Range 1 covers 200-300-400-500-1kHz with a coil of 4.6H (large audio choke). Range 2 covers 2-3-4-5-10kHz using a 47mH (milliHenry) toroidal core coil of 75 turns 24s.w.g. (Toroid is a Philips Green 1.5in outside diameter type). The capacitor values (0.27µF - to- 3.9nF) selected by the switch S3, will have to be found by trial and error.

absorbed by the absorbing circuit.

## Really Versatile

The basic instrument is, as I've already stressed, really versatile and to emphasise the point it will: (with no coil connected) act as a sawtooth generator, and it can be used to identify small (unknown value) capacitors and in conjunction with a frequency counter you'll have a very useful combination.

And if you don't have a good sensitive meter movement available to use to indicate the 'dip' don't despair! You can use a large external meter movement (an AVO type would be ideal). Additionally, if you take this idea up you can use the external



Wim & Son Ltd., Bobbin Winders To The Trade! Wim reminds anyone who plans to wind their own 'shuttle bobbins' that the construction is necessarily fragile and that much care and patience is needed. A patient assistant will also prove very useful indeed!

meter in a bridge type circuit so it can be 'zeroed' (this is necessary when you're using the dB scale).

Using the 'dip' meter as a field strength meter you'll be able to measure front-to-back ratios of beam antennas. If you have incorporated a bridge circuit as I've suggested, you'll be able to use the dB scale directly to compare the front-to-back ratios in dBs.

Incidentally, if you don't have access to a frequency counter you can either build the very popular PW 'Robin' frequency counter project, or build the very useful kit from Howes Communications (The DFD 5).

## Capacity Measurement

To measure capacitance using the dip meter you use the detuning effect of the unknown capacitor. Look at the diagram, Fig. 3, where the capacity measuring interface is shown. A simple circuit, but with two effects that limit in absolute terms the accuracy and range of measurements.

The two limiting factors are the coil's self capacitance and the hysteresis and saturation of the toroid core material used. The self capacitance of a coil is unfortunately not a fixed value. It varies with the construction of the coil and with the frequency of oscillation.

The coil L is wound on a 25mm toroidal core using 50turns of 0.5mm (24s.w.g.) enamelled copper wire.



The particular core I used came

from Philips and was coloured purple, but almost any low frequency toroidal core of 20-30mm diameter should work.

The hysteresis and saturation effects will change with the level of oscillation and with the frequency as well. But in general terms it will allow measurements to be taken within  $\pm 1.5\%$  up to 1000pF and within  $\pm 3\%$  up to 0.1µF

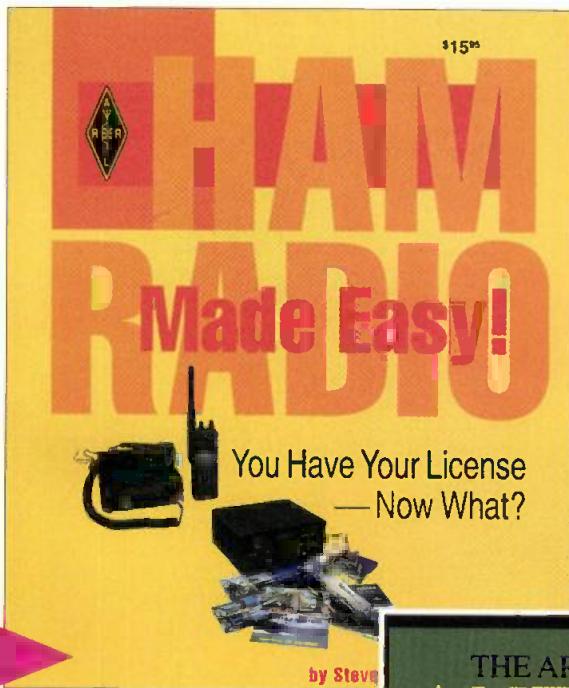
To measure a capacitance value the resonant frequency of the unit without the capacitor is measured, then the  $C_x$  is added and the new resonant frequency is measured. Following these two frequency measurements, a simple calculation is all that's needed to find the unknown capacitance value.

The two frequencies of oscillation are  $F_n$ , the normal frequency, and  $F_x$ , the frequency of oscillation with the unknown capacitor  $C_x$  in parallel.

$$F_n = \frac{1}{2\pi\sqrt{LC}} \quad F_x = \frac{1}{2\pi\sqrt{L(C+C_x)}}$$

Continued on page 57





## Ham Radio Made Easy

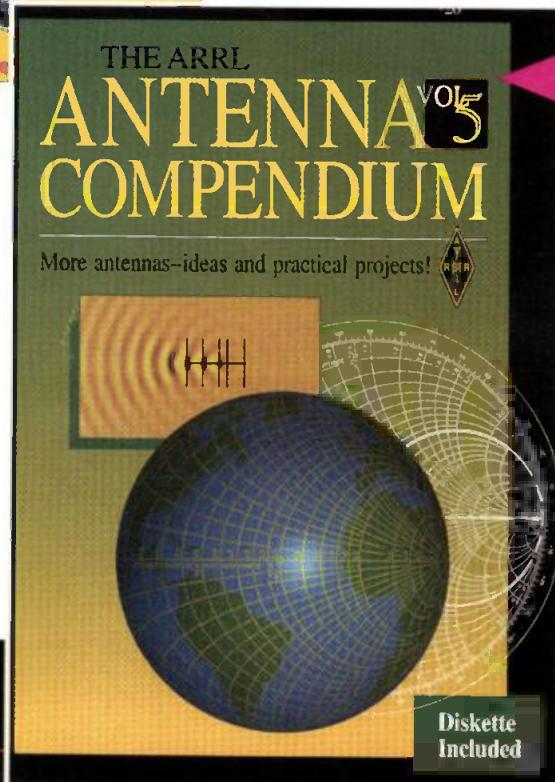
If you've ever seen a copy of the (very popular and it ran to many editions) RSGB's *A Guide To Amateur Radio* by Pat Hawker G3VA, you'll realise that this book is a modern American version of the same idea. And although it is very American in approach, any new Radio Amateur will find the book of interest.

Steve Ford WB8IMY, the author, provides a useful 'overview' of the hobby and procedures which will help new operators and experienced types who want to catch up on new techniques! And at just £12.50 it won't break the bank to add *Ham Radio Made Easy* to your collection.

# prof

This month we profile a selection of titles which are published from 'across the pond' by the American Radio Relay League. Although these titles are American in origin they are most informative and most certainly will appeal to the European Radio Amateur.

## The ARRL Antenna Compendium Vol 5



The very popular *Antenna Compendium* series from the ARRL has now reached volume 5. Editor Dean Straw N6BV and his Assistant Editor Rich Roznoy KA1OF have managed to find more antennas and techniques to publish in the ongoing series of antenna books.

There are eight sections in this 200-page A4 sized book as well as a 3.5in IBM PC (or compatible) disk with antenna data and programs. The sections are '80 and 160-Meter Antennas', 'VHF/UHF' Antennas, 'Antenna Modelling,' 'Multiband Antennas', 'Propagation and Ground Effects', 'Measurements and Computations', 'Special Antennas' and 'Antennas Tuners, Baluns and Transmission Lines'.

There are many new designs of antenna appearing in this, the latest in the series, book. Find out how to build the 'Hentenna' a new 'miracle' wire antenna from JF6DEA, a full sized discorne for h.f. working or a trapped delta loop for 3.5/7/10MHz working. These antennas and many more may be found in this new addition to the 'Antenna Compendium' series.

The *ARRL Antenna Compendium Vol 5* is available for £16.50.

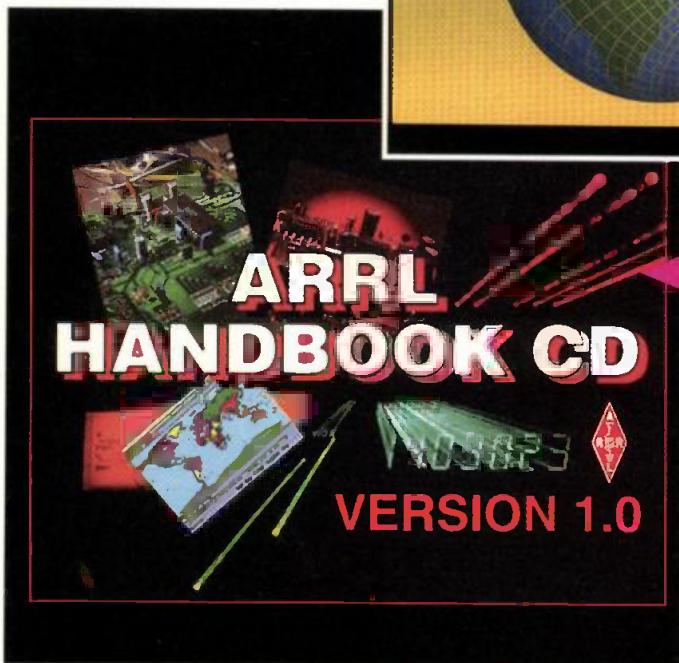
## ARRL Handbook CD Version 1.0

Over the years several generations of Radio Amateurs as well as engineers, technicians and students have enjoyed and found *The ARRL Handbook* to be an indispensable reference guide. And now for the first time ever it's available on CDROM. Contained on the CDROM is the complete text and illustrations from the printed handbook.

Also included is a powerful search facility that allows the user to find information quickly by simply entering key words or phrases, as well as audio clips to illustrate a variety of modes and activities. You can 'zoom' in to enlarge or reduce text and illustrations and well as pasting text and illustrations into other Windows applications.

The minimum system requirements to run the CDROM of the *ARRL Handbook* are a '386, '486 or Pentium IBM PC with 4Mb RAM, Microsoft Windows 3.1.

A copy of the *ARRL Handbook* on CDROM costs £30 and is available now!



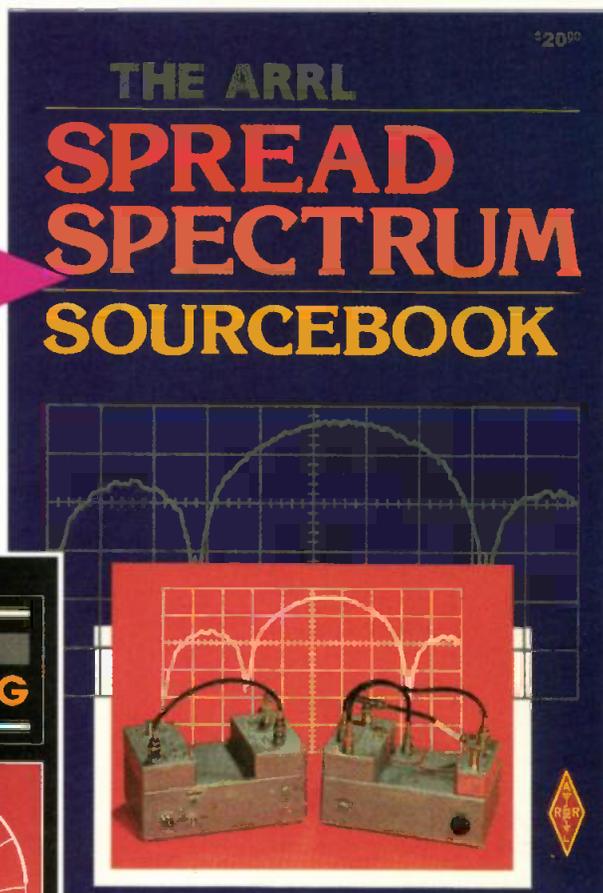
**TO ORDER ANY OF THE TITLES MENTIONED ON THESE TWO PAGES PLEASE USE THE ORDER FORM IN THIS ISSUE OR**

# Files

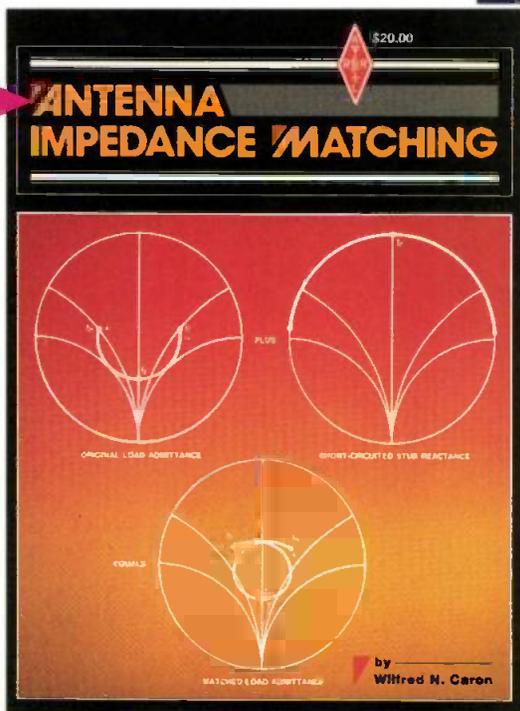
## The ARRL Spread Spectrum Sourcebook

When *PW* published an article on Spread Spectrum a few years back quite a few readers thought it was an elaborate practical joke! However, if you are interested in the fascinating new world of spread spectrum operation...this book will help you find out much more.

All the 'secrets', possible techniques and methods used in this highly complex mode are covered and if it becomes an option for all Radio Amateurs in the UK...you'll be ready and at least understand it's far from being a joke! *The ARRL Spread Spectrum Sourcebook* costs £15.50.



## Antenna Impedance Matching



Proper impedance matching of an antenna to a transmission line is a concern of every radio amateur and antenna engineers alike. A properly matched antenna as the termination for a line minimises feed-line losses. Power can be fed to such a line without the need for a matching network at the line input.

There is no mystery involved in designing even the most complex multi-element networks for broadband coverage and the author of *Antenna Impedance Matching*, Wilfred Caron sets out to prove that within the 195 pages of this comprehensive book.

A copy of *Antenna Impedance Matching* will cost you just £14.50.

FURTHER LISTINGS AVAILABLE ON PAGES 80 & 81 OF THIS ISSUE

## Understanding Basic Electronics

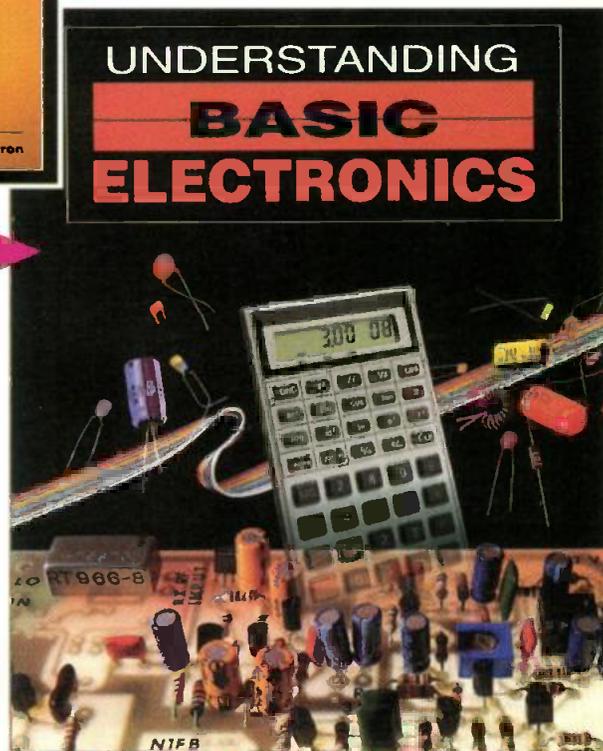
Anyone who remembers the excellent 'Common Core' series of books entitled *Basic Electronics*, *Basic Electricity*, *Basic Radar*, etc., will be interested in this new book from the ARRL. They have aimed at producing a book which is a first text book rather than an introduction to Amateur Radio.

Packed with relatively short (some single pages and some with two pages) 'bite size' sections covering the whole aspect of basic electronics...this book is an absolutely superb buy for the beginner and instructor alike.

Profusely illustrated with diagrams and excellent cartoons, *Understanding Basic Electronics* is both readable and instructive. I'm adding it to my 'Recommended Reading List' for the new 'Radio - Discover The Basics' column.

Well done ARRL! *Understanding Basic Electronics* comes Very highly recommended at £16.50.

Rob Mannion G3XFD



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## NEW FROM SGC ...

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# Dip Meters - Dutch Style

Continued from page 52

The ratio between the two frequencies is related to  $C_x$  by the following formula:

$$C_x = \left( \frac{F_n}{F_x} - 1 \right) \times 1000 (\text{pF})$$

But before you can use this formula it's necessary to calibrate the unit, to make  $(C_o + C_t)$  equal to 1000pF. This is quite simple to do, but you'll need a 100pF 1% capacitor to become the temporary  $C_x$ . When the capacitor  $C_x$  is 100pF and the  $(C_o + C_t) = 1000\text{pF}$  then the ratio of  $F_n$  and  $F_x$  is the square root of  $(1/1.1)$ , which is 0.95346.

So when  $F_x$  becomes  $(F_n \times 0.95346)$  then  $(C_o + C_t)$  is calibrated. You should carry out the calibration at the working temperature and with the

coil fitted into the die-cast aluminium box.

The unit is now ready to use, all you need now is the calculator. But if the counter has a 'count output' facility the whole thing could be made automatic.

If an inductor is placed in parallel then the frequency shift is negative. You can calculate the value a **negative capacitance** and then calculate it back to microhenries. But as this would depend on the exact frequencies I won't go into details.

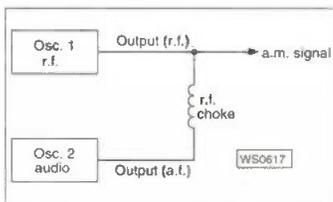
## In Your Shack

I hope you find my ideas of interest and that you'll now discover a useful (and perhaps neglected?) instrument in your shack. And if you don't have a 'dip' meter perhaps you'll be encouraged to build one for yourself.

So, I suggest you get busy and follow my example and although you won't do yours 'Dutch style'...you will make one to suit your requirements. They really are that versatile!



Fig. 5: Suggested technique for applying simple modulation to a 'dip' meter.



PW

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

# RADIO Diary

Compiled by Zoë Crabb

# 1997

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

**April 13:** The 16th Mobile Rally of the Lough Erne Amateur Radio Club will be held at the Killyhelvin Hotel, Enniskillen, Northern Ireland. Doors open at 12 noon. Tyrone Amateur Electronics, Icom, Yaesu, Waters & Stanton will be there as well as many other traders. **Keiran G17NET** on (01365) 348063 and (01365) 327133 (evenings).

**April 19:** International Marconi Day exhibition at the Wireless Museum in Puckpool Park, Seaview, Isle of Wight. There will be a display of early Marconi gear and working short wave transmitting station. Free entry and free parking plus refreshments. **Douglas G3KPO** on (01983) 567665.

**April 19:** SAMS '97 Computer & Electronics Show Rally will take place at Bingley Hall, Staffordshire Showground, Weston Road, Stafford (A518 Stafford-Uttoxeter Road), signposted from junction 14 on M6, bus shuttle from Stafford Railway Station. Doors open 10am to 4pm and admission is £2.50 for adults, children under 14, 50p, concessions, DAPS, RSGB members, student card, UB40, £1.50. Advance tickets £1.50 plus s.a.e. This is the 9th consecutive year for AMS at Bingley Hall. Last year's show saw just under 100 trade stands, covering the computing spectrum, including PC, Einstein, Amiga, AtariST and Atari8-bit, along with accessories, software, books, components and lots more. There will be lots of free parking, a licensed bar from 11am, refreshments, meals, cafeteria. More information from **Sharon Alward** on (01473) 741533 or FAX on (01473) 741361.

**April 27:** The BATC Rally '97 is being held at the Sports Connexion, Coventry. Doors open at 10am (9.30am for disabled visitors). Entrance is £1, 50p for

DAPs and under 14s. There will be all the usual features of BATC rallies, over 200 trading tables, Bring & Buy, large outdoor flea market, specialist more television displays, ex broadcast vehicles, etc. **GB6ATV** talk-in on S22 and **GB3CV (RB9)**. There are full refreshment facilities and a licensed bar. **Mike Wooding G6IQM** on (01788) 890365. FAX: (01788) 891883. E-mail: batc97@g6iqm.demon.co.uk

**May 5:** The Dartmoor Radio Rally are holding their rally at the Yelverton Memorial Village Hall, Meavy Lane, Yelverton, Devon. There is parking for 600 cars, access for disabled visitors, playground for children, trade stands, Bring & Buy, etc., refreshments. Doors open at 10.30am. Talk-in on S22. **Ron G7LLG** on (01822) 852586.

**May 5:** The Mid-Cheshire Amateur Radio Society are holding their rally at Winsford Civic Hall, Town Centre, Winsford. Doors open at 11am (10.30am for disabled visitors). Admission is £1, under 14s free with adults. Talk-in on 2m. There will be ample parking, a bar and catering services, too. All the usual traders will be there, there will also be a Bring & Buy stand. The rally is fully signposted. More details from **David G4XUV, QTHR** on (01606) 77787.

**May 11:** The Midland Amateur Radio Society (MARS) are holding their Drayton Rally at Drayton Manor Park, Tamworth, Staffs. Doors open 10.30 to 4.30pm. There will be trade stands, Bring & Buy, Flea Market,

local clubs, children's entertainment, side show, a licensed bar and a zoo, etc. A day out for all the family. For more information phone **Peter Haylar G6DRN** on 0121-443 1189 or **Mike Nyman G40MP** on 0121-486 1634.

**\*May 16/17/18:** The Dayton HamVention, the largest amateur radio show in the world, is taking place at the Hara Convention Centre in Ohio, USA. Doors open at 12pm on the 16th, and the event runs until early afternoon on the 18th. For the early risers, the Flea Market is open from 6am on the 16th. You will be able to visit many trade stands, attend lectures and meet amateurs from all over the world.

**May 18:** Yeovil ARC are holding their 13th QRP Convention at Digby Hall, Hound St., Sherborne, Dorset. Doors open 0900 to 1700. There will be lectures, trade stands, refreshments, talk-in on S22. Entry is £2, which includes prize draw ticket. **Peter G3CQR, QTHR** on (01935) 813054.

**May 18:** The Dunstable Downs Radio Club are holding their 14th Annual National Amateur Radio and Car Boot Sale at Stockwood Country Park, Luton, nr junction 10, M1. Doors open 10am to 4pm. Talk-in on 144MHz. Free entry to Mossman collection of Horse drawn vehicles, craft museum, plus much, much more. Plot details on (01582) 613899, pre-bookings for plots until May 14th. Plots can be purchased on the day.

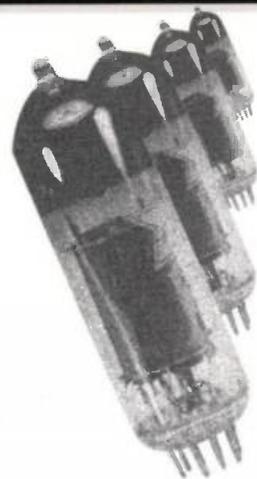
**May 18:** The Mid-Ulster Amateur Radio Club are holding their Annual Radio Rally and Bring & Buy at the Silverwood Hotel, Lurgan (1/2 mile from M1 motorway). Doors open from 12 noon. There will be a buffet, bar and car parking facilities available in the Hotel. Contact **Mr R. Todd G10STS** on (01762) 324383.

**May 25:** The Plymouth Radio Club is holding its rally at the College of Further Education, Kings Road, Devonport, Plymouth. Admission is £1. Doors open at 10am for disabled visitors and 10.30am for others. Anyone wanting further information, contact **Stephen Ramsden G7UXL** on (01752) 662051 during office hours or before 9pm on (01752) 777189.

**May 25:** The 21st East Suffolk Wireless Revival, Ipswich, is to be held at Stoke High School, SSE main rail station, map ref. TM164435. Radio & Computer Rally open from 10am (9.30am for disabled visitors) until 4pm. Talk-in on S22. **Dave Johnson G7SMX** on (01394) 285600, johnsod6@boat.bt.com

**June 21:** The Royal Navy Amateur Radio Society are holding their Annual Mobile Rally at HMS Collingwood, Fareham, in conjunction with The Royal Navy Brickwoods Field Gun Competition and HMS Collingwood Open Day. This year's rally will have a similar format to last year, plenty of action for all the family including the Free Fall Parachute team and the Hampshire Police Motor Cycle Team, plus all the usual Amateur Radio content for the remainder. (01705) 365503.

# Valve & Vintage



By Ben Nock G4BXD

*Stand by your desks and pay attention! It's Ben Nock G4BXD's turn to look after the vintage 'Wireless Shop'...and judging by the fact he's in uniform there must be a 'military flavour' this month!*

Here I am once more, on the subject of 'Valve and Vintage', with a 'military flavour' and amongst other things, a few readers enquiries to put forward. And to start off, Mr A. Guibert, from Canada, E-mailed to ask what I knew about the OSSRWS!

Now the initials stand for (apparently) Out Station Sound Ranging Wireless Set. Phew!

As it was, I knew nothing, but Mr Guibert kindly sent me the few sheets he had on the system. It looks like a No. 22 set, the p.s.u. is very similar, and the 'blurb' states that it's for recording the sound of the guns in a field battery, going BANG. Why, I do not know, but there we are!

Anyway, suffice it to say, if anyone out there knows about the OSSRW system or has a circuit diagram or other information, do let me know and I'll pass it on.

Another enquiry, and this time it comes from Ray K5FKT. "Picked up an Admiralty '5G' set from VK-land. Uses a 5Z3 rectifier, a 6V6 crystal oscillator and an 807 in the final. It is a c.w. transmitter operating in 3 bands, from 3 to 24 MHz, using plug-in coils. Cute little thing. Any idea where I can get a schematic or other information on the beast?". Well, if anyone can help Ray, get in touch with me and again I'll pass it on.

## Admiralty Pattern

Another enquiry has come from Jack G4IZM, who would like information on an Admiralty Pattern Receiver AP100335. This is a medium and high frequency set, covering 60kHz to 30MHz.

The receiver is quite large and heavy, as with all Navy things, and it's used in conjunction with an AP100333 transmitter. Jack needs a decent circuit diagram for the receiver and transmitter and any alignment notes that may be out there. Can you help?

## Arms Fairs

Though in the main a place for armour, medals and uniforms, you can find the odd radio related item at various Arms fairs.

One event is held on a regular basis at the National Motorcycle Museum. This is at Junction 6, on the M42. The next meetings there are on 15 June, 21 September and 23 November 1997. The contact number is (0115) 9474137.

## Specialised Societies

Brian Williamson, from Surrey, wrote in to ask me if there were any specialised societies for collecting valved equipment. And in answer Brian, I know of the Eddystone Users Group (EUG), mentioned in my last column, and then there is the Military



Fig. 2: The R-103 Mark 1 Canadian. Note the built-in speaker on the left, with main tuning knob on the right.

## Wireless Amateur Radio Society (MWARS).

The MWARS group, to which I belong, is mainly interested in military, or 'green' kit, hence the title. But many members have either commercial or Amateur Radio valved gear, KWs, Labgear, Eddystone, etc.

Membership of the group is £7 a year and we have a bi-monthly newsheet with articles and adverts. We also have a net on 3.625MHz, using a.m. on Saturday mornings at 0930 UTC.

There's also a net 3.577MHz on



Fig. 3: The inside of the R-103 Mark 1. The coil pack and tuning components are on the left of the picture, with the i.f. stages in the middle. The vibrator power pack is mounted on the right hand side of the chassis.

Sundays starting at 0930UTC for c.w. users. And with many members around during the week on the same frequencies, look around midday when you might find someone on the air. Contact for the Society is John Taylor-Cram, who can be telephoned on (01705) 250463.

## Picture Gallery

First in the picture gallery this time is an old favourite, the R1155 and T1154 as shown in Fig. 1 are Eric G3LPS's sets. Slightly modified as far as the plugs and sockets go, they are in use on the bands at odd times. So, if you hear a 'chirpy' c.w. note, it might be Eric.

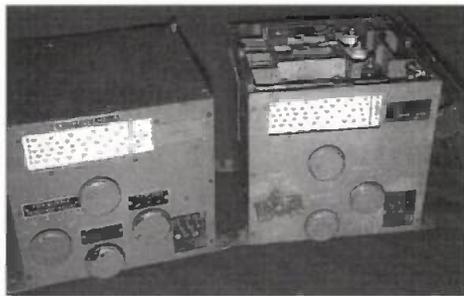
Next I've heard from Mr Loustau, near Paris in France. He has sent pictures of the R-103 Mark 1 Canadian. This Seven Loctal valved set, covers 1.5 to 16MHz in three ranges and is powered from a 6V d.c. source.

There is a British R-103 but it's slightly different in appearance. The photograph Fig. 2, shows the front of the Canadian version, while the photograph Fig. 3, shows the inside layout. I believe the set was fitted into vehicles as some sort of monitor. Again, information is required.

Now we're privileged to have a



Fig. 1: An old favourite...the R1155 (the two top units) belonging to G3LPS and the 1154 set (below). Note the slight modification to the h.t. and aerial plugs on the side of the 1154 transmitter.



**Fig. 4: The 'Saram' 0-12 set. The set on the left has German markings and the version on the right is in the original French (see text).**

picture of a rare little set. The photograph in Fig. 4, is of a 'Le Recepteur Saram 0-12', a 5-band, 4-valved set which covers Long waves up to 7MHz.

The set is a tuned radio frequency (t.r.f.) receiver. In other words, it's a 'straight set' with no intermediate frequency hence no local oscillator.

There are just three sets of tuned circuits running at the received frequency followed by a detector stage. The receiver was designed around 1935/36 and used by the French Air Force. (The version on the left was 'captured'

12V. The receiver has a vibrator power supply built in and the transmitter uses the familiar rotary generator. Two 6V batteries would have been used, wired in series with a take-off at the junction for the receiver, the two powering the transmitter.

The transmitter uses two 807 valves as oscillator and p.a. stage, and power output is around 10W c.w. only, no modulation being provided. An aerial current meter allows the 'roller coaster' output tank circuit to be correctly matched to long wire aerial. A connector allows the aerial to be patched through to the receiver whilst listening.

I have only ever seen one type of 76 Set, but there are at least three versions of the R-109 (I have a 109, a 109A and a 109AT. Slightly different frequency coverages and tropicalisation form the variations. (The 109 in the



**Fig. 5: The R-109 (left) with Sender No. 76 on the right. The centre plate mounted on the 76 set provides tuning settings for various lengths of wire aerial.**

by the Germans and has been replated with German lettering).

### My Shelves

Now a couple of sets off my shelves and I'll start with the receiver No R-109 and its matching transmitter, Sender No 76, as seen in Fig. 5. These battery powered sets were used together to form a fairly high powered station. The transmitter is crystal controlled, six crystals being fitted inside the set and selected from a front panel switch.

The receiver, tuneable from 2 to 12MHz, is powered from a 6V source while the transmitter needs

photograph is missing its front 'kick' grill, as fitted to the 76 Set).

With reference to 'kick' grills, many of the war time sets had these metal protection grills. The 19, 62, 22, etc., had them to protect the equipment controls from the heavy booted feet of the 'Squaddies'. They have, in the main now they're in the hands of amateurs and collectors, been removed for ease of operation.

### Tender Loving Care

Finding a poor old 18 Set transmitter in a cardboard box at a rally the other day I took it home for some 'tender loving care'. After

a good 'wash and brush up' an inspection showed it to be complete and free from attacks from the dreaded 'modifysanythings' animal.

Applying heater volts produced the faint glow in the valves. With appropriate h.t. provided, the set produced pleasing squeals, squeaks and whistles from the monitoring receiver. All the bits seemed to work so action was taken to see if the 18 would still transmit.

The 18 Set still had the original 5-pin power supply plug. Orientation of this is straightforward: looking at the pins (with the body of the plug pointing down) the bottom two pins are the heaters (3V) top pin is 12V positive, left pin is h.t. positive (170V) and the right pin is 12V and h.t. negative. All supplies are of course d.c.

The 4-pin microphone plug at the front of the transmitter needs to have pin 2 and 4 linked to apply volts to the transmitter unit. (Looking at the set that's the upper right pin to the lower left pin).

### Carrier Jumpy

With power applied to the 18 Set I found the carrier was very 'jumpy' and unstable. So I proceeded to remove the valve, clean the pins and re-soldered all the joints.

Next I added a couple of new decouplers (0.01µF), to the h.t. side of things. I finished off by tightening up all the screws, nuts and bolts.

Then I tried it on air again, the actions seemed to have helped but the drift was quite high and the chirp quite pronounced. Adding extra electrolytics to the h.t. only seemed to increase the chirp so they were left out of circuit.

To try and reduce the voltage change on the v.f.o. when the p.a. was keyed, I added a 3.3kΩ resistor in series with the v.f.o. feed, decoupled by a 1µF 250V capacitor. I also added a 0.01µF to the screen grid of the p.a., to ground, this being the pin that's keyed for c.w. use.

The overall effect was to calm things down quite a bit. The chirp was less, but still there, and the drift was still evident.

As there's no provision for crystal control on the 18

set I tried soldering a 7MHz crystal across the grid resistor of the v.f.o. This locked the v.f.o. quite nicely and now, with this addition, I tried it on the air.

I worked an SP9 (Poland) who gave me 579 and a DJ8 (Germany) who gave me 569 (that's 250mW into the 135 ft long wire aerial used at my station. Considering it's a 50-year old, flea-powered set. I think that's quite good going and a remarkable testimonial to the original designers of the 18 set. I would imagine the crystal addition would work on the 68 set on 3.5MHz just as well.

### Different QRP

I realise the 18 Set is not every QRPers ideal set. But it's certainly a little different from the fairly bland little sets sometimes used.

Well that's all for now. In closing I would like to point out that, contrary to comments made to me, I have no connection, privately or business wise, with any other contributors to this column or magazine (other than contact with the PW Editor). Any comments to other 'Valve & Vintage' contributors should be addressed directly to them.

Finally, thanks to G.A. Taylor G8AKN, and James Farquhar who sent information following my last column's mention of the Trophy 6 set.

As always, I can be contacted direct at: 'The Radio Room', 62 Cobden St, Kidderminster, Worcestershire DY11 6RP, via the PW offices or by E-mail at 106312.1035@compuserve.com or @ GB7TCM.



**Fig. 6: A pair of Wireless sets No. 18. The separate (removable for servicing) receiver unit is on top, with the separate transmitter (linked by an inter-unit plug and socket arrangement) at the bottom. The large combined h.t., bias and l.t. 'all dry' battery is housed inside the bottom unit, under the transmitter.**

# Carrying on the Practical Way

By George Dobbs G3RJV

*This month the Rev. George Dobbs G3RJV describes an 'add-on' external b.f.o. unit enabling reception of c.w. and s.s.b. on broadcast band receivers not fitted with such 'luxuries'!*

One of my favourite amateur radio station photographs is that of Binu VU2NGB's station in India. The whole station is home-made from what is to hand. His transmitter is a collection of circuit boards loose on the table and the receiver is an a.m. 'all-wave' transistor radio.

Binu's receiver uses an external beat frequency oscillator (b.f.o.) to resolve s.s.b. and c.w. stations. With this set-up, Binu has over 60 countries confirmed on 7MHz.

The VU2NGB set-up is a fine example of running an amateur radio station in difficult circumstances. It also looks a little like my first amateur radio station at the beginning of the 1960s!

This month's little project is designed to help an a.m. broadcast receiver, with short wave ranges, resolve s.s.b. and c.w. signals. Almost all such receivers use 455kHz as an intermediate frequency and injecting a 455kHz signal will provide the needed beat note.

The b.f.o. unit could also be used as a 455kHz source for a

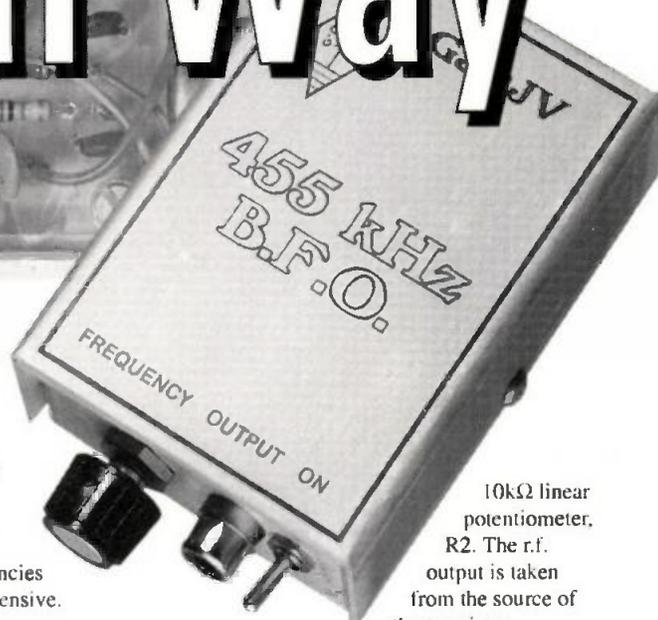
receiver project with that frequency used as an intermediate frequency. Suitable crystals for these frequencies are very expensive.

## The Circuit

The b.f.o. circuit is shown in Fig. 1. It's a Colpitts oscillator based around an MPF102 field effect transistor (f.e.t.).

In this application the oscillator is tuned to frequency with an i.f. transformer inductor from the Toko range. These inductors have an internal capacitor and additional parallel capacitance is added to enable the oscillator to tune across the i.f. pass-band, and this tuning is provided by a varactor diode type BB212.

Varactors require a 'tuning voltage', and this comes from a potential divider circuit with a



10kΩ linear potentiometer, R2. The r.f. output is taken from the source of the transistor.

The source resistor is a preset which is used to adjust the output voltage. Any stable supply in the 9 to 12V range will power the b.f.o. A PP3 battery would be ideal. (For effective operation from a mains powered supply, a smoothed stabilised supply is required).

## Small Board

For convenience, you can build the b.f.o. on a small, 60 x 30mm, printed circuit board. The layout is shown in Fig. 2.

It would be simple to translate the layout as illustrated on to Perfboard. (This is the circuit board material with an 0.1in matrix of holes).

The circuit would also lend itself to 'ugly' construction. And in fact, my first prototype was built ugly fashion on a piece of blank p.c.b. some 50mm square.

Construction of the b.f.o. is a simple half-hour job. Apart from taking care with the pin placements on Tr1, the constructor needs to watch the placement of the BB212 varactor. This is a double varactor diode, with two anodes and a common cathode. (Both sections are used with the centre pin being the common cathode).

Stability at a low r.f. frequency such as 455kHz should not be a problem. However, I would advise good quality capacitors for C4, 5, 6

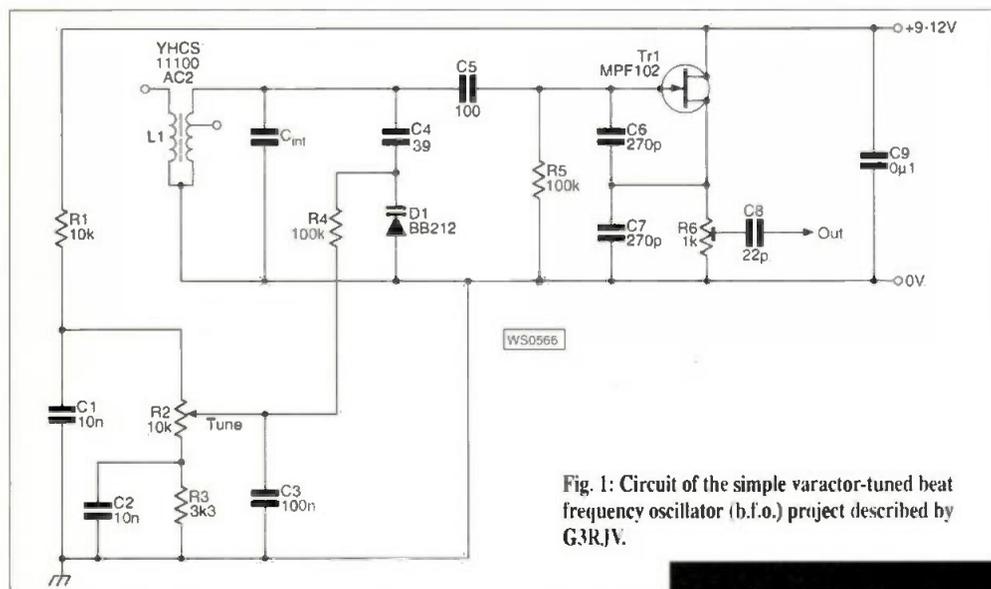


Fig. 1: Circuit of the simple varactor-tuned beat frequency oscillator (b.f.o.) project described by G3RJV.

Continued on page 63

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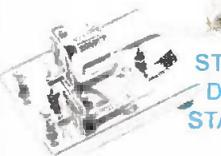


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# Carrying on the Practical Way

Continued from page 60

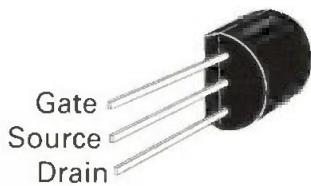


Fig. 3: Pin-out of MPF102 f.e.t. device.

and 7. Polystyrene capacitor types are more temperature stable and are worth the extra few pence for added frequency stability. All the other capacitors are small disk ceramics for decoupling.

## Getting Going

Getting the project going is straight forward. After checking out the parts placement and soldering apply 9 to 12V to the b.f.o., and if a frequency counter is available, you should connect it to C5 to monitor the output.

Even without the use of a frequency counter, the setting-up is still very easy. Turn R6 to maximum (towards the source of Tr1) and connect about half a metre of wire to C8. (This will act as a small antenna). Place the wire around, or inside, an a.m. radio with an i.f. frequency of 455kHz.

Set the tuning control, R2, at about mid travel. Then adjust the core of L1 until the oscillator is heard on the receiver. (If the receiver is not tuned to a station, the b.f.o. signal will appear as a 'rushing' sound).

The ideal method to tune in a medium to low strength a.m. (medium wave) station for maximum signal strength. You should then adjust the core of L1.

As the oscillator sweeps over the centre of the i.f. frequency, it will appear as a high pitched signal on one side, go down in tone to zero beat and then higher again as the b.f.o. is tuned through the other side of the i.f. frequency.

Next, set the core of L1 on the zero beat position. With a frequency counter adjust the core of L1 until the frequency is 455kHz with R2 at mid travel.

## Adequate Coverage

My prototype b.f.o. tunes from

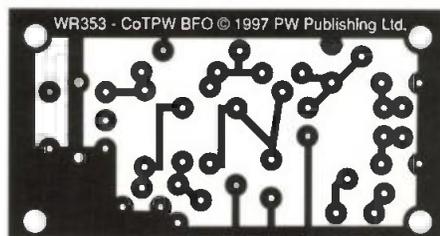
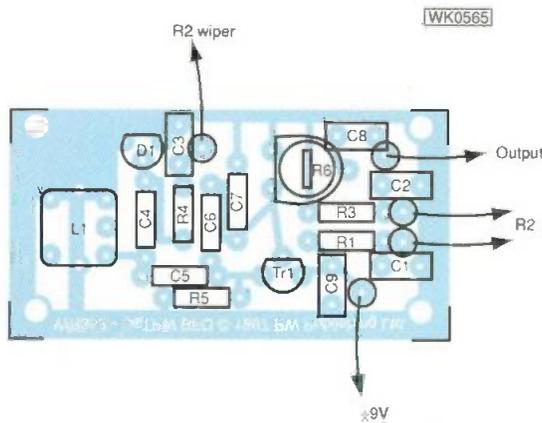


Fig. 2: The p.c.b. track lay-out and associated component overlay for the b.f.o. (See text for suggestions on alternative construction methods).

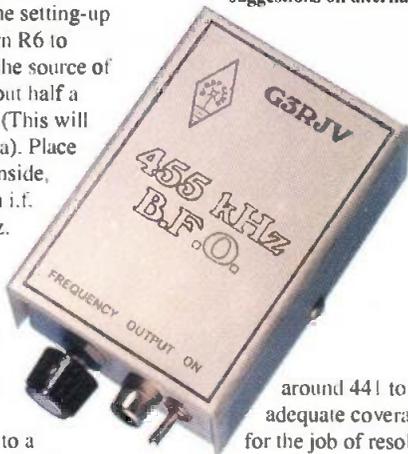


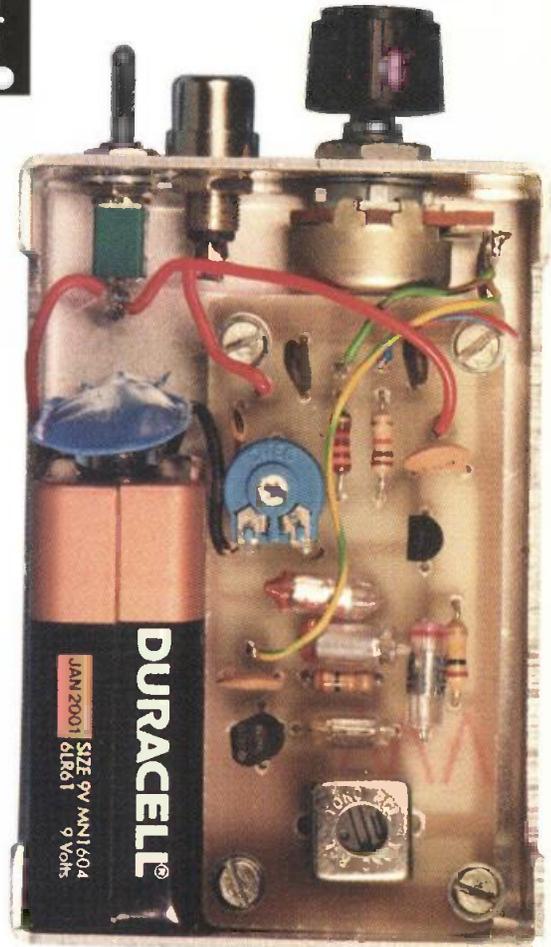
Fig. 4: Inside of George G3RJV's prototype

around 441 to 448kHz (an adequate coverage range for the job of resolving c.w. and s.s.b. signals). The range can be adjusted by playing with the values of R1 and R3.

In practice there should be no need to make an electrical connection between the oscillator and the receiver. A length of wire on the output as described above will usually provide enough injection for a b.f.o.

The wire can be placed inside or around the outside of the receiver. Some experimentation will be required for the best injection level.

So now you can turn that cheap a.m. short wave band equipped radio into a receiver that will resolve c.w. and s.s.b! Then you've only got to build a companion transmitter and you're on the air in true home-brew fashion!



Next time George goes hunting for the truly simple transceiver. DON'T MISS THE

# VHF REPORT

*David Butler G4ASR takes a look at recent band conditions, your activity reports, and has details of new amateur satellites and a meeting for microwave enthusiasts.*

It was 'batten down the hatches' during February whilst the UK was battered by weeks of storms, driving rain and very high winds. Those fortunate to own tilt-over towers could at least get the metalwork out of harm's way but others weren't so lucky. Hopefully your antennas stood up to the battering.

The prevailing low pressure weather systems were, as expected, not conducive to any form of tropo enhancement. So, generally there was very little activity noted on the v.h.f., u.h.f. and s.h.f. bands.

Two propagation modes not affected by the weather are Sporadic-E and Aurora and both of these occurred during February. On the 50MHz band a Sp-E opening occurred briefly on February 26 between 1115-1215UTC.

Contacts were being made from northern England to stations located in DL, I, OE and S5. Unlike previous years there has been only a minimal peak in Sp-E this winter season.

During the period December-January four openings were recorded of which only one, on January 20, was notable. This compares to 19 openings during the same three month period in the previous winter.

A total of four small auroral openings were recorded on February 8, 9, 10 and 27. In the opening on February 9 Nick Peckett G4KUX (I094) made c.w. contacts on the 144MHz band with LA5LGA (JP50) and LA9BM (JP40). He also heard the beacon stations LA4VHF (JP20), OY6VHF (IP62) and SK4MPI (JP70).

## Some Excitement

Two stations that caused some excitement during February were ROMIR and DL2MIR located onboard the Russian Space Station Mir. They were operating f.m. telephony on a down-link frequency of 145.800MHz.

To make contact you need to switch in your 600kHz repeater shift to reply on 145.200MHz. Although my antennas (4 x 17-element Yagis) were tilted over horizontally to the ground (to escape the gales) I was still fortunate in contacting ROMIR.

From above, my antennas would have looked at best like four vertical driven elements. No tracking was used, it was simply a matter of leaving the receiver tuned to 145.800MHz and

waiting for an appropriate overhead pass.

Obviously a small beam with elevation will give more consistent results but a number of stations have reported making contact with less than 25W and a whip antenna. Indeed Paul Thompson GM6MEN (I086) running a Yaesu FT-290R transceiver and a folded dipole made a packet radio 'connection' with the ROMIR TNC unit.

Paul received the connected text message "Hello from Mir crew" before disconnecting from the link. At Paul's QTH Mir only appear at a maximum elevation of 33° above the horizon.

An omni-directional antenna with a low angle of radiation therefore works reasonably well. By the way the QSL manager for MIR contacts is F5KAM (for Europe) and N6CO (for the rest of the world).

Chris Tran GM3WOJ (I077) has just received the first 50MHz DXCC award in Scotland - number 219. This is the result of 14 years of operating on the 50MHz band.

Chris was one of the original 40 permit-holders who started operations in February 1983. Contacts with OHOMB and JX7DFA provided the last QSL cards needed.

Chris has experienced many different propagation effects on 50MHz, probably the most interesting being the combination of auroral reflection and F2. This occurred on at least three occasions in the last sunspot cycle, and enabled GM3WOJ to make QSOs with South America and South Africa.

All received signals were tone-A (auroral) and peaking to the north-east, with no direct path signal audible. Another interesting propagation mode were the sidescatter openings to Japan.

Chris was active during four such openings but only able to work stations in two of them. Without a doubt this was a severe test of operating ability.

The c.w. signals arriving on a beam heading of approximately 100° were very weak (peaking S4 averaging S2) with fading and flutter. Combine this with the JA pile-up and a high QSO rate is very difficult to achieve.

In all only 19 JA stations could be worked in these two openings. High QRM in Japan made many more stations think that they had worked



**The winners of the 50MHz Trophy contest collecting their award at the RSGB VHF Convention, pictured l-r are G4KUX, G1GEY, G8AYZ (RSGB President), GD0TEP, G4XUM and GD4GNH.**

GM3WOJ when unfortunately they had not.

The DXCC award was achieved from I077 locator square in the North of Scotland. This achievement should encourage all GM stations that it's possible to work DX on the 50MHz band from anywhere in Scotland.

Gerry Schoof G1SWH (I083) reports that he is now particularly active on the u.h.f. bands. On the 430MHz band he is running a Trio TS-780 transceiver driving a K2RIW amplifier (2 x 4CX250) to 400W output.

Gerry's antenna system consists of 2 x 21-element Yagis at 23m above the ground. On receive he uses an SSB Electronics mast-head low noise amplifier.

On the 1296MHz band Gerry uses an Icom IC-1271E transceiver driving a pair of 2C39 disc sealed triodes. The antenna is a pair of 55-element Yagis, also fitted with an SSB mast-head pre-amplifier. During a period of good tropo conditions at the end of January G1SWH made a number of long distance s.s.b. contacts on the 1296MHz band including F5JKK (IN87) at 653kms, F6APE (IN97) at 709kms and F6CRP (IN96) at 831kms.

The station of K. Brown G7EXO (I091) reports making some Sp-E contacts during an opening on January 20. He first started hearing video carriers on the 50MHz band from around 0800UTC.

A little later at 1030UTC the band opened up to the north-east and east allowing many s.s.b. contacts to be with stations in DL, ES, OZ, SP and SM. After a break G7EXO returned to the band at 1630UTC and was pleasantly surprised to note that it was still wide open to many areas of Europe. Further contacts were made with stations located in HB0, I, OE, OH, OK and S5.

In the March edition of 'VHF Report' I gave details of the maritime mobile activity being carried out by Andy Adams GW0KZG. Well I've just received news from Andy of his attempt at earth-moon-earth (e.m.e. or moon-bounce) activity whilst/MM from the Gulf of Oman.

The only problem was that after 45 minutes of operation there came a loud knock on his cabin door.....and we all know what that means! Unfortunately, he was causing interference to some weather sensing equipment and GW0KZG/MM had to cease operation.

However, Andy was not deterred and intends to move the antenna position to a more favourable location on the R.R.S. Charles Darwin in readiness for the next e.m.e. activity weekend (which took place on March 22-23). Although only running 400W into a single 13-element Yagi he expects to pick-up a few dBs of ground (sea!) gain due to his uncluttered horizon.

I've received a letter from A. Warne G3YJX mentioning that the Mid-Cornwall Beacon Repeater Group took over the running of the five GB3MCB beacons some years ago. However, after many years of service the 432.970MHz beacon is now QRT due to a corroded antenna.

The 1296.860MHz unit also requires a new antenna and the beacon electronics are faulty. The money for repairs to these beacons only comes from subscriptions to the Cornish repeaters GB3NC and GB3HB.

Over the years the group have received a total of six reception reports and G3YJX suspects that other beacon keepers experience the same apathy from their users. He makes a plea for reception reports to be sent

from time-to-time and particularly requests listeners to report if they have a demand for the 432MHz and 1.2GHz beacons to be reinstated.

You can telephone G3YJX on (01208) 812772. I wonder if there are any antenna manufacturers out there that are willing to help?

## Satellite News

A new Russian amateur radio satellite designated RS-16 has recently been launched from the Svobodny Cosmodrome. The satellite is reported to have an average orbital altitude of 440km, producing a 'footprint' some 3200km in diameter on Earth.

Satellite RS-16 is expected to be a Mode A (145MHz uplink/29MHz downlink) satellite, like RS-10 and RS-15. It's the first Russian satellite to have a 430MHz beacon, but please note that this beacon is **not yet operational**.

The beacon frequencies are 29.408, 29.451, 435.504 and 435.548MHz. On March 4 a number of European satellite enthusiasts heard strong signals from the RS-16 c.w. beacon on 29.408MHz.

At the time of writing the communication transponders were not active but are expected to consist of an uplink from 145.915 to 145.948MHz with a corresponding downlink between 29.415 to 29.448MHz. Another 'Radio-Sport' satellite with a Mode A c.w./s.s.b. transponder is RS15.

The 40kHz wide uplink frequency of RS15 is 145.858 to 145.898MHz with a downlink on 29.36 to 29.40MHz. The c.w. beacon operates on 29.352MHz. However, RS-15 has a problem when it goes into the earth's shadow for more than five minutes and is also subject to deep fades.

Both RS-15 and RS-16, and other Mode A satellites, are very easy to access with simple antennas. Approximately 100W effective radiated power (e.r.p.) is all that is required on the 145MHz uplink frequency.

The term e.r.p. incidentally is the transmitter output power multiplied by the antenna power gain. For example, an 8-element Yagi with a gain of 10dB (a power gain of 10 in this example) would only need a transmitter power of 10W fed into it (10 x 10) to produce 100W e.r.p. Similarly a dipole (with a power gain of one) will need a transmitter power of 100W fed into it to produce 100W e.r.p.

Of course as you increase the size of the antenna the radiation pattern decreases and you will need to provide some method of tracking. Therefore one of the simplest antennas to construct is a pair of crossed dipoles mounted above a pair of reflectors. In this way a substantial amount of r.f. is projected upwards with no tracking required.

A very effective antenna for use on the 29MHz downlink is the so-called 'sloper'. This is basically a half-wave dipole, centre-fed but instead of being horizontal is sloped at an angle to the ground.

In *Oscar News* (the official journal of Amsat-UK) John Heath G7HIA described a sloping dipole which he

has been using with good results. The receiving element is an aluminium tube 15ft 10in long, cut in the centre to accommodate either 50 or 75Ω feeder with no balun used.

The tube is fixed to a backing piece of square timber, pivoted around its centre to a stiff upright. The angle between the upright support and the receiving element is set at 30° (producing an angle of 60° to the ground). This appears to be the optimum setting to provide the lowest angle of radiation (compensating for horizon losses) whilst providing adequate signal when the satellite is at high angles of elevation.

Shortly after erecting the sloper John tried the antenna out on RS-10. Running 25W on the 145MHz uplink he made contact with K1FX in Connecticut, receiving a 55 report.

John could hear K1FX better than he had ever done with a horizontal dipole. With this antenna he can copy RS-10 down to about 1° elevation from his QTH which has a clear view to the north-west.

## Phase-3D Satellite

Now I'll turn to news of the Phase-3D Satellite. The latest information is that the launch window is now between July 8-14 and there appears to be nothing within the AMSAT International programme to delay the launch date.

The Phase-3D satellite (to be renamed AO-31 after launch) promises to be an excellent development. One reason for this is that the transponders are high power and it will be very easy to receive the satellite with small antennas.

The downlink powers will be 250W peak envelope power (p.e.p.) on the 29MHz band and 200W p.e.p. on both the 145 and 435MHz bands. A 10W p.e.p. amplifier will be used on the 5.840GHz downlink as well as a 60W travelling wave tube amplifier (t.w.t.a.) on the 10GHz band. Finally, a 1W p.e.p. amplifier will be used on the 24GHz band.

The Phase-3D satellite will carry receivers for the 21, 145, 435MHz, 1.2, 2.4 and 5.6GHz bands and most can be cross-connected to the various on-board (downlink) transmitters. You'll be able to comfortably receive the 144MHz downlink using only a 5-element Yagi and 10W of transmit power into the same antenna will be all that is required for the uplink. On the 435MHz band an 11-element Yagi and 10W will be sufficient to get you up and running.

Further details about AMSAT-UK and the Phase-3D project can be obtained from **Ron Broadbent MBE G3AAJ** or by calling into the AMSAT-

UK Net on 3780kHz at 1015 local time on Sundays or 1900 local time on Mondays and Wednesdays.

## Microwave Meeting

This year's **Microwave Round Table** meeting at the **Rutherford Appleton Laboratories (RAL)** is being held on **Sunday April 13** between 1000-1700 local time. (The RAL complex is located off the **A4185** near Harwell, Oxfordshire). There's no charge for admission and refreshments are available throughout the day on a self-service basis at very low cost.

The event is organised on behalf of the RSGB Microwave Committee by **G0MJW, G3NAQ** and **GW4LXO** with assistance from **G3SEK** and **G4PMK**. The morning session is very relaxed giving you the opportunity to look for bargains on the Bring and Buy tables (no charge for selling) or to test your microwave equipment (up to 48GHz) on the measurement facilities. Or you can just use the morning to 'rag-chew' with many of the well-known UK microwave operators that attend the event.

During the midday period hot and cold food is available in the licensed restaurant. The afternoon is devoted to lectures, although you can still participate in the measurement facilities or vainly look for those bargains that others might have missed!

Lectures include 'Spread Spectrum Wireless LANS' by **G0IAY** and 'Microwaves in the future; Field Emission Microelectronic Devices' by **G3NAQ**. There's also a forum giving you a chance to ask the experts for advice or let the Microwave Committee know your criticisms or to ask advice.

If you're even the slightest bit interested in microwave operation or construction I thoroughly recommend that you attend the event.

## Spread Spectrum

Spread spectrum, if you're wondering is a transmission system where the energy of the transmitted signal is distributed among several synchronised frequencies within a band. This is unlike 'conventional' transmission where a signal is normally situated on a discrete frequency. (Editorial note: For further reading see 'Spreading The Spectrum' by **Phil Cadman G4JCP PW April 1993**).

At the other end of the link the received spread spectrum signals are reassembled to form the original modulation used. This technique reduces power density and duration of a transmission on a particular frequency. The advantage is that it lets

transmissions to (almost) invisibly share the same spectrum with users of other narrow-band modes.

Spread spectrum also provides for improved communication under poor signal-to-noise conditions and in selective fading and multipath environments. It also allows more communication channels to operating simultaneously in the same spectrum.

By the way I don't know anything about Field Emission Microelectronic Devices but as I'll be attending the RAL Round Table I'll let you know next time!

## Teledata Group

Are you interested in AMTOR, FAX, Packet radio, RTTY or other forms of data communications. If so then you should find out more about the **British Amateur Radio Teledata Group (BARTG)**, the national specialist group for data enthusiasts.

The BARTG offers a quarterly journal *Datacom* and also publishes a range of useful technical books. They also organise contests, run award schemes and provide a component service. There's also an annual rally, this year called *DataStream '97* at Sandown Park on **Sunday 14 September**.

For further details you should contact their newly appointed Membership Secretary **Bill McGill G0DXB** at **14 Farquhar Road, Maltby, Rotherham, South Yorkshire S66 7PD**. You can also telephone G0DXB on (01709) 814010, but please don't do it after 2100 local time. Alternatively turn your web browser to [www.bartg.demon.co.uk](http://www.bartg.demon.co.uk) to find out the latest details.

## Contests

Now I'll turn to news of some RSGB contests coming up soon. And the first is the 24GHz cumulative contest being held on Sunday 13 April. Let's hope the weather is calm as this is definitely a 'mountain-topping' event.

The last in the series of 144MHz cumulative contests is being held on Thursday 17 April between 1900-2100UTC. On Sunday April 20 the 50MHz fixed station contest is being held between 0900-1300UTC. Counties, Countries and QTH Locators count as multipliers in this contest.

A multi-band contest from 432MHz through to 248GHz is being held between 1400-1400UTC over the weekend of May 3-4.

The 432MHz Trophy and 106GHz Trophy contests are being run concurrently during the first eight hours on May 3 between 1400-2200UTC.

## 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 26 April.

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@mdlhr1.agw.bt.co.uk](mailto:davebu@mdlhr1.agw.bt.co.uk) Alternatively you can telephone me on (01873) 860679.

**END**

## HF FAR &amp; WIDE

Leighton Smart GWOLBI welcomes h.f. operators and listeners to the column that can't work without your input!

As I'm writing the column late in the month, I'm thinking what a terrible February it has been weatherwise! Another heavy storm has brought down countless antennas including my own long wire (again!).

The loss of my antenna which has prompted me to rig up a means of lowering the wire during storms by way of a pulley system. However, 'HF Far & Wide' reporters say that propagation conditions have fared a little better than the prevailing weather conditions, I'm glad to hear!

The recent Prefix Contest certainly showed that despite rather mediocre conditions, there was plenty of work. Even if it was just a brief report.

In fact, contests, (whether you love 'em or hate 'em) are a good way to build up your 'countries worked' list, particularly for the Novice and new licensee. After all, it seems to me that contest operators have the most acute hearing I've ever come across!

I've lost count of the times, during contests, that I've cracked a new DXCC country, running just 3W or so into a poor antenna, despite trying unsuccessfully to work that country for months beforehand! Seems to me that when there's a contest on, they actually want to work you, regardless of your weak signals, and that's the time to get that new country you've been after for a while!

So, whether you like them or not, contests are one way which amateurs can 'compete' within the hobby. And many amateurs consider contesting the best part of amateur radio.

One thing is for sure - many a rare country has been activated specifically for a contest. This gives us non-contesters the opportunity to increase our country scores, while giving the other chap a point or two!

What do you think of contests? Do you enjoy them or do you think they are a waste of time? Let's hear your views!

### Favourite Band?

The question of favourite bands was raised by Steve Locke GW0SGL in the March column regarding 3.5MHz (his favourite). For myself however, I've always considered 1.8MHz to be my favourite.

As you'll already have guessed, most of my on-air time is spent

'chewing the rag' rather than DX operating. And 'Top Band' is one band which is ideally suited to local and semi-local working.

However, let's not let new readers run away with the idea that 1.8MHz is merely a 'chat band'! One look at the reports for the band in this month's column will surely dispel that thought!

Because I work QRP (5W c.w. and 10W s.s.b.), I consider almost anything I work on 1.8MHz to be 'DX'! I've worked 44 countries and three continents so far on the band with QRP, but as with any band but maybe more so with 1.8MHz...it's the antenna that's the key!

For DX, a vertical with good low angle radiation is by far the best bet, although many amateurs use long wires of all types and descriptions for DX working. I use a 60m long wire with a loading coil at the far end, which, and although it's no DX antenna, the antenna still works well enough and serves the purpose.

The reason I enjoy using 1.8MHz is that it's possible to work reasonably low power DX at the lower end of the band. While the upper part of the band is used by many UK stations for more general conversations, and regular Nets, etc.

Another attraction, and probably the main reason why I use the band more than any other is that it comes to life in the evenings, and that's when I get home from work! Come to think of it, that's probably the only reason why I use it so much!

### Special Events Stations

Brian Brown GW0PUP will be operating a historical special events station GB0MPA in April, commemorating the role of the SS *Carpathia* in the rescue of 703 survivors from the RMS *Titanic* in 1912. The *Carpathia*'s callsign was MPA, and Brian will be operating the station throughout the month of April. (QSL via home call).

The Barry Amateur Radio Society will be running two special event stations in mid-May, namely GB100FI and GB100LP, to celebrate Marconi's first contact across water around the south coast of Wales. They will be operating s.s.b./c.w./RTTY/FACTOR/AMTOR and SSTV on all bands. (QSL via GW0ANA).

### Curious About QRP?

For those readers who are curious about QRP (low power) transmissions, Dick Pascoe G0BPS's book, *Introducing QRP* is for you.

Written firmly with the newcomer in mind, Dick's book is in an easy-to-read style, and consists of 10 chapters, from the history of QRP in the UK through to operating skills, antennas, simple rigs and construction techniques.

Of course, G0BPS is well known in amateur radio circles for his articles in *Practical Wireless*, as well as his work for the G-QRP Club. The book will be very useful for the newcomer, as well as amateurs who use low power as a sideline to their normal high power DXing. It costs £6.95 plus £1 P&P (UK), £2 P&P (overseas) and is available from the PW Book Service.

### Latest DX News

It's time for the latest DX news gathered from the RSGB's *DX Newsheet*. Here I've read that RA0FA in Asiatic Russia (zone 19) is active daily at 2000 on 1.830MHz, while also on 'Top Band' UA0FM is operational as 3W5FM in Vietnam between 2300 and 2330UTC also on 1.830MHz looking specifically for European stations.

Meanwhile in Sri Lanka, Mario HB9BRM is active as 4S7BRG until May. (QSL to his home call).

From the Philippines JG0HZE/DU will be operating from Lubang Island, the Philippines between the 13th and 20th of April, and N6VVV/VE7 will be active 25/28th of July from Queen Charlotte Island.

The Mel Island operation by PY5AA (s.s.b.) and PQ5L (c.w.) has been rearranged for the 17th to 22nd of April.

Finally, I've received a letter from Mathieu Roche F5SHQ who says that he is now operational from Guernsey with the callsign MU0ASP, the first MU call on the island. Mathieu says he's active on all bands (QSL to F5SHQ).

### The 1.8MHz Band

I'm starting off your reports with 1.8MHz news from Mike Devereux G3SED who reported working 3W5FM (Vietnam), a staggering number of Japanese stations (26 in all), and a

Malaysian station on s.s.b. all at around 2130UTC using a vertical antenna on the band. Well done Mike!

Ted Trowell G2HKU on the Isle of Sheppey in Kent says that conditions have been rather poor lately. But nevertheless Ted managed to get on to 'Top Band' and lists his c.w. contacts with OY5JD (Faroe Islands) at 0700, W2GD (USA) at 2100, and OH0/OZ1FG (Aaland Island) at 2300UTC. Ted's antennas include a G5RV dipole, HF6 vertical, and MFJ loop antenna.

Yours truly GW0LBI is back on 1.8MHz QRP and worked LY1DS (Lithuania) at 0046, 4N7ZZ (Serbia) at 0048, DL4ZU (Germany) at 2128UTC with 5W c.w. My 10W s.s.b. accounted for contacts with EI9CJ (Republic of Ireland) at 2154, and G4VFU/MM off the Norwegian coast at 0050UTC.

### The 3.5MHz Band

For the 3.5MHz band reports it's down to Skewen in West Glamorgan and Carl Mason GW0VSW. He uses around 100W output and a simple dipole antenna.

Carl used c.w. to hook up with OY1G (Faroe Islands) at 1951, LZ1NJ (Bulgaria) at 0600, and YL3GBU (Latvia) at 0656UTC. Using s.s.b. provided Carl a ragchew with ON5WA (Belgium) at 1804UTC.

Here at GW0LBI yours truly worked K3JGJ (USA) with 2W c.w. at 0043 during a contest, while Ted G2HKU offers a single contact with OY3QN (Faroe Islands) on c.w. at 2000UTC.

### The 7MHz Band

It seems that the 7MHz band is where it's at these days for Sean Gilbert G4UCJ in Milton Keynes. He's has worked most parts of the world over the past month on '40' using c.w. with 50W and a half-sized G5RV dipole mounted at seven metres above ground.

Sean says that 'early propagation favours stations to the West at his location, with Caribbean and south American stations coming in till around 0830UTC before fading out. From about 0800 to 0900UTC, the far East and Australia/New Zealand are apparent on the band'. Sean says his log is more 'quality than quantity' this month, and he's well pleased to be working such



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**The 'new' GW0LBI! Leighton Smart now has the benefit of a Yaesu FT-747 in the shack (it's the rig next to his left elbow) and of course it's properly modified for 'official' QRP operation!**

juicy DX! Who can blame him eh?

The list from Sean this month includes (all c.w.) contacts with FS/JE2YRD (French St. Martin Island) at 1110, WA4AFE (USA) at 0130, CU8/DL3KUD (Flores Island, Azores) at 2334, SV5BYR (Rhodes Island) at 0705, and QH0MDR (Market Reef) at 0640UTC.

Other early morning DX worked by G4UCJ included XT2DB (Burkina Faso) at 0649, TU4FF (Ivory Coast) at 0721, DH0KDY (Aaland Island) at 0736, 7X2CR (Algeria) at 0749UTC. Sean also logged K6UI (California) at 0823, EZ8AI (Turkmenistan) at 0030, UK8IZ (Uzbekistan) at 0043, along with FG5HR (Guadeloupe) at 0123, CD8LY (Cuba) at 0727, and finally ZL4FC (New Zealand) at 0843UTC.

On the listening side is **Charlie Blake M0AIJ** also in Milton Keynes, who says that his local QRM has finally disappeared and the band is now quiet. Peace at last eh Charlie?

Charlie lists s.s.b. reception of YS1SC in contact with F6ARC in France at 0633, ZL1PB (New Zealand) working CN8NK (Morocco) at 0750UTC. Also logged were JA7EAI (Japan) in contact with PT7FM in Brazil at 0800, as well as VK4MR (Australia) working OE6MBG in Austria at 0736UTC. Also listed was ZS6P (South Africa) working VK4KF in Australia at 0403UTC, with the ZS station listening out of band on 7.209MHz.

Charlie did have a small number of contacts himself however! The M0AIJ log includes a 7MHz s.s.b. contact with special event station SX2THE in Thessaloniki, Greece, (QSL via SV2TSL).

Carl GW0VSW has been busy here too! He reports all - c.w. contacts with 7X4AN (Algeria) at 1933, 9A50D (Croatian special call) at 2022, EC5AHG (Spain) at 1913, and S58MU (Slovenia) at 1210UTC.

### The 10MHz Band

The 10MHz c.w. only band, although being just 50kHz wide seems to be a

favourite for many c.w. operators. It certainly throws up a few gems that's for sure!

Carl GW0VSW reports contacts with TN6X (Congo) at 1907 (QSL via DL6SI), CX4KJ (Uruguay) at 2326, VE3HX (Canada) at 1826, and KB8IDW (USA) at 1209UTC.

Ted G2HKU reports a single contact on the band with 9H1AL (Malta GC) at 1900UTC.

### The 14MHz Band

Starting off the 14MHz band reports the big news for **John Heys G3BDD** in Essex this month is that he's worked VK0IR on Heard Island no less than eight times on 3.5 - 21MHz! That's good going John!

Other 14MHz DX for G3BDD includes s.s.b. contacts with ZD7DP (St. Helena Island), HS0/K4MRH (Thailand), 5A1A (Libya), JY5HF (Jordan), and AP2JZB (Pakistan), while c.w. gave John contacts with FG/JE2YRD (Guadeloupe), ZS8IR (Marion Island), and 8P9DX (Barbados).

John finishes by saying that 'the past year has been so lacking in sunspots that it compares with the great minimum which lasted 80 years in the 17th and early 18th centuries! Let's hope they return soon! (Hear-hear to that John!)

Now it's back to Carl GW0VSW, who hooked up with VE1MT (Canada) at 1820, SV2ASP/A (Mount Athos) at 1015, and V47NS (Nevis Island) at 1125UTC.

Ted G2HKU on the other hand offers contacts with ZS4XJ (South Africa) W60V (west coast USA), and KC4AAA (Amundsen - Scott south pole station) at 2000UTC, all on c.w.

Again using 50W c.w., Sean G4UCJ worked AA5MD (USA) at 1545, ZB2AZ (Gibraltar) at 1515, 8P9DX (Barbados) at 1131, and finally for this band PY2CJ (Brazil) at 0925UTC.

At this end GW0LBI used less than 1.5W to work S50N (Slovenia) at 1345, and K1KI, KQ2M, NA2N, and K8AZ

(USA) all at around 1600UTC. (Well done Leighton: Editor).

### The 18MHz Band

John G3BDQ spent some time on the 18MHz '17 metre' band this month, and his list includes s.s.b. contacts with XT2DB (Vietnam), AP3TN (Pakistan) as well as 9G5BQ (Ghana).

Carl GW0VSW used c.w. to hook up with KF2AT (USA) at 1612, 3B8FG (Mauritius) at 1409, 9H1AL (Malta) at 1437, PT7WX (Brazil) at 1219, KP4/K4WA (Puerto Rico) at 1753, and 8P9DX (Barbados) at 1306UTC (QSL via VE3ICR). Carl's only s.s.b. contact on 18MHz was with TA1/RU9WW at 1200UTC (QSL via RW9WA).

It was QRP as the order of the day for Ted G2HKU, who worked EA8/OH2BYS/P (Canary Islands) and CU8/DL3KUD (Azores Islands) at around 1500UTC using 5W of c.w.

### The 21MHz Band

There are signs of life (it seems) on 21MHz at last! There was a single report from Ted G2HKU in the form of a c.w. contact with 9J2B0 (Zambia) at 1100UTC.

John G3BDQ lists contacts with JY5FA (Jordan), FH5CB (Mayotte Island) and V21PI (Antigua), all on s.s.b.

### Signing-Off

Well that's it for this month folks, I must be signing-off! Thanks to all

**Don MacLean G3NOF:** Regular readers of 'HF Far & Wide' will have noticed that our long term h.f. column supporter Don G3NOF's contributions from Yeovil in Somerset is missing from the page. This is because unfortunately Don has been ill since before Christmas 1996 and is not well enough to get on the air. I wrote to him and have received a reply providing this, the latest up-date on our stalwart reporter. I'm sure that readers will join with the PW team in wishing Don a speedy recovery.

### 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: 1300 - 1500 most days around 14.180MHz s.s.b. using a Kenwood TS-940 & TH7 beam antenna, normally beaming to other continents.

**Leighton Smart GW0LBI** operates: Most Sundays (and some weekday evenings) at around 1000 - 1300 on 1.933 or 1.949MHz s.s.b. using Yaesu FT-747 transceiver and a long wire Marconi antenna.

**Rob Mannion G3XFD** listens and operates: (weekdays & weekends) 1800-18.30 3.7MHz 100W s.s.b., & 3.530MHz QRP c.w. using an Alinco DX-70 transceiver and (see below for temporary antenna details) trapped dipole/long wire antennas. Also at 2300 on either 3.530, 7.025MHz (c.w.) or 3.7MHz s.s.b. (Now back on air with temporary long wire antenna following repeated winter storm damage).

**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.

**T. Ibbitson G0VTI** operates: each evening between 1900 - 2000 on or around 7.020MHz c.w., or 14.035MHz c.w. using a Ten-Tec Scout at 50W.

**David Kennedy G7GWF** listens: on 7MHz using a Howes receiver and a Lake DTR-7 Transceiver. No time or frequency is specified.

reporters for all your support and information.

More photographs of you and you stations would be appreciated, as would your thoughts and views on your favourite bands, contests, and any other issues regarding h.f. amateur radio.

I look forward to hearing from you soon! As usual, reports and information (and photographs!) by the 15th of each month to: **Leighton Smart GW0LBI, 33 Nant Gwyn, Trelewis, Mid-Glamorgan CF46 6DB, Wales. Tel: (01443) 411459 or 710749 (work between 9am and 6pm).**

**END**

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# BITS & BYTES

Mike Richards G4WNC looks at software for the Amiga computer, the Internet Radio Guide and has details of the BARTG rally.

If you're into computing or the data modes in general, then there's one rally in the season that you really should make a point of visiting. The **British Amateur Radio Teledata Group (BARTG)** has been around for a long time now and have evolved from the days of electromechanical teleprinters and now deal with a wide range of data oriented transmissions systems.

The BARTG members have been running an annual rally around September time for many years and this now attracts not only a wide range of communications enthusiasts, but a complementary group of traders specialising in products that are of particular interest to the data community. Consequently, the BARTG rally is always well worth a visit.

As an added bonus for this year, BARTG are introducing what they have called **DataStream '97**. This is a series of lectures covering various aspects of datacomms in amateur radio.

DataStream '97 looks set to be

## 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. Please note that the software is only available as a set of five disks as follows:

IBM PC Software (1.44Mb disks): Disk A - JVFX 7.0, HAMCOMM 3.1 and WXFAX 3.2; 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.

very interesting and the provisional list of topics include: Datacomms for Beginners, Satellite Data Comms, Advanced Data Comms and a Q & A session. If I've convinced you to go, the date to note is **Sunday September 14 at Sandown Park Racecourse, Esher, Surrey**. I don't yet have the start time but it's usually around 10am

If you have Internet access you can find out more at BARTG's Web site which is at: <http://www.bartg.demon.co.uk>

## Amiga Software

I often get requests to provide details of where readers can get software for computers other than the common PC. And, this month it's the turn of the Amiga. This is because I've just received details of a whole range of radio related software from **Jim Prestoe of Priory Software** in Hungerford.

Jim offers a range of 32 programs for the Amiga OS2 or above, but PAL only. Among these are 11 radio related packages, many of which are specialist database applications covering such areas as aircraft callsigns, observations, selcalls, radio log book, scanner frequencies and a QSL database.

For the data enthusiast there's a RTTY data processor and a Weather decoder. The latter program takes the ASCII output of a stand-alone decoder such as the PK-232 series and converts coded weather broadcasts into plain language. This can provide valuable data on the likely propagation conditions and is particularly handy for spotting v.h.f./u.h.f. lifts in the summer months.

If you have an Amiga and would like more details on the products from Priory, I suggest you send an s.a.e. to Jim at **7 The Priory, 137 Priory Road, Hungerford, Berks RG17 0AP**.

## Internet Radio Guide

The latest book to arrive on my doorstep is the 1997 edition of the Klingenfuss *Internet Radio Guide*. This 488 page book provides a host of valuable information for any radio enthusiast who has Internet access. In this age of 'paperless'

communication with the Web offering the answer to all your information needs, you may be wondering why anyone should want a book to navigate the Internet! However, once you've acquired some experience of using the Web, you will soon discover that using the Web based search engines to find specialist information is something of a black art.

All too often you're faced with having to scroll through screen after screen of irrelevant information just to find the odd gem. This whole process becomes unworkable if the server has a slow response. The answer is to revert to the technology we know and love and get the book!

The Klingenfuss book is really very comprehensive and covers all aspects of radio and related services. Rather than just provide the URL for the site, the guide is packed with screen dumps of various home pages. While this considerably increases the size of

section was approximately 41 pages and covered businesses, clubs in general and finally special interest groups. Within this there were sample pages from over 36 different countries!

In addition to providing good amateur radio coverage there were sections covering Aviation, Radio equipment, Geography, Intelligence, Navigation, Press, Radio Clubs, Radio stations, Satellites and Solar/Geophysical data to name but a few. I must admit I've found the guide to be very useful as it can save a lot of on-line time when you're trying to locate specialist information.

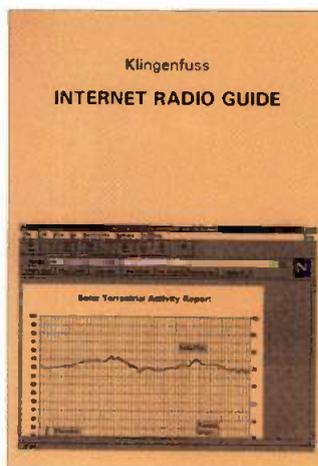
The *1997 Internet Radio Guide* costs **£21 plus P&P** and is available from the *PW Book Service*. My thanks to **Joerg Klingenfuss** for supplying the review copy.

## New Propagation Tool

I'm always on the look-out for new and unusual radio related programs and the latest to come my way is a very neat short-range r.f. propagation tool. The program is Windows based and operates comfortably on a Windows 3.1 based PC.

The program makes excellent use of graphics to show exactly what has been taken into account with the various calculations. Although the program has been primarily designed for dealing with low power short-range links, it looks as though it could be useful for v.h.f. and u.h.f. links.

The program comes without a manual, but there is a very good Windows help file that takes you through the various adjustable parameters. To get your copy from the Internet you need to visit one of the many simtelnet mirrors - a specific example being [sunsite.doc.ic.ac.uk/Mirrors/ftp.cdr.com.com/pub/simtelnet/win3/ham/rfpr.op.zip](http://sunsite.doc.ic.ac.uk/Mirrors/ftp.cdr.com.com/pub/simtelnet/win3/ham/rfpr.op.zip) phew!



the book, it does make it infinitely more useful as you can make a much better judgement as to whether or not the site is likely to be of interest.

To give you an example of the coverage, the Amateur Radio

I'm afraid that's all I've got room for this month, so until next time happy computing and keep your letters coming to me Mike Richards G4WNC at **PO Box 1863, Ringwood, Hants BH24 3ZD** or E-mail me at [mike.richards@dial.pipex.com](mailto:mike.richards@dial.pipex.com) Don't forget you can also visit my Web site at <http://dialspace.dial.pipex.com/mike.richards/>

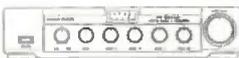
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**Trio TS-530 plus speaker SP230 and MCS0 mic** and fist mic., boxed in good condition, £325 o.n.o. Tel: (01432) 355155 day or (01432) 279435 evenings and weekends.

**Trio TS-530S h.f. transceiver,** with matching antenna tuner and full set of new spare valves, absolutely mint condition with all manuals and packaging, £550. Brian G0WZB, Tyneside. Tel: 0191-489 0601 after 5.30pm.

**Valves for sale,** numbers of valves: QQV06-40, 829B, TY2-125, 6B4C, 6L6, 3B2B, CV73, PX25, KT88, also lots of radio valves and military valves. N. Gale, 15 Lawrence Crescent, Easterley Road, Leeds. Tel: 0113-240 3496.

**VHF/h.f. frequency counter, £45. RS** Components frequency counter, £45. Digital multimeter, £15. Icom SM18 base mic., unused, new, £75. PRO2022 base scanner, £100. Yaesu

FL110 h.f. amp, £100. Digital s.w.t., 1500MHz, £75. Tel: Norfolk (01953) 884305 or (0860) 633366 daytime.

**Wireless World 1938-1980** approx. (some bound), offers. *Practical Wireless* 63-78, offers. *Electronics Today* 78-83, offers. *Practical Electronics* 1964-81, offers. *Science Journal* 1966-67, offers. *Scientific American* 62-70, offers. *Electronic Engineering*, a few. Tel: (01225) 311772.

**Wireless World magazines, 434 issues, 1943-1983,** many complete years, offers? Delivery negotiate within seventy miles. T. Baber, Boumemouth, Tel: (01202) 433323 (evenings) or Soton (01703) 736067.

**WS No. 52 RX** with p.s.u., £60. No. 19 Set, modified with a.c. p.s.u., v.g.c., front no TX, £80. TCS RX, £35. BE201, £80. GRC-9 h.L. TX/RX, complete, £180. Tiny key, £20. Ben. Worcestershire. Tel: (01562) 743253.

**WWII Wave Meter, class D, No. 1 MkII** with handbook, good condition, offers, buyer collects. M. Gilbert, Swansea. Tel: (01792) 794423.

**Yaesu F767GXII, all modules fitted,** superb condition, very rare, £1500, with built with base mic. and fist mic. Kenwood TH-78E handle with extra, £275. Tel: Essex (01268) 546523/ (0468) 604204.

**Yaesu FRG-7700 communications receiver** complete with 12 channel memory unit, FRT7700 antenna tuner, manual and circuit diagrams, good condition, £320. Carriage included. Tel: E. Devon (01395) 443872.

**Yaesu FRG-7700 receiver, £250.** DF-50 FAX machine, unused, cost £230, gift at, £150. W9GR DSP11 audio filter, £25. Yaesu YM-48 mic., £12.50. 144MHz mobile whip K3208 stainless, £10. Several hundred magazines, offers? Tel: Northants (01536) 522007.

**Yaesu FRG-8800 comms receiver plus FRV8800 v.h.f. converter and FRT7700 a.t.u.,** good condition with manuals and circuit diagrams, etc., £299 + carriage at cost. Mike, Hereford. Tel: (01981) 251743.

**Yaesu FRG-8800, fitted with FRV-8800 v.h.f. converter,** complete with handbook, good condition, £300 o.n.o. Spectrum comms. TRX2-61 50/144MHz transmitter, £80 o.n.o. Various other items plus carriage, outside Jersey. Please phone Stan G0GRND, Jersey. Tel: (01534) 36022.

**Yaesu FRG100 receiver with Yaesu p.s.u. and remote keypad** for direct frequency access, boxed as new, £350. Yaesu FRT-7700 a.t.u., boxed, excellent condition, £45. All including postage. S. Clifton, N. Wales. Tel: (01492) 878107.

**Yaesu FRG7, good working order,** handbook, £95 plus carriage. G3SVQ, Bedford. Tel: (01234) 730591.

**Yaesu FT-200 with matching p.s.u./speaker unit,** excellent condition with spare p.a. tubes and manual, £200 or part exchange for FT-690 MkII Kevin M0AHN, Marlborough. Tel: (01672) 563382.

**Yaesu FT-200FT-200 TX,** fault on high power but OK to 30W, v.g.c., with manual, £90 o.v.n.o. Prefer local. Bill G8ATV, 135 Moreton Road, Upton, Merseyside L49 4NT.

**Yaesu FT-290 MkII 2m (144MHz) multi-mode,** 4W output with MuTek front end, speaker mic, rubber duck antenna, NiCads and charger plus Yaesu handbag, excellent condition, £220, bargain! John M1AEB, Bristol. Tel: (01454) 882951 after 6pm.

**Yaesu FT-290 RII 2m (144MHz) all-mode transceiver** with FL-2025 25W matching linear, both boxed, v.g.c., £350. Tel: Kent (01474) 823797.

**Yaesu FT-5100 dual-band,** swap for Kenwood TS811E or Yaesu FT780R, with cash difference. Yaesu FT767GX for sale, 2m/70cm (144/430MHz) h.f., sell for £1000 or swap Icom IC706. Yaesu 747 and hand-held dual-band. Mch. S. Yorkshire. Tel: (01226) 742971 after 6pm.

**Yaesu FT-690R MkII 6m (50MHz) multi-mode plus 25W amp HSP62 58 x 58 vertical 6m antenna,** all mint, £395, bargain. Tel: Worts (01562) 68792 after 6pm.

**Yaesu FT-757GX h.f. transceiver** with matching automatic antenna tuner FC757AT, both with manuals and boxed, both in v.g.c., no offers, hardly used. Tel: (01642) 530663 24hr.

**Yaesu FT-757GX, 0-30MHz, all-mode TX/RX,** boxed in very good condition, £425. Yaesu FP-700 p.s.u., £70. John, Strarcar. Tel: (01776) 830275.

**Yaesu FT-76 70cm (430MHz) hand-held,** NiCad, charger, soft case, as new, boxed, £150. May part ex. or swap for h.f. RX or w.h.y.? Eddystone EC10 perhaps? Tel: Tamworth (01827) 58004.

**Yaesu FT-767GX h.f. plus 50MHz, 144MHz modules,** built-in a.t.u. and p.s.u. with manuals, in perfect working order, also SP767 speaker with built-in filters, £895. Roh, E. London. Tel: 0181-923 5845.

**Yaesu NiCad battery for the FT-50R d.c. 9.6V 110mAh** produces 5W power, boxed, as new, £45. Tel: 0181-767 7780.

**Yeovil transceiver 20 and 80m (2.5 & 14MHz),** c.w. and s.s.b. kit, completed by a professional, apart from test, not been used, reviewed in PW April 1994, complete with manual and mic., £125, carriage included. Vic G7PHJ, Cornwall. Tel: (01579) 348127.

**Yupiter MYT8000 multi-band scanning receiver,** 8-1300MHz, no gaps, f.m., n.b.f.m., a.m., 200 memories, complete with whip aerial, mobile bracket, power supply, manual, scarcely used, immaculate, £175. Tel: (01698) 888618.

## Exchange

**AKD f.m. 6m (50MHz) transceiver,** model 6001, three months old, three months guarantee with manual, exchange for dual-band hand-held or base 70cm (430MHz), 2m (144MHz). Tel: Kent (01634) 712270.

**Amiga 500+ 1 Meg,** colour monitor, second disc drive, mouse, joystick, loads of dises/games, £250 or exchange for Trident 2400 scanner or similar. Tel: W. Sussex (01903) 260851.

**ARRL Radio Amateurs Handbook 1942 (19th ed.),** ARRL Hints and Kinks for the Radio Amateur 1942, Admiralty Handbook of Wireless Telegraphy, Vols 1 & 11, swap lot for quality Morse key, Ron G4MBN, QTHR. Tel: Swindon (01793) 826325.

**FT-200 c/w p.s.u., v.g.c., c/w mic. and manual,** needs alignment (L.F. strip) otherwise OK, swap PRC316 complete or w.h.y.? No interest in FT200s. Andy, Derby. Tel: 0115-930 8096.

**FT-726R 2-70SAT, FT-757GX MkII, FC-757AT, auto a.t.u., Icom IC740 f.m., FT-707, FC-700 a.t.u., FL110 h.f. amp, PRO2022 scanner,** Cushcraft R7, excellent condition, some as new, boxed, manuals, exchange: other radio gear. Tel: Norfolk (01953) 884305.

**Kenwood R5000 receiver,** seven months old, boxed with manual, 20m band antenna, exchange for an AOR 3000A+, must be in good condition. Tel: (01443) 733801.

**Notebook laptop '486/DX33,** battery and power supply, grey scale screen, roller mouse, all enclosed in leather case, for general coverage receiver plus v.h.f. or Signal R535. Bill, Strathclyde. Tel: (01236) 762473.

**Orion video pattern generator,** exchange for v.h.f. TNC, also professional Eppm (Gang) programmer, cost £900+, very well used, but p.s.u., must go as shack has moved to broom cupboard, £250 o.v.n.o. Ian M1ATZ, N. Beds. Tel: (01234) 708278 or mobile (0976) 980360.

**Sangean AT5803A digital portable, 150W, 12 to 30MHz + f.m., in v.g.c. has s.s.b. also,** swap for Trio 9R59D receiver, must be in good condition, will collect if possible. Tel: (01450) 377861 anytime.

**Yaesu FTV107R 2m (144MHz) converter,** exchange for Yaesu FTV-700 or FV-700DM or sell for, £75. Tel: 0141-632 5408 (evenings) or 0141-649 4991, ext: 2285 (daytime).

## Wanted

**6m (50MHz) converter FC-4TR** for Yaesu FRDX400 receiver. Paul M1BFW, Peterborough. Tel: (01733) 331403 evenings please.

**455kHz s.s.b. i.f. filter** eg. Kokusai MF455 10K

or similar, also receivers G2DAF MJJJ, G3PDM, G4DTC 'ultimate', working or not, complete or incomplete, Tony, Worcester. Tel: (01905) 641759.

**An R210 receiver film scale,** I need to find a replacement 1.85m x 70mm tanning scale for my R210 receiver. Do you know of anyone who has a spare or where I can get one made? Werner Borgardt, Cedar Lodge, 22 Coleigh Road, Malvern, Wores WR14 1QD

**Any info. regarding conversion of Clearstone CM8000 p.m.r. radio to amateur v.h.f.,** also address or Clearstone, if poss. Nigel, 10 Larkman Lane, Norwich, Norfolk NR5 8TX.

**Baycom board wanted,** must be in good condition, also wanted 2m (144MHz) radio, ex p.m.r., just want something for packet, nothing special, i.e. 144.650, please help! G0SEC 5W output fine. Mr J. Curtis, 66 Rockhampton Close, Littlemore, Weymouth Dorset DT3 6NG.

**Bekom LS1021, 10m (28MHz) mobile radio,** John GOCHQ, Middlesex. Tel: 0181-561 3837.

**Bush VHF 64 valve radio or radiogram R666,** Pye v.h.f. 3D mains valve radio or Grundig Marlborough mains radio 3365. Hugh McCullon, No. 8 Strathard Close, Coleraine, Co Londonderry, N. Ireland BT51 3ES. Tel: (01265) 43793.

**Butternut HF6V-X or HF9V-X vertical aerial,** HF6V also, will collect and dismantle, please ring with details of condition and price. Tel: Bristol (01454) 887461.

**Circuit for Bergson 101 unit audio system,** Tel: London 0181-859 2488.

**D11 ex military transmitter to complete radio** station, working or otherwise, also crystals in B7G base 99.25kHz and 97.0kHz. Mark, Mid Glamorgan. Tel: (01443) 207931.

**Eddystone 770R MkII r.l. coil unit,** range 1, 114-165MHz wanted for restoration. Tel: E. Lothian (01620) 823926.

**Eddystone Receiver 880 or 888A,** Joe Francalanza, Plot 24 Housing Estate, Zejtun ZTNO4, Malta. Eddystone receivers 358, 358X, 870, 870A, 960, 890, 930, etc., any condition, also scrap sets for spares, please look in your left or garage! Many thanks. Peter Lepino, Surrey. Tel: (01372) 454381 or (0374) 128170 anytime!

**Electrostatic volt meter, 18kV** also info and parts for PRC-9, have various radios and Canon EOS650 camera for sale or exchange. Also Radio Designer's Handbook by L. Smith wanted. Ed Kelly E18R, Surrey. Tel: 0181-384 9199.

**FM Board for FT-707 70cm (430MHz) transverter** for FT-707 6m (50MHz) transverter for same, new. Novice, Gerakid, Aberdeen. Tel: (01685) 876414.

**For FRG7, quality extra 4kHz filter or add-on** filter board unit, also digital read-out unit required. Tel: Barnet 0181-449 3921.

**GEC BRT400 working or non working** for repairs/spares, Mullard valve tester, cards or can I take copies? Tom Benfield, 47b Wamford Street, London E9 7NG. Tel: 0181-985 7835.

**Goodmans tuner amplifier, 120 model,** instruction manual, will pay T. Hutton, Boadbea Cottage, 10 Star Corner, Barby, Nt. Rugby.

**HF linear amp 2100Z TL922, etc. Ian G0UWK,** Staffs. Tel: (01782) 771058 after 6pm.

**HRO loudspeaker,** good price paid, will pay P&P. Peter Norris G4VUN. Tel: (01287) 634397 9-5 works QTH.

**IHW8 top cover shell,** 12 Gilpin Road, Oulton Broad, Lowestoft NR32 3NS. Tel: (01502) 518745.

**Icom IC-245 2m (144MHz) multi-mode module** in g.w.o. with mobile mount, etc., also want info on Sota 100W linear and NiCad packs for FT-707. FNB10 preferred. Tel: Newport (01952) 556235.

**KW204 transmitter,** any condition considered plus manual if available, 9MHz c.w. crystal filter, any make. John Mullin DA1MU, Bradbury Bks, Krefeld, Germany. BFPO 35. Tel: 0049 2151 597562.

**Looking for plug-in modules 2m (144MHz),** 6m (50MHz), 70cm (530MHz) for FT-767GX, any info is very welcome. Jean-Pierre Verbes, Mechelbaan 10, B-2580 Beersel, Belgium. Tel: 00 32 15 250215.

**Marine band hand-held transceiver,** John G4BYV, Norfolk. Tel: (01362) 638142.

**Owner's handbook or manual for Yaesu FRG-7700,** also memory unit for same. Tel: S. Pethererton, Sumeret. Tel: (01460) 240365.

**Plesser Keying Unit type PV78B** wanted, also teleprinter, valve tester (preferably AVO or Mullard) and any additions to my collection, by way of interesting Kcal units, anything considered. Tel: Yeoks (01482) 869682.

**Revox reel-to-reel tape recorder:** Stereo upright type half track machine preferred with minimum 7 inch spool size (prefer 10 inch or larger studio type). Other semi-professional machines considered. Please contact Rob G3XFD at PW office.

**Service manual/circuit diagram for Pye** modulation meter type MM1 to buy or borrow, costs refunded. Bill G3XAN, Liverpool. Tel: 0151-526 8649.

**Spy/Clandestine radio sets** wanted by private collector. American, British, Polish, German, Russian, Japanese, etc. from WWII and since, send details and price wanted to: Bill MacDonald G8PUJ, 40 Latchett Road, London E18 1DJ. Tel: 0181-505 0838.

**Tech inf. Swan 500 (not 'C') and a power supply,** 6HF5 valves, history, advice. Tuning knob - TCS receiver or scrap unit. Well built home-brews inf. (urgent) - Lafayette HA600A receiver, cash waiting. J. Raynham, London. Tel: 0181-470 6316 sometimes answerphone.

**Trio (Kenwood) AT230 a.t.u.,** KB 1 de-luxe kit, narrow s.s.b. filter YK88SN, Andy G4RWY, Birmingham. Tel: 0121-421 3316.

**Trio JRS065E receiver** for spares or just the mechanical filter assembly, also a small 2m (144MHz) linear amplifier, Ian G0W8VUG, Colwyn Bay. Tel: (01492) 518499.

**Urgently require Racal RA63G or RA63H,** Walter Gates, 16 High Mill Drive, Scarborough YO12 6RN. Tel: (01723) 365093.

**User manual for Kenwood a.t.u. AT230,** copy will do, will cover cost. Arthur G4OSW, Dawlish. Tel: (01626) 864486.

**Valve receiver h.f. beam antenna analyser,** FL508 transmitter, cubical quad antenna, ARS8D, Eddystone receivers, carriage paid. Ed Kelly E18R, Cregganavar, Breatly Castlebar, Co. Mayo, Eire.

**Video recorder Philips 1700 or similar** (for square tapes), coloured plastic sheet to turn b&w TV to colour, and lists of radio amateurs before WWI for museum. Douglas G3KPO, Ryde. Tel: (01983) 567665.

**Wanted by new s.w.l. fairly cheap h.f. ham** bands receiver, either c.t.gov or com. with s.s.b./h.f.o. and good condition/v.w.o. Tel: Notts (01636) 616976.

**World all bands short wave receiver,** eg. Lowe, Kenwood, Yaesu, Icom, etc., prefer swap, exchange EchoStar 5500 satellite recpos 90cm moonised dish LNB and cables, excellent value, £350. Tel: 0181-549 2612.

**Yaesu FT-225 or similar 2m (144MHz) base** station, offers to G8NPK, Northolt. Tel: 0181-441 8190.

**Yaesu NC-8/FT-708R battery charger,** Alan Rayner, Cleveland. Tel: (01642) 478020.

**Yaesu SPS speaker to match FT-1000D,** also 6m (50MHz) module for FT-726R, must be in g.w.o. and excellent condition. Tel: (01953) 884305 or (0860) 633366 daytime.

**Please use a Form from a previous issue to send your advert in or write it neatly on a postcard.**

# PACKET PANORAMA

Roger Cooke G3LDI has the latest news from the world of Packet radio.

**T**he British Amateur Radio Teledata Group (BARTG) have recently announced details of their 1997 Rally. The rally will be held on Sunday 14 September at Sandown Racecourse, Esher, Surrey.

The BARTG 1997 rally will follow the proven and popular format of previous BARTG rallies, but with one major difference. This is the addition of DataStream '97.

DataStream '97 is a series of lectures covering various aspects of data comms in Amateur Radio. The provisional list of topics includes; DataComms for beginners, Satellite DataComms, Advanced DataComms and a Question and Answer session.

Further details on the BARTG 1997 rally can be obtained from the newly appointed Membership Secretary **Bill McGill G0DXB** at 14 Farquahar Road, Maltby, Rotherham, South Yorkshire S66 7PD.

## Receiving You

Some of you may have read in recent issues of *PW* in 'Receiving You', letters from **Mr. Charlton G0MDF**, regarding password access to the BBS, and several related subjects. Without wishing to revive any correspondence again, I received a telephone call from an amateur who enlightened me on one particular item.

It was stated in the correspondence from Mr Charlton that a certain BBS was demanding payment before allowing access. This is not a correct thing to do, and in fact the Radiocommunications Agency could take action over this. It seems that this could well be the case and I apologise to Mr. Charlton if this is indeed the case.

Running a BBS is a very time-consuming and expensive thing to do, both in equipment and electricity, and donations, if offered, are gratefully received. There is nothing at all wrong with this, but demanding money before access is totally unethical to say the least.

There is normally a local packet user group, set-up with the intention of encouraging users to join and contribute their share to the running of their local networking expenses. These can also be very high, higher in fact than some voice repeaters. Membership of the voice repeater

group is an accepted fact of life now, and this should also be the case for packet user groups.

A BBS service is set up by an individual for the use of local users. Again, a huge expense is involved and it **all** comes out of the pocket of that individual. No contributions are forthcoming from the RSGB, NASA, or the local council!

## On The Internet

If you looked on the Internet, admittedly with probably a lot more possible sites, albeit some questionable, it will cost you about £10 a month, plus the 'phone bill, which can soon mount up to a considerable amount.

On the other hand mail can be passed very quickly now on Packet. There are several h.f. packet, Amtor and Pactor gateways, two UK Satgates, and providing the terrestrial network is working well, delays should be minimal. In my humble opinion, users should bear this in mind.

Consider what it would cost you to set up a BBS, h.f. gateway, Satgate or whatever, then ask yourself why is it wrong to expect a donation? If we wish to build a high-speed National Backbone, it's going to cost money, and I haven't found a tree yet with any of this stuff on it!

Ten years ago, yes it really is that long, bulletin boards were a pleasure to log into, all sorts of interesting and informative gems were there for everybody to read. So what has happened in that decade?

I am afraid the network has sunk into decadence, a wall on which all the graffiti artists and junk-mail peddlers spin their wares. It has begun to take effect.

In the last year we have seen more BBS/node closures than we have for a while. More users have been discouraged by what they have found. Little wonder the reject file gets used! This is **not** what BBS operations, or indeed Amateur radio in general, is about!

Apathy, moaning and whining will bring the Packet network into severe disrepute. It will be frowned upon in much the same way as we used to frown upon the early 27MHz brigade with their echo chambers.

Software writers are not producing updated programs,

hardware manufacturers are closing down or not catering for the Amateur market and users mostly just send/receive their mail and occasionally type LL 10, to find the usual, then disconnect. Extrapolate this situation and you can imagine what it **might** be like in the next ten years.

So, what do we do about this? Well, there are a few answers. **1.** Leave the situation as it is, and watch packet gradually strangle itself; **2.** Shortcut that and sell all the gear now, and take up fishing; **3.** Do something about it.

In order to do something about it, we need to change our attitude, clean up our act, put in time to create, not destroy, raise money for the network (nothing is free!) and encourage the young amateurs just starting. Obviously, there are lots of dedicated amateurs doing just this, and I only hope that they long continue to do so, but some have already given up as I have mentioned.

We cannot afford to see any more do the same. We desperately need to see improvements to the network, high-speed linking, introduction of DAMA or similar and new links where needed. All this is going to need a lot of co-operation, and money.

## Gloucestershire Repeater Group

An example of successful repeater group dedication comes from the **Gloucester Repeater Group** Newsletter. They issue a quarterly newsletter giving updates for all their repeaters, voice and packet.

Contrary to my previous 'gloom and doom', the Gloucestershire group have continued to increase membership throughout the year, resulting in a significant increase in income. This will allow a continuing program of improvement to links and also enable them to add new ones.

In order to help this project, the group are searching for some two or four port PC RS232 Interface ISA cards that can use IRQs 8-15 together with some uninterruptable power supplies. There are also plans to install a regenerative repeater on 430MHz to provide a 38.4kbaud link.

It's always gratifying to be able to report something positive like this.

If your group has news that you would like me to use, **please send** it to me.

## Bandplan Changes

Changes in the 144MHz band plan will be announced soon. This will mean a change for most, not just for a few. The data segment will be moved and other changes will also take place.

Concern has already been expressed by RAYNET, in that QRM might be mutual unless something is sorted before the actual date. Obviously these changes will take time to accomplish and new crystals will have to be purchased.

Patience and co-operation will be necessary in order to make the change as smooth as possible. The following is an excerpt from a letter received from **Alan G0HIQ**.

Alan says: "I am an ordinary packet user and ordinary RAYNET member. Through the RAYNET channels I am advised that they will need to change frequency and that a new local/national plan will be needed to avoid adjacent groups having the same channel.

"All seems sensible until it says that this will take some time and will be implemented some time after July 97. Whilst RAYNET do not have prior right of access to any channel, i.e. essentially first come first served, groups are not at liberty to QSY willy nilly.

Should a non-emergency wish to use .800, .825 or .850 arise when the channel happens to be busy (voice) then we ask. If rejected we go elsewhere between .775 and .850.

With Packet in .800 up that is potentially 3/4 of the groups affected. In practical terms they do not have a clear patch to QSY to at that time. I foresee a period of time of confusion and irritation".

Thanks for your comments Andy and I too hope that common sense will prevail and this will take place amicably.

Well that's all for this time and don't forget keep your news and pictures coming to me. News can be sent to me via Internet at [mtaylor@uk.mdls.com](mailto:mtaylor@uk.mdls.com) or you can telephone me on (01508) 570278 or send things to me QTHR.

**END**

# BROADCAST ROUND-UP

*What's the future of Radio Australia? Are audience figures up for the BBC World Service? Read on and Peter Shore will explain all.*

**A**s this edition of *Practical Wireless* goes to press, Albania is gripped by what could prove to be the start of a fresh revolution, or worse still, civil war. The government has cut the Albanian peoples' easy access to news and information on radio by switching off the f.m. relays of both the **BBC World Service** and **Voice of America**.

In response, transmissions in Albanian have been stepped up on other bands by both broadcasters in an effort to maintain the information flow. The BBC World Service is now transmitting on short wave at 1415UTC (previously only on f.m.) as well as 0630 and 1800. The evening broadcast now lasts 45 minutes instead of 30 minutes.

Voice of America has put its two half-hour Albanian programmes at 0600 and 1700UTC on to its medium wave transmitter at Kavala, Greece which operates on 792kHz.

## First-Hand Knowledge

Listeners wanting to get first-hand knowledge of events in the troubled country can try tuning to **Radio Tirana**, but it's going to be a censored, one-sided story since the station is, as I write this, still in the hands of the Berisha government. English from the Albanian station can be heard in Europe daily at 1715 to 1730UTC on 6.185 and 7.155MHz.

Also, there is a 30-minute transmission at 1930UTC on 6.27 and 7.27MHz short wave, plus 1458kHz medium wave. If you want to try and

contact the station, the telephone number is +355 42 23239 and the FAX is +355 42 27745.

## Radio Australia

In Australia, the government Foreign Affairs, Defence and Trade References Committee is due to report by 14 May its findings into the future of **Radio Australia**. The Committee has been charged with looking at, amongst other areas, what contribution the Australian international radio station makes to Australia's foreign policy and trade interests.

We will bring you the details of the Committee's report in this column. Watch this space!

## Stopped Satellites

**Radio Korea International** has stopped using World Radio Network's satellite services to reach listeners. It is now using short wave only. Tune in Europe at: 0800-0900 on 7.55 and 13.67; 1830-1900 on 3.955; 1900-2000 on 5.975 and 7.275; 1930-2000 on 3.97 and 2100-2200 on 6.48 and 15.575MHz.

North Korea is becoming difficult to hear as some days transmissions from **Radio Pyongyang** just don't come on the air. Some reports suggest this is because of acute power shortages in the country, but there is no firm evidence to support this theory.

Try for yourself; English should be on the air to Europe at: 1300-1350 on 9.345, 9.64, 11.74, 15.23 and 15.43; 1500-1550 on 9.325, 9.64, 9.977 and 13.785; 1700-1750 on 9.325, 9.64, 9.977 and 13.785 and 2000-2050 on 6.576, 9.345, 9.64 and 9.977MHz.

## New Service

There is a new service on WRN. The station **CANA Radio**, part of the Caribbean News Agency, has a 15-minute programme weekdays at 1700UTC on WRN's European service which is carried via Astra. It brings a round-up of news from the Caribbean and, unless you are lucky enough to catch a medium wave signal from the region, is likely to be the only way of hearing news from the Caribbean.

**West Coast Radio** in Ireland has moved its European broadcast from Thursday to Saturday. Listeners can tune in at 1500UTC for an hour-long programme on 5.97MHz via the Deutsche Telekom transmitters.

## Audience Figures Up

The BBC World Service has announced that its latest compilation of audience research gives it a regular weekly audience of 143 million people. Of that, some 35 million listen to the **English World Service** (with a remarkable 1.3 million weekly audience reach in the UK), and the balance tune to the other 44 languages which are broadcast from Bush House in central London.

For the first time the BBC's figures include parts of China, previously a closed book for BBC researchers. Ten cities covering an adult population of 29 million were surveyed for the first time last year.

## Diverting Funds

As part of its ongoing restructuring, **NHK World** is diverting funds from its international radio service to television. This means less resources for programmes on the global radio service, and some shows are being axed, including the weekly *Media Roundup* programme.

## Brunei Going International?

You may have seen the advertisements for the Royal Brunei airline, soon there may be a chance to hear Brunei radio after an absence of many years. A report by **Glenn Hauser's World of Radio** programme says that an international short wave service is planned.

It could be some time before the tiny Asian country gets back on the air, as transmitters are needed. We'll keep you posted.

## Station News

**Monitor Radio International**, the short wave broadcasting arm of the *Christian Science Monitor* newspaper, broadcasts in English to Europe: 0400-1000 on 7.535; 0800-



0900 on 15.665; 1600-1800 on 15.715; 1800-2200 on 13.77 and 15.665 and 2200-2400 on 13.77MHz.

**Radio Norway International's** weekly English-language programme is heard on Sundays at: 0600 on 7.18, 7.295, 9.59 and 13.805; 0700 on 15.245; 0800 on 15.17; 0900 on 13.80 and 15.17; 1200 on 9.59, 13.80, 13.805 and 15.605; 1500 on 9.98 and 11.84; 1800 on 7.485, 9.59 and 15.22MHz plus 1314kHz medium wave 2200 on 9.405MHz.

The Norwegian short wave station at Fredrikstad is being dismantled, which means all programmes now come from the 500kW transmitters at Sveio and Kvitsoy. The NRK had hoped to be able to hire out the Fredrikstad short wave transmitters to broadcasters, but had no response.

Travel north-east from Fredrikstad and you'll come to Iceland. But wherever you are you can hear news from the northern island nation on short wave.

Tune in at 1215-1300 or 1410-1440 on 13.86 and 11.402MHz, both upper sideband, and then at 1855-1930 on 9.275 and 7.735MHz (also u.s.b.), and finally at 2300-2335 on 11.402 and 9.275MHz (again in u.s.b.).

## Strange Transmissions

If you have heard strange transmissions in the middle of the European night, it might well come from the HAARP atmospheric and propagation research centre in Alaska. HAARP has been testing at 0430 on 6.99MHz and at 0450 on 3.30MHz with a plain carrier signal and then five minutes of Morse code.

The station welcomes reports at **HAARP Test, PO Box 271, Gakoma, Alaska 99573, USA**.

That's all I have for you this month. Keep listening to the world's broadcasters, and let me know of any interesting discoveries you make.



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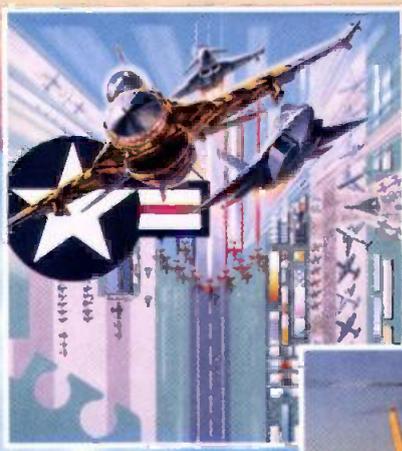
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