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April 1999 £2.50



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20 Memories
 5 Watts (13.8V)
 Digital Display
 Keypad Entry
 1750Hz Tonne
 130 - 174MHz Rx
 AA Cell Operation
 Programmable Features

2m Handheld
£99.95

ICOM

IC-706
 1.8 - 146MHz

Includes DSP & CTCSS Encode



£799

Yes, it's your final chance to purchase this great transceiver. Offering 100 watts on all bands from 1.8MHz to 54MHz plus 20 Watts on 144MHz.

Weather Station

- * Radio Controlled Clock
- * Date, Day Month
- * Cable Free Remote Sensor
- * Inside / Outside temperature
- * Air Pressure
- * Weather Forecast



£69.95

AT-600 Dual Band Handy

£199

Dual Band Performance
 2m & 70cms Handheld



Includes

Wideband Receive
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 5W from 12V
 Full Duplex
 Alphanumeric Display
 200 Memories
 CTCSS & 1750Hz Tonne
 Ni-cads & Charger

Ni-cads & Charger

AR-146 2M 50W Mobile

Includes Full CTCSS
 Complete with Microphone and mobile mount



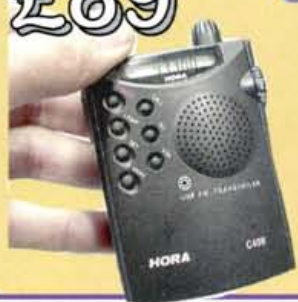
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Over 1000pcs Sold
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Amazing Value
 20 Memories, CTCSS
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YAESU FT-847 HF - VHF UHF



Phone for "Near Trade" Price

Includes 70MHz Transceiver

Yaesu's great new base station design lets you operate on all bands from 160m to 70cms. One small package - but what a package! Give us a call for the FREE leaflet.

YAESU FT-920 1.8 - 54MHz



Phone for "Near Trade" Price

* 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

NEW YAESU FT-100 1.8 - 430MHz
All modes - All Bands - One Box



It's been a long time coming - first shown at Dayton 9 months ago - we really are promised it for March. As usual we will have the first stocks and the best prices.

ICOM IC-746 1.8 - 144MHz



Phone for "Near Trade" Price

The IC-746 has proved to be one of the best value base station transceivers around. All bands from 1.8 - 144MHz and a straight 100W makes this great value. Give us a call for the latest brochure and the best price around!

YAESU FT-840 1.8 - 30MHz



Phone for "Near Trade" Price

If you are looking for a good, reliable 100W transceiver, then this is just the job. Supplied with FREE Base Mic.

YAESU FT-8100 Dual Bander Mobile



Phone for "Near Trade" Price

Yaesu's top selling dual band mobile transceiver, very thing you could wish for including wideband receiver

ICOM New IC-2100 2M Mobile



Phone for "Near Trade" Price

The IC-2100 Mobile transceiver from ICOM features switched filtering, 55 Watts with 113 memories. And all this at a very competitive price. In stock NOW

email: sales@wspc.demon.co.uk

IC-706 Mk IIG



UK's Lowest Price!

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In Stock Now!

Great Part Exchange Deals - Phone

1.8 - 440MHz 100W HF + 6m 50W 2m 20W 70cms

FT-1000MPDC (AC £2199) £1899



Phone for "Near Trade" Price

* 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

KENWOOD SALE



Model	Normal	Sale
TS-870S	£199	£1495
TS-570	£999	£849
TS-790	£1959	£1295

Unbeatable Prices



VHF Transceivers

TM-255E	£1059	£449
TM-742	£879	£549
TM-V7E	£569	£479
TMG-707	£349	£295
THG-71E	£279	£235

SGC-2020 QRP HF Transceiver



0 - 20 Watts SSB and CW with CW break-in. Runs from 12V DC and has very nice SCAF audio filtering. Very low current requirements.

YAESU VX-1R Dual Bander
2m / 70cms



500mW Output
290 Memories
Alphanumeric display
Full CTCSS
Dual Watch
Smart Search

A smart little handheld that has been one of our best sellers for many months. Ideal for the brief case - give us a call for a really super deal!

IC-706 MKIIG looks like being another great rig from the Icom stable. To have a complete HF and VHF/UHF station in one box that fits in the car or in the draw of the shack desk is amazing - but Icom have done it. What is more, the track record of the two earlier versions are such that you should have no worries about reliability. Give us a call and we'll let you have the latest information.

KENWOOD £319

New TH-D7E
Dual bander VHF / UHF
Built-in TNC Data Display

Now enjoy the benefit of a built-in TNC and APRS (Automatic GPS Packet Reporting System). The handheld that takes you into the Year 2000!

Features: * 144/430MHz * Wide / Narrow Deviation * 1200/9600bps TNC * DX Cluster Monitor * Dual Rx Data/Voice on VHF * 12 digit 3-line display plus scroll function * 200 Memories * CTCSS plus 1750Hz tone * AIP (VHF) * APRS * Built-in 13.8V DC charger * 6W on 13.8V DC * AC charger & Ni-cad pack



YAESU
Phone for "Near Trade" Price



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

This is a very solid rig that is proving one of the most popular dual band handhelds

ICOM IC-T8E Triple Band Handy
All in one small package.

6m
2m
70cms
* 5W output (13V)
* 25 / 12.5kHz ready
* Wideband Rx
* Nickel Hydride batt
* Wide FM broadcast
* AM for airband
* Rapid scanning
* Alphanumeric



ICOM Dual Bander
New IC-Q7E

2m & 70cms FM & AM Rx
In Stock NOW
This pocket handheld provides 300mW of FM on 2m & 70cms plus wideband receive FM AM WFM from 30MHz - 1300MHz - no gaps. Runs from 2 x AA cells

ICOM £369 IC-207H 2m/70cm Mobile



* 2m & 70cm
* 50W / 30W
* Detachable head

WATSON



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Kit comprises: AC charger suitable for either NiMH or Ni-Cad cells size AA, AAA or PP-3 plus a set of 4 x AA Ni-MH cells **£18.95**

Additional Cells 4 x AA NiMH **£9.95**
4 x AAA NiMH **£9.95**

Illustration only - Kit comprises 4 x AA Ni-MH cells

WEP-501 Adjustable Boom Mic

NEW



This brand new design is fully adjustable and unlike some copies, does not break after five minutes! Lightweight earpiece and flexible and rotatable boom. Come complete with PTT box

WEP-501 Yaesu etc **£24.95**
WEP-501 Kenwood **£24.95**
WEP-501 Motorola **£24.95**

Hands Free Mobile With Handhelds



This new boom microphone with single earphone is ideal for use with handhelds whilst mobile. Supplied with a locking PTT switch, you can talk hands-free. There are models for Yaesu and Kenwood.

LX-6 Yaesu etc **£24.95**
LX-8K Kenwood **£24.95**



W-50 Base Antenna



W-3HM Hatch Mount



XO-17 Throat Mic

Base Antennas

Dual Band	2m/70cm	
WVA-100	2/4.5dB 1.09m long	£29.95
W-30	3/6dB 1.15m long	£39.95
W-50	4.5/7.2dB 1.8m long	£49.95
W-300	6.5/9dB 3.1m long	£59.95
Triple bander		
W-2000	2.15/6.2/8.4dB 2.5m long	£69.95

Mobile Antennas

Single Band 2 metres		
W-285	5/8th foldover base	£14.95
Dual Band 2m/70cms		
W-77LS	Low profile 0.39m long	£14.95
W-770HB	3/5.5dB 1.1m long	£24.95
W-7900	5/7.6dB 1.5m long	£32.95
Triple band 6m 2m 70cm		
W-627	2.15/4.8/7.2dB 1.62m	£34.95

Accessories

W-3HM	Hatch / Boot mount	£14.95
W-CK	5m low loss cable kit	£18.95
W-ECH	5m standard cable kit	£12.95
WAM-2	BNC window clip mount	£12.95
WMM7	Magnetic mount	£10.95

XO-17 Throat Mic.

No, not the old fashioned type with horrible audio - this latest version offers amazing quality. Ideal for use in high noise levels or where discretion is of importance. Comes with PTT box for attachment to clothing and a lightweight earpiece. Versions available for Yaesu, Standard, Icom, Kenwood and Motorola.

XO-17	For Yaesu, Icom, Standard	£39.95
XO-17K	For Kenwood	£39.95
XO-17M	For Motorola	£39.95

Speaker Mics.

These are a great alternative to the official factory models and far cheaper - yet with super performance. There are models for most of the current handhelds - if in doubt phone for confirmation when ordering.

QSO-110	For Yaesu, Icom etc	£16.95
QSO-110K	For Kenwood	£16.95
WMN-227	For Motorola	£19.95

Equipment Cabinets



Great for construction projects, these boxes have internal side cheeks for mounting PC boards. The cabinets have louvred vents and are finished in a cream coloured plastic paint. Front and rear panels are plain alloy ready for drilling and finishing.

EM-01	160w x 120d x 75h mm	£10.95
EM-02	210w x 150d x 85h mm	£12.95
EM-03	200w x 170d x 110h mm	£15.95

Connector Kit

£49.95



Just the thing to have in any ham radio station. Now you can connect virtually anything to anything! This 32 piece set covers "N", BNC, SMA, TNC, UHF & Mini UHF. Supplied in smart zip-up case
Ref CON-K **£49.85**

WM-308 Base Microphone



Ideal for all base station applications, this high quality unit has electronic PTT / latching, plus, pre-amp and SSB / FM response switch. Matches impedances from 500 to 50k Ohms. Supplied with open ended lead and 8-pin plug plus wiring diagram.

WM-308	As above	£59.95
WM-308W	Wired for your rig	£69.95

HF Headset at a Great Price



W-184PTTW

This headset has been designed by Watson to match the modern HF transceiver. Dual earphone and an adjustable boom microphone mount onto a lightweight assembly. Supplied with mono audio plug and open ended mic lead. We can also supply PTT box if required

W-184	As described above	£39.95
W-184W	Wired for your rig	£49.95
W-184PTT	W-184 + PTT box	£49.95
W-184PTTW	W-184PTT wired for your radio.	£59.95

Antenna Analyser



This professional quality unit covers 1.8 - 170MHz. The BR-200 measures VSWR and impedance from 12.5 - 300 Ohms. Dual gate times and excellent slow motion dial mean accurate tuning. Requires 6 x AA or 12V DC. Made in Japan.
BR-200 1.8 - 170MHz **£329**
BR-400 100 - 500MHz **£399**

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W-3A	13.8V fixed 3 Amp continuous, 5 Amps peak.	£22.95
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W-10AM	0 - 15V variable 10 Amp continuous, 12 Amp peak	£59.95
W-25AM	0 - 15C variable 25 Amp continuous, 30 Amp peak	£89.95
W-30AM	0 - 15V variable 30 Amp continuous, 35 Amp peak	£119.95
WPS-312	Inpu 12V DC Output 1.5 - 9V 800mA Cigar plug	£9.95

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Great Value

A really accurate range of VSWR Meters - 5 / 20 / 200W



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W-620	1.8 - 530MHz	£89.95

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22 THE ALINCO DR-M06TH 50MHz MOBILE TRANSCEIVER

Richard Newton G0RSN takes a long, hard look at the Alinco DR-M06TH 50MHz Mobile Transceiver and pits it against other rigs in order to give you a fair opinion of this transceiver.



28 RADIO BASICS

Rob Mannion G3XFD explains how to get the best results from your receiver - whether it's a commercial model or 'home-brewed' along with some ideas for 'add on projects' to improve reception and ease-of-operation.



30 REMINISCENCES OF THE MACROELECTRONICS ERA

Brian Dance recalls his childhood memories, mainly of radio, at a time when electronics was easily carried out without a microscope and there were few applications other than radio!

31 LISLE STREET - RADIO'S 'MEMORY LANE'

Peter Hyams GW4OZU has very special memories of Lisle Street and for good reason too - his father ran one of the famous radio shops! So, why not take a stroll down memory lane with him?

34 SPEAKERS AND HEADPHONES

Gordon King G4VFF, author of our new regular series 'Looking At ...' and well-known technical journalist, describes the various principles which any Radio Amateur should know about speakers and headphones in order to "optimise on audio quality".



38 A PRACTICAL BEAM - FROM BITS!

Derek Holmes GW3JSV describes how he recycled a very useful beam antenna for the 18 and 24MHz WARC bands using bits from his 'junk-box'.

40 WIND ... DOES IT AFFECT FREQUENCY?

Trevor Newstead G0LQX explains why he thinks that the wind may affect frequency. A controversial idea? Read on and judge for yourself!

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44 VALVE & VINTAGE

This month it's **Charles Miller's** turn to look after the PW vintage 'wireless shop'. He turns his satirical gaze to look at some "heroic failures" from the world of thermionic devices!



46 THE MFJ-945E MOBILE ANTENNA TUNER

Rob Mannion G3XFD describes his continuing success and enjoyment working 'portable' from his car using a variety of antennas and what seems to be a very useful antenna tuning unit from MFJ in the USA.



48 CARRYING ON THE PRACTICAL WAY

Join **Rev. George Dobbs G3RJY** this month as he provides a blow-by-blow account of building a double balanced mixer

50 ANTENNA WORKSHOP

Dick Pascoe G0BPS describes how you can make a $\lambda/4$ vertical for the 1.8MHz band - it's easier than you think!

57 ELECTRONICS-IN-ACTION

In this month's Electronic-in-Action, **Tex Swann G1TEX** discusses, amongst other things, a small amplifier from **Lake Electronics** and he reviews the **UpTek LP-310 digital multi-meter** (d.m.m.) from **Vann Draper Electronics**.



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62 RadioScene

Nine pages of band reports from all your favourite authors.

GOOD ADVICE
GOOD PRICES
GOOD PRICES
GOOD ADVICE



a Fair Square

SMC
Special
Prize

Last month we told you that we would offer a special prize to the person who spent the most during January.

We are pleased to announce the winner was Bob Carpenter G4BAH
Have a good holiday Bob

£1000
Holiday
Accommodation
Florida

SMC INTRODUCE A NEW RANGE OF ANTENNAS

We have found some extremely well made VHF Yagis made from Dural Aluminium. These antennas are all individually tested to 1kW. The gamma matching ensures a very good VSWR and the square section heavy duty aluminium ensures that they will last.

2m	5 ele	boom length 63ins	9.0dbd	£36.95
2m	8 ele	boom length 125ins	11.0dbd	£46.95
2m	11 ele	boom length 186ins	12.7dbd	£65.95
6m	3 ele	boom length 72ins	7.0dbd	£49.95
6m	5 ele	boom length 142ins	9.0dbd	£69.95

We also have a new range of vertical antennas for 2m / 70cms and 6m / 2m / 70cms

X50N	144/430	4.5/7.2dBi	1.7m height	£46.95	£35.00
X200N	144/430	6.0/8.0dBi	2.5m height	£75.95	£45.00
V2000	50/144/430	2.15/6.2/8.4dBi	2.5m height	£64.95	£58.00

New Mobile aerials? - of course

SG7000	144/430	2.15/3.8dB 100W	£14.95
SG7200	144/430	3.20/5.7dB 150W	£17.95
SG7900	144/430	5.0/7.6.0dB 150W	£28.95

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SERIOUS POWER FOR SERIOUS RADIO AMATEURS

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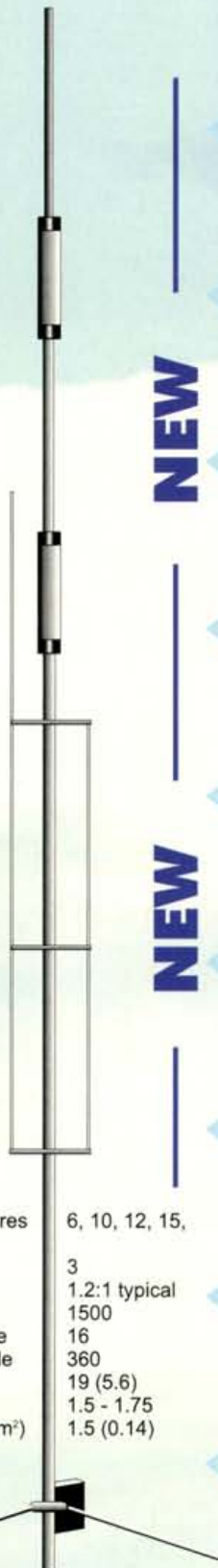
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South Midlands C

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Horizontal Angle	360
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deal from SMC

ICOM



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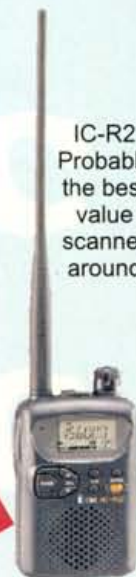
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with built in TNC

and

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Standard Half (Length 52")	£16 ⁰⁰

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SO239 Mag Mount 7"	£14 ⁹⁵
3/8 Tri-Mag 3x5"	£39 ⁹⁵

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18" T & K Bracket (complete with U Bolts)	£12 ⁹⁵
24" T & K Bracket (complete with U Bolts)	£14 ⁹⁵
1 1/4" x 5" Heavy Duty Ali Swagged Poles (set of 4)	£19 ⁹⁵

All Prices Plus £6.00 P&P, per order.

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SQBM100* Dual-Bander £39 ⁹⁵
(2 mts 3dBd) (70cms 6dBd) (Length 39")
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(2 mts 3.5dBd) (70cms 6.2dBd) (Length 62")
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(2 mts 4.5dBd) (70cms 7.5dBd) (Length 62")
SQBM200* Dual-Bander £49 ⁹⁵
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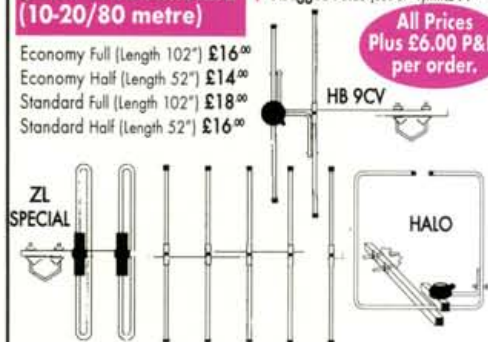
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The 'Spotlight' Is On Again

It's time to turn the 'Club Spotlight' on again as we invite you to enter your club magazines into the **1999 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 which category of club you would like to enter your magazines into.

For example, the Benelux QRP Club winner of the 1998 national award - can only enter as a 'national' club, whereas the Crowborough & District Amateur Radio Society - 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!), **Tex Swann G1TEX** (PW Technical Projects Sub Editor), **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 **Thursday 1st July 1999**. This is because the presentations are to be made at the Leicester Show in September (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 **Jo Williams, 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





Ever since the untimely death of His Royal Highness King Hussein of Jordan, I have been left wondering why it takes the passing of such an esteemed and respected person involved in our hobby - to provide the media with a thin and temporary veneer of acceptance for what is usually considered by them to be a pastime undertaken by 'eccentrics'.

Although 'Keylines' is not the place in *PW* for me to present my appreciation, which will be somewhat inadequate bearing in mind the achievements of the late King's life, I feel I must take this opportunity to comment on the variety of articles and media 'snippets' that have appeared since his death. (A full personal appreciation of JYI appears as the lead on the News pages).

Public Face

Although brought up to think of myself as being 'British' rather than English, nowadays it's important to be seen to be 'politically correct'. So I don't presume to be writing on behalf of the Scottish, Welsh and Irish cultures when I say that 'here' (in the 'English' part of the Islands) Amateur Radio continues to have a rather odd public face.

However, having acknowledged the fact that the other countries sharing the largest island of 'our group' have separate identities - I know from experience that our hobby is seen in the same way throughout the 'British Isles' - and it's one of the very few things **I wish we didn't have to share!**

I have mentioned the 'public face' topic many times and to justify my comments this time, it seems a good idea to mention an interesting and generally well researched article from *The Guardian* newspaper which appeared during the week following JYI's funeral. Other articles appeared in the 'quality' and 'tabloid' press - but that from *The Guardian* made particularly interesting reading.

Within the article, the author

made it clear that when researching the details - the 'trawl' on personalities was thorough. All the famous names many of us know are Radio Amateurs were there - plus one that I didn't know (the widow of the late Elvis Presley!) being mentioned.

The list was comprehensive in detailing famous living Radio Amateurs, together with those that have passed on.

Unfortunately though, in common with so many media mentions of the hobby it was obvious that the author had no real understanding of what we do and could not distinguish the Amateur Radio telecommunications hobby from that of broadcasting itself because the word 'broadcast' was firmly linked to our activities.

Personally, I think our hobby is unlikely ever to be properly understood by the media in general. After all - give the average journalist anything more complicated than the 13A mains plug and they're immediately lost aren't they? And from the aspect of an uninformed listener/viewer or reader - **how often must we ourselves** be misled by uninformed media sources on subjects new to us?

As an avid reader myself, particularly on scientific, medical and technical matters I rely on informed journalists and writers. On the many occasions where I know nothing or little about a particular specialist subject - it's highly likely that I'm being misled too.

As I write this there's much publicity about genetically modified food and, even though I've just finished a five year external degree course on genetics (an up-date was really needed if my work as a medical and scientific writer and journalist was to be fully informed) ... I think I'll have to be treating all the media information on the subject very carefully indeed!

However, and despite my pessimism, there's still hope for good specialist subject presentation within the media (including Amateur Radio), in particular via the BBC's Radio 4 service. I can say this even though

keen supporters of Radio 4's much lamented 'Medicine Now' and 'Science Now' still regret their passing - the BBC recently transmitted a series of 15 minute programmes on what is now seen to be a precursor of the 'Internet' - the old telegraphy system which in its day revolutionised communications and the spread of information.

So, in rounding off on this topic, I can honestly say that I think that Radio Amateurs were, and still are, pioneers in communications despite the fact that the media in general looks on us as being 'old fashioned'. Yes there are old fashioned aspects of our hobby, but there's also true 'state of the art' aspects too. There can't be many activities available to such a widespread section of the community (us!) with such a variety of specialities can there?

The Internet is nothing new in reality - the only difference is that it's available to all (at a price!) via the telephone whereas we have our own various communication modes. There's much more to science and learning than just sitting in front of a keyboard as we know!

I'm continually amazed at the number of people entering our hobby 'backwards'. They've enjoyed the 'Internet' and computers and then discover they want to learn just what is behind those specialised communications and then join our hobby. We must welcome them with open arms. So, we've just got to keep reminding everyone that we're still here, intend to remain and to take our ever expanding subject into its second century.

Irish Holiday

I need a holiday this year and I'm first heading for Tipperary (it's not so far you know!) to visit friends at the **Tipperary Club**. I'll be in EI and GI from **Friday April 23rd to Saturday 1st of May**.

From Tipperary I'll be travelling up to visit **John EI9GB** and other friends in Donegal (and also visiting sites of the County Donegal narrow gauge railways of course). I hope to work as many friends on the air as possible using **EI/G3XFD** and **GI3XFD** on 3.5 and 7MHz - so I'll be pleased to work you on the bands too!

The holiday rounds off (hopefully) with another trip to the hidden jewel of Ireland - the Transport Museum, at the Ulster Folk Museum at

Cultra near Bangor in County Down. I was introduced to this wonderful place (it reflects transport from all over Ireland) by **Terry Barnes GI3USS** and his son several years ago. So, I'm looking forward to another visit during the holiday. See you there perhaps?

Silent Bark

My work often brings the sad task of writing obituaries for Amateur Radio friends, under the title 'Silent Key' but this time it's not a key that's silent - it's the friendly bark from my Labrador **Mandy** who died on Tuesday 9th February.

Many people met Mandy as she accompanied me to clubs and shows throughout the UK and Ireland. Indeed, many clubs provided biscuits and a welcome



for her. However, although at 14 and a half years old she'd had a good long life, it was a sad time for myself and my family when she died, very suddenly and quickly in my arms before breakfast on the 9th of February.

Mandy was a much loved friend and companion and I thought it best to mention her passing because readers expect to see her with me. In life we were rarely apart for long, but even her death can't remove the happy memories of our love and friendship. It's good to have friends, whether they have two or four legs, isn't it?

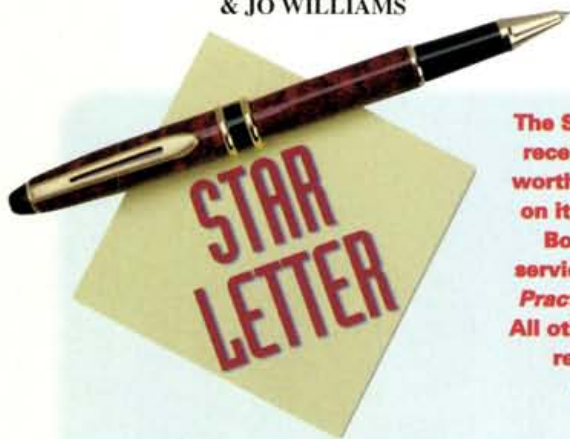
Rob G3XFD



WATCH OUT IRELAND - ROB'S COMING OVER FOR HIS HOLIDAY AT THE END OF APRIL!



COMPILED BY ROB MANNION
& JO WILLIAMS



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.

Battle Batteries

Dear Sir

The article in the January issue of *PW* by Ben Nock G4BXD on the 'Wireless Set No. 46' brought back some memories. Since I was working in 1944 on the production and testing of batteries for these sets. They were, by the way, type 162/3, not 163/3 as mentioned and I believe they were also used for tank transceivers. They were of very high quality designed to perform satisfactorily in a wide range of environments - down to -40° (which is the same in Centigrade and Fahrenheit) for Arctic warfare, 40°C and 98% relative humidity for jungles and up to 50°C for tanks, closed up for desert battle.

The care taken over the sealing of both the cells and the outer case was considerable. The 108 penlight cells, then known as 'L' cells, now 'AA', were protected against corrosion and perforation of the zinc cans by dipping in a styrene/benzene solution plasticised with tri-cresyl phosphate - 'TCP' (not to be confused with the disinfectant) and coloured with a red dye since the solution was colourless and detection of a missed cell would otherwise not have been easy.

After assembly and connection, using only resin cored solder, (the use of corrosive flux as in civilian 120V h.t. batteries was absolutely taboo) and housed in a normal waxed card egg-crate container, this section was sprayed with paraffin wax and formed the lower layer of the unit.

The upper 3V l.t. assembly consisted of two series connected groups of four paralleled 'cycle lamp'. 'K' cells, now apparently extinct. These cells were not styrene dipped since their zinc cases were much more substantial.

The shallow waxed card tray containing the l.t. section fitted directly over the h.t. section the cells being arranged to leave an empty corner for the five-pin socket. This was connected, so far as I can remember, red +150V, black -h.t./+g.b., yellow -12V, green +3V and blue -3V.

At first these were rubber covered 14/0076 flex but this was superseded by *pvc* insulation; this was late in 1944 and was my first introduction to this new material. After soldering the socket tag connections, black rubber sleeves were pushed back along the lead to insulate the tags, which were quite close together since the five-pin contacts were spaced almost equally on a 5/8in pitch circle. These sleeves were fitted before the solder and resin flux had fully cooled so that they were held securely in position.

The whole battery was about brick sized and the lid, which came right down to the bottom of the box, was sealed with a hot and sticky solution of resin dissolved in engine oil. This may sound a bit odd, but was extremely effective sealing and waterproofing, easily withstanding prolonged total water immersion tests. The socket was sealed with adhesive tape which was cut open when the battery was required for use. I have no idea what these batteries cost, but they were made on a £500 000 contract ... and in 1944, that was a lot of money.

Jack Davidson

Fife

Editor's comment: Fascinating memories Jack and I wonder how many of your batteries are still in store waiting to be discovered! Any more of the same sort of memories readers?

Kenwood Modification

Dear Sir

I am sure that those of your readers who purchased Kenwood TS-570s and experienced a very short lithium battery life will be pleased to know that there is a Kenwood modification which should ensure the next battery life lasts the normal five years.

I am also told by Lowe Electronics of Matlock that they can upgrade the earlier TS-570D to a DG, thereby giving the advantages of the later model.

I am very pleased to see Kenwood care enough for their customers to make this possible and for Lowes co-operation in doing the modifications.

**K G Evans M0AQQ
Nr St. Helens**

Editor's comment:
We contacted Kenwood for a comment and Dave Wilkins G5HY replied:

well as the favourable reviews, seemed to reinforce Mr Evans' comments in his letter about this latest version of a very popular rig.

**David Wilkins G5HY
Kenwood**

Morse Letter Competition:

Entries for the 'Morse Or No Morse?' competition are now arriving at the *PW* offices in Broadstone. If you would like to send in a letter (maximum length 200 words) please see the March issue for full details, categories of letters, prizes and closing date. Please don't forget to clearly mark your entry 'Morse Letter Competition'.

Letters entered into the competition will NOT be published - only the winning letters will appear in the next available *PW* after the closing date - 1 June 1999. On behalf of the Editorial team I wish you good luck! **Rob Mannion G3XFD.**

More On Morse!

Dear Sir

Thank you for the excellent reviews and material that appear in *PW* each month and long may they continue.

In the last few issues you have had many letters for and against the Morse code debate. I personally think the Morse exam should remain as it is. My reason for this is simple! The hobby has people from many walks of life with varying levels of education.

Using myself as an example, I come from a manual labouring background and my only experience of radio was as an s.w.l. and a short time on CB. I found the RAE quite hard and did not understand the physics of radio too easily. But like the old saying goes "if you throw enough mud at the wall some will stick!"

My point here is that people with a background in electronics and radio, etc., have the advantage and find the RAE easy. On the other hand, when it comes to the next step of learning the Morse code everyone is on an equal level. It doesn't matter if your a rocket scientist or a dustman your all on an equal level.

If the RSGB would like to adopt a more useful cause, why don't they suggest to the Radiocommunications Agency that the whole of the 28MHz band be opened up for the class B licence holder? In my opinion the Class Bs deserve a little more than his or her licence allows at present, after all 50MHz is allowed so why not 28MHz?

**Don GW0PLP
Cardigan**

The Debate continues...

Dear Sir

On the much debated subject of Morse code - "shall we/shant we" - I write another letter in favour of keeping the

Final two-penny worth... (this month!)

Dear Sir

Here's my two Penny-worth on Morse! I have been licensed for 16 years, 15 of which were spent as a G6, eagerly awaiting a painless solution to allow me access to the h.f. bands. As none appeared, I eventually 'bit the bullet'.

After many years of regarding Morse as an unnecessary, insurmountable obstacle, I was very surprised to progress from absolute scratch to 100% at 16 w.p.m. and a pass slip, in just ten weeks. On the way, my attitude to the code changed from loathing to delight, not only from personal achievement, but also the simplicity and effectiveness of Morse as a mode of communication.

I'm sure that there must be as many different opinions on the code as there are Radio Amateurs. There's an obvious validity in all the different arguments, both for and against. Personally, I feel that the Morse requirement should be dropped. I do not believe that this will significantly boost the numbers of new Radio Amateurs, but it will certainly greatly enhance the pleasure and enjoyment of a great many fellow amateurs, currently confined to v.h.f. or above. If, as has been suggested, knowledge of Morse is now no longer essential for safe operation on shared h.f. bands, then there should be only one class of Radio Amateur, with access to all bands.

However, I would suggest to any of the 'soon-to-be' new operators on h.f., just take a trip to the bottom (c.w. end) of 7MHz and listen to the 'music'. Take a moment to think, would the skill of Morse code be useful and valuable? Sometimes, a liking for the code does not come until you have progressed quite a distance into its study. If you do not try it you will never know. All it costs is your time and effort and it is said that once learnt, never forgotten. Few things in life are that cheap and durable.

Steve M0BQT
Nottingham

code. There has got to be something that sets aside the operators on h.f. to those on v.h.f.

I don't mean a class distinction - far from it - but access to the lower bands cannot be made a 'free-for-all'. The bands are already crowded and this would enable those who are not prepared for the disciplines needed on those bands.

As a v.h.f. operator, I have heard many bad operators - f.m. simplex QSOs in the frequencies set aside for s.s.b. and c.w. on 144MHz - very annoying when you're trying to hold a very difficult QSO with a distant station. We can't let this happen to the h.f. bands as well.

I personally use c.w. on 144MHz to make contacts north to Scotland and east onto the Continent. I will soon feel confident enough to take the test in order that I may use the h.f. bands. I only have a receiver for h.f. as yet, but am prepared to build my own transceiver. The point is, if this 'old dog' can learn something new, I'm sure anyone else can. 'If you want to do it you will do it'. That's always been my motto and I'll stick by it.

So, to all those out there who want rid of the Morse test, why? It's a beautiful language, even musical and very pleasing to the ear. Well, I'm all for it.

Nigel Booth M1DKN
Norfolk

and continuing....

Dear Sir

Over the past year I have read a lot about the decline in the use of Morse and the decline in the training of people to use Morse for communication. I have also read that this decline is all down to the, so-called, reliable use of satellites and yet I have also read that these same satellites are in continued threat from solar flares, meteorites, etc., putting

them out of action.

So, therefore, it would seem to me that this decline is a little premature and the need for the requirement to learn Morse is still there. And I think it will remain until a better form of communication is developed that does not solely rely on the use of satellites to communicate around the world, because ever since Samuel Morse developed it in the 1800s, it has been reliable even in today's world when (and if) all else fails.

R J Reynolds
Surrey

ongoing saga...

Dear Sir

Unfortunately I missed Mr **Walmesley's** letter in the November issue of *PW* regarding the ongoing Morse test saga. However, fortunately, I didn't miss the communication published in the February issue penned by **G6DAY**.

With respect to **G6DAY's** contention that a change (a requirement for access to the h.f. bands for unsupervised Amateur Radio operation) was "made necessary by the declining official use of Morse", this view, regrettably prevalent today amongst many Radio Amateurs whether they hold call signs or not, is nothing more (or less) than a convenient excuse to widen the goalposts to entry to the h.f. bands by stealth.

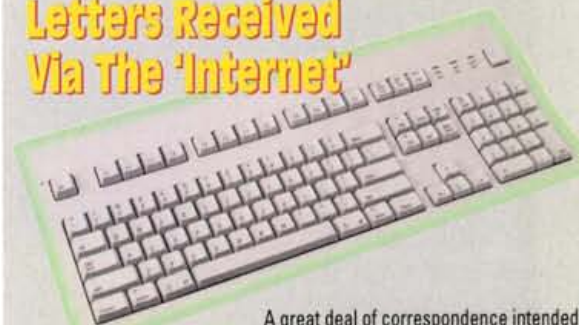
Those persons who continue to propagate the nonsense of Amateur Radio without a Morse test are doing so out of self-serving interests not, as they would have us believe, to promote the continuance of our common hobby - Amateur Radio! In fact, their agenda to rip out the requirement for a Morse test for an 'A' class licence has been so successful, that even the RSGB has been hoodwinked into accepting their proposal.

It doesn't matter one iota whether professional radio operators or 'marine

band' (**Dave Beedan**, same issue) operators have dropped Morse code or not. This fact is merely a ruse used by the advocates of no Morse test for access to h.f. bands. Trouble is, far too many people who should know better have fallen feet-first into their trap. Official and emergency communications as noted by **G6DAY** are professional users. We are 'amateurs'. That's a big difference! If some Radio Amateurs insist on wanting to talk to other amateurs thousands of miles away, use the amateur satellites - no knowledge of Morse required.

Lastly, those who also advocate idiotic "incentive-licensing", do they realise that it almost killed Amateur Radio in the USA? Probably not - and what price 'superiority' then within the hobby (if it ever became reality) I wonder?

Ray Howes
Weymouth

Letters Received
Via The 'Internet'

A great deal of correspondence intended for 'letters' now arrives 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! All letters intended for publication on this page must be clearly marked 'For Publication'. Editor



COMPILED BY JO WILLIAMS

Headline News

His Royal Highness King Hussein of Jordan - An Appreciation

Rob Mannion
G3XFD offers his
personal
appreciation
following the
untimely death of
HRH King Hussein
- better known to
the Amateur Radio
fraternity around
the World as JY1.

In the week as I write this short, personalised and somewhat inadequate appreciation of JY1, there's been an enormous amount of public tributes to the late King, his statesmanship, his diplomacy and his well-known activities in Amateur Radio. However, behind that statesman there was also a kind and caring man few knew about and I count myself fortunate in having experienced his kindness and generosity of spirit to the full.

I'm able to write personally because my wife, Carol, was Governess to King Hussein's twin

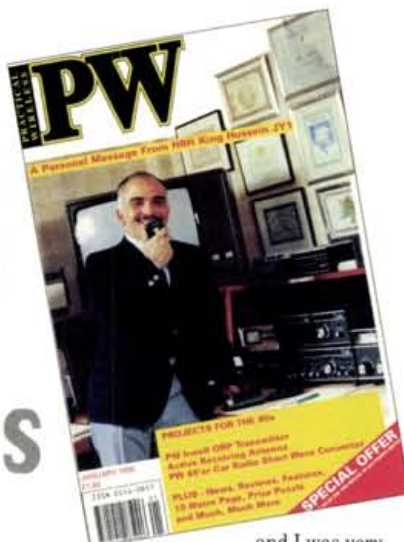
daughters before we were married 25 years ago. However, despite the time lapse, the late King found time to keep in touch with my wife and we always had a greeting from them every New Year.

When Charlotte, our eldest daughter, was born in 1977 she became extremely ill before her first birthday and we couldn't attend the King's eldest daughter's wedding in Jordan. King Hussein was quick to enquire about the progress of our (now a fit and healthy mother of two herself) daughter. He was a kind and caring man.

Islam is seen by many in the West as a threat to our culture and we're now used to seeing many news items showing fundamentalists in action here in the UK and abroad. Such reporting does not take into account the kind and caring actions of the silent majority and when I find myself disturbed at what I see on TV, I remind myself that King Hussein personally funded the education of many children and young people - both followers of Islam and Christians in Jordan itself and abroad.

My wife and I had personal experience of King Hussein's generous and humane work in supporting a Jordanian Christian child because for five years we acted as the British 'mum and dad' for one such young man who was financially supported by the King. He completed his education here in the UK and has gone on to make a career in TV abroad, all thanks to King Hussein JY1.

Such a man was the late King,



and I was very proud indeed that he immediately agreed to my request to write a personal message to our readers when *PW* was re-launched in January 1990 with myself as Editor.

No greater tribute can be given to someone than to be loved for their care, kindness and actions and I'm proud to have had some slight connection with this great man. May God bless and keep you, your Majesty - we are all proud to have been associated with you in some small way by sharing the same hobby, Amateur Radio, the pastime that knows no frontiers.

G3XFD

Timestep's New "PROsat For Windows 'i'"

Timestep, weather satellite equipment manufacturers, have been in touch with the *PW* News desk to inform us of their latest weather software: *PROsat for Windows 'i'*. They claim that it's their "... latest and most powerful APT/WEFAX weather satellite reception interface and software ...".

The new 'i' interface can take up to three different receivers and, Timestep say, it connects to the computer serial port and can be used with a notebook or desk top. All switching is computer controlled and system monitoring and status is shown by 11 l.e.d.s on the front panel.

On top of all the features of earlier *Windows* versions which it retains, this

new 'i' software also includes: multispectral colour NOAA APT images; cubic interpolation for smoother display at higher zoom levels; zoom in and out while receiving; quick 'auto limits' contrast setting; multiple windows for the same image (e.g. to view NOAA IR/visible simultaneously); continuous polar autosave with auto schedule to receive all passes with no user intervention and, finally, colour animation.

Dave Cawley of Timestep says "We have been designing weather satellite systems since 1984 and this latest software exploits APT imagery to a level previously unthought of". The new *PROsat for Windows* Interfaces and 'i' software are priced from £120. Upgrades for existing Timestep *PROsat for Windows* users start at about £50.

For more information on all Timestep weather satellite equipment and current prices you can contact them on Tel: (01440) 820040, FAX: (01440) 820181 or write to them at PO Box 2001, Newmarket CB8 8XB. Alternatively, you could visit their Web site at <http://www.Time-step.com> or send an E-mail to Sales@Time-step.com



Club Visits Schedule

Our much travelled Editor is well into his annual 'Club Visit' schedule now and Thursday 28 of January found him in 'Aspidistra' country visiting The Crowborough & District Amateur Radio Society (C&DARS) in East Sussex. The Club made Rob very welcome indeed and he even found time to pay a quick visit to the (still secure) site of (now famous but then very secret) extremely high powered 'Aspidistra' Second World War 'black propaganda' transmitter site, hidden away in the Ashdown Forest.

Rob's visit to the C&DARS provided an interesting 'follow up' for the club because they're the current holders of the *PW* 'Club Spotlight' Trophy for their extremely high quality winning entry in the 1998 competition, sponsored by *PW* and Kenwood Electronics (UK) Ltd (see p.6 for more details on this year's Club Spotlight Competition). In fact, Rob reports that he sat alongside the gleaming trophy throughout the evening - which incidentally was greatly enjoyed by all. He was on his best behaviour and resisted all

temptations to watch the trains entering the tunnel almost immediately along the Hotel on the outskirts of Crowborough where the meeting took place!

Soon after the visit to Crowborough Rob received a cheque for £50 from them to send on to the **Radio Amateur Invalid and Blind Club**, the charity which Rob supports via the 'PW Talks'. His reaction? "Well done Crowborough, a marvellous turn-out and a lovely evening amongst many friends. Thank you all".

Now all Rob's waiting for is a return visit to see round the 'Aspidistra' site (named, so we're led to believe after Gracie Field's song *The Biggest Aspidistra In The World*) which housed what was once the world's most powerful medium wave transmitter!

Trowbridge Visit

Very few of G3XFD's 'club visits' can be considered as 'local'.



mainly because the PW office is so far south! So, when the invitation came from **The Trowbridge & District Amateur Radio Club (T&DARC)** to visit them - it made a nice change as it's less than an hour to Trowbridge from our part of Dorset.

Despite a Whist Drive taking place in another part of the substantial Village Hall, at Southwick on the outskirts of Trowbridge, the club made sure Rob had somewhere to park. Visitors from other clubs joined in for the busy evening and after the talk 'PW Past, Present and Future' the very enjoyable event was rounded off by a 'Question & Answer' session - during which G3XFD was asked by the audience where he thought 'Amateur Radio was heading in the future'?

In reply Rob provided a few of his ideas 'off the cuff' and also announced that a special series of articles 'Counting Up From The Millennium' are due to appear in PW from the July issue taking a

(purely) imaginative look into our future. "So", he said "watch this space as PW prepares to do something rather different. Others are 'counting down' to the new century while PW is 'counting up' from the Millennium".

On receiving a very welcome cheque for £33 for the RAIBC on behalf of the T&DARC Rob thanked them all for the warm welcome and says he's "looking forward to seeing them at the nearby Longleat Rally as usual", later in the year. Hope you can make it too!

Icom's New Quad-Band Hand-Held

Icom (UK) have announced their return to the 1296MHz band by introducing the launch of its latest hand-held transceiver: the **IC-T81E** - the "... first ever quad-band hand-held". Icom state that the IC-T81E is "extremely powerful, ultra compact" and is "...

set to have a strong impact on the UK Amateur market".

The IC-T81E gives full transmit coverage on 50, 144, 430MHz and 1.2GHz and has a multi-band receiver which, Icom say, operates in a.m.,

f.m. and w.f.m. modes. "Packed" with useful features, the IC-T81E has narrow band f.m. (n.b.f.m.) capability on 144MHz and CTCSS. It also comes with an automatic squelch system which is able to "... adjust the squelch threshold to help receive weaker signals". Icom go on to say that r.i.t. and VXO functions are also available for operation on 1200MHz which, they state, is "... to compensate for other operators' frequency errors".

The IC-T81E incorporates a new 'joystick' style multi-control which they claim was designed to make operation simpler. With 100 memories, ten scan-edge pairs and one call channel for each band, this new quad-band hand-held makes frequency management simple, Icom say and, "for added convenience a six-character name can also be programmed into each memory via the keypad or optional PC programming software".

The IC-T81E will be available from February and will cost **£399.99 including VAT**. For

more information on this, or any other **Icom** products, you can contact them on Tel: **(01227) 741741**, FAX: **(01227) 741742**, Sea Street, Herne Bay, Kent CT6 8LD. Alternatively, you can visit their Web site: <http://www.icomuk.co.uk>

New NEXcells

Peter Waters G30JV of Waters & Stanton (W&S) have written to tell PW that they have been appointed distributors for the new range of **NEXcell Ni-MH rechargeable batteries**. They come available in AA size (1.35A capacity) and AAA size (0.6A capacity). According to W&S, they are cadmium free and also comply with EEC standards.

Waters & Stanton claim that these rechargeable batteries have a much higher capacity than Ni-cads and have no memory problems. Peter goes on to state that they are also capable of large current discharges and are therefore "... ideal for use in hand-held radios and those hungry digital cameras!". W&S also state that they will soon be introducing, a dedicated charging unit for the Ni-MH at a very competitive price.

The NEXcells will cost **£9.95**



for a pack of four (AA or AAA) but, as a special introductory price, they will be offering the first 100 applicants a pack of four cells for just **£8!** For more information about these, or any other W&S products, you can contact them on Tel: **(01702) 206835**, FAX: **(01702) 205843**, Spa House, 22 Main Rd, Hockley, Essex SS5 4QS. Alternatively, you can visit their Web site: <http://www.waters-and-stanton.co.uk>

Faster Communication Card?

Brain Boxes have released the fastest **PCI RS422/485 serial communications card**. They claim that some of its features include increased speed, deeper FIFOs and WIN 98 support. They go on to say that the PCI RS422/485 also has the addition of **autogating** on the board which, they say, allows low level, low cost, RS485 half duplex (two

Nevada's New Patcomm Product

Mike Devereux of Nevada has been in contact with PW concerning the new **Patcomm PC-16000 h.f. transceiver** which they are promoting at the moment. He tells us that the "... PC-16000 has a 'breathtaking' receiver with Collins mechanical filter and advanced d.s.p. facilities, ideally suited for the serious DXer. Uniquely, it has built-in c.w. and RTTY encode and decode facilities with computer keyboard supplied as standard".

According to the literature on the Patcomm PC-16000, some of the "advanced features" include a power output

which is adjustable from 1-100W (1.8MHz through to 28MHz), g.c. dual conversion receiver (u.s.b./l.s.b./c.w./RTTY and a.m.), built-in digital power/s.w.r. meter, built-in iambic keyer (5-75 w.p.m.), 100 memories plus scratchpad and much, much more.

Mike tells us that the Patcomm PC-16000 h.f. transceiver will sell for **£1595** and their first shipment will arrive sometime in February (and PW plans to review one as soon as they're available!). For more information on this, or any other **Nevada** products, you can contact them on Tel: **(01705) 662145**, FAX: **(01705) 690626**, 189 London Rd, North End, Portsmouth, Hants PO2 9AE. Alternatively, you can visit their Web site: <http://www.nevada.co.uk>



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wire) control but without the need for special drivers - "... thus permitting multitasking operating systems such as Windows 95, Windows NT, Windows 98, OS/2 and SCADA packages to see the card as if it was an RS232 interface".

The transfer rate, according to Brain Boxes, is "... typically eight times faster and the FIFO is four times deeper than competing cards ...". This increased data rate, coupled with the deep FIFO and the automatic RTS gating, guarantees fast data transfer without the risk of data loss. For more information

on this product, you can contact Ian Brew at Brain Boxes on Tel: 0151-220 2500, FAX: 0151-252 0446, Unit 3F, Wavertree Boulevard South, Wavertree Technology Park, Liverpool L7 9PF. Alternatively, you can look on their Web site: www.brainboxes.com

New Web Site For Kenwood

Kenwood Communications have E-mailed PW to tell us about their new Web site which can be found at <http://www.kenwood.net>

The new site, Kenwood tell us, uses the "latest design and development tricks and tools" to provide the best site to the maximum audience. They promise us that many new features will continue to be added to the



Kenwood Web site and we've had a look at it and it's definitely worth a glance if you want to keep up-to-date with what's new at Kenwood.

Museum For The Radio Amateur?

The News desk here at *Practical Wireless* received an interesting letter from Dick Rollema PA0SE from the Netherlands in the post this month. He wrote to tell us all about the official opening of the Museum For The Radio Amateur - "Jan Corver" at Budel, near Eindhoven, in The Netherlands.

On January 17 1999, Mrs J. M. de Vries - State Secretary for Transport, Public Works and Water Management in The Netherlands - opened the museum by operating the Morse key of a spark transmitter as used by Marconi in 1896. The State Secretary's signal was answered by a shot from a gun - echoing what

happened back in 1896 when Marconi's signal was also answered by the firing of a shotgun.

The museum, Dick PA0SE tells us, was named after Jan Corver who is, apparently, the most popular writer on Amateur Radio in The Netherlands before the Second



World War. He was Editor of *Radio-Express* and also the author of many books on the subject of Amateur Radio.

The museum houses a collection of Amateur Radio equipment dating from the 1950s onwards. Jan Corver is open on the first and third Saturday of the month from 1000-1700 - but on request, it will open on other days and times. The museum can be found at Broekkant 1, 6021 CR Budel, The Netherlands. Tel: (00) 31 495 430331.



Svetlana's Cyber Tour!



Practical Wireless received an interesting press release from Svetlana Electron Devices about their new Web site. You can visit 'The Tube Zone' at www.svetlana.com and click on 'What's New' and you will find a series of photographs (like the one pictured here) recently taken in the

Svetlana plant in St. Petersburg. If you're interested, why not take a peek at what Svetlana describe as an "intricate process".

Svetlana Electron Devices have also announced the arrival of some new triodes. They tell PW that they have brought "superb Russian quality" to the very popular 3CX800A7 and the 8874/3CX400A7 tube types. Svetlana say that these triodes are being manufactured as exact "drop-in" replacements. The Svetlana 3CX800A7 will be available from the summer and the Svetlana 8874/3CX400A7 is already available from their stocking distributors world-wide. The main Svetlana headquarters is in Huntsville, America, so for more information about these, or any other Svetlana products, you should write to them at 8200 South Memorial Parkway, Huntsville, AL 35802. Alternatively, why not visit their Web site:

www.svetlana.com or E-mail: info@svetlana.com



Historical QSL Card

Practical Wireless received news from the Yeovil ARC about their brand new QSL card. As you can see from the picture, it shows the south of England with the circuit of the transistor transmitter used by Yeovil ARC way back in 1954.



The history behind this transistor transmitter is written up on the back of the QSL card and, apparently, on February 21 1954 Yeovil ARC made "... the first long

distance radio contact to be made using a transistor transmitter". For more information, you'll just have to get your hands on the QSL card for yourself - Good Luck!

A Charitable Event

John Hampson G0VXH, Secretary of the **Hambleton ARS**, has written to tell *PW* all about Hambleton ARS' Special Event which will be taking place on **April 24** in aid of **Motor Neurone Disease Awareness Week** and will be working in association with the **North Yorkshire branch of the Motor Neurone Disease Association**.

Their Special Event Station, **GB2MND**, will operate on all bands from the Buck Inn in the village of Thornton Watlass in North Yorkshire and would really like sponsorship from anyone interested in helping out a really worthy cause!

More details are available from **John G0VXH** on **(01845) 537547**, or you could send him an E-mail: jonham@breathemail.net

On The Air With Determination!

Practical Wireless received a letter from **Alan Taylor M0AVR** about his wife, **Norma M0CEQ**. He writes to tell us of her determination in becoming M0CEQ - despite the fact that she is both blind and disabled.

Norma M0CEQ began her Amateur Radio career by obtaining the callsign: 2E1FJW but she didn't stop there! She then went on to learn Morse with the help of her husband, Alan M0AVR, and on-air help from **Frank G3FIJ** and **Charles G0VAE** with their QRS net.

Alan tells us that by practising every day (as well as taking the c.w. equipment on holiday with them!), she passed the 12 w.p.m. Morse test first time and became 2E0ASK. Still determined to keep going,



"Windmills On The Air"

York Radio Club (A) Special Events Group have written to *PW* to tell us all about their first Special Event which will be taking place on the May 8 and 9 1999. Held at Skidby Windmill near Beverly - North Humberside, the Special Event will mark the "Windmills On Air" weekend and they tell us that the East Riding of Yorkshire Council have given York ARC permission to use Skidby Windmill which is a rare working mill.

The usual entry fee of £1.50 will be waived to all visitors to the mill/museum and the mill will be operating throughout the weekend.



and they will have full colour QSL cards: QSL via RSGB bureau or by G0VYS QTHR.

There will also be a photographic competition (on windmills and watermills) over the weekend.

If you want to know more about the "Windmills On The Air" Special Event then you can contact the event organisers, **Andy Rennie G0VYS** and **Alex Williamson G0WUY**, QTHR. The event has been given GB5SW as their Special Event Callsign

Norma then studied for, and passed, the RAE and is now the proud owner of the callsign: M0CEQ!

Now, if that doesn't inspire more of you to attempt the Morse test, then nothing will!

Dover ARC Celebrate Centenary

The **Dover ARC's** Special Events Co-ordinator, **Hugh Burton G0WWQ**, has been in touch with *PW* and told us all about their plans to celebrate the centenary of Guglielmo Marconi's first cross-channel radio transmission of March 21 1899.

On **March 27**, there are plans to operate a Special Event Station at the South Foreland Lighthouse to celebrate this centenary using the Special Event Callsign: GB100SFL. They say that this is subsequent to the events in December of last year involving

members of the Barry ARS.

Between April 22 and 25, the Dover ARC will be responding to a request from the Wimereux ARC to celebrate the centenary of both the original Wimereux to South Foreland radio transmission (March 27 1899) and the original Dover (town) to Wimereux radio transmission (September 1899).

Transmissions to Wimereux will be made from both the South Foreland Lighthouse using the Special Callsign GB100SFL and from the White Cliffs Experience using the callsign GB100MAR. Hugh G0WWQ says that the clubs mentioned here are all taking part in the celebrations.

Hugh G0WWQ goes on to say that the White Cliffs Experience venue will house additional displays of original Marconi equipment along with other antique radio artefacts and will also feature demonstrations by **Dr. Ken Smith G3JIX** (of the University of Kent) in which

early radio experiments will be recreated.

Also, in conjunction with French Amateur TV groups, the RSGB and local dignitaries will be sending greetings to their French counterparts during a re-enactment of the sending of

the original messages (with operators in period costume).

For more information on this event you can contact **Hugh G0WWQ** by E-mail: hughburt@clara.net or write to him at **137 Markland Road, Dover, Kent CT17 9NL**.

Special Event Supports 'SET99'

The **Brickfields ARS**, with support from the **British Association for the Advancement of Science (BAAS)**, have received permission from the **Radiocommunications Agency (RA)** to operate a Special Event Station from 1-28 of March in support of the national celebration of **Science, Engineering and Technology week, 'SET99'**.

They tell *PW* that they have chosen to mark the achievements of **Sir John Ambrose Fleming**, the English engineer, as the foundation for their event and will be using the callsign GB150SJF.

The letter we received from the Brickfields ARS states: "The original application for the GB150SJF was 20th October 1998. At the time of writing [2 February] I am still awaiting the formal Letter of Variation of Licence from the RSGB. This letter is the result of the letter received direct from the Radiocommunications Agency who have advised they will notify the RSGB accordingly", so assume that this callsign isn't finalised yet.

PW

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RADIO DIARY

March 7: The Wythall Radio Club are holding their 14th Annual Radio & Computer Rally at Wythall Park, Silver Street, Wythall, near Birmingham on the A435, just two miles from junction 3 of the M42. Doors open from 1000 to 1600 and admission is £1.50. There will be the usual traders in three halls and a large marquee, Bring & Buy, bar and refreshment facilities are also on site. Talk-in on S22. There will also be a unique park and ride for easy and comfortable parking. Contact **Chris GOEYO** on 0121-246 7267 evenings and weekends for more details, FAX on 0121-246 7268 or E-mail: goyo@compuserve.com

March 13: The 6th West Wales Amateur Radio & Computer Rally will be held at Penparcau School, Aberystwyth. Doors open 1030 till 1600 (with disabled access from 1000). Admission is £1 per person. There are good parking facilities, with easy access for disabled and traders to all stalls. There will be a demonstration area and catering facilities. Features also include Amateur Radio, Bring & Buy, computers (software and hardware), electronics, h.f. and v.h.f. on the air, and much more. **Katy GWOSFO** on (01545) 580675.

March 20: The Lagan Valley Amateur Radio Society (Northern Ireland) will hold its annual rally at the Lagan Valley Hospital conference centre. Doors open 1200. Further details from **Reid MI0BOT** on (01232) 258403, E-mail: gi4gty@qsl.net or check out the Web site at www.qsl.net/gi4gty

March 21: The Tiverton South West Amateur Radio Club will be sponsoring and running their rally in the Tiverton Pannier Market. Doors open at 1000. There will be a wide selection of traders, catering for all aspects of the hobby. There will be the usual excellent food and catering facilities around and in the Pannier Market. More information from **Alan Sedgbeer G0MAS** on (01884) 252259.

March 21: The Bournemouth Radio Society are holding their 12th Annual Sale at Kinson Community Centre, Pelhams Park, Millhams Road, Kinson, Bournemouth. Doors open at 1030 and close at 1630. Talk-in from G1BRS on 2m (144MHz) S22. There will be Amateur Radio and Computer Traders, clubs and specialised groups, excellent refreshments and a Bring & Buy. Admission is just £1. More details from **Olive or Frank Goodger, 66 Selkirk Close, Merley, Wimborne, Dorset BH21 1TP** or telephone on (01202) 887721.

***March 21:** The Norbreck Amateur Radio, Computing & Electronics Exhibition is being held in the Norbreck Castle Hotel, Queens Promenade, Blackpool, Lancashire. Doors open 1100 (with disabled access at 1045). There will be over 100 trade stands, club stands, Bring & Buy stand, RSGB stand and book stall, amateur computer stands, construction competition, free car parking at hotel, a bus from an extra car park and wheelchair access to all the exhibitors. Admission is £2, OAPs £1 and under 14s go free. **Peter Denton G6CGF** on 0151-630 5790.

March 28: The 10th Magnum Radio & Computer Rally will be held at the Magnum Leisure Centre, Harbourside, Irvine, Scotland. Doors open 1100. This rally is organised by the Cunninghame & DARC. More information from **William Gebbie** on (01560) 321009.

April 18: The Lough Erne Amateur Radio Club will be holding their 18th rally at Killyhevlin Hotel, Enniskillen (Northern Ireland) at 12 noon. Attractions include the usual interesting variety of traders and the no charge Bring & Buy. **Kieran G17NET** on (01365) 348063 day or (01365) 327133 evenings.

April 18: The 13th Rainham Radio Rally has moved to a new date, but still at the same venue, which is The Rainham School for Girls, Derwent Way, Rainham, Kent ME8 0BX. Doors open 1000 (0930

for disabled visitors and Bring & Buy). Admission is £2 (under 14s go free). There will be all the regular traders, plus a few new ones. Many special interest groups will also be represented. Plenty of off road parking and hot and cold snacks will also be available. **Martin** on (01634) 365980 any reasonable time.

April 18: The Cambridgeshire Repeater Group are holding their annual rally at Bottisham Village College, Bottisham, which is six miles east of Cambridge. Access is via A14 and A1303. There is a large hall with a car boot sale, Bring & Buy and the Group's renowned auction of radio and electronic equipment. Doors open 1030 and admission is just £1. Refreshments will be available. Talk-in on S22. **Paul Dyke G0LUC** on (01462) 683574.

April 18: The Yeovil Amateur Radio Club are holding their 15th QRP Convention at Digby Hall, Hound Street, Sherborne, Dorset from 0900 to 1700. There will be interesting lectures, trade stands, a Bring & Buy and refreshments. Talk-in will be on S22. Entrance fee is £2. Further details from **Mike G7SDD** on (01935) 814612.

April 24: A Marconi Birthday Exhibition will be held at the National Wireless Museum, on the Isle of Wight. Open from 1100 until 1700 with free entry and parking. More details from **Douglas G3KPO** on (01983) 567665.

May 3: The Dartmoor Radio Rally is to be held at Pannier Market, Tavistock, Devon. This new location has much more space for traders and visitors, with access for disabled too. There is plenty of free public car parking within five minutes walking distance. There will be trade stands, Bring & Buy, and refreshments, etc. Doors open 1030, with a talk-in on S22. There are beautiful views over Dartmoor, ideal for picnics, so why not take the family. **Ron G7LLG** on (01822) 852586.

May 9: The Drayton Manor Radio & Computer Rally is to be held at Drayton

Manor Park, Fazeley, Tamworth, Staffs on the A4091. The main traders will be in four marquees with a large outside traders flea market. There will also be a Bring & Buy stall, local clubs and special interest stands. Open from 1000 onwards. Trader information from **Norman** on 0121-422 9787, other information from **Peter G6DRN** on 0121-443 1189 evenings please.

May 16: The Ripon & DARS are pleased to announce that the Northern Mobile Rally will take place at the Great Yorkshire Showground. There will be all the usual stalls, talk-in, Bring & Buy, free car park, disabled access, etc. Details on (01765) 640229 or E-mail gerald@bronco.co.uk

May 23: The Three Counties Radio & Computer Rally is to take place at the Perdiswell Leisure Centre, Bilford Road, Worcester. Full restaurant services from 0700, licensed bar from 1100. All traders in two adjoining halls, easy access to the halls (ground level) and convenient parking for traders. There will also be free parking for 900 cars and coaches. Being close to the City Centre, wives and children can spend a pleasant day in historic Worcester sightseeing, shopping, etc. **William E. Cotton G4PQZ** on (01905) 773181, for FAX please ring first.

May 30: The Plymouth Amateur Radio Society are holding their rally at the usual venue, which is at the Plymouth College of Further Education, Kings Road, Devonport, Plymouth. Doors open 1030 till 1430 and admission is just £1. There will be the usual traders, plus Morse testing on demand. The venue is large and spacious with ample free car parking. The display halls have plenty of room for visitors to mingle and browse. There is also a large canteen serving freshly cooked light meals and snacks at reasonable prices. Plymouth City Centre, the Hoe and many major attractions are close by for the family. Signposting will be from the Manadon Junction on the A38 Devon Expressway and there will also be a talk-in on S22. More information on (01752) 662051 during office hours.

June 13: The Elvaston Castle National Mobile Radio Rally are holding their rally at Elvaston Country Park, on the B5010, five miles south east of Derby. Further details from **Brian** on (01332) 751412 or contact **Stuart** for trader enquiries on (01283) 537778.

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

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

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Diac & Triac?

Ian Poole G3YWX answers the questions: "What are Diacs and Triacs?"

In the last 'What Is A...?', we looked at the thyristor or silicon controlled rectifier and saw how it could be used as a switch in various circuits. However, whilst the thyristor is widely used in many applications it's not particularly suited to a.c.

Basically, the thyristor is a d.c. device, conducting only in one direction. This means that it is used in an application where there is a.c., it will only conduct over half the cycle. For example, when used in the ubiquitous light dimmer it will only be able to conduct over half the cycle at maximum and this will cut the maximum light output available.

What's required, is for a bi-directional version of a thyristor to be available. However, before we get to that point, there are a couple of devices to look at on the way.

Breakover Diode

The first we come across on the journey is known as the 'breakover diode'. This is sometimes known as the Shockley diode and consists of four layers

in a *p-n-p-n* structure as shown in Fig. 1. It's effectively a two terminal version of the thyristor having only the anode and cathode connections, i.e. there is no gate connection.

It's found that when the voltage across the diode reaches a certain level it breaks down as shown in Fig. 2. It can be used as a trigger for another SCR or thyristor.

In this application, it is connected to the gate of the thyristor and gives a far sharper gate trigger pulse. This results in a more timely turn on and it is very useful where the timing is of importance.

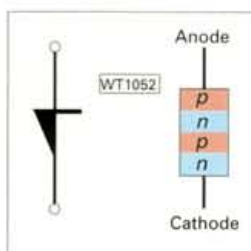


Fig. 1: Structure of a breakover diode

The Diac

The word 'diac' stands for Diode a.c. switch. It's a bilateral switch that's capable of being turned on in both directions. There are two forms of diac and the first is a three-layer *n-p-n* or *p-n-p* device. In this form of the device, switching occurs when the reverse biased

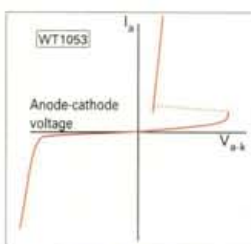


Fig. 2: The V-I characteristic of a breakover diode.

junction experiences avalanche breakdown.

When the avalanche breakdown occurs, the transistor action in the device means that the voltage drop across the whole device falls and the device can be considered to be switched on. In the case of the three-layer device the switch does not 'latch' and as the

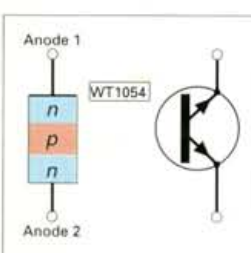


Fig. 3: A three layer Diac.

voltage is slowly reduced the device will return to its normal state.

The second variant is a five layer device and its operation is slightly different. It can be considered as two breakover diodes back-to-back. This device is the more commonly used and once triggered it remains in that state until the voltage is completely removed.

Triac Device

The triac device is basically a bi-directional version of the SCR or thyristor. The thyristor would only conduct in one direction, whereas the triac conducts in both directions. In other words, it may be thought of as a bi-directional thyristor. It has forward and reverse characteristics that are identical as shown in Fig. 6 (a & b). In this way it can either block or conduct current from an alternating waveform over all or part of the waveform. In other words, it can be thought of rather like two thyristors that are connected in inverse direction but parallel (anti-parallel).

As far as the construction of the device is concerned, it consists of a diac with the addition of a gate to enable the switching to be controlled. As shown in Fig. 6, it can be seen that the gate contact is made to the p-type material

close to anode 2. This is done using an n-type diffusion layer onto which the gate connection is made.

Operation is slightly different for negative and positive potentials. For positive gate potentials the gate acts in the same way as that of a thyristor. For negative potentials the n-type gate pocket injects electrons into the central n-type region and this triggers the device.

Applications

The triac is widely used for

switching in a.c. power applications. It's possibly best known in home electronics circles for its use in light dimmers, however it is more widely used in industry for controlling electrical loads of all descriptions that require an alternating current.

Next time I will be taking a look at the field effect transistor (f.e.t.). This is a device that has had a major impact on the electronics industry and not least in the field of r.f. technology.

There's a section explaining semiconductor terminology on Ian Poole's Radio and Electronics Web Site at: http://website.lineone.net/~ian_poole

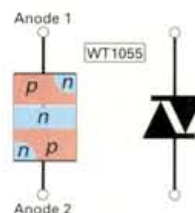


Fig. 4: A five layer Diac.

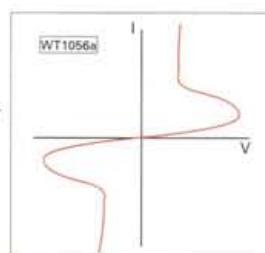


Fig. 5 (a & b): Switching characteristics of three and five layer diacs.

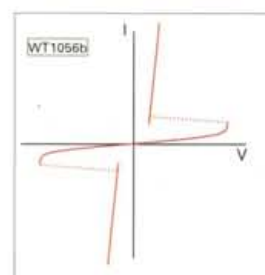


Fig. 5 (a & b): Switching characteristics of three and five layer diacs.

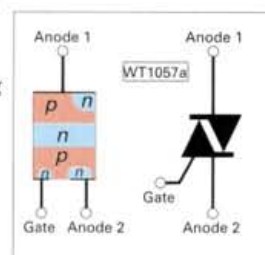
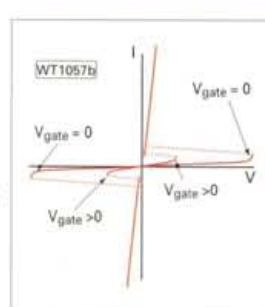


Fig. 6 (a & b): The structure and switching characteristics of a triac.



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A Simple Deviation Meter

James Brett G0TFP explains how he constructed a "simple", "practical" and "economical" deviation meter to check the deviation of an f.m. transmitter. Read on and discover just how easy it is.

The object in the design of this deviation meter was to build a self-contained piece of test gear which didn't require special calibration or additional test equipment. Construction was to be simple and practical and the cost was to be kept to a minimum hence the 'local oscillator' required is another transmitter on the same band.

The principle is to use two transmitters - the first one to be tested and a second one to be used as a local oscillator. This second transmitter doesn't have to be f.m. since it only has to produce a carrier at the same frequency as the signal on test.

By modulating the test transmitter with an audio tone and mixing the two transmitter outputs, a signal results which is purely the frequency deviation. This deviation is converted to a voltage proportional to the highest frequency and thus indicates the peak deviation occurring at the peak amplitude of the audio modulation.

Calibration is easily carried out by having both transmitters on c.w. and setting one to a different known frequency.

The Circuit

The circuit is straightforward and signals from the transmitter to be tested and the transmitter which is to act as the local oscillator are fed into the two banks of load resistors R1 to R6. (See Fig. 1). These resistors have the resistive elements cut as a spiral on the carbon film surface and by winding the three turns around one resistor in each bank the two signals are

into the frequency to voltage converter integrated circuit IC1. The circuit being used and biased as described in the manufacturers instructions.

The relationship between the input frequency and the output voltage on pin 10 is set by the combination of C6 and the total resistance of R15 plus that set on R17. Capacitor C7 is made comparatively large and since the circuit works on the charge 'pump' principle, it provides integration of the signal to be fed to the output. The resulting effect is a quick response to an increasing frequency but a slow decay following a reduction of input frequency.

Since the transmitter under test is being modulated with an audio sine wave, the output of the circuit will respond quickly to the positive peak of the deviation and will not fall before the next positive peak of deviation.

The output circuit of IC1 is a buffering amplifier and setting it to unity gain by linking pin 10 to 5, it is able to drive the dual range voltmeter circuit M1, R18 and R19.

An audio tone of approximately 400Hz for the transmitter is generated by IC2 which is a conventional Wien bridge oscillator. With C8 equal to C9, R21 equal to R21 the frequency is determined by the formula:

$$f = \frac{1}{2 \times C_8 \times R_{21}} \text{ Hz}$$

For sinusoidal output, the circuit must not become over

Fig. 1: Full circuit diagram of James G0TFP's "simple" Deviation Meter.

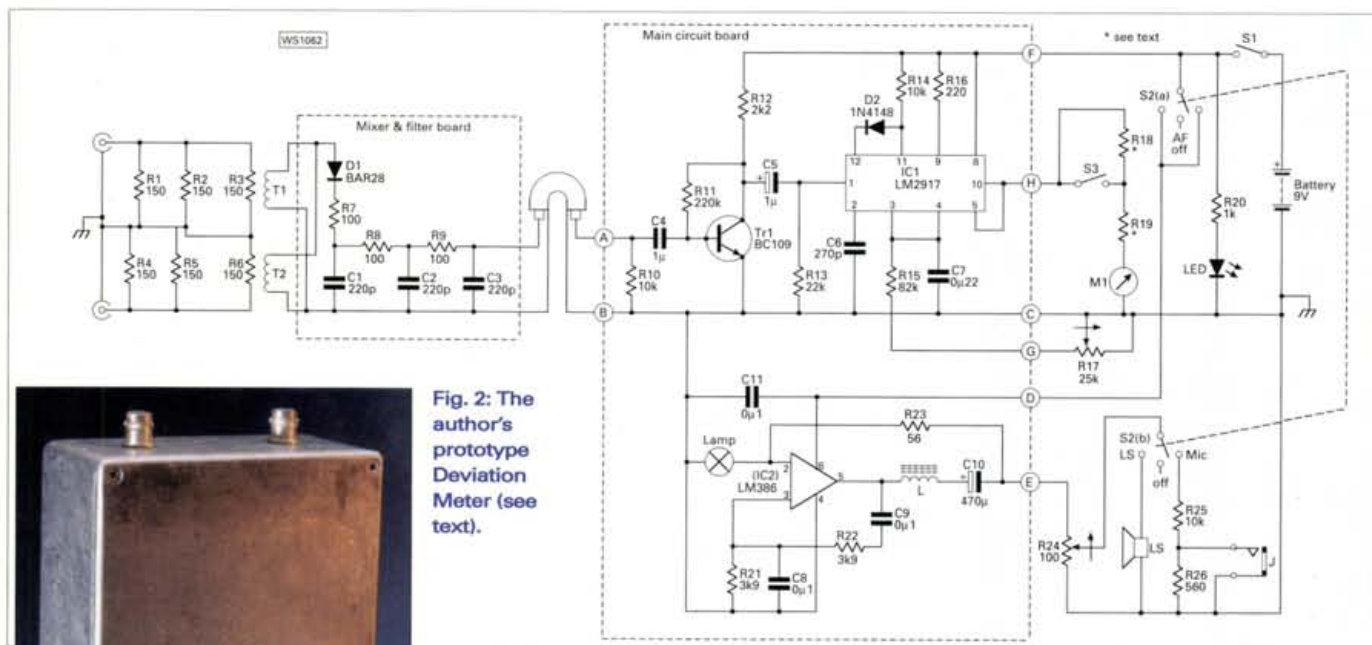


Fig. 2: The author's prototype Deviation Meter (see text).



coupled to the diode mixer, D1.

Both transmitters are set to the same frequency and with one of them modulated, one of the outputs from the mixer is the deviation frequency caused by the audio modulation.

Resistors R7 to R9 and the capacitors C1-C3 form a low pass filter which, at a few kilohertz gives negligible attenuation, but at v.h.f. virtually eliminates all the carrier and sum frequencies. This low frequency signal is passed to the base of Tr1 and is large enough to give a comparatively square wave output on its collector. This square wave is fed by C5

driven and needs to have a loop gain of three. This is set by the feedback circuit R23 and the lamp. As the output starts to rise, more voltage appears across the lamp and the filament gets hotter, increasing its resistance. This increases the proportion of the output fed back and reduces the overall loop gain, thereby keeping the output constant.

The circuit can easily become unstable and the ferrite bead with two turns of wire provides enough loss to completely prevent IC2 self oscillating at some very high random frequency.

As IC2 is a low power audio amplifier it's able to drive a loud speaker directly via the d.c. blocking capacitor, C10. The test transmitter microphone is placed over the loud speaker to provide the modulation. Alternatively, S2 can isolate the speaker and through the attenuation of R23 and R24, can give a signal

suitable for direct connection to the transmitter microphone input. The level in either case is set by R24.

Choice Of Meter

The choice of meter, M1, is not critical, any value of moving coil ammeter between 50µA and 5mA will do. For ease of remarking, a scale of 5 or 2.5 main divisions would be best.

Also, to give an accurate range between 5kHz and 25kHz, R18 should be four times the total resistance of R19 plus the resistance of the meter coil. The total resistance of the full combination of R18, R19 and the meter coil resistance should be chosen using Ohms law to give approximately 4-5V across the network for full scale deflection current of the meter.

(The full scale voltage of this circuit is not critical since the calibration is made in terms of deviation frequency using R17 as will be described later).

Suggested Layout

Suggested layouts are shown in Fig. 4 and Fig. 5 and the wiring of the panel components is taken from the full circuit diagram in Fig. 1.

The two banks of load resistors, R1 to R6, are mounted directly onto the coaxial plugs and the earth tabs keeping the leads as short as possible. One resistor in each bank is wound with three turns of plastic covered wire leaving long ends to be twisted and brought through the grommets holes to the mixer board.

Each resistor bank is screened using a thin aluminium sheet which is cut carefully to make a tight fit with the lid and bottom of the box. If a box with circuit board guides is used only with the joint between the dividing piece and the main screen needs to be fixed with nuts and bolts, the mixer board is wired and mounted on short pillars in the box.

The rest of the circuit and components are mounted on the lid and wired to the suggested layout in Fig. 5 to avoid the screened load compartments. The battery is fitted into a 25mm Terry type tool clip and held into place by an elastic band across the open ends of the clip.

If the speaker has no mounting lugs it can be held in place using three countersunk headed screws round the outer edge of the speaker and the edge of the speaker frame trapped by using large plain washers under the nuts (a matrix of holes having been drilled to let the sound out).

Since in use, the microphone of the transmitter under test will be placed directly over the speaker - a piece of thin foam should be placed over the matrix of holes or a ring of soft rubber glued round the circumference of holes. This is needed to prevent unwanted vibration or other hand induced noise affecting the sinusoidal sound and giving inaccurate results.

Once the components are all mounted and the interconnections between the components wired as far as possible a careful wire check should be made. Finally, the main circuit board is wired in with wire tails long enough to allow access to both sides of the circuit board and the panel components, the probable best position over the meter and speaker.

Careful Inspection

After a final (careful) inspection and wire check, the battery is connected. Set R17 and R24 fully anticlockwise,

S3 open (25kHz position), S2 to mid position (a.f. off) and switch on S1. The l.e.d. should light up, showing that the power is on.

Set S2 to the LS position and advance R24. An audio note of approximately 400Hz should be heard. For the musically minded, this is approximately 'G' in the middle of the music scale.

The output of IC2 should be between 2 and 3V peak-to-peak. If an oscilloscope is not to hand, the level can be measured using a multi-range meter set to a.c. volts. Since this will read r.m.s., a

reading between 0.7 and 1V should be indicated. If the level is outside these limits, increase the value of R23 to reduce the amplitude or vice-versa.

Set S2 back to 'off' and connect two transmitters to the two coaxial inputs. Set S3 to the 25kHz position and both transmitters to the same frequency and output powers of a watt or so.

Switch on both transmitters and, although there may be a very slight meter movement, it should be basically at zero. Adjust one of the transmitters up or down 25kHz. The meter should now read and by adjusting R17 it can be made to read full scale of 25kHz.

If one of the transmitters can be set to smaller step changes, make the change and check that the meter now reads the set difference in frequency between the two. If a difference of 5kHz can be set, put S3 into the 5kHz position and check that the meter again reads full scale. The unit is now tested and calibrated for deviation measurements to be made.

Application

The transmitter to be tested and the one to act as the local oscillator are connected and switched on at power levels of a watt or two. Calibration at 5 or 25kHz may be carried out as described above.

Set both transmitters to the same frequency and place the microphone, of the transmitter on test, over the loud speaker. With S2 in the LS position adjust R24 to give a sound level equivalent to speaking into a microphone. The meter will indicate the maximum deviation from the centre frequency of the transmitter. If the automatic gain of the audio amplifier in the transmitter is working correctly, quite substantial adjustment of R24 will only produce a small change in meter reading.

If it's not practical to apply the microphone directly to the loud speaker, a lead can be made up with a connector to mate up with the transmitter microphone socket. A switch will probably have to be included connected to the microphone connector to replace the p.t.t. switch.

As a typical guide, an amateur transmitter on narrow band f.m. (n.b.f.m.) should give a deviation as measured of 2.5kHz. The deviation meter can also prove useful in comparing differences in transmitter output frequencies or such things as v.f.o. calibration, etc.

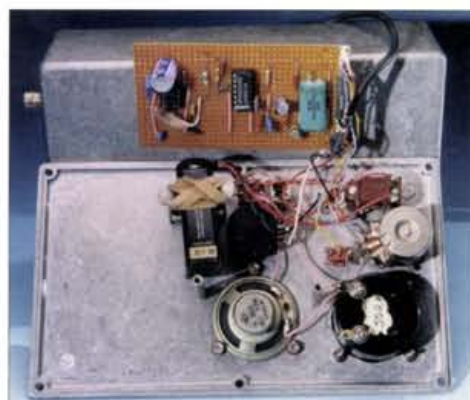


Fig. 3: An inside view of the unit showing method of construction using Veroboard (see text).



Fig. 4: Close up view of main board showing lay-out. (see text for details on lay-out).

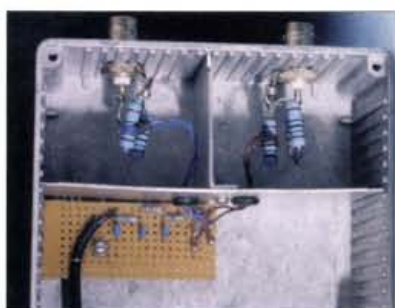


Fig. 5: Close up view of the two input ports and coupling method (see text).

Constructional lay-out using Veroboard.

Readers wishing to build their own Deviation Meter using Veroboard rather than designing their own printed circuit board lay-out can obtain (free of charge) photocopies of the matrix board lay-out used by the author. To receive the photocopies please send an A5 self-addressed stamped (26p) envelope to the Editorial offices marked as **Deviation Meter Details**.

Component List

Resistors Fixed

1W 10% Carbon Film
150Ω R1-R6

0.25W 10% Carbon Film

56Ω	R23
100Ω	R7, R8, R9
220Ω	R16
560Ω	R26
1K	R20
2K	R12
3K9	R21, R22
10K	R14, R25
22K	R13
82K	R15
220K	R11
See text	R18, R19

Resistors Variable

100Ω Wire wound	R24
25K Carbon	R17

Capacitors 15V d.c. or greater

220pF Ceramic 10%	C1, C2, C3
270pF Ceramic 10%	C6
0.1µF Poly 10%	C8, C9, C11
0.22µF	C7
1µF	C4
1µF Electrolytic	C5
470µ Electrolytic	C10

Semiconductors

BAR28	D1
1N918/1N4148	D2
BC108	Tr1
LM2917N	IC1
LM386	IC2

Miscellaneous

1.5V/25mA lamp (Tandy 272-1139), meter (see text), loud speaker - miniature 8Ω, two coaxial panel connectors with earth tags, mono jack socket, panel l.e.d., two SPST switches, DPDT centre off switch, 9V PP3 battery and snap connector, two metal box 110x190x55mm (approx) aluminium sheets for screen, knobs for variable resistors, wire, two small grommets, pillars, nuts and bolts.

The Alinco DR-M06TH 50MHz Mobile Transceiver

Richard Newton G0RSN takes a long, hard look at the Alinco DR-M06TH 50MHz Mobile Transceiver and pits it against other rigs in order to give you a fair opinion of this "refreshingly easy to use" transceiver.

The 50MHz allocation is a band that I have seen grow in popularity since I was first licensed nearly ten years ago. More and more we see dedicated equipment come onto the market and it would seem most h.f. mobiles now have a 50MHz capability. But, if you do not hold an h.f. licence, then it's a little extravagant to purchase an h.f. mobile just to have access to 50MHz. Dedicated 50MHz multi-mode transceivers are still few and far between and the most inexpensive option still seems to be a transverter.

However, should you want f.m. only operation, then there are a few options open to you, one of which is the **Alinco DR-M06TH**. This is a dedicated 50MHz f.m. mobile transceiver, offering coverage from 50.000MHz to 54.000MHz. It gives you the choice between 2W and 20W r.f. output. The radio is pleasing to the eye and is finished in black metal and dark grey plastics. It appears to be well made and is supplied with a fist microphone, power cable and mobile mounting bracket.

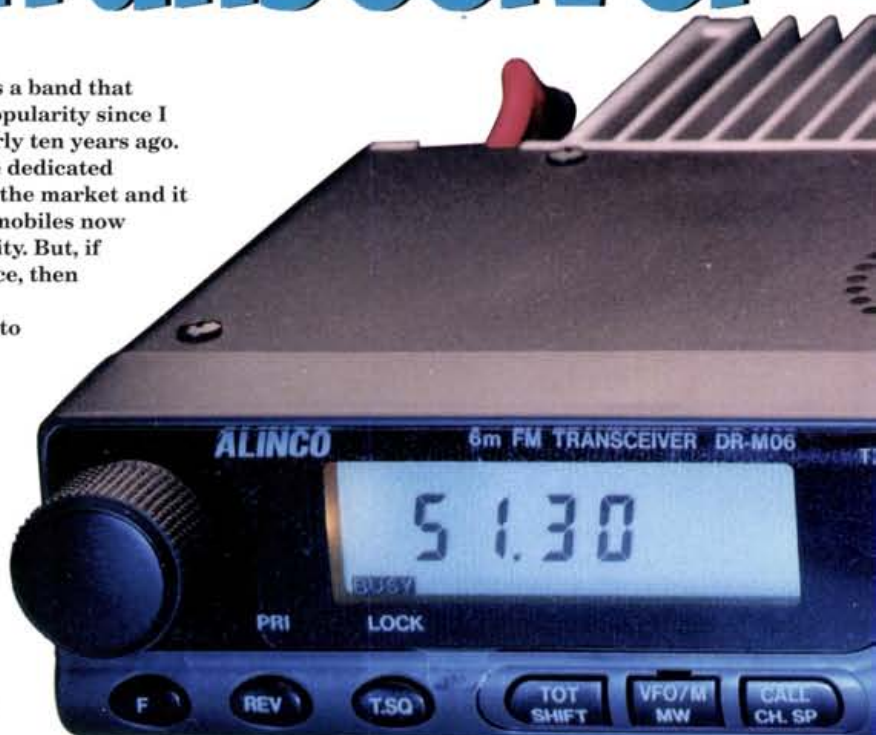
The DR-M06TH is approximately 140mm wide, 40mm high and 154mm deep. A large proportion of this is heat sink. The radio is about the same size as most modern v.h.f./u.h.f. mobiles and, to be honest, has a very smart appearance. It's supplied with a handbook, which wasn't the most comprehensive or easy-to-read manual I've ever seen, but it was functional.

The DR-M06TH Features

The DR-M06TH has most features of a modern mobile radio. The radio has **100 memories**, **CTCSS encode** for repeater access (however CTCSS decode for coded squelch is an optional extra). It will scan the v.f.o. range and it will also scan memories.

The transceiver also has a **priority channel monitoring**. It can be set in either memory or v.f.o. and will keep a listening watch on either the last selected memory or the last selected v.f.o. frequency. (I used this to monitor the local chat frequency and the Calling frequency at the same time).

All the controls for the DR-M06TH are on the front panel. A bright orange button controls the radio power **'On/Off'** and two well-proportioned rotary



knobs control **Squelch** and **volume**. A larger rotary knob controls the tuning through memories and v.f.o. range - this is also used when setting up options such as the variable tuning steps and repeater offset. Push buttons then control the other functions.

Sensibly Laid Out

The controls are well labelled and sensibly laid out. However, speaking as a mobile operator, I found that the priority given to some controls were not as I would have expected. Most controls have two functions, a primary use and a secondary use. On the DR-M06TH, the **'F'** key is the key that one depresses to gain access to a button's secondary use.

Most control keys were all right, for example, the **'Reverse'** key was given priority, the secondary function on this key being the **'Priority Monitor'** function. However, the **'Tone Squelch'** and **'Lock'** facility shared a control button - in this case, the **'Lock'** got secondary place.

My personal preference is that an operator should be able to **'Lock'** and **'Unlock'** a mobile radio with the ease of one button operation. The CTCSS tones would be mostly used for repeater access, this could easily and most conveniently be placed in memory in any case and should have been given the secondary place.

Another example of what I considered to be incorrect prioritising of controls on the DR-M06TH

was the 'Time out Timer' being given primary status over the 'Shift' facility on a button. The only other one that perplexed me was that 'High' and 'Low' power selection took second place to MHz tuning. (However, I accept that these criticisms amount to personal preference and not everyone may agree with me).

The DR-M06TH was refreshingly easy to use, the controls are kept to a minimum without losing the effectiveness of the radio. The memories were very easy to programme and due to the good labelling and ease of operation, the DR-M06TH



The Alinco DR-M06TH 50MHz f.m. transceiver.

was up and running and programmed with all the memories that I wanted within about half an hour of me unpacking it.

Out And About

Having programmed the DR-M06TH, I decided to give it a go 'out and about' on the air. It was a mobile radio, so the obvious place for me to put it was in my car.

Due to an ever-growing family - in size and not actual numbers - my wife, **Diane** and I 'invested' (Hmmm) in a newer and larger car recently. I only mention this in order to illustrate that I can now empathise with those owners of modern cars, who cry: "Where on earth do I put my mobile radio!?" The Alinco DR-M06TH is, as I have mentioned, a compact little unit - this helped in finding a spot.

The Alinco shares the standard type snap-in d.c. power connector found on most v.h.f. and u.h.f. mobiles. I managed to install it into my car quite easily, using existing wiring for my existing 144/433MHz mobile. This meant that the whole operation took about an hour. This did **NOT** include the considerable negotiation stage with Diane!

I connected the DR-M06TH up to my antenna and positioned it for 50MHz. I got an s.w.r. of 1.3:1. I set all this up with **Terry G7VJJ** lending a hand. We did it, believe it or not on Christmas Day! What dedication!

On Boxing Day, we all set off to visit my Mum and Dad in Minehead, Somerset. On the first leg of the journey I had arranged to call Terry G7VJJ who was set up at home using a Trio 9000 144MHz multi-mode with a 144-50MHz transverter into a W2000 tri-band antenna. Terry and I managed a contact on 50MHz. Terry gave the radio a good audio report saying that it 'sounded very good'. However, we did lose contact after a relatively short distance, probably only about four to six kilometres.

On the journey, I was talking to my dad (**John G8EAM**) via the Wells repeater, GB3WR, on 145MHz. I mentioned that I was monitoring 50MHz, I gave the frequency I was monitoring and stated that I was in the Yeovil/Ilminster area. (HINT, HINT!). With that, a booming signal came in on the DR-M06. It was **Dave G4JXX** who had monitored my conversation on GB3WR and had been kind enough to answer my plea for a contact.

I was just entering the Ilminster by-pass and Dave said he was in Barrington, some six kilometres north of the town. I would estimate we were about 12km away from each other. Dave was a wonderful signal and said I was 'a good strong signal' with him. The received audio on the DR-M06TH is really very good. We had a very pleasant contact. I eventually lost contact with him in a little village called Henlade, a distance of about 14km.

During my conversation with Dave, I mentioned that I had only managed a short haul with Terry earlier in the journey, Dave told me that this did not surprise him too much as 50MHz often did this. This seems to be where it differs from 144MHz. He told me that medium and long distance can be a lot easier on 50MHz. DX is also a lot more of a possibility given the right conditions. It has to be said that most intercontinental DX will be found on side band.

Later in my journey I was contacted my brother, **William G7GMZ**, on 50MHz. William was operating my Dad's set up in Minehead. The set up there is, again, a W2000 base station vertical antenna connected to an Icom IC-551D 50MHz multi-mode transceiver.

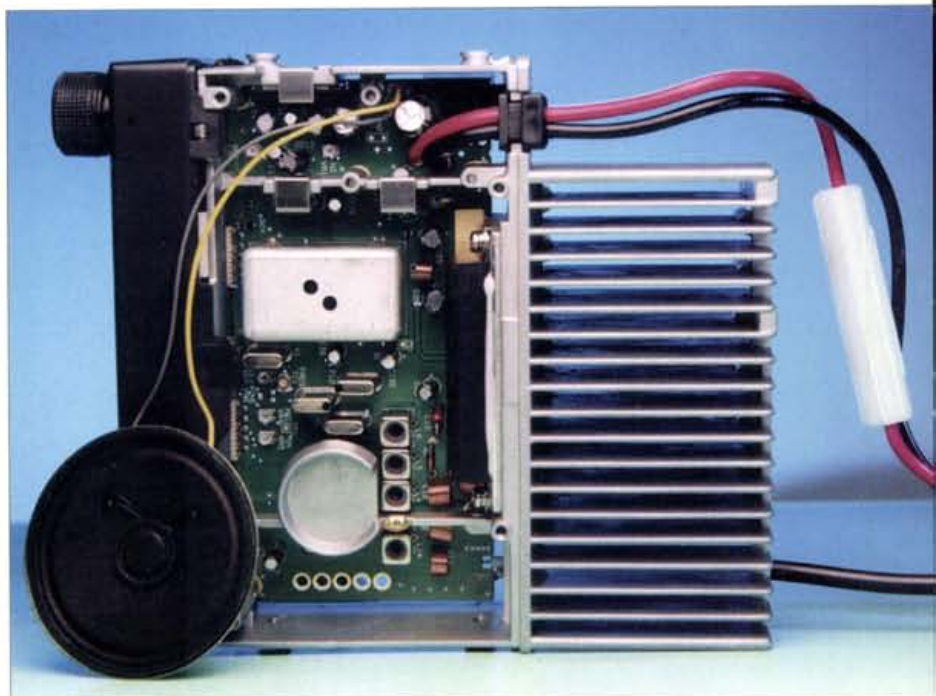
William and I tied up at a distance of about 27km. Dave's wisdom was then confirmed as I heard him call

Continued on page 25...

"... the Alinco DR-M06TH represents good value for money".

RICHARD NEWTON GORSN REVIEWS AND COMPARES THE ALINCO DR-M06TH.

Fig. 1: Internal view (top) of the DR-M06TH showing the extensive heatsink.



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"The DR-M06TH is a well made, easy to operate, smart looking unit".

...continued from page 23

in and speak to William, I could hear Dave but he could only just hear me down in the noise.

Experience & Journey?

My experience on the journey showed me that 50MHz was a lot different to 145MHz. I was still a little concerned about the way the DR-M06TH was behaving. I was not sure whether it was the radio, the antenna system or just the way 50MHz is.

So, in order to allay my fears I decided to do some comparisons. The only other radios I had access to with 50MHz was William's Icom IC-706 MkI and Dad's Icom IC-551D - a dedicated 50MHz multi-mode.

William and I went on an expedition to Selworthy Beacon, a high point overlooking the Bristol Channel. We used the same antenna and switched between IC-706 and the DR-M06TH. My Dad, John G8EAM, helped from base camp and gave several reports. It was difficult to get a true comparison on transmit because of different power outputs, however, the Alinco compared very favourably with the Icom IC-706 MkI on receive. The IC-706 MkI has three receive settings, Attenuated, normal and pre-amp. The Alinco DR-M06TH out-performed the '706 on receive on the first two settings, the received signal on the Alinco DR-M06TH was basically equivalent to the '706 set on 'Pre-amp'.

As a last test of the radio on the air I went back to Dad's shack and connected it to the W2000 Tri-Band vertical for 50/144/433MHz. Using a coaxial

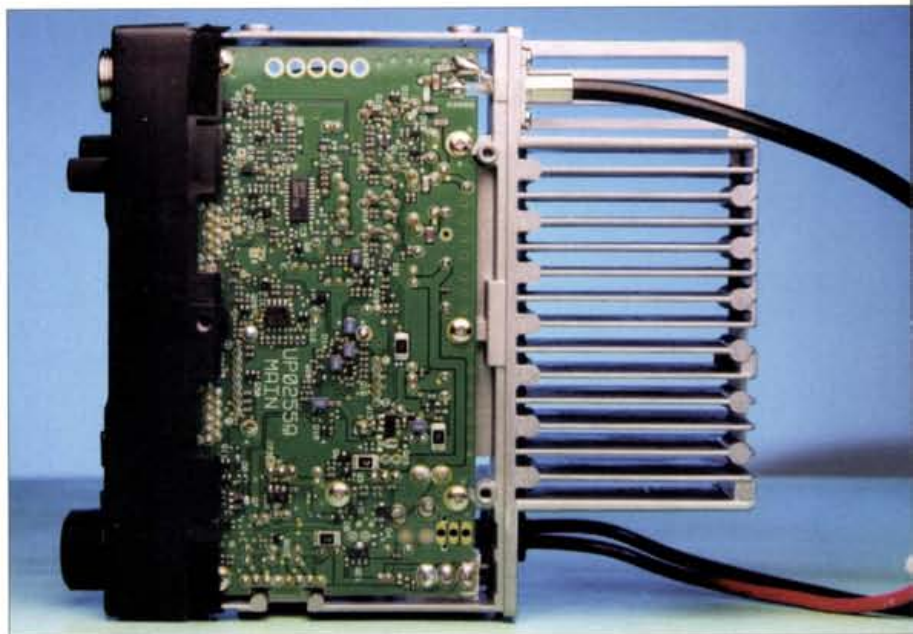


Fig. 2: Internal view (bottom) of Alinco DR-M06TH.

switch we switched between his 551D and the Alinco DR-M06TH.

I tuned the band and put out some calls with little success. Eventually I heard a QSO in progress and politely called in. **Dave G3ZXX/M** and **Jeff G7SSG** welcomed me in. Dave was at the site of a proposed 50MHz repeater, GB3WX. He was doing some tests for coverage, so this became rather a mutual help session with reports flying to and fro.

Dave was in a car with a quarter wave antenna near to Wincanton. Jeff was a base station also in the Wincanton area, this was distance of about 80km. Both Dave and Jeff gave the DR-M06TH a very good report on signal strength and audio quality. This was a very pleasing and interesting contact to complete my on-air tests. Again, a comparison with the '551D on transmit was difficult because of too many variables. Direct comparison with the received signals showed that there was no discernible difference between the two radios.

With any fears I may have had completely allayed, I consider the Alinco DR-M06TH represents good value for money. I was very pleased with it in comparison with the other 50MHz radios I could find. The receiver seemed sensitive and the 20W output was a good solid output power that meant that I made contact with everyone I heard and called.

If you are happy with f.m. only, the Alinco DR-M06TH is a convenient and relatively inexpensive way of getting on a band that is gathering momentum. Repeaters are slowly appearing and over the last few reviews I have done on 50MHz equipment I have noticed more 'Nets' appearing. Sometimes these 'Nets' can cover quite a large area.

The DR-M06TH is a well made, easy to operate, smart looking unit. It seemed to work well as both a mobile and a base station and always got complementary reports on the transmitted audio.

My thanks go to Nevada, 189 London Road, North End, Portsmouth PO2 9AE, Tel: (01705) 662145, for the loan of the Alinco DR-M06TH for review. The price of the transceiver is £249.95 including VAT plus £8 for next day delivery.

PW

"... the DR-M06TH was up and running and programmed with all the memories that I wanted within about half an hour of me unpacking it".

Richard gave the Alinco DR-M06TH a reviewer's score of six out of ten!

Specifications

General

Frequency coverage	50-54MHz
Frequency steps	5, 10, 12.5, 15, 20 and 25kHz
Antenna impedance	50Ω unbalanced
Power supply	13.8V d.c. (± 10%)
Current drain at 13.8 V	Approx. 6A on high power
Transmit	
	Less than 800mA squelched
receiving	
Dimensions	140mm (W) x 40mm (H) x 154mm (D)
Weight	Approx. 860g

Transmitter

Output power	High - 20W (approx.) Low - 2W (approx.)
Emission type	F3E (f.m.)
Modulation system	Variable reactance frequency modulation
Max. frequency deviation	± 5kHz
Spurious emissions	-60dB or under below carrier
Microphone	Electret condenser microphone
Offset	from 0-15.995MHz

Receiver

Receiving system	Superheterodyne Dual Conversion
Intermediate frequency	1st - 10.7MHz. 2nd - 455kHz
Sensitivity	12dB SINAD - 16dBμ
Selectivity	More than ± 6kHz at -6dB Less than ± 15kHz at -60dB
Audio power output	More than 2.5W at 10% Distortion
Speaker impedance	8Ω



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RADIO BASICS

In this month's column Rob Mannion G3XFD takes time off between 'Radio Basics' projects to answer reader's queries on getting the best out of their radio and suggests simple modifications to help achieve good results.

Before I start the preparations for the next 'Radio Basics' project (more on that later) I'll break off to answer some queries on reception and how to improve it before replying directly to one or two interesting points raised by readers.

Firstly, I should like to thank the readers who've contacted me - by telephone, E-mail and letter asking how they can improve things on their existing receivers.

This question - by far the most commonly asked - is rather difficult to answer in general terms. However, having looked through the various letters from readers I have seen that the vast majority in this category come owners of older transistorised communication/general coverage receivers.

Looking back over the years to the early 1960s I've got to admit that I always fancied a Perdio 'Town & Country' receiver. It covered 1.8MHz ('Top Band' and the old 'Trawler Band' up to about 6MHz, I believe). And it appears

that quite a few readers have receivers of this type and vintage which require 'hotting up'.

The older British made receivers are joined by the huge number of Russian made 'Vega' receivers (the types using the 'turret tuner and built like the proverbial tank') together with the cheaper 'multi-band' receivers that are often seen advertised as 'special offers' in the national newspapers - particularly in the weekend supplements.

The Problems

Some of the problems the readers are finding with the type of receiver mentioned involved interference, overloading on external (longer) antennas and difficulty in tuning. Additionally, several have written to me saying that they've tried to use 'good quality' portable long and medium wave receivers in conjunction with the 'Radio Basics' 3.5MHz to 1MHz (medium) converter (with little success).

Let's look at interference first. The most common source of interference - particularly for the h.f. broadcast band listener and those looking for weaker

Amateur Radio signals has to go to be the domestic TV receiver. These are extremely potent

'transmitters' and they radiate powerful signals from various circuits. The main culprit being the scanning coils associated with the cathode ray (picture) tube.

The 'timebase' (the line timebase signals can be heard throughout the broadcast bands right up to 30MHz in some cases) can penetrate through walls and

radiate signals strong enough for TV 'Detector' vans to receive up to 3km away from the TV set! So, if you're near to a TV (many flat dwellers have this problem from neighbour's TVs) and want to listen to long, medium or short waves what can you do?

The answer is first: run the receiver from a battery source if possible as much radiation comes through the mains. Secondly, place your receiver as far away from the TV set as possible. Thirdly, whenever possible use a receiver with a screened metal case in conjunction with an external (screened input lead) antenna. Additionally, although I know it's difficult for many people to persuade others in the house to switch off the TV - (it's quite surprising just how many people have the TV on when they're not watching - try asking! I do the same myself sometimes).

Other forms of interference come from sources such as thermostats, central heating ignition systems, fluorescent lights (particularly bad), motors and other household appliances. And although curing the problems can be very difficult - especially if you have limited experience - the problems can be dramatically reduced by operating your receiver from a non-mains source. It's often the easiest and most economical way of reducing mains borne interference - especially if

short wave bands in the evenings. Fortunately for him, we were soon able to discover the cause and it was very easy to overcome!

One of the first questions I'd asked the reader was "Do you have fluorescent lights in your radio room"? The answer was very positive: "No ... I won't have them in the house other than in the kitchen".

Puzzled (mainly because the interference sounded so much like that from fluorescent tubes) I asked some more questions. Finally we discovered the problem - the reader had fitted the relatively low powered so-called 'economy light units' which are mostly miniature (coiled tube) fluorescent lamps.

Even the more modern lamps of the kind the reader had can be a potent source of interference close up. However, those of European manufacture are now much better, but don't be fooled - they are still fluorescent tubes in disguise and can still radiate interference. In my opinion you're better off with a standard incandescent (filament) type of bulb in your radio room.

Overloading Antennas

One of the other troublesome problems is the overloading caused to simpler receivers by the connection of external antennas. Many 'Radio Basics' readers have

run into this annoying difficulty - especially after they've gone to the trouble of erecting what they consider to be a good outside antenna.

However, instead of improved reception "everything went haywire" one reader wrote in to say (his letter joined many others on the same topic!). He went on to explain that all he's done was to connect the new antenna directly into the 'external antenna' socket of his older receiver. "What was wrong in doing that?" he asked me.

In answer I had to tell him that the problem was caused by the receiver being overloaded by the

tremendous increase in signal levels. In fact, the reader whose letter I'm quoting from said "I could even hear my local commercial medium wave station on top of everything else I was receiving".

Unfortunately, what the reader described in his letter was obviously overloading and what it



Fig. 1: Many radio enthusiasts start off by using simpler receivers such as this Goodman's set. Although ideal for truly 'portable' listening, a different approach has to be adopted when the user wishes to obtain better short wave reception with an external antenna (see text).

you can run your radio from a 12V battery source or something similar.

Incidentally, one reader rang me at the office one day to say that radio reception on anything other than Band II v.h.f. f.m. services was virtually impossible due to a continual 'buzzing' sound all over the long, medium and

referred to as 'cross modulation'. The effect is - unfortunately - impossible to eradicate on simpler receivers, but you can easily modify the way you feed the signals into the radio, thus making a compromise between getting better reception and minimising the overloading and cross modulation.

The simpler receiver, **Fig. 1**, is available in many forms and from various manufacturers (I've got a very similar version marketed by Philips). It is in fact quite sensitive, but when connected to an external wire antenna of more than three metres long, can easily overload the receiver with strong signals from the band you're listening on together with transmissions from other bands.

However, it's very easy to 'attenuate' the incoming signal somewhat, without losing all the advantages of the external antenna, by actually wrapping the external antenna's wire (I'm assuming you will use insulated wire for the external antenna) round the telescopic whip antenna for approximately four to six turns. This will make a remarkable difference - try it and see.

If you want to be really clever (providing you have access to a good external 'earth' connection you can then attach the previously un-connected end of the external antenna to earth. This will prove a crude 'transformer' action and will help reception further).

Antenna tuning units (a.t.u.s) can help minimise strong 'out of band' signals but require a receiver fitted with 'external antenna and earth' connections. A suitable (receiving only) design will be appearing in 'Radio Basics' very soon as I realise that many of you will find it to be of great help improving reception.

Tuning Difficulties

Most readers using simpler receivers, particularly those with analogue tuning (the traditional tuning scale with mechanical drive and moving tuning scale indicator) report that they find that they have tuning difficulties. In other words - the tuning rate is too high (fast, or 'coarse' are other common terms) for the narrow frequency segments needed to listen to Amateur Radio and even h.f. broadcasting transmissions.

The 'Steepletone' receiver, **Fig. 2**, has a much larger and easier-to-use tuning scale than the smaller receiver in **Fig. 1**. It's also equipped with 'fine tuning' to provide some bandspreading. Usually achieved by incorporating

a small set of variable capacitors connected in parallel with or within the main tuning capacitors and operated by a concentric or separate control). However, because **it is larger** - it's not so portable as the radio in **Fig. 1**. You pay your money and take your choice!

Lack of 'bandspread' is always a problem on older/simpler receivers has always been a problem. In the old days (40 years or so ago) we often used to make larger tuning knobs (stick-on fibre or cardboard disks were popular) or even used 'Meccano' gearing! However, in all honesty I suggest that you don't modify existing receivers - it's not worth it in my mind and we've got an interesting project coming along soon to help in this area!

Resolving Signals

I was temporarily 'stuck' in choosing a heading for the next topic because it could also have been included under the heading of 'tuning difficulties'. However, on reflection I thought it best to address the queries under the chosen heading 'Resolving Signals'.

The signals to be resolved - or rather the signals that the listeners would like to **resolve** - are mainly Morse (c.w.), single sideband suppressed carrier (normally referred to as s.s.b.) and narrow band frequency modulated (n.b.f.m.) signals. The first two (c.w. and s.s.b.) are relatively easy - provided your receiver is fitted with a beat frequency oscillator (to provide a 'local carrier' to create a 'beat note' to make an audible tone for the Morse signals or to 'artificially' reinsert the 'carrier' of the s.s.b. signal*. **See note below.**

(*The s.s.b. signals we use nowadays are actually a specialised form of amplitude modulation. At the transmitter the a.m. signal is produced in the normal way, specially processed to remove (in practice - greatly reduce) the 'carrier' wave, and then - usually - the speech 'sidebands' (which are 'mirror images' of each other, just above and below the carrier frequency) are made

available singly. This is because only one sideband (either the upper or lower sideband) is required for transmission and reception. This reduces the frequency bandwidth needed considerably and reduces the possibility of interference. The local 'carrier' (the b.f.o.) then re-introduces the carrier so that the operator can resolve the speech into something resembling (very nearly!) the original voice at the other end.

However, all is not lost if you don't have a b.f.o. fitted on your simpler receiver. Instead, you can use another radio (or the 'Tinny Dipper' if you've built one for yourself) to provide the b.f.o. signal quite easily!

All modern radio receivers contain a 'local oscillator' which is in effect a very low power transmitter. This can be demonstrated by switching on and tuning a receiver to the very top end of the medium waveband (preferably with a fairly weak

can use them to advantage.

Fortunately, you don't need two short wave receivers to get the 'external b.f.o.' effect. The local oscillators (this is usually a nuisance but is useful in this instance) radiate many harmonics and so it's possible to tune a receiver on the 3.5 or 7MHz band and gently tune the second medium wave receiver (placed close by of course) to produce a 'beat note' for Morse (c.w.) or to resolve s.s.b.

Resolving s.s.b. using the 'second set' method is not easy - but it is certainly easier than modifying a radio to incorporate a b.f.o. or making an external unit. Try it and see!

Finally, and briefly, I must mention n.b.f.m. This form of modulation is found on the CB radio bands just below the 28MHz band and also at the top end of the 28MHz band itself. Several readers wrote in and asked why - although they could tune the signals in okay - was there so little audio, resulting in a very difficult-to-hear transmission?

The reason behind the problem is that the detectors on your radio (unless equipped for n.b.f.m.) respond mostly to amplitude changes and not the frequency changes of n.b.f.m. With luck you can slightly 'off tune' your receiver (switched to a.m.) and use what is called 'slope detection' to receive an audible audio signal.

Resolving n.b.f.m. on an a.m. receiver takes skill, but you can do it - and older receivers usually get better results.

Try this and see what happens - it's amazing what 'DX' signals you'll be able to hear on 28MHz. (I hope to describe a very simple 'Radio Basics' 28MHz n.b.f.m. receiver later on this year so watch this space!

Next Project

Next time I'm planning to describe an interesting project that will demonstrate excellent 'bandspreading' for use on the narrow Amateur Radio bands, introduce a 'tunable' front end (fixed i.f. output) and a form of tuning which may be new to you - permeability tuning.

The project will provide good training and then I hope we'll be able to incorporate it into a simple receiver - to use on the band of your choice. Cheerio until then! **PWW**



Fig. 2: There are many receivers - such as this 'Steepletone' - in use. The advantages with the larger dial means that 'fine' tuning is easier because of the larger scale (see text).

station tuned in). Next, you should switch on and tune another receiver to the bottom of the medium waveband and slowly tune it up (higher in frequency, lower in wavelength) the scale until you hear a 'whistling' (beat) note on the first radio.

What's happening is this: The first receiver is receiving the 'local oscillator' of the second receiver (operating approximately 455kHz above the incoming signal) and the two signals (that from the second receiver and that from the weakly received medium wave station) produce a 'beat note'. It does require careful tuning - but will work very well provide the two radios are quite close and both have plastic cabinet, which as you now know, provide little screening and this allows more of the local oscillator signals to 'escape' so we

Reminiscences Of The Macroelectronics Era

Brian Dance recalls his childhood memories, mainly of radio, at a time when electronics was easily carried out without a microscope and there were few applications other than radio!

"Boiling off the water to get the concentrated acid ..."



The whole receiver was fitted into a polished wooden box about 230 x 130 x 130mm with a deep lid. When opened, the baseboard was on top of the box and the lid had storage spaces for spare crystals.

Battery Version

A year or two before the Second World War, my father decided to construct the battery version of the ST900 receiver, the most advanced of John Scott-Taggart's well-known designs of that era. This was a t.r.f. receiver (tuned radio frequency) - meaning it was not a superheterodyne.

The receiver employed valves with 2V filaments, mainly made by Hivac and Mazda. A particularly inconvenient feature was the plug-in coils, two coils for each of the five wavebands (l.w., m.w. and three s.w. for about 6-30MHz reception).

Each coil was about 35mm in diameter and 90mm high. Wavebands were changed by opening the top lid, removing the two coils in use and replacing them with those for the wanted band.

Unused coils were stored in a rack. The lower compartment contained a Stentorian speaker, accumulator and h.t. supply (eliminator or battery).

The antenna of this receiver fed directly into a 'triple extractor' (three adjustable tuned circuits designed to reduce the amplitude of any powerful signals). I remember my Father often told us he could not get any sound when he switched on the receiver for the first time, but when he adjusted the triple extractor, the sound roared out.

Gain was low in frequencies in the 30MHz region (to be expected in a t.r.f. receiver, owing to the low r.f. anode load), but the noise performance was good. Connections were by knurled screw terminals with no soldered joints.

We moved to a country cottage without mains power during the bombing of Birmingham in 1940. It was then that we had to obtain a very large 'triple capacity' h.t. battery for this receiver and had to resume taking accumulators to a garage to be charged until a mains supply was connected in about 1942.

Unfortunately, the 6-pin connectors at the base of the coils were not robust enough to withstand the rough handling I gave them when I was in my early teens, so my father replaced them with fixed coils for only l.w./m.w. use. He also fitted mains valves. I still have this receiver, but it's no longer used.

During my early teens, I spent much time experimenting in chemistry. I remember getting a large 2V accumulator filled with sulphuric acid (30% battery acid) and boiling off almost all the water to get my supply of the concentrated acid. I could not otherwise obtain this cheaply, as the shop was only allowed to sell it in an accumulator.

It cost 1s 6d (about 7p) for about 1.5 litres.

My parents doubtless found some relief when I changed to the cleaner, less smelly, hobby of electronics in 1949.

It was safer than chemistry - at least until I charged a 12µF capacitor to 3kV and nearly got my fingers across it! (When discharged with a screwdriver, the noise was like a gun).

Government Surplus

Large quantities of 'government surplus' parts were on sale from about 1948 in many shops in large cities. (Television came to the Midlands in about 1950 via the old 50MHz Band I v.h.f. service from Sutton Coldfield).

The school radio society made a receiver using government surplus parts with a VCR97 radar tube. This 6in round c.r.t. produced a small monochrome green picture - the room curtains

had to be drawn for better viewing.

A friend made his own vision receiver, but did not have time to make a good sound receiver. In order to use it on the first night Sutton Coldfield transmitted, he quickly rigged up a super-regenerative receiver for sound and happily watched *'The Winslow Boy'* on the first night.

The next day my friend heard that all radio shops in the area were inundated with complaints about television interference, so his super-regen was never used again. (I must be careful - he still reads *PW*).

Audio Interest

My interests were more in the audio than in the television field when studying for Chemistry Degrees. So I made one of the famous Williamson amplifiers using separate large metal chassis for the power supply and for the amplifier itself.

The amplifiers used two 6J5 triode valves in metal envelopes feeding a 6SN7 double triode phase-splitter stage. This fed a pair of 807 power output valves in push-pull.

The metal 6J5s were later replaced with EF37As low microphone valves with special heaters for minimum hum. The output end of the chassis was weighed down by a huge, heavy 'Savage' 2B36B output transformer.

The mains transformer was a similarly heavy Admiralty surplus component rated at 525-0-525V, 550mA. Although far larger than needed, it was the only cheap one I could find at 17s 6d (87.5p).

I knew the transformer voltage was too high, but high power impressed me at that time. Nevertheless, I was surprised the 807 anodes glowed at a red heat before I modified the power supply!

I thoroughly tested the amplifier on square waves. It certainly performed well and I could watch music, especially Beethoven's symphonies, as variations in the blue glow of the mica insulators in the 807 valves under electron

bombardment. (This was not a glow from between the electrodes which would have indicated a faulty tube).

Radio Circuits

In the late 1950s, I spent much time experimenting with radio circuits, including variations of the Lamb noise silencer and started writing for *PW* and others, leading to my second career as a technical author. I then became involved with early germanium transistors in the early 1960s in my lecturing work.

Apart from their size and the lack of a heater, the main difference from valve circuitry was the far lower impedance. The control grid circuits of valves have impedances in the megohm range, whereas that of the early transistors were much lower.

An r.f. tuned circuit can be connected directly across the input to a valve. But almost all of the early germanium transistor receivers used coils with tapings.

Another feature of transistors is that they normally fail catastrophically, whereas valves usually slowly deteriorate in performance as their emission falls. Obviously sudden failure may occur if stupid constructors allow the anodes to get hot!

I did considerable experimentation with tunnel diodes, but the two terminals of these devices offered no input-output isolation. So, there was a strong tendency to oscillate at various frequencies, but they were useful for my work in the nuclear field.

The availability of silicon planar transistors in volume from the 1960s followed by radio frequency i.c.s from the 1970s greatly simplified radio design. This was helped by high performance ceramic filters instead of conventional tuned circuits.

In spite of the high performance of modern highly miniaturised radio receivers, I have some regrets that you cannot experiment with them in the way you could in the 1930s and 1960s!

PW

Lisle Street Radio's Memory Lane

My memories of Lisle Street go back to the late 1950s, when I was about five or six years old and my father used to take me to our shop which was 14 Lisle Street, known as West End Radio Ltd., a name which is very familiar to Radio Amateurs all over the United Kingdom.

We used to live in Hove in Sussex and it involved a moderate train journey. The shop was owned jointly by my father, John Hyams and my Uncle Henry.

Together with my Grandfather they had owned a number of shops. The earliest photograph, **Fig. 1**, shows my Grandfather and my Uncle (they used to dress them that way then) and my father. The photo is of the Brixton shop and was taken around 1925.

The later photograph, **Fig. 2**, was again of the shop in Brixton, South London, taken in the late 1930s with my Uncle Henry standing in the doorway.

At the outbreak of the Second World War they closed all except 14 Lisle Street. Unfortunately,

although my family took many photographs of the famous Lisle Street shop - none have survived.

Playing With Radios

I can remember spending hours playing with the ex-Second World War radios and all sorts of other things such as yellow tinted goggles and large microphones. It was an Aladdin's Cave!

In the basement was a huge amount of old stock that had been brought from the other shops. I can remember the boxes full of big carbon resistors, large glass insulators and there must have been thousands of valves down there.

I worked in the shop in the early 1970s for a couple of years and my first job of the day was to

put the long trays outside. These were placed in

Continued on page 33...

Whenever the subject of Tottenham Court Road, Edgware Road and Lisle Street are mentioned to Radio Amateurs over the age of 40 - the memories start flowing. However, Peter Hyams GW4OZU has very special memories - his father ran one of the famous radio shops!



Fig. 1: The Brixton shop in the 1920s. Grandfather Hyams stands in the doorway while Peter Hyams' young Uncle shyly stands next to Peter's father.

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Continued from page 31...

front of the windows and, on more than one occasion, I dropped one all over the pavement.

Because of its proximity to Wardor Street it was common to see famous film and TV personalities in the street and sometimes they would come into the shop. I can remember the magician, the late Tommy Cooper came in one day and was looking for six stands to hold eggs for a trick he was doing in the Royal Variety Performance at the weekend.

We scratched our heads for a while and came up with six valve screening cans of the type that were fitted to EF86s, etc. Tommy was delighted with our efforts and a sale was made. We all sat at home that weekend and watched for our screening cans on TV!

Thunderbirds & Dr. Who?

Film and TV companies used to come to the shop and buy quite a lot of items from time to time to use as props, in fact many of the knobs, switches, lamps, speaker grills, etc., were used in 'Thunderbirds' and some of the early 'Bond' films and 'Dr Who'. And of course the price 'went up a bit'!



Fig. 3: At his home in Wales Peter says "I still have a few odds and ends left from those days, including the Westinghouse battery charger which still works!"

We also knew most of the 'ladies' who used to rent the flats upstairs. One day I was asked to replace a broken 13A socket in one of the flats above the shop, so when I got there I had to roll the bed out of the way to get to the socket. On doing so, I revealed several whips and some handcuffs and various other devices. I think I must have blushed profusely, because the 'lady' of the flat burst out laughing.

Incidentally, although many people think that Lisle Street's connections with 'dubious' entertainment and the 'oldest profession in the world' has developed since the 1960s are wrong! In fact the



Fig. 2: This later photograph was again of the shop in Brixton, South London, taken in the late 1930s with my Uncle Henry standing in the doorway

connection has been in evidence since the 1890s!

Odds & Ends

Here in my home in Wales I still have a few odds and ends left from those days, the Westinghouse battery charger, **Fig. 3**, was built in 1944 and is still

working well, the only thing to have failed was the metal rectifier which I replaced with a diode bridge. The large variable resistor, **Fig. 4**, still has 'War Finish' stamped on one end.

I left the shop after I was offered an apprenticeship with Philips and spent the next eight years with them at their service department in Croydon. It was during this time that I studied for, and passed, the RAE.

I always used to call into the shop when I was working in field service in the area and have a cup of tea and a chat. My father died and my Uncle kept the shop going until about ten years ago when he retired - he has also since died. All the remaining stock was sold off cheaply or dumped in a skip!

If you do venture down from Leicester Square, you'll find 14 Lisle Street is now a Chinese Grocery Shop. I walked down the street about four years ago, finding it to have a very different atmosphere and of course ... my visit was tinged with a little sadness.

PW

Fig. 5: Peter Hyams GW4OZU now lives in Pembrokeshire, a long way from Lisle Street and he says that a recent visit to the road of radio memories left a "tinge of sadness".



Fig. 4: A 'macro' volume control! Peter GW4OZU says that this large surplus variable resistor still has 'War Finish' clearly marked on one end.



How to optimise your audio quality

Speakers & Headphones

Gordon King
G4VFFV, author
of our new
regular series
'Looking At ...'
and well-known
technical
journalist,
describes the
various
principles which
any Radio
Amateur should
know about
speakers and
headphones in
order to
"optimise on
audio quality".

Having in mind their diminutive size, lack of acoustical loading and being crammed in with a load of electronics, it's rather amazing that the speakers built into our transceivers sound as well as they do! Most audio output stages which drive these little speakers are capable of producing three or more watts of 'music' power (as distinct from continuous sinewave power) and in many cases, the output impedance is close to 8Ω . Inevitably, however, when the volume is well advanced things begin to rattle and the measured total harmonic distortion (THD) rises to 10% or more.

Of course, as Amateur Radio enthusiasts, we're not into the territory of the hi-fi buff, but even so, it's good to optimise on audio quality as far as possible and this applies whether we use a loudspeaker or a pair of headphones. It can also help if Morse code is our forté, as of recent times I have proved.

Moving Coil Principle

The operation of the loud speaker unit is well known. It follows the basic moving coil principle where a coil is accurately wound at the apex of a cone and suspended in a strong magnetic field - See Fig. 1 (a, b & c). When an electric current is caused to flow through the coil, a mechanical force is produced of a strength governed by the intensity of the current.

The cone is thus deflected either inwards or outwards depending on the direction of the current flow. When the current is alternating, as it would be from the audio output stages or our transceivers, then the cone is deflected or vibrated rapidly in and out according to the pattern of the audio information carried by the signal.

The air either side of the cone is thus alternately compresses and rarefied producing variations in the local air pressure, which in turn communicates with our ear drums, causing them to vibrate in sympathy. Our brains then decode the vibrations to what we hear as sound.

Moving Armature

Very early loudspeakers, although based on the electromagnetic principle, didn't use a moving coil. Instead, they employed a ferrous metal armature coupled to a largish diaphragm, which was caused to vibrate when an audio signal was applied to a pair of coils wound on a 'U' shaped permanent magnet.

Back in the 1920s the diaphragm, which then formed the armature as well, was loaded acoustically to a horn. In the 1930s, the horn was replaced by a large fabric diaphragm treated with cellulose acetate and tightly stretched over a wooden frame.

Vibration resulted because the audio current through the coils caused a varying magnetic field which, on alternate half cycles, added to and subtracted from the field of the permanent magnet (Fig. 2). This principle was adopted in all early headphone sets (and telephone receivers) and headphones of this kind are still in use.

However, quality headphones these days are often based on the moving coil principle. In fact, in many ear

piece units the elements look like miniature moving coil speakers. The lower frequency response is maintained, despite the small cone (diaphragm) size, because of the close coupling to the ear drums.

Rarely used in Amateur Radio (except perhaps in the form of a microphone) is the ribbon speaker where, instead of a moving coil, a thin piece of flexible metal ribbon is suspended within the magnetic lines of force of a powerful permanent magnet. When a strong audio current is passed through the ribbon,

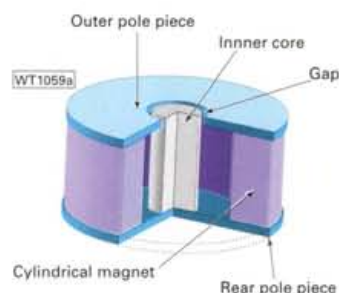


Fig. 1(a): Principle of the moving-coil loudspeaker unit, formation of the magnetic core.

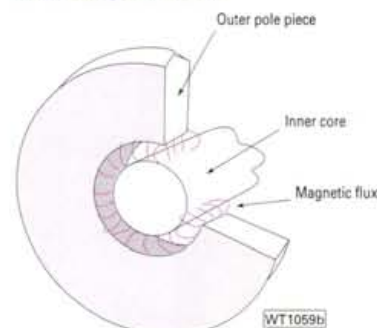


Fig. 1(b): Cross-section view, showing the magnetic lines of force (flux).

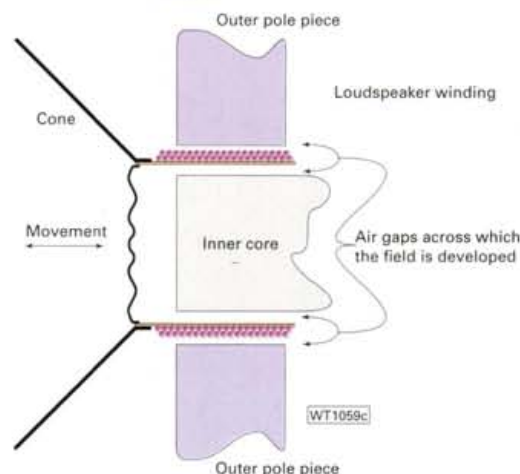


Fig. 1(c): Showing how the moving-coil at the apex of the cone is suspended in the magnetic field.

variation occurs which is coupled acoustically to a small horn. This kind of speaker is mostly designed to respond to the higher audio frequencies. It often constitutes the 'tweeter' unit of a hi-fi speaker system.

Piezo Electric Principle

Loudspeakers and headphones can also adopt the 'crystal' or Piezo electric principle. Here, amplified audio signal is

applied across a pair of metal plates sandwiching a ceramic or (formerly) Rochelle salt crystal element.

The varying voltage causes the 'crystal' to change its shape slightly and hence vibrate in accordance with the analogue of the audio. The vibrations are coupled to a small cone or diaphragm. However, this kind of unit is unsuitable for low frequency sound because large amplitude vibrations cannot easily be accommodated by the 'crystal' without the danger of it fracturing.

Electrostatic Principle

For the sake of completeness, mention should be made of the electrostatic speaker (ELS) principle. Here, a thin conductive diaphragm is engineered to vibrate in parallel with, and close to, a fixed metal mesh. The diaphragm and mesh form the two plates of a capacitor across which a steady polarising voltage is applied through a 'hold-off' resistor, causing a slight inward deflection of the diaphragm. When the audio signal is applied in parallel with this voltage, the diaphragm vibrates linearly and in sympathy with the corresponding changes in the electrostatic force.

The principle is adopted in the hi-fi world, but based on a 'push-pull' technique to cancel residual distortion and it forms the basis, for example, of the acclaimed Quad Electrostatic Loudspeaker. Rarely used in speakers for Amateur Radio, the electrostatic principle can, however, be found at the other end of the audio chain - at the microphone. However, it's really the moving coil principle which is our primary practical concern in this article.

Current Drive

Because the moving coil has only relatively few turns of wire it has a low impedance and thus requires current drive. This is just the job for solid state or transistor audio output stages, which are current rather than voltage operated. Almost a direct audio coupling from the device to the speaker is thus feasible, but with valve output stages, which are essentially voltage operated, a step-down transformer needs to be used to match the high anode impedance of the valve to the low impedance of the speaker to obtain current drive.

Moving coil headphones are usually of higher impedance than speakers, sometimes around the 50 Ω mark, but it's possible to connect them to the point where the loudspeaker is connected and still achieve adequate volume, depending on their sensitivity. In some transceivers the headphone jack also caters for an external loudspeaker, but the jack is often switched so that when the plug is inserted, the internal speaker is automatically disconnected.

However, where there's an external speaker socket as well as a headphones socket, the speaker should always be connected to the former. This is because a current limiting resistor might well be included in the headphones circuit to avoid overloading or ear damage.

Enhanced Readability

A case can certainly be made for the use of an external speaker, especially where the transceiver needs to be compacted into a small working space along with other closely adjacent equipment, which could be adversely affecting the sound from its own speaker. The external speaker could then be mounted away from the main equipment on a wall or table.

The quality of sound will invariably be enhanced by this and the speaker can be orientated for the least 'overhang' which may be caused by room resonances and reflections. This will also improve readability, especially when sending or receiving fairly fast Morse, where element spacings are in milliseconds!

For basic communication purposes, a loudspeaker of Practical Wireless, April 1999

the hi-fi kind is not necessary. In fact, such a speaker may detract from the requirement owing to its wide frequency response letting through QRM that might not be audible from a less exacting counterpart. Hi-fi speakers commonly have a frequency response from around 30Hz-20kHz, while for general speech communication, a much more limited response is adequate. (See Fig. 3).

The extended bass response of hi-fi speakers is achieved by the nature of the acoustical loading of the main drive unit, while two or more additional units cater for the mid-range and upper treble. The different units are connected through a sort of filter circuit (crossover network) so that they are fed only with the range of frequencies for which they are designed.

However, all moving-coil speaker systems need to have a baffle or some sort of enclosure to prevent sound pressure waves from the rear of the cone cancelling out those from the front, which would otherwise result in a serious fall off in bass output.

In the hi-fi world, remarkably elaborate enclosures are often evolved to maintain a

smooth output response and extended bass. Speakers for general communication, however, are usually contained in a small enclosure, often of metal.

Improved FM Audio

However, on narrow band f.m. (n.b.f.m.), it's surprising how remarkably good the audio quality can be from a well installed and adjusted transceiver and this applies to the f.m. segments of the various v.h.f. and higher bands. It's good to be able to provide a realistic quality report to a station using frequency modulation, which is rarely possible using the squeaky little rig speaker.

I employ a couple of discarded hi-fi speakers in my shack, one connected to the h.f. rig and the other to the 144MHz rig (Fig. 4). Happily, I'm able to tailor the response of my h.f. rig to relate to the type of transmission I'm handling and this is where good audio filtering to provide the most suitable audio bandwidth required at the time can pay dividends, especially when an external speaker of the hi-fi kind is being used.

In full response mode, such speakers are able to detect not only possible shortfalls in the high frequency quality of a transmission, but they can also be extremely critical of the low frequency end, especially with regard to power supply smoothing and the like. Good transmissions will be completely hum or ripple free, but it's really surprising how many otherwise good quality transmissions are marred essentially by second or third-order ripple components generated by poorly designed or serviced power supply units (p.s.us.).

Since I have been investigating the application of external speakers I have been surprised by the relatively high incidence of 144MHz f.m. stations which are transmitting, presumably quite unwittingly, significant levels of 50, 100, and 150Hz and sometimes higher order power supply

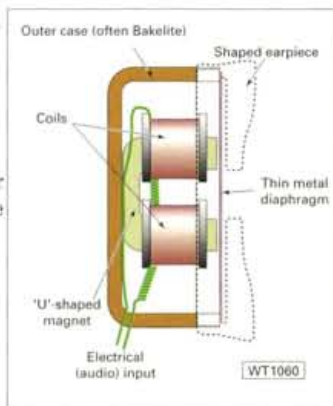


Fig. 2: Basic features of one of the ear units of an early pair of headphones.

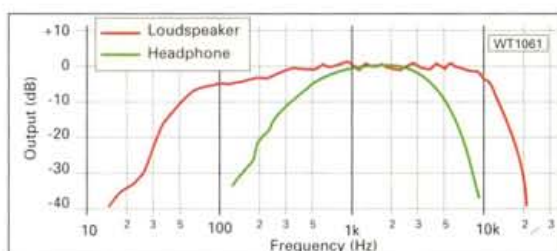


Fig. 3: Graph showing response of a hi-fi loudspeaker system and the lesser response required for basic 'communication quality' speech.

Fig. 4: Part of G4VfV's shack, showing the pair of hi-fi loudspeakers (not in stereo mode!) individually connected to 144MHz and h.f. transceivers.



Continued on page 41...

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A Practical Beam - From Bits!

Derek Holmes
GW3JSV
describes how
he recycled a
very useful
beam antenna
for the 18 and
24MHz WARC
bands using bits
from his 'junk-
box'.

Before building the antenna I'm about to describe, I'd managed with a 3/2 dipole for 18MHz and a 1/2 dipole for 24MHz. Prior to this, I'd loaded up my trusty doublet, cut for 3.5MHz, to work the WARC bands. The antennas had been quite satisfactory, but with the declining sunspot numbers and the increasing number of stations, I decided it would be nice to have something with a bit more directivity and, possibly, a bit of gain in the wanted direction.

As a result of reading an article by WB4OSN in *DX Magazine* (June 1989) my attention was drawn to a redundant Mosley TA32, residing in the loft over the garage. I began to formulate some ideas as to how this could perhaps be converted to provide a 2-element dual band beam for the two h.f. WARC bands.

I'm not exactly in love with traps and similar devices so, my first idea was to produce an antenna that didn't require traps. I designed along the lines of using a switching system, of half-wave stubs. Though this idea was pursued for sometime, I had little success.

Antenna Analyser

Then I persuaded myself to buy an MFJ-249 Antenna Analyser. Suddenly antenna experimentation became a joy rather than a chore.

With the analyser available I admitted that traps would have to be part of the system. So, work commenced. Reading up Carl Mosley's 'Theory Of Traps' (presented in most Amateur Radio handbooks and in the Mosley UK Catalogue) convinced me that this was probably the easiest way to go.

But first, you must catch your old TA32 or a TA33. If you don't have one, then I am sure that a small advert in the wanted section of 'Bargain Basement' will produce the goods.

Identify Elements

Once you have the start point antenna you must identify the driven and reflector elements. The driven element is easy to identify, as it comes in three parts - two half length tubes, a pair of trap assemblies and the centre support. But make sure you select the correct trap assemblies for the driven element (the driven element trap assemblies have a longer 'inboard' tube section than the reflector ones).

Having sorted out the correct traps, you will now need to dismantle each one. This is quite easily done with care

and attention as follows: Cut off the trap cover end caps with a strong sharp knife. The caps are scrap and will be replaced with new ones.

You should have exposed the screws (see Fig. 1) which both fix the end of the coil to the trap cover and secure the trap cover to the coil formers.

Next, you should remove both pairs of screws and put them in a safe place. Remove the trap coils from the trap cover. You now have the following (six) items: Two sets of trap coils and two trap covers.

Then remove the coil windings from the 28MHz trap - (it has 20 turns). The other coil - the 21MHz trap - has 40 turns. Now is a good time to clean up these items. If, like mine, the original assemblies are somewhat antique, there will be evidence of corrosion, particularly where the wire ends of the coil have been in contact with the aluminium of the trap cover.

You may find that some of the trap cover itself has eroded. This is not important, as there is plenty of metal to provide a new fixing. The standard Mosley trap coils are wound using tinned copper wire. Over a period of prolonged exposure, the trap formers can absorb a very small amount of moisture with its usual detrimental effects.

New Coils

Now to wind new coils: To do this, I obtained some 1.25mm (18s.w.g.) enamelled copper wire from a local factory that manufactures wound components for industry. Alternatively, a local electric motor rewind shop should be able to help. **(I would advise against using recycled wire for this job!)**

When dismantling the trap coils, you'll notice that the inner end of the winding is fixed by a screw recessed into the moulding of the coil former. This screw is about midway along the length of the coil.

You will also notice that there is another recessed, but undrilled point, some 20mm inboard of this first fixing point. Drill this point out to accept the self tapping screw used to fix the end of the new coil.

The new trap coil is going to provide a trap at 24.9MHz or thereabouts, so it will require a few more turns than the original. I started with 36 turns and found by trial and error during the setting up and tuning process, that I was able to prune this down to 33 turns for the final assembly.

When you are happy with the number of turns on the coil, make sure that you thoroughly tin the ends that will come into contact with the aluminium components. If not, you'll be setting in motion a potential corrosion point that will be hard to reverse and also, in time, will do a lot of damage.

Also with any corrosion points, you'll have created a very good non-linear device, which can cause all sorts of interference problems and will, in all probability, impair the receiving performance of the finished beam. The illustration of Fig. 2 shows the new trap in cross section, although the outer element must be removed for initial tuning up and checking.

Driven Element

I assembled the midsection of the driven element onto the element support and mounted it on my test range mast. This is perhaps a grandiose description of a length of mast, a little over three metres high, that I use out in the large field, away from all obstructions. It's lashed to a large wooden step ladder, which has a platform to put any test gear on.

You should temporarily assemble the trap coil and cover, using the un-wound coil former as the cover support for the outboard end of the assembly. This is where you need to beg, borrow, steal or, in the worst case, buy an MFJ-259 Antenna

"You may find that a bit of trap coil pruning is required..."

Analysers. But do not fit any trap cover and caps at this stage.

Slide fit these new trap assemblies into the centre section tubes. (No need to put the fixing screws in as there's a certain amount of adjustment to be done). As a starting point, position the inner faces of the traps as shown in Fig. 3 with 'L' equal to about 5.485m

Connect a short length - no more than half a metre - of 50Ω coaxial cable to the centre point of the element. (**Do not earth the braid side of the coaxial cable** as normally specified in the Mosley assembly instructions). The instructions may be okay for their regular product, but it did not help the situation here. Neither did the inclusion of a balun device, but more of that later.

Connect your MFJ-249 to the end of the cable and check to find where the resonant point of the assembly is. With luck, it won't be too far off the design point. Possibly at about 20MHz.

Next, adjust dimension 'a' equally on both sides to bring the assembly into resonance in the 24MHz band. You should aim to get as near to 24.9MHz as possible with minimum s.w.r. indicated on the MFJ analyser

Mark the position of the trap rods (the outer lengths of aluminium tube sliding into the centre sections) relative to the end of the centre section tube for future reference. You may find that a bit of trap coil pruning is required together with the readjustment of sections 'a' to bring the assembly to resonance, but I would leave this until you are adjusting for the 18MHz band.

The 18MHz Sections

You can now start to add the 18MHz sections to the driven element. There's no need to wind a trap coil for this band. In fact, the original trap coil former (the outer one of the pair in each trap) is only required to provide mechanical support for the outer end of the trap cover and the outer element tube.

I carried out the various steps in the following order, and it's the order I suggest you follow too:

A: remove the trap assembly, that you have just set up, from the test rig;

B: remove the blank trap coil from the trap cover and cut off any tubing that may be protruding from the 'inside' face of the former;

C: re-assemble the trap former as the trap cover and drill through one of the trap cover fixing holes, right through into the outer element rod;

D: insert this coil former assembly into the trap cover using a screw of sufficient length, screw the trap cover onto the former and the element rod, effectively shorting the cover to the outer section of the element, see Fig. 4.

The outer section elements, as they are, are too long to obtain a resonance on 18MHz. The overall length of a half wave dipole cut for 18MHz is 8.285m (27.18ft).

The inductance of the 24MHz trap coil is going to provide a degree of loading at both frequencies of operation and the adjustment to obtain resonance on the 24MHz band will have reduced 'L' of Fig. 2 to less than 2.4m. Therefore, I decided as a starting point to reduce the length of the outer section to some 400mm protruding from the outer face of the trap.

Re-Assembling & Fitting

You can now re-assemble the trap outer section and cover and fit the whole onto the dipole on the test pole. Clip your test lead as before and set up to the marks obtained when tuning for the 24MHz resonance. This is now your starting point.

Begin by re-establishing the resonance point for 24MHz by small adjustments of the length of the inner part of each element only. **Avoid the temptation to add or remove trap coil turns at this stage.** The aim is to get as close to the desired 24MHz resonant point as possible. Having achieved that, then start looking for resonance at 18MHz.

You may find that the (18MHz) resonance will be most likely be low, probably about 15MHz. Tuning for 18MHz

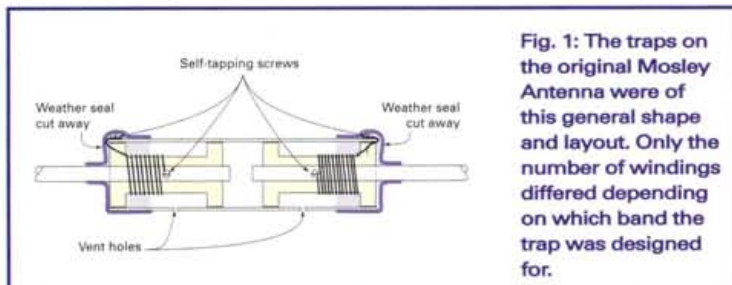


Fig. 1: The traps on the original Mosley Antenna were of this general shape and layout. Only the number of windings differed depending on which band the trap was designed for.

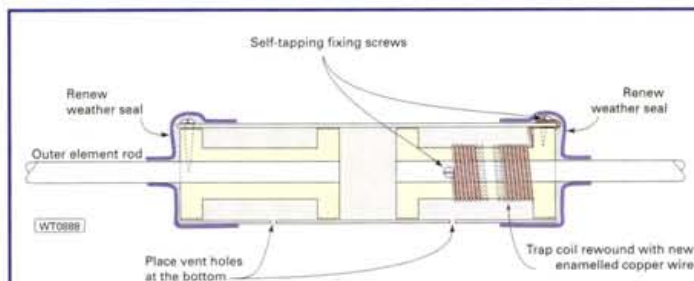


Fig. 2: The modifications will entail removing the outer coil all together and creating a new coil on the inner side of the trap. The outer element will be attached directly to the trap sleeve (see text).

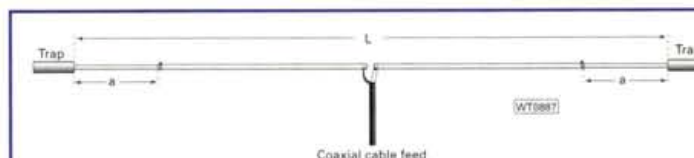


Fig. 3: Each element is treated to a first adjustment individually and without the outer element fitted.

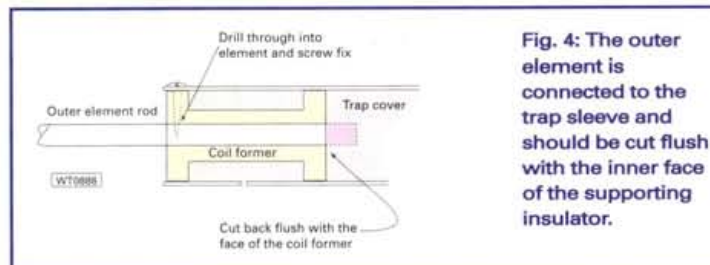


Fig. 4: The outer element is connected to the trap sleeve and should be cut flush with the inner face of the supporting insulator.

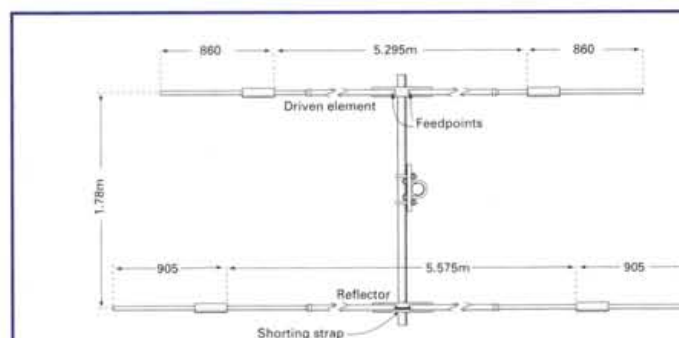


Fig. 5: The final assembly of Derek's 'new' WARC band antenna.

resonance is achieved by removing short lengths - no more than 10mm at a time - from the outer section tube and check again. (I ended up with the dimensions for the driven element as given in Fig. 5, where I've shown all the dimensions of the antenna).

The s.w.r. measured at approximately 3m above ground for this assembly as indicated on my MFJ-249 are shown in the two graphs of Fig. 6. The 24MHz band (actually nearer to 25MHz than to 24MHz) elements showed a reasonably even, if slightly high, s.w.r. over the whole band. But the 18MHz sections showed a rising s.w.r. over the 18.068 to 18.168MHz band.

Continued on page 54...

RAID THE JUNKBOX AND MAKE A BEAM ANTENNA, SAYS DEREK HOLMES GW3JCV

"The proof of the pudding..."

Wind ... Does It Affect Frequency?

Occasionally PW is able to find space to publish controversial ideas and topics associated with radio communications. This month, Trevor Newstead G0LQX explains why he thinks that the wind may affect frequency.

Whilst using c.w. have you ever noticed slight variations in the audio frequency of the signal during long QSOs in the same way I have? During some recent experimentation with another amateur we noticed the variation, was it our equipment or some other factor?

The variation in audio frequency was, we guessed, no more than about 20Hz, but our inquisitive nature got the better of us and we decided to investigate.

First thing to be checked was our equipment and, although the transceivers were home-brewed, they were designed and built to a high degree of accuracy. They were crystal controlled using matched crystals and were operating c.w. and s.s.b. on the 3.5MHz band.

Tested & Calibrated

Both rigs had been thoroughly tested and calibrated by a friend of ours, Jim, who runs an approved calibration house. However, when they went to be re-tested - there was no problem, it wasn't the rigs, so now what?

It was suggested that using a highly accurate tone transmitted on s.s.b. at one station and measured at the other may give some clue to the drift phenomena. Jim once again came to the rescue and he loaned us two synthesised function generators and two frequency counters, these items had just been calibrated at the National Physical Laboratory so the accuracy was known.

Back in our respective shacks we tried the experiment, using a 1kHz tone, over a period of two days getting similar audio frequency variations as previously encountered. The drift therefore had to be some external influence but what?

Was it temperature variations in the shack causing the problem? To prove or disprove the idea (blow the cost!) I



In his article, Trevor Newstead G0LQX sets out to prove that wind can affect frequency.

then set the central heating at 20°C and on continuous, waited two days and tried again - but still got the same results.

What to try next? How about weather conditions, atmospheric pressure or air temperature? How should we record this information and what should we actually record?

Meteorological Help

As our Amateur Radio stations are about 8km apart (roughly on a line SE/NW) and there is a meteorological station within 10km of both stations we decided to contact them and see if they could help. It was worth a try anyway.

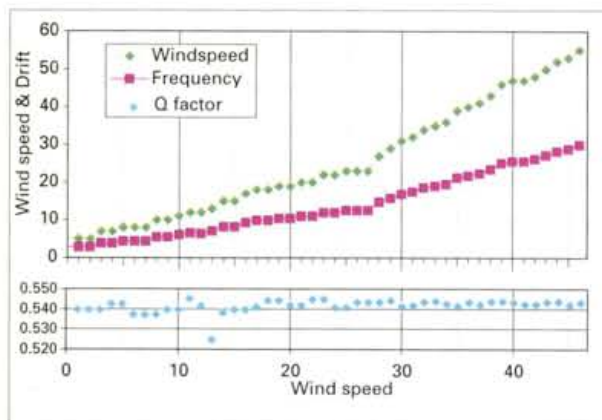
When we discussed our problem with the Meteorologists they were very willing to help. We were told they continuously record such factors as atmospheric pressure, relative humidity, air temperature, wind speed and direction and general weather conditions, as these conditions can vary from minute to minute they would also give us a daily time check.

It was decided that, rather than try to continuously monitor the frequency variations, each station would take three readings during the day. Station A (myself), at the SE end, would take readings at 0700, 1200 and 1800UTC, whilst Station B was to take readings at 0800, 1300 and 1900UTC each day. To keep contact we would use 144MHz n.b.f.m. utilising the tone burst as a marker pulse. Records were to be taken for a 28 day period.

Hours Of Studying

After the 28 day period, we had so much information it took many hours of studying our tabulations to find some sort of correlation. When it was found, it wasn't as we suspected related to atmospheric pressure, air

Fig 1. Graph showing variations of Q with Frequency.



temperature or relative humidity.

We began to wonder - was it possibly to do with the sun spot count? However, a chance observation gave us the clue we were looking for. Surprisingly it seemed the variation in frequency was related in some way to wind speed!

To simplify things we decided only to use data when the wind direction was along the NW/SE line (i.e. along the line between the two stations). Luck was with us as the prevailing winds seem to be in these directions with 47 of the 94 readings taken being along this line (plus or minus 10°).

It worked out that the frequency change was directly proportional to the wind speed, as shown by the formulae: Frequency Variation = 0.542 x Wind Speed

Table 1 shows the tabulations of our records where:

Vel. = Wind Speed

Dir. = Wind Direction

V_F = Frequency Variation

Q = Calculated Relationship (constant)

We had found a relationship between wind speed and the audio frequency variations and could find no other factors to cause this effect. Hang on though! Why, if the audio frequency drifted, why didn't the carrier frequency drift?

Further experimentation revealed that **all frequencies** varied to a more or lesser degree. The lower the frequency the greater the variation and **Fig. 1** shows a graph of frequency against Q.

Findings Simplified

For the purposes of this article, our finding have been somewhat simplified. With the readings taken over a short distance the wind velocity has been taken as being

Date	0700hrs				1200hrs				1800hrs			
	Dir.	Vel.	V _F	Q	Dir.	Vel.	V _F	Q	Dir.	Vel.	V _F	Q
1												
2	NW	12.0	-6.5	0.542								
3	SE	8.0	4.3	0.538	SE	10.0	5.4	0.540	SE	7.0	3.8	0.543
4	SE	8.0	4.3	0.538								
5									SE	15.0	8.1	0.540
6	SE	12.0	6.3	0.542	SE	15.0	8.1	0.540				
7									NW	19.0	-10.3	0.543
8					SE	22.0	11.9	0.541	SE	23.0	12.5	0.543
9	SE	20.0	10.9	0.545	SE	23.0	12.5	0.543				
10	NW	40.0	-21.7	0.542	NW	46.0	-25.0	0.543	NW	48.0	-26.1	0.544
11	NW	43.0	-23.4	0.543	NW	47.0	-25.5	0.543				
12	NW	31.0	-16.8	0.542	NW	34.0	-18.5	0.544				
13									SE	18.0	9.8	0.544
14	SE	19.0	10.3	0.542	SE	18.0	9.8	0.544	SE	23.0	12.5	0.543
15	SE	20.0	10.9	0.545	SE	22.0	11.9	0.541	SE	17.0	9.2	0.541
16												
17					NW	32.0	-17.4	0.544				
18	NW	29.0	-15.7	0.541					NW	35.0	-19.0	0.543
19	NW	27.0	-14.7	0.544								
20					NW	10.0	-5.4	0.540	NW	8.0	-4.3	0.538
21	NW	13.0	-7.0	0.538	NW	11.0	-6.0	0.545				
22					SE	52.0	28.2	0.542	SE	53.0	28.8	0.543
23	SE	55.0	29.9	0.544	SE	50.0	27.2	0.544	SE	47.0	25.5	0.543
24	SE	41.0	22.3	0.544	SE	39.0	21.2	0.544	SE	36.0	19.5	0.542
25												
26									NW	5.0	-2.7	0.540
27	NW	5.0	-2.7	0.540	NW	7.0	-3.8	0.543	NW	5.0	-2.7	0.540
28												

(W/T1079)

of the same magnitude and direction over that distance.

What will happen over greater distances where the wind velocity and direction can vary many times, would be extremely difficult to calculate or predict in any way.

In order to calculate the effect of the wind velocity from other directions would take many years of collating measurements and carrying out calculations, but we'll be leaving this up to others. It would prove a challenging area for research and we hope interest would not 'drift away' because the end results could prove both enlightening and entertaining.

PW

Table 1: Table of Wind Speed, Direction and Audio Frequency variation for NW and SE wind direction only. (All readings are for Station A).

...continued from page 35

components. This also applies to a few 144MHz repeaters, some being pretty bad, which could encourage a detailed low frequency spectrum check by their keepers.

Wide response speakers are also useful for listening for microphone aberrations and shortfalls in the audio input circuits of the transmitters themselves. It's possible, for example, to tell whether a station has a 'hissy' microphone or one with an intermittent noisy connection somewhere. r.f. getting into the microphone circuit may also be detectable by an edginess or h.f. audio ringing tendency. Tests like these are generally not possible when the rig's internal speaker is used, though they can be aided by the use of reasonable quality pair of headphones.

Headphones

Headphones based on the kind of unit shown in Fig. 2 were extensively used up to and beyond the First World War. In fact, I wouldn't be surprised to hear that many old timers are still using such devices. I know I have a pair or more hidden away in the archives somewhere!

With the two coils of each ear unit connected in series and the two units themselves also connected in series the overall impedance worked out to about 2kΩ, which was a desirable matching value for the crystal set and early valve era.

The headphones were



Fig. 6: Close up view showing the mechanism inside a 'balanced armature' earpiece. Extremely versatile and sensitive, this form of earpiece insert is extremely robust and many examples made between 1939-45 are still in service.

remarkably sensitive and bearing in mind that all the audio power in the crystal set days (before the addition of an audio valve) was derived from the demodulated r.f. signal itself, such headphones were often operated as quasi-speakers by placing them in a large kitchen basin so that the family could gather round and all participate in the radio programme, albeit at 'whisper' volume. Audio quality was pretty grim and there were nasty 'peaky' resonances around the 1.5-3kHz region, but the term 'hi-fi' hadn't yet been coined.

With the advent of the moving-coil headphones there was a remarkable advance in audio quality. The best ones now yield an output from as low as 30-35Hz and up to 10-20kHz, while the harmonic distortion and resonance effects are far less troublesome than those of the earlier headphones.

As already noted, moving-coil headphones have an impedance of around 50Ω, so they represent a reasonable match to most rigs without a circuit modification, but if hi-fi species are employed some degree of audio filtering could well be required to reduce the noise power bandwidth, at least, when operating on other than the v.h.f. (and higher) f.m. bands in F3E mode. The inclusion of a switched analogue or digital filter is highly desirable for the A1A and J3E modes.

Indeed, the audio aspects of Amateur Radio are quite interesting, from microphone to ear and it's hoped that this article will, at least, reveal some of the factors involved at the loudspeaker/headphones end of the chain.



Fig. 5: A truly 'vintage' earphone, illustrated with the 'Stalloy' metal diaphragm slid away. (They must never be pulled away from the magnet to expose the high impedance (approximately 2kΩ) windings around the permanent magnets.

PW

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L-566 1120



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This month it's the turn of Charles Miller to look after the *PW* vintage 'wireless shop'. Specialising in truly ancient wireless equipment Charles turns his satirical gaze to look at some "heroic failures" from the world of thermionic devices!

Welcome to the shop! Find yourself a comfortable place to sit because this time I'll be looking at the story behind a couple of heroic failures in the world of thermionic devices. Note that I purposely don't say valves, because it's not certain whether our first examples were in fact valves in the usual sense. Going back to the heady days of Lee de Forest, when valve development was in its infancy, all sorts of ways were tried of modulating the flow of electrons from the cathode to the anode of a diode, and thus to make it amplify.

Included in the trials were 'external control electrodes', which were a dead loss. This, we are told by those who ought to know, was due to the fact that in the case of ordinary valve envelopes an external control electrode couldn't possibly influence the space charge around the cathode.

After a brief interval of about 30 years Telefunken cracked the problem, by which time the development of efficient 'real' valves had made the question largely academic. But what the hell, why waste 30 years hard work? Thus, in 1933 the wonderful 'Radio Rod' made its debut.

Contemporary Photographs

Contemporary photographs showed radio rods, known generically as 'Arcotrons', to be about five inches long and about an inch in diameter. They contained nothing more than a simple filament enclosed by a tubular anode, in this respect resembling very early Fleming diodes.

The rudimentary electrode assembly was mounted on stiff wires which passed out through the glass pinch at the bottom to form the same type of connecting pins as used in local and other all-glass valves.

The control electrode took the form of a metallic coating sprayed onto the envelope. Some rods were highly evacuated, others were gas-filled.

As to how they worked, we have to rely on a contemporary description penned by a certain Dr. Gradenwitz. However, at this stage it has to be said that it may have lost something in the translation!

British journalists, especially those writing for the so-called 'quality press' are capable of perpetrating some pretty diabolical elliptical sentences but the good Doctor's effusion contains the longest and most complicated example I have ever seen, and which I've had to render into English in an empirical manner. It doesn't help, either, to find occasional references to a non-existent 'control grid', which I've taken as a mis-print for control electrode.

"Radio rods," stated Dr. Gradenwitz, "are subject to operating conditions altogether different from those of conventional valves. It is impossible to record any statical [sic] characteristics ... the glass wall being charged with electrons whenever a positive voltage was applied to the control grid [sic], while the total voltage resulting from that of the control coating and the voltage on the charge on the inside of the wall is always nil". (If you think this is hard to understand, wait for the next bit!).

"No amount of positive grid bias has any effect. This is true also, more or less, of any negative voltage applied to the control coating. At the same time Telefunken rods will respond to alternating h.f. voltages, there being set up excess charges on the wall whenever the voltage on the outside coating is varied, so that the resulting voltage is no longer nil. These excess charges always take a certain time to be compensated across the insulation resistance of the glass wall".

I certainly don't intend to quarrel with the description provided by Dr. Gradenwitz, mainly because I don't understand a blind word of it. If any reader does know what it means, it might be better to keep quiet about it. (People might look at you strangely).

However, to return to the good Doctor's dissertation: "Telefunken rods destined for purposes of amplification are designed as high vacuum valves, whereas those devised for detecting purpose are of the gas-filled type ... [they] are directly heated with alternating current. No directly-heated valves have so far been very successful as detectors, owing to the direct effect exerted by the filament on the grid and the influence of voltage variations on rectification". [This appears to be a long-winded way of saying that they would hum like mad].

"However, gas-filled Telefunken rods, on account of their characteristic behaviour, as explained, are insensitive to low-frequency voltages. Any voltages applied from the outside are, so far as the negative half-wave is concerned, compensated by the ions of the residual gas, in fact, the lag between the electrons and ions is only felt as the frequency becomes more rapid, until the ions in the case of real high frequency are no longer able to follow.

"Only low-frequency oscillations are thus compensated by ions, resulting in a rectifying effect which is quite similar to the detecting effect of standard valves.

"The insensitiveness of the gas-filled radio rod to low frequency by no means affects the low-frequency modulation of the h.f. pulses. Oscillation on the grid being invariably of high frequency [is] in turn modulated in accordance with the rhythm of the speech or music transmitted. Whereas a frequency of, say, 100 reaching the grid from the alternating current mains has practically no influence upon detector rods, a sound of the frequency of 100 arriving from the transmitter will readily be passed on". (Well, of course, what else?)

A circuit exists of what is claimed to be an actual tuned radio frequency (t.r.f.) receiver using radio rods. An h.f. transformer preceded the first rod, described as being an h.f. amplifier.

On the other hand, since there appears to be a conventional reaction coil in the anode circuit, it might really be a detector. Whatever signals appeared at its anode, whether r.f. or a.f., were directly coupled to the control electrode of the next rod, named as the detector but possibly an a.f. amplifier. The anode of this rod was resistance-capacity coupled to the grid of a conventional output valve for, as the good doctor explained just before the men in white coats came for him:

"You have seen why radio rods are not suitable for l.f. purposes and therefore will not be surprised to note that a three-electrode valve of the ordinary type is utilised for the output".

Frankly, by this time I wouldn't be surprised by anything regarding the radio rods except to learn that they ever entered gainful employment.

Enough of this frivolity, however, let's now turn to the

serious subject of the 'Sargrove Wonder Valve' which, apart from anything else, was British.

John Sargrove

John Sargrove was an electronics boffin who owned a small but go-ahead firm in Walton-on-Thames, just south of London. Mr. Sargrove's proposition was to make a single valve type that could be used in every stage of a radio receiver.

It's difficult to conceive of a single valve type capable of operating in such diverse roles as frequency-changer and high tension (h.t.) rectifier but that was exactly what Mr. Sargrove anticipated. He must have been able to put forward a pretty convincing case for his project because he managed to get the British Tungsram Valve Co. interested enough to put money into it.

As I mentioned some time ago, Philips NV had a substantial interest in British Tungsram, which provided it with a useful watching brief without being directly involved.

Because the project initially was kept secret it's not known exactly when work started on the 'universal' valve. But by the autumn of 1947 it reached fruition in the form of the extraordinary UA-55 double beam tetrode.

The two sections of the valve were disposed on either side of a central common cathode and, as will be seen in the diagrams, a screen in the form of two 'Es' face-to-face, was fitted around the cathode assembly with the top and bottom arms of each forming the beam-shaping plates.

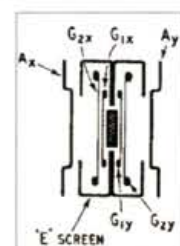
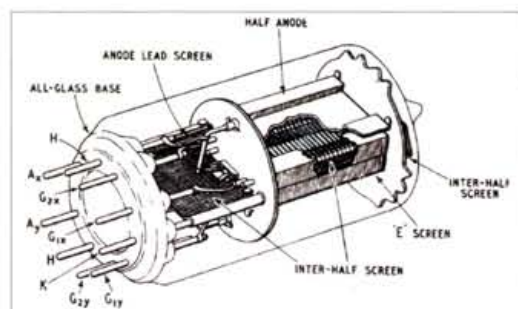
The anodes were shaped rather like shallow straw hats with the crowns facing towards the two E-shapes. Nine lead-out wires were needed, for which a new type of 9-pin all-glass base was developed, not unlike that of the B9A base that came into popular use a few years later. The heater was rated at 55V, 100mA, making it suitable for a.c./d.c. operation on either 110/120V or 200/250V mains.

Astonishing Versatility

The stated explanation of how the astonishing versatility of the UA-55 was achieved says that it was "due to varying the way in which the electrodes were connected and to how much voltage was applied to them".

For instance, if you strapped the anode and screen grid of a single section you had the equivalent of a high-slope low impedance triode which could be used as a local oscillator in a superhet, with the other section acting as a mixer. In this application a conversion conductance of 700mA/V was claimed with an h.t. voltage of no more than

Fig. 1: Sectional view of the electrode assembly of the Sargrove UA-55.



90V, which if true was commendable, being nearly twice that of the highly esteemed 6K8.

As regards r.f. or i.f. amplification, each or both tetrode

Fig. 2: The arrangement of the 'E-Screen'.

could take on the job but due to fairly high inter-electrode capacities neutralising or some other stabilising method was necessary to prevent self-oscillation. This would have represented a major step backwards of some 20 years to before the advent of the screen-grid valve.

To make up for this failing, a variable-mu effect could be obtained if the two grids and the two anodes were strapped and different voltages applied to each of the screen grids. Exactly how this voltage change could be related to a conventional automatic volume control (a.v.c.) system was not revealed to us, nor were we told how detection was to be achieved in a superhet.

Maybe Sargrove-Tungsram weren't too sure themselves? Maybe you had to strap the electrodes in each of the valve sections to make up a sort of double diode?

We're on firmer ground as regards a.f. amplification because the tetrode sections would work in much the same way as will most 'straight' r.f. pentodes if the screen grid volts were kept low, i.e., of the order of 15V. The slope obtained in this mode was 4.5mA/V, so a.f. sensitivity shouldn't have been a problem.

So to the output stage. With the electrodes of both sections strapped grid-to-grid, screen-to-screen and anode-to-anode, and with the latter two supplied with only about 90V h.t. a power output of around 1W could be obtained. This was considered acceptable for the kind of small receivers envisaged as using the UA-55. The slope in this application was high at 7mA/V, the grid bias low at -5V and the optimum load also low at 2,500Ω.

The anode and screen grid currents were not stated but they must have been pretty low.

Evidence of this fact was provided by the description of how the UA-55 could be used as a rectifier.

By strapping both anodes directly and connecting these via limiting resistors to the strapped grids and screens, the valve would act as a half-wave rectifier capable of delivering up to 25mA with a small internal voltage drop. The manufacturers envisaged using for this lowly job valves that had been rejected on test as not up to standard for general use. (Shades of Lee de Forest!).

It's an interesting thought that since every receiver would need a rectifier, the expected quality failure rate for the UA-55 must have been between about 20 and 30%.

Into Quantity Production?

Whether the valve did, in fact, go into quantity production is unclear, but if it did, precious little evidence survives of its appearance in actual receivers. In fact, the only example so far traceable is a two-valve t.r.f. that was reported as being exhibited at RadiOlympia in November of 1947.

The receiver in question had another claim to originality as it employed a very early form of 'printed circuit' with many of the components 'sprayed' on to the Paxolin circuit board. How many of these boards were made is another matter for speculation, but they may well have been counted in dozens.

If so, there's a very good chance of some of the boards being preserved in lofts or cellars, because at that time the British were well known for not wantonly throwing anything away, "in case it comes in useful".

Keep looking!



Fig. 3: Actual view of a Sargrove UA-55. Note the B9A type base.



Fig. 4: An early type of 'printed circuit' receiver using two Sargrove UA-55s.

The MFJ-945E Mobile Antenna Tuner

Rob Mannion
G3XFD
describes his
continuing
success and
enjoyment
working
'portable' from
his car using a
variety of
antennas and
what seems to
be a very useful
antenna tuning
unit from MFJ
in the USA.

Since I have started to enjoy operating 'stroke Portable' from my car again, using the versatile Alinco DX-70, I've used a variety of antennas. In the past I always opted for a simple 'long wire', tuned up with the a.t.u. from the main shack ... but having to continually take it from the house and into the car and back again got on my nerves. So, something else for tuning the antennas had to take its place!

My renewed interest in h.f. portable operations really accelerated in 1998 when in mid summer, I started using the triple magnetic mount (reviewed in the October 1998 PW as 'Out & About With Pro-AM Antennas & Magnetic Mount') in conjunction with the Pro-AM h.f. whips antennas.

I found the mag-mount and whip combination suited my portable operations on h.f. very well indeed. (Although I don't actually work 'mobile' for safety reasons - see the Pro-AM review).

The Pro-AM whips were easy to use, except that I had to continually re-adjust the whip section to work over the whole band. This was because the American-made antennas are optimised for work in their s.s.b. section of the various bands.

Using my main a.t.u. for portable operation as well as at home was a first class idea because I was able to tune the mobile whip over the whole of the European band plan sections. I then only had to get out of the car when I wished to change band altogether.

However, as I've mentioned, I quickly found it was a real nuisance to be continually taking the a.t.u. in and out of the house. And that's where the idea of trying out a small portable type of a.t.u. came about in the form of the MFJ-945E.

What's In The Box?

So, what's in the MFJ-945E's box? In fact, it's a remarkably compact a.t.u. - measuring 210mm (wide), 148mm (deep) and 60mm (high) and considering its size, the maximum (claimed) forward power rating of the 300W (High range) is generous with the lower range covering up to 30W. However, inside the unit is a very large (considering the size of the actual a.t.u.) antenna matching inductor on which the tapings are selected by a rotary switch.

Most of the inside of the unit is taken up by the matching inductance and the tuning capacitors. The two meters providing 'forward and reflected' power levels are tucked up right in the front of the a.t.u. (See Fig. 1).

Apart from the antenna matching inductance, the unit is a straightforward a.t.u. with built-in v.s.w.r measuring facilities. However, there's no 'average power' indication facility provided and so the meters continually flick up and down with speech or c. w. keying.



Using The MFJ-945E

When the MFJ-945E arrived at the PW office I quickly unpacked it and managed to use it for the first time on the way home! My favourite 'P' location is on high ground, not far from Wimborne from where I can just glimpse the sea, between the Needles on the Isle of Wight and Hengistbury Head, just to the east of Bournemouth.

From this location I've been able to work all around the world on h.f., using powers ranging from less than 5W to a maximum of 50W. However, my usual power level (on s.s.b.) is around the 25W level, with c.w. power rarely exceeding 5W, but even on 100W tests in damp conditions (February weather) the a.t.u. coped well with no 'flash-overs'.

Using my Pro-AM HF80 on 3.5MHz I now tend to use a long wire radial. With the long wire radial run out to its maximum of 30m the MFJ-945E enabled me to get minimum reflected power from the antenna resulting in excellent QSOs all over the UK on the 3.5MHz band. In fact the a.t.u. proved delightfully easy to use with all my mobile antennas (3.5, 7, 14 and 18MHz).

In practice, I found that rotating the inductance control and then setting the transmitter control and then finally adjusting the antenna control - worked well. The small, neat meters proved very adequate for the job and the whole unit proved remarkably easy-to-use and an ideal size for use in the car.

In fact, the MFJ-945E sat very comfortably on top of my Alinco DX-70 and the two units together provided a very neat looking pair.

At home I found the a.t.u. could cope with everything I 'threw' at it - including a true 3.5MHz 'long wire', short wires and my old G-whips. It was truly versatile.

Quality & Finish

In past reviews I've commented on the poor quality of finish on some MFJ items. There have been many occasions when despite their innovative approach to Amateur Radio equipment this manufacturer's wide range of products has been let down by the sharp, unfinished edges on equipment cases, front panels and boxes.

However, I'm pleased to say that this problem does not occur on the a.t.u. under review because it has rather neat plastic end panels and soft resilient 'feet'. Well done MFJ!

Needless to say, I've actually been very impressed by the a.t.u. and apart from it not having 'peak hold' facilities on the meter (which I can live with) I was happy to buy the review unit itself!

My thanks go to Waters & Stanton Electronics PLC of 22 Main Road, Hockley, Essex SS5 4QS, Tel: (01702) 206835, FAX: (01702) 205843, for the loan of the MFJ-945E which they can supply for £89 plus £5 P&P.

PW

Fig. 1: Inside the MFJ-45E showing the substantial inductor. An idea of the size of the unit is provided by the two pence coin above the front panel. Meter illumination is provided by the 'Meter Lamp' socket on the left of the rear panel.



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This month the Rev. George Dobbs G3RJV provides a blow-by-blow account of building a double balanced mixer, following immediately (of course!) after his usual appropriate quotation!

Carrying on the Practical Way

In the last column, I offered the reader a Universal VXO (Variable Crystal Oscillator). It's a useful amateur bands variable frequency generator with a whole variety of possible applications. It prompted me to think that I ought to offer at least one practical application for the VXO.

Before we jump into something new, a couple of readers have asked me about the availability of amateur bands crystals, something you will certainly need for the VXO. So, here we go!

Some of the QRP constructor suppliers stock amateur band crystals usually at the International QRP Calling Frequencies (3.560, 7.030, 10.116, 14.060, 21.060 and 28.060MHz). And to help, I'm pleased to say that **Chris Rees G3TUX of The QRP Component Company** (*Editorial note: please see*

information panel at end of column), holds a stock of QRP crystals and some other amateur band frequencies.

Those readers blessed with (if that be the appropriate word) an Internet connection can also obtain a range of amateur band crystals from *Funk Amateur* magazine on their WebSite at www.funkamateur.de

Obvious Application

An obvious application for the Universal VXO is to use it as the frequency source for a direct conversion receiver. The design has the advantage of offering plenty of r.f. output: up to about 2V peak-to-peak.

The r.f. output is more than adequate to drive a passive double balanced mixer, one of the better mixer options for a direct conversion receiver. The only problem here is that commercial double balanced mixers (although excellent in use) are rather expensive.

In the past I have had good results with home-brewed double balanced mixers (d.b.m.s) for receiver mixers and double balanced modulators.

I now share this knowledge with *PW* readers with some trepidation. My caution comes from knowing that a home-brewed double balanced mixer involves the winding of two trifilar transformers and getting the connections right!

The trepidation arises because I can recall a

transceiver design of mine published in the 1980s, which generated a more than usual number of letters and phone calls of disappointment. In every single case the failure was caused by incorrect winding or lead identification of a bifilar wound transformer. But I know that current *PW* readers will not let me (and themselves) down. You **will get it right** - have as much confidence in yourself as I've got in you!

The Circuit

The diagram, **Fig. 1**, shows the circuit of a double-balanced diode-ring mixer. Diodes offer good dynamic range (strong signal handling capability) in mixer circuits.

The problem is that the diodes have a conversion loss rather than the gain that comes from active mixer circuits. The losses may be in the order of 5-10dB, which may mean having to obtain more gain in other stages of a receiver.

For first mixers in a receiver - and especially when it's the only mixer in a direct conversion receiver - the better dynamic range more than makes up for the losses.

Excellent commercial d.b.m.s are available and the common SBL1 is often used in amateur circuits and these are expensive components. Fortunately though, with some care, it's possible to make a d.b.m. to give an equally good performance.

Trifilar Winding

Transformers T1 and T2 provide 50Ω termination points and the trifilar winding presents the input, output and local oscillator ports to a balanced diode bridge, D1-4. Compact construction and a symmetrical layout help to maintain the balance of the circuit. I will describe the method that has worked for me in some detail. The completed DBM circuit board would be useful as a mixer or a balanced modulator.

Commercial DBMs usually include hot-carrier diodes but in this circuit, and in most of my other home-built DBMs, I have used commonly available high speed silicon diodes. There is advantage in matching the four diodes. They can be the cheap 1N914 or 1N4148 or similar types which are easy to match with the resistance ranges on a multimeter. The typical forward resistance of such diodes is in the 5 to 20 Ω range. Finding four diodes with closely matching forward resistance will produce a better mixer. Simply measure the forward resistance of whatever diodes you have to hand and pick the four best matches. The 'back' resistance will probably be over 1MΩ and need to be checked.

Making the DBM

The really critical part of building the DBM circuit is winding the transformers T1 and T2 and wiring them correctly into the circuit. Extra care at this stage will repay you with success!

The heading photograph shows the project with one transformer mounted on a home-brewed 'surface mount'

Fig. 1: Circuit of the double balanced diode ring mixer project.

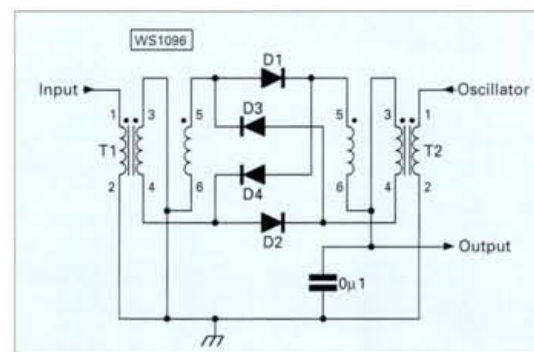




Fig. 2: Pad numbering sequence for the mixer project. See text for detailed construction advice and assembly instructions.

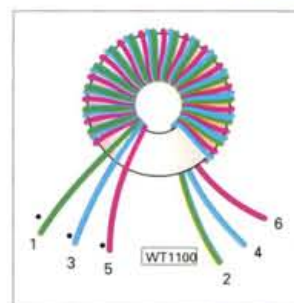


Fig. 3: The layout and wire end 'numbering' for each toroid.

This month's project - a miniature mixer!

board that I use for building a DBM. It's a piece of unetched printed circuit board some 40mm by 20mm divided into 12 soldering pads.

Drawing a saw blade across the copper-clad side of the board to make 12 'islands' produces these pads. The islands are then tinned with solder. I have numbered the pads, as shown in Fig. 2, to help the wiring layout.

The Transformer

Each trifilar transformer is wound with (three lots of) 15 turns on an FT37-43 ferrite toroidal core. This core has a 0.37 inch outer diameter and a permeability of 850.

In practice other ferrite toroidal cores of similar diameter would probably do the job well. I have often wound DBMs on surplus ferrite cores. (But remember - the cores **must be ferrite** rather than powdered iron.

In a trifilar winding, three wires are wound through the core. This can be done with the wires lying side by side but it's more common to lightly twist the three wires so

end of the three-strand wire in a small vice - I use the crocodile clip in a 'third-hand' bench jig.

The three wires now require twisting together. In practice I've found that slipping a cocktail stick (or something similar) between the individual wires at the free end provides a convenient turning 'handle'.

Twist the wires to produce about three or four twists per centimetre. The wires are now ready for winding as if they were a single wire.

Wind 15 turns on the toroid core and separate the six wire ends with the beginning of each winding at one side and the end of each winding at the other side. (This is shown in Fig. 3 - Stage 1).

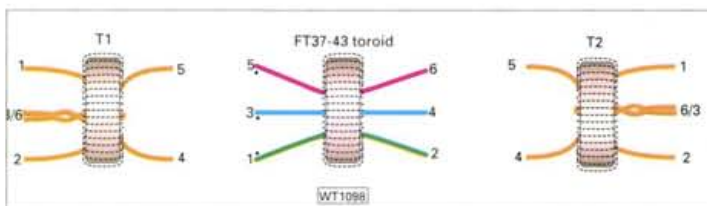
The convention on the circuit diagram is to mark the beginning of each winding with a dot. So the dotted ends become wires 1, 3 and 5 and the other ends wires 2, 4 and 6.

Now The Fun

Now it's time for the fun bit! Lay out the wires as shown in Fig. 3. Remove the enamel from the ends of the wires and tin the bare copper ends. (This is the point at which the wires can be identified using a resistance range on a multimeter, or any other continuity checker).

Next, you should position 1 and 5 and 2 and 4 out of either end of the toroid as shown in the centre toroid of Fig. 4. Wires 3 and 6 are taken under the toroid, twisted, then soldered together.

Make up T1 and T2 as a mirror image of each other as



shown in Fig. 4. Leave them on the bench in this formation ready for adding to the matrix circuit board.

The two transformers are now added to the matrix board as shown in Fig. 5 (left and right in Fig. 4). **This must be done correctly or the mixer may not work.**

The order is: (for T1) - lead 1 to pad 1, leads 3 and 6 to pad 5, lead 2 to pad 9. For T2 - lead 1 to pad 4, leads 3 and 6 to pad 8, lead 2 to pad 12, lead 5 to pad 3 and lead 4 to pad 11. The diodes may now be added to pads 2, 3, 10 and 11 (taking care to place them in their correct polarity).

The diode ends soldered to pads 2 and 3 **must cross over without touching.**

Pads 5 and 9 are joined and pads 9 and 12 are connected to ground. (For a direct conversion receiver the signal input is at pad 1 the local oscillator input is at pad 4 and the output is from pad 8).

Phew! You've now built a double balanced mixer for a fraction of the price they cost to buy. Next time we will complete the other circuit items required to make the complete receiver. Cheerio until then - **and I know you will be successful!**

PW

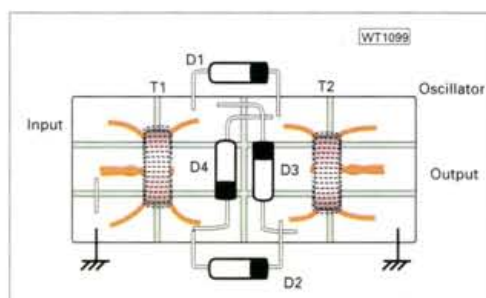


Fig. 5: Component lay-out for the double balanced mixer.

they can be treated as a single wire in the winding process.

A thin gauge wire is required for the windings and for this job I have some 0.2mm (36 s.w.g.) wire designed for use with a wire-wrapping tool, which has a coloured enamelled coating. My three little reels of this wire have different coloured enamels, which helps with lead identification. (Wire of one colour is also fine because the leads can be identified with a multimeter).

To wind the transformers, cut three lengths of the wire (different colours if available) about 300mm long. Tied the three wires together with a knot at each end. Secure one

Antenna Workshop

In this visit to the Antenna Workshop, Dick Pascoe G0BPS raises the topic of 'Top Band' antennas for small spaces - or ways of getting a quart out of a pint pot!

During recent occupancy of the 'Antenna Workshop', I've discussed several types of antenna but missed out on those for 'Top band'. After being taken to task about this by more than one reader, this is my earliest opportunity to remedy the matter!

When considering the space required for antennas it is always easier to check the tower for my 144MHz beams rather than the space needed for my h.f. antenna system. I have been planning to upgrade my 1.8MHz antenna for some time.

Then some six years ago we moved from a large three story Victorian house to a bungalow. The old house didn't have a large garden but the height helped a lot. My vertically mounted 3.5MHz full size loop, with some help, tuned up on 1.8MHz too.

However, moving to the bungalow made life a little more difficult, especially as we now have power lines on three sides of the garden. The biggest advantage of the new home is the size of the plot. Half an acre of space does make it much easier to erect decent antennas, in spite of the power lines.

The drawing of Fig. 1 shows the plan of my present house and the constraints. The doublet antenna with the feed at the top of the 20m tower works well - well mostly, but of course always could be better.

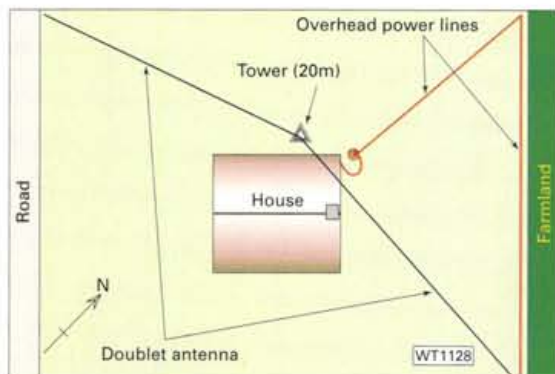
Legends

A few years ago, I was lucky enough to stay with the late **Doug DeMaw W1FB**, one of Amateur Radio's genuine legends. He took me for a walk us around his 'plot of land'. It had been a multi hundred-acre farm, left to return to nature.

The only exception to nature, was the field where he had his antenna farm. There, Doug had erected four telegraph poles for a horizontally mounted full-sized 1.8MHz wire loop (about 12m above ground). Although it surprised me to see it mounted horizontally, I was told that it worked very well.

Now, when someone like Doug tells you a thing works, you listen. The sheer size of antennas for the 1.8MHz band makes space a requirement, unless we cheat of course. But - don't go out - go up!

Fig. 1: The half acre plot that Dick G0BPS calls home - to his antennas.



A $\lambda/4$ vertical antenna, radiates equally all around the antenna. So, we might make a $\lambda/4$ vertical antenna. Though on 1.8MHz, such an antenna would be 40+m tall, which is still rather big so, again we will cheat a little.

Doug DeMaw has written many articles on antennas. One of his ideas was about loading up the antenna support tower. A tower with a height of 40m can easily be used as a 'Top Band' antenna.

Feeding such a vertical antenna, usually 'plugged' into the ground, provides us with our first problem, to which there are several answers. The first and in many cases the easiest answer is a form of Gamma matching system.

A heavy wire or rod (the diameter is not that critical) is run vertically, alongside the tower and held firmly in place between 250mm and 1.5m away (this distance should not be less). The wire or rod is held in place by fixed insulated bars mounted on the tower.

In the illustrations of Fig. 2 you can see the inner of the coaxial cable feeding the 'gamma' rod via the air spaced capacitor, for matching and fine-tuning. The only electrical connection to the tower, is of the wire to the top of the tower as shown.

The antenna will need some fine-tuning. The diameter and type of shunt feeder will affect the tuning. The height of the tower, even the antennas on the tower will affect it. Like many other antennas in use, the time spent on getting it right will be of benefit in the end.

The bad news is that because of the limited height of the antenna (compared to the 'real' $\lambda/4$) the matched bandwidth will be quite narrow. The 'tuning' capacitor at the base could be motor driven to aid tuning. A good Antenna Tuner in the shack will also help.

A tip about raising long poles like this. Never let the feeder hang loose from the top. It puts a great extra additional strain on both the pole and the lifter. Tape the feeder to the pole all the way down to the base.

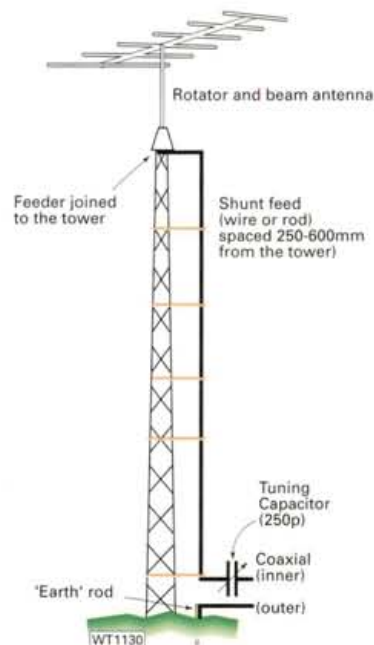
Cheat A Little!

There are other ways to get an antenna up vertically, cheat a little! Take one of those cheap fibreglass-fishing poles that are available. They range from 3m to over 10m long (some even longer), but try the longest that you can. Although a good ground is essential in this project.

The 'thin end' may have to be cut back until the centre hole is found. The antenna wire is fed through the middle of the fishing pole. If you are lucky enough to have two scaffold poles and a joiner we will get closer to our required 40m.

With two scaffold poles and the fishing pole at the top, we will have a total length

Fig. 2: The late Doug DeMaw W1FB made this suggestion for loading up the tower as on the lower bands (see text).



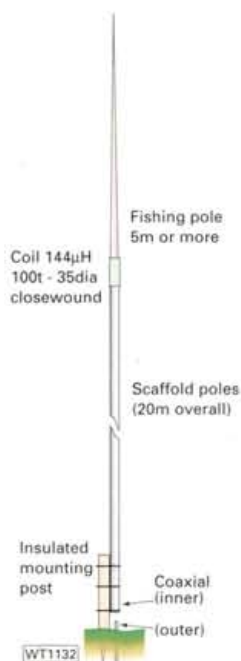


Fig. 3: Joining two scaffold poles together and using a long fishing pole can take a vertical antenna towards the magical 1/4 (40m) on 1.8MHz (see text).

middle of the fishing pole and out of the top. All joints should be taped to aid weatherproofing and to stop the pole collapsing in on itself.

The coaxial inner is connected to the bottom of the scaffold pole and the outer shield connect to your ground stake or, if you're lucky, to your earth mat. The scaffold pole should be guyed of course, but make sure that insulated materials are used.

Top Hat

Apart from loading verticals a form of 'Top hat' can be used, the model shown incorporates both of these techniques. The 15m of scaffold pole topped by a loading coil of 53µH is capped by just two wires which can also be used as guys. The 8.2m of wire provides the 'Top hat' effect in a limited way (Fig. 4).

With the dimensions mentioned the antenna should resonate about 1.84MHz. It is essential that the diameter of the pole used is over one inch as if, say 2mm wire was used the top legs would have to be increased to 10m each side and the loading reduced to 32µH. A 'Top hat' is shown on top of the 12m poles. In this case we again use a mixture of loading coil (166µH) and 'Top hat' (Fig. 5).

The 166µH loading is made up of 119 turns on a 35mm former. The hat can be made up of anything. I have used a loop of fencing wire hung on a fibreglass pole. The loop of wire was joined at short spacing to the centre, much like the spokes on a bicycle wheel. The 1.2m diameter will aid the resonating of this antenna on the band.

It must be remembered that each of the descriptions above, worked at my house! They probably won't work where you live. The changes in ground, the type of material used and even type of tower used will change things quite a lot.

What I can say is that if you are willing to experiment then a way forward will be found. The

sizes and notes given here are intended to guide you towards achieving a good antenna for the band.

Many amateurs will rely on a simple s.w.r. bridge to resonate their antennas. There are many other variables involved that the simple bridge cannot cover. Yes, you may have a low s.w.r. but is the antenna efficient?

All Singing

On a recent trip I bought one of the MFJ 'all singing' Antenna Analysers (MFJ-259), not their latest version but the one with the meter and frequency counter in it. This proved beyond doubt that you should not rely solely on the s.w.r. bridge.

Anyone doing antenna work should have an antenna analyser (club's should buy one to loan to members), they are excellent. Just knowing the resonant frequency of an antenna and the (approximate) impedance makes them worth the price.

For those wishing to get more ideas, there's a lot of good reading available in **John Devoldere ON4UN's** book *Low Band DXing*. The next best (in my opinion) is the *ARRL Antenna Book*, which has several chapters aimed at loop antennas and long wires.

We can't miss out either, **Les Moxon G6XN's** book, *HF Antennas for all Locations*. First published in 1982 and updated in 1993, this book still has lots of ideas in it. Others books include **Orr & Cowan's** *Vertical Antennas* and **John Heys G3BDQ's** *Practical Wire Antennas* or **Peter Dodd G3LDO's** *Antenna Experimenters Guide*. Any of these books will provide good basic information on making your own antenna.

I have about 18 books on antennas from around the world. From home-produced by a club to text books on antennas, they are all similar in many ways but there are also small nuances of approach that can be used in differing circumstances.

Personal Computers

In recent years the profusion of personal computers has brought forth a wonderful number of programs allowing 'modelling' of many electrical parameters. Without doubt one of the very best antenna modelling programs is *EZNEC* from **Roy Lewallen W7EL**.

Used by some of the very best contest groups, *EZNEC* allows you to input your 'thoughts' and actually see them in action on your screen. This highly recommended program is available from Roy direct or via email at W7EL@teleport.com

To misquote our Prime Minister, The Right Honourable Tony Blair's 'famously saying' there are three important things for us to do, experiment, experiment, and to experiment. If we work at it and experiment we will get a 1.8MHz antenna that will produce the goods and just maybe work the world.

Happy building.
Dick GOBPS

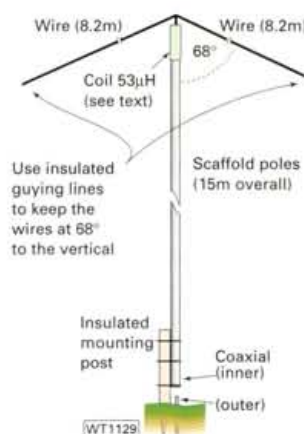


Fig. 4: Using 8.2m long wires as both 'top-loading' and as part of the guying system (see text).

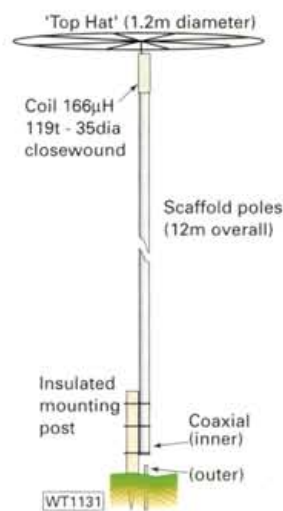


Fig. 5: A round capacity, or 'Top' hat loading element on a free-standing vertical suitable for use on 1.8MHz (see text).

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...continued from page 39

Reflector Elements

Each of the reflector elements is treated in much the same way as the driven elements. The trap conversion is identical to that described previously. The only difference is in the final assembly by allowing for a 5% increase in dimension 'L' as given in Fig. 2. This gives the slightly inductive length of the inner elements of 5.575m making the overall length some 6.48m.

The driven element and reflector are mounted onto the original TA32 boom, which is 1.78m long. This gives an inter-element spacing of just over 0.11 for 18MHz and just under 0.151 for 24MHz. The forward gain of this new combination antenna is not super, but accords with what the *ARRL Antenna Book* leads me to expect from a two element beam antenna of this type, and that is about 3.5-4dBd.

The front-to-back ratio as measured on air using a steady carrier, (although not very scientific) gave a figure of about 25dB. The front-to-side ratio is amazingly good. I can null out 'EU' QRM by on air measured 45dB and more distant signals can be reduced to the noise level.

This is no TH7 antenna but it does a fine job for me and it cost only the price of some new trap covers. My rotator, a Diawa DR7600R rotator (Yaesu equivalent G600), turns this antenna plus a stacked 3-element tri-bander - see heading photograph - is mounted on a 21m tower (though it's seldom above the 15m level). The assembly has survived five winter seasons of gales.

Other Beams

For this article I've assumed that you have a Mosley TA32. However, if you have a TA33 (or similar antenna) then these modifications can still apply. All you will need to do is experiment with the director along the same lines and you'll have a 3-element dual bander for the WARC bands.

If you have a TH-3 or similar high gain beam, then I

refer you to WB4OSN's article in the June 1989 issue of the *DX Magazine*.

One good thing about the Mosley beam antennas is that most of the spares you'll require are available from Mosley UK, who will send you a price list upon application.

Unfortunately, Mosley cannot supply spare trap covers and coil formers. If you have an accident with these then you will have to improvise. Take a trip into your local aluminium graveyard and save yourself some money.

A Balun?

I made mention earlier of a balun. Many years ago an elderly Radio Amateur giving some sage advice to this (then!) stripling beginner regarding antennas, uttered the maxim "Balanced feed my boy, balanced feed". These words have always stuck with me, and invariably, when building antennas, I try to comply with that stricture.

The maxim was, of course, perfectly true in the days of open wire line and parallel tuned a.t.u.s. Since those times, we have come to accept 50Ω coaxial cable as the preferred method of feeding our antennas. However, I have tried various unbalanced to balanced devices and have come to dislike all of them for a variety of reasons.

However, the presence of r.f. appearing on the outer of the coaxial cable braid can cause complications. Therefore, in this installation, the coaxial cable is directly connected to the driven element and I've used the preferred current type balun. This consists of six turns of the coaxial cable (close up to the feed point) wound to a diameter of 150mm. With this arrangement, I have had no problems.

I daresay that the 'experts' will be able to pull holes in this 'design' but the proof of the pudding is in the operating. So, if you want a beam for 18/24MHz, then this could be for you!

PW

A Beam Antenna From Bits

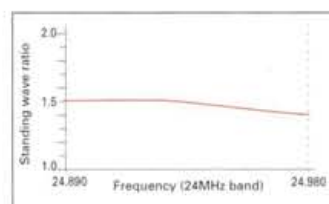
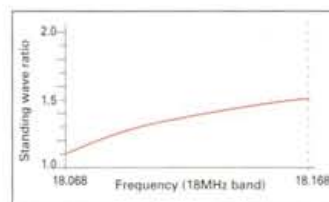


Fig. 6: The measured s.w.r. of Derek's antenna over the two, relatively narrow, WARC bands.

"You may find that a bit of trap coil pruning is required..."



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ELECTRONICS IN ACTION

Hello and Welcome to Electronics-in-Action (E-i-A) for April 1999. I've got so much to tell you about this month that I'll have to shorten my usual book descriptions. Rest assured though, we haven't forgotten books altogether. Elsewhere in this issue you will find profiles on several other books about test equipment and associated electronic subjects.



As I've seen the books that are described in the Profiles, I have to say that they are all well worth the space on your bookshelf. However, back to the book I'd like to mention, it's worthy of a whole page to itself. The book, by **Rudolph Graf** and **William Sheets**, is called *Encyclopedia Of Electronic Circuits Volume 7*, the latest in a series of circuit 'cook-books'.

As a book, *Encyclopedia Of Electronic Circuits*, is a real 'thumb-buster', at over 1100 pages it's almost 70mm thick

(that's around two and a half inches in 'old money'). There are 117 sections with many circuits in each section. Each circuit has a good description and other relevant detail, unlike the 'circuit cook-book' that I've had for many years that provides circuits only.

Of the many sections in Volume 7 of the encyclopedia likely to be of interest to you, as a Radio Amateur, there are sections concerning antennas (both active and 'normal'), r.f. amplifier circuits. As well as oscillator (audio, LC, RC, and crystal types) circuits, mixer, modulator/demodulator and transmitter circuits. If you have any interest in radio circuits then *Encyclopedia Of Electronic Circuits* is a definite 'must on your bookshelf.

Though I feel the book will spend little time sitting on the shelf, the *Encyclopedia Of Electronic Circuits* is far too full of new circuits to spend much time alone. And with more than 100 sections to choose from, there's bound to be more than one section that appeals to you!

Encyclopedia Of Electronic Circuits is excellent value at £31.99 (plus P&P) and is available from our Book Service.

From Readers

Reader **Peter Crabtree G7TOO** thinks he's come up with a p.c.b. production tool that will consign messy etchant and

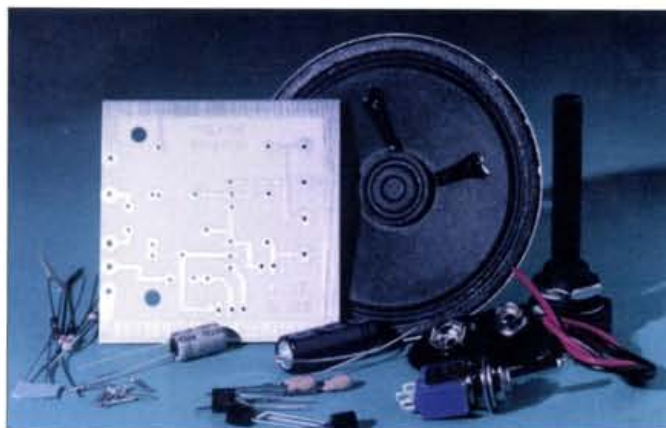


Fig. 3: The kit of the Novice Amplifier, as supplied from Lake Electronics. (See text for details).

resist-pens to the realms of history. Have a look at the photograph of **Fig. 1** where I've shown the pad-cutting tool that Peter has designed. Similar to the familiar 'hole-cutter' but much smaller, the cutting tool leaves a small circular pad on p.c.b. material. Peter produced the circuit of **George Dobbs G3RJY's 'Mix Box'**, as a demonstration of the technique, this is shown in **Fig. 2**, where you should (just) be able to see the cleared pads surrounded by 'ground-plane' material. Starting with a unetched piece of p.c.b. material, the 'islands' are cut out using the inverted cup cutter, either 'freehand' or using a matrix guide made from some other material.

I like the method that Peter has developed, it's both unusual and easy to

use. In fact, I found that I didn't need a drill of any type, a simple pin-vice, big enough to grip the cutter, was all that was needed for small projects. The miniature inverted cup cutter is available direct from **Peter Crabtree G7TOO**, at **106 Sagecroft Road, Thatcham, Berkshire RG18 3BF**. Readers should contact him for price and availability, because I have no other details.

Amplifier Kit

Part of the Novice License course is to build, under supervision, a small audio amplifier. **Alan Lake** of **Lake Electronics**, has developed a suitable small amplifier that would be ideal for the prospective Novice or in fact for anyone needing a small self-contained amplifier of around 100mW of audio output. The contents of the 'kit-bag' are shown in **Fig. 3**, which lives up to Alan's boast of 'The kits with all the bits'.

In the kit are the semiconductors, resistors, capacitors, the volume control and a small speaker, a battery clip suitable for a PP3 9V battery and of course, the p.c.b. itself. The instructions accompanying the kit are on a single A4 double-sided piece of paper. Short but adequate for the task, each resistor component is identified by reference to the colour bands. All other components are shown in a simple overlay diagram, which aids putting them in the right place.

With only 12 components to solder in place, I took under an hour to complete the kit and I would imagine that a

Fig. 1: Cutting 'islands' made easier with this cutter from Peter Crabtree G7TOO. (See text for details).



Fig. 2: A project showing how neat the results of using the cutter can look in practice.

Novice would take just a little longer than this - but not much more. I would suggest though, that having a magnifying glass to hand to positively identify the three transistors would be handy. My eyesight is not bad, but I found that reading the transistor type numbers just a 'tad' on the difficult side. But this is not an adverse comment about the kit itself, which is shown completed in the photograph of Fig. 4.

The Novice Amplifier Kit has a companion Novice Receiver kit, shown in Fig. 5 and they cost £8 each with a £1 P&P charge (for one or more kits). I shall be describing building the receiver kit in the next issue of E-i-A, but if you're unable to wait, the kits are direct from Lake Electronics, at 7 Middleton Close, Nuthall, Nottingham NG16 1BX. Tel: 0115-938 2509 or you may order via E-mail to radkit@compuserve.com

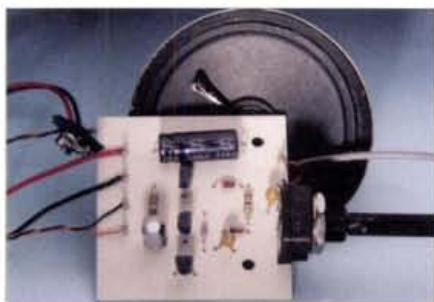


Fig. 4 (left and lower): The neat - if spartan - layout of the Novice Amplifier.

Pin	DL92	DL93	DL94	DL96
1	f(-)	f(-)	f(-)	f(-)
2	a	a	a	a
3	g1	g2	g2	g2
4	g2	g1		
5	ftap	ftap	ftap	ftap
6			g1	g1
7	f(+)	f(+)	f(+)	f(+)

Table 1: Pin connections for several output pentodes from the DL9? series that will work with the two valve audio amplifier.

Fig. 5: The Novice Receiver Kit, also from Lake Electronics, which will be described in more details in a future issue of E-i-A.

Valved Amplifier

In the February issue of E-i-A, I mentioned that I was developing a small valved audio amplifier using 'battery' valves and easily available components.

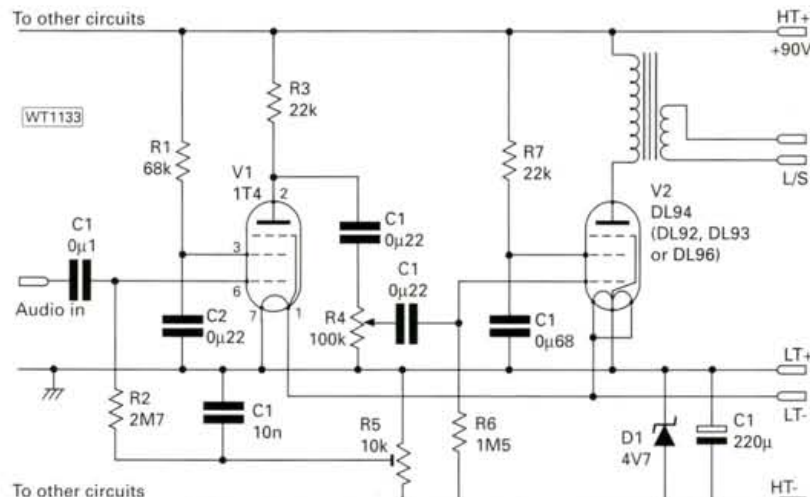


Fig. 6: This audio amplifier, using battery valves may be built with easily available parts. Though pleasing in sound - don't expect real 'Hi-Fi' quality from it. (See text for more details).

Well, if you look at the circuit diagram of Fig. 6, you will see the results. I'm particularly fond of the small battery valves, they take me back to my first 'personal' radio many years ago, when I used to listen to radio Luxembourg with the characteristic 'rise-and-fall' of signal level that the a.g.c. circuits couldn't cope with very well.

The circuit shown in Fig. 6, uses a 1T4 as a preamplifier stage (V1) with a voltage gain of about 10-12. This may seem to be an unusual application of a variable gain valve - but I had a lot of them to hand. The main amplifier, V2, may be any one of the DL9? series of output pentodes. I've tried most of them

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Measuring Vann Drapers

In the course of preparing this column for the magazine, I'm lucky, in that I get to 'play with' many pieces of equipment that I might not otherwise have the chance. This month, I've had the opportunity to try out a new digital multimeter (d.m.m.) from the test equipment suppliers Vann Draper.

The UpTek LP-310 d.m.m. is a well specified multimeter. It is so well specified that it truly is worth calling a Multi-meter as it measures not only the usual voltage, current and ohms, but also capacitance, frequency, transistor gain and logic levels in computer circuits. All this in a unit measuring around 190x90x35mm and weighing around 320g!

The 320g weight is for the unit itself, there is a supplied protective 'holster' that, when used pushes the overall weight up to around 600g. This protective unit, formed from a dense soft plastic, doubles as either a belt mounted holster, into which the LP-310 d.m.m. may be clipped, or as an impact protection 'armour' when the unit is used on the bench.

I didn't try the armour out by dropping the UpTek, but it definitely gives the impression that it will be more than adequate for the job. A moulded-in loop would allow the holster to be fitted on strong belts up to 30mm wide and up to around 5mm thick. But enough of the holster, what were my thoughts about the UpTek LP-310 itself you may ask?

Solidly Constructed

In answer to that question I have to say I found the LP-310 a solidly constructed unit with a large (18mm high) liquid crystal display (l.c.d.) that was particularly easy to read under most lighting conditions. The 30-way rotary measurement selection switch was very positive with little inclination to move, once set. The measurements are on a 'three and a half' digit meter giving a range of 0-1999 on all ranges.

The decimal point is set in the relevant position in each of the six current, five voltage, eight resistance, one junction forward voltage, five capacitance, once frequency, and two logic level types settings. The transistor f_{FE} setting has no decimal point setting. Both voltage and current ranges may be selected for either d.c. or a.c. values with the same range.

Two 1.2m test leads are supplied with

The UpTek LP-310 digital Multimeter from Vann Draper in its 'armour' holster, a useful meter for all aspects of the hobby.



Measuring transistor gain is particularly easy on the LP-310, and it makes choosing matched pairs a simple matter.

Two fuses, one for 2A and a larger one rated at 10A, protect the current ranges from overload.



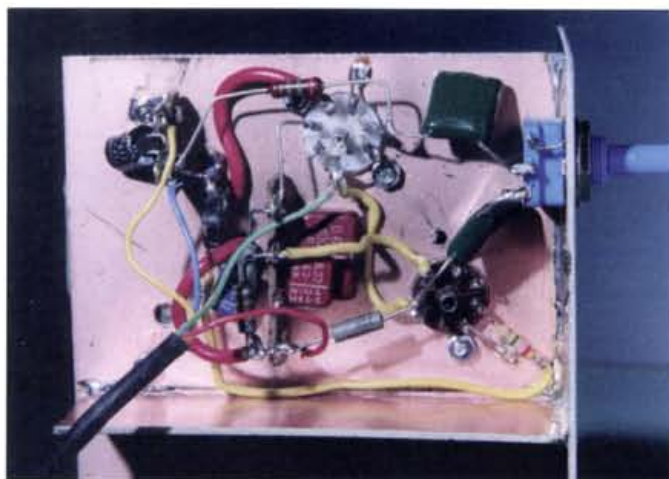


Fig. 7: The underside of the prototype two valve audio amplifier showing the temporary link up. The pre-amplifier valve V1 is the darker valve base on the right hand side.

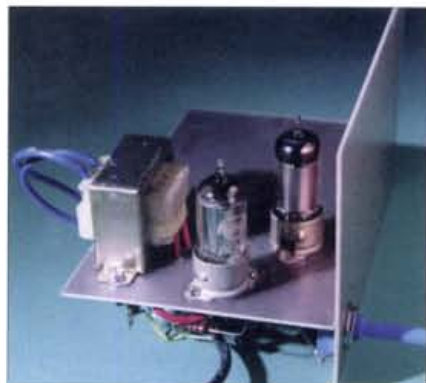


Fig. 8: The prototype audio amplifier from above. Space has been left at the other side of the unit to include a receiver at a later date.

in the circuit and they all work in the circuit shown without any real changes being necessary.

Looking in my valve data books I decided that using the parameters for the DL94 valve was a useful compromise and so the anode current is around 10mA with a negative bias of -4.5V. As the various valves in this series have slightly different pinouts I've included this detail in **Table 1** so that you may use whichever you have to hand.

Zener Bias

I chose to use a Zener diode to 'create' the grid bias as the most convenient way, being 'self-contained' no other battery or p.s.u. is needed.

Developing the grid bias this way does mean that there's only a nominal 85V available for the h.t. but it makes little difference that I noted in development. The underside of the

prototype is shown in the photograph of **Fig. 7**. The variable resistor R5 allows the grid bias to be changed to accommodate other preamplifier valves in V1's position.

The only other component that needs more explanation is the output transformer in the anode circuit of V2. I use a small 6V-1A mains transformer for availability and cheapness. The 40:1 ratio of the transformer suits the 8Ω loudspeaker to a nominal anode load impedance of around 12-15kΩ. A better match would have been a 7.5V-1A transformer, but I didn't have one!

The main failing of using a 'mains' transformer (which I 'rescued' from a set of powered computer loudspeakers) is that it has far too much primary resistance (around 700Ω) which causes lowered gain and worse distortion. However, the 'real' audio quality is adequate (in spite of the inadequacies of the output transformer) and the prototype unit, **Fig. 8**, has space that will eventually have a receiver built into it. So, watch this space!

Tex

And Finally

And finally this month, the answer to the Picture Conundrum that featured in the February 1999 issue of E-i-A. It is of course (as almost all of you pointed out) a valve pin straightener. It's shown 'in action' in **Fig. 9**. I haven't drawn a winner yet as several people sent in their answers via E-mail - and I've had an enormous computer crash which means I've lost their entries. Would those people who know their answers arrived (I told you what number you were in the list - so no cheating) send another E-mail and I'll make the announcement of the winner in the next issue of E-i-A.



Fig. 9: The answer to the picture conundrum is - it's a valve pin straightener!

Well that's all I have space for this month so, I'll see you all again in the June issue.

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the unit (which if it's being worn on a belt, would have to be pushed into your pocket or removed) are pushed into the recessed sockets. There are three options for the positive lead with one common terminal. Voltages, resistances and frequency are measured on one terminal, currents up to 2A on a second, whilst a third is used for higher currents up to the 10A limit.

Test Sockets

There are two other test sockets on the front on the LP-310 meter, and eight-pole socket to be used when testing the d.c. current gain of transistors, and a two 'in-line slot' type through which the leads of capacitors on test should be pushed. The transistor socket is laid out in such a way that both *npn* and *pnp* transistors of any lead orientation may be fitted without leads having to cross. Very useful!

The two spring clip connectors for

testing capacitors I found rather 'tight' in operations and I have some difficulty in inserting the finer leads of smaller value components. As the unit I had on loan was new, this problem might disappear with use. The thicker types of leads were no problem at all, pushing in quite positively giving a good contact with little evidence of 'noise' on the reading.

The ease of reading and general agreement with a variety of other meters that I use constantly, gives me confidence to say that the UpTek LP-310 is an excellent meter that would be suitable as a main test meter for many technicians in workshops or on the 'shop floor'. The range of measurements makes it difficult to think of a better or more versatile unit.

Protective Holster

The protective holster makes it easy to carry round with you in safety, although

the leads would need to be tucked into your pocket or removed when not in use. I have only one real quibble about the UpTek LP-310 d.m.m. and even that's a minor one not connected with its ability to measure. I feel that the fold-out stand on the back is a little on the flimsy side. It bends quite dramatically when in use and changing ranges as is sometimes needed when you're working.

Would I recommend the LP-310 to you the reader? I most certainly can, it's a very capable d.m.m. and could form a major part of anyone's test equipment.

It should give many years useful service even submitting it to the rigours of the field days and garage use. With around 200 continuous hours of use from an alkaline 9V battery, it should always be available whenever you need the meter.

My thanks go to Vann Draper Ltd. of Unit 5, Premier Works, Canal Street, South Wigston, Leicester LE18 2PL. Tel: 0116-277 1400, FAX: 0116-277 3945, who can supply the UpTek LP-310 d.m.m. for £69.33, which includes VAT and post and packaging. A real bargain at that price!

STOP PRESS *How's This For An Offer?*

If you would like to save 30% off the price of the LP-310 Meter, Vann Draper have told me they're willing to offer the UpTek LP-310 meter for only £49 inclusive of VAT and delivery to anyone mentioning *PW* when placing an order.

In 'Book Profiles' this month, the Practical Wireless Editorial team suggest that you take a closer look at some books about test equipment. Now that the novelty of the New Year has well and truly worn off (and Christmas is but a memory), why not take your mind off the winter blues and chills by testing our opinion of this selection of books?

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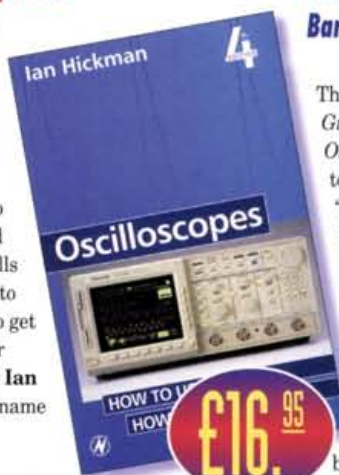
Book PROFILES

Oscilloscopes - How To Use Them/How They Work
- Fourth Edition
Ian Hickman

This book, published by Newnes, claims to be "... the standard reference which tells you not only what to look for, but how to get the most from your 'scope". Written by **Ian Hickman** - a pen-name used by a "... professional electronics engineer of many years experience ..." is also the author of numerous articles in the technical press and has a number of other books under his belt - *Analog Electronics*, *Practical RF Handbook*, *EDN Designer's Companion* and *Analog Circuits Cookbook*, so the book states.

In the Preface to the book, it states that the book is aimed at anyone interested in oscilloscopes, how to use them and how they work - just what the title of the book suggests. It does state, however, that it's not a textbook and "... particularly not a textbook on how to design oscilloscopes". So, don't buy this book if you want to design one!

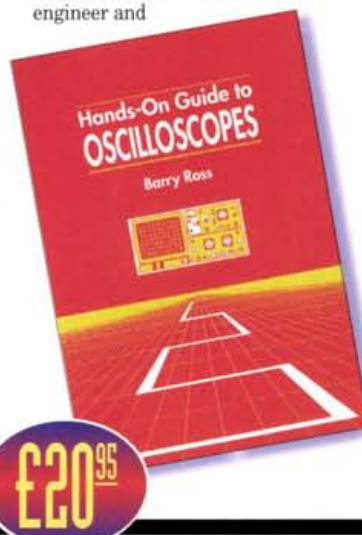
However, the book does go into great detail on the types of oscilloscopes which exist and the contents range from 'The Basic Oscilloscope', 'Advanced Real-time Oscilloscopes', 'Using Oscilloscopes' and 'Oscilloscopes For Special Purposes'. Some of the diagrams could be a little easier to read but otherwise, this book comes **Recommended**.



Hands-On Guide To Oscilloscopes
Barry Ross

This *Hands-On Guide To Oscilloscopes* claims to cover "... all aspects of oscilloscope use". Published by the McGraw-Hill Book Company, this book is aimed at the novice who wants to become familiar with oscilloscope circuitry and correct operation of the instrument in a range of operations and states that it only requires a minimum of previous knowledge. So, if you have ever wanted to learn more about oscilloscopes but didn't know the best place to start, then this could be the book for you.

The book states that the author, **Barry Ross**, "... has spent over 30 years in the oscilloscope industry, first as a design engineer and



now as a technical manager for Hameg Instruments (UK)".

There is something in this book for those of you who feel you already know something about oscilloscopes - as it also covers the more complex oscilloscope functions - digital storage circuitry and the correct use of digital storage oscilloscopes (DSOs). Some of the chapters include: 'Vertical Amplifiers', 'Probes', 'Trigger Circuits', 'Timebase Generator' and 'Choosing An Oscilloscope'. The diagrams in this book are of better quality and, overall, it's clearly set out. **Recommended**.



Build Your Own Test Equipment
Homer L. Davidson

Would you like to be able to build instruments to help you with troubleshooting: TVs; stereos; computers; CD players; Amateur Radio equipment and much, much more? Then this could be the book for you!

Build Your Own Test Equipment claims that it will tell you all you need to know about constructing expensive, high-capacity trouble-shooting equipment for almost any purpose. The American author, **Homer L. Davidson** owned and operated a successful radio and TV repair business for 38 years before becoming a full-time writer of 'how-to' electronics books.

It doesn't matter what level of electronics you're at, this book aims to be something for all levels.

A professional technician, it claims, will find this a useful book just as much as an ambitious hobbyist who wishes to save on instrument and repair costs.

The author takes a step by step approach to: finding and buying components; designing PC boards; substituting components, building and testing projects and putting your completed instruments to work.

With extremely clear pictures and diagrams, this book comes **Highly Recommended**.

Test Equipment Construction R. A. Penfold

This compact little book is published by Babani Electronics Books and appears to be a handy reference source, it's neat size is just right for storage and use in the shack.

The author, **Robert Penfold**, states in the Preface: "... in this book some simple and inexpensive pieces of test equipment are described. They have been designed to fill in the gaps covered by most multi-meters and to cover the checking of both linear and digital circuits". So, this book would probably be a good starting point for those of you who are new to test equipment design and construction.

The chapters take you through 'Audio Test Gear' - the AF

Transistor Tester, the Capacitance Meter and the AF Frequency Meter. The last chapter covers 'Probing' - the Analogue Probe, the CMOS Probe and the TTL Probe.

Good clear diagrams and a casual, easy-to-follow approach by the author makes *Test Equipment Construction* a **Highly Recommended** title at a mere £3.99.

More Advanced Test Equipment Construction R. A. Penfold

More Advanced Test Equipment Construction, as you may have noticed, is written by the same author as *Test Equipment Construction* - **Robert Penfold** - and follows the same format as the above title.

Obviously, this book covers the more advanced equipment and the author himself states: "... this book is not primarily aimed at beginners and near beginners at electronic project construction. A certain amount of practical experience and knowledge of electronics theory is assumed". So, be warned. He does go on to say that you do not need to be an expert in order to be able to build and use these designs and that "... anyone with a moderate amount of electronics experience should be able to tackle these projects".

A similar format to his first *Test Equipment Construction*, this offering from Babani Electronics Books also comes **Highly Recommended** to those more confident Radio Amateurs and it too is very reasonably priced at £3.50.

Test Equipment For The Radio Amateur - Third Edition Clive Smith G4FZH

This book, published by the **Radio Society of Great Britain**

The Editorial Team at PW put some Test Equipment books through the vigorous 'Book Profile' mill this month. From Oscilloscopes to the more advanced test equipment construction - we've 'tested' them all for you!

(RSGB) and written by Clive Smith G4FZH claims to describe "... a range of test equipment and measurement methods which should satisfy the requirements of most Amateur Radio stations".

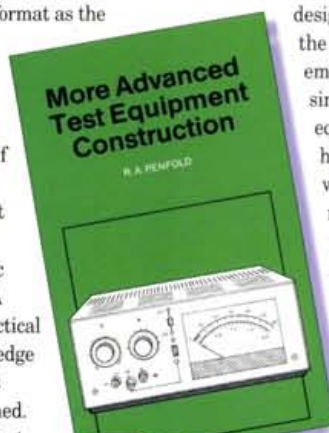
The text explains the theory and construction stages of a majority of the designs covered in the book with the emphasis on the simpler type of equipment in the hope that "... they will be easier or more affordable to the Radio Amateur".

This Third Edition has, apparently, been completely revised with many new designs: "... including digital instruments and p.c.b. patterns and layouts have been provided to make construction as easy as possible".

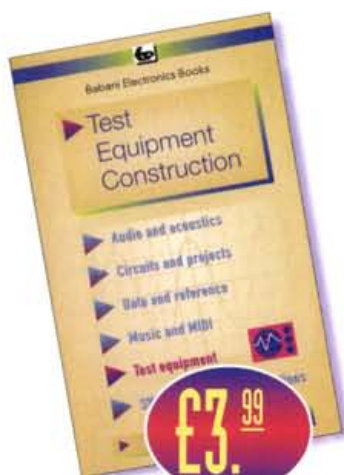
This book has many diagrams and comes **Recommended**.

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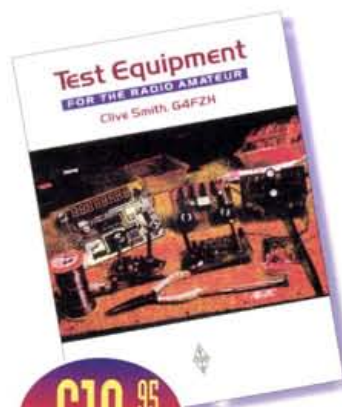
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THIS MONTH DAVID BUTLER
G4ASR TAKES A LOOK AT
YOUR ACTIVITY REPORTS
AND MAKES A PREDICTION
OF WORLD-WIDE DX LATER
THIS YEAR.

Conditions on the v.h.f. and u.h.f. bands during the December-January period can best be described as 'rather quiet'. On the 50MHz band there were no winter Sporadic-E (Sp-E) openings of any note and no-one in the UK reported any DX stations outside of Europe via other propagation modes during the period.

The Geminids meteor shower on December 13/14 and the Quadrantids shower on January 3/4 provided some activity, mainly on the 144MHz band. A few auroral backscatter openings were noted (December 11, 29, January 13, 14, 22) the best of these being the event on January 13.

ON THE AIR

One of the characteristics of the Quadrantids meteor shower is that the peak in radio activity is very sharp and therefore quite easy to miss, go on the air an hour early and you might not hear any reflections at all. However, by using the proven technique of adding one year plus six hours to the previous years observations it does get

you in the right ball-park. This method is of more practical use on the 144MHz band where peaks in activity are more easily defined.

At lower frequencies such as the 50MHz band, it's often difficult to identify a specific peak in radio reflections. This is because the ionisation may exist considerably longer, very similar to a Sp-E opening, with no easily identifiable activity peak.

During the 1998 Quadrantids meteor shower I observed the peak in activity on the 144MHz band to occur on January 3 between 1230-1530UTC. Adding 365.25 days gave the 1999 peak as Sunday January 3 between 1830-2130UTC. As a rough check as to the validity of this method I made a note of when UK stations made meteor scatter 'spots' on the DX Cluster. The first 144MHz spot was made at 1819UTC and the last at 2320UTC with many occurring between 2000-2100UTC. (It was difficult to analyse the 50MHz spots but most seemed to occur between 1900-2300UTC.) I am therefore confident that this prediction method is reasonably accurate.

Further confirmation came from Dave Dibley G4RCK (IO91) who reckoned that the shower peaked around 2045UTC on January 3. During the evening he heard some excellent reflections on 144.100MHz, many from stations greater than 1800km away. Dave mentions that he's now using software written by 9A4GL to decode the high speed c.w. signals. Called MSDSP, this program emulates a variable speed tape recorder by using a SoundBlasterPro compatible sound card.

However, unlike a modified tape recorder or the DF7KF digital tape recorder (d.t.r.), the MSDSP software is not completely stable and may crash unexpectedly on occasions. However, despite these glitches, Dave reports that he is very impressed with the program. During the

Quadrantids he received c.w. signals from the stations of EU6MS (KO45), LY2MW (KO24), LY2SA (KO14) and RU1AA (KO48).

AURORA

A reasonable wide-scale auroral opening occurred during the evening of January 13. On the 50MHz band stations throughout the UK were heard working on s.s.b. into Estonia (ES), Finland (OH), Sweden (SM). Up on the 144MHz band it was a similar state of affairs although there was much more c.w. activity in evidence.

Andy Cook G4PIQ (JO01) missed the first hour of the event but did manage to get on the band around 1910UTC. Although it was getting towards the end of the first phase there were still a few strong c.w. signals to be heard. Among them was the station of YL2IJ (KO16) but he couldn't attract his attention. Andy noted that he had to beam significantly towards the east to work some of the stations. For example, he worked PA4VHF on a beam heading (QTF) of 60°. The first phase of the opening faded out at his QTH around 2000UTC but reappeared suddenly at 2155UTC.

The beacon SK4MPI came up to 57A and GB3NGL, which Andy reckons is a useful indicator, was heard at 55A. (The 'A' at the end of the report indicating an auroral tone - a hissing sound when heard on c.w.). Andy then called CQ and worked a number of stations including SM3MXR (JP80) and SK4AO (JP60).

In his opinion, the second phase didn't seem all that stable with the auroral curtain moving around quite a lot. The beacon SK4MPI was extremely variable in strength and often not audible at all. However, Andy did work some good DX on the 144MHz band including DL1UU (JO62) and YL3AG (KO26) before finishing up with a number of DL stations (JO30/JO31) on a QTF of around 60 degrees again. The

event then faded out around 2305UTC with MM0BQI being the last station heard. A very sudden end to a reasonably good auroral opening.

SOLAR CYCLE

If you've been following this column recently, you'll know that we're heading relentlessly towards the peak of **Solar Cycle-23**. What relevance does this have to v.h.f. propagation? I hear you ask. Well, quite a lot actually and especially so on the 50MHz band.

If you're a newcomer to the 'magic band' then you've probably only experienced the summer Sp-E openings and maybe the occasional auroral opening. That's all well and good if you only want to work around Europe (and very occasionally to North America), but what if you want to work world-wide? Well you can - and it will happen very soon.

Around the peak of the solar cycle (and for one or two years after the peak), the F2-layer can be sufficiently ionised to support world-wide communications on the 50MHz band and on very rare occasions even as high as the 70MHz band. One of the latest predictions places the maximum to occur around March 2000 (with limits between the middle of this year to middle-2001).

As any h.f. operator worth his salt will tell you, however, there are seasonal variations in the F2-layer intensity. Although the ionisation in the F2-layer is caused by solar radiation, the maximum electron density is found in regions 10-15° north and south of the magnetic equator. Although the position of the ionised regions are independent of the time of year they become unbalanced in intensity as the sun favours either one or other region.

However, during the period of the equinoxes (September 23 and March 21), when the sun crosses the equator, the intensity of the two regions are at their greatest. This is because the length of day and night everywhere are of equal duration and therefore the ionisation effects are similarly balanced.

Although I've been very specific about the date when the sun crosses the equator, the F2 season on the 50MHz band is generally accepted to lie between September/November and February/April. During the

year of maximum solar activity the December/January gap may disappear completely allowing up to eight months of DX conditions. Some operators claim that when approaching the solar maximum the autumnal equinox gives a higher m.u.f. while during the decline towards solar minimum the earlier spring equinox is better.

A similar mode to look out for is trans-equatorial propagation (t.e.p.) which utilises two F-layer ionised belts located north and south of the geomagnetic equator. During the autumn and spring equinox periods contacts can be established by stations located around 4000km either side of the geomagnetic equator. From the UK, this means that contacts into Southern Africa (A22, Z22, ZS) and South America (CX, LU, PY) are very possible. There is a very high likelihood of these paths developing around October of this year.

STATION ACTIVITY

David Dodds GM4WLL reckons he must be "off his rocker". Who else would deliberately choose to be tramping around in deep snow on a gale-blown moor at 0800UTC, in order to erect an antenna for a brief two and half hour Sunday morning contest on an under-used band? This was the first in a series of short cumulative contests on the 70MHz band which David had decided to enter.

The weather in mid-January was very cold but in a perverse sort of way this was rather useful as the rock-hard ground enabled access to be made to the highest point of the contest site. Normally the mud defeats him! The station at GM4WLL/P (IO85) consisted of a Trio TR-9130 transceiver, a Spectrum transverter and a 4-element Yagi. This was mounted at a height of only 5m above ground as the high winds made it difficult to fully erect the portable mast.

The first hour of the contest was very slow going but after that it livened up as fixed station operators finally crawled out of bed and got on the air. In total, 15 contest QSOs were completed, the best DX of the morning being G3TCU (IO91) at 526km. Other stations worked on the 70MHz band included GD4GNH, GM3TAL, GM4AFF, GM4DGT, GM4DIJ, GM6CMQ and GM8BDX.

Further to the south, David

worked the stations of G3IKR, G3NKS, G3UKV, G3XDY, G4LRT, G4YTL and G0MJW. He mentions his surprise that some of the operators in southern England were not being heard at the station of GM4AFF. Although Stuart is located 120km north of the GM4WLL/P site his superior station normally winks out the DX that David cannot hear. He suspects there may have been some form of tropospheric enhancement even though there were gale force winds at the time.

MICROWAVE BANDS

Recently I purchased the latest 'Third generation' DB6NT 10GHz transverter. Although fairly expensive (approximately £350), it does blow away the myth that microwave operation is only for the advanced enthusiast. Now it really can be a case of 'plug and play'!

The DB6NT unit is manufactured by Kuhne Electronic and is claimed to be the world's smallest 10GHz transverter measuring only 30 x 55 x 150mm. Its small size doesn't belittle its performance, though and each unit comes with its own measured test results.

My unit produced 220mW output power (nominal 200mW minimum) with a 1.3dB noise figure (1.2dB typical). The transverter requires drive at 144MHz and has built-in i.f. switching. Both the i.f. drive (4W maximum) and receiver gain (18dB) are adjustable to suit the 144MHz transceiver in use. The d.c. switch-over is also built-in, operated either automatically via a positive signal on the i.f. feed (as in the FT-290), or manually via a p.t.t. to earth.

Three solder pin connectors are provided for +12 to 14V d.c. power input, a 12V output (on transmit) for antenna relay and/or external p.a. and an output power monitor via a built-in directional coupler and detector. This feature is really useful as not all operators have access to microwave analysers or power meters.

The transmit output and receive input ports are SMA connectors, as is the 144MHz i.f. feed. All you need to get operational is a changeover relay (microwave type with SMA connectors), an antenna (a small dish or horn), some SMA patch leads and a low power 144MHz transceiver (an FT-290

or IC-202 would be ideal). Just throw it all together - and 'hey presto' - you're operating on the 10GHz band.

Normally you'd use the transverter for narrow-band operation such as c.w. or s.s.b. but there's nothing to stop you from using f.m. (if you really must!). Many operators only use the band when a contest is scheduled. In this instance, they usually operate portable from the top of a local hill. However, there's a growing number of operators who prefer to operate from their home location. You may not get the advantage of a perfect line-of-sight path but you will be able to catch all those propagation modes that probably won't exist during a brief contest session.

Among these modes will be tropo enhancements and scatter from intense rain and snow showers. Signals can be quite strong during these events enabling contacts to be made over obstructed paths of many hundreds of kilometres. The existing UK tropo record for the band is a 1275km contact made between G3GNR (IO70) and SM6ESG (JO67) in January 1997. Neither station had any significant site advantage, it was just a matter of being in the right place at the right time.

SATELLITE NEWS

A few months ago I mentioned that Russian cosmonauts had successfully hand-launched a second mini-Sputnik satellite. Listening immediately following the launch **Pat Gowen G3IOR** heard the beacon during the first pass between 2355-0000UTC on November 10. Signals were excellent and Pat even found the transmission to be fully quieting on his hand-held radio using a quarter-wave whip antenna.

Called *Sputnik-41*, RS-17B and RS-18, the new satellite was built by AMSAT-France in co-operation with the educational department of the Russian Aeronautic and Space Federation. Note that this is not the spare model of *Sputnik-40* as I had originally reported. That unit is still housed aboard the Mir Space Station and is expected to be launched later this year.

Sputnik-41 is similar to its *Sputnik-1* model predecessor, being only 20cm in diameter and weighing 4kg. It comprised of a 180mW frequency modulated (f.m.) transmitter operating on 145.815 MHz. It

had no solar cells but worked from dry batteries with a life expectancy of three to four weeks.

In addition to an audio-frequency tone indicating the internal temperature *Sputnik-41* also transmitted six pre-recorded digitised voice greetings in French, English and Russian. One message came from 14-year old Constantin Samburov, son of Sergei Samburov RV3DR, who is the Mir Space Station Amateur-Radio Manager. Constantin said "1998 was the International Year of Air and Space". The other English message came from Project Chief Victor Kourilov of the Russian Aeronautic and Space Federation and stated "International Space School Sputnik Program." The French and Russian messages conveyed similar greeting messages.

Andrew Thomas G8GNI (IO91) was pleased to see a mention about *Sputnik-41* as his ten-year old son, Carl, had been carrying out a 'space' project at school. He had been downloading weather satellite pictures from NOAA 12/25 and thought it would be interesting to listen out for *Sputnik-41*.

Using a Yaesu FT-847 transceiver and 9-element Yagi (no elevation), the satellite was received on a number of occasions, 20 times or so, with the best reception occurring between mid to end November. Signal strength was invariably very strong and during one pass, on November 17, a tape recording was made which was used as part of Carl's school project. Andrew reckons that *Sputnik-41* was an excellent educational satellite as it certainly made space communication very real to his children. They now stop and listen every time something space-related comes on the radio or television news which can't be bad!

In a Packet radio message, **John M1BTR** reported hearing *Sputnik-41* every night since it was hand launched. Using a Yaesu FT-3000 and a tri-band vertical antenna, the low power signals were only peaking around S1 at best. However, with an Icom IC-821 transceiver and a horizontal 9-element F9FT Yagi the signals were often S9+. According to reports, *Sputnik 41* lasted for four weeks, falling silent on, or around, December 10. Certainly at my QTH it was unheard on December 11,

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although it had been heard at very good strengths on days previous.

BEACON NEWS

In a recent issue **Tex Swann G1TEX** published a list of v.h.f. and u.h.f. beacons located throughout Europe. However, as you may realise, it's impossible to hear the majority of these from the UK. Therefore, I've provided a list of UK beacons that you should be able to hear from your QTH on the 50MHz, 70MHz, 144MHz and 430MHz bands. At the time of writing (January 1999) some of the beacons were off the air

and I've indicated, where known, when these units are expected back.

DEADLINES

That's it again for another month. Please forward any news, views, comments or photographs to the address and by the date given at the top of the column.

THANKS FOR YOUR LETTERS AND GOOD LUCK WITH THE DX. SEE YOU AGAIN NEXT MONTH.

73 David G4ASR

Fig. 1: List of beacons which you should be able to hear from your QTH on 50MHz.

50MHz beacons

50.000MHz GB3BUX	Buxton IO93BF.
50.042MHz GB3MCB	St.Austell IO70TJ.
50.050MHz GB3NHQ	Potters Bar IO91VQ (Off).
50.060MHz GB3RMC	Inverness IO77UO.
50.062MHz GB3NGI	Ballymena IO65PA (Off - back in March).
50.064MHz GB3LER	Lerwick IP90JD.
50.065MHz GB3IOJ	St.Helier IN89WE.

Fig. 2: List of beacons which you should be able to hear from your QTH on 70MHz.

70MHz beacons

70.000MHz GB3BUX	Buxton IO93BF.
70.010MHz GB3REB	Camberley IO91OH (Off).
70.020MHz GB3ANG	Dundee IO86MN.
70.025MHz GB3MCB	St.Austell IO70OJ.

Fig. 3: List of beacons which you should be able to hear from your QTH on 144MHz.

144MHz beacons

144.430MHz GB3VHF	Wrotham JO01DH.
144.445MHz GB3LER	Lerwick IP90JD (Off).
144.453MHz GB3ANG	Dundee IO86MN.
144.469MHz GB3MCB	St.Austell IO70OJ.
144.482MHz GB3NGI	Ballymena IO65VB.

Fig. 4: List of beacons which you should be able to hear from your QTH on 430MHz.

430MHz beacons

432.890MHz GB3SUT	Sutton Coldfield IO92CO.
432.910MHz GB3MLY	Emley Moor IO93EO.
432.934MHz GB3BSL	Bristol IO81QJ.
432.942MHz GB3NGI	Ballymena IO65VB (Off - back in June).
432.965MHz GB3LER	Lerwick IP90JD (Off).
432.970MHz GB3MCB	St.Austell IO70OJ (Off).
432.980MHz GB3ANG	Dundee IO86MN.

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Conditions on the h.f. bands have been rather 'up and down' this month, with generally good conditions throughout the first couple of weeks of January. However, the latter half of the month definitely provided a downturn in propagation conditions.

Most of the h.f. bands have only been open during daylight hours this month, although they have been allowing long-distance work to take place regularly. But despite this recent 'dip' in conditions, things are steadily improving for the h.f. operator and as we approach the next sunspot maximum, we can expect even better propagation conditions, particularly on the bands at the higher end of the h.f. spectrum.

CLUB ON THE NET

News has come in from **Dave Griffiths GW0JUI** in Pontypridd (Mid Glamorgan) that the **GW QRP Club - Cymdeithas QRP Cymru** - is now on the Internet. The club was formed in 1994 to encourage on-air low power operating amongst Welsh Radio Amateurs and has around 40 members in Wales.

Their new Web pages include information on the club, QRP clubs around the world, as well as QRP articles written by its members. The address is: www.gwqrp.free-online.co.uk and messages can be sent to GW0JUI via: dave@gw0juj.free-online.co.uk

YOUR REPORTS

As space is limited this time around, I'll go straight into your reports, concentrating on the higher bands this month.

The 14MHz log from **Don McLean G3NOF** in Yeovil shows that he's been reaching out to all parts of the globe lately. Using s.s.b. at 100W, he hooked up with FR5HA (Reunion Island) at 1628, TL5A (Central African Republic) at 1800, ZL9CI (Auckland & Campbell Islands) at 0930, 3V8BB (Tunisia) at 1600,

9G1NS (Ghana) at 1659 and an unusual one in the shape of SP5EWX/Aeronautical Mobile over Iceland at 1750UTC.

Next up comes **Carl Mason GW0VSW** of Skewen in West Glamorgan, who has been using low power this month. On the 14MHz band, using 4W of s.s.b. he worked CT3/LX1KQ (Madeira Island) at 1330, while 4W of c.w. brought in EA8QJ (Canary Islands) at 0822, HB0/DL1RBW (Liechtenstein) at 1500, as well as 8P9EM (Barbados) at 1940UTC. (QSL via G3VPL).

Meanwhile, on the receiving side of the hobby is **Gordon Hurrell BRS-91705** on the Isle of Wight, who reports amongst others 14MHz s.s.b. reception of TN7OT (Congo) at 0900, RX1OX/FJL (Franz Josef Land) at 0930, FG/W0ADX (Guadeloupe) at 1929, 3B8GF (Mauritius) at 1620, A47RS (Oman) at 1630 and using RTTY.ZD7DP (St. Helena Island) at 1740UTC.

THE 18 & 21MHz BANDS

Now over to the Isle of Sheppey in Kent and **Ted Trowell G2HKU**, who thankfully managed to avoid the 'flu bug this year! An 'all-c.w.' man, Ted used 70W to hook up with ZB2EO (Gibraltar) on the 18MHz band at 1600, while operating on 21MHz brought him contacts with VE3AR (Canada) and K2VCO/6 (west coast USA) both at around 1600UTC.

Down in Worcester Park Surrey, **Eric Masters G0KRT** has been using both low and high power this month, hooking up with LZ2EV (Bulgaria) and IK4UGH (Italy) around 0900 with 5W of c.w., while high power s.s.b. brought in EW7EW (Belarus) at 0920, and US0HZ (Ukraine) at 0900UTC.

Don G3NOF had a go at the 18MHz band, and dug out TI2CF/YN1 (Venezuela) at 1237 QSL via W3HNC, ZL9CI (Auckland & Campbell Islands) at 1936, VK2CLB (Australia) at 0934 and VP8CRB (Falkland Islands) at 1029UTC. (QSL via K4QD).

Sean Gilbert G4UCJ in Milton Keynes bemoans the perennial problem of h.f. Amateur Radio - that of the 'idiot brigade' who continually call during 'pile-ups' on the bands, rather than behaving like gentlemen (and gentlewomen!) and having courtesy for others. They lost him a contact with ZL9CI on the Auckland &



Fig. 1: Home-brew is the theme at the station of Pat Painting G3OUC in Newbury, Berkshire.

1145, JX7DFA (Jan Mayen Island) at 1250 QSL via LA7DFA, TI2JJP (Costa Rica) at 1600 and ZF2NY (Cayman Islands) at 1641UTC.

Short wave listener

Campbell Islands, hence his use of the term 'idiot brigade'.

Undaunted, Sean used power levels of 5 and 30W c.w. to hook up with OY2H (Faroe Islands) at 1400 on the 18MHz band. While 21MHz operation brought him contacts with CO3IP (Cuba) at 1420, PT7SY (Brazil) at 1150, EK88L (Armenia) at 1550 and W6FJD (west coast USA) at 1540UTC.

THE 24 & 28MHz BANDS

In between job-hunting, Eric Masters G0KRT has been getting some time on the air. Eric's log shows c.w. contacts on 24MHz with K1ZFE and N4ND (USA) at 1550, SM3WMU (Sweden) with QRP c.w. at 1500, while low power s.s.b. brought in W4OIZ (USA) at 1451UTC.

On the 28MHz band Eric used 5W of s.s.b. to hook up with a string of US stations, while a switch to 100W n.b.f.m. on 29MHz gave him contacts with UA1TBK (Russia) and UR3CHS (Ukraine) at around 1250, as well as CN8NK (Morocco) at 1103UTC.

Home-brew is the theme at the station of **Pat Painting G3OUC** (see Fig. 1). All of Pat's gear is home-made, low power s.s.b. Using his 'Little Skipper' 15W 28MHz rig into a wire dipole and home-made two element cubical quad antenna, he worked, amongst others, 9G1BJ (Ghana), ZS6BSN (South Africa), TA2IJ (Turkey), 6W1HM (Senegal), KC3JL (USA), SV0LM (Greece) and HZ1AB (Saudi Arabia).

Ted G2HKU lists 28MHz c.w. contacts with TL5A (Central African Republic), HS1RU (Thailand), KP3AO (Puerto Rico) and AA1AC/VP9 (Bermuda) all at around 1200.

Don G3NOF lists s.s.b. contacts with A41LZ (Oman) at

(s.w.l.) Gordon BRS-91705 has also been active on the 24MHz band, logging ZS6HVM (South Africa) at 0855, ET3AA (Ethiopia) at 1400 and DU4DX (Philippines) at 1128, while Carl GW0VSW offers 24MHz QRP c.w. contacts with T94KU (Bosnia) and WA4TDL (USA), both at around 1420UTC.

Finally for this month, Sean G4UCJ ties up the ribbons with reports of his c.w. contacts on the 24MHz band with 5N3CPR (Nigeria) at 1330, LW1DX (Argentina) at 1220, 6Y5/DL7VOG (Jamaica) at 1620, HK6KKK (Colombia) at 1642 and CO8LY (Cuba) at 1345UTC.

Operating on the 28MHz band brought Sean contacts with VK4XA (Australia) at 1108, PJ9/PA0VDV (Netherlands Antilles) at 1300 and last, but certainly not least, ZF2NT (Cayman Islands) at 1320UTC.

SIGNING OFF

Well, it certainly looks as though our reporters have had a good month on the h.f. bands and have proved themselves quite adept at digging out the DX. Being in the right band at the right time is what it's all about, so keep an eye on the clock and watch out for those big openings, whichever band you use!

That's it for this month, hope I managed to squeeze you all in! Cheerio for now and good DX!

THANKS TO ALL REPORTERS FOR THEIR TIME AND EFFORT IN MAKING THE COLUMN A SUCCESS. AS USUAL, REPORTS, INFORMATION AND PHOTOGRAPHS TO ME BY THE 15TH OF THE MONTH PLEASE. DETAILS AT THE TOP OF THE COLUMN.

Leighton Smart G4WLB

SCENE USA

PLEASE SEND ME REPORTS AND INFORMATION FOR THE JULY COLUMN BY APRIL 15.

**ED TAYLOR N0ED
PO BOX 261304
DENVER
COLORADO 80226
USA**

E-MAIL: N0ED@RadioLink.net

ED THINKS THAT ONE OF THE MOST INTERESTING PARTS OF THE WORLD IS HAWAII. THIS GROUP OF ISLANDS IS ALSO A USA STATE. IN THIS MONTH'S COLUMN, HE DESCRIBES A RECENT VISIT AND WHAT YOU MIGHT FIND ON THE RADIO IF YOU HAVE THE OPPORTUNITY TO GO. IN ADDITION, THERE'S GOOD NEWS ABOUT RECIPROCAL LICENSING AND THE UNITED STATES.

As Radio Amateurs we sometimes think we know a little bit more about the world than most other people. We know about geography, because we're always studying maps to find out how to work that latest DX. We know about politics, because we're aware of the changes in prefixes around the world as countries split up, merge and change their status. We perhaps know more than our neighbours about postage rates in sending QSL cards to exotic places.

It was with these thoughts that I contemplated my OWN knowledge of a part of the USA which I had never been to before and which was quite a bit more exotic than I expected. The islands of Hawaii are out to the south and west of mainland USA and quite remote. The flora and fauna are unusual and the islands were the 50th state to join the union - and the latest. That was about all I knew and I decided to learn a little more before taking a winter holiday there. I could also add that Hawaii must be a long way from my home in Colorado, since it was going to take longer to fly there than it would to fly to London!

From an Amateur Radio point of view, Hawaii is obviously not really rare DX. Most of us will have contacted KH6 if we are active on the h.f. bands. However, because of its

geographical separation, Hawaii counts as a separate 'country' from the rest of the USA, so this state is in demand by everyone on the air, particularly during contests.

BACK OF BEYOND

To learn more about Hawaii, take a look at a Great Circle map based on Honolulu, the state capital (see Fig. 1). The Great Circle is a view of the earth, looking down from directly overhead at the point of interest. The far side of the globe is 'stretched' and opened out, as if it were a flat piece of material. The advantage of doing this is that you can now see the correct bearing and distance from your point of interest (in this case, Hawaii) to any other place in the world. Of course, the scale of the map is exaggerated more and more as you go out to the edge.

It immediately becomes clear from Fig. 1 that Hawaii is isolated. The nearest continent (North America) is 3000km away. The next nearest land masses - Asia and New Zealand - are even further. This has created a unique situation as far as wildlife and human development is concerned and it also has ramifications for radio, as we will see.

Historically speaking, Hawaii is thought to have been settled by Polynesian voyagers in the 6th Century, with later arrivals in the tenth century. These intrepid sailors from the south travelled to many of the Pacific islands, including New Zealand. They brought a language and a relatively stable way of life and must have thought the Hawaiian islands to be a paradise, with a plentiful food supply and a warm climate.

Europeans arrived with Captain Cook in the 18th Century, by which time Hawaii was beginning to become united under a single King. The Hawaiian royalty were much taken with the European style of monarchy and the country was a British possession for a few months. To this day, Hawaii has the Union Jack in the corner of its state flag - see Fig. 2. However, the (relative) nearness of the USA led to domination by American sugar producers. In a series of unsavoury events, the monarchy was overthrown in 1893 and Hawaii became an American colony, leading to statehood in 1959.

Hawaii consists of six larger

THIS MONTH, ED TAYLOR N0ED TAKES YOU THROUGH AMATEUR RADIO IN HAWAII.

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islands and many smaller ones, stretching over about 700km of ocean. (See Fig. 3). All the main islands have Amateur Radio Clubs, so I checked their meeting dates to see what could be fitted into my trip. Perhaps there might also be some radio facilities that a visiting 'ham' could use. A little research produced great results and gave me an insight to what it's like to

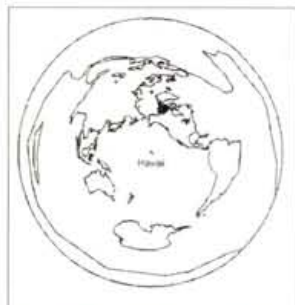


Fig. 1: Great Circle Map based on Hawaii.

go on the air in Hawaii. Not only that, the XYL and I had time to see some of Hawaii's amazing natural phenomena!

Imagine the ideal situation: a Radio Amateur runs a 'Bed and Breakfast' and lets 'hams' have full



Fig. 2: The Hawaiian flag.



Fig. 3: Map of the Hawaiian islands.

use of his shack. The accommodation is reasonably priced and congenial and the station has modern equipment with a range of decent antennas. The location is close to the airport and the main town and within easy reach of tourist attractions. Does it exist? Yes - welcome to the island of Maui and to the home of Terry KH6SQ!

If you want to have complete information about Terry and Donna Clayton's QTH, 'Sea Q Maui', it's best to check their Web site: www.seaqmaui.com They offer great B&B facilities overlooking a golf course and can't do enough to make visits as interesting as possible. There are plenty of things to do on the island, so members of a party who are not so enamoured of radio will find lots of amusement.

'HAM' RADIO FROM HAWAII

So, what's it like to operate from Hawaii? The first thing to remember is that virtually everyone you hear is DX, in the sense of being a long way away. It wouldn't be a good idea to expect too much from the v.h.f. and u.h.f. bands! But what this means on h.f. is that the bands seem remarkably quiet. There's no real local QRM, because there are very few locals; your nearest 'ham' neighbour is likely to be 100km away on the next island - not a problem!

Another factor of importance is that your first 'hop' down from the ionosphere is likely to be onto water, that is - the Pacific Ocean. We experience this phenomenon from the UK when working the Americas - it means that outgoing signal attenuation is often lower than incoming. As a result, signals from Hawaii can be stronger than expected.

On the downside, the proximity to the equator (20° north) means that static interference is higher on the lower bands, particularly 3.5 and 1.8MHz. Terry is happy for visiting 'hams' to experiment with antennas, so it might be interesting to try something new, such as a Beverage. (Actually, visitors have been responsible for several of the new antennas put up at Terry's QTH).

Just having 'KH6' in your callsign leads to pile-ups of greater or smaller degree. I suppose that there are always new amateurs around the world who would like this new country in their logs. Once you



Fig. 4: The crater of Haleakala volcano.

are in a conversation with someone, it's unlikely that people will interrupt - Hawaii is not THAT rare! But it's easy to work stations 'contest-style' on an open band and a lot of fun! Now that 28 and 21MHz are opening more frequently, I would guess that there will be pent-up demand for Hawaii on those bands, leading to high QSO rates.

To get an overall picture of the bands, I asked KH6SQ to compare operation from Hawaii with operation from other locations: "At the moment, 14 and 7MHz are both very good. It's easy to work Japan, Australia and New Zealand. The Pacific Islands are close and if there's anyone on, we'll work them. I've found 3.5MHz to be harder, using long wires and I might need to put up a better antenna. With an amplifier feeding a TH7 at 14m, we're spoiled here! Europe is easy to contact in the right conditions, although not on 1.8MHz. Don't forget 50MHz, which is great when open - we regularly hear the beacons from Australia and South America".

Without turning the column into a travelogue, let me briefly mention some of the non-radio activities which visitors to Maui can find. For example, KH6SQ's house is on the slopes of an inactive volcano and a drive to the summit leads to some breathtaking views - see Fig. 4. There's fabulous snorkelling and whales can be seen at a nearby bay. There are plenty of splendid hikes, with views around almost every bend. Naturally, there are lots of beaches and with a minimum daytime temperature of about 23°C, it is easy to get a tan. No wonder some visitors decide not to go home!

MAUI AMATEUR RADIO CLUB

While staying with KH6SQ, I went along to one of the monthly meetings of the Maui

Amateur Radio Club in Kahului. As it happened, this was an open meeting, where members could air their views about the club's activities for the following year. I wondered how the concerns and interests of the locals would compare with those of 'hams' elsewhere.

Perhaps I should not have been surprised that the topics of conversation were similar to those to be heard in almost any other club. There was to be an emphasis on training of new Amateurs. Who would like to run courses? Members were asked to think of ways in which newly licensed Amateurs could be retained in the hobby.



Fig. 5: KH6/N0ED operating from Maui.

The club wanted to attract younger people. There were concerns about repeater sites, particularly those managed by commercial organisations. Questions were asked about content of club meetings and the possibility of 'back to basics' lectures. Who would arrange club outings and when should they be? Volunteers were needed to prepare for field day and contest operation.

There was one difference from typical 'hams' in the UK. When talking with members after the meeting I noted this general assumption: that Amateur Radio involves being ready for emergency communications. In fact, the meeting itself was held in the offices of the Civil Defence Headquarters, with whom the radio club has close ties.

Although not common, hurricanes and tsunamis (tidal waves) could strike and there were detailed measures to deal with them. Radio Amateurs were part of the communication plan, particularly if mains power were cut off to any area. Both h.f. and v.h.f. rigs were to be deployed if necessary. In addition, 'hams' were ready to communicate with (and if

necessary, travel to) other islands in the Pacific in the event of natural disaster.

RECIPROCAL LICENSING

I've mentioned before that the USA will be joining the CEPT scheme for reciprocal amateur licences. It finally looks as though the bureaucracy has been surmounted and the system is about to come into effect. What this means is that a UK licence will be valid for operation in the USA without the need to apply for a reciprocal licence and vice versa.

All you will need to operate in the USA is your home licence and the CEPT document (should be attached to the licence itself) - no need to apply in advance for permission. The target date is April 1999, but please don't assume it's all cut and dried until officially announced. The best place for latest information is probably the ARRL Web site: www.arrl.org

MANY THANKS TO TERRY KH6SQ FOR THE FINE HOSPITALITY AND FOR THE USE OF HIS PHOTOGRAPHS. ALSO TO THE MAUI AMATEUR RADIO CLUB FOR MAKING ME WELCOME AT THEIR MEETING. IF YOU HAVE ANY COMMENTS, PLEASE LET ME KNOW.

73 Ed NoED

FOCAL POINT

REPORTS & INFORMATION TO:

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ACOCKS GREEN
BIRMINGHAM
B27 6LE

E-MAIL:
graham@ghank.demon.co.uk

PACKET: G8EMX@GB7SOL

THIS MONTH GRAHAM HANKINS G8EMX HAS SOME INTERESTING INFORMATION FOR YOU ABOUT SOME IMPORTANT ATV EVENTS THAT ARE COMING UP THIS YEAR.

INTERNATIONAL MARCONI DAY (IMD)

International Marconi Day (IMD), on **Saturday 24 April 1999**, celebrates Guglielmo Marconi's birthday and the Amateur Radio on-air activity that's being planned will include Amateur Television (ATV).

The **Kent Television Group (KTG)**, in collaboration with the **British Amateur Television Club (BATC)**, will be responsible for the television contacts. **Chris Gibbs G8GHH**, Technical Co-ordinator for the KTG says:

"South Foreland Lighthouse will be our main base and it is hoped to run a 10GHz ATV link from here to Wimereux in France. The public displays and another ATV stations linked to Wimereux, are planned from the **White Cliffs Experience (WCE)** building in Dover town. Actual bands and equipment requirements have not yet been finalised". Saturday 24 April and Sunday 25 April will be the main days of operation.

Chris continues: "From an r.f. propagation viewpoint, Dover lies in a big hole in the ground! But Cap Gris Nez on the French coast can be seen from the roof of the WCE. Direct ATV from the lighthouse to the White Cliffs Experience is not possible on any band, so a repeater link might be established if enough equipment is available - we have had the offer of some low-power 10GHz ATV gear but 23cm ATV will be used as well".

RALLY '99

The day following Marconi's birthday will see the BATC holding the first of its two big gatherings this year. 'Rally '99' is on **Sunday 25 April** at the usual venue, the Sports Connexion near Ryton, which is

just outside Coventry. There will be all the familiar features of a BATC rally - specialist Amateur TV displays, ATV Repeaters Groups, ex-broadcast vehicles and many seriously high-quality ex-broadcast cameras! Doors will open at 10am (0930 for the disabled) and talk-in will be provided by GB6ATV on 144MHz (S22) and via the Coventry 430MHz voice repeater GB3CV on RB9.

SHUTTLEWORTH '99

The countdown has started to 'Shuttleworth '99', organised by the BATC to celebrate its 50th Anniversary. This major ATV event will be at Shuttleworth College on **Sunday 8 August**, the college is part of Cranfield University, near Bedford and the event will include lectures and demonstrations on all television-related topics. The day will conclude with the BATC's Biennial General Meeting to elect officers to the BATC committee for the next two years and the presentation of various awards for achievements in the hobby of ATV. Plans for the event are still unfolding to make this an occasion to remember. Further details in the next 'Focal Point'.

As a further mark of its 50th year, the BATC has changed the format of its quarterly magazine CQ-TV. Issue 185, dated February 1999, is the first ever A4 sized CQ-TV and in its Editorial, **BATC Chairman Trevor Brown G8CJS** explains why the move up from A5 was made:

"We talked about it, we asked the membership what they wanted and we asked the printer what it would cost. The new larger page size enables us to produce more pages if needed and we have to think of our Editor, **Ian Pawson**. Ian had been wrestling with the software while in A5 - most

packages are designed for A4 so all sorts of reductions were having to happen. We regard the move to A4 as inevitable as was the change from 405 line TV to 625 lines in the UK".

The **North London Television Group (NLTG)** are working at providing a 1.3GHz ATV repeater in the Enfield area and could have a repeater licence soon. Their application was submitted to the Repeater Management Committee on 25 September 1998 and forwarded onto the Radiocommunications Agency (RA) in November.

In the NLTG's December newsletter, secretary **John Douglas G4DVG** says "The RSGB Repeater Management Committee and Graham Shirville G3VZV (BATC committee) in particular have moved very quickly in the processing of the application and we thank them for their help".

The Beacons Repeater Group, based in the West Midlands, began this year with an actual test of their planned 1270MHz ATV system for Birmingham. On Sunday 3 January I took myself up to the site for the proposed repeater to carry out some receiving tests and to put out a 1.255GHz transmission of test card idents and a New Year greeting, using my own call sign G8EMX/P.

The results of these receiving tests were interesting and informative. **Leicester ATV repeater: GB3GV** was received quite strongly, but the s.w.r. measurement on the transmit feeder and antenna gave a fairly high 2:1 reading. Several ATV stations in the West Midlands were available to participate and all of them could put a strong, high-quality P5 ATV picture into the receive system at the site. Transmissions from the site were given varying reports, from a low of P2 in Stourbridge, a P3 from West Bromwich then up to P5 within Birmingham.

I was using 144MHz for talkback during the site testing and would have used the ATV calling channel of 144.750MHz for initial contacts. However, two stations seemed to be already using that frequency for an ongoing QSO, so my opening contacts had to be made away from the accepted channel. So, could I urge non-

Leicester ATV repeater: GB3GV



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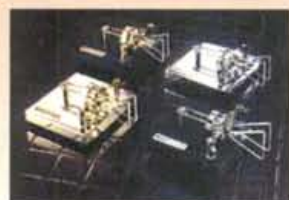
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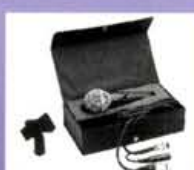
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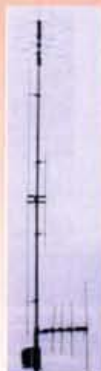
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RadioScene

ATV stations to avoid 144.750MHz if at all possible and even ATV stations are asked to move away from the calling channel once a contact has been established?

COMPUTER CRASH

I have been unable to respond to some recent correspondence. An E-mail arrived, inviting me to give a Club talk on ATV but a date was not set. Then, horror on horror, my computer hard disc 'crashed' and all data was lost (no, that's right, I had not made backups!) At least I now know what a 'hard disc crash' means - ha! Could the Radio Club that made the enquiry please E-mail again?

I also received a (real) letter through the post. It was from a reader in Tel-Aviv, but unfortunately, was hand-written and the name, address and telephone number were not clear. If the writer still wants the information, please try again with printed details, or E-mail me (hard disks permitting).

THAT'S ALL FOR NOW, BEST 73 AND P5!

Graham Harkins G8EMX

DATA SCAPE

ROGER J. COOKE G3LDI

TEL: (01508) 570278

E-MAIL: rjcooke@FreeNet.co.uk

PACKET: G3LDI@GB7LDI.#35.GBR.EU

THIS MONTH ROGER COOKE G3LDI EXPLAINS WHY HE'S YET TO BE CONVINCED THAT MORSE (CW) IS DEAD, REPORTS BACK ON SHACKLOG'S NEW FACE-LIFT AND ALSO EXPLAINS THE INS AND OUTS OF THE NEWSGROUP.

In my opinion, c.w. is hardly dead, or even dying, if listening around the h.f.

bands during the recent **CQ WW contest** is anything to go by! The bands were the best they have been for years, the 28MHz band was even packed with c.w. up as far as 28.170MHz.

The poor old CB intruders were having a real hard time on our band. Did I feel sorry for them? Did I heck! If we could encourage this sort of activity outside of contests, then the CB stations would not last a day! It was impossible to find a clear spot anywhere. Even the RTTY sub-bands and data sub-bands were full of c.w. This was a little naughty I thought, although in fairness, the data operators did steal part of the c.w. band in the first place!

Having said all this, it makes the 5 w.p.m. proposed c.w. test look a little silly! I suppose I'm prejudiced again in that respect, but I totally disagree with making the amateur licence easy to obtain. Anything obtained with ease is treated with disrespect and not valued at all. I am, however, in favour of a tiered form of licensing, similar to that in the USA, so starting with a very limited licence at 5 w.p.m. would be fine.

But looking at it from another point of view, if you wish to become a member of the **High Speed Club (HSC)**, the criteria for that is as follows: you have to obtain sponsorship from another member and to have that, you must qualify with 30 minutes two-way c.w. communication using no less than 25 w.p.m. Solid copy must be made, together with excellent keying. Computers, keyboards and decoders are banned, reception only by ear and only a basic electronic keyer may be used for sending! Similar rules apply for membership to the **Very High Speed Club (VHSC)**, except the contact must be at no less than 40 w.p.m. Again, for the **Super High Speed Club (SHSC)**, the speed must be no less than 50 w.p.m.

An interesting addition is the **Extremely High Speed Club (EHSC)**. Here you must have two recommendations and,

again, a 30 minute, faultless contact at 60 w.p.m. must be made. Applicants can send their paperwork with ten IRCs and a written and signed statement to the effect that no computers, etc., were used. Membership is for life.

If you wish to practice for entry into the exclusive **EHSC** club, I suggest you log onto the Web site shown in **Fig. 1**. There's a very good program here called **NUMORSE** and you can download it for free. The URL of the Web site is <http://www.btinternet.com/~to ny.lacy>

An interesting use of Morse took place earlier this year in the **EME contest**. One report came from a local station here in Norfolk. **Roy G3ZIG** made nearly 50 contacts via the moon, after spending the summer months re-building his huge 144MHz array. I spoke with Roy at the local club recently and he says that his new antenna is surpassing all expectations and he has now worked 120 new stations on c.w. via the Moon. Our original basic data mode is now serving a very hi-tech section of our diversified hobby.

DCC WEB-SITE

The **Digital Communications Committee (DCC)** have their own Web site now and all matters relating to it can be found on this site, together with lots of other useful information. There's a full list of members, together with E-mail addresses and telephone numbers, reports of meetings and links to other digital sites.

Those of you with Internet facilities should check out this site: www.rsgb-dcc.demon.co.uk. It is shown in **Fig. 2**. This site will be kept updated as far as possible, so keep an eye on it for the latest DCC information, an addition for the address-book!

ADVERTS ON INTERNET

Paul Sargeant G4ONF recently wrote to me offering space on his Web site for anybody wanting to sell Amateur Radio equipment. If you are interested in trying this, the Web site to look at is: <http://www.ncsl.co.uk/forsale.html> Paul also manufactures Cavity Wavemeters. The full report on these wavemeters can be found at: <http://www.ncsl.co.uk/cavity.html>

Also available on Paul's Web site is a data software program that could be interesting to somebody. Look on: <http://www.ncsl.co.uk/ncsl.html> The program is by **Brian Cauchi 9H1JS** and uses the sound card as the interface. The sound card is being used a lot these days for programs like this. It's a DOS based program but will run under **Windows**.

Full documentation, program, manual, etc., is included in the self extracting file on Paul's Web site. It can take up to six minutes to download but it's worth it. It will receive **WEFAX**, **FAX**, **RTTY** and c.w. Some modes will transmit as well. Registration is \$25 however.

SHACKLOG

The **SHACKLOG** program is probably the most popular UK written and UK supported logging software received its first major face-lift for nearly four years, adding functionality, which puts **SHACKLOG** up with the best logging software. New features include:

- (1). s.w.l. mode, bringing all the features of **SHACKLOG** to the s.w.l. QSO data entry, reporting and QSL labelling functions are modified to suit s.w.l. use.
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- (5). Dual radio control - **SHACKLOG 5** now supports control of two connected radios simultaneously.
- (6). More radios - **SHACKLOG 5** supports many of the new radios introduced in the last four years.
- (7). Multiple COM ports are now supported.
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GW3PMR, TK/G3PMR, etc. (9). Radio Amateur Callbook CDROM interface - print address labels directly from SHACKLOG and optional display name/QTH/state when logging US stations. (10). Enhanced import - SHACKLOG 5 can import logs from NA, TR, LOGEQF and tab or comma delimited text files as well as all those formats supported by V4.x. (11). Enhanced Contest Mode with dupe checking. (12). Completely re-written simpler to understand User Guide - with worked examples and lots of pictures. (13). Availability and pricing. SHACKLOG 5 will be ready for shipping from January 9th 1999. Pricing: SHACKLOG 5 will cost £32. IOTA Database £8. IOTA Awards Manager £5. Set of 3: £42.50. Upgrades from V4.x: SHACKLOG 5 (including user guide) £20. IOTA Database £3. SAM-I:£2. Upgrades from earlier versions are available - please ask. Overseas pricing - please ask. As regards support and future development, SHACKLOG will continue to be supported, enhanced and developed from the UK.

It's the policy of the author that SHACKLOG will continue to be developed to keep it amongst the leading Amateur Radio logging software packages. Review copies of SHACKLOG 5 are available from the author to bona fide Amateur Radio magazines and publications. SHACKLOG 5 is available from: Alan Jubbs G3PMR, 30 West Street, Gt Gransden, Sandy SG19 3AU, UK. Tel: (01767) 677 913. E-mail: SHACKLOG@aol.com

NEWSGROUPS

A Newsgroup could be a misnomer - gossip columns more probably! There are about 13 000 of these and can provide hours of endless - and mindless - entertainment, if that sort of thing is your bag! To read the Newsgroups, you need to be able to access a news server. (These are the computers that distribute messages sent to newsgroups). Most major UK service providers run news

servers and provide newsgroup access as part of the Internet access package.

The news servers are set up to exchange information with the nearest machine, so that a new message gradually gets passed across the Net, from machine to machine. This means that a message can take several days to reach a distant news server.

Your service provider should even provide you with a newsreader program, the software you need to read and



Fig. 2: The Digital Communications Committee (DCC) Web site which can be found at: www.rsgb-dcc.demon.co.uk



Fig. 3: The new search engine which Roger discovered: [GOOGLE.COM](http://www.google.com).

send newsgroup messages. If the software doesn't come pre-configured, you will need to tell it the address of the news server you are using, which will probably be your service providers' domain name preceded by the word 'news'. Some service providers restrict access to their news server to their own customers while others, such as Demon, allow all and sundry to log on.

There are so many newsgroups that you're bound to find something you're interested in and plenty that you didn't know you were interested in! The groups are divided into



Fig. 1: The NUMORSE Web site which can be found at: <http://www.btinternet.com/~tony.lacy>

'Communicator' and choose 'Messenger'. Click on 'File', then 'Subscribe' in the window that opens. Click on 'Add Server' and type in the name of your news server (probably news.freemove.co.uk), then 'OK' it and hopefully it will start downloading the list of News

groups. All this can take anything between ten and 40 minutes and will slow down if you start doing other things like Browsing so best to sit back and watch. It's also better to do this early on a weekend morning.

There is, of course, more than one way to do all of this. In the bottom right-hand corner of the screen, there should be four icons (five in version 4.5x). Click on the one second from right (third in 4.5x) and 'Messenger' will come up with Netscape started, but off-line. Click on 'Edit' and choose 'Preferences' and under 'Mail & News groups' there should be somewhere to add your News Server.

SEARCH ENGINE

I was told about a new search engine the other day: www.google.com shown in Fig. 3. It really is superb, seems much faster than Altavista (the one I'd used up to now) and very versatile. It also has a 'feeling lucky' tab you can click on. If you are feeling confident about the outcome of the search, click on this tab and you are directed straight into the site. The alternative gives you ten selections in order of priority and then another ten times ten selections to look through. Try it, you'll like it!

THAT'S ALL FOR THIS MONTH. REMEMBER TO KEEP ME INFORMED OF ANYTHING WHICH YOU WOULD LIKE TO SEE COVERED IN THIS COLUMN.

Roger J. Cooke G3LDI

several main areas, identified by the first few letters of the newsgroup name.

To get involved in a newsgroup discussion, you first have to subscribe to the group you are interested in. With most newsreaders you simply highlight the name of the newsgroup in the full group list and select subscribe from the menu. When you have subscribed to a newsgroup, your newsreader will download all the messages that have been sent since the last time you logged on. Messages are usually deleted after three days, so log on regularly.

My local guru, Paddy G7KZZ, has offered the following advice to new newsgroup readers using Netscape: Every new user to Usenet should read news.announce.newusers There are only 18 messages in there at the moment so it's not going to take long to download. Also, most ISPs provide a newsgroup to inform their users what's going on with the service. Search for freemove and see what you find.

Start Netscape and go on line, then click on

RadioScene

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THIS MONTH PETER SHORE
BRINGS NEWS OF A CUT IN
DEUTSCHE WELLE'S BUDGET,
RADIO YUGOSLAVIA'S
EXPANSION AND UPDATES
ON BAND INFORMATION
FROM MANY RADIO
STATIONS AROUND THE
WORLD.

EXPANSION & REDUCTION!

As we head into summer there's bad news from one of the world's largest international broadcasters. **Deutsche Welle** faces a budget cut of DM40m, reducing the station's total operating budget to DM596m (around £192m). One immediate effect was felt in early February, when staff at the Berlin studios of Deutsche Welle were told that the facility was likely to close.

The German press has reported the planned cuts extensively and have suggested that the station's austerity measures means that some of the 35 different language services broadcast by Deutsche

Welle from its Cologne studios may have to close. Already the new Ukrainian service, due to start in February, has been postponed and may not start at all, despite arrangements being in place for the Ukrainian programmes to be broadcast in Ukraine on m.w. and on f.m. German newspapers have

also been following the long running saga of the potential closure of the BBC World Service's German language service. The decision on the future of the service, which marked its 60th anniversary last September, was due in November

and then postponed when the management at Bush House changed. As this edition of *PW* goes to print, the decision is expected to be announced. Also on the cutting block is the Czech service.

At the other end of the financial spectrum, **Radio Yugoslavia** is benefiting from expansion. Programmes in English, French, Russian, Spanish, German, Arabic, Hungarian, Serbian and Greek have all had their transmission times expanded. Italian is a new language service from Belgrade too.

If you have access to the Internet, check out Radio Yugoslavia at www.beograd.com/radioyu/. When I looked in mid-February, the site had not been updated with the expanded schedule. There was, however, a series of stories about the current situation in the former Yugoslavia, promoting a heavily anti-Albanian viewpoint.

To listen to Radio Yugoslavia, try the English broadcasts at:
0000-0030UTC on 7.115MHz
0100-0130UTC on 7.13MHz
1330-1400UTC on 11.835MHz
1930-2000UTC on 6.10 and 9.72MHz
2200-2300UTC on 6.10 and 6.185MHz

OTHER STATION NEWS

Croatian Radio's domestic service is broadcast on short wave direct from Croatia and via the Deutsche Telekom site at Jülich. English news bulletins form part of the output. Frequencies vary during the day and you can try these: 13.83,

9.86, 9.83, 7.525, 7.305, 7.185, 6.165 and 5.89MHz. As is mostly the case with short wave, the higher frequencies are used during hours of daylight and the lower ones during the night time.

The international service from Croatia is on the air with a mix of Croatian and English at 0200-0600 on 6.13 and 0600-1000 on 13.82MHz.

Radio Australia has been testing 21MHz channels out of Shepparton, the short wave transmitting station in Victoria. The frequency of 21.71MHz has been on the air

between 0900 and 1358UTC, beamed to South East Asia with likely reception in Europe.

The former Radio Australia transmitting station at Darwin in the far north of Australia may be run by another major broadcaster. It's reported that **Deutsche Welle** and **NHK Radio Japan** have been negotiating with the Australian authorities and a report on *Media Network* on **Radio Netherlands** suggested that **Merlin Communications International**, the former BBC World Service transmission company, is also exploring taking over the site.

Radio Thailand has English broadcasts via its own transmitters and the high-powered **Voice of America**

senders in the country. Try these times and frequencies:

0000-0030UTC on 11.905, 9.68, 9.655MHz;
0030-0100UTC on 13.695, 11.905, 9.655MHz;
0300-0330UTC on 15.46, 11.905, 9.655MHz;
0530-0600UTC on 15.115, 11.905, 9.655MHz;
1230-1300UTC on 11.905, 9.81, 9.655MHz;
1400-1430UTC on 11.905, 9.655, 9.53MHz;
1900-2000UTC on 11.905, 9.655, 9.535MHz;
2030-2045UTC on 11.905, 9.655, 9.535MHz.

Has anyone had a reception report confirmed by Radio Thailand? Let me know if you have and do send me a copy to include in a future column. If

you want to try getting a QSL card, the address is **Radio Thailand, 236 Vibhavadi Rangsit Highway, Din Daeng, Huaykhwang, Bangkok 10400, Thailand** (this must be one of the most complicated addressees among international radio stations!).

Here's an update to the frequency schedule for **RTBF**, the French-speaking broadcaster in Belgium, which is now back on the air to Africa:

0400-0600UTC on 9.49MHz (only 0530-0600 at weekends)
0600-0810UTC on 17.65MHz (until 1100 Saturdays and 0915 Sundays)
1100-1315UTC on 21.565MHz (1100-1215 Saturdays and 1200-1215 Sundays)
1600-1810UTC on 13.82MHz (only 1700-1810 Saturdays)
RTBF's Web site address is www.rtbf.be

Despite the dreadful stories of food shortages, power rationing and death coming out of North Korea, **Radio**

Pyongyang continues to make quite a bit of use of the short wave bands to beam programmes in English, Chinese, Spanish, Japanese, Russian, Arabic, French and German world-wide. English programmes can be found throughout the day, although frequencies can come and go: 0000-0100UTC on 15.23, 13.65, 11.845MHz;

0500-0600UTC on 13.79, 11.71, 3.56MHz;
1100-1200UTC on 13.65, 11.335, 9.975, 9.85, 9.64, 3.56MHz;
1500-1600UTC on 1.65, 11.735,

11.335, 9.975, 9.64, 3.56MHz;
1800-1900UTC on 13.76, 11.71, 9.335, 6.575, 4.405MHz;
1900-2000UTC on 9.975, 9.60, 6.52MHz;
2100-2200UTC on 13.76, 11.71, 9.335, 6.575, 4.405MHz;
2300-0000UTC on 15.13, 13.76, 11.335, 4.405MHz.

THAT'S ALL THIS TIME AROUND. KEEP YOUR EARS ON THE HIGHER FREQUENCIES AS WE ENTER THE SUMMER PERIOD IN THE NORTHERN HEMISPHERE AND DROP ME A LINE BY POST OR E-MAIL IF YOU HEAR SOMETHING UNUSUAL.

UNTIL NEXT MONTH, 73.

Peter Shore



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MCL1100 decoder with technical manual, g.w.o., £100. Heathkit Mohican receiver, working, needs re-aligning, with manual and circuit diagram, £15. AVO valve tester with valve data manuals, £15. All plus P&P. Tel: (01924) 408817.

MFJ-901B h.f. a.t.u., boxed, brand new, new price: £52, will sell for £25. Also, Lake Electronics ORP a.t.u., as new, £20. Both plus £2 carriage. Tel: J Garner 0151-427 1903, evenings, 'Barbon', Aigburth Hall Rd, Liverpool L19 9DG.

Offers invited for Bremi BRL 200 linear in good condition for its age, very little use, no box or manual, interested? Tel: Bill (01684) 295770 or (07771) 870611, anytime.

Panasonic DR49 receiver, f.m./l.w./m.w. plus 85W bands, three built-in antennas, continuous coverage, to 30MHz, b.f.o. mains, battery or 12V car socket, £65. Tel: Jeff on Harrow 0181-907 0140, evenings.

Panasonic multi-band compact radio, model RF-B65D, size: 198x118x33mm, s.w., 1.1615-29.999MHz, m.w./l.w./f.m., 87.5-108MHz, u.s.b./i.s.b., instructions, good condition, £75. Tel: Alan Edwards G3MBL QTHR, near Bury St. Edmunds (01284) 827379.

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R & N transverter 2m (144MHz) in, 6m (50MHz) out, 25W, £100. Tel: (01963) 32241.

Racal 1217, Racal 117E, Racal RA-17C, all clean, g.w.o. Exchange: Icom IC-R70, nice condition, for Yaesu FT-747GX g.c. with f.m., cash difference. Wanted: R1155 complete, any condition, also information on Howes DFD4 dig readout. Tel: Eric on Lancashire (01254) 705454.

Racal RA17L receiver, 500kHz-30MHz, in excellent condition and full working order, £135. Early military aircraft valve transceiver, type TR-1920, £60. WS No. 38 with junction box, £40. Tel: (01482) 887938.

Shack clearance, large amount of spares, components, connectors, manuals, cases, new and vintage parts, unfinished projects, etc. SAE for list to Mr Alston, 14 Kendal Close, Workshop S81 7PU. Tel: (01909) 485742.

Short Wave Magazines April 1987 up to current edition plus 65 various older editions. offers or swap anything interesting, must collect. Tel: Chester (01244) 310271.

Sommerkamp FT-2772D 100W h.f., all bands, 1.8-30MHz, 240V or 12V, £175 o.n.o. Icom IC-735 g.c. receiver, all band, 1.8-30MHz, 12V, £425. 10-6m (28-50MHz) transverter, 5-10W drive, £85. KW Eze match, £55. Tel: G4OJN QTHR on Essex (01277) 624386.

Sony CRF-320 world-zone, 32 bands, digital, classical radio, £350. Drake SPR-4, v.g.c., £100. Century 29 bands digital a.m./s.s.b., b.f.o., solid state, very sensitive, £100. Icom ICR-70 professional receiver, £200. Racal RA17 MkII, v.g.c., £90. Inspect, collect, swap radios possible. Tel: Middlesex 0181-813 9193.

Tektronix 546 dual trace oscilloscope on trolley, manuals and spares, g.w.o., no sensible offer refused, buyer collects. Tel: (01732) 822455.

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TNC KPC9612. £165. KPC3 Plus, £95. KPC4 with smartwatch, £150. K-Net options for 9612, KPC3 Plus and KPC3 Extra, PMRS, Icom U101 70cm (430MHz), 12 channels, PRM80, 4m (70MHz), ten channels, £95/£50. Tel: (01626) 773301.

Traps: Sandpiper 40m (7MHz), £12. Deecom 80m (3.5MHz), £12. (Never used). Tel: (01740) 651938.

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Trio TR-9130 v.h.f., 2m (144MHz), all mode transceiver, 25W output, mobile bracket, boxed, manual, £250 o.n.o. Tel: Ted GOWYU on Cornwall (01209) 211689.

Trio TS-120V 10W, c.w./s.s.b. (plus details on running at less than 10W) covers 3.5/7/14/21/28MHz, £225.

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Universal M-8000 decoder, good condition, £550. Tel: Chris on Chester (01244) 346067.

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Yaesu FRG-8800 receiver in mint condition with front end modified. Copy of SWM magazine with radio, £375 or exchange/part exchange for Kenwood TS-440S or WHY? Tel: John (01202) 240390 or (07971) 700835.

Yaesu FRT-7700 a.t.u., £35 plus P&P. Tel: Alex on Kent (01732) 864920.

Yaesu FT-1 plus speaker, excellent condition, full working order, manual and service manual, £650 o.n.o. Tel: Dave on Clacton-on-Sea (01255) 675718.

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