

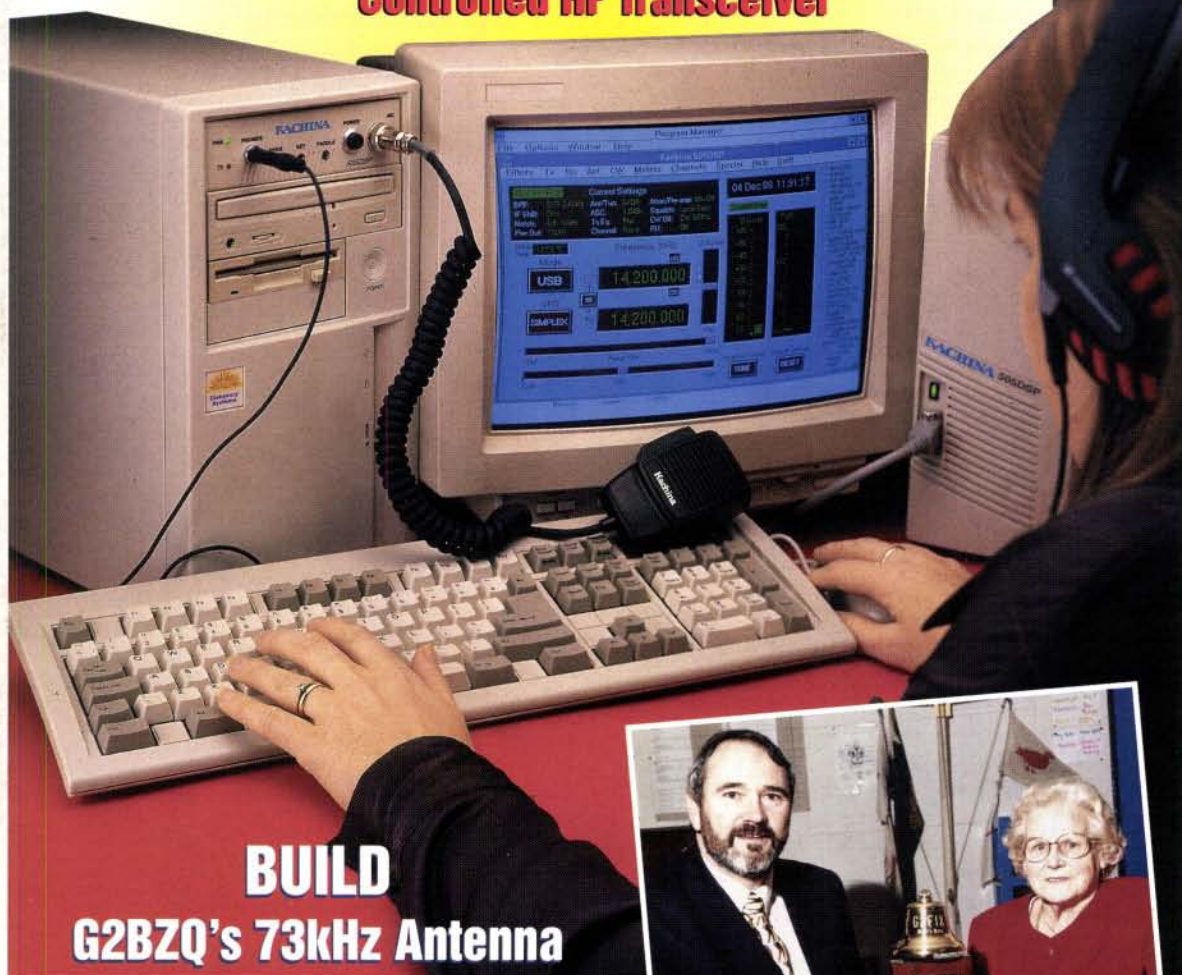
# PRACTICAL Wireless

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CELEBRATING  
100 YEARS  
1898 - 1998  
OF AMATEUR RADIO

## A NEW APPROACH TO AMATEUR RADIO?

Roger Cooke G3LDI Reviews the Kachina Computer  
Controlled HF Transceiver



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G2BZQ's 73kHz Antenna

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February 1998  
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Peter Waters G3OJV / G0PEP  
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## ADI AR-146 2m 50W



**£249**

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- \* 7 Programmable steps
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- \* Keypad mic and mounting kit
- \* CTCSS Encode and Decode!

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**New Low Price**



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- \* Alphanumeric memories
- \* Full duplex
- \* CTCSS tone reader
- \* 29 programmable features
- \* AM airband receiver
- \* Rx up to 990MHz
- \* Ni-cads and charger

## ADI AT-201 2m FM Handy



**FULL CTCSS**

**W&S £149**

- \* 40 Channels
- \* 5W on 12V
- \* Illuminated keypad
- \* Full CTCSS
- \* 1750Hz tone
- \* DTMF
- \* Channel Reasort or
- \* Frequency Readout
- \* Set to Set Cloning
- \* Uses AA cells

## ADI AT-400 70cm FM Handy



**The Novice Rig**

**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

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We promise you the lowest UK price! Just give us your address or phone number and we'll mail you the latest information pack as soon as it is available.

**ICOM IC-746 1.8 - 144MHz**

\* 100W 1.8 - 54MHz \* 50W 144MHz \* SSB - CW - FM AM \* Electronic keyer \* Gen. cov receiver \* Spectrum scope \* DSP noise filter \* Notch filter \* IF pass band tuning. Delivery shortly after Christmas.

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

**ICOM IC-756 HF Rig**

\* 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

**KENWOOD HF TS-570**

Kenwoods new transceiver that is earning a reputation for offering one of the best receivers in the business. If you are looking for a hot little number that is not too expensive (Radio we mean!), send for brochure.

**Value Added Packs****Customer Offer Just £59.95**

Buy any designated base station hf transceiver from us before 1st March 98 and you qualify for this special offer pack for £59.95

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\* squelch \* IF shift \* Notch filter \* Power control  
\* Tx monitor \* Electronic keyer \* 12.5 / 25kHz switched FM filtering \* Switchable pre-amp  
\* Size 260 x 86 x 270mm \* weight 7kg  
Above details are provisional

**NEW Yaesu FT-920**

+ Free FM board & AM Filters  
\* 1.8 - 54MHz 100W \* DSP filter \* MOSFET PA  
\* Internal ATU \* Auto notch \* Twin VFOs \* Auto glow display \* Shuttle jog \* Digital voice memory  
\* Electronic keyer \* RS-232C converter \* Quick memory bank + lots more phone or e-mail for colour leaflet

**Yaesu FT-1000MPDC**

\* 1.8 - 30MHz 100W \* SSB - CW - FM - AM \* Rx 100kHz  
\* 30MHz \* Message memory \* Dual in-band rx \* EDSP filter \* RF processor \* RF pre-amp \* Electronic keyer  
\* IF shift width \* Collins filters \* Comprehensive menu system \* RS-232 interface and more - send for details

**ICOM IC-207H 2m/70cm Mobile**

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

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- \* Rechargeable Alkaline
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In stock now! \* Note: you must use the special charger supplied with Starter Kit.

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**W-MM1 Multimode Modem**

\* 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

**Price Down****ICOM IC-706 MK II****£995**

Plus £50  
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**PRICE MATCH****160-6m 100W 2m 25W ++**

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**YAESU VX-1R****£269**

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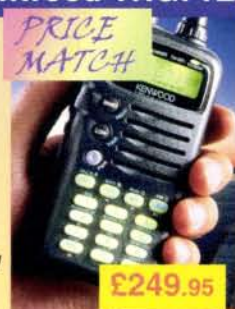
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**NEW****Kenwood THG71E**

- \* Dual Band 2m/70cm
- \* 200 memories
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- \* Up to 6W out
- \* Wideband Receive
- \* Illuminated Keypad
- \* PC Compatible
- \* Windows Programming

Send For Brochure

**£249.95****NEW****Icom IC-T8E**

6m  
2m  
70cms

All in one  
small package.

- \* 5W output (13V)
- \* 25 / 12.5kHz ready
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- \* Nickel Hydride batt
- \* Wide FM broadcast
- \* AM for airband
- \* Rapid scanning
- \* Alphanumeric Provisional spec

**£349.95**



# MFJ

## Ham Radio Accessories

### Programmable DSP Filter



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

### 1.8-30MHz 300W ATU



- 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.

### 300W ATU + Dummy Load



- 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.

### 1.8-30MHz 300W ATU



- 160m - 10m + VSWR metering
- Wire, coax, balanced feed
- 3-way antenna switch
- By-pass position
- 260 x 180 x 70mm

### 1.8 - 30MHz 3kW ATU



- 1.8 - 30MHz with roller coaster
- Cross needle VSWR & PEP
- "T" network with 4:1 balun
- Long wire, coax and balanced feed
- By-pass and Antenna select switch
- 270 x 375 x 115mm

### Auto ATU matcher



**Auto-Tuner Extender**  
Connect between transceiver and antenna - no more problems with G5RVs and all those difficult antennas - 160 to 10 metres

Phone 01702 206835 for FREE MFJ catalogue  
or e-mail to sales@wsplc.demon.co.uk

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

### Mobile HF+6m ATU



- 1.8 - 52MHz at 300W max
- Built-in VSWR Xneedle meter 30/300W
- Coax fed systems \* Thru button
- 210 x 150 x 60mm

### DSP Data Audio Filter



- CW 50, 100, 200, 500Hz filter
- Suits all data modes
- Full adjustable pass band & filter

### 2m FM Analyser



- This new analyser lets you check out your 2m FM signals and any other local ones as well!
- 143.5 - 148.5MHz
  - Deviation
  - Audio quality
  - Field strength in dBm
  - Scope socket
  - 3uV sensitivity
  - Runs from PP3

### New QRN Noise Filter



- Phases out noise at the antenna socket
- Kills local QRN - lets signals through
- No more electrical interference!
- Rf sensed for transceiver use (150W)
- Up to 20dB noise reduction
- Recovers signals below the noise!
- Adjust to suit local problems
- Kill that thermostat problem

### MFJ-250X 1kW Load



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

### 1.8-170MHz Ant. Analyser



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

**The World's Best Seller**

Connect to aerial or coax and adjust it in seconds. Turns hours into minutes and ideas into antennas! Give your antenna system a complete check out. Over 500 sold so far! A great piece of kit.

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### Ameritron 811 1kW



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

### Electronic Keyer



- Self contained - ext 12 or internal batt.
- Semi auto and full auto modes
- Dot dash memory - self completing
- Weight, tone and Vol. controls
- Just plug in paddle and connect to rig
- Works with all modern rigs.

### Magnetic Loop Antenna



The antenna for those with small gardens or no gardens at all! Just 3ft in diameter it performs as well as a full-sized dipole. Tuning control signals are sent up the coax cable. The only extra you need is a length of coax cable to go between the supplied control box and the loop. 2" mast mounting brackets included for loop.

- 10 - 30MHz Size <1m (36")
- 50 Ohm feed 150W
- Remote control head included
- uto band select Fast/Slow tune
- Cross needle VSWR meter

### LCD Data Reader



- Decodes CW, RTTY, ASCII, AMTOR FEC
- LCD 2 x 16 characters
- 8000 character RAM
- Key input for CW practice
- Epson compatible printer port
- Requires 12V at 300mA DC
- Connects to receiver phone socket

### MFJ-901B HF ATU



- 1.8 - 30MHz 200W
- Long wire, balanced & coax

If you are looking for something that will match almost anything at a price that will please almost everybody - here it is!

- 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"

### 300W Dummy Load



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

### MFJ-264 1kW Model 64.95

### New CW Tutor



**"It's an Amazing Idea!"**

- Displays words, letters and numbers
- 3 to 35WPM with natural CW note
- Various modes including Farnsworth
- Enormous vocabulary of words
- Actually sends QSOs as well!
- Individual characters or groups
- Headphone socket; Power from PP3
- Sends text just like an actual test.
- A tutor that displays what it sends.

### 10W 6m SSB Transceiver



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

### 200W Low Pass Filter



- 1.8 - 30MHz 200W PEP
- 50 Ohms impedance
- 50dB @ 50MHz 0.5dB at 30MHz
- SO-239 connectors

### Long Wire 300W ATU



- Long Wire ATU
- 300W pep rating
- 160 - 10m
- Tunes any wire
- Use Home
- Use Portable
- SO-239 to tx.

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Order a 3 year subscription and you'll not only  
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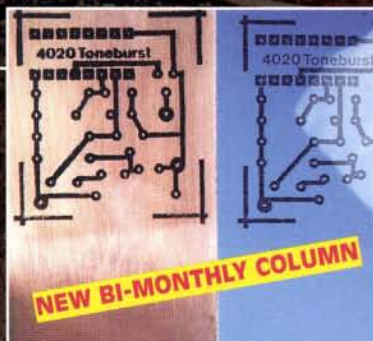
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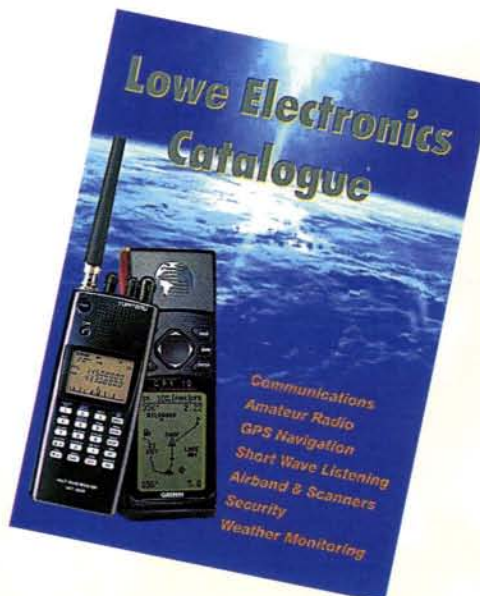
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# EDITOR'S Keylines

Rob Mannion's viewpoint on the World of Amateur Radio

In my January 'Keylines' I discussed the Centenary of Amateur Radio and issued a welcome to readers as *PW* launches into a year of continuing celebration of our marvellous hobby. However, personally I think there should be another celebration running concurrently with 'our centenary' - and that's the celebration of the local Amateur Radio club.

In a way I've already 'put my money where my mouth is' by showing my support for the all important local clubs by publishing my 'club visit' schedule for the year. And continuing on that theme I'd like to mention some of the really good ideas I've seen in action, read about and been told of during the various visits made in recent years.

I have no doubt that many readers will agree that the local club is the backbone of our hobby. I've said it many times before and knowing me I'll say it many times in the future! But joking apart...it's amazing what talent there is in the local club, and I think this is the prime reason for it to be celebrated along with the centenary.

So, why shouldn't your club celebrate, socialise and publicise? There's nothing to stop your club - whether it be in Cornwall, Aberdeenshire, County Antrim Cork, the Isle of Wight or Wales - you've all got something to celebrate!

## Radio Activity

Some of the clubs I've visited in recent times could be classed as being truly alive with 'Radio Activity' and are literally buzzing with ideas. Among these are the **Hoddesdon Club** in Hertfordshire who along with producing a very distinctive - personality filled - club magazine (they were of course the first 'Club Spotlight' Club Magazine Competition winners) have an extremely active 'twinning' arrangement with an American club.

It seems very strange to me - bearing in mind that our hobby is mainly involved in radio communication - that there aren't many more clubs following the example of the Hoddesdon Club. However, when clubs do enter a twinning arrangement they always seem to be very successful indeed.

Occasionally I hear of clubs that have tenuous ties with Amateur Radio Clubs associated

with the twinned town, city or village that their own locality is linked with. But despite this, the twinning of clubs with those in other countries is the exception rather than the rule. But surely...during 1998 everyone involved in Amateur Radio in the British Isles has got the ideal chance to stretch out the hand (or radio wave!) of friendship to another club somewhere?

## Club Spotlight

**Zoë Crabb**, who is busy every month compiling our 'Club Spotlight' feature from your news every month, would be very pleased indeed to have news of your planned 'radio activities' for 1998. And of course, Zoë and I (we work as a 'team within a team' on this very important aspect of *PW*) would be delighted to hear from **your club** - particularly if you set up a 'twinning' arrangement with a club outside of your own country (I say this because it's important to remember that many *PW* readers are to be found outside of the British and indeed - outside of Europe!).

Incidentally, I'm pleased to say that after an initial show of resistance from some of our readers the 'Club Spotlight' feature is now proving to be very popular. The format we've adopted - 'newsey', friendly, informative and personality-based topical items - replaced the (quite honestly!) somewhat boring list of 'club events'. It was changed because none of the editorial team thought that the 'club scene' was being represented in the fashion it deserved and we felt that it did deserve far better and more effective 'treatment'.

And although 'Club Spotlight' does still provide the occasional short paragraph listing times of meetings and 'what's on' at various clubs - anyone reading the pages regularly will see that we promote the 'Club Scene' in the most effective way we can and it's far more than just a 'listing of events' page.

Zoë and I encourage the often hard-pressed Club Secretaries to send in topical items and interesting information along with their club's schedule for the coming months. In this way we feel that it's possible to show the local club to best advantage - and

it's working thanks to your help, co-operation and enthusiasm. Thank you!

## Magazine Competition

Following on with my comments on the importance of the local clubs and their activities I think it's appropriate to mention the *Practical Wireless* and Kenwood Club Spotlight Club Magazine Competition and that we are looking forward to receiving your entries. Everyone entering stands a chance of winning - so why not have a go?

This year of course there will be two trophies on offer - one for the 'local' club and one for the 'national' club winner. The splendid 'Club Spotlight Trophy' itself - sponsored and donated by Kenwood - would look good in your meeting room! And if you are involved with a club which has a 'national' membership (such as the **British Amateur Radio Teledata Group** - the first winners) you could enter with a chance of being awarded the newly-introduced 'Bert's Bell' Trophy in memory of **Bert Newman G2FIX** (full competition details in 'Club Spotlight').

So, why not, make this year a three-way Amateur Radio Celebration? 'Top it off' with another reason to cheer - when your club wins one of the trophies on offer! Have a go, support our hobby, your club and enjoy yourself at the same time! Good luck to you all!

## Electronics In Action

This issue of *PW* sees the first of our new feature entitled 'Electronics In Action' which will appear every-other-month. In this way we hope to fill the 'electronics' gap that's appeared in our coverage since the magazine concentrated on Amateur Radio.

**Tex Swann G1TEX** our Technical Projects Sub-editor, Technical draughtsman and Staff Photographer (when he can find the time he also drives a Reliant Three-wheeler car!) will be compiling the column. The editorial team consider this was the best way to introduce a few more electronic ideas, projects and circuits into *PW* and it will appear in the 'opposite' month to 'Antennas In Action' which of course is also compiled by Tex.

We're introducing 'Electronics

In Action' because for a long time readers have been asking for the return of articles along the line of 'Take 20' or 'IC Of The Month' to the magazine. However, to do so and to serve the purposes of an Amateur Radio magazine has made it difficult...until now!

So, in future *PW* will carry a column every-other-month where we can publish ideas on a purely electronics theme. Such ideas, topics, circuits and projects will obviously be helpful in the wider field of Amateur Radio. And whereas we don't often have the space to discuss power supplies, stabilisation, digital techniques, remote control, etc., in the general coverage of *PW* the new column will be able to do so without detracting from the main editorial content.

I often see products, ideas and projects which although not strictly Amateur Radio orientated - appeal to my interests and I feel sure they'd also appeal to readers. And as it seemed a pity that readers should lose out because of editorial restrictions - the idea of 'Electronics In Action' was born.

From a purely personal point of view I'm looking forward to seeing the topics of power supplies discussed in depth. For instance (I'm always tempted to buy some of these) why haven't the sealed lead-acid gel 2V rechargeable cells been widely adopted by hobbyists? If the reluctance stems from the special charging needs I have no doubt that readers who do use them will pass on their ideas and advice!

I'm also looking out for ideas that I can use to build digital projects and I have in mind the idea of incorporating l.c.d. frequency displays into home-brew equipment. And of course, I do know kits are available to do this - but with 'Electronics In Action' I think many of us are going to be encouraged to have a go at something different and learn at the same time.

So, as we launch into our first edition of 'Electronics In Action' we need your help and support. Keep Tex on his toes! Send your ideas, hints, tips and techniques and comments direct to him and together we'll produce another helpful series for you and all our other readers.

*Rob Mannion  
G3X7D*



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

# RECEIVING You

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

## Letters Received Via The 'Internet'

Many letters intended for 'Receiving You' now arrive via the 'Internet'. And although there's no problem in general with E-Mail, many correspondents are forgetting to provide their postal address. I have to remind readers that although we will not publish a full postal address (unless we are asked to do so), we require it if the letter is to be considered. So, please don't forget to include your full postal address and call sign along with your E-Mail hieroglyphics! Editor

## This Month's Star Letter

### Back On The Air

Dear Sir

You may or may not remember, but a couple of years ago, I wrote to you and you very kindly published my letter. Thank you for that.

In that letter, I told the story of how I had been QRT for some time, having previously become disenchanted with 'black box' operating, and how I had sold all of my equipment when relocating to our present QTH. I said then that I was determined to get back on the air and that I saw the way back via QRP and home-brew gear.

As I remember, you added a footnote to my letter in which you said something along the lines of 'Welcome back, please keep us informed of progress'. Well...here's the report!

It may have taken two years, partly because I suffered a heart attack in the middle, but I finally made it back onto the bands (7MHz to be exact) with a completely home-built QRP station on the morning of 1st July 1997.

After listening around for quite some time, I came across a DL coming in very strong and although my antenna was less than adequate, I gave him a quick call. He didn't hear me, which didn't surprise me with 4W output into 85ft of wire draped across the bungalow roof, and I knew my signal strength would be low.

Shortly afterwards, I heard a G station calling CQ, this was a bit nearer to home and so seemed more promising. I went back to him and to my very great pleasure, he came back with a 579 report. To say I was pleased would be the understatement of the year and if I hadn't forced myself to remain calm afterwards, I could easily have had a second heart attack! My second attempt at transmitting had resulted in a contact!

Spurred on by this, I set about improving the

antenna set-up. I still have the 85ft wire, end fed, but now with the aid of two stub masts and the chimney stack. It is at an average height of 25ft with the central heating system water piping as earth, aided by a counterpoise around the shack. With this set up, I have had many QSOs during the past three months and worked into eight countries with average signal reports of 6/7.

I am enjoying my QRP. There is a satisfaction which I have not experienced since I was first licensed almost 40 years ago. My next project is to be a rig for 3.5MHz, hopefully followed by one for 14MHz. After that, who knows? There's no end to the possibilities.

In conclusion, there is one very important point which I have so far withheld. Who was the 'G' who came back to my call and gave me a welcome 579? Well, you may be surprised to learn that it was none other than yourself...G3XFD!

I am ashamed to say that despite the fact that I look forward to and enjoy 'Keylines' every month in PW, the call just did not register. However, when I was reading Leighton Smart's 'HF Far & Wide' in the November '97 issue and saw your call in the 'Listening & Operating Watch List', the truth hit me like a bolt from the blue!

So, thank you for being my first QRP contact ever. I sincerely hope it will not be the only time we shall 'hook-up'. Thank you for a great magazine, a bright spot in every month.

Peter Nicholson G3MYZ G-QRP 9391  
East Yorkshire

**Editor's reply:** Good to have you back on the air Peter and I try to get on myself as much as possible. But I can understand you not recognising a call sign, as I've done it myself. Recently the 'penny didn't drop' when I worked Charlie Blake M0AIJ (a regular 'HF Far & Wide' contributor) on s.s.b. And I know his voice well! (See December 1997 page 63).

### Lighthouses & Railways

Dear Sir

Congratulations to the Sutherland & District Amateur Radio Club for their activities at Tarbat Ness Lighthouse (page 15 of the December edition). The locomotive Stephensons were George and his son Robert. George was born in Killingworth, Northumberland, and both

were very much children of the northeast England. In any event, it is questionable whether the Stephenson's *Rocket* was the first locomotive in the world, but it was certainly not designed by Robert Louis Stevenson.

The lighthouse Stevensons were an Edinburgh family, notably Robert Stevenson and his sons Alan and Thomas. Thomas was the father of Robert Louis Stevenson

who was the author of *Kidnapped* and *Treasure Island*, but whose interest in locomotives probably only extended to writing poetry about them and travelling behind them. The Stevenson family did deal in railways but, as far as I can find, the Stephensons confined themselves to railways.

Back to your books, Sutherland & District Amateur Radio Club. The history of both families is

fascinating and well worth further study.

W. J. Gay  
Edinburgh

**Editor's reply:** As a railway enthusiast (and a journalist who wrote tourist guides on Scottish lighthouses when I lived in Scotland) I'm ashamed to say I let this one slip through Mr Gay. The mistake (a very common one I'm afraid) on the original

press release sent in by the Sutherland Club should have been spotted - but of course the confusion does not detract from the success of the event. My thanks go to the many readers who drew my attention to the errors (on the air and by letter!) and 'pulled my leg' and suggested that I did not try an audition on railways for the 'Brain of Britain' quiz on BBC Radio Four!

### What Is A Varactor Diode?

Dear Sir

Reading Ian Poole G3YWX's 'What Is A?' column dealing with Varactor diodes (December 1997), brought back memories of my G8 days as it was one way to triple from 144 to 430MHz.

The BAY96 diode could give maximum 15W in at 144MHz with 10W out at 430MHz. It was, however, unwise to do this because you could make others think the band was wide open (only to find it was all the same call sign) due to overdriving the diode! It was called a tripler, but in fact the 1st coil was 144MHz, the 2nd 288MHz, the output line at 432MHz.

The BAY96 was stud mounted and needed a good heatsink. Later, very small diodes, only about 3mm long, these work up to 5.760GHz microwave bands.

I think perhaps that Ian is talking about varicap diodes, not the varactor that I knew? John G4BYV  
Norfolk



## Finding The Elusive ZN414

Dear Sir

I note in your November's issue an appeal for stockists of the ZN414. I rang the source of those I purchased back in the mid 1970s and yes, they still have them - now priced at £1.75 each:-  
**Progressive Radio Supplies, 93 Dale Street, Liverpool 2, Tel: 0151-236 0982.**

Over the years I have made a number of sets using this device, including one which has been in continual use for the past 12 years. The output of the device being fed into an OC71 transistor and the signal taken off the collector by a Philips 2000Ω earphone, which feeds an acoustic tube 'stethoscope' headphone as used years ago on hospital radios. It is never switched off and the battery lasts for nine months.

It is a sad thing that junior newcomers to our hobby will no longer have this useful device available to make a very simple, reliable radio to perhaps take away to school or college.

Incidentally, I had my first copies of *Practical Wireless* in the early 1940s in F. J. Camm's heyday.

**C. N. Webster  
Merseyside**

**Editor's reply:** Thank you Mr Webster and I agree that it's a shame the versatile ZN414 family of i.c.s seems to be no longer manufactured. Let's hope more supplies continue to surface!

## Piccolo System

Dear Sir

Many thanks for the article 'In Tune With Piccolo' by **Malcolm McLeman F5VBU** on the Piccolo system in the November 1997 issue of *PW*. Despite the system being superseded by satellite communications, I have heard occasional

Piccolo transmissions during the last two years or so whilst tuning around on h.f., and there are still quite a few references to it in *The 10th Edition of Ferrell's Confidential Frequency List*.

What prompted my interest was the recent acquisition of a Racal RA1772 receiver containing a Piccolo reception facility. Upon investigation, I discovered what was obviously a dedicated narrow band filter inside bearing a 1978 date code, but I did not appreciate the significance of the 340Hz bandwidth until reading your article.

Another reception mode available on this particular receiver is 'Kaybard' - in this case fitted in place of the normal l.s.b. mode. The relevant filter is offset 2kHz below the i.f., i.e. 1398kHz, with a nominal bandwidth of 400Hz and as such, is not especially useful for normal communications, but I would be interested to know what it is used for. I'm sure someone out there must know!  
**Neil Clyne G8LIU  
Middlesex**

## Year Planner & Feedback

Dear Sir

I would like to thank the Editor for attending the Rochdale QRP Convention in October. During your lecture it was particularly appreciated that you took the trouble to seek feedback about the kind of articles we wanted to see in *PW*.

The free year planner with the January issue is also most welcome and has pride of place on the office wall. For those who may not have a use for this, how about next year you print something on the otherwise blank side, such as band plans, etc?  
**Tony Fishpool G4WIF  
Kent**

**Editor's comment:** It's my pleasure to attend Tony. Feedback is

## Tackling QRM

Dear Sir

I was interested in reading 'Tackling QRM - The Active Way' by **Adrian Knott G6KSN** (November 1997). I expect there is always a first time for everything and the above article is the reason for picking up my 'electronic pen' for the very first time, at least as far as *Practical Wireless* is concerned.

The subject was particularly interesting from my viewpoint, since for some time I have been looking into the design of 'Active Filters' with the object of building, more or less exactly, what Adrian Knott designed and published in the November issue of *PW*.

During my researches into the various types of filter, I came across the Sallen & Key and later the Bessel, Chebyshev and Butterworth designs in both high and low pass formats. In the basic two pole form, they all have the characteristic that  $C1 = C2 = C$  &  $R1 = R$ .

However, Adrian's design has different values for  $C1$  and  $C2$  and this has left me somewhat puzzled. Later stages reduce in value, whereas in a Chebyshev design, the RC product would increase. Each capacitor connected to the non-inverting input of the first three stages is 1nF.

However, the inverting input capacitors have a ratio of 10:1 in the first stage, 2.7:1 for stage two and 2.2:1 stage three. Finally,  $R1$  and  $R2$  stage one are 15kΩ while later stages are 39kΩ. An explanation would be much appreciated with a bit more technical detail please Adrian.

Change of subject now! For many months, I have read with much interest the arguments in 'Receiving You' 'For' and 'Against' Morse, how very difficult it is to learn and whether it should remain part of the licence conditions when it is quite obviously outdated. Well, there is no doubt that it no longer forms part of modern day communications and to that extent there is little point in burying your head in the sand.

However, I find c.w. enjoyable and there are many others like me, for there is a rhythm, a cadence within the

transmission or reception of 'good' Morse, which is both satisfying and pleasurable. Speed is unimportant, but as my old instructor used to say, it must be possible to differentiate each letter and separate each word.

Anyway, live and let live, provided the technical level of the RAE is kept up to a reasonable standard, it won't break my heart is the requirement to send Morse is removed from the licence requirements for h.f. operating, so long as a part of each band remains sacrosanct to c.w., if only for the foreseeable future. The only problem left would be keeping the uninitiated off the c.w. part of the band.

When it comes to improving your speed of your Morse, let me recount my memories. At the end of the Second World War, as a Radio Officer in the Merchant Navy, I was one of the first people to be made redundant and, since I had only been in the service for 18 months, I was promptly, much to my initial disgust (but later enjoyment) called up for National Service in the RAF.

Although my Morse was more than good enough, it was nevertheless necessary, from an operating procedure viewpoint, to go through RAF training. The instructors there had a very clever method to improve speed of reception. This involved sending long, torrid and very salacious excerpts from the unabridged version of *Lady Chatterley's Lover* (in those days unobtainable by legal means in the UK).

Since my earlier PMG training allowed me to get full copy of the Morse being sent I became extremely popular with the rest of my class. The room resounded with cries of 'Hey Smithy, did you get that bit after...?' My goodness, those were the days!  
**Ken Smith G3IYU  
Wiltshire**

**Editor's reply:** I will pass your query onto Adrian Knott Ken and perhaps (because other readers will be interested) he will send in a letter for 'Receiving You' in reply.

**essential and the Editorial team are pleased you like your 'Wall Planner'.**

## Ekco Autotune Radio

Dear Sir

With reference to the letter 'Valve & Vintage' from Mr P. D. Balding (November '97 issue) I used to own a Ekco autotune radio, purchased second-hand for £1.00 around 1950-52. When tuned to distant stations on

the m.w. band, and operated at night or early evening, should the station fade, the autotune would sometimes scan around and select another station a few kHz away, returning to the original station as the signal recovered from the fade. This phenomenon being similar to the 'capture effect' currently experienced on the f.m.-v.h.f. band.

I moved house in 1964 and disposed of the receiver, so you can

imagine my surprise and delight when visiting the Radio Museum at HMS Collingwood recently, when I saw an Ekco autotune receiver on display in the Domestic Radio section. My receiver had no back on the cabinet, so I made one from hardboard. Upon turning the set around at Collingwood I was amazed to find it had a hardwood back - in fact, it was and is my old set!  
**John Lepper G3JHL  
Hampshire**



# NEWS 1998

Compiled by Donna Vincent G7TZB

## Micro Sized Transceiver



Lowe Electronics have recently announced the arrival of a new product called the **HORA C408**. HORA are a new name to the UK market as the brand comes from Taiwan, where they are a well known and respected manufacturer of amateur radio and commercial equipment.

The C408 is a 'micro' sized f.m. transceiver with full coverage of the 430MHz. It measures only 58 x 80 x 25mm and is powered by two AA alkaline batteries.

The HORA C408 has selectable tuning steps, 20 memories, full CTCSS as standard, repeater shift and battery save modes, as well as full scanning facilities. The power output is 230mW, which allows access to local repeaters as well as short range simplex use.

The price of the C408 is just **£89.95** and is available from all branches of Lowe Electronics.

## Free Catalogue

A copy of the new **Optoelectronics** full colour product catalogue is available **free** from **Waters & Stanton PLC**. The A5 sized 17-page catalogue contains five of the new Opto products including the Micro Frequency Counter, Micro DTMF unit and the R11 FM Nearfield Test Receiver.

To get your copy of the latest Optoelectronics catalogue call Waters & Stanton on (01702) 206835 or write to them at 22 Main Road, Hockley, Essex SS5 4QS and remember to mention *PW* of course!

## Digital Recorder

The **Maycom VR-60** is a digital voice message recorder which is being distributed by **Nevada**. The VR-60 is a hand-held digital voice recorder that also has the capability of recording from a communications receiver, when used with a suitable connecting lead.

Features of the VR-60 include 60 minutes of recording time, 3 level battery indicator, calendar function with voice alarm, wake-up call and date and time of message record. The manufacturers state that it features easy-to-use controls for playback, pause, stop, skip, repeat and delete as well as a 'user friendly' option menu.

In addition to this, the VR-60 has the provision for an external speaker microphone to be used as well as a PIN (password) protection facility. The unit is powered by two AA cells.

Nevada of **189 London, Road, North End, Portsmouth PO2 9AE Tel: (01705) 690626** are currently selling the Maycom VR-60 for **£75** and would be happy to supply further information on the unit.



## Radio Amateur Saint - SP3RN

It's very often a busy frequency on 3.702MHz late in the evenings - with much of the activity coming from **Willy**



**Saint Maxilian Kolbe SP3RN**, who died in Auschwitz death camp in 1941 to save the life of another prisoner. He was canonised in 1962.

(Original photograph and story from SP5HS & W6YY).

**McCauley EI4EK**, **John Doherty EI9GB** and **Johnny McClintock EI6FF**. And sometimes - depending on band conditions - 'G' stations (and many s.w.l.s) 'join in' the fun when EI4EK poses 'mystery' quiz questions.

The QSOs are lighthearted affairs and add much to the great bond of friendship that exists between EI, GI and

## Bert's Bell Bagged By 'BARTAG'!

The **British Amateur Radio Teledata Group**, the winners of the newly instituted 'national' section of the *PW & Kenwood Club Spotlight Magazine Competition* received their trophy at a well-attended ceremony in Salisbury on Friday 28th November. Hosted by the **Salisbury Amateur Radio Club** the new **Bert Newman G2FIX** trophy ('Bert's Bell') was presented to the **British Amateur Radio Teledata Group** - affectionately known as 'Bartag' - by the late G2FIX's sister **Hilda Rusbridge** - ably supported by a large number of their close-knit family.

'Bert's Bell' was presented to BARTG at the Salisbury Club's headquarters in a moving ceremony which also produced many smiles - something G2FIX was always doing himself. From an original idea by **Rob Mannion G3XFD** (represented on this occasion by **Tex Swann G1TEX**) **Vicky Amos** (G2FIX's niece) organised the production and donation of a trophy in the form of a bell. The bell idea was adopted because of Bert Newman's famous campanology (Bellringing) activities and was specially made by **Gerry Amos**, Vicky's husband.

The magnificently finished trophy is mounted on a polished teak plinth and is inscribed 'G2FIX - Bert's Bell' on the bell itself with a commemorative plaque mounted on the plinth. The inscribed plaque carries the engraved name of the winners and details of the prize. It is to be awarded each year to the winner of the 'national' club magazine section of the competition and is planned to be presented at the Leicester Show.

In presenting the award to outgoing *Datacomm* Editor **Arthur Bard G1XKZ**, accompanied by new Editor **Mike Conder G6NCF**, G2FIX's family expressed a wish for a continuing involvement each year and hope to present the trophy to the 1998 winner and in subsequent years. The Salisbury Amateur Radio Club will also continue to support the award by providing a judge for the 'national' club magazine section adjudication.

And on that note *PW* would like to remind all clubs that the 1998 competition is open for entries. (Please see full details in 'Club Spotlight').



What a lovely trophy you've got! Outgoing BARTG *Datacomm* magazine Editor **Arthur Bard G1XKZ** shares the pride of the presentation with *PW*'s 'Tex' **Swann G1TEX** who was representing **Rob Mannion G3XFD** and acting as the photographer!



**Bert's Bell Bagged!** The BARTG representatives **Arthur Bard G1XKZ** (left) and **Mike Conder G6NCF** the new *Datacomm* Editor (2nd left) receiving the Bert Newman G2FIX 'Bert's Bell' trophy from **Hilda Rusbridge** G2FIX's sister. Main 'organiser' of the trophy (and family) **Vicky Amos** is directly behind the bell and to her left is **Gerry** her husband and maker of the trophy, accompanied by **Sue Rusbridge** (2nd right) and **Paul Rusbridge** (far right).



G stations...even when 'Quizmasters' EI4EK and EI9GB pose very difficult questions! Such a question was set in the summer when they asked if anyone on the 'Net' knew the name of the only known Radio Amateur Saint?

Despite a certain journalist having access to the Vatican's 'FAXbank' and press office (where they speak excellent English) he then proceeded to get hopelessly lost on their electronic multi-choice telephone system (which doesn't speak English). So, defeat was admitted and it was only when EI9GB sent the answer the truth came to light!

John EI9GB wrote to PW with the answer: "Father Maximilian Kolbe SP3RN spent several years as a missionary before starting his Amateur Radio activities in 1938. He was arrested by the Gestapo in December 1939 and was sent to the infamous Auschwitz death camp near his home parish of Krakow. In 1941, when one of his fellow prisoners (the head of a large family) was selected for death Father Maximilian volunteered to go in his place. He thus died on 14th August 1941.

Father Kolbe was posthumously awarded the highest Polish Military Medal - the *Virtuti Militari* Golden Cross. Pope John Paul canonised Father Kolbe as a Saint on October 10th 1962 - the first licensed Radio Amateur to become a Saint". (With thanks to SP5HS and W6YY for the original photograph and information).

G3XFD

## Robot Intelligence

Kevin Warwick Professor of Cybernetics at the University of Reading will be presenting a lecture entitled 'Minds Of Their Own - Could Robots Be More Intelligent Than Humans?' on Monday 16 March 1998 at the University of Leeds in the Conference Auditorium starting at 7.30pm.

Professor Warwick states that "Humans are where they are because of their intelligence. Yet in the next decade or so we will most likely see robot machines that are far more intelligent than we are". In his lecture Professor Warwick will show how robots could easily be running things in the future.

Entrance to the Lecture is free but by ticket only. Tickets are available from Freda Barker BA, Branch Organiser, 7 Canford Road, Allerton, Bradford BD15 7BS Tel: (0274) 499043 on receipt of an s.a.e.

## West Wight, Marconi & The World

An ambitious programme of events, 'on air' schedules and activities by the West Wight Radio Society marked the 100th anniversary of the Needles Wireless

Telegraphy station on the Isle of Wight on Friday 5th and Saturday 6th of December. The magnificently co-ordinated series of events ended up with much publicity for the hobby of Amateur Radio and for commemorating the important pioneering station used by Marconi in 1897.

The Needles event - organised by a team from the West Wight Radio Society led by Ben Clegg G7RER

attracted the attention

of the public - drawing 400 visitors to the special event stations operating on the Saturday despite the very poor weather conditions at the very exposed site. The unexpectedly large number of visitors saw the various aspects of the GB100 IOW (a very special event call sign) stations in action.

The success of the two-day event (which for the teams involved started on Tuesday 2nd of December when station erecting started) was crowned by successful QSOs with HM Royal Yacht *Britannia* and many other notable stations. And despite other major news events...the activities from the Needles station attracted national and local TV and Radio news coverage.

Souvenir copies of the impressively produced Centenary Programme of Events and a GB100 IOW QSL card are available for £2 cheque or postal order (including postage) from Ben Clegg G7RER at the 'Marconi Centenary Office, Monks Lane, Freshwater, Isle of Wight PO40 9ST.

*Editorial note: We hope to bring you a full feature covering the story of the impressive Isle of Wight Centenary Event in an early issue of PW. And from what we've heard of the weather experienced (severe gales!) it sounds as*

*if the West Wight Team worked really hard.*

*Congratulations to all concerned and we look forward to reading 'the story behind the event'!*



## Yaesu's 'Ultra-Compact' FT-847 Transceiver

Yaesu (UK) Ltd. have announced details of their new FT-847 h.f., v.h.f and u.h.f. transceiver. Described by Yaesu as being "Ultra Compact" this all-mode transceiver provides coverage of all Amateur Radio bands from 1.8 to 430MHz in one 'package'.

Expected to appear in the UK in January 1998 the FT-847 offers 100W on h.f. and 50MHz and 50W on 144 and 430MHz. Other features will include cross band full duplex, normal/reverse tracking (for satellite operation) and CTCSS and DCS encode/decode.

Yaesu's press release also says that "The FT-847 also incorporates high resolution 0.1Hz tuning steps for 'ultra smooth' tuning, DSP filters (notch, noise reduction and band-pass filtering) and 'Shuttle Jog' tuning dial, direct keypad frequency entry, 1200/9600BPS packet ready and optional voice synthesiser. And although the final price has not been announced, Yaesu have informed PW that the transceiver will be available within the £1700 to £1800 range.

**Note:** PW hopes to review this transceiver as soon it's available. **Editor.**



## On Air With GX4BJC/P

The International Short Wave League (ISWL) will be again be activating the club call sign GX4BJC this year. This time operators from Northern Ireland, Scotland and Wales will be taking part which means that GN4BJC/P, GS4BJC/P and GC4BJC/P will also be activated. The list of operators is as follows:

Month	Call	Name	Location
January	G3NYY	Walt	Tewkesbury
February	G0KOC	Arthur	Didcot
March	G0LCB	Tony	Wantage
April	G0LGF	Terry	Norfolk
May	G0DBX	David	Lincolnshire
June	G14CBG	Roy	Belfast (GN4BJC/P)
July	G0MPKW	John	Isle of Lewis (GSBJC/P)
August	G4IUF	Mike	Harrogate
September	G4EUI	John	Birmingham
October	G0IYZ	Chris	Derby
November	GW3CNW	Frank	North Wales (GC4BJC/P)
December	MOBAX	Brian	Christchurch

As in previous years, a special ISWL Club Callsign Card will be available to anyone who either hears or works the station. A QSL will be sent on receipt of an incoming QSL or reception reports. You can QSL via the bureau or direct to: David Beale G0DBX (G-10618), ISWL Club Callsign QSL Manager, 'Kenwood', London Road, Louth, Lincolnshire LN11 8QH.

Following the ISWL Elections which were held in October Mike Parker G-8264/G4IUF/N6SVL was elected as **Honorary President** and John Raynes G-16436/G0BWG as **Honorary Secretary**. Please note that John's election means that as from now all correspondence relating to information requests, orders and all ISWL related correspondence should be addressed to John at 267 Pelham Road, Immingham, North East Lincolnshire DN40 1JU. Finally, Evelyn May G-17197/G00ZI was elected as **Honorary Vice President** in recognition of her hardwork and dedication to the ISWL.



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

# CLUB Spotlight

Compiled by Zoë Crabb

## The 'Spotlight' Is On Again!

It's time to turn the 'Club Spotlight' on again as we invite you to enter your club magazines into the 1998 *Practical Wireless* & Kenwood Club Spotlight Magazine Competition. Local clubs entering will be competing for the magnificent original trophy - kindly donated by Kenwood - and 'national' clubs will be competing for the 'Bert's Bell' award, which was instituted in 1997 in tribute to the late Bert Newman G2FIX.



It's very simple to enter the 'Club Spotlight' magazine competition and all you need to do is to send us the **three most recent copies** of your magazine and a covering letter. The covering letter should make it clear **what category of club your club is eligible**.

For example, the **British Amateur Radio Teledata Group - 'BARTAG'** - winner of the 1997 'national' award - can only enter as a 'national' club' section, whereas the **Cockenzie & Port Seton Club** - last year's winners, now have to specify that they are a local club.

### National Or Local

For either category ('national' or local) your covering letter should provide the following details: How many people there are on the Editorial team and the type of job they do/or did (if retired), how long the magazine has been established, how it's produced (on your computer or text supplied to 'outside' printer for professional printing, etc.) and whether or not the publication is 'sponsored', the number of copies printed and membership size of your club. It would also help the judging panel if you could provide some historical details on your club.

The judging panel this year includes **Jim Bacon G3YLA**, **David Barlow G3PLE** (who of course first suggested the competition), **Zoë Crabb**, **Dave Wilkins G5HY** and **Rob Mannion G3XFD**.

Additionally - and for entries in the 'national' category only - the Salisbury Club will be providing one extra judge to decide the winner of the 'Bert's Bell' Trophy (Salisbury was of course Bert's Club).

Entry to the competition is open now and all entries should be at the *PW* offices in Broadstone no later than **Wednesday 1st of July 1998**. This is because the presentations are to be made at the Leicester Show (the new venue of course) and members of the judging panel live in places as far apart as Cornwall, East Anglia and Greater London, so it will not be possible to consider late entries!

So, make sure your club's entry reaches us in good time by sending it to **Zoë Crabb, Club Spotlight Magazine Competition, Practical Wireless, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW**.

The Editor's decision (as head of the adjudication panel) is final and no correspondence will be entered into. Good luck and we look forward to reading **YOUR** magazine!

**Rob Mannion G3XFD**

## New Exam Centre

The **Sandwell Amateur Radio Club** have registered a local primary school with the City & Guilds as an approved Centre for the 1998 Novice Radio Amateur and Radio Amateurs examinations. The club, which meets at their own premises in **The Broadway, Oldbury, West Midlands**, has been conducting RAE and NRAE classes for a number of years and entering candidates as external candidates at a local college.

"We felt that the time had come for the club to have it's own exam centre" the Club Chair **Martin Prestidge G2BXP** said, "so we decided to go down the road of registering a nearby school as an exam centre".

The school chosen, **Causeway Green Primary in Pennicricket Lane, Oldbury**, has good public transport links with Birmingham, West Bromwich and Dudley, and is about one mile from Junction 2 on the M5 motorway.

For further information, contact the club officers:  
Chairman: **Martin Prestidge G2BXP, 48 Parkfield Road, Oldbury, West Midlands B68 8PT** on **0121-552 4902** or the Secretary: **Clive Binnell G0TVR, 146 Hales Crescent, Semthwick, West Midlands B67 6QX** on **0121-429 6061** or last but not least the Treasurer: **Archie Holyoake G4OJJ, 281 Causeway Green Road, Oldbury, West Midlands B68 8LT** on **0121-532 7039**.

## Morse Club

Members of the **Morse Club** meet on the 2nd and 4th Thursdays of the month at the **5 Wents Memorial Hall, Swanley, Kent**. The club's activities are, own h.f./v.h.f. antennas on site with h.f./v.h.f. and Packet, CB, Radio

Morse and Novice training, PMR conversions, computer advice and repair, home and club construction with computer CAD programmes and with field days, surplus sales and a mini rally.

So, why not go along and join, all new members will be made most welcome. Further details from the Club Secretary **Robert Francis G7KOQ, 163 Sherwood Park Avenue, Blackfen, Near Sidcup, Kent DA15 9JD**.

## Lighthouse Activity Weekend

The Northern Lighthouse Weekend, an idea conceived and co-ordinated by the Ayr Amateur Radio Group, has Scottish Amateur Radio stations established at lighthouses around the coast of Scotland and has been running for a number of years, but last year, 1997, it was developed into The Lighthouse/Lightship Activity Weekend.

The event took place over the weekend of 23/24th August, when 36 stations were established at lighthouses and lightships in 14 countries. The event is not a contest, but a weekend for amateurs to enjoy themselves and have fun whilst making contact with as many stations as possible.

However, it is requested that stations take some time out to work the slow operator, the newly licensed and QRP stations. There are no restrictions on antennas or power and operating times at each station's discretion within the period of the activity.

This year, 1998, The Lighthouse/Lightship Activity Weekend will be from **0001UTC on Saturday 22nd August** until **2359UTC on Sunday 23 August** and amateurs are invited to join in the fun of the weekend by establishing an amateur radio station at a lighthouse or lightship.

The annual event is used to obtain maximum exposure for the





hobby, The Press and, QTH permitting, also the public are invited to underline the obvious parallel between the international aspect in lighthouses, lightships and Amateur Radio.

So, if you fancy joining in the fun of the weekend and establishing a station at a lighthouse or lightship, then contact **Mike GM4SUC, QTHR** or **gm4suc@compuserve** or **@GB7AYR.#78.GBR.EU**

## Stevenage & DARS

The **Stevenage & District Amateur Radio Society** meet every week from 1930 at **The Stevenage Resource Centre in Chells Way, Stevenage, Hertfordshire**, where there is a permanent h.f. and v.h.f. station on site. New members and visitors are most welcome.

Just a few of the up and coming events for the new year include: January 13 - Sandhurst - 'A New Experience', 20th - Project Night - h.f. operating and instruction c.w., 27th - Video Evening.

For more information please contact either **Peter Bell 2E1CRK** on (01462) 674505 or **John Churchill M0ARQ** on (01462) 684962.

## Coventry ARS

Members of the **Coventry Amateur Radio Society** in the county of West Midlands meet every Friday at 2000 hours at **Binley Church Hall, Brinklow Road, Coventry**. Visitors are always welcome.

January 9th is a computer night, so bring along your new soft/hardware Christmas pressies, 16th - Night on the air (v.h.f., h.f. and Packet), 23rd - Quiz Night, 30th - Night on the air (v.h.f., h.f.

and Packet) and on February 6th, there is a Junk Sale.

More information from the Secretary **Robin Tew G4JDO** on (01203) 673999.

## Salop ARS

Members of the **Salop Amateur Radio Society** meet every Thursday evening at **The Telepost Club, Railway Lane, Abbey Foregate, Shrewsbury**, starting at 8pm. January 8th is a Natter Night and Night On The Air (these nights are usually held every alternate Thursday) and on the 15th, the Chairman will be holding a discussion evening, so this is an opportunity to air your views.

More information from **T. G. Davies G0JIX, 20 Kirkwood Court, Shrewsbury SY1 3SX**.

Send in all your Club News details to **Zoë Crabb** at the Editorial Offices.



**Saltash & District ARC members enjoying their BBQ on Kit Hill back in September.**

## Recent AGM

The **Saltash & District ARC** held their AGM back on the 7th November 1997 at the club room in the **Toc H Hall, Saltash**. Reports were received from the Chairman, Secretary and Treasurer.

In the Chairman's report, he commented on the club's activities during the year. He said that the highlights had been the visit by members to **Multi Media Studios Landrake**, the talk on **Airband Communication** by **Tony M0AVP** and **Roland G3XLU**, together with a talk on **Oil Rig**

Engineering by **Barrie Moreton** and also the successful **BBQ** and v.h.f. operation from **Kit Hill (300m a.s.l.)** with s.s.b. contacts with the **Poldhu Club**, the local s.s.b. **Net (the Hazel Net)** and a couple of stations in **Hants**. **Kevin G7NHW** indicated that he would not be able to continue as Chairman next year due to work commitments.

**Brian M0BHG** (Secretary), commented on attendance at club meetings, which had fallen slightly. He also noted that the club now has two overseas members. These are **Tim G7LRO**, who is now working in the **Falkland Islands** and **Giorgio Romani**, s.w.i. in **Undine, Northern Italy**.

Club publicity has been achieved through reports of club activities in the local press and **PW** and **RadCom** magazines. A local newspaper had included a report on the naming of a new road in **Saltash** by **Caradon District Council 'Jackson Way'** after **Captain Henry Jackson**, the early naval radio pioneer, who was resident in **Saltash** a century ago.

The Treasurer, **Tony Baughan M0AVP**, presented the club's audited accounts, which were received and passed by the meeting. In his report, the Treasurer said that there was a need to reduce expenditure or increase income to ensure the long term viability of the club as both fixed and variable cost

had increased during the last few years. The AGM meeting also set new subscription rates for 1998 and also introduced a new class of associate membership for those members who were unable to regularly attend meetings at the club room. This was the first increase in subscriptions for three years.

A vote of thanks given by the members to retiring Chairman **Kevin McKane G7NHW** for his period in office as Chairman. The following office bearers were elected unopposed: Chairman: **Bert Lee G7FTF**, Secretary and PRO: **Brian Giles M0BHG** and Treasurer: **Tony Baughan M0AVP**. **Kevin McKane G7NHW** will continue as Editor.

The committee were re-elected enblock as follows: **Geoff Markey G7VXN** (Deputy Chairman), **Andrew Blackmore G7WFF**, **Kevin Hale G0AKH**, **Arthur Rowse 'KA'** and **Gordon Robertson M0BHK**. **Robin Hewett G3XLU** agreed to continue as club President this year.

The meeting concluded by discussing items for next year's programme and the recruitment of new members who are always made most welcome, be they short wave listeners, Novices, CB operators or licensed Radio Amateurs or just anyone interested in radio and electronics. More information from **Brian M0BHG** on (01752) 8484321.



**Kevin G7NHW operating portable 23cm ATV into the local ATV repeater GB3WV. Kevin is the former Chairman of Saltash & DARC and committee member of the West Devon ATV Group.**

## Exeter's Events

The **Exeter Amateur Radio Society** meet on the 2nd and 3rd Monday of each month at the **Moose Centre, Spinning Path, Blackboy Road, Exeter EX4 6SN**. A Club Net is also held every Tuesday at 7.45pm on 145.575MHz f.m.

January 12th is a practical evening so bring your soldering irons, coaxial cable, plugs, etc. to see how **Theo G3EQM** does it and then show him how to do it better! Come and operate the club TX on January 19th or buy and sell lots of surplus at the **Surplus Sale**, which is being held on February 9th. Further details from **Theo G3EQM, QTHR** on (01392) 875498.





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# SPECIAL OFFER

## 'Grab' A Video Frame Grabber & Save A Packet!

This month we've teamed up with Applied Technologies Manufacturing Ltd. to bring you a **very special offer.**



Why buy a new digital camera with its low pixel count and poor picture storage ability when you can store thousands of high resolution still pictures on your computer using your Camcorder? The units that will allow you to do this are the **Motion Picture 1040-24**, 16bit ISA card, or the **PIC Pocket 1040-24** 'printer port picture grabber'.

The Motion Picture 1040-24 is a 16bit ISA card, supplied with software for monochrome AVI video capture while the PIC Pocket 1040-24 has the same capabilities but with its external connection this means it can be transported between computer locations very easily. Both units are capable of producing high resolution (1.6 million pixels) pictures in full colour to use with any computer program.

Once the Motion Picture or PIC Pocket is installed you will be able to 'grab' pictures from any video source - TV, VCR, satellite decoders or with Hi-8, S-video and the new digital Camcorders. And if you're on the Web you'll be able to send high resolution colour pictures and AVI movies with your E-mail to anywhere in the world!



The Motion Picture 1040-24 and the PIC Pocket 1040-24 units would normally cost £116.33 each including VAT however, we're offering you the chance to buy yours for **just £96 each inc. VAT and carriage** (UK mainland, overseas carriage prices available on application). To order either use the form on this page or call the **Credit Card Hotline** on (01202) 659930 and quote **PW Offer 2**.

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# Pin Diode?

Ian Poole G3YWX continues with his series and this time sets out to answer the question What is A ... Pin diode?

The Pin diode is widely used in radio frequency circuits as their structure enables them to perform well as switches and in attenuators. Apart from this, Pin diodes are also used in high power rectifiers where its structure also enables it to withstand high voltages.

The Pin diode was first developed in the early 1950s as a high power rectifier. The first technical papers on their operation appeared in 1952, but it was not until 1958 that they started to be used in radio frequency and microwave applications.

## Diode Sandwich

The Pin diode consists of an intrinsic or non-doped layer of semiconductor sandwiched between  $p$  and  $n$  type layers. It's the intrinsic layer (belonging to, part of its nature) which gives the diode its unique properties. This has a low concentration of carriers (holes or electrons) and as such has a relatively high level of resistivity.

Normally the intrinsic layer is quite narrow, typically between 10 and 200  $\mu\text{m}$ . Either side of the intrinsic layer the  $p$  type and  $n$  type layers are normally heavily doped.

The diodes are manufactured in two main types planar and mesa as shown in Fig. 1. For the planar structure a substrate of heavily doped  $n$  type ( $n^+$ ) material is used. A layer of intrinsic material is then grown onto this and the heavily doped  $p$  type region ( $p^+$ ) is diffused into this.

For the mesa structure the intrinsic and  $p^+$  areas are grown onto the substrate. The outside layers are then protected with a layer of oxide.

For high frequency operation the mesa structure is better because the layer thickness can be controlled more accurately.

This enables the intrinsic layer to be made very thin. In addition to this levels of capacitance can be reduced and surface breakdown is less of a problem.

## Operation & Characteristics

The intrinsic layer performs a vital part in the operation of the Pin diode. It has virtually no carriers (holes and electrons) of its own and at low levels of bias the carriers do not enter this layer. As a result no current flows.

Under reverse bias conditions the layer of depletion remains almost constant and the capacitance between the  $p$  and  $n$  regions remains almost the same. Under forward bias conditions a current starts to flow as shown in Fig. 2. The potential causes electrons to enter the intrinsic region. Further electrons enter the  $n$  type region from the connection.

Electrons are forced to leave the  $p$  type region into the external connection creating holes. These holes migrate across the  $p$  type region and enter the intrinsic region.

The holes combine with electrons from the  $n$  type region allowing further holes and electrons to enter the intrinsic region. The overall effect of this is that a current flows in the circuit.

One important characteristic of the Pin diode is that once it is forward biased it follows a very linear characteristic, being virtually resistive in nature. Unlike a normal  $pn$  junction diode there is virtually no distortion or rectification.

The value of resistance can also be altered. The resistance falling with increased bias current as shown in Fig. 3.

## Pin In Use

The Pin diode can be used in several areas.

For amateur radio purposes they are widely used as r.f. switches.

When Pin diodes are forward biased they can be considered as a short circuit, although there is a small loss in reality. When they are zero or reverse biased they act as an effective isolator.

In the reverse bias or zero condition their capacitance is comparatively small because of the thickness of the intrinsic layer. This makes them superior to ordinary diodes whose capacitance is higher because the depletion layer (the layer around the junction which is depleted of holes and electrons because it's reverse biased) is not as thick.

As a result Pin diodes are often used as transmit-receive switches in transceivers. Here they are superior to electromechanical relays because they are more reliable and operate far more quickly.

Diodes for use in the switching application must be high power varieties capable of carrying a few Amps when forward biased, and high voltages in the reverse bias condition. The actual specifications are naturally dependent upon the powers being transmitted.

Pin diodes are also used in voltage controlled variable r.f. attenuators. They act as variable linear resistors controlled by the level of bias, and as a result they can be incorporated into circuits to control the level of attenuation. With careful design the impedance of the attenuator can be maintained within reasonable limits over the range of operation.

Turning away from their r.f. applications Pin diodes find uses as high power rectifiers. Diodes for these uses normally have a wide intrinsic layer and this increases the reverse breakdown of the diode.

PW

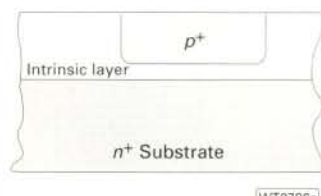


Fig. 1: Pin diode structures, (a) shows the planar structure and (b) the mesa structure.

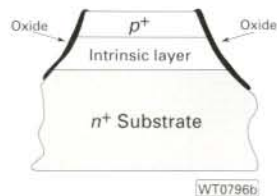


Fig. 2: Holes and electrons enter the intrinsic layer and combine causing a current to flow in the circuit.

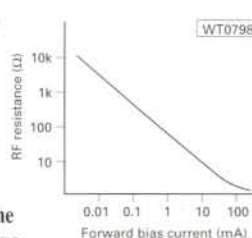


Fig. 3: A typical plot of r.f. resistance against forward bias current.

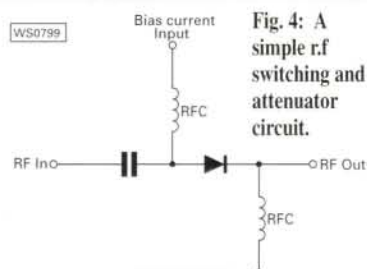


Fig. 4: A simple r.f. switching and attenuator circuit.

## Next Time

I'll be looking at the light emitting diode and its uses.



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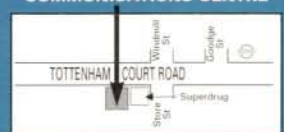
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# ELECTRONICS IN ACTION

Welcome to the first of the new Electronics-in-Action (E-i-A) features. I hope that this new feature (or is it a column - or - maybe a new section of the magazine? I'm not sure, it's really up to you, the reader) will prove popular. I look upon it as being like the 'Tex Topics' column in the Antennas-in-Action (A-i-A) section of *PW*. I'll kick it in a direction that I think you would like to go, and then you can help me to develop the column. As it is with 'Tex Topics' (A-i-A), I hope to act as a central point for information on questions about electronics. You pose the questions and I'll find an answer for you.

In this new column, I also hope to publish your electronic tips and tricks (it's similar to the 'What-A-Good-Idea' feature that we run from time-to-time) and the authors of the ideas I use in any month will get a voucher to 'spend' at our *PW* Book Store. And in each issue I'll have look at a few books to suit all levels of knowledge and skills.



Let me start with a few books that I think may be of use to you. And some of the best 'value for money' titles on the market are from the Babani range. *Getting Started In Practical Electronics* (BP345) by **Owen Bishop** is a very useful book for those who have a little theory but are looking for project ideas to have a go at. With 30 projects (ten each in the categories 'First', 'Easy' and 'Challenging') there should be enough to keep you busy in long winter evenings within its 170 or so pages.

One of the biggest problems found in electronic projects are the soldered joints due to poor soldering technique. *The Art Of Soldering* (BP324) by **Richard Brewster** is a very useful 'aide-memoir' for anyone. Fourteen chapters deal with such topics as which type of iron and accessories, what type of solder do I need for each type of 'job', techniques and how to recognise 'dry-joints'. There are also sections on model railways, White metal soldering, stained glass and using a gas flame to solder. A very useful book for anyone!

From the pen (or word-processor perhaps) of the prolific author **Robert Penfold** come the two complimentary books *Getting The Most From Your Multimeter* (BP239) and *More Advanced Uses Of The Multimeter* (BP265). The first is a very useful starter book and has within it only three chapters. They cover choosing your multimeter and what type you should consider, testing components with your chosen meter, and testing circuits in total.

With fewer chapters (only two) *More Advanced Uses Of The Multimeter* seeks nonetheless to extend the measurements that can be made with a basic meter. Taking in such ideas as r.f., high resistance and low voltage a.c.

measurements. There are also many add-on units as projects described with the book. It's an interesting guide showing that although a simple tool, a multimeter is indispensable in any branch of the hobby.

For more advanced users, *How To Test Almost Anything Electronic* by **Delton T. Horn** does just what the title says. A book of American origin, the techniques shown involve more test equipment than just a multimeter, and I think they're just as useful on this 'side of the pond'.

As an author **Ian Sinclair** is very well known, and with his fourth edition of *Practical Electronics Handbook* he attempts to cover many aspects of electronics that may be found in everyday life. Eleven chapters cover most aspects of analogue and digital electronics with typical circuits in many cases. It provides an excellent insight into everyday electronic household and hobby items and how they work.

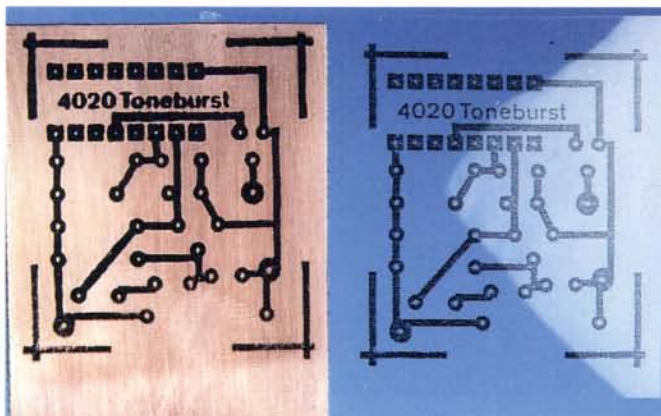
As *PW* is an Amateur Radio magazine, I

couldn't get away without at least one book on radios to build. In fact, there are 33 complete practical radio projects in **Homer L. Davidson's** book *Radio Receiver Projects You Can Build*. Of American origin (the author's name providing a clue) the book is still ideal as a start point for radios of all types. There are crystal radios, valved radios and radios made with integrated circuits within the 300+ pages. Something to fascinate everyone!

I have come across another book on building a fairly advanced transceiver, but I shall let you know more next time when I've had time to read it! So, let me now turn to some of your ideas and tips that you've sent in to share with everyone.

## Creating And Etching

Let's turn to creating and etching printed circuit boards (p.c.b.s), which is normally a three-part process: Draw artwork, create track mask and etch away the unwanted copper from the board. It may be possible to link the first



**Fig. 1:** With two pieces of overhead projector film and the technique outlined by Glynne Jones and you can transfer artwork to unetched p.c.b. material. The film itself is shown on the right.



two operations together if you use one of the special etch-resist filled pens directly onto the copper layer of the board. But in general most of us will be making boards from printed designs.

If you are going to draw your own track mask direct onto copper, then you'll probably use an etch-resistant ink marker. The Dalo Pen has been around for many years and serves the purpose well, but I have used waterproof marker pens in the past as a substitute when the Dalo has run dry. These waterproof pens are available with many differing shaped points making it easy to create tracks of different widths.

From Glynne Jones GW4TFS comes an idea using a photocopier to create track masks from published designs. Glynne says that all you need are two sheets of overhead projection (o.h.p.) film and access to a photocopier. In PW, and

"Leave the board to cool down then peel off the plastic sheet. The pattern should now be transferred to the copper, but any 'bits' that are lost such as lines, dots, etc., can be filled in by hand using a Dalo Pen or similar. (I use plastic enamel paint and a fine brush)".

Glynne suggests etching the p.c.b.s by floating them face down in the Ferric Chloride bath watching the p.c.b. until the track can be seen through the board. This works very well if you use the translucent p.c.b. material. Any small thin tracks that do not reproduce well may be bridged with a length of copper wire - not pretty, but it will work. Although as he showed in the photo of Fig. 1, the method is capable of very fine line reproduction.

As an aside to the o.h.p. film method, there is now a commercial product that uses this basic method. You still use a piece of o.h.p. film to create the 'flipped' version, but you then use the film from Press-N-Peel Etching Supplies for the second copy. This new (second) film produces a much better track mask than the original basic o.h.p. film.

For more details, contact Press-N-Peel Etching Supplies at 18 Stapleton Road, Peterborough PE2 6TD. Tel: (01733) 233043, FAX (01733) 231096. If the designs are from PW and there's enough demand we can create an accurate reversed image for individuals to create their own track masks.

On a more interesting side, the method of creating the artwork mentioned is not new. Some time ago while 'trawling' through the archives for 1933, I found that PW took out a provisional patent on exactly the same idea of using an iron-on transfer to create artwork. The PW system was called 'Transfer Print' and the page from November 1933 showed the various steps involved. I wonder what happened to that particular idea between then and now?

## Ready To Etch

Having produced your ready-to-etch p.c.b. it's about ready to go in the tank full of Ferric Chloride etchant liquid. So, clearing an area of the XYL's nice shiny draining board you lay out the shallow plastic etching tray and half fill it with the etchant. Keeping a constant to-and-fro rocking motion during the process, you will etch the p.c.b. beautifully cleanly. Still wearing the XYL's household gloves, you fish it out of the etchant 'soup' and start to wash the p.c.b. under the tap (not noticing the small speckles of yellow etchant on the work surface).

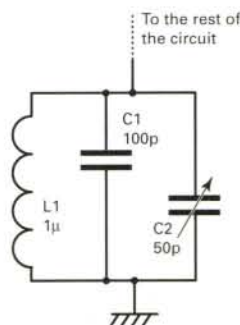
Imagine the fury of the 'other half' when she sees the **spots that will not come off** (I've been there - and done that. Tex). So, how do you avoid this domestic QRM? Well, Dave Fairhurst reckons that he has a method that's fairly 'flame-proof'. He puts the p.c.b. to be etched in a large plastic bag and does the etching outside (or in the shed) with the bag and contents completely immersed in a bucket of very hot water.

The type of bag that Dave prefers is the fairly thick type that is used for holding A4 sized documents. Pour some etchant into the bag with the p.c.b. and fold over the top several times if possible. This can now be held firmly in place with large 'bulldog' clips. The bag and contents may be lowered into the hot water and gently agitated to encourage the etching process.

After about 10 minutes the p.c.b. should

be fully etched, and its progress can be checked occasionally by gently squeezing the bag sides together so that any remaining copper on the board can be seen. The used etchant may be disposed of safely (your local reclamation site should be able to help. Tex), although Dave suggests returning it to the original container with the rest of the etchant.

The (by now only warm) water in the bucket may be used to do a first wash of the p.c.b. before returning to the house to finish off. By using this method, suggested by Dave, the domestic friction could be reduced to an absolute minimum and harmony will be maintained. (Now if only I could find a way to get the solder-splashes out of the carpet before she returns! Tex).



**The circuit of Tex's Conundrum No. 1. (See The End Box for the questions, then see if you can get the right answers).**

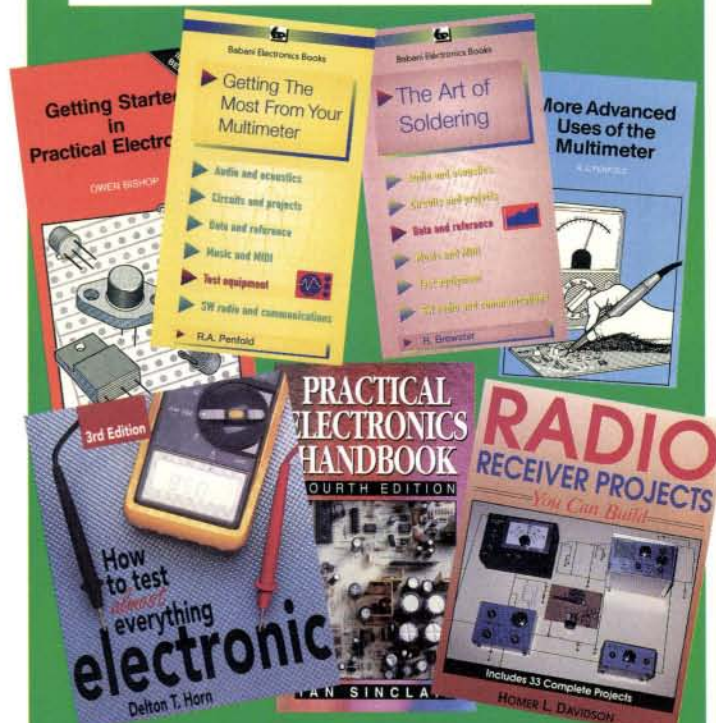
many other magazines, the track patterns are shown as you would see them on the p.c.b. itself. Glynne's method however, involves making mirror image of the design first.

In his letter Glynne says " Photocopy the original p.c.b. pattern onto o.h.p. clear plastic sheet. Reverse this copy (flip it over. Tex), cover it with a blank sheet of white paper and photocopy it again onto an o.h.p. sheet. This is now the reversed copy of the original. Cut the board to size and clean the copper thoroughly with steel wool to get a smooth shining surface. **Do not touch the copper, and handle it only with a cloth or tissue.**

Next he says "Place the reversed copy face down on the copper (note the image has a matt finish and it is this face that should be against the copper). Carefully, hold the plastic sheet in place and press a hot smoothing iron down onto the sheet, taking care not to move it until it sticks down.

## Books Mentioned

Getting Started In Practical Electronics (BP345)	£4.95
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Getting The Most From Your Multimeter (BP239)	£2.95
More Advanced Uses Of The Multimeter (BP265)	£2.95
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Any of the above books may be obtained from the PW Book Store featured elsewhere in the magazine.



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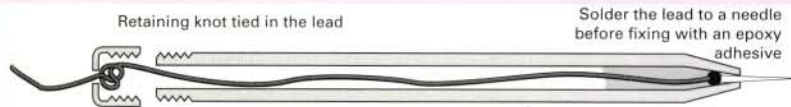
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## Test Probes

From Ken Fisher G0LKK comes a simple idea for test probes where he says "I needed a pair of very fine meter probes to do some fault finding on some very small closely packed boards. So a quick look in the junk-box produced a couple of old ballpoint pens".

Ken's idea is shown in Fig. 2 and, I for one will, certainly make a pair of them. I've found, when trying to read the meter, that the 'ordinary' pointed probes can slip off a test point and short across onto a nearby pad - sometimes with disastrous results. You may have to raid the XYL's sewing box for the small pins, but she is unlikely to miss two. As an 'improvement' I would be tempted to add a short length of insulated material around the pin, leaving only a short point peeping out.



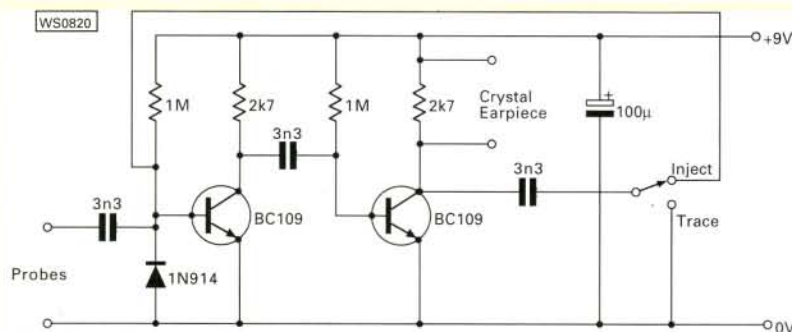
**Fig. 1: A fine pointed probe that Ken Fisher G0LKK made earlier.**  
(See text for detail).



**Fig. 4a: The design of this crystal earpiece hasn't changed in a long time.**



**Fig. 4b: The diaphragm of the earpiece, mounted on the piezoelectric transducer, seen through the centre hole, is extremely fragile and shouldn't be touched.**



**Fig. 3: This circuit is both signal injector and tracer, covering a wide range from audio to radio frequencies.**

Another neat idea is the one from J. Williams of Clwyd in Wales. The circuit shown in Fig. 3, is one that has been in use in his workshop for over 20 years. In his letter he says "I do not know where the circuit originates, but I hope this unit may be of use to some of your junior/Novice constructors, as it is a very simple and inexpensive piece of equipment". It is a simple idea, and should only cost pence to make, but it's very useful!

The circuit, when switched as shown is a simple square-wave ('flip-flop' or multi-vibrator) signal generator, with a frequency of about 400Hz in the audio band. There are however, harmonics reaching up at least into the v.h.f. range, that will find their way into almost any r.f. circuit. The circuit itself was built on a small square (8 x 8 holes) section of Veroboard without any track cuts. But you could make it smaller on a piece of 'Perf' or matrix board (like Veroboard but without copper tracks).

I have to admit I saw a similar circuit, to the one shown in Fig. 3, many years ago, and my only comment about the circuit is that I think that (from the signal injector side anyhow) using a lower voltage might be more beneficial. The output is some eight or nine volts peak-to-peak (p-p) and this level of high frequency signal might overload some sensitive audio amplifiers. If getting hold of a crystal earpiece, shown in the photographs of Fig. 4, is difficult then a crystal microphone can be pressed into service, although it's not as sensitive, due mainly to the poorer coupling to the ear.



**Fig. 5: A picture of John Olway's 'third hand' for holding p.c.b.s steady.**

From John Olway G3RMA comes a nice idea for holding a p.c.b. in position whilst working on it. John's 'PCB Helping Hand' as he calls it is the 'third hand' needed when trying to solder (or unsolder) a component onto a p.c.b. The type of 'Bulldog' clip he used was one that was some 75mm (3in) wide and had fixed handles. John says that if you only have the type with folding handles, they should be fastened (stuck or glued) into place.

The main holder is a ball-and-socket head designed originally to hold a camera, and these should be available from your local photographic shop (if you're lucky you could find a second hand unit quite cheaply). Fasten the clip onto the top of the socket unit and the ball-and-socket unit itself onto a section of aluminium or iron angle. The completed unit may be then held in a bench top vice in use. Although a slightly less stable, but far more portable unit could be built by utilising one of the small table top camera tripods, as these often have a small ball-and-socket head fitted.

John's unit has a thumbscrew locking device on it, but this isn't easily seen in the photograph of Fig. 5, and he mentions that p.c.b.s as large as 250x200mm may be held securely in positions ranging from horizontal to vertical. A neat idea John!

## The End

So I've come to the end of the first of the new E-i-A section of the magazine. I hope you will write in to me and send your electronics ideas and tips so that I can share them with other readers. I also hope to be exploring some of the intricacies of electronic circuits so, let me leave you with the small tuning problem shown in on page 19. The circuit consists of an inductor, L1 (1µH) and two capacitors C1, a fixed 100pF capacitor, and a variable capacitor C2, with a 50pF nominal value. The manufacturer's specification for C2 suggested that it was 50pF maximum and 3pF minimum capacitance. What are the upper and lower frequencies that the circuit will tune to? Answers to be sent to the editorial address marked *Tex's Conundrum No. 1*. (the answer need only be accurate to within 1kHz). The winner, drawn out of the editorial hat on monday 9 February 1988, will get his (or her) name 'in lights' within the next Electronics-in-Action'. See you then.

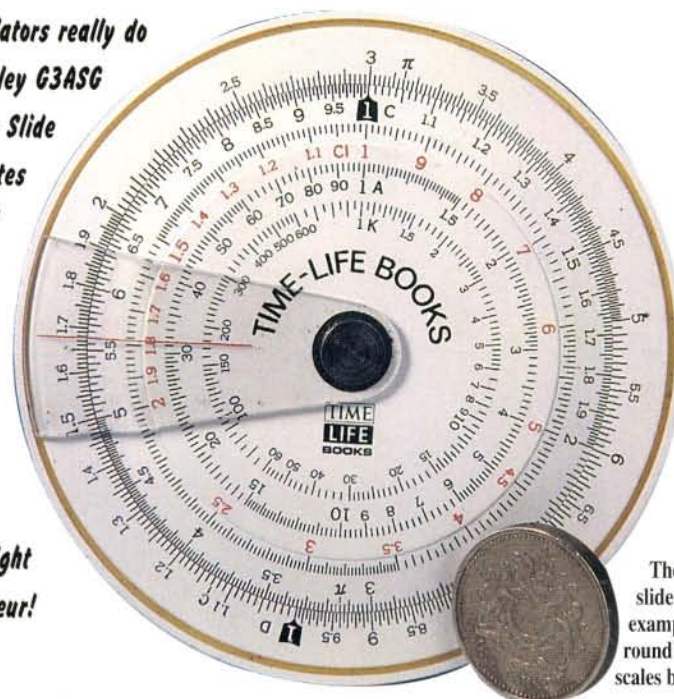
Tex



# Batteryless Calculators?

## Looking At The Slide Rule

*'Batteryless' calculators really do exist and Ray Fautley G3ASG takes a look at the Slide Rule - which predates the 'solar powered' l.c.d. variety by many decimal decades! They're still useful for radio, easy-to-buy, second-hand and everlasting - just right for the Radio Amateur!*



There are many varieties of slide rules around. This example really is 'in the round' and provides very long scales by being circular.

By Ray Fautley G3ASG

Another British invention! The slide rule has been around for quite a long time, it was invented by an English mathematician, **William Oughtred** in 1622.

The slide rule uses a method based on the logarithms that had been devised, earlier in the 17th century by a Scotsman **John Napier**. We know these logarithms as Naperian (or natural) logs (to the base  $e$ ) which (happily) we can conveniently forget as nearly all slide rules are based on the use of common logarithms to the base 10. These are the type that we were taught at school. Some of us even remember them!

Slide rules come in many varieties, some intended for electrical and radio engineering problems, others for use by mechanical or civil engineers. I own one which has rather sentimental attachments.

My old favourite was bought for the enormous sum of 6d (2½p) at Woolworth's in 1937. There are only six scales on it and it is 8 in (200mm) long.

### *Rubbing A Candle*

I remember removing the slider from my ruler completely and then rubbing

a candle along both edges of the slider to prevent it from sticking. It's still in good working order. The manufacturer was Lawrence Engineering Service of Wabash, Indiana, USA. I wonder if the firm still exists?

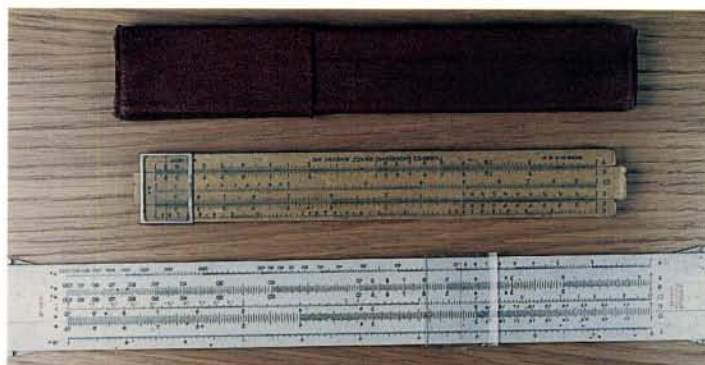
The photographs give some idea of the different types of rules produced over the years, even including circular models. There were a remarkable variety and they came in all shapes and sizes.

Nowadays however, the slide rule

has been completely superseded by the hand-held electronic calculator with its simple keyboard. Despite this, the knowledge of slide rule design and use may be of interest to the younger amongst us who have never had the opportunity to use the pre-electronic 'slip stick'.

### *Why Logarithms?*

So, why do logarithms (Logs) come into slide rules at all? Well, to explain this it's first necessary to understand



Ray G3ASG bought his favourite slide rule in Woolworth's for the equivalent of two and a half pence in 1937 (centre, with case above and a modern version below). He wonders if the American manufacturer of the 1937 slide rule is still in business!



Fig. 1: The techniques behind the slide rule (see text).



something about them and their uses in mathematics.

A logarithm is an index. Any number can be expressed as a power of some arbitrary number which is called the base. A few simple examples will hopefully make these rather confusing statements a bit clearer(!):

$2^2 = 4$ , then 2 is the log of 4 to the base 2, or  $\log_2(4) = 2$   
 $3^2 = 9$ , then 2 is the log of 9 to the base 3, or  $\log_3(9) = 2$   
 $4^2 = 16$ , then 2 is the log of 16 to the base 4, or  $\log_4(16) = 2$   
 $10^2 = 100$ , then 2 is the log of 100 to the base 10, or  $\log_{10}(100) = 2$

The '2' is the index or logarithm in each example.

So what? The only base we're concerned with is 10, so forget the other examples. (They were supposed to demonstrate the idea that any base could be used.)

### Multiplying & Dividing

Logarithms are most useful when multiplying and/or dividing several numbers. This is because it's only necessary to **ADD** or **SUBTRACT** the logs of numbers which is much easier than doing the long winded multiplication and division sums. Well, it was before the pocket electronic calculator was around!

As a device for performing arithmetical calculations (particularly those involving the several sequential

multiplications and/or divisions I've already mentioned) the slide rule requires only simple mechanical operations to obtain the accuracy necessary for solving most engineering problems.

Most models of slide rules have scales which are about 250mm (10in) long. They are usually called '10 inch' slide rules.

Although there may be as many as 12 scales on each side of some rules, I'll start the discussion using only two, usually marked 'A' and 'B'. One of these scales, the one designated 'A', is marked on the fixed part of the rule, and the other, designated 'B' is marked on the sliding part.

Both of the scales are identically marked. This becomes obvious when the slider is set so that the '1' on the 'B' scale coincides with the '1' on the 'A' scale. Then the '2' on the 'B' scale can be seen to coincide with the '2' on the 'A' scale and so on.

Each scale of the slide rule is a logarithmic scale, meaning that divisions on the scales are **proportional, not to the number marked on them, but to the logarithm of that number**. For example, the distance from the start of the scale (which always starts at '1' as the log of '0' is '1', i.e.,  $\log(0) = 1.0000$ ) to the division marked '2' is a length proportional to the logarithm of '2' which is 0.3010, or  $\log(2) = 0.3010$ .

### A Bit Confusing?

Perhaps it's all a bit confusing for you modern 'non-loggers'? Well, I suppose it is if you aren't familiar with using log tables at school as we 'old uns' used to have to do! Help is at hand though, **because you don't really have to understand logs if you just want to know how to operate a slide rule.**

My method, as perhaps some of you may remember from my 'Maths For The RAE' column in *PW*, is to provide worked examples as the best method for getting familiar with problems. So let's solve a very simple sum using the complicated slide rule.

We know that  $2 \times 3 = 6$ . So how is this multiplication achieved on the slide rule?

Look at **Fig. 1**, it represents the 'A' and 'B' scales. The 'B' scale is slid along until its '1' mark is opposite to the '2' mark on the fixed 'A' scale.

Now look along the 'B' scale to its '3' mark. Okay now? Next look just above 'B's 3' mark to the 'A' scale. What do you find? It's indicating '6' - wonderful! So  $2 \times 3 = 6$ . (Just a bit of mental arithmetic if you remember your tables!).

The first example was very simple, but what about multiplying  $2.35 \times 3.45$ ? Not so easy by mental arithmetic. But look at **Fig. 2**, here '1' on 'B' is set to 2.35 on 'A' and 3.45 on 'B' is found to be opposite 8.1 on 'A'.

Using a calculator you'll find that  $2.35 \times 3.45 = 8.1075$ . So the slide rule answer of 8.1 was not very far out, was it? (It would be near enough for most engineering problems).

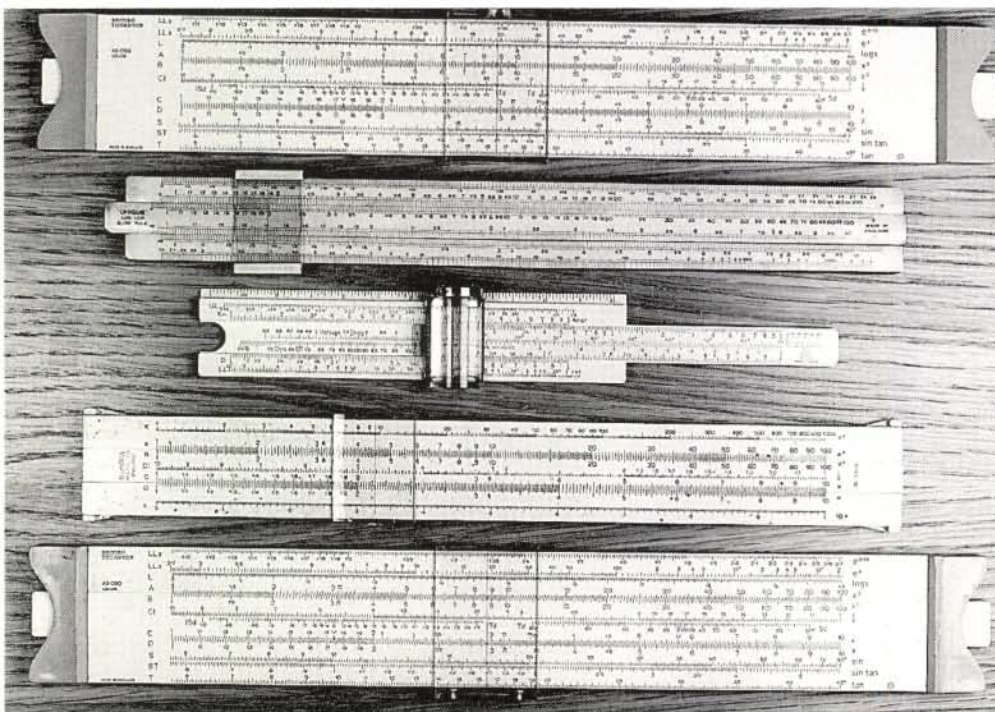
### Movable Cursor

Apart from the scales on the rule there's also another part which is movable and is called the **cursor**. This has a similar function to the cursor on the modern computer. It is used as a marker, especially when more than two numbers are to be operated upon. So, here's another example:

Multiply  $1.37 \times 1.7 \times 2.65$

- 1: Set 1 on scale B to 1.37 on scale A.
- 2: Move the cursor until its centre line is over 1.7 on scale B.
- 3: Set 1 on scale B to the cursor centre line.
- 4: Move cursor until its centre line is over 2.65 on scale B.
- 5: Look at where the cursor centre line crosses scale A.

Quite a collection! A selection of relatively modern slide rules. The model in the centre incorporates a magnifying lens to help the user to read the (often quite difficult to see!) scales.





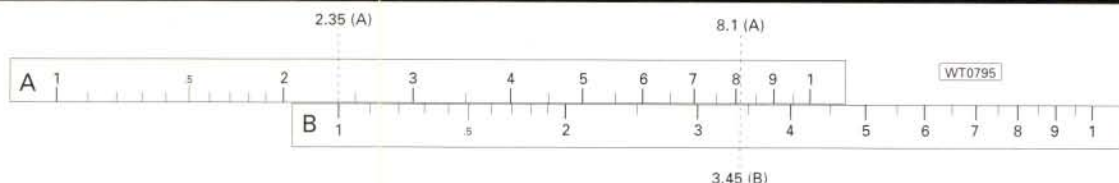


Fig. 2: Multiplying  $2.35 \times 3.45$  gives an answer of about 8.2 (see text).

6: This point on scale A gives the answer, which is 6.17 as near as it can be read.

The same problem solved using a calculator gives:

$1.37 \times 1.7 \times 2.65 = 6.17185$  so again the slide rule answer was near enough for most purposes.

### What About Division?

So, what about division using a slide rule? It's a similar operation but subtracting instead of adding lengths on the slide rule. Let's take a look at the technique:

Divide 8.5 by 1.6

1: Set the centre line of the cursor to 8.5 on scale A.

2: Set 1.6 on scale B also to the cursor centre line.

3: Set the centre line of the cursor to 1 scale B.

4: Look at where the cursor line crosses scale A. 5 This is the answer, 5.3.

The calculator gives:

$8.5 \div 1.6 = 5.3125$

### More Complicated

Now a more complicated problem: Multiply  $2.45 \times 8.3 \times 6.2$

Going by the steps in the examples I've already shown:

1: Set 1 on scale B to 2.45 on scale A.

2: Set centre line of cursor to 8.3 on scale B.

3: Set 1 on scale B to centre line of cursor.

4: Move cursor so that its centre line is opposite 6.2 on scale B.

Oh dear! The cursor has gone off the end of the rule! What do you do now? Don't panic! Don't panic!! ('Corporal Jones in 'Dad's Army'!) We can get over this problem. Slide scale B so that 1 on the right hand end of the scale is under the centre line of the cursor.

5: Move the cursor so that its centre

line is over 6.2 on scale B.

6: Look at where the cursor centre line intersects scale A.

7: This gives the answer as 126.

The calculator gives:

$2.45 \times 8.3 \times 6.2 = 126.077$

### A Decimal Point

Wait a moment, how do you know where the decimal point goes in the answer? There's no problem using the calculator as it's done for you, but with the slide rule it isn't!

What I do is to very roughly approximate the answer by multiplying  $3 \times 8 \times 6 = 144$ . So the answer is something over 100. (I used 3 instead of 2 for the first figure so as to allow for 8 and 6 being smaller than the actual 8.3 and 6.2 used in the example.)

### Other Functions

Of the other functions on the rule, one of the most useful is found on the scales marked A and D. It enables squares of numbers to be found directly.

Question: What is the square of 2.4? Usually written as  $2.4^2$  (2.4 squared).

1: Set the cursor centre line to 2.4 on scale D.

2: Look at where the cursor line crosses scale A.

3: The answer is 5.76.

Conversely square roots can be obtained. So, what is the square root of 8.4? (or  $\sqrt{8.4}$ ):

1: Set the cursor centre line to 8.4 on scale A. But wait, there are two points on scale A for 8.4. Which one should you use? Well, the left hand end of the rule is used for numbers 1 to 10 and the right hand end for 10 to 100. (This is another problem which doesn't exist when using a modern calculator!).

2: As our example is a number

between 1 and 10, the centre line of the cursor is set to 8.4 on the left hand end of scale A.

3: Look at where the centre line of the cursor crosses scale D.

4: The answer is 2.9.

In this case the calculator gives 2.898275349 as the answer.

### Which Ends?

To help fix in your mind which of the two ends of scale A to use when finding square roots of numbers here's a list:

Numbers between 0.01 and 0.1 use the LH end.

Numbers between 0.1 and 1.0 use the RH end.

Numbers between 1 and 10 use the LH end.

Numbers between 10 and 100 use the RH end, and so on.

(A degree of approximation is still necessary to assess just where the decimal point should appear in the answer!).

So, those are just a few of the many facilities available on most slide rules - or 'batteryless calculators'. During my own engineering days, after log tables, the slide rule offered a much speedier service, but now with electronic calculators so cheap and easy to use - you youngsters have never had it so good!

PW

An unusual 'tubular' slide rule which (by providing very long scales due to the 'spiral' action) is easier to use and read and provides more accurate answers.



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*Time to bring you a selection of readers' ideas. This month we feature a simple ground-plane antenna for h.f., a festive voltage test set that's useful on radio or on the car, some water waste-pipe spacers for twin feeder and a way of calibrating cheap slow-motion tuning dials.*

## A Cheap Ground-Plane Antenna

After a recent QSO with a fellow Radio Amateur in which I mentioned not being able to 'raise the DX' on my G5RV antenna, he persuaded me to try using a ground-plane antenna for the 14MHz (20m) band. So, from his instructions, design shown in **Fig. 1**, I made the antenna.

I secured it to a non-metallic pole so that the 'ground-plane' support wires form an angle of about 45°, so that the base of the antenna will ideally be about 5-7m above ground. The ropes connected to the ends of the ground wires can be tied off to either a convenient fence or ground pegs.

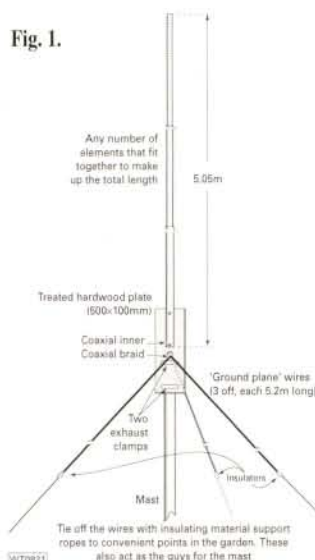
The vertical portion of the antenna was made from various sections of aluminium tubing that fitted together to make up the 5.05m length. The outer screen of the coaxial cable is connected to the three ground-plane wires, secured to the centre wooden plate.

The inner of the coaxial cable was soldered to a solder tag, secured under the lower support screw of the vertical section. The various joins should be covered in a waterproof type of material.

Since I erected the antenna, I've had good strong contacts with many countries, all on less than 100W and with an antenna costing only a few pounds.

**Chris Brown G0UNJ**  
Manchester

**Fig. 1.**



## 'Fairy Light' Test Set

In many instances in testing circuits, a multi-range 'all-singing all-dancing', transistor, capacitor and all else testing meter isn't required. All you really need is a simple power indicator to confirm 'is there power getting here'? And I think that my 'Fairy Light' Test set fulfils all the requirements.

The diagram, **Fig. 2** is more than adequate to show the design method. And although I've shown all the leads soldered directly to the brass screw of the miniature Edison screw (MES) bulb, the

original bulb and holder came from a redundant set of Christmas Tree lights - hence the name.

Have you ever noticed that the spare bulbs you purchased with the set of lights always disappear? And, that the type of replacement bulb you need isn't used in this year's light sets! When there are 12 lights in the 'string' then the bulb voltage is 20-24V. When there are 20-24 lights in the set, the bulb voltage is 12V. With a 36-40 bulb set, the bulb voltage is only around 6V.

The bulb specified in **Fig. 2** is capable of displaying power between two and 15V so, it's ideal for use when fault finding on car electrics.

**Wyn Mainwaring GW8AWT**  
Dyfed

**Fig. 2.**



## Pipe Slice Spacers

I use twin wire feeder by preference in almost all of my antenna systems. But after a time I find the cost of spacers becomes expensive, I've tried using some of the other methods suggested. And although they all work, they have their own problems. So, I think I've come up with an idea that overcomes many of the problems I've found.

My idea is to use a system of 'slices' cut from plastic waste pipe as the spacers. (I use two length of pipe that just slide snugly inside one another). The diameters to be used are whatever you find that fits the bill, but they should be cut into 'slices' not less than 6mm long.

Select a wire diameter (either insulated or bare) that just allows you to trap them both between the two 'slices'. The wire chosen should be tested before beginning the task of making up the

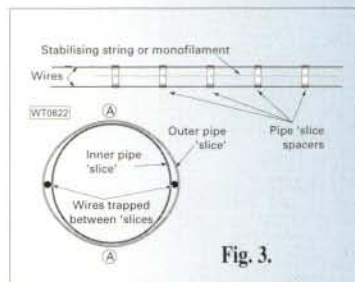
complete run. The idea is shown in the illustration of **Fig. 3**.

To make up a length of twin feeder, stretch two lengths of the chosen wire between two points, putting all the outer 'slices' over the wires. Then starting from one end, gently force the inner 'slice' in place trapping the wires diametrically opposite. Continue to fit inner 'slices' to trap the wires at the desired spacing along the wire pairs.

As an aid to stability the spacers should be coupled together with a nylon monofilament or thin string at points marked 'A' in **Fig. 3**. If the wire is still not quite tight, then the wires may be held in place with a 'figure-of-eight' binding at each support point.

**Gerry Smith**  
Gibraltar

**Fig. 3.**



## Slow-Motion Scales

Those popular little Japanese slow-motion drives are excellent, but come with a 0-100 scale over half of the dial. The other half of the dial is normally blank. But if you'd prefer a calibrated dial scale it's easy!

The stages involved in making your own scale are as follows:

- 1) Remove the knob from the drive, to expose the centre of the dial.
- 2) Remove and store carefully, the two (normally) tiny screws.
- 3) Take off the dial and rotate through 180° then put it back.
- 4) Replace the two screws and the knob.

You now have a slow-motion drive in which the blank side of the scale passes by the static mark. You can now calibrate your tuning dial using one of the water-proof pens such as the Lumocolor 313 type to mark the various frequency points.

**Walter Farrar G3ESP**  
Pontefract



# Mykonos Revisited

By Phil Whitchurch G3SWH

*Following the success of his 1995 holiday operation from the Island of Mykonos, Phil Whitchurch G3SWH, actively encouraged by his wife Jan, returned to the island again in 1996.*

There were no problems in booking the same accommodation as we had in 1995, and the owner, **Paris Panayoyopoulos**, even made the same apartment available for us. We were dismayed to learn that there were to be no direct flights in 1996. It is the apparent view of the UK tour operators that Mykonos has become so expensive that nobody can afford to go there any more!

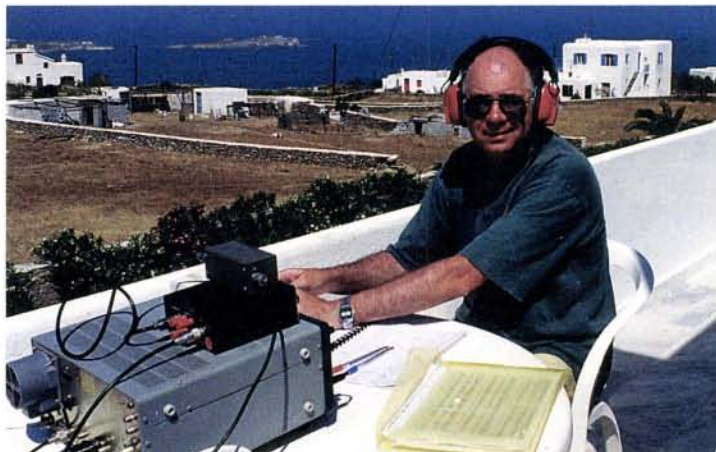
Initial enquiries of airlines and charter companies produced exorbitantly high quotations for flights from London to Athens, which tended to support this view. We finally settled for a relatively good deal from Greek island specialists 'Simply Simon Holidays' for an outward Olympic night flight from Heathrow to Athens, and an early morning flight from Athens to Mykonos, with return times at more sociable hours.

## Added Advantage

It is fairly important to fly Olympic, as under the circumstances we found ourselves, we would have to deal with the hassle of changing airport terminals at Athens. This has the added advantage that we were able to book our hold baggage right through from London to Mykonos, and nobody was more surprised than me when it turned up!

I took the Yaesu FT-101ZD again, as the IOTA FT-990AT was already booked for another operation. The security staff at Heathrow were a bit more switched on than at Gatwick last year and actually queried what I was carrying, but accepted the explanation of 'a radio transmitter' without further comment.

We arrived on the island at about 0730 local time on 1st June and found that our room was still occupied. Paris and his delightful sister Maya entertained us with coffee and



Phil G3SWH operating on the balcony of the apartments.

brought us up-to-date on all the gossip since last year. As soon as our room was available, we got unpacked and settled in.

Paris was so helpful, even to the point of providing a bamboo pole and the loan of a rickety pair of steps so that I could get onto the roof to rig the centre of the antennas a few feet higher! I used the same multiband dipole arrangement which I had used in 1995 and in my Chausey Islands (IOTA EU-037) operation earlier this year, with the exception that I had found and rectified the fault preventing me from using 14MHz (20m).

## Antennas Rigged

Once I had the antennas rigged, having been on our feet for about 24 hours non-stop, we elected to have a few hours sleep. After a short snooze, my first QSO was on 10MHz (30m) with YO2BP at 1437UTC.

Conditions were not good, and I tried 14MHz (20m) for a while, but did not want to get tangled up with NFD, and moved to 18MHz (17m) just after 1500UTC. I was then able to run a fairly consistent European pile up until about 1630UTC, when it was time to close and go for dinner and hit the high spots of the town.

Activity then fell into the same pattern as 1995, a session of up to two hours in the mornings starting around 0700UTC, followed by a similar session in the afternoon starting at around 1500 to 1600UTC. I clocked up a total of about 22 hours operating, split up into 13 separate sessions.

There was sprinkling of DX - a respectable number of JAs, a solitary ZL, a couple of PYs and a few Ws. I made a total of 1223 QSOs with 56 DXCC countries. This brought my total DXCC score for the two

operations to 65, although the average QSO rate per hour was down by about 8%.

## Analysed Log

When I got home and started to analyse the log I was very surprised at the number of duplicate QSOs - a total of 47, whereas there were only nine in 1995. One HA station made a duplicate QSO less than 15 minutes after his first! Don't these guys keep log books?

I made a point of giving my call at least every three QSOs and usually after each one, but without a computer, it was impossible to keep track of - and filter out - duplicates.

The largest number of contacts by far was with Germany, totalling 224, followed by European Russia, totalling 107. Contacts with England totalled 96, making it a respectable 3rd.

Table 1 shows some of the statistics.

## Operating Standards

I was appalled at some of the poor operating standards, thankfully not from UK amateurs. I particularly objected to strong stations breaking the pile-up and then insisting on giving me their names, QTHs and inside leg measurements, etc. This seemed to happen again and again, and is really inexcusable as it effectively prevents other people from making a QSO.

Only on one occasion was it sufficiently busy to warrant working split frequency, and I sometimes wonder whether it is necessary for minor operations to use it on every occasion. If you need one, QSLs are available, either direct (I'm QTHR in any callbook since 1970) or via the RSGB Bureau.

PW

Table 1

Band	Total QSOs
40	66
30	114
20	786
17	256
15	1



## ISLAND OF MYKONOS, GREECE

# SV8/G3SWH

IOTA: EU-067

LOC: KM27QU

Lat: 37°50' N Long: 25°20' E

My special thanks to my wife Jan, and to Paris and Maya Panayoyopoulos of the Geranium Apartments, without whose tolerance and encouragement this operation would not have been possible.

73 and thanks for the contact



Phil Whitchurch, G3SWH

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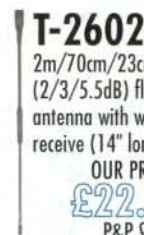
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# Computer C

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The transceiver itself is a little smaller than a small 'tower' computer and looks like a computer too. It measures 280 x 310 x 110mm. All of the connections are made via D-connectors.

There is one on the front panel and the control unit for the 505 is separate and measures 140 x 160 x 40mm. It's designed to be mounted into a slot in the main computer and is connected to a two port junction panel that is also designed to be mounted in the main PC.

A jumper lead then connects the control unit to the panel and a long two meter lead connects the other connector on this panel to the main transceiver. If the user wishes to keep the control unit separate from the PC, there is an accessory kit available that allows the control unit to sit on the desk.

It comes complete with a painted cover for the unit, rubber feet, and a cable that connects a port on the rear of the transceiver to the computer serial port. It is possible to control the transceiver from up to 23 metres away, so the PC can be located in another room if desired.

### First Talk

After unpacking the Kachina 505 my first task was to read the manual and then to install the software.

I was licensed in 1956 (a very young G3LDI then, I might add!) and so have spent the last 40 years sitting behind equipment that has knobs and dials. To be confronted with a grey box with a few connectors on it seems totally alien to me, although I do feel that this is the way that Amateur Radio is going.

So, with these thoughts of the modern way in mind, I decided to approach this review as objectively as I could and I installed the control software, which requires Windows 3.1 or 95, running on a 386 PC or better (I think most amateur stations are thus equipped these days). The transceiver was very easy to connect, and was ready to use as soon

as the program was running. The software was quite straightforward to install, and running under Windows 3.1 or Windows 95, it's possible to multi-task.

I installed all the equipment and the software and immediately met my first problem. According to the screen, I was connected to, and controlling, the transceiver but no sound was coming from the speaker at all.

There is a prompt that comes on the screen that says 'OFF-LINE' if there is a problem with the transceiver connection to the serial port. As this did not show, I assumed all was working.

However, I was running my BBS on that computer, so I then swapped serial ports with the mouse and tried again. When the software is first run, it prompts for the serial port. But, the main '.CFG' file has to be deleted if there is a change in serial port, so that information can be entered again.

I eventually ended up with the BBS and node software disabled, editing the AUTOEXEC.BAT file to take out all other software that might be causing conflicts, such as BPQ, DRSI cards and so on.

I then had the words OFF-LINE appear on the screen, so I tried my Satgate computer with the same result. There had to be a problem with the

A large 12V power supply is also needed to power the transceiver, so it does tie-up a lot of equipment, whereas a normal transceiver can be used by itself, and in that respect is more transportable. An external speaker is also needed, unless the computer has a sound card and speakers, in which case these can be used.

The manual that accompanies the 505DSP transceiver is in the early stages of production to be kind. It is only 17 pages, and these include the following sections: Two pages of Introduction and Specifications; Seven pages of connecting instructions, and pin-outs for the various connectors; Three pages of Operating instructions and Four pages of Trouble-shooting.

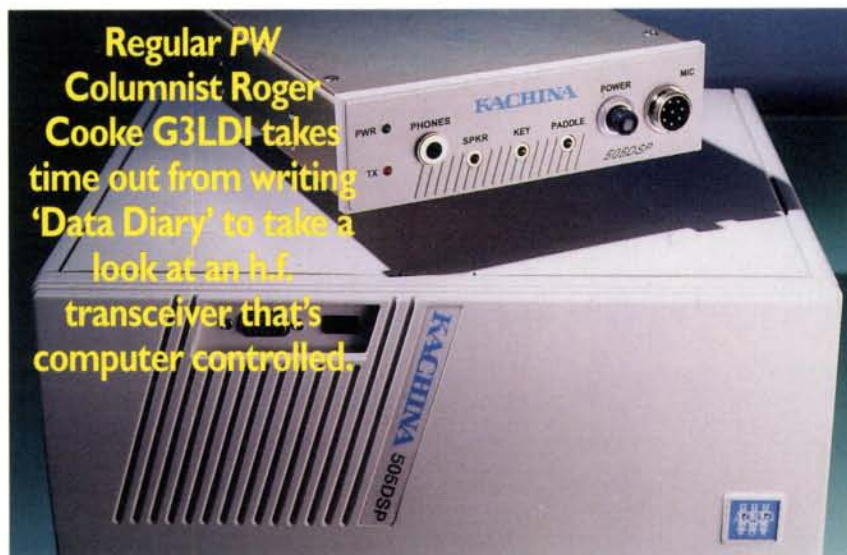
There is no circuit diagram, no block diagram, and no description of the operation of the transceiver. Compared to the manuals that are usually expected with a modern piece of equipment this is very sparse. Not only that, but there are quite a lot of errors, and a full page of addendum comes with the manual.

In defence of Kachina, they have promised that a full manual with circuit diagram will be available in the near future. There are also the added features that come with this transceiver not found with the

'normal' type of equipment.

Although I have said there is not yet a full instruction manual, with an on-screen control program, most functions can be found in seconds by negotiating the screen with the mouse, and if problems are encountered, there are help screens to cover most problems, in much the same way that you can ask for help with Windows '95. Having said that, all the help screens in the world do not assist with a circuit diagram or description, so I shall

**Regular PW Columnist Roger Cooke G3LDI takes time out from writing 'Data Diary' to take a look at an h.f. transceiver that's computer controlled.**



transceiver. I took the lid off and sure enough, three of the boards were loose. They had obviously had worked loose during transit. However, I would have expected a piece of equipment of this sort to have used p.c.b. retainers. Once I had re-seated the boards, the transceiver sprang into life.

The Kachina 505DSP transceiver is one of the leading products of its kind and I can visualise all the present range of 'standard' transceivers sitting in museums in a few years time. Using a transceiver of this sort in an amateur station makes the use of a computer obligatory, and whilst that would be the case for somebody running a BBS, where the computers run 24 hours a day, it might not be acceptable for the average user.

quote the literature from Kachina for technical specifications.

I do not possess the laboratory facilities that some other reviewers are privileged to have, and so cannot confirm the figures. Despite this, I think most users will be interested in subjective tests, and on-the-air reports so I decided to put it through its paces and report the results.

### Exceptional Performance

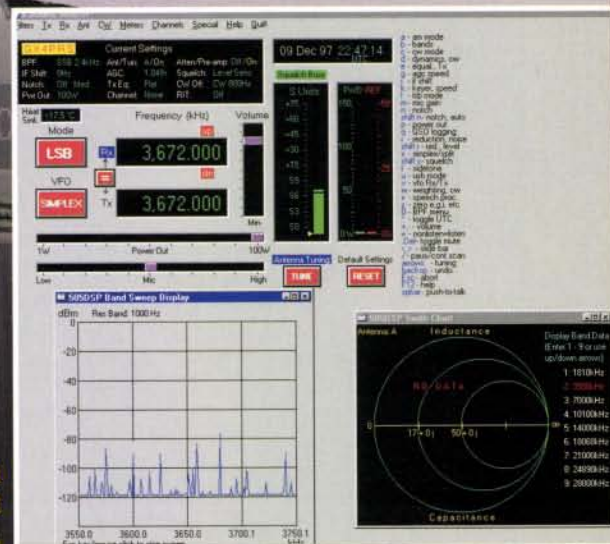
The 505DSP is built to commercial standards and offers exceptional 16/24 bit DSP/DDS (Digital Signal Processing/Direct Digital Synthesis) performance. It covers all nine h.f. bands with 1Hz tuning, plus 100kHz to 30MHz receive and provides a full 100W



# Control ATEUR RADIO?



The main control screen.



Main control screen with additional sweep chart and Smith chart display.

## Review - Kachina 505DSP Computer Controlled HF Transceiver

p.e.p.  
or c.w.  
output.

The i.f. stage, 'brick-wall' digital filtering, adaptive notch filters and noise reduction ensure state-of-the-art receiver performance. Up conversion to the 1st i.f. of 75MHz ensures maximum freedom from spurious responses. The 2nd i.f. of 40kHz allows utilisation of the most advanced DSP hardware available.

Signals are converted directly from 75MHz to 40kHz. This greatly simplifies the transceiver; only the minimum number of local oscillators (l.o.) must be generated, reducing spurious products.

The first l.o. is a state-of-the-art DDS/PLL hybrid, its low phase noise and fast lock times maximise enjoyment of operation. Frequency tuning is performed in 1Hz steps under microprocessor control.

Small tuning steps give the impression of continuous tuning, even over small frequency ranges. The second local oscillator is a VCXO, also locked to the master frequency reference.

The reference itself is a precision MPCXO, it's a variable crystal oscillator digitally temperature compensated by the microprocessor. A thermometer mounted near the crystal allows the system to accurately track the crystals' frequency versus temperature curve. Absolute accuracy is achieved using built in test equipment (b.i.t.e.) facility; the microprocessor calibrates itself against WWV, or any other external frequency standard, on command.

With the high dynamic range of the Kachina 505

receiver boasts low in-band Intermodulation Distortion (IMD). This, combined with a very high available signal-to-noise ratio, makes for a very clean sounding receiver.

Sophisticated DSP technology makes it possible to achieve very high performance levels. The most advanced 'sigma-delta' analogue-to-digital (A/D) converter is used.

The DSP system has a dynamic range of 96db, even before automatic gain control (a.g.c.) is applied. Additionally the 13 available filters offer very versatile filtering, with shape factors approaching unity.

The transmitter side of the Kachina 505DSP also benefits from precise 16/24 bit processing. Excellent carrier and opposite side-band suppression is obtained using superior phasing-method algorithms.

The r.f. compressor, operating on the actual signal envelope, will add lots of punch to your signal without adding lots of bandwidth. A built-in equaliser lets you tailor the transmitted audio for more highs or lows.

On the air you can exactly regulate the rise and fall times of your c.w. signal in 256 increments. Weighting and speed are also continuously variable over wide ranges for the sound and feel you want.

Another facility will be that you can have full 'machine-c.w.' as a low-cost option (available soon),

allowing you to send from the keyboard of the PC. The 100Hz c.w. filter provides ample selectivity and there is also a 60 character message store for sending prepared messages on command.

An optional internal antenna tuner automatically matches your antenna system to 50Ω, within a 3:1 voltage standing wave ratio (v.s.w.r.). This subsystem, using 'fuzzy reasoning', is fast and accurate.

The 64 internal memories and impedance point interpolation (i.p.i.) mean virtually transparent operation within a few tune cycles. You can also display the antenna impedance for the entire band on a Smith chart right on the PC screen.

There is also a Band Sweep function, which allows you to 'see' the whole band as a panoramic display. 'Pile-ups' can be located and by clicking the mouse on the peak, you can change frequency instantly.

### On Air Performance

I conducted most of my tests on the 14MHz band, talking to a variety of stations. The first test was to see if the 505 would 'crack' a pile-up.

Tuning over the band I found **9X0A** on 14.195MHz, working 'split', listening 'up 10 or so'. To set-up this scenario on a normal transceiver, I usually use the transmitter's variable frequency oscillator (v.f.o.) to hunt for the station that the DX is working and then flip back to the other v.f.o. to listen to the



DX. It is possible to do this with the Kachina, but there is no duplex position, whereby transmitter and receive frequencies can be changed instantaneously.

Duplex can be useful if the operator wishes to talk to a local very quickly on the other frequency. It would also be nice to have dual receive, a very useful DXing feature that seems to be standard on many transceivers these days.

It took me some time to become accustomed to fast frequency changes with the mouse, instead of a tuning dial, but I feel sure that with practice, this could become as natural as the method I have utilised for the last 40 years, a habit that is difficult to change! I must admit that after several days of practice with the Kachina, it did become much easier.

Tailoring of the transmit audio is quite easy to do. There are quite a few 'slider' type bar-graph controls on-screen and the only off-putting point about this is that the two controls visible are the last two selected.

The reports I received were very encouraging, especially when the audio had been set to the optimum, including the speech processing levels. The modes covered do not include f.m., which, on 28MHz would be very useful with the up-coming sunspot cycle. Working into the USA 28MHz repeaters is quite easy, and there are several local Nets on '10' f.m. here in the UK.

The c.w. keyer on the 505 is quite basic, and although the speed range does go up to 80w.p.m., for the avid c.w. contester, an external keyer, such as the MM3, with incrementing serial numbering and lots of memories would be a better bet.

The other disadvantage of using the in-built keyer is that the control program must be run on a computer that is a 'clean machine' for perfect c.w. I used it within a multi-tasking environment, with the PC running BPQ node software and also the BBS, which to be honest was running in a DOS-based window, so thereby taking up quite a large percentage of the PC's time, and there were lots of errors in the sent c.w. When I ran it on a clean machine there were no errors.

However, it is possible to adjust most of the keying parameters, and there will be a full c.w. option available soon. This will enable the operator to send from the keyboard.

## Manufacturer's Specifications

### General

Power Requirements: +13.8 VDC nominal  
Receive <2A max.  
Transmit <25A max

### Receiver

Frequency coverage 0.1 - 30MHz  
Modes: USB, LSB, AM, CW  
Sensitivity  
SSB: 0.18µV, (2.4kHz filter, 10db SINAD, pre-amp on)  
0.35µV typical (2.4kHz filter, 10db SINAD, pre-amp off)  
0.6µV (pre-amp on), 1.0µV typical (pre-amp off)  
AM: >2W into 8Ω, or >4W into 4Ω  
Spurious Rejection: >80dB  
Image Rejection: >80dB  
IF Rejection: >80dB  
3rd-order Intercept Point: +18dBm typical @± 20kHz (pre-amp off)  
3rd-order IMD: 96dB typical (pre-amp off)  
Dynamic Range  
2nd-order Intercept Point: +49dBm typical  
Blocking Dynamic Range: 115dB typical @± 20kHz (pre-amp off)  
118dB typical @± 50kHz

Audio THD:  
Manual Notch Depth:

<5% @ 2W into 4Ω  
better than -50dB

### Transmitter

Frequency coverage 1.8 - 2.0, 3.5 - 4.0, 7.0 - 7.3, 10.1 - 10.15, 14.0 - 14.35, 18.068 - 18.168, 21.0 - 21.45, 24.895 - 24.995, 28.0 - 29.7MHz.  
Modes: USB, LSB, AM, CW  
Output Power: SSB: 100W ± 1 dB into 50Ω  
AM: 25W carrier nominal  
Better than -60dBc @ 100W into 50Ω  
Spurious, Harmonics: SSB: < -55dBc  
Carrier, Opposite Sideband: 5-80 WPM adjustable  
CW Keyer Speed: Can be automatically calibrated to within ± 10Hz of WWV or other external standard.  
Frequency Stability: Can be automatically calibrated to within ± 10Hz of WWV or other external standard.  
Operating temperature range: -10 to +50° C

There are several add-on features. For example it's possible to display the antenna impedance for the entire band on a Smith chart. It's also possible to use a 'sweep' display and look at a certain bandwidth for signals. Clicking on these with the mouse enables a fast QSY. One disadvantage to this is that the receive is muted whilst this process takes place.

Logging software, which in itself is fairly basic, also comes with the 505DSP transceiver, as does the ability to achieve absolute accuracy, on command from the keyboard, against WWV or any other frequency standard.

I was not too happy with the microphone, which appeared to be an average mobile hand-held microphone, but having said that, it performed well enough. However, I would hope that it would be replaced in the future with a decent looking desk microphone.

## Unusual Transceiver

The Kachina 505DSP is an unusual transceiver, with a few teething problems as the first of its kind. However, I feel sure that these will be overcome and more features added.

There is an Internet site that has updated software as the 505DSP is being developed. But the transceiver does take some getting used to, and it does require the user 'tying-up' a computer, a large 12V power supply, and external speaker, thereby making it somewhat cumbersome if using it for DXpeditions or field days events.

The Kachina is currently on sale in the UK for £1995 or with built-in a.t.u. at £2244. There are a wide range of accessories, such as extra cables, mobile mounting brackets, an external waterproof a.t.u. (at £1095!) and a ROM option to provide 1.6 - 30MHz transmit (at £79.95).

Personally, I think the Kachina is quite expensive, but then (as my son says!) I am not living in the present! Comparing it to something like a Yaesu FT1000MP, it certainly is expensive.

It will take some time for prices on this type of transceiver to drop, because of the development and import costs. However, I certainly think this is the way of the future.

I would like to thank **Waters and Stanton PLC**, of 22 Main Road, Hockley, Essex SS5 4QS. Tel: (01702) 206835, FAX: (01702) 205843 for the loan of the Kachina 505DSP h.f. transceiver which is available from them or from **Martin Lynch & Son** at 140-142 Northfield Avenue, London W13 9SB. Tel: 0181-566 1120 at the prices quoted above.  
PW



**AFTER SEEING A COPY OF ROGER COOKE G3LDI'S REVIEW  
JEFF STANTON G6XYU OF WATERS & STANTON SENT  
US THE FOLLOWING COMMENTS:**

**If I needed any convincing then Roger Cooke G3LDI's in depth look at the Kachina transceiver has assured me that this is one of the highest specification h.f. rigs ever made for the hobby market. He had a false start with the loose circuit boards, which has not been a problem with other units sold but which has been reported back to the factory in Arizona, USA. The full instruction manual with circuit diagrams will be available soon. Of course, most modern h.f. transceivers need optional power supplies and desk mics.**

**Roger comments several times on the state-of-the-art performance and general high quality. Of course, this is likely to be reflected in the selling price where in fact the Kachina list price with auto a.t.u. is £2244 compares favourably with the Yaesu FT-1000MP/DG, list price £2279.**

**Jeff Stanton G6XYU**



# The VLF-FFL Antenna for 73kHz



By Richard Marris G2BZQ

*Richard Marris G2BZQ describes the FFL antenna. The letters 'FFL' are an acronym for Ferrite Frame Loop. So to get the 'low down' read on!*

The FFL antenna was specifically designed for reception and low power transmissions on the UK 73kHz band. Also provided are facilities for monitoring the projected European 136kHz band (135.7-137.8kHz) and the North American 1750m experimental band (160-190kHz). The total frequency range of the prototype is 55 to 200kHz.

The antenna is just 915mm square, enabling it to be used indoors in a compact space, outdoors on the lawn or flat roof or as a portable antenna. It consists of a combined Ferrite and Frame Loop of optimum size. It thus presents the individual advantages of both types of loop, with a high sensitivity and comparatively narrow beamwidth and bandwidth.

As a result of its sensitivity and bandwidth, the usual heavy i.f. band atmospheric and man-made noise levels are kept to an absolute minimum. The antenna can also be loaded with a low power transmitter providing a useful signal.

The FFL can be operated quite independently of the usual r.f. grounding system associated with low frequencies. (Good r.f.

grounding at v.l.f. is anyway, beyond the real estate facilities of many enthusiasts).

A selection of alternative feedline impedances

are provided. And more can be easily added if required.

## Loops In Series

The antenna schematic, Fig. 1, shows 24 turns (on a 915x915mm frame) loop, L1, wired in series with a ferrite cored inductor (L2), resonated by a 1000pF variable

capacitor (C1a and b). Four tapping points are provided on L2 for feedline impedance matching.

The ferrite wound inductor, L2, is positioned within L1, Fig. 2, so that the 'signal pick-up' of L1 and L2 patterns are superimposed. Maximum signal on a frame loop occurs at the ends, with the null at 90° or broadside to the loop, whereas, the ferrite maximum pick-up occurs on the long side with the null at the ends. Thus L2 is mounted at 90° to L1.

Furthermore, I've found experimentally, that there's an optimum position for L2 within L1 to produce the narrowest beamwidth and bandwidth with the highest sensitivity on receive and maximum radiation on transmit. It's important that the position indicated later should be adhered to for best results.

The impedance matching techniques adopted enabled the FFL to be matched to a variety of feedline impedances for low power 73kHz transmissions and reception. Additional feedline points can be added if required.

## Grounding Not Necessary

An external grounding system is not necessary and L1, L2 and C are 'earthed' to the copper clad front panel. It is interesting to note that a 4m length of stout wire, taken to a metal water pipe increased the noise level on receive and did nothing to improve the transmitted signal.

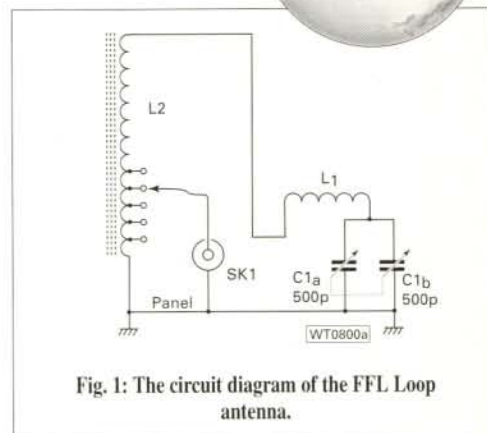


Fig. 1: The circuit diagram of the FFL Loop antenna.

The frame coil, L1, is wound on a timber frame, Fig. 3. The timber frame is 915 x 915mm, and made from well seasoned lengths of 33 x 12mm timber, glued together at 90° at the corners and fitted with corner reinforcing blocks. A vertical member (of the same timber) is used to strengthen the frame and allow it to be secured to a vertical support pole, on the base, with wing nuts, bolts and washers.

The frame coil, L1, winding consists of 24 close wound turns

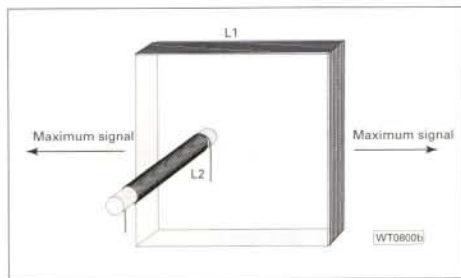


Fig. 2: The two loops are mounted together in this way to increase their effectiveness.

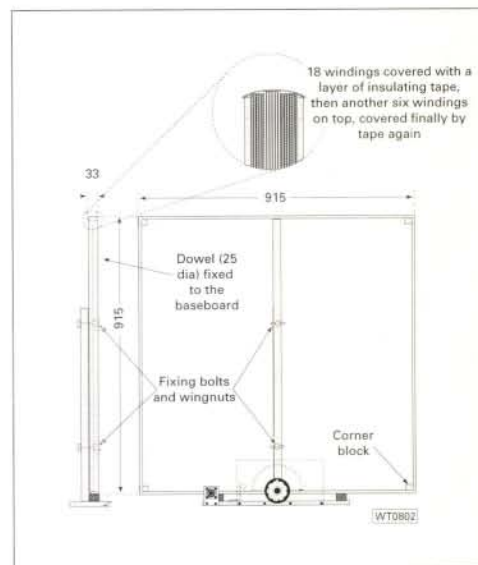


Fig. 3: The overall layout of the loop antenna, with details of how L1 is wound in two layers.



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# VLF-FFL Antenna for 73kHz

Continued from page 37

of pvc covered hook up wire (22s.w.g.) with an o/d of 1.2mm. **This wire specification is mandatory.** The first layer of 18 closewound turns onto the outer frame and is held in position with a few strips of pvc insulating tape.

Over this first 18-turn winding is laid one layer of masking tape, onto which the coil winding is continued with a further six closewound turns wound over the centre of the first winding layer (i.e. over the masking tape).

The end leads for L1 are brought out through holes at the

down with fine glass paper before application of the Superglue. The same hookup wire is used for winding L2. But before beginning the winding, the rod is covered with one layer of self-adhesive paper (sticky side out) cut from address labels (89 x 36mm original size).

Starting 12mm from one rod end, L2 is wound counter clockwise with closewound wire turns. Feedline impedance matching tapping point should be made at 25mm for No. 1 and for taps 2, 3 and 4 at 13mm intervals, see Fig. 4. To complete the winding bring the total winding up to 160mm.

The frame Loop L1, is held in position on a stout vertical pole embedded in a

heavy baseboard, onto which a small control panel with the variable capacitor C is mounted, see Figs. 5, 6 and 7. The baseboard has to be rigid and heavy to support the size and weight of Frame Loop L1. It was cut from a piece of 20mm thick plywood size 410 long x 160mm wide.

The vertical mounting pole is a length of standard 25mm diameter well seasoned wood dowel, such as is used for large broom handles, or some garden tools, the length required is 585mm. The pole is embedded and glued into a 25mm diameter hole drilled into the baseboard as shown.

The frame loop is attached to

the vertical pole with two bolts, washers and wing nuts. Wing nuts facilitate easy removal of the frame during initial testing and for subsequent possible modifications.

The bottom limb of the frame must lie against rubber pads as shown, to further brace the loop. Two standard 25mm diameter x 25mm high rubber doorstops are ideal.

Ferrite Loop L2 is mounted on the baseboard, through, and at 90° to the frame loop using plastic angle brackets (see parts list) and nylon 'P' clips as shown. It is important that the ferrite coil, L2, is positioned as shown.

## Control Panel

A small control panel (200x100mm) is single sided copper clad Fibreglass board and is screwed to the centre front of the baseboard as shown. The two-gang (2x500pF variable capacitor C1a and C1b) is mounted behind this board. The variable capacitor should be of the larger rigid receiving type.

A Jackson type E variable capacitor was used on the prototype, having the advantage that it has feet which can be screwed to the baseboard. Some variable capacitors are fitted with pre-set padding capacitors, and

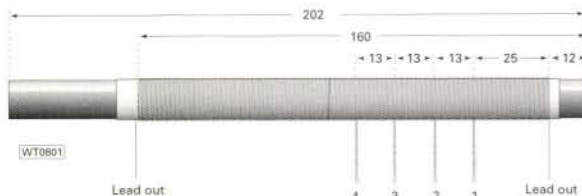


Fig. 4: Details of the winding put onto the ferrite rod to make up L2.

centre of the bottom frame limb. Tails should be left for connection to the circuit components. The whole of L1 is wrapped, after initial testing, with overlapping turns of pvc tape.

The ferrite rod cored coil, L2, consists of a winding of an 202mm (8in) ferrite rod with a diameter of 12.7mm (0.5in) diameter. The rod can be Neosid F14 material, or made from 2 x 4in long x 1/2in diameter Amidon 61 material rods, secured end to end with Superglue to form one rod.

## Two Short Rods

If using two short rods, the mating rod ends should be rubbed

Fig. 6: The ferrite rod section is mounted on 'P' clips attached to plastic angle brackets.

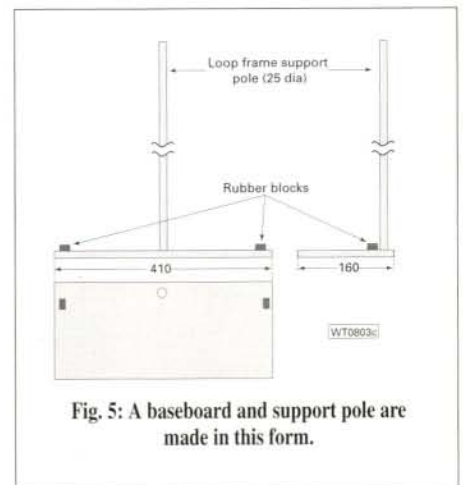
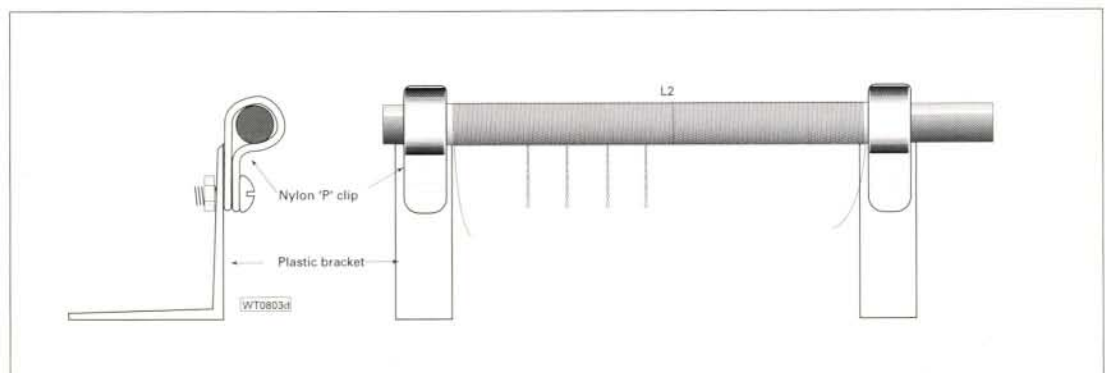


Fig. 5: A baseboard and support pole are made in this form.



these should be removed.

The front of the panel is faced with white glossy card, onto which is a 0-180° protractor which acts as a scale with a large (75-80mm diameter) instrument knob. The relationship of the board and panel are shown in Fig. 8.

A surface mounting coaxial output socket is screwed to the front of the baseboard, just to the left of the control panel.

Assuming 50Ω impedance is required, connect this socket to tap 1 on L2. Select the appropriate tap and feedline for other impedances. All 'earthy' connections i.e. on L1, L2 and C1a/b) are all securely soldered to the copperclad panel.

Connect the coaxial socket to the receiver with a short length of RG58 feedline. Tune the receiver to the 73kHz band and rotate the loop variable capacitor to resonance, which is indicated by an increase in background noise and signals. Useful Standard Frequency stations are MSF Rugby at 60kHz and DCF on 77.5kHz in Germany.

At my location, in Central Southern England, using the really excellent Palomar VLF-A Converter with a 'souped up' 3.5MHz receiver, the MSF and DCF stations may be clearly heard throughout the 24 hours, with mighty signals at night. The antenna should next be tested at the h.f. end using the long wave broadcast stations.

## Wide Range

The range of the Loop Antenna is wide, being from about 55kHz to just beyond 200kHz just taking in BBC Radio on 198kHz. If the frequency range is way out, then reverse the L2 leadout ends and the end of L1.

For use on transmit, a simple microammeter/diode r.f. signal monitor arrangement should be placed near the loop frame. The transmitter is tuned up, in the usual way, into a dummy load and then fed into the loop (previously tuned to the transmitter frequency using the receiver).

The resonating capacitor C is slightly adjusted as necessary for maximum indicated output radiated signal. I **must stress that this loop is a low power device on 'transmit'**.

However, during initial testing, using a signal generator CT438, which gives 3V into 600Ω, I was astonished by the strength and range of the test signal, while checking the transmitted radiation

pattern of the FFL antenna, with a portable receiver/l.f. converter/ferrite loop assembled into a briefcase. The FFL antenna was on a table indoors, alongside the CT439 Generator.

## In Operation

In operation, the FFL will have to be rotated for maximum signals, and interference elimination/reduction. A simple robust turntable will greatly assist. In operation, the loop should not be standing on a metallic surface and should be kept away from a.c. mains wiring.

The FFL is an excellent experimental antenna for receiving the 73kHz band also transmitting on that band. It will also monitor the projected European v.l.f. band, where some 'jumping the gun' activity has been identified between about 140 and 148kHz.

Another projected use for the FFL is to monitor the USA 1750m experimental band (160-190kHz) during the dark winter months and which is usually more or less blotted out by high power European BC stations. There is also of much interest to be heard between 55 and 200kHz.

The Loop narrow bandwidth and beamwidth reduce any atmospheric or man-made interference and QRM as well as harmonic radiation on transmit. It will also operate quite independently of any grounding system.

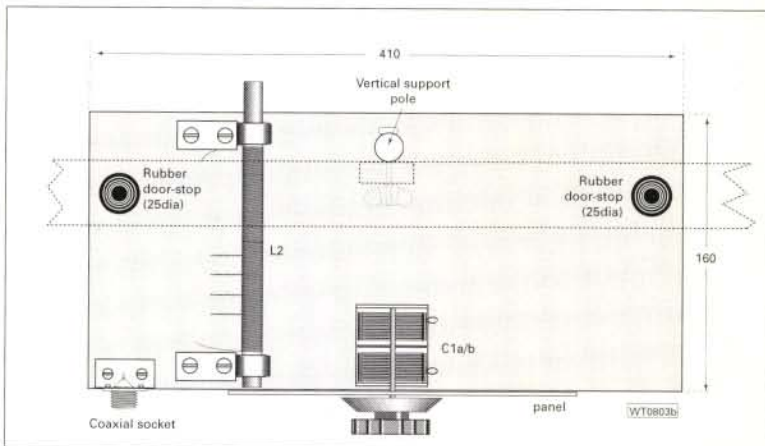


Fig. 7: Looking down on the baseboard and control panel assembly.

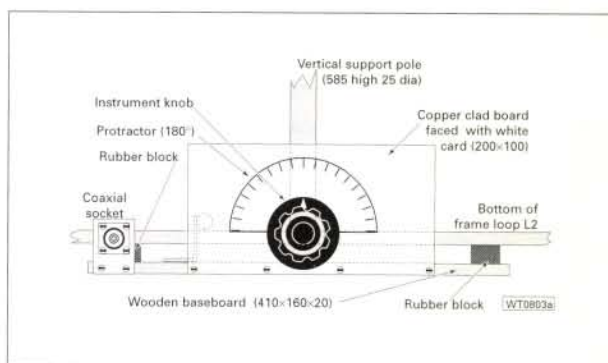


Fig. 8: A closer look at the area of the control panel from the front.

The FFL was constructed in such a way that future modifications or improvements can easily be made in the light of experience, that is why it is called 'experimental'. When we, in the UK, have the projected new, European wide v.l.f. band, then the FFL will be similarly immediately available for both reception and transmission. **PW**

## Shopping List

Note: All dimensions are metric, except where an item has been supplied in inches.

Solid core pvc covered wire (1/0.6mm 1.2mm o/d. Maplin PA56L (100m)

- 1 1000pF variable capacitor (500pF + 500pF in parallel). Robust receiving type such as Jackson type 'E'
- 1 Ferrite rod 8in long x 1/2in diameter (202 x 12.7mm dia) - MMG Neosid F14 material or 2 x 4in long x 1/2in diameter - Amidon 61 material - rods adhered together end to end (see text)

3m RG58 coaxial feedline ( $Z_0 = 50\Omega$ ) with suitable plugs

- 1 surface mounting coaxial socket - Maplin HX970 or similar Self adhesive address labels
- 2 Nylon 'P' clips. Maplin 1/2in JLOOA or similar
- 2 Plastic 1.25in x 1.25in 90° angle brackets (DIY Store)
- 1 Panel (200 x 100mm) single sided copper clad fibreglass board - Maplin HX01B
- 1 large diameter instrument knob
- 1 protractor
- 1 White glossy card to fit panel
- 1 Wood base plywood board 410x160x20mm thick
- 1 length 25mm diameter dowel x 600mm long (see text)
- 2 25mm diameter rubber doorsteps (DIY store)

## Useful Addresses

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Amidon Associates Inc., 3122 Alpine Avenue, Santa Ana, California 92704, USA



# Accent On

As *PW* is celebrating the centenary of Amateur Radio throughout 1998 it seems appropriate to suggest some good reading on the older equipment many of us remember - and in some cases - still enjoy using. With this in mind, the Editorial team have chosen some interesting titles for this month's 'profile' which could help you renovate some much cherished older equipment.

## Handbook Of Radio, TV, Industrial & Transmitting Tube & Valve Equivalents

G. C. Arnold Partners

Geoff Arnold G3GSR's reprints of the original Bernard's Radio Valve Guides are deservedly popular. This booklet is complimentary to the highly acclaimed series and provides a great deal of information enabling valve users to find commercial equivalents for valve types.

Reprinted from the original 1974 edition it carries information on Second World War civilian valves, RAF types, British Army types, Royal Navy Types, USA services types with equivalents. **A Very Useful Reference Source** and affordable too at just **£2.95**.

## Essential Characteristics

Reprinted by Antique Electronic Supply

This book is a facsimile copy of the original General Electric manual and provides a wealth of essential characteristics of receiving valves, special purpose valves, c.r.t.s, reed switches, thyratrons, vidicons, radio & TV pilot lamps, and i.c.s., transistors and ignitrons. It provides an excellent source of reference to many valves found in our junk boxes and in many items of older equipment. An **Extremely useful reference source** at only **£10.50**.

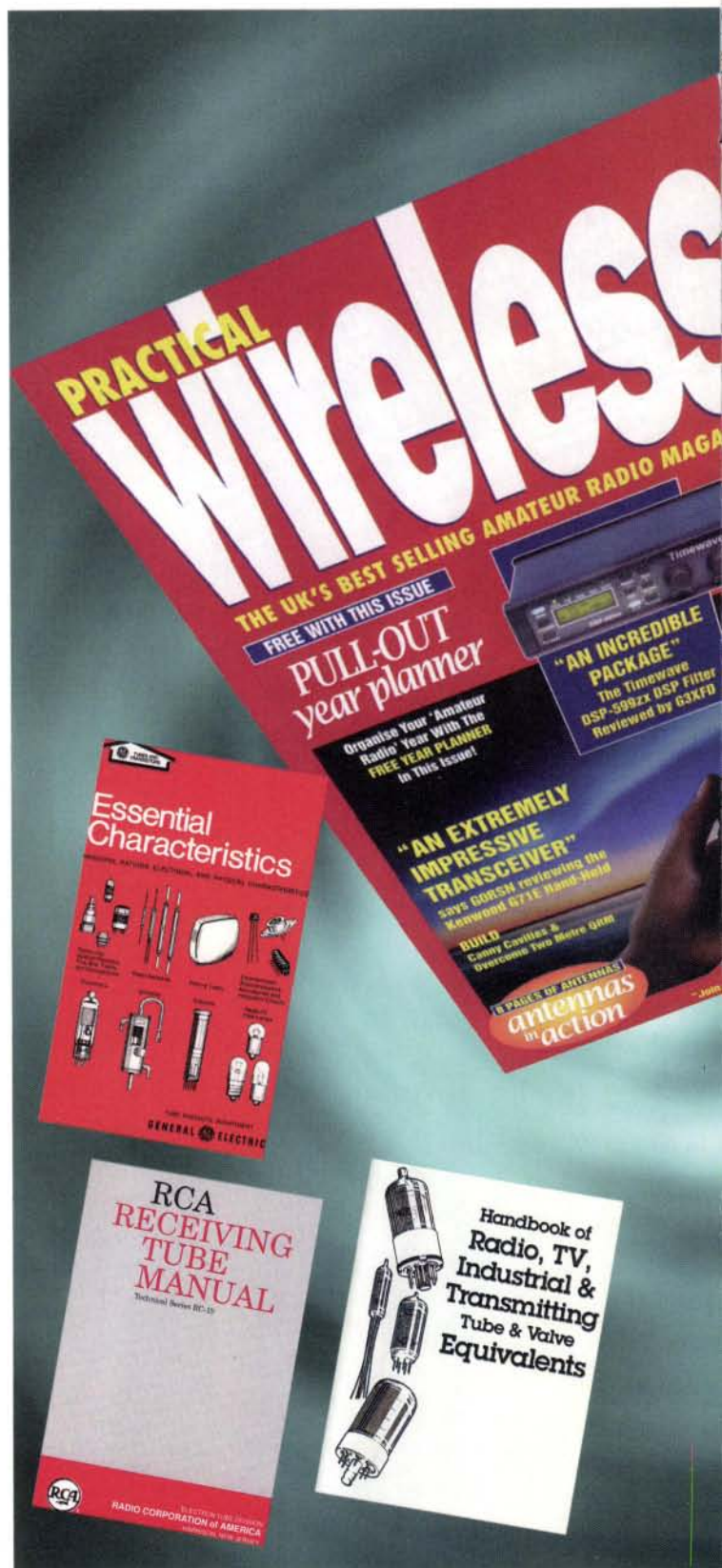
## RCA Receiving Tube Manual

Reprinted by Antique Electronic Supply

This book is a very well produced reprint of the original Radio Corporation of America manual. It really is a manual and will prove to be extremely useful to anyone considering building a project using valves.

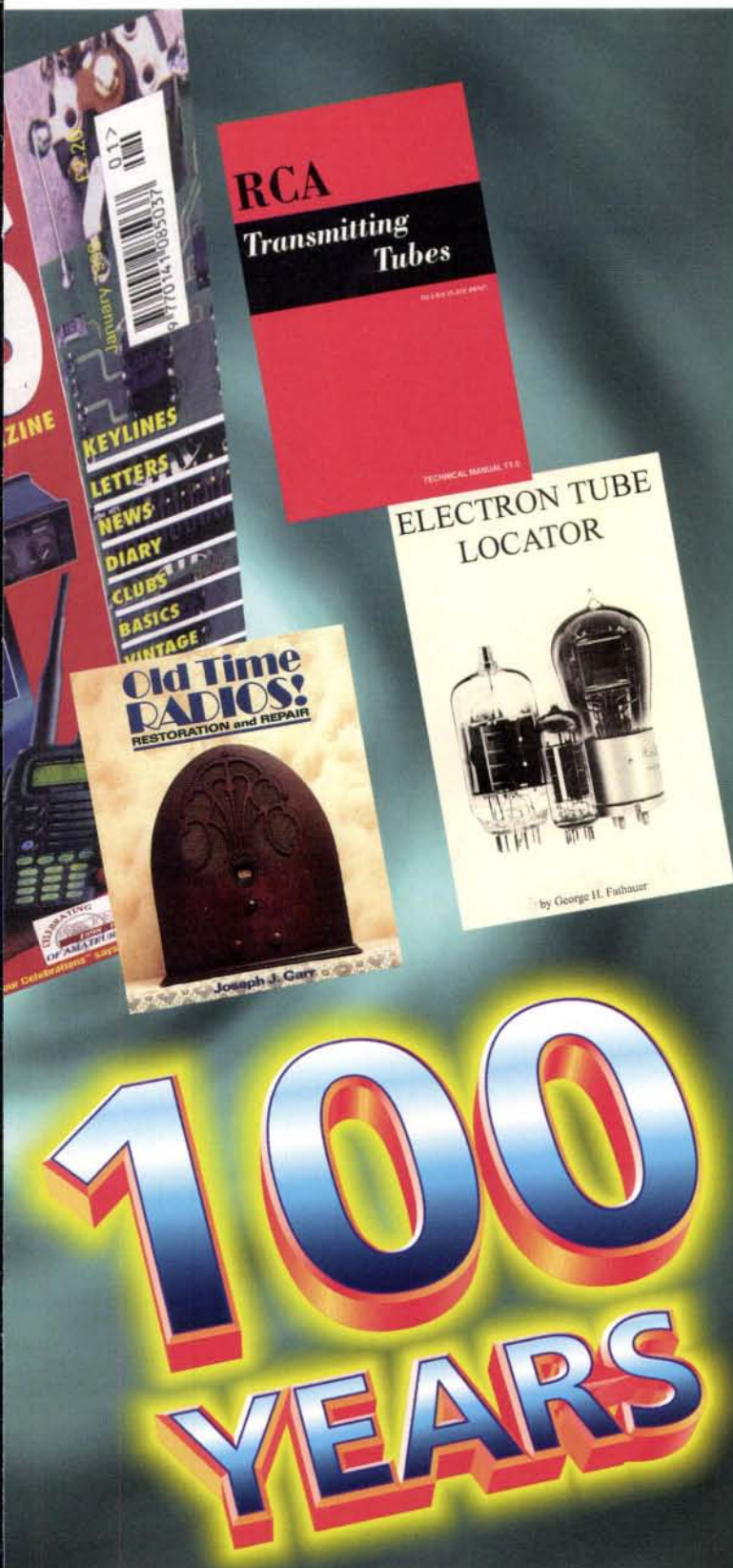
In effect it provides a manual on working with valves - as it provides much essential background details on valves (tubes), their design, characteristics, circuitry techniques, applications and operating details. The 'Circuits' section at the rear of the book is particularly useful and will provide any valved-equipment enthusiast with many ideas for projects.

An extremely interesting and readable reference/practical information source. **Very highly recommended** and costing just **£10.50**.





# The Antique



## RCA Transmitting Tubes

Reprinted by Antique Electronic Supply

This reprint will be an excellent companion to the *Receiving Tube Manual* for anyone interested in using valves for transmitting purposes - right up to 4kW plate (anode) input!

Many of the popular valves used for Amateur Radio linear amplifiers are mentioned in the book and there is an interesting (but of course dated) selection of transmitter circuitry at the rear of the book. A very useful and readable reference and practical information source.

*RCA Transmitting Tubes* costs **£10.50** and is **highly recommended**.

## Electron Tube Locator

George H. Fathauer

Looking for an usual valve or just want to know what it does? This spirally-bound book provides the basic information you need - what the valve is, filament current and base details. The 'lay-flat' format assists the reader when the pin-out information section (in the rear of the book) is being used.

A useful CV-to-civilian equivalent guide is provided for anyone wishing to identify those mysterious valves with CV references. **A Useful Reference Source** which costs **£21.95**.

## Old Time Radios - Restoration & Repair

Joseph J. Carr

Joe Carr is a well known technical writer and Radio Amateur but he's not so well known in Europe for his interest in 'old time radio'. This is a great pity because this book is excellent and although it's certainly an American book - everything Joe Carr covers is applicable to European-made vintage radio receivers. There's no problem even if you do come across 115V a.c. radios nowadays as 'step down' isolation transformers - the recommended method - are easily obtainable.

The book provides some background history, outlines of techniques, example of early equipment, commonly found circuits (from the r.f. front-end to audio, tone control and power supplies, fault finding (this section is particularly useful and well prepared) renovation methods, component details and safety aspects.

An extremely useful book for any radio enthusiast. **Very Highly Recommended**. *Old Time Radios - Restoration & Repair* costs **£17.95**.



# Carrying on the Practical Way

By George Dobbs G3RJV



*This month the Rev. George Dobbs G3RJV discusses two methods of making instruments to evaluate standing waves. And of course he's found an appropriate quote to accompany the article!*

In those far-off romantic early days of radio a particular manufacturer of plug-in basket woven coils used the quotation "what are the wild waves saying" as their trade mark. Perhaps some knowledgeable *PW* reader will be able to tell us the name of the company?

Whatever the usage of Carpenter's original words, the idea of radio 'waves' is firmly fixed in the popular mind. And in like mind, Radio Amateurs attempt to push the maximum amount of the waves they generate into the outside world. To this end many use a standing wave bridge, or standing wave (s.w.r.) meter, to ensure that most of it goes out and very little is reflected back into the transmitter.

The theory of 'standing waves' is too much for this little column to bear because of our 'practical' approach. But although s.w.r. measurement may not be everything that some claim...it is **the easiest way** for the average amateur to match a transmitter to

**"What are the wild waves saying"  
Joseph Edward Carpenter (1813)**

an antenna. The circuits assume that the transmitters have a characteristic output impedance of 50Ω.

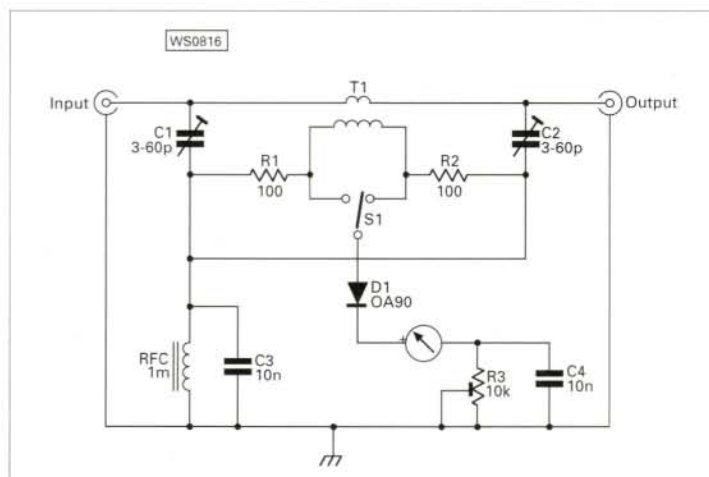


Fig. 1: The 'classic' s.w.r. bridge first designed by Warren Bruene (see text).

## Bruene Meter

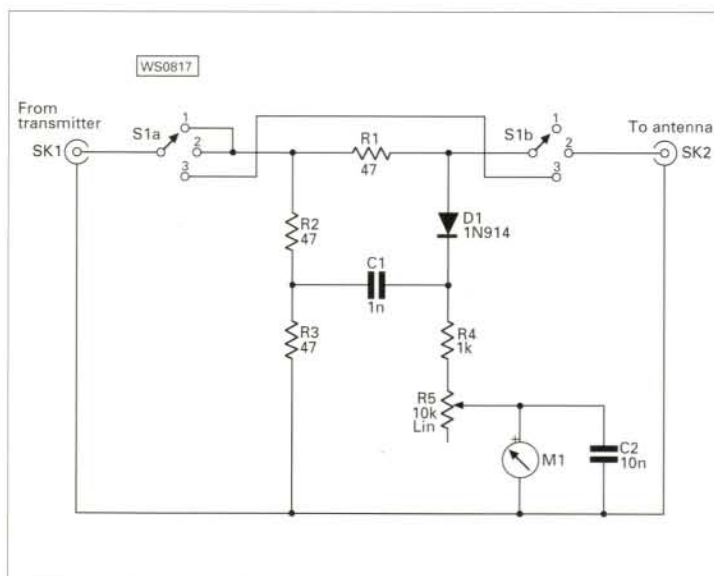
The diagram in **Fig. 1**, shows the circuit for the 'classic' Bruene Standing Wave Bridge developed by **Warren Bruene** of Collins Radio. Its 'heart' is a small r.f. transformer made from two windings on a toroidal core.

The smaller winding is connected in the path of the generated radio frequency (r.f.) signal and the larger winding samples the signal as it passes through. In this example the core is a T68-6 toroid with three turns as the signal carrying section of the transformer. The pick-up (or sampling) winding has about 55 turns on the same core.

The ratio of the winding is about right for a QRP transmitter running up to about 10W output. For higher or lower powers the constructor will have to experiment with the numbers of turns. (A higher power transmitter can simply use a single wire, which passes through the core).

The larger winding samples the r.f. and two signals appear at either end of the winding at R1 and R2. Two trimmers, C1 and C2, null out any lack of symmetry in the circuit due to components tolerances or construction. These signals are 90° out of phase and represent the

Fig. 2: A simpler form of s.w.r. bridge. This resistive type cannot be left in circuit and must be 'switched out' after use (see text).





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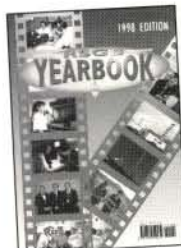
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forward and the reverse (or reflected) currents in the feeder line.

A single pole change-over switch (S1) is used to select either of the two outputs. A diode (D1) converts the r.f. energy to a d.c. signal. This produces a voltage across R3, through a meter (M1), which measures the resulting current. The resistor, R3, is a pre-set variable type, and forms a sensitivity control for the meter.

The circuit in Fig. 1 shows a Germanium diode used for D1. Better results would be obtained using a Schottky or hot carrier diode. (The really keen constructor might like to match a pair of diodes for forward and reverse resistance readings).

The meter could be an edge-wise reading instrument of the type used in tape recorders or as cheap S-meters. These usually have a full-scale deflection of some 200 $\mu$ A.

### Simple Calibration

In use, the Bruene Bridge requires some simple calibration. Firstly, you should connect a 50 $\Omega$  resistive load to the output of the meter. Next you should apply a few watts of radio frequency power to the input.

Now, with the meter in the 'reflected' position adjust for the lowest possible reading in the meter. Reverse the connections by feeding the signal in to the output and placing the 50 $\Omega$  load on the input. Then with the switch in the 'forward' position, you should adjust C1 for the lowest possible reading.

When using the Bruene Bridge, adjust R3 for the highest reading in the 'forward' position. Then you should switch to the 'reflected' position to read the relative reflected power. The antenna tuning unit (a.t.u.) can then be adjusted for the lowest possible reflected reading on the meter.

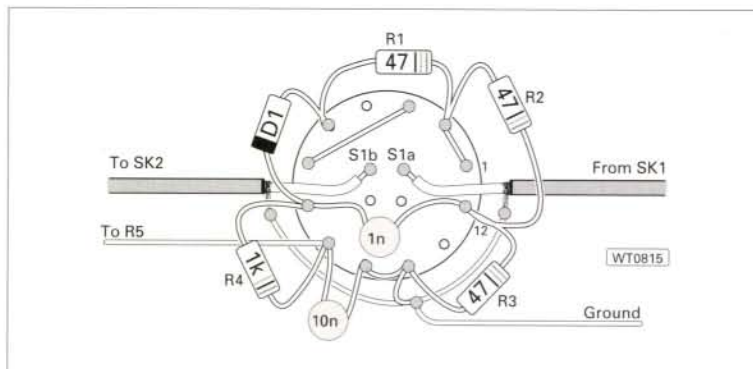
### Simpler Form

The diagram in Fig. 2, shows a much simpler form of standing wave bridge using resistive elements. This might be called an antenna impedance matching bridge. (Do you remember the Wheatstone Bridge, so beloved by physics masters at school? Well, this circuit is a variant of the old favourite).

In the circuit resistors R1, 2 and 3 form three arms of the bridge. The fourth is the load offered by the antenna, or the antenna via an antenna tuning unit.

When a radio frequency signal is applied and all four impedances (R1, 2, 3 and the presented antenna load) are equal, there should be a null across the bridge. The resistances used are 50 $\Omega$  (in practice 47 and 51 $\Omega$  as these are the available 'standard' values).

The reading across the bridge is by means of a meter which indicates the d.c. current produced by a diode (D1).



A pre-set resistance (R5) sets the sensitivity of the meter. Again a cheap signal strength meter can be used in this circuit.

The resistive circuit has the obvious merit of only requiring a few cheap parts and no setting up procedure. It also has the advantage that it presents a resistive load to the transmitter during the tuning up procedure. **However, the chief disadvantage is that the bridge has to be switched out during transmission.**

### Three-Way Switch

A two-pole three-way switch is required to select the required measuring function. It also 'switches out' the bridge during transmission of the signal.

**Position 1 (Set)** of the switch allows calibration of the meter. When power is applied R5 is used to set the meter at full-scale deflection.

**Position 2 (Reflected)** on the switch brings the bridge into the circuit. In this position the a.t.u. can be adjusted for the lowest possible reading (the null of the bridge).

**Position 3 (Output)** on the switch bypasses the bridge and allows the full signal to reach the outside world.

The main part of the circuit can be built on the back of the switch itself and the layout is shown in Fig. 3. And although the switch is a four-pole three-way wafer type, only two sets of the three-way switching are required.

Waste not - want not is my motto!



So the extra sections of the switch are used as the termination points for the components. The metal frame of the wafer switch forms the ground point for the circuit.

Most modern wafer switches are

Fig. 3: Diagram illustrating the wiring technique used by G3RJV to construct the resistive bridge circuit on the switch itself (see text).

made entirely of plastic nowadays. If you're using a modern type you should make a ring of copper wire to go around the wafer switch.

The resistors in the bridge do have to carry some current but of course the actual current is dependent upon the power output from the transmitter. So, it may be best to use two 100 $\Omega$  resistors connected in parallel for R1, 2 and 3. And although the layout I've illustrated in Fig. 3 is tight...with care it can be duplicated.

The photograph shows such a resistive s.w.r. bridge built into a small metal box. The switch holds the bridge components as in Fig. 3.

In the example shown the preset resistor, R5, is soldered directly on to the positive terminal of the meter. The whole thing represents a simple but effective s.w.r. monitoring unit for low power operation.

There it is!  
Home-brew  
s.w.r.  
measurements  
on a tight  
budget - have  
fun and get  
building. See  
you next time.  
PW

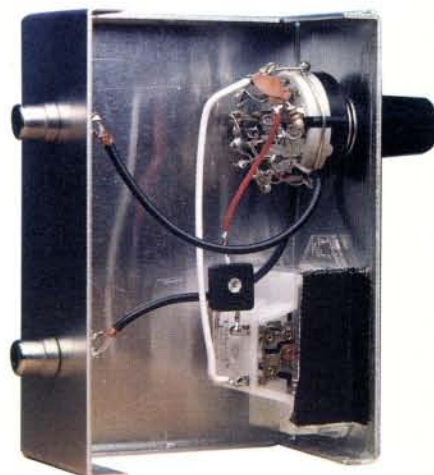


Fig. 4: Photograph of the completed resistive bridge and the simplicity is evident. The indicating meter on the lower right hand side with R5 (meter sensitivity adjustment) mounted directly on the meter connector contact (see text and Fig. 3).



# Taking A Peep - At The DX Cluster

By John Heys G3BDQ

*Computerless John Heys G3BDQ - a keen DX chaser - has found a way of getting the latest information - by using the 'DX Peeper' unit to look at the 'Cluster' information.*

The 'DX Peeper' really is unobtrusive! John Heys G3BDQ's shack is exceptionally compact and the 'Peeper' (position indicated by the inset arrow) receives audio from his AKD 2001 144MHz transceiver and sits comfortably above his Kenwood TS-870 and ancillary equipment.



Not owning a computer I have been unable to see the DX Cluster, which is part of the Packet system. I have no bench or shelf space for a computer system and the financial outlay involved would also be considerable.

I have long realised that stations using the Cluster are at considerable advantage and often hear and work stations I have not found. My trawling of the bands for stations on my 'wanted' list has been a time consuming and often fruitless exercise.

In the autumn of 1996, I spotted an advertisement for a new device called the 'DX Peeper'. This item allowed access to the DX Cluster System and only needed a suitable 144MHz receiver tuned to a local packet cluster node.

## **Peeper Ordered**

Fired with enthusiasm, a Peeper was ordered and few days later it arrived at my door. The Peeper is a small (120 x 40 x 153mm) black box and is made by the Japanese Company, Sigmatech Ltd.

The leads, to connect it to a 12V power supply and to the Packet audio output on my AKD 144MHz f.m. rig, were soon made-up and fitted. I was then ready for 'switch on'.

There's a considerable wisdom in first reading any instructions that come with new gear, so I studied the four page leaflet headed *Users Manual*.



Some of the text was couched in the well known 'Japanese English', but it was easily understood.

Then it was time to switch on. This meant pushing the Peeper **On/Off** switch upwards. Little red l.e.d.s shone and after what seemed an eternity (actually about 20 minutes) the first cluster signals came through.

## **Morse Signals**

Instead of a visual display, the Peeper delivered Morse signals. From its internal speaker came 'DE VU2UPX 21259'. My transceiver was already set-up on the 21MHz band and I quickly found and worked Sharo before a 'pile-up' developed.

Soon, lots of DX calls and frequencies came through the Peeper as the DX conditions 'perked up' and I could decide which stations merited my attention. The Peeper proved to be an invaluable aid during the CQ World Wide CW Contest and helped me to net some of the exotic DX that appeared. Whenever I am in the shack, it stays switched on and alerts me to any unusual activity.

## **Unexpected Problem**

An unexpected problem arose when operating my station. It was easy to be disturbed by the insistent c.w. from the Peeper. I overcame this by using its memory facility.

If you're interested in 'taking a peep' at the DX Cluster, DX Peeper units are available from Lowe Electronics Ltd.,  
Chesterfield Road, Matlock,  
Derbyshire DE4 5LE.  
Tel: (01629) 580800,  
FAX: (01629) 580020  
for £149.

The Peeper audio can be turned well down so it doesn't intrude into normal operating. But at some convenient time the Peeper **Memory** button can be pressed. This results in a repeat of the last six cluster messages together with the time they were sent.

The Peeper does not have a battery to allow memory storage (so this is lost when the power is removed). The audio level can be adjusted with a front panel knob and it is quite easy to change the c.w. tone by an internal adjustment.

The unit's Morse speed of 70 characters a minute can be set to give speeds of between 60 and 95 characters per minute. (Its normal c.w. speed is about 13w.p.m.).

## **Parasitic Device**

The Peeper is actually a 'parasitic' device which 'rides the back' of Packet cluster signals that have been initiated by a 'normal' cluster set up from a station within the local cluster group. It cannot itself initiate a response.

My area has about 100 stations which can access our packet cluster node, so it's not often that I'm deprived of signals from the Peeper. The little unit has proved to be a valuable addition to an already overcrowded shack and it's certainly helped me work more DX!

PW



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# Walter's Wi

Continuing  
with the  
centenary  
celebrations of  
Amateur  
Radio, avid PW  
reader and  
enthusiastic  
Radio Amateur  
Walter Farrar  
G3ESP shares  
some of his  
radio  
memories from  
the last 70  
years.

Sometime in 1923, when I was four years old, a man delivered to our house an item of floor-standing furniture, with four glass bulbs sticking out of the upper sloping part of the front panel. This was our first wireless set, and I was hooked!

About four years later, we had a smaller tabletop set, with the glass bulbs (valves) inside, but the tuning and reaction plug-in coils were on the outside. It stood on a mahogany cabinet (made by my Uncle Harry) which contained the batteries.

When I was eight, Uncle Harry gave me a crystal set, which he had built into a wooden box measuring about 250mm cubed. The Ebonite panel carried two knobs, each surrounded by studs connected to a large coil inside (tuning by varying the inductance, it would seem), and, of course, the galena crystal and 'cat's whisker' in a glass tube.

I gained much enjoyment from the crystal set, getting the correct spot for maximum signal. The 'in' phrase at the time was 'tickling the cat's whisker', although my viewpoint is that the cat's whisker tickled the crystal! Never mind!

## Real Breakthrough

The real breakthrough for me came in 1930. My father, who knew nothing about wireless, bought a kit of parts to make a set which would receive long, medium and short waves. The label on the case was **Lissen**, a



Walter aged 17 in 1937, 11 years before gaining his amateur radio licence and his specially selected callsign G3ESP.

respected name in those times.

When the set was built to my surprise it worked! So, I got busy searching the short wave bands and thus heard my first American station **W2XAF** in Schenectady, New York, with a commentary on a football game. I sent in a listener report and in reply received a QSL card.

The station **W2XAF** and its partner **W2XAD** were not amateur stations. They were regular broadcasters, as was **KDKA** Pittsburgh, also to be heard on the band.

However, it was not until much later that I started constructing on my own account. Later in the 1930s, I attempted more ambitious circuits. As a guide, I used to get *Practical & Amateur Wireless*, edited by F. J. Camm and once had a receiver circuit published!

In 1934, our domestic radio was changed for a factory built Marconiphone long and medium wave superhet (Wot, no short waves?). One

Christmas time I had been out visiting with my parents and when we arrived home at around midnight, I switched on the wireless and it seemed to be dead. This was because all the European stations had closed down by that time.

However, somewhere around

300m (1000kHz) I heard a faint signal and with my ear close to the loudspeaker, could just detect an American voice. I have never heard a medium wave American broadcast since!

Sometime in the mid-1930s, a friend of my father gave me the bare chassis of a mains receiver, with a useful-looking transformer on it. My first job was to decide which windings were which.

Now, my only continuity test gear consisted of a pair of high impedance headphones (originally with the 1923 set aforementioned) and a dry cell. If these and a winding in series formed a continuous circuit, then a click could be heard in the headphones.

Contacts with the winding were made by finger and thumb pressure, after all, there was only a safe 1.5V in circuit. However, on one winding when breaking the circuit, I got quite an electric shock (from the 'back' e.m.f.)!

At that time of life I was studying subjects such as French, Latin and Greek and the bit of Physics we did on the side included nothing about electromagnetic induction. No harm done, but a lesson learnt!

Having obtained my School Certificate in 1935, I went onto study the Science side of things in the sixth form. **Charlie Cowell**, my Physics Master, was a radio

'buff' and he kept a portable receiver in the laboratory.

One day I was reading a book which showed how

to modulate a signal. I cannot precisely remember the (simple) circuitry, but from it I built an oscillator and applied the speech modulation.

The signal from my oscillator was picked up at the far end of the Science laboratory on Mr Cowell's receiver. The next day,





# reless World

the evening newspaper carried a letter from a lady living near the school, complaining about interference on her wireless set!

## Modulation Mysteries

In 1941 when my academic studies over, I was drafted into the **Ministry of Supply at the Signals Experimental Establishment** (later the Signals Research & Development Establishment - SRDE). There I was introduced to the mysteries of frequency modulation and the application of n.b.f.m. at h.f. rather than v.h.f.

I was also working, to a small extent, on British Army radio equipment and from mid-1943 investigating captured equipment, especially from the German Army. During my time at this part-civilian part-military establishment, my knowledge of radio increased enormously. It was there also that I met my first Radio Amateurs and decided to join their ranks after the war.

At the end of 1946 I left the Ministry of Supply and came north to Yorkshire, having

married a Yorkshire lass eight months previously. In Ossett, near Wakefield, I made the acquaintance of **Cliff G2AQN** and **Ken G3RB**. Ken took on the task of training me up to the standard of the Morse test, (I was exempt from the RAE by virtue of my B.Sc. qualification).

Thus it was that on 8 May 1948, I got my Amateur Radio licence with the selected call **G3ESP**. I chose this call sign as I hoped to find lots of Esperanto speakers on the bands. I have worked and met many, but it can't compete with English!

## Hobby Indulgence

To me, Amateur Radio is a hobby, to be indulged in as and when it pleases me. For some years now I have favoured low-power working (QRP) and I consider that if all radio amateurs the world over were limited to, say, 25W output, the hobby would be just as interesting, a lot less hassle and far less expensive (just ask any dedicated QRP'er, who chooses a maximum of 5W output).

So, I became a transmitting radio amateur in 1948, 50 years after the first radio amateur. Whether I will celebrate my 100 years on the bands is open to question, as by the time you reading this I will already have celebrated my 78th birthday!

PW



Pictured in 1997 in his shack, Walter G3ESP can be seen operating his Kenwood TS-50. Situated on the two shelves above is an AT-50 auto a.t.u. with a Watson p.s.u. to the right.

## RADIO Diary

Compiled by Zoë Crabb

# 1998

\*Practical Wireless & SWM in attendance

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

**January 18:** The Oldham ARC Mobile Rally is to be held at the Queen Elizabeth Hall, Civic Centre, West Street, Oldham, Lancashire. Doors open at 1100 (1030 for disabled visitors). The event features all the usual traders plus a Bring & Buy stall. Morse tests are available on demand and there is a talk-in on S22 via GB4ORC, commencing at 0730. Mobile Contact prize up to 1400. There will be refreshments and free parking available. (01706) 846143 or 0161-652 4164.

**January 25:** The Lancastrian Rally is to take place at the Lancaster University. Please note that this Rally is now under new management and will be run under the auspices of the Central Lancashire Amateur Radio Club. There will be the usual traders, Bring & Buy and ample parking space is available on the campus. Admission is £1.50 and should you require further information, contact **Jim GOGVA** on (01772) 621954.

**February 1:** The 13th South Essex Amateur Radio Society Radio Rally will take place at the Paddocks, Long Road, Canvey Island, Essex. This is one of the biggest and best rallies in Essex, (the Paddocks is situated at the end of the A130). Doors open at 1030. Features include Amateur Radio, computer and electronic component exhibitors, a Bring & Buy, RSGB Morse testing on demand (two passport photos required), home-made refreshments, free car parking with space outside main doors for any disabled visitors. Admission is £1. **David G4UVJ** on (01268) 697978.

**February 1:** The Harwell Amateur Radio Society will be holding its second indoor Radio & Computing Rally at the Harwell International Business Centre, 1 mile west of the A34, between Oxford and Newbury. Talk-in on S22. Doors open at 1030 (1015 for any disabled visitors). There will be trade stands, special interest groups, Bring & Buy, craft exhibitors, bar and refreshments and ample car parking with spaces for disabled visitors. Admission is £1, children free. **Arthur GOKOC** on (01235) 815399.

**February 8:** The Kidderminster Radio & Electronics Fair is taking place at the Kidderminster College, Hoo Road, Kidderminster, Worcs. Doors open 1000 to 1500 and admission is £1.50. There will be all the usual traders, plus a Bring & Buy, Flea Market, Food and Drinks and a talk-in on 145.550MHz. **John G8MGK** on (01527) 545823 or mobile on (0860) 147954 or **Tony G4ALT** on (01562) 69652 or mobile on (0860) 902165.

**February 15:** Northern Cross Rally to be held at Thornes Park Athletics Stadium, Wakefield, South Yorkshire, just out of town on the Horbury Road. Easy access from M1 junctions 39 & 40. The event is well signposted and talk-in will be on 144 and 430MHz. Doors open at 1100 (1030 for disabled visitors and Bring & Buy). Details from **Peter G0BQB** on (01924) 379680 or mobile on (0976) 834938. Internet on rally@waveg.demon.co.uk Web page at <http://www.waveg.demon.co.uk/rally/>

**February 28:** The 13th Rainham Radio Rally is to be held at the Rainham School For Girls, Derwent Way, Rainham, Kent ME8 0BX. It is very easy to find from junction 4 M2 motorway A278 to Gillingham or from the A2 at Rainham. Just follow the RRR Arrows. Talk-in on S22 GB4RRR. Doors open at 1000 (0930 for disabled visitors and items for the Bring & Buy). Admission is £2. There will be the usual excellent mix of trade stands, many special interest groups will also be represented: BARTG, Kent Repeater Group, Kent RAYNET, RNARS, KEPAC, TCP/IP, Kent ATV Group, G-QRP Club, BYLARA and local club stands. There is a large hardstanding carpark, a licensed bar, hot food and drinks and refreshments will be available plus somewhere to sit and eat. **Martin M0AAK** on Medway (01634) 365980 at any reasonable time.

**\*March 7/8:** The London Amateur Radio & Computer Show will be held at Lee Valley Leisure Centre, Picketts Lock Lane, Edmonton, London, N9. Doors open 10am to 5pm each day. There will be trade stands with over 100 exhibitors, a Bring & Buy, RSGB committee and book stands, on-demand Morse tests, talk-in on 2m and 70cm, Special Interest Groups, disabled facilities, bars, catering, ample free parking and lectures. Adults £3, pensioners/under 14s, £2. (01923) 893929.

**March 8:** The Wythall Radio Club are holding their 13th Annual Radio Club Rally at Wythall Park, Silver Street, Wythall, near Birmingham on the A435, just two miles from junction 3 of the M42. Doors open from 10am to 4pm and admission is just £1. There will be the usual traders in three halls and a large marquee, bar and refreshment facilities on site plus a Bring & Buy stand. Talk-in on S22. Contact **Chris G0EYO** on 0121-246 7267 evenings and weekends, FAX on 0121-247 7268 or E-mail at [g0eyo@compuserve.com](mailto:g0eyo@compuserve.com)

**March 14:** The 5th West Wales Amateur Radio & Computer Rally will be held at Pengarcae School, Aberystwyth. Doors open 1030 to 1600 (disabled visitors from 1000). Admission is £3 only. There is good parking facilities with easy access for disabled and traders to all stalls, demonstration area and catering facilities. Features include Amateur Radio, Bring & Buy, computers, software and hardware, electronics, h.f. and v.h.f. on air, packet station, repeater group, RAFARS, RSARS, WAB, RAYNET and other special interest groups, trade stalls and lots more. Talk-in on S22. Come and enjoy yourselves. For details and trade stand bookings contact **Katy GW0SFO** on (01545) 580675.

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



# Coping With QRM

By John Worthington GW3C0I

*John Worthington  
GW3C0I describes  
some useful methods  
to try and cut down  
on these strong  
interfering signals.*

In former years, i.e. before the advent of the single sideband transceiver, many c.w. operators used to manage most of the time with no special means of cutting down QRM at all. The brain is a marvellous 'sorter out' on its own but cannot carry on its wonderful work indefinitely and sooner or later most amateurs would take steps to help their head out with one of the many ways known at the time, and this includes me!

The best known was the crystal filter followed by narrowly tuned i.f. transformers, audio filters and so on. Quite effective was the common earphone available at that date employing magnets, coils and metal diaphragm. These instruments invariably had resonances which could be

However, most 'hams' aspired to receivers which would make c.w. life easier and their demand opened up a small market for the brave manufacturers. Then s.s.b. started to become popular, bringing with it the steep sided 2.5kHz filters and c.w. men soon came to recognise that the s.s.b. transceiver made a very good c.w. rig (not only for its selectivity but stability, ease of operation, etc., etc.).

## *In One Stroke*

Indeed, the 2.5kHz wide pass-band in one stroke removed what seemed to be at least 80% of the QRM and what is more, the only remaining signals that could be heard were those to one side of zero beat. This fact was a revelation to those accustomed to reading from the wide passbands of e.g. 455kHz i.f.s or even to an AR88 or HRO receiver for the reason that signals both sides of zero beat were getting into the final audio with resultant mayhem.

So, it ended up with the unlikely spectacle of the two entirely different mode operators being well pleased at the same time. The 'phone men were very gratified with their vastly improved effectiveness and so were the c.w. lads!

## *Never Satisfied*

But most amateurs are never satisfied for long and so special c.w. filters soon became available as we now have them. But what of the occasions when you find yourselves without any add-on filters?

Well, not all operators use narrow band reception and some (like myself!) even normally manage without it, but there is a method of operating the normal s.s.b. transceiver which can bring a good deal of relief to the hard pressed, although I do not claim

any originality I have never yet seen it described in Amateur Radio literature.

You can use the technique when you are in contact with a station which has a comfortable S7 signal when up comes the QRM within 50Hz calling CQ. Now, if you are bothered, proceed as follows: a) switch on your IRT and adjust same until the QRM has disappeared the other side of zero beat or the opposite way (i.e. the QRM signal note has been made too high in pitch to be a problem, b) if you are still having problems say now with an additional station who has started up, switch to the other sideband position.

Find your contact station and see if you can now receive them better. Often, this switching of received sidebands will be effective, c) you cannot forget to switch back to the c.w. position when you want to transmit as most rigs are otherwise inoperative anyway!

## *Little Skill*

It should be pointed out that no little skill is required for the above in that one has to be able to pick out the wanted signal from a new ball game when the sideband switch is activated. So, this involves recognising the subtle sound of the other station's fist and signal, no mean feat in these days when all signals are so perfect.

Another useful point to remember is that most 2.5kHz sideband filters have 'resonant' points near their edges. And by judicious IRT tuning you can often make the wanted signal 'stand out' five or six S points, albeit the tone of the same is high pitched.

The methods described are of course most useful when there are not more than two or three strong interfering signals but they are a ready answer for all seasons and all the better for costing now!



TWO .... WELL PLEASED AT THE SAME TIME....

activated by tuning the wanted signal accordingly, making it stand out apparently many S-points above noise and other stations.

## *Popular Cube*

One popular ex-government item was a small cube containing a resistance/inductance filter designed to 'sort out' beacon signals for direction finding purposes. In amateur use, it was quite effective, although needed quite a lot of audio pushed through to work effectively.

PW





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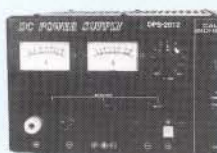
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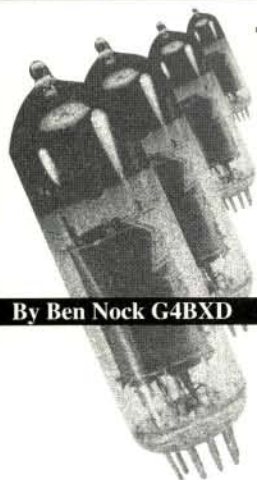
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# Valve & Vintage

By Ben Nock G4BXD

*Ben Nock G4BXD has been busy this month - he's been 'treasure hunting' in junk shops, looking at an interesting Russian radio, and has tackled woodworm in a South African military radio!*



**Fig. 1:** Ben's 'junk shop' BC-148 transmitter-receiver. The set itself is housed in the lid of the box and the receiver batteries are under the Morse key. The chart mounted on the right of the Morse key is the unit's circuit diagram.

First, a Happy New Year to everyone, as this is my first column for 1998. I hope Santa delivered what you wanted, if not, remember to ask earlier next year!

These dark winter nights are ideal for those restoration projects that I never completed in the heat of the summer. Many boxes here already have been stripped, cleaned and re-painted ready for the next display season.

A telephone call from a friend way back in October (thanks Anthony) informed me of a BC-148 languishing in a junk shop. A quick 40km or so dash, with a much slower return trip, secured the set which turned out to be a rather cute little pre-Second World War transmitter receiver.

## The BC-148

The transmitter-receiver, **Fig. 1**, I bought turned out to be an American made BC-148, part of the SCR-131. It operates between 3.950 and 4.4MHz and uses what must have been an early magnetic loop as the antenna (there's nothing new in radio!).

The transmitter uses a single valve, type (USA)VT-25 or commercial type 10 or UX-210 and the receiver uses

three type VT-24 or commercial type 864 valves. There's a 'balancing' circuit in the regenerative receiver circuit which reduces the radiation of the receiver oscillator when it's used for receiving Morse code (c.w.).

The antenna is a diamond shaped loop which fits into two sockets on the rear of the set, the sides of the loop being approximately 1m in length. Internally contained batteries of 4.5 and 45V powered the receiver while a

hand cranked generator (designated as a GN-35) powered the transmitter, supplying it with 10V for the valve filaments and change-over relay and 400V high tension supply.

In addition to the BC-148 there was also a BC-151 (SCR-161). This was identical apart from covering the band 4.37 to 5.1MHz.

Although the BC-148 just misses

the 3.5MHz band I hope that a small amount of capacity across the tuned circuits might prove enough to get it onto the band. The transmitter uses a free running oscillator but the old trick of putting an appropriate frequency crystal across the grid resistor might lock it up enough to make it usable on the band.

## The Collins 32V-1

Still looking at equipment made in the North American continent (but more recently built) is the Collins 32V-1 Amateur bands transmitter, **Fig. 2**, which is a real fine piece of engineering. Though large and heavy (approximately 48kg!) it's a very attractive set indeed, looking like a real radio should do in my opinion.

The Collins uses 17 valves in all (that's including the modulator and regulator valve) and an inside view is shown in **Fig. 3**. The 32V-1 has an RK-4D32 in the p.a. stage, amplitude modulated by a pair of good old 807s. A power input to the 'final' of 120W on 'phone' or 150W on c.w. is obtained with coverage of the 3.5 to 28MHz bands (no WARC of course).

Although the v.f.o. tuning on the 32V-1 is very fine and smooth, I think it's rather odd that it tunes well past the band edges, even by American standards. On the '40' metre band the Collins tunes from 6.4 to 8MHz, and up on '20' it covers 12.8 to 16MHz. I fail to see why there is such a large overlap, does anyone have any thoughts on this?

The set is quoted a 'table top' unit (there must be strong tables in the USA) as it contains the transmitter, modulator and power supply all in the one box. A matching receiver (and matching weight) would be one of the 75A range of sets. Wonderful... 'Ham' radio as it used to be!

## Russian Made

On the Russian made 'front' now. The R-123 is a Russian made set which was used in armoured vehicles. That's probably why it looks and feels like one!

The R-123 was supplied to many of the



**Fig. 2:** The Collins 32V-1 transmitter clearly illustrating its very finely engineered tuning dial arrangement and symmetrical dial layout (see text).

old Communist Bloc countries. Very solidly constructed, the 123 covers the frequency range of 20 to 51.5MHz, giving about 20W of f.m. output. My copy of *Jane's Military Communications 1991* still quoted it as in service with Soviet and other 'Warsaw Pact' forces.

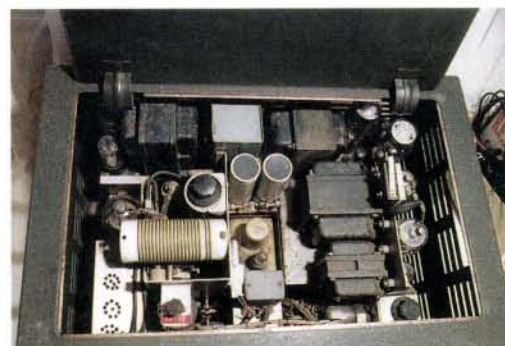
Four pre-set frequencies can be entered on the R-123 or the set can be tuned manually across its range. Some 1261 channels at 25kHz spacing are available. An external power supply is used providing 1.2, 6.3, 150, 250 and 600V for the set from a basic 26V vehicle supply.

The M version of the R-123 was slightly modified and the MT version allowed remote control operation. A 4m long whip antenna was used on the vehicle when in motion, a 10m long whip was employed when stationary. Quoted ranges were 20 and 50km respectively.

The front photo of the R-123, **Fig. 4**, shows the set with its p.a. valves removed and rather strangely all the markings are in English! The interior rear view, **Fig. 5**, shows the set with an 807 for size comparison and gives a good indication of the modular construction used. (This modular construction is a very common feature in many of the Eastern Bloc sets).

## South African Teco

A contact in South Africa mentioned a set, called a Teco, of which there were apparently many lurking in an old shop in Pretoria. So, having a friend who



**Fig. 3:** Inside the Collins transmitter with the p.a. stage on the left and the v.f.o. in the centre front. The power supply is at the rear centre and the modulator on the right hand side.



travels the world a lot and was just about to go to South Africa, I persuaded him to find the shop and secure a set for me.

After walking the streets of Pretoria looking for the junk shop my friend gave up but asked his colleagues to carry on the search. As luck had it, they did indeed find the shop but alas, only a few beat up Teco sets were evident. Undeterred, on my friend's next visit to Pretoria one was purchased and, via Namibia and France, found its way here.

The Teco was in a good state, dirty but nearly complete. The case though was full of woodworm (It's a wooden enclosure ... just in case you thought South African woodworm eat metal!).

I've made a new box and work is continuing on the restoration.

details or history on the set, it may have been used in the North African campaign against the mighty Field Marshal Rommel.

And on applying power the thing worked! I've even had contacts on '80' with Ray G3IFF, during the Military Wireless Amateur Radio Society (MWARS) Sunday Net. Later on I'm planning to show you a picture of the finished set but if anyone has information, I'm sure I and other readers would like to hear it from you.

### Some Rumours

There are some rumours around that, in the very near future, the powers that dictate our hobby (mainly in mainland Europe it seems) may allow only type



Fig. 5: Inside the Russian set. Note the modular construction. The 807 valve provides an indication of the size of the equipment and the Russian p.a. valve dimensions.

The photographs, Figs. 6 and 7, show the set itself, which is a simple affair with separate tuning dials for the receiver and transmitter covering from about 3.5 to 7.5MHz.

In appearance the Teco is very similar to the WS18 set and apparently, though I have very little

approved rigs to be used. This idea (if true) means disaster to vintage set users.

How can you 'type approve' a 60 year-old transmitter designed for war? Although in my opinion I think that many military rigs are of a higher specification than 'plastic' Amateur Radio gear.



Fig. 6: The South African Teco wireless set (without meter). Note the very simple controls - the centre 'tank' knob tunes the p.a. stage (an 1Q5 valve). The date of manufacture (1941) is marked on a plate in the lower right-hand corner.

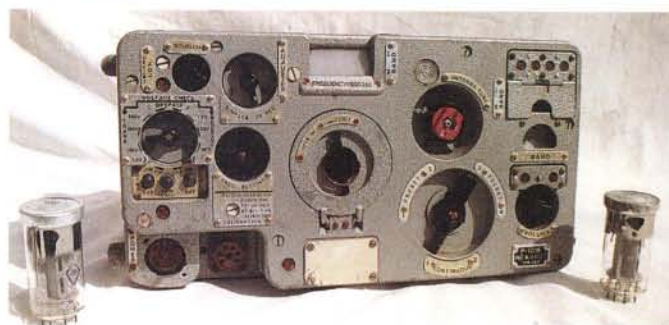


Fig. 4: An interesting (and very rugged) Russian-made military set - the R(P)-123M showing its two p.a. valves removed for display purposes. The power and headset sockets are on the lower left (with English lettering).

I think it's in all our interests that the 'type approval' situation is closely monitored and that any groups interested in vintage equipment, be it military or vintage amateur equipment, should make representations to those powers informing them of our interests.

Individuals not connected with a group could write in as well. Possibly the RSGB could be petitioned, though there are reservations in my mind about the effectiveness of petitions, as well as consulting your MP or even your 'Euro MP'.

It's a certain fact that if nothing is done, then arguments based on EMC problems, stability and spectral purity of old sets, etc., may see just such a ban being imposed.

that if anyone has any idea as to which set it was used in, he would like to know. (So would I, so details to me and I'll pass them on).

Walt Novinger wrote to ask if anyone could give him the location of a 3AMP1A (aka DG7-32 aka CV2431 CRT) as used in the Racal 121B ISB adapter. The one in his set has a heavy line burned in the phosphor and is quite dim. (Let me know and I'll pass it on to Walt).

Thanks also to Alan G4YMU and James Farquhar who supplied information on the AVO 40 multimeter, this was passed on to Michael VE3PRW. So, it's time to go off duty again and as always, I can be contacted via the PW offices, or direct at: 62 Cobden St, Kidderminster, Worcestershire DY11 6RP. (s.a.e. please) or at G4BXD@compuserve.com on the internet.

### Tips & Post Bag

Before looking into the post bag...here's a restoration tip. After re-painting a set, and giving it that final polish and buffing up the identification tag I apply a coat of Nail Enamel. I use No. 7 (mainly as that's what 'she indoors' has on her dressing table!) as it gives a nice finish to the name plate and stops it tarnishing with age.

Into the mail bag now and I've received a letter from Ralph VE3BBM, who wrote to say he has a valve which he thinks is from a First World War transmitter. Its marked with 'WD EDISWAN AT50 serial No 6146'. (Nothing to do with a modern 6146).

Ralph's valve is a triode with the grid and filament leads brought out at the sides to three binding posts. In his letter he asks



Fig. 7: Inside the Teco set with the receiver on the left, transmitter on the right. The modulator is in the centre and the p.a. stage tank coil at the top centre.

Cheerio for from Ben, see you in May.



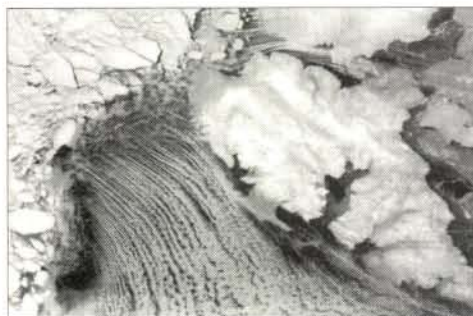
# BITS & BYTES

Mike Richards G4WNC takes a look at AMTOR, has news of a Web site you can visit to hear data modes and starts off with a 'weather' update!

The mention I made of weather information on the Internet in the December issue seems to have caused quite a stir, especially as the address I gave for one of the sites was wrong! If you want to take a look at the fascinating and informative Jersey Met site, the address is <http://user.super.net.ul/~jmet/> If you have any trouble with this just search for 'Jersey Me' using the Infoseek search engine.

Since mentioning the weather information lots of readers have written telling me about their own favourite sites so here's one of the best. **Scott Carpenter** has located an excellent site at Dundee University which carries a host of detailed satellite data that's loaded onto the Web just five minutes after the satellite pass.

As the satellite information is taken eight times a day you can see that the Dundee site is great for the very latest weather pictures. When you first visit the site you are required to register, but this is just to give the site operators information on how the



Part of a high resolution NOAA image.

information is being used - there's no charge for registration.

Rather than use the more common Meteosat images, the Dundee site uses images from the NOAA polar orbiting satellite which provides coverage from the North Pole through to the mid-Atlantic from their listening site. The NOAA satellite provides very detailed images using a total of five image channels.

The image channels provide views that range from pure visual on channel one, through to pure infrared on channel five. The images from all five channels are made available in both JPEG and GIF file formats with the more efficient JPEG images running at about 100kb and the GIF images at around three times that size.

The images contain loads of detailed information for those of you that want to watch weather developments to spot potential enhancements in propagation conditions. If you want to get really serious you can write to the university and arrange to buy high resolution satellite images. The Internet site address is: <http://www.sat.dundee.ac.uk/>

## Inside AMTOR

As my introduction to RadioTeLeTYpe (RTTY) proved so popular, this month I'll take things a little further and take a look at how the more sophisticated AMTOR system works. Before I go

delving in, let's just briefly re-cap on what you learnt from my RTTY tutorial back in the December 'Bits & Bytes'.

You will recall that when operating a computer based RTTY station each press of the keyboard is converted into a five bit binary

number that emerges, one bit at a time, from the computer's serial port in the form of a voltage that varies between 0V and +5V depending on whether the bit is a logic one or zero. This varying voltage is then converted into one of two tones again depending on whether a one or zero is being sent. Finally, these two tones are applied to the microphone input of your s.s.b. rig and you have a frequency shift keyed RTTY signal.

At the receiving end the whole process is reversed i.e the tones are converted to voltages which are applied to the computer which then

rebuilds the original binary number and converts it into a letter/number and prints it on the screen! Phew! It took me best part of a column to explain that last time!

So, let's start by looking at why anyone would want to develop an alternative to RTTY - surely, being so simple and cheap there's not much point in changing? Although RTTY seems almost magical when you first start to use it you will soon find that there are a few problems.

Most of the problems stem from its susceptibility to errors. Going back to basics you will recall that the RTTY systems uses the International Telegraph Alphabet No2 (ITA2) to convert the text into a five bit binary number.

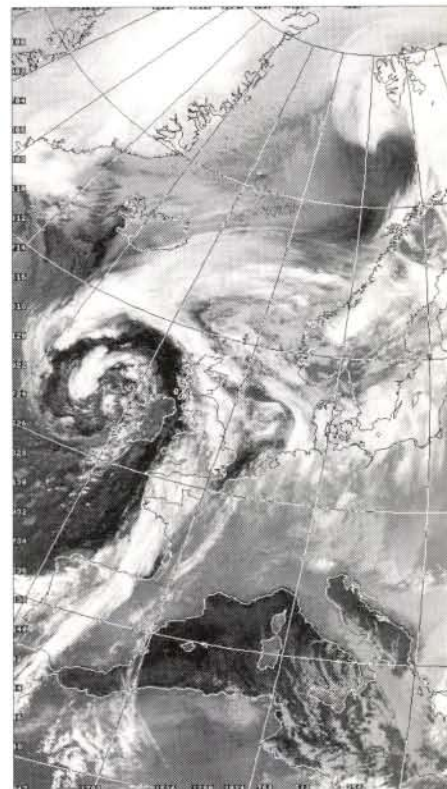
One of the problems with this particular code is the restricted number of characters that can be handled with such a small code. As a result, each five bit number has two interpretations. These are known as Figures and Letters.

For example, the ITA2 binary number 10000 can mean E or 3. Switching between these two meanings is done by including a couple of special characters called Figure shift and Letter shift. These are used rather like a toggle switch.

If you want to send some plain text you first send a letter shift then the various letters that make up a message. If you want to add a number or some punctuation you have to send figure shift followed by the number or punctuation and then another letter shift to restore the system to accept letters again.

As you can see this is a rather long winded process which can result in a lot of shift characters being sent just to send a relatively simple message. Not only does this slow down the progress of the message but it also makes the system very prone to errors.

If one of the shift characters is lost due to interference the whole



Standard infrared image from the Dundee site.

systems quickly gets out of synch, as all the following characters could be printed as numbers instead of letters or vice-versa. If you've ever used a RTTY system you will be only too familiar with this problem.

There have been a number of systems developed to try and limit the corruption and one of the common ones found on most decoders is the unshift-on-space facility. When enabled this causes the decoder to revert to letters whenever it encounters a space. Although this is a useful fail safe that works quite effectively it's not a total solution.

An alternative that was used by telex systems went to the extreme of using only letters and spelling-out all the punctuation and numbers. You will no doubt have seen this in telegrams from long ago as they always spelled out the word STOP at the end of each sentence.

Although the operational techniques developed to reduce the effects of interference were quite effective, they did not really lend themselves to automated reception. What was really needed was a system that would automatically



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ECC83	5.00	PL504	3.00	6BW6	4.00	13E1	85.00
ECC85	3.50	PL508	3.00	6BW7	3.00	572B	95.00
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Published regularly, containing 100s of out of print, old and collectable wireless books, magazines, vintage and valve communications receivers, valves, components, etc. Send six 1st class stamps for the next listing or £8 for the next four catalogues and eight issues of "The Vintage Wireless Trader", containing our latest acquisitions and subscribers' 'Wants & Sales', published at approximately six-weekly intervals.

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73 from Dave G4KQH, Technical Manager.

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check for errors and then put them right!

The answer came with the development of Simplex Teleprinter Over Radio (SITOR). This used a new code known as CCIR476, which uses seven bits to represent each character.

The particularly special feature of the SITOR code is the ratio of logic ones and zeros which remains at 3:4 for every character. This simple characteristic is used at the receiving end of the transmission to check for errors.

All the system has to do is examine the received signal and check for the 3:4 ratio. If the transmission doesn't match the 3:4 ratio, then there must have been an error and that character needs to be discarded and requested again.

AMateur Teleprinter Over Radio (AMTOR) is a development of the commercial SITOR system. This is all very well, but how can you ask for a character to be sent again? This is where the other key difference between RTTY and AMTOR comes into its own.

Rather than send a constant stream of characters, the messages are broken-up into chunks of three characters at a time. Once these have been sent, the sending station drops back to receive and waits for an acknowledgement from the distant receiving station.

If the acknowledgement is received in the set timescale the

## Special Offers

If you'd like a copy of Hamcomm/JVFX, etc. I've arranged a very special offer with the **Public Domain and Shareware Library (PDSL)**. They have put together a library set of all five disks for just £12, all inclusive.

Using PDSL also makes ordering simpler as they accept all the usual credit cards so you can order by 'phone - you don't even have to write a letter. Please direct all orders and enquiries about this disk set to **PDSL, Winscombe House, Beacon Road, Crowborough, Sussex TN6 1UL. Tel: (01892) 663298** and request library volume: **H008739abcde**.

The software is available as a set of five disks as follows: IBM PC Software (1.44Mb disks): **Disk A - JVFX 7.1, HAMCOMM 3.1 and WXFAX 3.2; 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.**

## Detailed Look

Let's now take a slightly more detailed look at the AMTOR system to see just how the timings are arranged to keep the message flowing. The first point to note is that the transmission of the bursts of three characters is usually done at 100baud.

The original reason for a baud rate of 100 was to keep the overall through-put of information at the same rate as you would get from a standard 50baud teleprinter system. The higher speed being necessary to compensate for reception of the acknowledgement signal.

I've shown a detailed timing chart in **Fig. 1**. As you can see, the initial burst of three characters takes 210ms then there's a rest period of 240ms to allow for the rig to switch back to receive and capture the

(FEC). So why do we need another mode?

The main limitation with Mode A that I've concentrated on so far is that to work it requires both stations to be linked together and synchronised. This is great when you want to link-up with a friend, but how do you call CQ?

What's really needed is a broadcast mode where anyone can listen into the transmission. This is precisely what Mode B or FEC does, but to make use of the error correction it has to put the message together in a slightly different manner.

Rather than send three characters then wait, FEC mode sends the message twice within a constant stream of characters. It does this by interleaving the characters so that the message is in fact sent twice but the repeat of the message is delayed by 35 bits or five characters. An example is shown in **Fig. 2**.

The logic behind the interleaving method is that unless there is very bad interference you are unlikely to lose both versions of the message. So, the receiver just checks for the 3:4 ratio and when it finds an error it just waits to see if the duplicated character arrives OK.

If the duplicated message is also corrupt there's no way to recover the situation, unlike Mode A. If you've never used AMTOR I would recommend you to try it as it's a very simple but effective communication system.

One of the things that always used to fascinate me was the very low powers that can be used to communicate reliably over huge distances. The trick here is to first call CQ using full power and, once the link has been set-up, just try winding the power down to a setting just above the point where the link starts to show some errors.

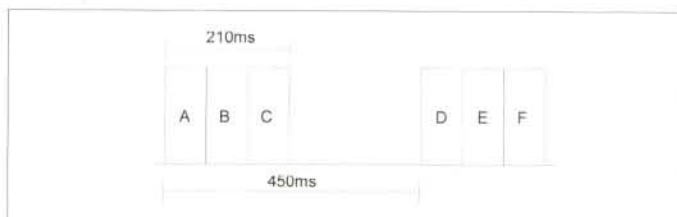
I used to find that I could make reliable links into South America with just a watt or two. As well as being an interesting exercise, this technique also helps to reduce the QRM levels on our crowded bands.

## Warbles & Whines

One of the common questions posed by those new to the data modes is how to recognise all the different warbles and whines that are to be found on the bands these days. One very useful starting point is to get hold of a recording of the various modes.

If you have access to the Internet you can do this on-line as the Worldwide Utility Newsletters Web site has an excellent collection of digital modes all in .WAV format. You can either listen to these on-line, or you can download them by holding the shift key before you click on them.

The audio files can also prove extremely useful for testing your decoding gear as they are usually nice clean examples. They can also be very useful if you want to



**Fig. 1: AMTOR Mode A timing chart.**



**Fig. 2: An example of the FEC message format.**

station goes back to transmit and sends the next three characters. If the acknowledgement is missing or a repeat request is received, the transmitting station will re-send the first set of three characters.

The process continues until the complete message has been sent. As you can see the whole thing depends on the use of the 3:4 ratio in the received text to identify and remove any errors.

While the process may seem fairly crude it really does work very well indeed. I have used the AMTOR mode extensively in the past and have been amazed by the results that can be achieved.

incoming acknowledgement signal.

In the early days of AMTOR, you often had to make modifications to your rig to improve the switching speeds or you would end-up missing the acknowledgement. However, today's modern rigs with solid-state switching have much improved switching speeds and can usually handle AMTOR with ease. The first rig I used for AMTOR was an old Icom IC-720 which was a great rig, but the relay switching made a dreadful din whenever I used AMTOR.

Returning to our timing diagram you will see that the overall time for sending the three characters is 450ms which is exactly the same as three characters would take if we were using 50baud RTTY with one and a half stop bits.

So far I've only covered what's known as mode Automatic Repeat reQuest (ARQ) but there is a second very important system that's called Mode B or Forward Error Correction



**Dundee University Satellite Station.**

experiment with more detailed analysis of data signals, as you can use tools like Spectrogram to take a more detailed look at the signals. The address for the digital sounds page is [http://www.gem.net/~beri/wun/files/sounds/digital\\_sounds.html](http://www.gem.net/~beri/wun/files/sounds/digital_sounds.html)

That's all I got room for this month so, until next time have fun using your computer in the shack and don't forget to keep your news and views coming to me at **PO Box 1863, Ringwood, Hants BH24 2ZD** or via **E-mail to: [mike.elaine@btinternet.com](mailto:mike.elaine@btinternet.com)** Don't forget that my Web site can be found at: <http://www.btinternet.com/~mikespage>

**END**



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Yaesu FT-902DM + SP-901/SPC-300 ATU	£499
Yaesu FT-747 + FC-700 boxed	£TEL
Kenwood TS-830M +	£375
Yaesu FT-102	£375
Yaesu FT-101Z	£299
IC-706 MKI boxed	£675
Kenwood TS-505	£550
Yaesu FT-757GX + FC-750SAT	£650
Kenwood TS-140S boxed	£499
Yaesu FT-707 + FC-700	£399

#### MOBILE/BASE VHF/UHF TRANSCEIVERS

Kenwood TS-700S	£450
Icom IC-229 - boxed	£225
Icom IC-290D	£300
Kenwood TM-255E boxed VGC	£TEL
Yaesu FT-230	£175
Icom IC-271H + 100W internal PSU	£550
Icom IC-2410H boxed	£TEL
Yaesu FT-790R + linear	£TEL
2 x FT-290RI	from £200
Kenwood TR-751 - boxed	£350
Icom IC-251E	£TEL
Yaesu FT-290RII boxed	£325
Yaesu FL-2025	£99

#### RECEIVERS/SCANNERS

ICOM IC-R71E boxed	£599
Regency MX-7000	£TEL
Drake R-8E	£699
Lowie HF-225	£299
Sony PRO-80	£150
Yaesu FRG-9600 - HF converter	£350
Yaesu FRG-7	£150
Icom IC-R7100 boxed	£TEL
AOR AR-3000A	£575
Sony SW-55 mini condition	£199
AOR AR-2800 boxed	£250
Grundig Satellite 500 + IC-FAX 1/Datong AD-270	£175
Icom IC-R100 - mini condition	£275
NRD-525 mini condition	£560
Icom IC-R7000	£650
JIL SX-400 boxed	£TEL

#### HANDHELDS

Kenwood TH-21	£99
Icom IC-4E	£115
Standard C-528 boxed	£199

#### MISC.

SDU-5000 Spectrum Display Unit - as new	£599
AT-230 - box	£175
MEF-1278 Packet Unit + Software	£225
MML-144 - 100-3 + boxed	£TEL
Tokyo HL-160V linear	£175
Tiny 2	£80
MEF-784 boxed	£175

### SHORTWAVE SHOP 01202 490099

#### HF TRANSCEIVERS

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Kenwood TS950SDX - The Ultimate HF Set	£1,695
Kenwood TS680S - HF & 6M	£695
Kenwood TS120S - 100W HF	£295
Trio TS530SP - 100W HF	£375
Trio TS530SP - 100W HF Narrow CW Filter	£395
Trio TS130S - 100W HF & WARC	£325

#### VHF/UHF

AKD 7003 Channelised 3W 70cms Mobile	£125
Icom IC215 - 2M Channelised FM	£85
Icom IC2E - 2M Thumbwheel H/Held	£75
Icom IC02A - No 1750Hz	£85
Kenwood TH42E - 70cms H/Held c/w Keypad	£175
Kenwood TH22E - 2M H/Held c/w Keypad	£175
Kenwood TS711E - 2M Multimode Base	£525
Kenwood TM 733 - 2M/70cms Mobile	£399
Trio TR9130 - 2M Multimode Boxed	£350
Yaesu FT290RII - 2M M-mode Mobile	£325

#### RECEIVERS

AOR 7030 Acclaimed HF RX - Ex Demo	£645
Icom R71E - General Coverage Receiver - Mint	£495
Icom R71E - Gen Cov RX with ALL OPTIONS	£595
Icom ICR72 - General Coverage RX	£595
Lowie HFI25 - HF Gen Cov RX	£225
Lowie HFI50 - HF Gen Cov RX - Mint	£325
Realistic Pro-2006 - 400Ch Scanner	£175
Sony Air7 Air and Marine Rcv	£195
Sony ICF Pro80 - SW and FM Broadcast	£135
Trio JR500S Ham Band HF Receiver	£85
Yaesu FRG8800 with VHF (Choice of two)	£495
Yaesu FRG7700 - General Coverage RX	£295

#### MISCELLANEOUS

Capco 1KW ATU	£125
Diawa CNA1001 - Auto ATU	£145
Diawa AF-606K Active Filter Unit	£85
Diawa PS304H - 30A Psw	£95
Global AI2000 - RX ATU - New - No Box	£79
Howes CTU8 Receive ATU	£39
Icom AG-25 2M Masthead Preamp	£89
Icom SP-7 External Speaker	£25
Kantronics KAM - Multimode TNC	£165
Manson EP295 12V Variable 20A PSU	£70
MEF 407B - Keyer	£49
Microset R432-90 - 90W 70cms Amplifier	£349
Microwave Modules 100W 4M Amplifier	£95
Microwave Modules 30W 70cms Amplifier	£95
Optoelectronics 3300 - Frequency Counter	£100
Optoelectronics 3000A - Frequency Counter	£120
SEM QRM Eliminator Filter Unit	£50
Tokyo Hy-Power HC400L Deluxe ATU	£145
Tokyo Hy-Power HX240 - 2M->HF Transverter	£145
Trio PF810 Function Power Meter	£35
Welz SP400 VHF/UHF Power/SWR Meter	£85
Yaesu G500A Elevation Unit - VGC	£165
Yaesu G250 Rotator	£95

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Trio R600 Shortwave receiver	£215.00
Yaesu PRG-100 Shortwave receiver	£375.00
Grundig Yacht Boy 206 portable receiver	£79.00
Sony ICF-7600 portable receiver	£58.00
Siemens RK-702 portable receiver	£49.00
Lowie HF-250 Receiver c/w FM/AMS & speaker	£499.00
Realistic DX-394 Receiver	£189.00
Icom IC-R70 Receiver	£449.00

#### SCANNERS

AOR-3000 wideband scanner	£499.00
Icom IC-R1 handheld scanner	£169.00
AOR-2000 handheld scanner	£149.00
Fairmate HP-100 handheld scanner	£149.00

#### HF TRANSCEIVERS

Kenwood TS-850S	£899.00
Icom IC-720A c/w PSU	£479.00
Yaesu FT-890AT	£689.00
Icom IC-735	£549.00
Icom IC-745 with internal AC PSU	£489.00
Icom IC-751	£589.00
Yaesu FT-757GX	£499.00
Yaesu FT-707 80 - 10M transceiver	£299.00
Alinco DX-70T HF + 6M	£580.00
JRC JST-135 transceiver c/w matching PSU	£999.00

#### VHF/UHF

Yaesu FT-4700 dualband mobile	£279.00
Kenwood TM-701 dualband mobile	£299.00
Alinco DJ-580E Dualband handheld	£219.00
Alinco DJ-F1 2M handheld	£159.00
Kenwood TH-75E 2m/70cms handheld	£229.00
Kenwood TM-431E 70cms mobile	£239.00
Trio TS-770E 2m/70cms Base station	£469.00
Yaesu FT-50R 2m/70cms handheld	£229.00
Kenwood TH-42E 70cms handheld	£189.00

#### OTHER ITEMS

PK-88 Packet terminal	£89.00
FL-2 Audio Filter	£89.00
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### MULTICOMM 2000 01480 406770

#### HF TRANSCEIVERS

ICOM IC-706DX HF+6+2-MTR. (BOXED)	£679
ICOM IC-720A + PSU GENERAL COVERAGE RX	£345
ICOM IC-725 GENERAL COVERAGE HF TX/RX	£575
ICOM IC-726 HF + 6 WITH PSU (MINT)	£695
ICOM IC-738 "AS NEW"	£895
ICOM IC-740 HF GENERAL COVERAGE RX	£499
ICOM IC-775DSP (8-MONTHS OLD) "THE BEST"	£2,225
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KENWOOD TS-520 (BOXED & MINT)	£235
KENWOOD TS-520 SE	£249
KENWOOD TS690SAT HF+6MTRS FULL RX	£869
KENWOOD TS-820 (MINT)	£325
YAESU FT-101B HF (GOOD CONDITION)	£140
YAESU FT-757GX FULL COVERAGE HF	£349
YAESU FT-757GX FULL COVERAGE HF	£399
YAESU FT-840 (MINT)	£599
YAESU FT-840 GENERAL COVERAGE	TRANSCIVER
YAESU FT-902DM GREAT TRANSCIVER	£325

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FDK MULTI 2 FM MOBILE GREAT VALUE	£69
ICOM IC-2350 (EX-DEMO)	£329
ICOM IC-251E 2MTR BASE MULTIMODE	£289
ICOM IC-290E 2-METER MULTI-MODE 25W	£249
ICOM IC-V200 2-METER FM MOBILE	£99
ICOM ICW-21-ET DUAL BAND HANDIE	£199
ICOM ICW-32E DUAL BAND HANDHELD	£169
KENWOOD TH-79E HAND HELD	£299
KENWOOD TR-741E TRIBAND 6-2-70 MINT	£499
KENWOOD TR-751E 2-METER MULTIMODE	£375
YAESU FT-10R 2-METER HAND HELD	£129
YAESU FT-23R 2-MTR. HANDHELD	£110
YAESU FT-2500M 2-MTR / 70CMS MOBILE (6-MONTHS)	£299
YAESU FT-3000M (3-WEEKS OLD)	£335
YAESU FT-480R (MINT CONDITION)	£325
YAESU FT-480R + PSU (MINT CONDITION)	£350
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#### SHORT-WAVE RECEIVERS

AOR AR-3030 with COLLINS FILTERS	£399
AOR AR-7030 PLUS THE TOP OF THE RANGE RX	£799
AOR AR-7030 LATEST HOT RECEIVER	£599
ICOM ICR-72E SHORT-WAVE RECEIVER	£450
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JRC NRD-525 "AS NEW"	£595
JRC NRD-525 "GREAT RECEIVER"	£650
KENWOOD R-2000 (MINT)	£335
KENWOOD R-5000 DELUXE SHORTWAVE RX (INC VHF)	£599
KENWOOD R-5000 DELUXE SHORT-WAVE RX (INC VHF)	£629
KENWOOD R-5000 DELUXE SW RX	£579
LOWIE HF-225 GENERAL COVERAGE RECEIVER+KEYPAD	£325
LOWIE HF-235 COMMERCIAL SHORT-WAVE RECEIVER	£559
RACAL RA-1217 "GREAT PERFORMER"	£399
REALISTIC DX-394 (AS NEW)	£165
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WIN RADIO PC-RX WITH NEW SOFTWARE	£275
YAESU FRG-7700 GENERAL COVERAGE	£265

#### SCANNERS

AOR 3000A SW+VHF+UHF	£550
AOR 3000A SW+VHF+UHF	£515
AOR AR8000 SCANNER	£245
AOR AR-5000 (EX-DEMO)	£1,050
BEARCAT 220-XLT HANDHELD HI SPEC	£130
ICOM ICR-1 (NEW) MINI-SCANNER	£259
ICOM ICR-7000 VHF+UHF RECEIVER	£575
ICOM ICR-7000 VHF+UHF RECEIVER + HF	£645
ICOM ICR-7000 VHF+UHF RECEIVER	£499
ICOM ICR-7100 VHF+UHF RECEIVER MINT	£845
YAESU FRG-9600 VHF+UHF ALL MODE	£299
YUPITERU MVT-7200 (EX-DEMO)	£269

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## VHF REPORT

David Butler G4ASR reports on the recent Leonids meteor shower, Sporadic-E and Auroral openings and has news of the joint Russian/French Sputnik.

**B**and conditions during November were very much like the weather, generally gloomy with intermittent sunny patches! Best of the 'sunny patches' was the tremendous increase in meteor activity during the Leonids shower on Monday November 17.

Other periods of brightness included two openings via auroral backscatter (November 22-23) on the 50 and 144MHz bands and five days of Sporadic-E (Sp-E) openings on the 50MHz band (November 4, 16, 19, 23 and 24). The Marconi c.w. contest on November 1-2 created a fair bit of activity on the 144MHz band but very little in the way of DX. Conversely there was some good DX during the ARRL earth-moon-earth (e.m.e.) contest on November 15-16 but relatively little activity being only available to the real enthusiast.

### Meteor Shower

Past observations of the Leonids meteor shower have shown that approximately every 33 years the shower reaches storm proportions. The last peak was in 1966 and for the past few years each succeeding year has seen the zenith hourly rate (z.h.r.) of the shower steadily increasing.

Although we are not due for the 33-year cyclic maximum until 1998 or 1999 the shower, which peaked on Monday November 17, produced some excellent results especially on the 144MHz band. On this band many stations reported receiving bursts of signals of up to three minutes duration and this went on for a number of hours throughout the morning.

Surprisingly, although the 50MHz band was open for lengthy periods there did not appear to be much activity compared to that on higher frequencies. Perhaps most stations that can be worked via meteor scatter (m.s.) on this band have previously been worked via the summer Sp-E openings. Or could it be that the real DXers prefer to operate on the 144MHz band where the effective radiated powers (e.r.p.) are considerably higher?

At my QTH (IO81) in Herefordshire I commenced m.s. activity at 0615UTC on November 17. Initially, I listened to the television video carriers between 48-49MHz.

Although there were some

meteor reflections the band didn't seem to be very lively. Surely all the TV stations would have been active at that time of the morning?

Moving up to the 50MHz band I was hoping to find lots of activity but disappointingly I heard only two stations DL4MDQ (JN58) and OE2UKL (JN68). These stations were worked very easily on s.s.b. without having to resort to conventional m.s. procedures and reports. Then it was time to take a listen on the 144MHz band to see what the c.w. activity was like.

I listened on the calling frequency 144.100MHz for 10 minutes but heard only one station calling CQ. It was Marek SP4MPB (KO03), 1584km away, but I had worked Marek many times in the past. This was getting desperate!

Where was all the activity that I had predicted? By now it was 0655UTC and I decided that I'd better have a listen on 144.200MHz, the s.s.b. meteor scatter calling frequency.

Immediately I heard 9A1CAL in Croatia calling CQ. So, this is where the real action was!

Switching the amplifier on (shown in the photograph, Fig. 1) and turning the 17-element Yagi towards central Europe, I was ready for action. The activity on s.s.b. was really amazing and the best I've heard in any meteor shower for a long, long time.

Between 0657-1129UTC I made 27 contacts with stations in 11 countries. The list included EA3TI (JN11), EA7GTF (IM87), DL3IAE (JN49), DL4MEA (JN58), DD6UFR, DJ9KV (JN68), F6DRO (JN03), HA5CRX (JN97), HA5OV, HA7UL (JN97), HB9FAP, IK1EGC (JN35), IK2EAE (JN45), IV3BBL, IV3HWT (JN65), IK4WIL, I8MPO (JN70), I8TWK (JN70), LA0BY/P (JO59), OE3MWS (JN88), S51MQ (JN75), S53EA (JN76), YU1WP, YU7EW (KN05), 9A1CAL (JN86), 9A2RD and 9A4EW (JN95).

Many bursts were between two to three minutes long with signal strengths peaking S9 on numerous occasions. It was difficult to assess when the peak occurred but certainly conditions appeared to be excellent between 0700-0800UTC and 0915-1000UTC.

Other stations heard on s.s.b. but not worked were EA3BTZ,

EB4GIA, HB9QQ, I1DMP, I1JTQ and SP4MPB. Best DX was YU7EW at 1859 km, followed by the two I8 stations at 1829 and 1827km. It certainly was worth taking the morning off work!

Dave G7RAU (IO90) was active between 0234-1130UTC on November 17. He uses a Yaesu FT-757 transceiver, a muTek transverter, 70W and a pair of 9-element OZ5HF Yagis.

Dave made 12 s.s.b. contacts on the 144MHz band with stations in nine countries. They were EA3TI, EA7GTF, ES2RJ, HB9FAP, IK2LGV, IV3HWT, IK4DCX, LA0BY/P, LY2WR, SM3LBN, S52EA and 9A1CAL. 'Gotaways' included DL9MS, EA3ECE, EB4GIA, HG1DLZ, HA5OV, IW1CHX, I1DMP, I1JTQ, I8MPO, SP4MPB, YU7EW and 9A1CCY.

At the QTH of Mike Stevens GOKAS (IO91) a total of five stations, EA3TI, EA7GTF, IV3HWT, LA0BY/P and S53EA were worked in the morning. Mike mentions that he was only 'dipping' in and out at odd times and didn't make a concerted effort to work all the DX available.

Mike runs an Icom IC-275H, an amplifier with a pair of 4CX250B's and a 17-element Yagi. On the following day he completed a QSO with 9A2RD.

Another m.s. enthusiast participating in the Leonids shower was Ray James GM4CXM (IO75). He reports that the reflections were the best he had heard in a long time on the 144MHz band.

The activity was very high on the random calling frequency 144.200MHz and Ray reckons that it would certainly help if stations spread themselves out more to reduce the interference level. Using 400W and two 16-element Yagis he made 17 s.s.b. QSO's with stations located in six countries. Between 0842-1114UTC he contacted 7 x DL, EA2LU, EA3TI, EB4GIA, F6DRO, HB9DFG, HB9FAP, IW1BCV, I1DMP, IW5AVM and S51AT.

A report from Pista YU7EW (KN05) details making 18 s.s.b. contacts between 0704-1056UTC. His furthest distance contacts included G4AEP (1704km), G4CLA, (1733km), G4ASR (1859km), G8XVJ (1874km)



**Fig. 1: The operating position at the QTH of David Butler G4ASR.**

and G4HGI (1887km). He used a 250W amplifier and a 10-element DJ9BV Yagi to make these single burst QSOs.

As you can see it's relatively easy to make m.s. contacts on the 144MHz band but it is also a real challenge when attempted on the 430MHz band. But that's exactly what David Dibley G4RGK (IO91) tried recently.

Using his e.m.e. amplifier and antenna array David arranged a two-hour test with LY2WR in Lithuania. The results (not unpredictably) were disappointing with David only receiving one very weak burst of signal. He reckons that his antenna is far from ideal for m.s. work being far too sharp with a very clean pattern.

What you actually need David is a relatively broad beamwidth to illuminate as many ionised meteor trails as possible. David suggests that one long Yagi and lots of transmitted power could be the answer to making a successful m.s. contact on this band.

David did report however that he has made two m.s. contacts in the past on the 430MHz band. These were to Germany and Austria but the distances were not very great, being around 1200-1400km. Making contacts via aurora on the 430MHz band has been much easier although G4RGK reports it's a difficult task to get operators to move up from the 144MHz band during an intense event.

### Auroral Openings

Two auroral openings were reported on the 50 and 144MHz bands occurring in the period November 22-23. Geomagnetic activity had been at 'quiet' levels on February 20-21 with the daily A-index being recorded as two units.

However, around midday on



February 22 a geomagnetic storm commenced lasting until late on November 23. Geomagnetic levels increased to 'major-storm', with an A-index of 45 and 60 on November 22 and 23 respectively.

First indications that anything unusual was happening in the UK was when the station of **Bill Stirling GM4DGT** (I085) noticed the GB3RMK beacon (50.060MHz) go auroral at 2245UTC. Bill then went on to make auroral backscatter contacts with OZ4VV and SM3NRY. The event continued to around 0300UTC on the following morning and it was fortunate that it occurred over a weekend period.

**Alan Wright GW3LDH** (I083) reported the stations of ES1CW (K029), G13PND (I064), GM7SVK (I075), PA2VST (J022) and SM6CMU (J057) all active on the 50MHz band between 0058-0238UTC on the Sunday morning. Up on the 144MHz band the DX seemed to be even better.

**David Johnson G4DHF** (I092) reported LY2WR (K024), SM4IVE, SM5BSZ and SP4MPB between 0010-0120UTC on November 23. All of these stations of course being on c.w., the mode real DXers use for making long distance contacts.

Operators located in the north of England and Scotland got the most out of this opening. For example the station of **Keith Kerr GM4YXI** (I087) was spotted on the European DX Cluster system by such DX as OK1JKT and RU1AA (KP40) over 1800km away.

Another auroral event occurred later in the day between 1200-1400UTC. Most traffic, on both bands, seemed to be between stations located in central and northern England to Scotland.

Scottish stations always have the advantage in the smaller types of events. However, in the really big auroral openings GM stations lose out as the auroral circle moves to the south of them.

Stations in central England and Wales then hold the advantage and are able to work some excellent DX up to 2000km or so away. (More on this subject as we head upwards towards the maximum of Solar Cycle-23).

## Sporadic-E

An E-mail from **Bob G7UTO** (J001) reports some of the Sp-E contacts he made recently on the 50MHz band. Most of his contacts in October were predominantly to the south of the UK, mainly into Italy and Spain.

On October 30 Bob made a brief s.s.b. contact with CN8LI (IM64) in Morocco, North Africa. So, far he's worked 38 countries and 119 locator squares with his Yaesu FT736, 50W amplifier and vertical antenna.

Your reports show that a number of Sp-E openings occurred on the 50MHz band during November. The best of these were on November 4, 16, 19, 23 and 24 enabling s.s.b. and

c.w. contacts to be made from the UK with stations around 1500km away.

Your reports also indicated that contacts were made with stations located in CT, EH, EH6, ES, F, I, IT, LX, OE, OH, OK, OZ, SM, SP, S5, YT, YO and 9A. Among the DX worked were the stations of EH6NB (JM19), IT9KSS (JM68), LX/PA3FUE (JN39), OF3QL (KP20), SQ9CXT (JO90), S58J (JN76), YO2LAM (KN05) and 9A3HZ. Certainly nothing to write home about but it makes for some interest on the band.

## Satellite News

On October 4 1957 the Soviet Union launched the first artificial satellite, Sputnik-1, into Earth orbit. To commemorate its 40th anniversary a one-third scale model of Sputnik was hand-launched from the Mir Space Station on November 3 and I'm pleased to report that it was received very well by stations throughout the UK.

The one-third scale Sputnik was built as a joint project by schools in Russia and Reunion Island, with technical assistance from AMSAT-France. The Russian students built the satellite body, while the French students made the internal transmitter.

The transmitter ran 150mW output into 500mm circularly polarised antennas and was powered solely on internal dry batteries. Reception was possible in either f.m. or s.s.b. mode and consisted of a 'bleeping' beacon on 145.820MHz.

Two working models of the Sputnik were assembled and transported to the Mir space station, but only one was used. The Sputnik model was hand launched from Mir during a space walk by Cosmonauts **Pavel Vinogradov** and **Anatoly Solovye** on November 3. Initially they turned on the transmitter and checked out reception aboard Mir with help from US Astronaut **David Wolf KC5VFP**.

One feature of the transmitter is that the frequency of the beacon tone indicated the satellite's internal temperature. The scale ran from 1361Hz at +50°C down to 541Hz at -40°C.

Observations made by the US stations W8RVH and W8ZCF showed that there was a downward drift of temperature in the two weeks following launch. Using an audio generator, frequency counter and oscilloscope they measured an internal temperature of +27°C on November 6. Two days later it measured +22° and on November 17 it had dropped to 18.5°C.

**Dennis Kearton M0BDR** (I084) reports hearing the Sputnik on November 7 and November 8 with signals peaking around 53. He was using a Kenwood TM-251E and a vertical antenna and first heard the satellite on 145.825MHz.

As the Sputnik moved away from Dennis the frequency moved

down to 145.820MHz. This effect is known as doppler shift and is always noticed on low earth orbiting (l.e.o.) satellites. Dennis mentions that although his callsign is not very old, he is 71 years young and can remember hearing the original Sputnik on 20MHz some 40 years ago!

**Ritchie Craib GM1LKD** (I087) also mentioned that he heard Sputnik-1 in 1957 and was pleased to hear the model Sputnik (now formally classified as RS17) recently on the 145MHz band. He reports receiving signals strong enough to be heard on his hand-held transceiver.

Located in north Wales **Paul Owen MW1CAN** (I073) is another newcomer to the v.h.f. bands having only been licensed since July 1997. He first heard RS17 late in the evening on November 26.

Paul uses a Yaesu FT-290R MkI and a 9-element crossed Yagi (A crossed Yagi is one that has a set of elements in both the horizontal and vertical polarisation plane). Paul noted that the satellite was weak on vertical polarisation but very strong on horizontal polarisation.

Another station to hear RS17 was **Bob G7EDC** (J002). He received the Sputnik's bleep on 145.820MHz at 2149UTC on November 24. Bob was using a Yaesu FT-290 MkI and a  $5\frac{1}{8}$  vertical antenna.

A station with a similar set-up is **Alan Philips G7EUK** (I082). He used his FT-290R in s.s.b. mode to hear RS17 on a number of passes during November.

In an early morning pass on November 18 when the satellite was 515km away Alan received it at S9. On the next pass, approximately 96 minutes later, the received signals had dropped to S7.

On the later pass RS17 was only 16° above the horizon at a distance of 1103km. Alan also heard it on November 27 peaking 43 around 2200UTC.

The beacon signal was expected to continue until mid-December but it may be possible to still hear weak signals from the satellite. I wonder when the last reception report will be?

If you did manage to hear the Sputnik you can claim a certificate by sending your reception report to **Sergei Sambourov, PO Box 73, Kaliningrad-10 City, Moscow Area, 14070, Russia**. Include a self-addressed business size envelope and one International Reply Coupon (IRC). Both envelopes should be kept 'low profile' and don't put anything on the outside of the envelope that would draw attention to it. For example, callsigns or colourful stamps.

Other l.e.o. satellites to listen for include RS-12 and RS-15. Both use an uplink in the 145MHz band and a downlink in the 29MHz band. To hear RS-12, leave your receiver tuned to the c.w. beacon on 29.408MHz or listen for users between 29.410 to

29.450MHz. To make contact you need to transmit on upper sideband (u.s.b.) or c.w. between 145.910 to 145.950MHz.

If you want to hear the RS-15 satellite then you should set your receiver to the c.w. beacon on 29.353MHz or listen for users between 29.357 to 29.397MHz. The uplink (u.s.b. or c.w.) is between 145.857MHz to 145.897.

In both cases the difference between your transmitted frequency (145MHz) and received frequency (29MHz) is 116.50MHz. So, if you transmit to RS-12 on 145.920MHz you can expect to hear your signal come back down on 29.420MHz. You need to make a few kilohertz allowance for doppler shift however.

Both RS-12 and RS-15 act like a repeater, accepting a range of frequencies on its input and re-transmitting the entire range on the output. Since the satellite is transmitting many signals at the same time it is dividing its output power amongst all of these signals.

If someone transmits a very powerful signal into the satellite it will use most of its power re-transmitting that signal and all other signals will drop in level. This is **not** the way to earn friends and it will make you very unpopular!

Operators who use too much power to access the satellite are commonly called 'alligators', all mouth and no brain! A good rule of thumb is to ensure that your downlink signal is no stronger than the satellite's beacon signal.

Antennas for l.e.o. satellites can often be very simple. A pair of crossed dipoles, ground-planes or other verticals are often used on the 145MHz uplink. Small Yagi antennas work well but generally need to be steered towards the satellite thus complicating the system somewhat. On receive a simple sloping dipole cut for 29MHz works very well.

Further information about amateur radio satellites can be obtained from the **AMSAT-UK Secretary, Ron Broadbent MBE G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ**.

## Deadlines

That's it again for another month. By the way the annual table which I ran during 1997 was a dismal failure and I don't propose running it again. However I'm always looking for feedback regarding any aspect of v.h.f., u.h.f. or microwave operation.

Please send any news, views, comments or photographs (especially) to reach me by the end of the month. 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** Alternatively you may find it easier to telephone me on **(01873) 860679**.

**END**



## HF FAR &amp; WIDE

*Leighton Smart GWOLBI reports on your h.f. activities - and what a busy bunch of contributors you've been in the last month or so!*

**W**ell, it looks as if recent forecasts of better conditions have been pretty close to the mark, with propagation conditions improving all the time on the higher h.f. bands this last month. I say this as that's where all our reporters seem to have been working this month!

The recent CQ SSB Worldwide contest even showed that there have been reasonably good conditions on 28MHz. And once again it proves the old adage 'if no one puts out a call, no one will be worked'!

One good thing is that quite a few DXpeditions from rare locations have been received well here in Europe. They've been giving us the chance to notch up a few of those rarely activated places.

On the other side of the coin however, is the appalling behaviour of some operators during the inevitable pile-ups on the h.f. bands. For example I heard TI4CF in Costa Rica on the 18MHz band recently, and what seemed to be the entire world was calling him. No problem really, as most operators patiently wait their turn, so to speak.

The annoying thing was that a very large number of European stations were continuously calling TI4CF when he was actually transmitting! They were also calling him when stations were replying to him, thereby forcing him to ask for repeated reports!

The bad behaviour could only mean that either they couldn't hear him (unlikely since he was well over S9+15 on my simple dipole) or they were being just plain ignorant and inconsiderate to other amateurs.

I listened to the 'circus' for about 20 minutes, and despite repeated pleas by TI4CF for calling stations to stand by, they continued to call over him, thereby making proper contacts impossible. I can honestly say that I've never heard such bad operating on the h.f. bands.

I wondered how many s.w.l.s and potential Radio Amateurs were listening to the chaos surrounding poor TI4CF? And how many decided there and then that amateurs were an undisciplined lot?

More importantly, how many decided that amateur radio was not for them because of the bad

behaviour? Thankfully, most of our fellow amateurs are considerate to others, and the TI4CF situation is due to a minority.

However, let's not forget that every time each of us transmit, we are heard by short wave listeners and people interested in getting a ticket and joining us on air. So let us PW readers continue to set the proper example that we always have eh? (Well said Leighton, let's show them! *Editor*).

### Falklands Activity

I've heard that **Mr C. M. Vernon G0TQJ** will be active from the Falkland Island (VP8) up until the 12th of April 1998. He will be specifically looking for UK stations on 3.5, 7, 14.290, 21.290, and 28MHz.

At the time of writing to me (November) G0TQJ did not know his call sign, but will be active as you read this. QSL via RSGB or direct to: **57 Parker Road, Wittering, Peterborough, Cambridgeshire, England PE8 6AN.**

### Your Reports

Now it's straight into your reports, and as most of our reporters have been on the higher bands this month, I'll start with 14MHz this time around. (Must be a first for 'HF Far & Wide'!).

Firstly though here's the monthly propagation report from **Don McLean G3NOF** in Yeovil. Don says 14MHz has been opening most days around 0800 on the long path to Australia and New Zealand, while in the afternoons there have been openings to Asia and the west coast of the USA. Africans were heard around 1600UTC.

Don says "the 21MHz band has been very active during the CQ SSB Contest. The long path to Australia opened for a few days around 0930 and North and South America and Asia came in during the afternoons. The 28MHz band was another active band during the contest, but has been patchy. African stations came in the morning and afternoons, while the Americas also came in well during the afternoon.

Next on the list comes **Ted Trowell G2HKU** on the Isle of Sheppey in Kent, who hooked up with 5B4AGC (Cyprus), CY0DX (Sable Island) K8CW (USA), and OX/028AE

**A QSL card from the "State of YAP" (who says Radio Amateurs talk too much?) sent to GW0SGL confirming a QSO with Micronesia.**



(Greenland), all were worked on c.w. around 1600UTC.

Ted reports s.s.b. contacts on 14MHz with CY0DX (Sable Island) (QSL via VA3EU) at 1826, HC1JQ (Ecuador) at 2300, VU2ELJ (India) at 1512, 9X0A (Rwanda) at 1628 (QSL to DL5VMM). He also worked V29NR (Antigua) at 1719, and ZS5BBO (South Africa) at 1756UTC.

While down in Skewen, West Glamorgan, **Carl Mason GW0VSW** logged all-c.w. contacts with BV7FC (Taiwan) JA3ULF (Japan), PY6AN (Brazil), and VK5GZ (Australia). All were worked between 0630 and 0930UTC.

**Richard Lewis GW0WRI** in Brynamman has been busy on the bands, sending a huge list of s.s.b. contacts. He worked 9O5HX (Zaire - now the Democratic Republic of Congo), 5H3HG (Tanzania), and 5N37BHA (Nigeria) between 1700 and 1900. Operating around 0900 gave him contacts with JA3USA (Japan), BA1CO (China), and V63KU (Micronesia).

Next comes short wave listener **Derek Blunden BRS171057** in Swindon. His gigantic log shows s.s.b. reception of CP6DA (Bolivia) at 0653, RW9JE (Asiatic Russia) at 0818, 5X1T (Uganda) at 1500. Also mentioned were N3HBX (USA) at 1505, VU1PA (India) at 1517, and VK2EKY (Australia) at 1538UTC.

### The 18 & 21MHz Bands

Over to Milton Keynes now, and the log from **Charlie Blake M0AIJ**. Charlie reports s.s.b. contacts with 3A7G (Monaco) at 1100 on 18MHz, while 21MHz brought contacts with SV2COL (Greece) at 1523, C33RI (Andorra) at 1222, CN8VB (Morocco) at 1057, 5N37T (Nigeria) at 1314, and

VK4GPS (Australia) at 1050UTC.

Still in Milton Keynes, **Sean Gilbert G4UCJ** has been busy 'QR'ing of late. His low power (2-4W) 21MHz log shows s.s.b. contacts with FM/K2PF (Martinique Island), CY0DX (Sable Island), 5B4AGC (Cyprus), and UN7BD (Kazakhstan), all between 1100 and 1300UTC. A switch to low power c.w. brought contacts with K9DP (USA), 7Z500 (Saudi Arabia), and HF0POL (South Shetland Islands) around 1500UTC.

### The 28MHz Band

In deepest Wiltshire, **Jon Wheeler G0IUE** has been busy on this 28MHz band. He worked ZS6SA (South Africa), LU6ETB (Argentina), CX8XX (Uruguay), V26B (Antigua Island) and W3LPL (USA) during one afternoon between 1200 and 1500UTC.

New reporter **Dr Peter Ewing GM0WEZ** operating from Edderton in Scotland offers a short log for his first contribution to the column, in the form of contacts with FM5DN (Martinique Island) as well as P5JR (North Korea), and PY1SW (Brazil) all on 28MHz s.s.b. (Thanks Peter...and welcome to 'HF Far & Wide').

### Signing-Off

Well, that just about wraps it up for this month, folks and it's signing-off time! Hope I managed to get you all in, although lack of space this month really means it's a real squeeze this time around!

Thanks to all reporters for your help in making the column a success, and as usual, reports and information (and photos!) by the 15th of each month to me: **Leighton Smart GWOLBI, 33 Nant Gwyn, Trelewis, Mid-Glamorgan CF46 6DB, Wales.** Tel: (01443) 411459 or (01443) 710749 (9am-6pm). FAX: (01443) 710789.

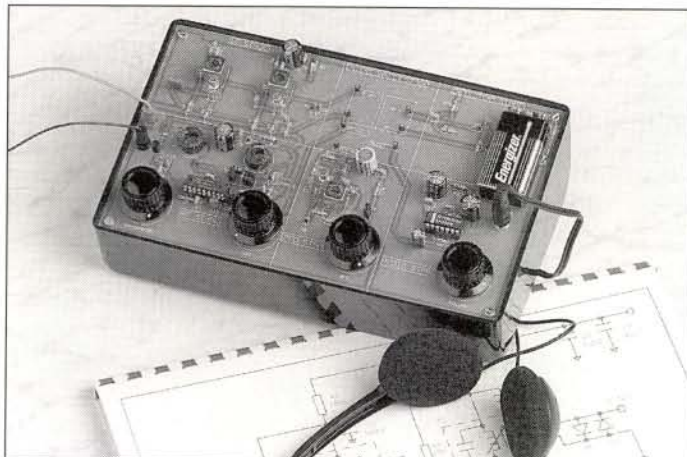
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# BROADCAST

## ROUND-UP

*Peter Shore was lucky enough to travel to Australia recently, and even found time to drop in on the new management team of Radio Australia.*

I am becoming rather disillusioned. It seems that short wave radio is on the decline. The number of sets in the shops available to listen to international radio, both in the UK and overseas, is falling.

Radio stations around the world are having their budgets cut. It's a gloomy picture, and one which was illustrated for me recently when I was lucky enough to travel to Australia.

If you walk along the Yarra River in Melbourne's city centre, past the chic boutiques and restaurants of the Southgate Arts and Shopping Centre, and cast your eyes away from the river, you might just notice a modern building with a couple of satellite dishes on the roof. Nothing unusual in that, but if you look more carefully, you see that one of the dishes has **Radio Australia's** name emblazoned on it.

The building is the home of Australia's international radio service, and until earlier this year, the country's fledgling pan-Asian television service, too. As I strolled along the river on a glorious summer's day in December, with the temperature a sizzling 38°, there was no one around me who took any notice of the fact that Radio Australia was just a stone's throw away.

Compare my Australian stroll with walking around the Aldwych in central London where Bush House is located and, whatever the weather, you'll find someone pausing to look at the building and commenting to their companion that 'this is the home of the **BBC World Service**'.

### Lack Of Interest

Given the lack of interest in Radio Australia among visitors to and apparently residents of Melbourne, maybe we shouldn't be too surprised that the station has effectively been cut in half in the past 12 months. I called in and met with some of the station's new management team which has had to preside over a painful cut in staff from more than 150 people to a little over 70 in the last year, a transition that's not yet complete.

Combine that staff reduction with the closure of the powerful

Darwin transmitting station in the north of the country, and Radio Australia's ability to reach its key target audiences in the Pacific and South East Asia is truly diminished. Instead, the station has to make do with low powered transmitters in the southern half of the continent-sized country.

At Shepparton in Victoria (not far from Melbourne) there are 100kW senders while in Brandon in Queensland there is a truly old-fashioned 10kW transmitter. As a result, signal strength is severely reduced.

### Fate Of Darwin

The fate of the Darwin station is currently undecided. It is expensive to run because its geographic remoteness means that it has to generate its own fuel from diesel generators, with the diesel brought in by road. It may be that the transmitting station is to be leased from the Australian authorities by another organisation.

There have been several expressions of interest and it may be that a non-Australian company takes over the operation, hiring time on the high powered transmitters to broadcasters willing to pay handsomely to put good signals into Asia. One organisation rumoured to be looking at transmitting from Darwin is the US Congress-funded **Radio Free Asia**, which is the modern day equivalent of the Cold War versions of Radios Free Europe and Liberty.

However, it is likely that China would take a very dim view if short wave transmitters on Australian territory were used to be beam, what it views as contentious propaganda, to its peoples. The matter is unlikely to be resolved for some months, but Radio Australia's management has some hopes that it will regain use of Darwin at some point before too long.

### Current Schedule

Meanwhile, the current schedule, hot from the hands of Radio Australia's transmission manager is: English: 0000-0400 on 17.75; 0000-0800 on 13.605; 0100-0400 on

15.415; 0100-0800 on 15.24; 0600-0900 on 15.415, 17.75; 0800-0900 on 5.995 (a real DX catch as it's a 10kW transmitter!), 9.71 (100kW); 0830-1800 on 6.08; 0900-1100 on 11.88; 1330-1700 on 11.66 (likely candidate for reception in Europe); 1430-2200 on 9.435; 1800-2000 on 6.08, 7.24; 1800-2130 on 9.415; 2100-2200 on 7.24 (100kW), 9.66 (10kW); 2130-2300 on 11.695 (also a European bet); 2100-0800 on 9.66 (10kW) and 2130-0100 on 13.755MHz.

Despite all the difficulties, Radio Australia has in reaching outside the country, tuning around on my Sony SW100 receiver I kept on discovering the station with remarkable clarity. This brings home the fact that Australia is huge, so large in fact that it is hard to visualise its exact size in relation to other parts of the world.

And Australia is such a long way from so much of the world (spending 24 hours on a plane getting there from England confirms this in no uncertain terms!), that it's surprising that any short wave signals manage to reach there from other parts of the world.

### Broadcast Bands

I listened across the broadcast bands at different times of day during my trip (which was limited to Melbourne and Sydney which are both in the far east of the country), and I have to say that it was all fairly dead. Trying to find the BBC in English, despite having the current copy of *On Air* magazine with all the right frequencies, was all but impossible for much of the peak morning and evening periods.

Yet both **Deutsche Welle** (DW) and the **Voice of Russia** put in very good signals. I assume that DW's signal originated at the Trincomalee relay in Sri Lanka, while the Voice of Russia was probably broadcast from a station in the Russian Far East, such as Vladivostok. But trying to find anything else was really quite difficult.

The absence of broadcasting that's audible leads me to confirm my worst suspicion that sooner rather than later we'll be without a whole variety of direct short wave radio broadcasting. Look at the

number of international radio stations which now have Internet audio services... it's already large and is growing each month.

You can hear the news from BBC World Service each hour at [www.bbc.co.uk/worldservice](http://www.bbc.co.uk/worldservice) so if you're sitting at home in front of the computer or are hooked up at work, you can listen to the service without having to switch on a radio.

### Via Satellite

Then, of course, a huge number of stations are available via satellite, although just who is listening is sometimes a bit baffling. **Swiss Radio International** and **Radio France Internationale** both have extensive satellite radio feeds, including one to Asia via the European Bouquet, the only free-to-air digital TV and radio service (made up entirely of European public service broadcasting stations) beamed to the region.

But ask any of the manufacturers of the digital satellite decoders how many black boxes they've sold, and you'll find out that the numbers are in the low hundreds, as opposed to the tens of thousands which would make it an economically successful venture.

Aha, but are these stations reaching f.m. and a.m. broadcasters on the ground who want to relay them? No, is the straightforward answer. Only Deutsche Welle, which is giving away the satellite decoders and a dish to stations, has had any success in this area.

So, maybe that means that satellite isn't the answer. And not everyone has access to a computer with high speed modem, so the Internet isn't the solution, either. That only leaves short wave broadcasting.

All we need is for governments to realise the importance of the services their public broadcasters offer overseas, and for radio manufacturers to get back into production with a range of exciting and worthwhile new short wave sets which people will want to buy.

Until next month, good listening!

**END**



# FOCAL POINT

*Graham Hankins G8EMX reports  
on all the latest news from the  
ATV scene.*

In December I reported the news of the formation of the **Beacons Repeater Group (BRG)** to provide 10 and 1.3GHz Amateur Television repeaters to serve the West Midlands. Since then substantial progress has been made towards the 10GHz (3cm) unit.

Most of the hardware is being home-constructed, or modified by BRG members. Credits so far go to **Alan G7UMW** who has built the video modulator board, **Chris G7IPT** for the audio filter and sound sub-carrier p.c.b., while the Group's chairman **Alan Kendall G6WJJ** has been working on the transmitter and receiver.

The BRG repeater will be using slot antennas to provide the omnidirectional, horizontally-polarised radiation or sensitivity pattern normally required. The two antennas have been constructed by BRG members but required careful checking to determine how close to truly circular their polar diagram was going to be.

Alan Kendall describes how the antennas were tested: "The slotted waveguides were placed 20 metres away from the detector in an 'open field' site - my back garden! The deviation from circularity was found to be no worse than 3dB so it was agreed that this performance was very acceptable. The gain was measured at 10dB relative to a dipole, which again was satisfactory for an omnidirectional antenna".

The 10GHz transmitter, receiver and antenna assemblies will be housed in some plastic domestic drainpipe. This piping can be obtained in white, grey or black which on a house is usually of no consequence provided it looks pleasing to the resident and takes the water away.

However, ATV enthusiasts have discovered that the colouring pigments used in the plastic piping are not inert to microwave r.f.! Black piping has been guilty of distorting repeater service areas, so only white or grey drainpipe is considered suitable for protecting ATV antennas!

Alan Kendall and I have visited the site where the 1.3GHz repeater will be located. A screened housing for the r.f. and logic modules is

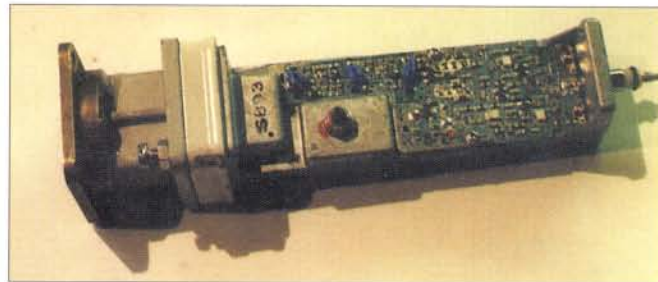
already available, because the 24cm ATV unit will co-exist with a 70cm voice repeater and other radio services.

Dual Alford-Slot antennas are being used for the 1.3GHz unit, so the first job was to mount them high enough up on the surrounding buildings. Lengths of very low-loss feeder, a transmitter and receiver plus a spare BBC Model B computer await installation, so watch for updates on both projects, here in 'Focal Point'.

## Devon Coverage

Not every ATV repeater needs all-round coverage. The **West Devon ATV Repeater Group** runs 24cm unit **GB3WV**, which opened in April 1997 using three trough-reflector antennas. These were intended to point at Torbay, Plymouth and Bude - unfortunately, the Bude antenna had been aligned roughly at Exeter.

The weather in the Dartmoor area and the planning required for antenna work delayed corrective action, but the 'rogue' antenna was



eventually cranked towards Bude. This done, a lightning strike then put an end to the output p.a. stage! A replacement was soon installed to bring **GB3WV** back to 18W e.r.p.

The West Devon ATV Group has just produced the first edition of its newsletter *WDATV News*, which contains an update on 'WV' contributed by chairman **Tony G8CEQ**. Tony comments: "GB3WV has actually set a record for the speed of its conception to operation. 'Teething' problems are inevitable, but we can all look forward to a high-quality service. Please use it!"

The Devon group was invited to the **Launceston Computer Club** to give a talk on the use of computers within Amateur Radio and ATV. Tony relates what took place: "An ATV station was set-up and the whole evening was sent through **GB3WV**. Various other stations joined in to demonstrate how their computers were applied to ATV, producing weather pictures, graphics and suchlike. The whole event was thoroughly enjoyed by everyone present and on the air".

## Updates

Now for some updates from other ATV Repeater Groups. Firstly **Home Counties** have added a new 'tone' to the 24cm repeater **GB3HV**. This will alert any stations monitoring 'HV' when incoming video is detected from the sync. pulses. The **GB3PV** repeater is part of the **Cambridge Repeater Group** and is in use nearly every day, especially during the Thursday activity evenings. Group chairman **Ian Waters G3KKD** highlights some of the changes being planned for 'PV'. Ian says: "We will be

**A microwave block being converted by Alan Kendall G6WJJ for use in the West Midlands 10GHz ATV repeater transmitter (see text).**

adding another sideband filter to the transmitter to comply with the latest Repeater Specification, more video processing too - chroma boosting and black-level clamping for the received video".

Ian also has plans for a 70cm ATV facility, adding: "We hope to also use part of the 430-440MHz band for monochrome direct station-to-station links".

The **Solent Club for Amateur Radio and Television (SCART)** near Southampton is trying to find a better site for the ATV repeater **GB3AT**, but without much success so far. **Mike Sanders G8LES** explains: "At the moment coverage is poor in certain directions, but trials at another location failed from physical problems - the antenna and mountings produced excessive wind-loading stress on the mast". So, the hunt continues.

One of the 10GHz ATV repeaters currently off-air for re-tuning is **GB3TG** at Milton Keynes.

Meanwhile, keeper **Dave McQue G4NJU** is busy with modifications.

Dave says: "We are rebuilding the logic so that a PC can be used for control instead of the 'Spectrum'. Hopefully, **GB3TG** will be back in service very soon."

So, cheerio and P5 for now. More progress reports, ATV news and newsletters next time - when I may even have an internet address! Please keep posting all that news to me, Graham Hankins G8EMX at **11 Cottesbrook Road, Acocks Green, Birmingham B27 6LE**.

Each year, the **British Amateur TV Club (BATC)** writes to each repeater Group directly or via the **RSGB**, asking each Group to renew its affiliation link with the national ATV Club. The latest information is that there are 18, 1.3GHz and four 10GHz f.m. ATV repeaters around the UK, plus one 1.3GHz unit (**GB3UT**, Bath) which uses a.m.

## Licensed 1.3GHz f.m. ATV repeater list:

<b>GB3TM</b>	Amlwch (North Wales)
<b>GB3VR</b>	Brighton
<b>GB3ZZ</b>	Bristol
<b>GB3PV</b>	Cambridge
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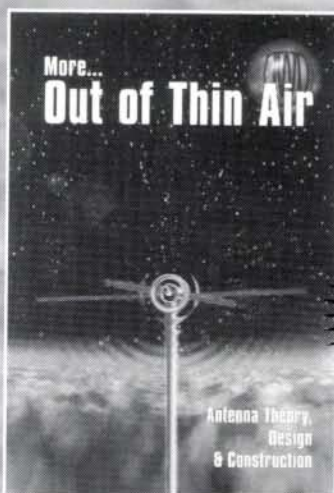
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Chris Lorek reviews the new Yupiteru MVT-3300 Hand-Held Scanner.

Barlow Wadley - The Non-Phase Locked Loop by John Wilson G3PCY.

Code3 Gold Review by Kevin Nice G7TZC.

Wage War On Whistles - Part 2 - Peter Rycraft concludes with a description of how to build and use the filter unit.

Indoor Ionosphere - Part 2 - by the late Fred Judd G2BCX.

# short wave magazine

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