

Practical Wireless

PW

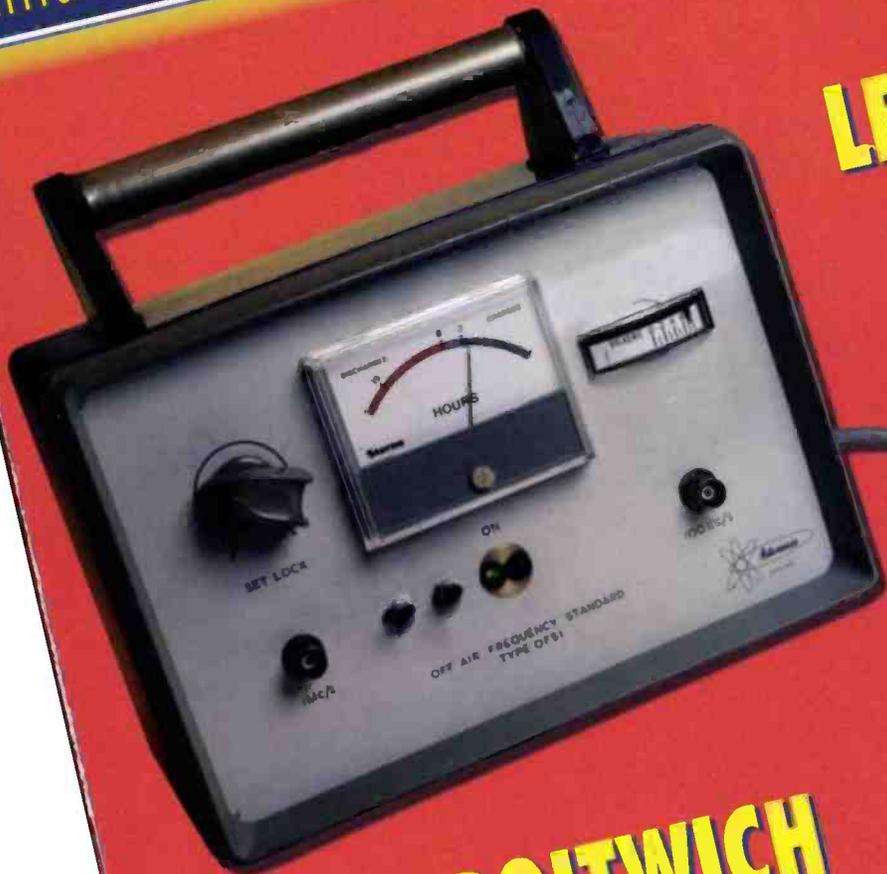
amateur radio & more!

MFJ-259B



SPECIAL OFFER

LEICESTER SHOW GUIDE INSIDE!



THE 'DROITWICH CHRONICLES'

October 1998 £2.20



10 >

BUMPER ISSUE

Leicester Show News

With the 'new look' Leicester Show looming on the horizon we thought we'd give you a 'sneak preview' of who and what you can expect to find in the way of exhibits. Even if you're not attending the show you should hopefully find something of interest on these pages, especially as many new products are traditionally launched at the show.

Leicester Electronics

Leicester Electronics (LE) is a leading supplier of electronic components and equipment. The company has a long history of providing high-quality products and services to the amateur radio community. This year, LE is proud to announce the launch of a new range of products, including the MFJ-259B SWR Analyzer, which is a must-have for any serious ham operator.

Leicester Show

The Leicester Show is one of the largest and most popular events in the Midlands. This year, the show will be held at the new Leicester Show Centre, which offers a much-improved venue for exhibitors and visitors alike. The show will feature a wide range of exhibits, including electronics, model aviation, and more. Don't miss out on this fantastic opportunity to see and buy the latest in amateur radio equipment.



Waters & Stanton PLC

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Kachina 505DSP HF Transceiver



It's Amazing!
Ask for copy CQ
& QST Reviews



NO MORE PAGER PROBLEMS
We guarantee this will kill all QRM caused by strong out of band signals - - - - or your money back!

DGH-145 £89.95	DGH-435 £119.95
Passband: 144 - 146MHz	Passband: 430 - 440MHz
Loss: Less than 1 dB	Loss: Less than 1 dB
Selectivity: -68dB at 136MHz	Selectivity: -47dB at 415MHz
-55dB at 155MHz	-50dB at 455MHz
Power: 200 Watts	Power: 200 Watts

AR-146 2m 50W



£199

Main Features **£1899** *auto atx version*
100W HF All bands + Receive 100kHz - 30MHz
Filters for SSB 3.5, 2.7, 2.4, 2, 1.7kHz
Filters for CW 1kHz, 500Hz, 200Hz, 100Hz
Band Scope, DSP filter, Memory keyer, log book,
VSWR meter, Smith Chart, pre-amp, 20dB attenuator, plus many software controlled functions

Bulk Factory Purchase
Alinco C-1 2m FM Tcvt.
Plus AM Airband Rx*

Was £169



- * 144 - 146Tx FM
 - * 118 - 174 Rx *
 - * AM Airband Rx *
 - * CTCSS Tones
 - * 1750Hz Tone
 - * 20 Memories
 - * Lithium-ion battery
 - * AC charger
 - * Telescopic Antenna
- Needs small internal mod

Limited Stocks

£89.95

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

AR-446 70cm
35W £269

YAESU £349
FT-3000M 2m + Wideband RX

Save £50



2m/70cm 70W plus wideband rx including AM aircraft band. 9600 Packet ready. A bargain at this price!

ICOM IC-22E

List price £259!

We purchased the entire stock!

£149.95

2 Metre FM
Plus AM
Airband Rx!



C-408 From

HORA

70cms
Handheld
Full
CTCSS



£89.95!

SPECIAL OFFER PRICE

FREE Postage

Full CTCSS; 20 memories; 1.6MHz repeater shift; Priority channel, Scanning; Dual watch; Dual mode squelch; PTT lock; 12.5/25kHz steps, 230mW output - all from just 2 x AA cells

ADI **AT-600** Dual Bander

New Low
Price £229



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

- * 2m / 70cm
- * CTCSS encode/decode
- * Full DTMF + 1750Hz tone
- * Alphanumeric memories
- * Full duplex
- * CTCSS tone reader
- * 29 programmable features
- * AM airband receiver
- * Rx up to 990MHz
- * Ni-cads and charger

AM Air Band

UK's Best Prices?
Even Lower
Than our Advert
- - on some items!

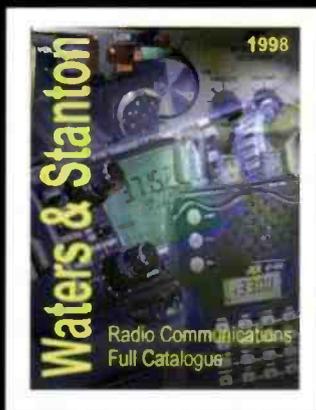


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UK's Top Dealer for YAESU, KENWOOD & ICOM

YAESU FT-847 *it's Here!*



£1599

1.8MHz to 432MHz

Plus FREE PSU & Base Mic

Includes 70MHz Transceiver

100W 1.8 - 50MHz * 50W 2m/70cm * SSB - CW - FM - AM * CTCSS * Alphanumeric * 0.1Hz steps * Packet ready 1200 & 9600 * DSP filtering * Dual display * squelch * IF shift * Notch filter * Power control * Tx monitor * Electronic keyer * 12.5 / 25kHz switched FM filtering * Switchable pre-amp * Size 260 x 86 x 270mm * weight 7kg

YAESU FT-920 1.8 - 54MHz **£1299**



PRICE MATCH

+ Free FM board & AM Filters

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

YAESU FT-1000MPDC (AC £2199) **£1899**



PRICE MATCH

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

ICOM Dual Bander New IC-Q7E **£215**



2m & 70cms FM & AM Rx
In Stock about 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 IC-706 Mk II 1.8 - 146MHz **£995**



Phone For Deal

Now includes FREE DSP Module - a W&S Deal
The IC-706 Mk II transceiver as the best compact hi mobile bar none. It out performs and out specifies any other model. The only choice left is which dealer you buy it from! We offer you an unbeatable price and an unbeatable back-up service plus optional extended 5 year warranty for an extra £98!

ICOM New LOW Price!

+ FREE ACARS Software

£269

PRICE MATCH

New DSP Module Available £59.95
Computer controlled Receiver 10MHz - 1.3GHz
SSB CW AM WFM NFM Unlimited Memories
FREE Software, AC Supply and only amateur



ICOM IC-746 1.8MHz - 146MHz

Superb HF Performance



Our Best Seller!

Free PSU **£1595**
Free Base Mic

KENWOOD THG-71E Dual band **£279**

Phone

* Dual Band 2m/70cm
* 200 memories
* Alphanumeric Display
* Full CTCSS
* DTMF
* Up to 6W out
* Wideband Receive
* Illuminated Keypad
* PC Compatible
* Windows Programming
Send For Brochure



YAESU FT-840 1.8 - 30MHz **£649**



Phone for Crazy Price!

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

Allnco DX-70 HF Base / Mobile



£599.95

* 1.8 - 54MHz
* SSB CW FM AM
* 100W HF 10W 50MHz
* CTCSS Tone unit

YAESU FT-8100 Dual Bander Mobile **£399.95**



Price Smash

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

ICOM New IC-2100 2M Mobile **£269**



New Model

With Switched 12.5kHz & 25kHz

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@wsplc.demon.co.uk

ICOM IC-207H 2m/70cm Mobile **£339**



PRICE MATCH

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

Rechargeable Alkaline Cells For Starter Kit

Now £13.99

- * Rechargeable Alkaline
- * 1.5v cells
- * No memory effects
- * Charge mid cycle is OK
- * 5 year charge shelf life
- * 3 x capacity of ni-cads
- * Very low cost



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

Starter Kit: Comprise 4 x AA cells and dedicated AC wall charger **£13.99 + £2 p&p**

4 x AA cells (ready charged) **£5.99** (£1.00 post)
8 x AA cells (ready charged) **£10.99** (£1.50 post)
4 x AAA cells (uses standard charger) **£6.25** (£1.00 post)

YAESU FT-50R 2m/70cms Handy **£279**



Price Smash

- * 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 Dual Band handy **£319**



PRICE MATCH

6m 2m 70cms

All in one small package.

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

WATSON

New HF Whips

160 - 6m 250 Watts

Interchangeable
Single Band Whips

From £18.95

High Efficiency
Low Profile
Robust Build
Fully Tuneable
CW & SSB Bands
2 Section Design
Easy Boot Stowage
3/8th Stud Base
Approx 7ft Long

WHF-6	6 metre whip	£18.95
WHF-10	10 metre whip	£18.95
WHF-12	12 metre whip	£18.95
WHF-15	15 metre whip	£18.95
WHF-17	17 metre whip	£18.95
WHF-20	20 metre whip	£18.95
WHF-30	30 metre whip	£18.95
WHF-40	40 metre whip	£18.95
WHF-80	80 metre whip	£19.95
WHF-160	160 metre whip	£49.95

HF 3/8" Magnetic Mount

Amazing strength. Ideal for the above whips. Guaranteed to stay put at 80mph! Includes 5m coax fitted PL-259

£39.95

Mast/Base Station Duplexers

Split 1: 1.8-225MHz
Split 2: 350-540MHz
Power 300W / Loss 0.2dB
Socket SO-239

Save on coax cable! Accepts masts up to 2.25" diam. Includes water-proof plug shrouds. Use indoors or outdoors.

£24.95

£9.95

Our standard 8 Ohm earpiece that is ideal for long-term wear. Comes with 3.5mm plug.

Great Value

Prices Down!

W-2000 6m-2m-70cm (2/6.2/8 4dB 2.5m long)	£69.95
W-30 2m/70cm (3/6dB 1.15m long)	£39.95
W-50 2m/70cm (4.5/7.2dB 1.8m long)	£49.95
W-300 2m/70cm (6.5/9dB 3.1m long)	£59.95

All aerials have SO-239 sockets, mounting hardware for masts up to 62cm diameter and three radials. All tuned for UK bands.

Mobile Whips
Stainless Steel Mobile Whips with hinged bases. Pre-tuned.
W-285 2m whip £15.95
W-770HB 2m/70cm £24.95

New Super Gainer
W-7900
Best value in high quality antenna design we have ever seen! A super antenna at a very special price! Why pay more?
* 144 & 430MHz
* 5dB 2m / 7.6dB 70cm
* L 1.58m Power: 150W
* PL-259 connector
W-7900 - £34.95

W-3CK Cable Kit 5 metres £18.95
W-3HM Hatch Mount to suit above £14.95

Hunter Counter
10MHz - 3GHz. Includes: Ni-cad pack, AC charger and antenna. Features "hold" control and clear LCD readout.
£59.95

8 Digit Display
10MHz-3GHz/300 FREQUENCY COUNTER
10 Day Approval!

W-25AM
£94.95

New Sun Visor Speaker



New
SP-2000
£19.95

Ideal for mobile use, this speaker mounts on any sun visor and has a built-in volume control. Supplied with 5m of cable terminated in 3.5mm plug

New Budget Base Ant

WVA-100
Dual Band
2m & 70cm
£29.95
* 1.09m Long
* Fibre glass housing
* 2dB on 2m
* 4dB on 70cm
* SO-239 socket
* Mast size 35 - 65mm

For your Mini Handy

WSC-3 £12.95
For modern mini handies. It holds the rig firmly in place. The belt clip provides a quick release and has a curled end to prevent it from accidentally riding up, and off the belt.

DC Mobile Leads Standard "T" connector lead used by all modern rigs. 15A dual fused, 1.9m long. £6.95

WSM-270 Mag. Ant Price Down £19.95
* Dual Band 2m/70cms
* Mini Magnetic design
* Super strong magnet
* Base just 29mm diameter
* Pre-tuned for 2m & 70cm UK
* Low Profile whip
* 2.75m of mint coax - BNC
* Power rating 50W max.

New Triple Bander

6m - 2m - 70cms
£34.95 New
WATSON W-627

Now you can have all three bands on one compact antenna! Are you ready for the 6m DX?
* 2.15dBi / 4.8dBi / 7.2dBi
* 100W maximum
* Length 1.62m
* Foldover PL-259 base

In Stock NOW

Cushcraft Antennas

New R-6000 In Stock
6m - 20m Vertical
The New DX-band Vertical
£299.95

- * 6 Bands 6m - 20m
- * Trapless on 6 / 10 / 15m
- * Slim line design
- * No ground radials
- * Automatic Band Change
- * Very low angle radiation
- * Wide bandwidth
- * Height 5.5m
- * Power 1.5kW
- * Weight 5.6kg.

R-7000
7 Band Vertical
40-10 Metres
£369

80M Option Kit Available
What the mags say!
Practical Wireless: "An excellent DX antenna - Extremely impressed with standard of workmanship and ease of erection"
RadCom: "Ideally suited to the small garden - an investment which lasts"

- * 7 Bands 40-10m
- * Power 1.5kW PEP
- * Height 7.3m (24ft)
- * 7 x 49 inch radials
- * Self-supporting.

Other Cushcraft Models

R-80	80m kit for R-7000	£129.95
AV-80	80m vertical 1.5kW 10.5m	£349.95
A-3S	10-15-20m beam 2kW	£389.95
A-4S	10-15-20m 4 el beam 2kW	£489.95
X-7	10-15-20m 7 el beam 2kW	£499.95
X-9	10-15-20m 9 el beam 2kW	£749.95
Ten-3	10m 3 el beam 2kW	£139.95
10-4CD	10m 4 el beam 2kW	£269.95
15-3CD	15m 3 el beam 2kW	£249.95
20-3CD	20m 3 el beam 2kW	£379.95

FC-130 Counter

£79.95
Now being shipped to UK Gov. departments.
* 1MHz - 3GHz
* LCD Display
* BNC Whip Antenna
* Very sensitive "off air"
* Ni-cads and Charger

Super Hunter

New £149.95
* 10Hz - 3GHz
* 16 segment field meter
* 4 x gate speeds
* Noise filter
* 50 Ohm / 1M Ohm
* Hold button / Beeper
* Backlight / Battery Saver
* Charger, Ni-cad & whip

24 Hour Digital WallClock

£34.95 + Temperature & Date
* 265mm diameter
* 24/12 hours LCD
* 55mm digits
* date - day - month
* Celsius / Fahrenheit
* 2 x AAA cells

In Stock NOW!

New Design



Recommended for HF Rigs

25 Amp Power Supply For 100W Transceivers

- * 30 Amp Surge 25 Amp normal duty
- * Variable output 0 - 15V DC
- * Input 230V AC Front panel fused
- * 3 sets of front terminals
- * Cigar socket (10 Amps)
- * Dual Analogue meters
- * Click Stop adjustment for 13.8V
- * Internal heat sink for safety
- * Smart professional design

Fully conforms to the latest CE regulations and Low Voltage Directive. Phone for details of other models providing outputs from 3 Amps to 30 Amps, both variable and fixed.

Other Models

W-30AM	30 Amp metred & variable	£119.95
W-10AM	10 Amp metred & variable	£59.95
W-5A	5 Amp fixed	£29.95
W-3A	3 Amp fixed	£22.95

Carriage is charged at cost - Phone, fax or e-mail for total cost.

Free-Phone Orders
0500 73 73 88

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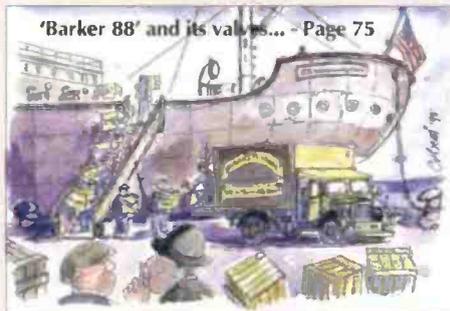
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All the regular band reports from your favourite authors.



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DX-70TH

100 Watt HF Transceiver
plus 100 Watts on 6 mtrs

- TX - all HF + 6mtr
- RX - general coverage 150kHz - 30MHz 50MHz - 54MHz
- SSB, CW, AM, FM and digital modes
- 100 memories
- Detachable faceplate and remote mounting kit available
- Speech processor standard
- Narrow filters fitted as standard
- 100W output on HF & 6mtrs
- Selectable 4 stage RF gain 20dB to +10dB
- Superb TX audio and RX
- Excellent RX sensitivity
- Full break in on CW
- All mode squelch
- Scan facilities
- CTCSS encoder
- Noise blanker
- Quick offset for DX pile-ups
- IF shift control
- Separate HF & 6M antenna sockets

NEW LOW PRICE!

£699.00

Award winning HF Performance

The very LATEST VERSION DX70 TH packs a hefty 100W punch on all Ham bands 1.8 - 50MHz. It is backed by a superb receiver with narrow filters fitted as standard. Make no mistake - this is a real DX operators transceiver ideal for use at home, in the car, or for that portable DXpedition. General coverage receive is included and wideband transmit facilities for export customers. The detachable front panel allows remote mounting and additional security.



EDX-1 HF Antenna Tuner

The EDX-1 is a coaxial tuner with built in Power and SWR meters. The ATU is rated at 120W and covers 160-10 meters including WARC bands.



£159.95

EDX-2

Automatic Random Wire Antenna Tuner

Quickly matches random wire antennas, mobile whips, verticals, inverted Ls. Wired for DX70 - but can be used with most HF Transceivers.

- 1.6MHz - 30MHz
- 200W PEP

£289.95



DX-77(E)

- Covers all HF Amateur Bands
- General coverage receive (150kHz - 30MHz)
- 100 memories
- 100W, SSB, CW & FM, 40W AM
- Built in speech compressor
- Computer control with optional ERW-4
- Full QSK in CW modes
- QRM/QRN reduction with IF shift, RF attenuator and optional CW filter
- Two VFOs + memory operation mode
- Basic model upgradeable to (T) model with

- EJ33U Electronic keyer
- EJ34U CTCSS
- EJ35U CW filter

£675.00



HFM-1

HF stainless steel mobile antenna complete with spring base.

Covers: 3.5 - 30MHz (when used with EDX-2 auto ATU)
Length: 2.7 metres

£59.95



DR-605E Dual Band Mobile



£399.95

Easy to use twin band mobile TX that delivers both high power and performance with user friendly features.

- 50W (2m) - 35W (70cms)
- 100 memories
- Full Duplex
- CTCSS encoder fitted

DR-140E

2 Metre Mobile/Base

NEW LOWER PRICE

£219.95



Simple to operate, easy to program and dependable to use.

- Optional RX to cover Airband, PMR & Marine 118-135.995MHz (AM) 136-173.995MHz (FM)
- 51 memories

- Time out timer
- Alpha numeric display
- 50W FM output
- Electronic squelch
- c/w DTMF mic

DJ-C5E

Micro sized handheld



£189.95

- 144 - 146MHz transmit
- 430 - 440MHz transmit
- Extendable receive 118 - 174MHz including (AM) air band
- Extendable receive 420 - 450MHz

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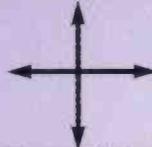
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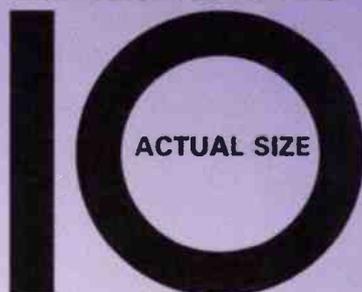
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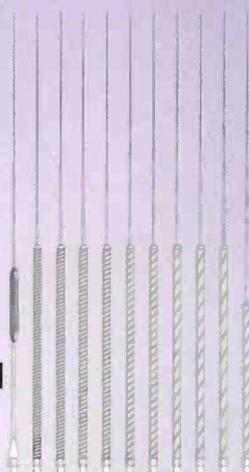
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As a previous editor, a special G7TZB Club Column... The new G7TZB Club Column will be written by...

Keylines

As you will see when you come to read the separate panel on this month's 'Keylines' - we are losing Donna 'Toad' Vincent G7TZB as she takes up her first post as an Editor. And because of her departure I'm afraid that I write this editorial with very mixed emotions indeed!

From a professional point of view I'm immensely proud that the young lady who joined us eight and half years ago has progressed far enough to be awarded the responsible post of an Editor at 26 years old. (To put things in perspective...I didn't get my first 'Editorship' until I was nearly 30 and that was by default and with a specialist 'In-House' publication). So, in my opinion and that of many others - Donna has done tremendously well indeed.

However, from a purely personal (and perhaps selfish) point of view I'm truly devastated at losing an extremely important member of the Editorial team. I'm also losing a good friend, advisor, confidant and organiser, in fact Donna (she's developed the job around her in a most professional way) is truly unique in her approach and although someone else will inevitably take her place - they will do the job in their own way.

Everyone here at PW Publishing will

miss Toad's influence but both **Tex Swann G1TEX** and I will miss her day-to-day guidance as 'Production' Editor very much indeed. In this aspect of her job she worked as co-ordinator 'par excellence' and always kept me aware of priorities in a kind, courteous but firm professional manner ensuring that your PW was always ready for that ever-important 'deadline' no matter what 'panic' occurred (panic by the way is a word that doesn't appear in her dictionary or 'spell-checker'). It was an essential method which was encouraged by me as 'team leader'. Yes - she really was the 'day-to-day 'boss' and I wish her well in future as she becomes her own 'boss'.

Please Donna - even though my diving days finished over 20 years ago - when you're in charge of 20 or 30 magazines in the near future (a distinct possibility I think) - you will remember the decrepit G3XFD won't you? So, Good Luck Donna it was a privilege working alongside you and we'll all follow your career with great interest and pride in knowing that in some



small way we've played a part in it too!

Telephone Enquiries

Now that Donna is leaving us and we shall be busy 'getting up to speed' again with a new member of the team - I think it's time to ask for your help regarding telephone enquiries. These are now becoming so frequent and time-consuming that I have to ask for your help so we can assist you in the best way possible.

In future, on behalf of everyone involved in bringing the magazine to you I ask that you limit telephone enquiries to those involving the current magazine (the one you've got). Any other enquiries should be sent by post or E-mail to either **Tex G1TEX** or myself.

Incidentally, I'm hoping the E-mail problem (it's somewhere here in this building) where I cannot access the E-mail from my computer will soon be sorted out. In the meantime I ask that you either send an E-mail to G1TEX or post me a brief note which I can reply to by post. This save me valuable time as I don't have to occupy another computer - thus delaying its usual 'driver'.

Thanks for your help, understanding and support. Here's to the future!

Rob Mannion G3XFD

Taking The Plunge - G7TZB Moves On

'By the time you read this I will have moved onto pastures new. As many of you will know by now...I have taken the decision to spread my wings (or is it flippers!) and after eight and a half thoroughly enjoyable years of working for PW Publishing and in my role as News & Production Editor on *Practical Wireless* I've taken the 'plunge' and left the warm glow of all things wireless to do something completely different.

My new job is as Editor for *Scuba World* magazine, which is rather appropriate when you consider my nickname ('Toad') isn't it? So, it's all going to be very different from the world of radio but I'm sure it will be equally as rewarding and challenging.

As Rob has kindly given me this space to say a few words I would like to say a huge 'thank you' for all the help and support I've received from readers, advertisers and friends that I've met over the years and to say it has been a pleasure 'working' with you all. I am intending to keep my licence active (who knows I may even get around to taking my Morse!) so hopefully our 'paths' will cross again in the future.

Finally, I would like to thank **Rob and Tex** for 'doing as they've been told' while I was 'in charge' and for making my job a pleasure to do, as well for teaching me the 'tricks of the trade'. Thanks also to everyone at **PW Publishing** for giving me all the help

and support I could have asked for. A special 'thank you' has to go to **Dick G8VFN** and **Elaine G4LFM** for employing that very timid and shy young 17-year old all those years ago and for giving her the chance to enter the world of publishing.



All that leaves is for me to bid you all fond 73 and to say may PW and SWM continue to prosper and continue to put a 'warm glow' into the hearts of radio enthusiasts everywhere.

73 DE Donna G7TZB

Letters

COMPILED BY ROB MANNION G3XFJ

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.

STAR LETTER

GEE & LORAN

Dear Sir

Further to the letter in the September issue of *PW* from Norman Smith with information on the GEE and LORAN systems. When I was doing my National Service during 1952/54 at RAF Lyneham, our Hastings aircraft carried both Gee and Loran systems. As far as I can remember, the antenna and electrical connections were interchangeable.

As I was an Air Wireless Mechanic, my knowledge of radar systems is somewhat limited so I stand to be corrected about the later statement. If I remember correctly, Loran was only used on aircraft going to the airfields beyond Singapore.

Incidentally if anyone who served with me at Yatesbury, Classes AWM 138 A, B or at Tech-Wing Signals RAF Lyneham 1953/54 reads this letter, I would be very pleased to hear from them.

I too used R1355/62 Indicator units to make a TV set and also watched the Coronation on it, having cycled home from Lyneham after the early morning parade (about 25 miles, how I wish I was as fit today), the circuits I used came from a booklet published by the now defunct *Radio Constructor*. Incidentally, the last Editor of that publication - the late J. R. Davies - was a corporal in the Radio Servicing Section at Lyneham when I was there, and was writing articles for that publication under an assumed name as, I believe, serving personnel were not supposed to write without permission.

I never made a sound unit so the audio came from the wireless commentary, using my R1155 receiver which was very much modified, long before I learnt all about it on my course at Yatesbury.

I've just realised that it's 51 years since I first bought *PW* as a 14 year old school boy and copies were few and far between in those days due to paper rationing and lack of pocket money!

Mike Mills G3TEV
Stroud

Editor's comments: Fascinating Mike! Thanks also for the memories of the *Radio Constructor* magazine. Like many others I thoroughly enjoyed 'Smithy's Workshop'. His adventures - and those of Dick (his assistant) taught me a great deal. And although I've a good idea who wrote the series...perhaps readers could suggest a name for the author?

Morse & More!

Dear Sir

I read with interest, the Editor's 'Keylines' comment in the August *PW* on the RSGB's suggestion that the 12 w.p.m. Morse test should be cast aside and five w.p.m. test be introduced in its place.

As a 'second-class' (?) operator, I have no wish to be given the right to operate on h.f. without showing that I at least know something of the theory of h.f. operation. Having said that, what did I do in the May 1992 RAE that proved that I was more competent in v.h.f./u.h.f. operation than h.f.? Nothing. So I cannot for the life of me see why the ability to use Morse code should make me a better operator, capable of operating h.f.

I listen to the h.f. bands, so to say that it needs some form of restriction does not seem to hold much water. So please can we move our hobby into the next Millennium and encourage new operators, and keep it alive.

Keith Marshall G7NDB
Hampshire

...And More

Dear Sir

May I, as someone who wants to use Morse but is having difficulty in mastering it, add my voice to those who feel that it should be removed altogether from the A licence requirements. I really see no reason why we should not be allowed to use voice on those frequencies labelled 'telephony'.

Also, I am sure that if a few frequencies were allocated to struggling aspirants who, like me, really want to learn and use Morse, we could learn and slowly build up speed together. This provision would also help those who have managed to pass by the 'skin of their teeth', but who are afraid to use Morse because of the 'Flash Harrys' who sneer at those not yet up to 200w.p.m. (I exaggerate slightly, but only slightly!)

Such a system would also allow us (both A and B licence holders) to gain confidence and speed and result in many, many more people using Morse in the future. Could we not have a special suffix to indicate to all listening to CQs that we are beginners - /L for learner, for example.

Then we could chat to each other without fear, perpetuating the Morse tradition and, the most important thing, make contacts at great distances with people who might be too frightened to even try under the present elitist conditions.

George Mills M1CSY
Hertfordshire

....Even More!

Dear Sir

To my mind, the Amateur Radio bands are like the roadways of this country - a

public resource available, in principle, for everyone to use. Of course, to make the roadways work acceptably there are certain conventions to be observed (we all keep to the left) and a minimum level of skill required to drive cars on them without harm to others (how to brake, how to steer, etc.).

In the world of Amateur Radio, we also have conventions and skill levels. Without band plans, there would be chaos and without a minimum level of skill, there would be interference to other amateurs and to those using other parts of the radio spectrum.

In both environments we learn the conventions and skills by a mixture of theoretical and practical training. Over the years, the Highway Code has evolved to keep pace with change. We now have details of how to use motor ways and negotiate pelican crossings, but we are unlikely to be taught how to hand crank a car or how to recognise the old yellow semaphore indicators.

The principles are the same - engines need to be started and others need to know when we are about to turn - but the methods we use have changed. The old methods are still available for classic car enthusiasts, but as technology has advanced, so has the basic training for the average motorist.

What about those who aren't able to drive a car? Many school children each year pass their cycling proficiency test. Again, the aim is to train them to a minimum standard so that they can enjoy limited use of the roads without being a danger to themselves or others.

For both the motorist and the cyclist the 'price' they pay is the effort needed to pass their tests. But it is not an absolute price. Likewise for Amateur Radio, access to the h.f. bands does not carry an absolute price of a pass in the 12w.p.m. Morse test.

We should drop the idea of 'price' altogether from discussions on amateur radio licensing. Instead we should focus on what the novice and the fully licensed amateur need to know to be able to enjoy the hobby and then set about bringing the training into line.

For the record, I am learning Morse (albeit slowly) and will almost certainly use it even if the licensing regulations change before I achieve 12w.p.m.

Dave Gough MM1BEM
East Lothian

...Continued...

Dear Sir

How far does commercial interest affect policies and decisions made by RSGB Council? Reading 'Keylines' (August issue) reinforced my own thoughts that it seems odd that RSGB Council has instigated the controversial issue of Morse tests rather than getting down to the more important, wider issue of improved entry and licensing structure to

Amateur Radio Still Valid?

Dear Sir

I feel that I must comment on GM4PGL's letter in the August *PW*. In his last paragraph he refers to the 'hobby' but seems to have lost sight of what a hobby is. Surely a hobby is for entertainment and fun? Where a hobby intrudes into a wider field (in this case radio transmission) it is necessary to have some control, e.g. licences, basic knowledge tests, etc.

Considerable numbers of amateurs indulge in restoration and use of items of "old technology" whilst others gain great satisfaction from the use of low power rigs to challenge today's crowded airwaves. Does it really matter that technology has left us behind? It is interesting to note that, in a number of 'major disasters' in more recent times (Falklands invasion, earthquakes in Mexico, etc.) modern technology invariably broke down and communications were only maintained by means of 'outdated' Amateur Radio.

Richard Walker G4PRI
West London

....and continuing on the same theme....

Dear Sir

What a deeply troubled 'experimenter' GM4PGL must be, according to his letter in the August *PW*. I wonder why he uses the *PW* Letters page, to try and convince us that Amateur Radio is no longer "valid"?

He states that the instant access of Cellular telephones, FAXes, and the Internet, make it "more important", and that the RAE and c.w. are of "little relevance".

All of the above mentioned 'Alternatives' to Amateur Radio cost money to use, which might bring a shudder to someone from north of the border, who I believe usually suffer from deep pocket and short arm syndrome!

Reliable world-wide communication is nothing new. I wonder if Mr. Adams remembers the telephone, or the fact that his Amateur Radio licence was issued primarily for 'self training in Communication by Wireless telegraphy, which includes technical investigations'? In a word, his licence allows him to run a transmitting station, build and use equipment without type approval, and amazingly enough, assumes him competent enough to probe the many areas waiting perfection. How on earth can this compare with paying for the use of various modes of telephone that he describes?

I think Amateur Radio needs the negative self-destructive views of GM4PGL like a hole in the head and that possibly he would find another hobby more enjoyable. Basket weaving possibly?

Alan Taylor MOAUR
Suffolk

meet current and future needs.

Is the Morse test proposal, supposedly stemming from RSGB Council's stated wish to secure wider access to h.f., really motivated by a desire to provide an enlarged market for sales of expensive new equipment and so maintaining its advertised revenue? Whatever the real motive, this proposal raises important issues of possible conflict of interest which the RSGB should address without delay.

Numbers of new UK licensees are declining with a resulting challenge for the sellers of new imported gear and some organisations frantic to maintain their place in the market. On the other hand, interest in home brewing in QRP and vintage gear is gaining in popularity.

If this trend continues, the days of extensive 'black box' use appear numbered and an era of home brewing and experimenting is looming. We must resist all attempts to engineer licence conditions which would compel us to use ready made approved gear, or flood our bands with people who are not genuinely interested and committed. There is no doubt: commercialism means profit first, with little concern for experimenters and home brewers - though I certainly acknowledge the good work done by kit and component suppliers.

Whilst there is no need to limit access to our bands with unrealistic barriers like Morse tests, to avoid further deterioration in standards we must actively encourage self-motivation, experimenting, DIY and our traditional aims and ethos. We need an accessible and inexpensive entry assessment procedure and a licensing system which will promote these rather than one designed to satisfy and perpetuate the

aims of commercial interest.

There could be an Operator's licence intended for the amateur wanting to use commercial equipment only, entry based on knowledge of licence conditions, how to use the gear and basic EMC aspects, at a realistic licence fee dependent on facilities required such as power and bands.

Alongside that, an experimenter's licence with entry standards higher than the current RAE, perhaps with some choice of exam subjects based on the candidates' specific areas of interest, at a nominal licence fee, with full privileges but especially giving exclusive access to a defined segment of each band, entitling use of any gear.

Additionally, entry to the experimenter's licence could be via an entry level licence similar to present novice 'A' category but with no Morse test, free to students, pensioners and the 'unwaged', permitting access to the experimenter band segments only with low power and allowing use of home-brew gear, only renewable after two or three years in exceptional circumstances.

Surely committed, keen and active amateurs, even in modest numbers, are preferable to a plethora of appliance operators who often get bored once the dust starts to settle on their gear? Shouldn't our main objective be to promote the long term involvement of anyone genuinely interested?

Howard Aspinall G3RXH
RSGB Member
North Yorkshire

Dear Sir

With the end of the Morse test in sight I would like to add my suggestion to the

many already expressed. Although I have been a licensed Amateur for only five years, my interest in amateur radio goes back to the 1960's as an s.w.l. on 'Top Band'. Even then I couldn't get my head around the Morse code. I have spent my career in broadcasting starting at BBC Tatsfield in 1965 using Racal RA17 receivers. I have worked in television for the last 30 years. My two sons revived my interest when they became interested through the Scouts, 'Jamboree On The Air' (JOTA) and Raynet. I got my licence six months after them in 1993.

My view is that the Morse test should be replaced with an h.f. operators test. It has become obvious to me, over my (few) years as a class B licence holder, that working on the h.f. bands needs more than a written exam. Just as passing the written part of the driving test does not make a good driver, passing the RAE does not give all the expertise required of working an h.f. transceiver. The h.f. operators test could be done by the existing Morse testers and to pass the candidate must be able to show the ability to operate and set up the transceiver to a high standard.

I hope that a common sense approach to the demise of the Morse test will result in any licence holder being allowed to operate on h.f. provided they can show a suitable level of expertise that is required of those bands. This is necessary to maintain the good reputation of the UK's class A licence holders.

Eddie Wheaton G7OMK
Surrey

Continued...

letters

Continued

Class Distinction & The Hobby**Dear Sir**

I have been involved in Amateur Radio since the early 1970s when, as a young teenager, I was introduced to the hobby by my late uncle **Kipp G8PL** who had the compulsory caravan at the bottom of his garden which supported numerous wire antenna for his c.w. only operations on the lower h.f. bands. From that introduction on I became an s.w.l. using various ex-military equipment including an AR88 (which I still have to this day). Then I located **PW** in my local newsagent and was introduced to the late **Eric G4AR**, who I, and my late wife, visited at his QTH on many occasions to discuss DX on the h.f. bands and helped add to his column most months for many years.

In the early 1990s, I ran an Amateur Radio retail outlet for some five years and finally sat my RAE passing it with credits first time, without attending any college course. In my short time (20 plus years) as an s.w.l., licensed operator and emporium manager, I have heard or spoken to thousands of operators and like the Editor ('Keylines' August **PW**), am appalled at the attitudes of **SOME** fellow operators who, because they have taken a Morse code test, feel that they are above and beyond Class B licensed operators.

The facts are simple, technically we all pass the same exam to become licensed. Then going on to pass a Morse test does not make you a better technically minded or more superior operator. In fact, many only take the Morse test as a means to an end and within months could not communicate with Morse if their microphones became inoperative.

Personally, I think that most Class B licence operators are far more dedicated to the hobby. They often spend hours monitoring dead bands on equipment that, pounds per band, is three times more expensive than h.f. equipment and far more technical to be successful with (h.f. equipment being far more tolerant and flexible).

I also agree with **G3XFD's** comments regarding the

abolishment of the Morse test in its entirety. If the RSGB in their wisdom have decided that its past its sell-by-date, then why make a simplified version? I would also agree with **Mr. Adams GM4PGL**, also in your column last month. Putting his and your thoughts together, then some positive action to secure the future of Amateur Radio must be taken.

The Novice system to recruit new blood seems to be working well but what about sustaining the interest of the middleman, the B licence? If the RSGB want a gradual influx of new blood on the h.f., rather than just letting the flood gates open, then scrap the Morse once and for all and shift the minimum B class frequency limit from 30MHz to say 24MHz, releasing two extra bands. Then test the response and in five years drop the limit to 10MHz? This would also help the retail sector within the hobby, many, if not all B class licensees, would be keen to experiment on their new allocations, requiring transceivers, antennas, etc. Some would stay in the lower new bands while others would return back to the higher frequencies.

In my experience, operators fall into two categories: DXers and non-DXers, those wanting to make world-wide communications, mainly on s.s.b and those looking for local communications via town-to-town and mobile use repeater and the challenge the higher v.h.f. frequencies provide - NOT A and B licence class.

Finally, if by purchasing a CB licence and taking no test at all operators of a CB can operate on 26/27MHz, why can't a B class licence holder operate on 28MHz?

From a loyal reader and non-RSGB member.

Andy G7OEC/G7VHF
Essex

...continued....

Dear Sir

Just reading the August edition of **PW** and found the Editor's 'Keylines' rather interesting - mainly the part referring to the 'class distinction' bit, regarding G3s and G8s.

I have only just passed my RAE after studying off and on for 14

years! (Cars, work, beer, women and children got in the way until now!). The reason the class distinction struck a chord with me takes me back to a month or so before my RAE came up and I was driving to work, listening to the output of **GB3VT** on a loaned receiver.

Two fairly local (Stoke-on-Trent area) operators were on, one around my age (25-45) and a more senior, retired user. Before their QSO ended, they too had been going on about G3s, G8s and, what the older gent called '(censored) M1s'. I sat in the car, my blood boiling at his attitude towards recently passed amateurs!

To add icing to his own cake, the offending operator finally finished the QSO with the line and I quote: "I'm off to work some DX now with my 2m f.m. rig, 800W linear and 5/8th over 5/8th vertical - like they teach them on the RAE courses nowadays". Talk about unbelievable! I think I was more gob-smacked to think that I had studied for years and now about to join a "community" frequented by the likes of this chap?

Well, now I've been operational on 2m for the past three weeks after receiving my callsign, **M1CZK** and have been welcomed with open arms by everyone I have spoken with to date. Let's just hope I don't ever get QSO with the sad individual above, or someone with the attitude that you met, eh? Just thought I'd share that with you.

Leigh M1CZK
Staffs

Editor's comment Thank you Leigh and everyone who wrote in this month - an incredible postbag and I'm very sorry we couldn't squeeze more of you in... even with an extra page!

Letters Received Via The 'Internet'

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

EVERYONE HAS AN OPINION - SEND YOURS TO PW AND WIN A VOUCHER TO SPEND ON ANY PW SERVICE

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On pages 40 & 41 of this issue **Tex G1TEX** reviews the **MFJ-259B** antenna analyser, which he finds to be a very useful piece of 'shack' equipment and one that he wouldn't be without. So, if you're looking for a way to keep your antenna system 'in check' - look no further!

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NEWS

COMPILED BY DONNA VINCENT G7TZB

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United in Radio



Unfortunately the last ten years has seen a steady decline in Amateur Radio dealers with several stores closing and moving away from dedicated sales. So, it's refreshing to hear that a new business has opened in Kent.

Universal Radio Communications trading as UniCom is the newly founded business of **Dennis Goodwin G4SOT** and **Andy Rudd G6MRI**, who between them have over 25 years experience of radio retail. Many of you will no doubt recognise Dennis and Andy, especially if you regularly attend radio rallies.

UniCom officially opened on 1 September 1998 in Beltinge in Kent and offers a wide range of Amateur Radio products, as well as marine, commercial, airband and CB. Dennis and Andy have between them knowledge in h.f., marine, p.m.r., short wave listening and scanning and so are well armed to offer potential customers plenty of advice.

So, why not drop by and pay them a visit at **112 Reculver Road, Beltinge, Herne Bay, Kent. Tel: (01227) 749352** or visit their Web Site at <http://www.cqdx.co.uk/unicom> Old friends and new will all be very welcome.

A Tribute - Ian Wye GOOKY

The G-QRP Club regret to announce the death of **Ian Wye GOOKY**, the G-QRP Club Sales Officer. For some five years Ian had been responsible for the sale items of the club. During his time as a G-QRP officer he gained a reputation for helpful and personal service to club members.

George Dobbs G3RJV comments: "Ian was the ideal club officer, he simply got on with the job with the minimum of fuss and maximum efficiency and service. He will be difficult to replace."

Ian leaves a wife, Jules and a five year old daughter, Grace. The PW team offer their sympathies to Ian's family and friends for this sad loss. Ed

Web Support

The communication mast, boat cradle and metal product manufacturers, **Tennamast (Scotland)** have recently launched their own Web site. To view the site point your browser at <http://www.tennamast.com>

Norrie Brown, Director of Tennamast told the 'newsdesk' that within hours of the site being launched he had received his first order from a Radio Amateur in Dublin. The site comprises Tennamast's extensive range of fixed, wind-up, tilt-over and lattice masts giving detailed information and photographs of each one. There's also information on their extensive range of brackets and other metal fabrications.

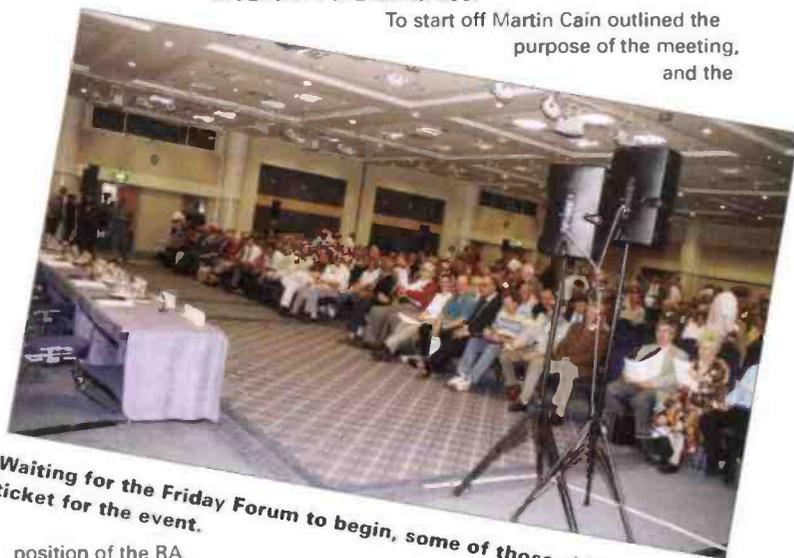
Friday Forum - The PW Report

Tex Swann G1TEX provides his report on the important NEC Forum arranged by the Radiocommunications Agency.

Around lunchtime on Friday 24 July last I, and many other Radio Amateurs, assembled in a large conference room at the NEC Birmingham to meet members of the Radiocommunication Agency (RA). There was some urgency needed to apply for the limited tickets to the 'all-ticket-do', as invitations were sent out only a few days before the event.

On opening the meeting **Martin Cain** (of the RA) who chaired the meeting, apologised for the short notice but hoped that it would be a useful meeting for both sides. He then allowed those at 'Top-table' to introduce themselves. They were, as they introduced themselves: **Don Beattie** and **Peter Kirby** (both representing the RSGB), **Doug Raynes**, **Colin Richards**, **Karen Scott**, **Helen Hicks** and **Aaron Abiaw** all from the RA. Representing SSL were, **Les Mountford** and **Linda Lee**.

To start off Martin Cain outlined the purpose of the meeting, and the



Waiting for the Friday Forum to begin, some of those able to get a ticket for the event.

position of the RA with regards to Radio Amateurs, before throwing the meeting open to questions and comments from the floor. Such was the size of the hall, that radio microphones were held by attendants around the room for use by speakers in the audience.

There was some confusion at first as some were anxious to begin their questions, but who started without one of the radio microphones. Martin Cain asked for people to wait until they had the microphone, as the meeting was being recording for others to hear. When answers came from those on the 'top-table' their desk microphones proved inadequate, and a radio microphone was passed to each speaker in turn.

For over an hour there were discussions about 'should Morse be used as a method of limiting access to h.f.?' in which over 35 speakers had the chance to make their comments. Around one in ten of the speakers were strongly 'for retaining Morse as an h.f. bands access limiter'. However, an equal number, also with strong views were 'against' the present method

of limiting access to h.f.

However, after listening very carefully to my own recording of the meeting, I estimate that some 40% of the speakers were neutral in their comments and significantly, a little over a third said that Morse (as a limiting factor) was no longer a suitable method of allowing access to the h.f. bands. The remaining few speaker felt that they would like to retain Morse, but with a reduced rate of words per minute (w.p.m.) needed.

The general tone of the the first part of the meeting was that even if the requirement for Morse was removed, then the use of Morse, as a mode of operation, should be both retained and indeed encouraged to all radio amateurs. A comment that perhaps the band-plans be made mandatory,



Colin Richards of the RA has the microphone answering a question. To his right are Doug Raynes (also of the RA) and Peter Kirby GOTWW (far right) of the RSGB.

received a round of applause from the meeting.

In reply, and closing the period of discussing the Morse Test, Don Beattie G3OZF said that he, and the RSGB was committed to a thriving interest in Morse code. He then went on to say that although there seemed no short term prospect of changing the present system, there may be an "opportunity for a simplified licence with access, in some way, to h.f...."

During the remaining 40 minutes of the meeting various other topics were raised. These included: The use of power lines to transmit digital data on frequencies within the band of 2-10MHz, narrower channel spacing on v.h.f./u.h.f., raising the permitted power level up to 1kW (which raised a laugh from the floor), repeater abuse and methods of dealing with it, giving Novice licensees more bands and greater spectrum space, the intrusion of low power digital devices within the 430MHz band and the granting of longer term licences rather than the present annual period.

Members of SSL received some comments and questions, which were fielded by Les Mountford, who apologised for "what had happened in the early part of the contract". He then went on to say, that he hoped his department (a part of the Post Office) now dealt with queries in "a capable and efficient manner". And that if anyone had experienced any problems, that he would look into any comments made by those present, on returning to his office on the monday following the meeting.

After running over it's allotted time of two hours by almost 15 minutes, Martin Cain thanked everyone for attending and said that a consultative document would be presented to the members of the Amateur Radio hobby in either late September or early October. And that everyone should take the opportunity to make their thoughts known to them (the RA) in response to that document. **G1TEX**

Graham Gets Personal!

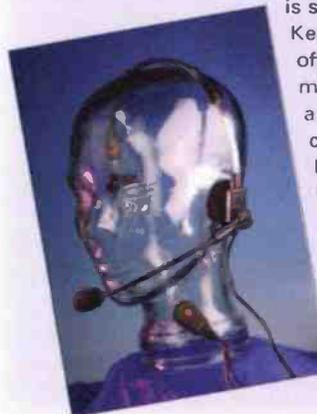


Graham Patterson G4TJB of QSL Communciations has joined hundreds of personal 'plate' owners by buying his callsign number plate at the recent auctions that were held in York. Graham is pictured here outside QSL with is new number plate proudly displayed!

Following on from our News mention last month Graham and Jayne would like to remind *PW* readers that their product range includes the AV-200, 400 and 600 SWR power meters, which offer a selectable range of 5 - 400W and carry price tags of



£59.95 - £99.95. Another very useful product that QSL are offering is the EP-600K headset microphone which



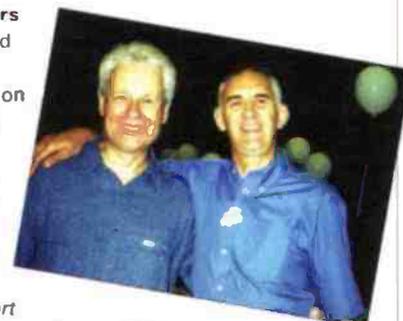
is suitable for use with Kenwood hand-helds and offers an impedance of 8Ω, maximum power of 500mW and comes with 1.4m of cable. Also available is the EP-600S which is suitable for use with Alinco, Icom and Standard hand-helds for the same price of **£19.95.**

More information on the QSL Communciations product range can be obtained by contacting **(01934) 512757.**

Party All Night

On Saturday 25 July Waters & Stanton PLC celebrated 25 years of trading with a party and dance that went on into the night. Around 150 guests were invited and these included customers, friends, staff and business associates. Among those were representatives from Icom, Kenwood, Yaesu, *Practical Wireless* and *Short Wave Magazine*. As the picture shows Jeff

Stanton and Peter Waters may have been in business for 25 years but they still enjoy a good party and are still smiling!



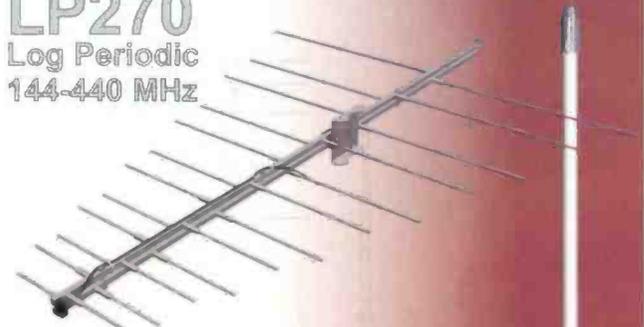
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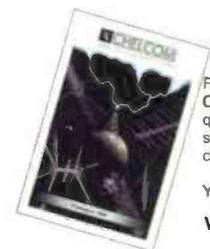
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WE ARE NEXT TO THE BILLINGHURST TRAIN STATION

Up until now in 'Radio Basics' I've been able to prepare and produce projects for you that can be presented in a single issue of PW. But from now on many of the projects and necessary explanations will inevitably require two issues of the magazine.

However, despite the fact that you'll perhaps not be able to start on the current project immediately - you will be able to gather what's required ready for the next PW. So, off we go!

There's nothing wrong with taking a short cut - even with radio construction. And those of you who have copies of the original 'Getting Started - The Practical Way' will know I've used one short cut - the crystal-controlled converter - once before.

Using a crystal-controlled converter to take a short cut has many advantages. The first is that you can get excellent results for minimum effort and learn something at the same time.

The project we're undertaking will receive the 3.5MHz amateur band and 'translate' it down by using a superheterodyne converter. Literally - it's the 'front-end' of

a superhet and in practice is very simple indeed. It's so simple that it will not require any complicated alignment - just a few 'twiddles' for best results.

Colour Crystal

The fixed tuned converter unit will receive the 3.5MHz (80m) band. It uses a TV receiver 'colour' sub-carrier generator 4.43MHz crystal to provide a convenient local oscillator source for the converter operating above the wanted frequencies.

At 4.43MHz the local oscillator - using an MPF102 field effect transistor (I'll use these wherever possible for simplicity) will 'mix' with the incoming signals

on the 3.5MHz band to produce a 'difference' signal at around 1MHz. This can then be conveniently tuned on a car radio unit switched to the medium waveband.

Why use a car radio? Well, the answer is simple - they're cheap to buy and are also provided with excellent radio frequency screening. They also require an **external antenna** input rather than using the ubiquitous ferrite rod antennas (very helpful in this case).

The receivers are usually also very sensitive and fairly selective when you consider they're for broadcast use. And conveniently - they run from 12V d.c.

Add-on converters for

radio and TV reception have been used effectively for many years. These included the useful little externally mounted 198kHz to medium converters made by Ambit to help listeners receive BBC Radio 4 when it changed from medium waves to the 198kHz frequencies about 20 years ago.

However, anyone who used the converters will know of the problems - of existing signals already on the output frequency being used by the converter (picked up by the ferrite rod antenna) interfering with the wanted 'up converted' signals.

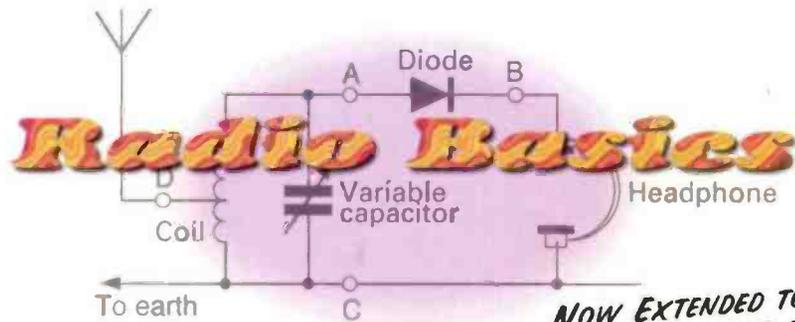
Hence, by having a receiver which is already well screened - we can also use the screened antenna input of the car radio to advantage. Although it's possible that you will receive 'breakthrough' from a local medium wave station, it will be minimised.

As the converter will be used to listen to single sideband (s.s.b) transmissions, it will also incorporate a beat frequency oscillator (b.f.o.). This will also enable c.w. (Morse) to be received.

Unusual & Useful

While I was 'on duty' at the 1998 London Amateur Radio

Radio Basics is continued on page 18



NOW EXTENDED TO TWO PAGES BY POPULAR DEMAND!



Fig. 1: The unusual 'Delco' (Made in Mexico for the American market) car radio which can be used as a 'tuneable intermediate frequency', photographed together with a 50p piece for size comparison. Looking almost like a miniature 'communications' receiver the radio is both sensitive and selective bearing in mind its original purpose.

Rob Mannion G3XFD aims to take you another few steps forward in learning 'radio basics' by preparing you for the next project - a crystal-controlled converter unit enabling you to tune into the 3.5MHz amateur band on a car radio.

Interested? Want to join in and have a go yourself? You can... by just sending a large s.a.a. (with 50p stamp) asking for the free 'Radio Basics' Guide - Issue 1.

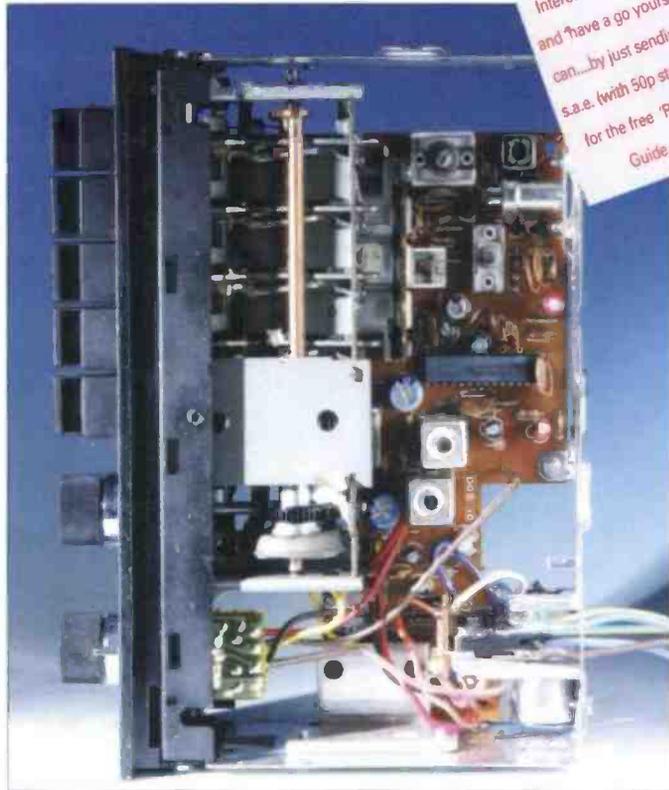


Fig. 2: Inside view of the 'Delco' car radio with the antenna input socket at the top right, and soldered connecting wires on the bottom right. Note the traditional mechanical push-button tuning assembly which dominates the receiver 'chassis'.

Show at Picketts Lock this year I was fortunate to discover a source of very unusual but useful car radio receivers. Made originally for the American market - they only cover medium waves - these receivers, Fig. 1, 2 & 3, are ideal for use as tuneable intermediate frequencies.

Another advantage of the car radio in the photograph is that in effect they look like miniature communications receivers with push-buttons. And although they're fitted with unusual (non-standard 12V power sockets, audio output connections and totally non-standard (from a

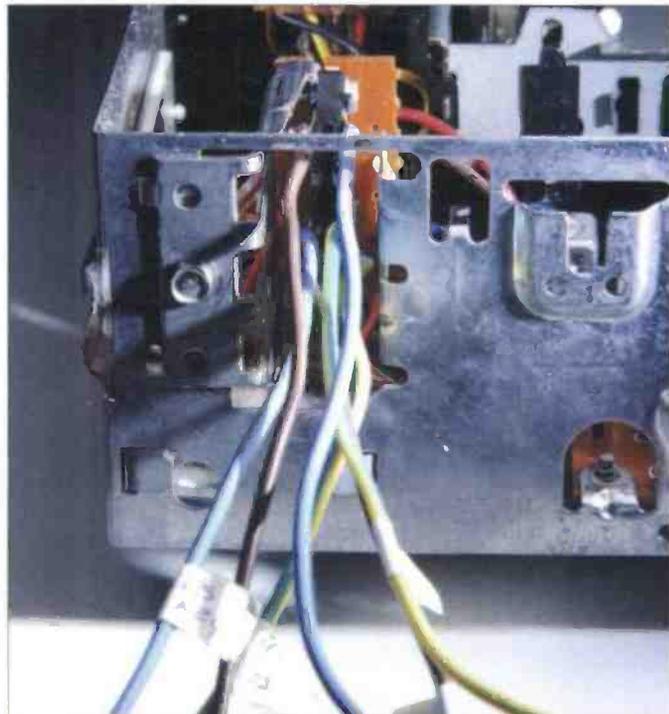


Fig. 3: Connections to the car radio (full details are provided with each radio) have to be made by soldered leads. The wiring task is simple and effective.

European point of view anyway) sized enclosure - I think they are absolutely ideal for the purpose.

Obviously, any 12V car radio - provided it will tune over the medium waves - will do the job. However, a 'standard' type of older British car radio won't look like a miniature communications receiver in quite the same way! On test I found the receiver to be remarkably sensitive and selective. Although fitted with mechanical push-button tuning (which will prove useful as you'll find out!), the variable tuning control also has a reasonable 'turn rate'. (Full details of how to get these receivers, plus other unusual components for the project will be found in the separate panel labelled 'Component Sources').

The connection from the converter to the car radio is provided by one of the special 'in car' coaxial cables and plugs. If you don't have an old car antenna to hand (to remove the cable and plug for re-use) the plugs are often available with a short length of coaxial lead from car accessory shops for around £1 or so.

Electrovalue (see PW advert) have suitable plugs and cables in their catalogue, as do Maplin Electronics (Mail order and shops). The 'skeleton' type of plug available from Maplin is simple to use and I've also seen it on sale in the usual car accessory shops at around 50p.

Building The Project

Next month I'll provide you with circuit and p.c.b. design so you can start building the project. In the, meantime I suggest you start collecting the 'bits and pieces' together!

Finally, if you want to 'read ahead' and learn more about the 'converting' technique - full details are in the series of 1987 'Getting Started - The Practical Way' articles I've already mentioned. However, the original project did not incorporate a built-in b.f.o. and the 40673 f.e.t.s used in the project are now difficult to buy. But it will still help you prepare to build and use the Mk II!

Cheerio until next time.

Component Sources

The Delco car radios are available for £10 (including P&P) from Roy Barrett at 'Uplands', Tidings Hill, Halstead, Essex CO9 1BJ, Tel: (01787) 472982. Roy can also supply the synthetic resin bonded paper board (SRPB) p.c.b. material which is suggested for use in 'Radio Basics' (and will feature in most future projects in some way). Please contact Roy direct regarding this material (it's not cheap to post due to the weight, although very reasonably priced to buy!). Alternatively, he will be at the 'new' Leicester Show on Stand 5B.

The converter circuit will also use some 'postage stamp' pre-set 'trimmer' capacitors for adjustment purposes. These are normally quite expensive but John Birkett of 25 The Strait, Lincoln LN2 1JF, Tel: (01522) 520767, has some unusual and very useful 1250pF types available for 50p each (I suggest you buy six or so because they're very useful!). He also stocks a selection of surplus traditional air-spaced variable capacitors suitable for projects.

Robin Sykes G3NFV of Syon Trading, 16 the Ridgeway, Fetcham, Leatherhead, Surrey KT22 9AZ, Tel: (01372) 372587, can supply the MPF102 f.e.t.s for 45p each plus 30p P&P (four required for converter project). He can also supply the 4.43MHz oscillator crystal for £1.30. (Syon Trading attend many rallies throughout the year).

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Callsign

NUMBER PLATES

A few Radio Amateurs have recently bought vehicle registration numbers that match their callsigns. Roger Hall G4TNT explains how they did this and why he didn't get to buy his.

Expensive and ostentatious or a harmless bit of fun - whatever your view, personalised number plates are big business. However, the strict format of British vehicle registration marks severely limits the amount of words that can be made and this gives meaningful combinations a scarcity value. For instance, H.R. Owen, the luxury car dealer, has been offered more than the cost of a new Rolls Royce for their number plate RR1 and double letter single digit registrations regularly sell for tens of thousands of pounds.

For a long time, local registration centres issued vehicle numbers to dealers by just tearing them off the computer printout as it came out of the machine. This meant that some people were given attractive numbers

purely by chance. Soon, specialist number dealers were making money by buying these numbers and reselling them. Eventually, someone at the **Driver Vehicle and Licensing Authority (DVLA)** realised they had some valuable assets and that they could be selling the numbers themselves and making money for the Treasury.

In the 1980s, as the plans became known, the DVLA started to get requests from individuals and different groups, including Radio Amateurs, wanting specific numbers. Unfortunately, the law enabling the sale of registration numbers came just too late for Amateurs to buy G prefix plates as it was not passed until 1989 and the first series of numbers to go sale to the public began with H (1.8.90 - 31.7.91).

Many of the first 'H' plates were sold by telephone on a first-come-first-served basis but some of the better ones

"Expensive and ostentatious or a harmless bit of fun - whatever your view, personalised number plates are big business"

"...an amazing £235,000 was once paid for K1 NGS..."

were held back for sale at auction. This was in line with the policy that was established right from the beginning. The DVLA had to maximise the amount of money it earns from the number plate sales and, at the same time, offer the numbers for sale on the open market so that everyone had an equal opportunity to buy them.

The H plate sales were followed by J as they came out (there were no I registrations), then K and so on up to now when they have just started selling S numbers. In 1992 the DVLA also went back to the beginning of the alphabet and started selling A plates followed by B plates in 1996.

The DVLA intend eventually to work their way through to G but there is no fixed timescale for this. Their strategy is obviously a successful one as they have made in excess of £250 million for the taxpayer so far from number plate sales.

Potential Plates

The DVLA **do not** sell 'one-offs' in that they will not pick out a number for an individual if it's from a series that has not been issued yet, but they are aware of the potential market for G callsign plates. This is why they asked the **Radio Society of Great Britain (RSGB)** to conduct a survey on their behalf.

The RSGB were asked to poll all Radio Amateurs, both members and non-members, in order to evaluate the number of potential customers for callsign number plates. The DVLA then wrote to everyone who had responded positively to the survey asking them if they would be willing to buy those numbers at the reserve price if they were to be offered at auction.

Some 250 numbers for those amateurs who had responded positively were then entered in an auction that was held at the **Grand Assembly Rooms** in York on **Thursday 16 July 1998**. This auction was specifically for selling numbers to those people who had expressed an interest and said they would be willing to pay the minimum price.

The reserve price for most numbers was £330 which, by the time the buyer's premium, assignment fee and VAT had been added, meant that most people who bid were sold their numbers for £496.83. However, this was an open auction and some amateurs were outbid by other buyers who were also at the sale.

Professionally Run

The DVLA has obviously had several years experience organising auction sales and the one in York one was run very professionally. The interior of the wonderful old building had been fitted out with various booths for payment, enquiries and so on and the main auction room featured a large screen that displayed the number under the hammer.

There were also several television screens in the other rooms showing the current number and the price. Arrangements had been made for bids to be accepted from the floor, by post or by telephone. The DVLA even picked up the cost of the call because they called you when your number came up to see if you wanted to bid for it!

Surprisingly, despite having said they would be willing to pay and despite it being made so easy, quite a few amateurs failed to bid for their callsigns. So, why didn't I buy mine? Well, given the chance, I would have but somehow the RSGB poll passed me by.

Perhaps I may have become a little blasé about reading everything that comes onto my desk and I might have missed it. It's surprising, however, to find that only

some 600 or so amateurs responded to the original survey. Out of approximately 60,000 amateurs, I would have thought more would be interested in buying their registration numbers.

Because I didn't respond to the survey, I didn't get the letter from the DVLA. Because I didn't get the letter, I didn't even know there was the possibility of buying my number and it was only because **Rob G3XFD**, our Editor, heard about the auction that I knew that it was taking place!

Weren't Asked

If you are wondering why you weren't asked if you wanted your number, think back. Did you see the survey, did you fill it in and did you answer the letter from the DVLA?

If not, don't worry, **it's not too late**. While I was at the auction I had a long chat with **Byron Roberts**, the Marketing Manager for the Sale of Marks division of the DVLA. He explained that this was a pilot sale and, despite the poor response, he has not ruled out the possibility of holding more in the future.

Byron's problem, though, is the comparatively low price charged for the callsign numbers. I know almost £500 may seem a lot but, to put it in perspective, the day before this sale there had been one for Classic numbers and some of those were going for thousands of pounds. The record so far is an amazing £235,000 that was paid for K1 NGS at a previous sale.

In order for sales of lower priced numbers to bring in comparable amounts of money, the auctioneers need to rattle through them at some speed. That is why the DVLA would like to know that each number in a sale has at least one

confirmed customer who has said in advance they are willing to buy it. That way they can sell a dozen at £330 in the same time as they sell one for £5,000 at the Classic auction.

Byron also said



that, although he will not be asking the RSGB to conduct another survey, he does need to have some feedback so that he can tell if it will be worthwhile holding more sales of amateur related numbers. He hasn't decided how to do this yet so please, don't try and contact him direct.

Apparently, some amateurs have been quite persistent and, as he said, he now knows them almost as well as he knows his family! He is sympathetic to the sale of marks to Radio Amateurs and I'm sure a way will be found. When it is, you can be sure of reading about it in the pages of *PW* in plenty of time to buy yours, because I'm going to make sure I don't miss mine again!

PW

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Ian Poole G3YWX sets about answering the question What Is A ... Tunnel Diode?

This time Ian Poole G3YWX looks at a diode that was widely used 30 years ago and has a fascinating mode of operation.

One type of diode that was widely used in the 1960s in many applications where transistors did not operate well was the tunnel diode. Its mode of operation enabled it to be used at frequencies in excess of those that could be achieved by many other semiconductor devices.

Although tunnel diodes are not nearly as widely used today, they are still mentioned and it's still well worth investigating how they work. Sometimes they are

was also demonstrated in a number of other materials including gallium arsenide. In 1973 Esaki was awarded the Nobel prize for physics for his pioneering work with the tunnel diode.

Similar Junction

The tunnel diode is similar to a standard *p-n* junction except that the doping or impurity levels are very high and the depletion region, or the area between the *p*-type and *n*-type areas is very narrow, typically in the range five to ten nano-metres. The very narrow depletion region width means that the capacitance of the diode is high, which means that where the diode is to be used for high frequency operation, the diode area must be made very small.

There are a number of structures that can be used to fabricate a tunnel diode. These are shown in Fig. 1(a). The first structure is

substrate.

The structure is heated to a temperature of around 500°C. At this point the alloy melts and the dopants diffuse into substrate. The area around the alloy is then etched to reduce the size of the junction as shown in Fig. 1(b).

The third structure uses normal planar technology. A small area of a heavily doped substrate is left exposed as shown and the area is exposed to diffusion, epitaxial growth or alloying to give the required *p-n* junction

Characteristic Curve

The characteristic curve for a tunnel diode is shown in Fig. 2. This can be seen to rise at first and then fall back, then starting to rise again. The reason for this is that there are a number of different components needed to form the overall curve.

The two main components

are the normal diode current across the junction and the current arising from the tunnelling effect. It's this last component that's of interest in a tunnel diode.

'Tunnelling' is a complicated mechanism resulting from a quantum mechanical effect. It arises when electrons pass through a potential barrier in a way that can be visualised as tunnelling.

It's found that the tunnelling current peaks at a certain voltage and then falls away giving a negative resistance. This effect can be used in a variety of ways to give amplification.

The tunnel diode can be placed in a circuit like that shown in Fig. 3. The steady bias voltage supplies the additional power and for the new signal, that is an amplified form of the changing input signal.

Advantages & Disadvantages

The reason for the success of the tunnel diode resulted not only from its negative resistance but also its high speed of operation. This results from the fact that it only uses majority carriers i.e. holes in a *p*-type material and electrons in an *n*-type material.

Many other devices are slowed down by the fact that the minority carriers (i.e. holes in an *n*-type material and electrons in a *p*-type material) are stored and slow down the operation. Also the tunnelling effect is inherently fast.

However, there are a number of disadvantages and these have meant that in recent years tunnel diodes have not been as widely used. In the first instance they only have a low tunnelling current and this means that oscillators can only run at a low power.

Secondly, they are only a two terminal device and they do not provide isolation between the input and output. The third drawback results from the problems in reproducibility, especially in integrated circuits.

Uses

Although tunnel diodes are not widely used today they found uses as widespread (in the late 1960s) as u.h.f. and microwave amplifiers and oscillators. In this application they were able to offer good high frequency performance coupled with low levels of noise, and indeed today they are occasionally still seen in use as low noise amplifiers.

PW

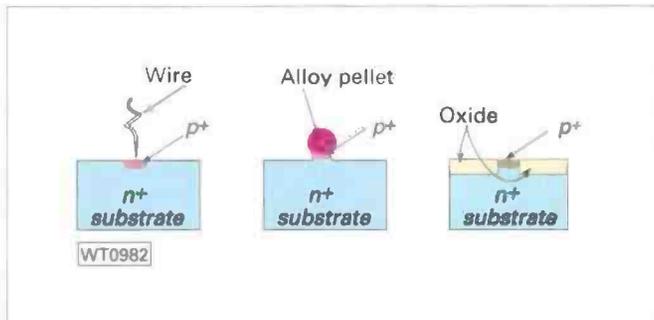


Fig. 1: Examples of tunnel diode structures.

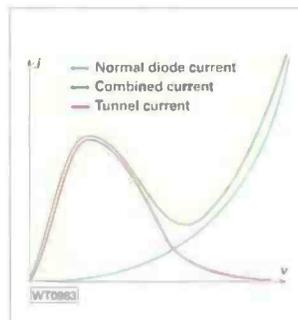


Fig. 2: The current in a tunnel diode.

encountered today and their mode of operation is very interesting.

Discovered

The diode was discovered in 1958 by a Ph.D. research student named Esaki. He was investigating the properties of heavily doped germanium *p-n* junctions for applications associated with high-speed bipolar transistors. In this application a narrow, but heavily doped *p-n* junction was required.

Subsequently the tunnel diode discovered by Esaki

known as the pulse bonded method. Here a heavily doped substrate is again taken and a wire coated with dopants is pressed against it.

A voltage pulse is then applied and this causes local alloying and a small junction is formed. As may be guessed this method is not very controllable but it produces a very small junction suitable for r.f. applications.

The second structure is known as the ball alloy structure. Here an alloy containing the required dopants is brought into contact with a heavily doped

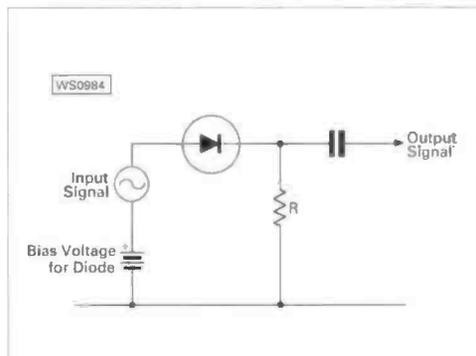


Fig. 3: A basic circuit for a tunnel diode amplifier.

Next time I'll be looking into the mysteries surrounding the diode ring mixer.



September 12: Reddish Rally is to be held at St Mary's Parish Hall, Reddish, Stockport. More information from **John G4ILA** on **0161-477 6702**.

September 12: The 4th Northampton Radio & Computer Rally is to be held at the heart of the Shires Shopping Village Showground on the A5, just two miles north of Weedon, with easy access. Rally opens at 0900. There will be a Bring & Buy, organised by the Northampton Radio Club. Bring the family as they can spend the day in the 'olde worlde' village. Refreshments and toilets are on site. Admission is only £1. Contact **Steve MOARZ** or **Paul G0HWC** on **(01604) 632478**.

September 13: The 1998 BARTG Rally will be held at Sandown Exhibition Centre, Esher, Surrey. Doors open 1030. Attractions include free parking, Bring & Buy, many trade stands, a licensed bar and catering. *DataStream 98* forms an integral part of this Rally. *DataStream 98* will consist of a series of lectures looking at various aspects of amateur radio data comms. More info, from **Alan Hobbs G8GOJ**, **83 St Peters Street, South Croydon, Surrey CR2 7DG**, **0181-688 2564** (evenings) or <http://www.bartg.demon.co.uk/rally.htm> or E-mail: rally@bartg.demon.co.uk

September 13: The Milton Keynes & District Amateur Radio Society are holding their Annual Rally and Boot Sale in Blechley Park. More information from **Dave White G3ZPA** on **(01908) 501390**.

***September 13:** The 13th Lincoln Hamfest will be held on the Lincolnshire Showground. This is on the A15 just five miles North of the City. Talk-in on 70cm. There is extensive parking available on the day and overnight on the 11/12th for caravans and tents. There will be many trade stands, a Bring & Buy, Flea Market and Car Boot Sales. Morse tests will be available by arrangement, there is also catering and a licensed bar. Admission is £2, (free for those 14 and under). **John & Sue** on **(01522) 525760** or **John** (mobile) on **(0385) 738976**.

September 20: The Cambridge & District Amateur Radio Club are holding their Car Boot Sale in the Reindeer Pub grounds, Saxon Street, Near Newmarket. Open from 1100 till 1500, entrance fee is 50p, pitches are from £5, depending on vehicle size. More information from **Michael Addelese**, Public Relations Officer, on **(01223)**

872258, or visit the web site, which contains a current club programme, <http://peach.cam-orl.co.uk/cdarcweb/>

September 20: The Mansfield Amateur Radio Society's first Radio, Computer and Electronics Car Boot Sale is to be held at Debdale Lane Sports & Social Club, Debdale Lane, Mansfield Woodhouse, from 1000 to 1600. Talk-in on S22, ample parking. **Angela G1DZH** on **(01623) 429218**.

September 20: Their will be an Electro-Jumble Sale (4th) to be held at The South Yorkshire Aircraft Museum. The organisers planned the event for constructors, restorers and collectors of electrical radio and radar equipment up to the 1950s and 1960s (both commercial and military), to buy, sell or swap pieces of kit, transmitters, receivers, components, connectors, cables, handbooks, test gear, etc. and those odds and ends you've had for years but cannot use and do not know what they are for! Starting time is 1000, setting up from 0800. Admission is free and so is the parking. More information from **Mike Diprose** on **(01433) 631296** or **Mike Green** on **(01253) 347176**.

***September 25/26:** Leicester Amateur Radio Show will this year be held at the Donington International Exhibition Centre at Donington Park, Castle Donington, Leicestershire. Many traders have already reserved space at what will be the biggest UK Amateur Radio event this year. The hall itself is purpose built and features a floor area approximately one third larger than the two Granby Halls combined and the car parking is unlimited and free. There will be 150 stands and many new features such as camping and caravanning on site, a meeting room for clubs and societies and a convention. **Geoff G4AFJ** on **(01455) 823344**, FAX: **(01455) 828273**.

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

October 4: The Blackwood & DARS are holding their Radio, Computer and Electronics Rally at The Community College, Oakdale, near Blackwood, Gwent, South Wales. Doors open at 1000. There will be traders, a Bring & Buy sale with a talk-in on 145.550MHz. **MWOATF** on **(01495) 246594**.

October 4: The Great Lumley Amateur Radio & Electronic Society are holding their rally at the Great Lumley Community Centre near Chester le Street. Good parking facilities with easy access, There will be good, inexpensive food and drink also. There will be a Bring & Buy stall in two sections, junk and good buys, with radio, electronics, computer, satellite and components stalls also. Doors open 1100 (1030 for any disabled visitors). **0191-384 2803** or **0191-388 6865**.

October 18: The North Monaghan Hobby Radio & Computer Exhibition will be held in the Four Seasons Hotel, Monaghan (function room and not the disco), Ireland. Doors open at 1130 and the rally finishes at 1630. All the usual retailers will be in attendance including large displays of computer equipment and a Bring & Buy. Refreshments are available in the hotel along with full facilities for QSLing via the bureau. **Stephen Hand** on (Irish Republic number) **(01365) 751479** evenings or E-mail: Stephen.hand@virgin.net or **Ken O'Reilly** on **(01365) 738981** or E-mail: kenoreilly@enterprise.net

October 18: The Hornsea Amateur Radio Club Rally is to be held at the Floral Hall, Hornsea, East Yorkshire at 1100 (1030 for disabled visitors). There will be trade stands, B&B, restaurant and a licensed bar, entrance £1, talk-in, S22. Tel: **(01964) 532588**.

October 24: The Carrickfergus Amateur Radio Group welcome everyone to their annual rally, which takes place at 1200 at the usual venue

which is Downshire School, Carrickfergus, Northern Ireland. Talk-in on 145.550MHz (V44 (S22)).

November 1: The Tir Conaill Amateur Radio Society Annual Radio Rally. Attractions will include trade stalls and a Bring & Buy. There will be refreshments available all day with a bar in the hall. Doors open at 1200 and will end at about 1600 with an auction at the Bring & Buy stall. Tel: **(072) 52598** (Irish republic calls) or from Northern Ireland by calling **01035372 52598**.

***November 7/8:** The Twelfth Wales Radio & Electronics Show is to be held at Aberconwy Conference Centre & New Theatre, Llandudno Promenade. The shows opens at 1000 each day and the entrance fee is £1.50 for adults, children under 14 free. **M. Mee GW7NFY** on Tel/FAX: **(01745) 591704** or the Secretary **Greg Robbins GW7NAU** on **(01492) 878288**.

November 8: The Midland Amateur Radio Society (MARS - Birmingham) are holding their 10th Radio & Computer Rally at Stockland Green Leisure Centre, Slade Road, Erdington, Birmingham Doors open at 1000 and admission is £1. There will be a large free car park, a free hampers draw plus many trade stands, local clubs and special interest exhibits. For trader details contact **Norman G8BHE** on **0121-422 9787** or for general information, contact **Peter G6DRN** on **0121-443 1189**.

November 14: The SAMS '98 Computer & Electronics Show is to be held in the Bingley Hall, Staffordshire Showground, Weston Road, Stafford (A518 Stafford-Uttoxeter Road), signposted from junction 14 on M6, (bus shuttle from Stafford Railway Station). Doors open 1000 to 1600. Admission for adults is £3, children under 14, 50p, Concessions, OAPs, RSGB Members, Student Card, UB40, £2, (Advance Tickets £2 plus s.a.e.). There will be masses of free parking, a licensed bar from 1100 and refreshments, meals and a cafeteria. A great day out! **Sharon Alward, Sharward Promotions, Knightsdale Business Centre, 30 Knightsdale Road, Ipswich, Suffolk IP1 4JJ**, Tel: **(01473) 741533**, FAX: **(01473) 741361** or E-mail: services@sharward.co.uk

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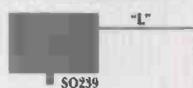
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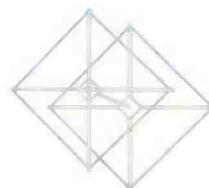
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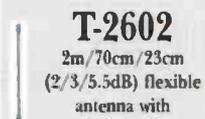
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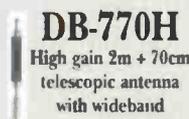
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Out & About With Pro-Am Antennas & Magnetic Mount

In the last year or so Rob G3XFD has 'rediscovered' the joys of portable operation on h.f. And in his quest to find simple and convenient antennas and mountings he's gone 'magnetic' and American style!

Last year when I was on holiday in North Wales - playing trains with the narrow gauge railways - I spent some leisure time operating as GW3XFD/P with a simple long wire antenna. However, I realise that in many cases it's not convenient to string out the necessary wire antenna in a car park - so I've opted for a different approach which others might like to consider.

Gone are the days when it was easy to mount antennas on cars - my modern Peugeot car is not fitted with gutters and fitting 'roof bars' is quite an expensive job. So, I'm left with a choice of modifying the bodywork or using some form of magnetic mounting. Fortunately though...nowadays there are some pretty effective magnetic mounts for v.h.f., u.h.f. and even h.f. operation available.

Triple Magnets

As I thoroughly enjoy parking somewhere nice and quiet - usually with a nice view - to enjoy a few hours on the air with my Alinco DX-70 I decided to do it with the aid of a triple magnet mobile antenna base. When I contacted our local dealer - **The Short Wave Shop** - in Christchurch they came up with the **MM-3401** which comes complete with approximately 5m of coaxial cable, **Fig. 1**.

The triple-magnet base, which in Fig. 1 is shown mounted on the roof of my estate car, is provided with rubber pads to protect the vehicle bodywork. These must reduce the magnetic attraction somewhat...but I can tell you I only made the mistake of 'parking' the mount on a central heating radiator at home only once! From that experience I can tell you that the ceramic magnets are extremely powerful indeed.

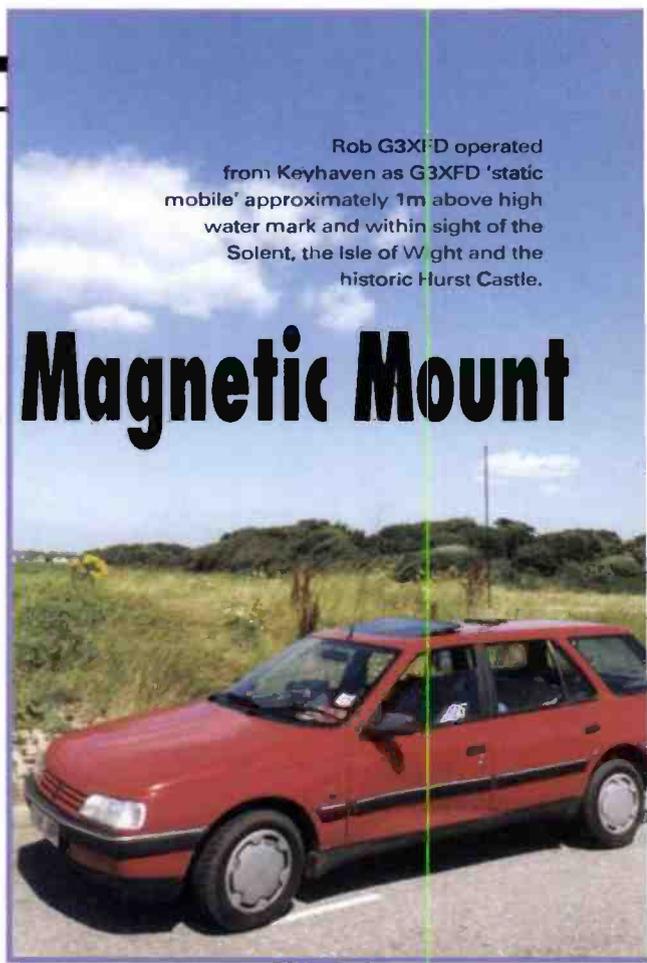
The magnetic mount is provided with the standard type of screw thread base to take the majority of mobile antennas now available. The old G-Whip antennas are of a different thread and I had an adapter made up some years



Fig. 1: Close up view of the MM-3401 triple magnetic mounting which proved more than capable of withstanding gale force winds (see text).

ago so I could use my collection of G-Whips for 1.8, 3.5, and 14MHz with CB-type antenna mountings.

Having seen the Pro-Am range of h.f. mobile antennas in use during my visits to the USA I decided to try these in conjunction with the magnetic mount. Another factor was that I'd recently worked **Peter Waters G3OJV** (of Waters & Stanton Electronics) as GM3OJVM while he was on holiday near Fort William, Inverness-Shire in Scotland. I was so impressed at Peter's signal - he was using an Icom IC-706 Pro AM PHF-40B - that I decided to try the Pro-Am range myself.



Rob G3XFD operated from Keyhaven as G3XFD 'static mobile' approximately 1m above high water mark and within sight of the Solent, the Isle of Wight and the historic Hurst Castle.

Very Long Whip

To be honest, the Pro-Am range of h.f. whip antennas are **very long**. In fact they are so long I would not wish to go very far with one mounted **on the roof of my car** because of the danger - particularly here in Dorset - of narrow roads and low tree branches and more importantly - **power lines**. However, they are very suitable for boot mounting on cars or by using some form of 'bumper' (or should that be 'fender?') mounting where although effective operation is **comprised a little**, I know from experience it won't be drastically effected.

But for my purposes the magnetic mount on the roof of the car proved ideal for operating **static mobile**. Nowadays because of safety reasons operating 'mobile mobile' is not a sensible option for me. Instead, I enjoy operating when safely parked. It does not detract from operating away from dreaded TVI and EMC problems...and in fact I enjoy it more.

The ground-plane provided by the roof of the vehicle, plus the locations I chose, provided some excellent results with relatively low power. So much so that I've bought the magnetic mount and two of the antennas...but more about that later!

For the purposes of the 'portable trials' the Short Wave Shop provided me with the Pro-Am PHF-80B, PHF-40B and PHF-20B for 3.5, 7 and 14MHz respectively. These were to be used in conjunction with my Alinco and rather battered antenna tuning unit (a.t.u.). All I needed was some relatively good weather to tempt me out during a long weekend at the end of July and into early August!

Out & About - Monday

I was 'out & about' over the weekend of 31 July to 4th of August. However, the best results came on Monday 3 and Tuesday 4th of August.

On Monday 3 August I drove to a nearby local beauty spot called Holt Heath here in East Dorset. From this location I could clearly see the Isle of Wight, the New Forest and got a good view out into the English Channel. The weather was

appalling with heavy wind and driving rain. An ideal time to sit inside and operate on the h.f. bands!

It only took me a moment to erect the antenna and run the relatively slim coaxial cable lead into the car. The wind - blowing at up to Force Eight (it caused havoc at the Cowes Regatta so I heard later) - proved that the magnetic mount was perfectly capable of holding the antenna under really difficult conditions.

Tuning up on the first band - 7MHz - was extremely simple. In fact I found that the antenna was already roughly on tune and provided me with a good s.w.r. as I'd accidentally selected 'by-pass' on the a.t.u. and couldn't (briefly) work out why my tuning adjustments didn't have any effect. So, although for 'portable' operation I'll be using the a.t.u. for easier 'in car' wider bandwidth tuning - you can be assured that the Pro-Am whips all proved to be very easy to set up initially).

I called 'CQ' on s.s.b. and was immediately called by **Gerry E1BHT** (known to all as 'Ger') who lives right next to the sea and superb golf-course at the seaside resort of **Youghal** in County Cork. Gerry gave me a 5 and 9 report and I reciprocated. It was a pity he had to dash off - but it was Bank Holiday Monday in the Irish Republic and there was a street festival to go and enjoy!

Next successful QSO was with **Graham MM0BSX** near Dundee who gave me 5&5, and then I worked **Wilf GW0NSQ** in Prestatyn, North Wales. Despite the band becoming very noisy - accompanied by the car's rocking motion (due to the wind) all the QSOs were carried out using a maximum of 50W. However, I called it a day when I saw lightning flashes in the distance... as there was no sense in risking that sort of e.h.t. 'flash-over'! in such an exposed location.

Out & About On Tuesday

What a difference in the weather for my 'out & about' day on the Tuesday! It was a truly beautiful day as drove I along - with thousands of others - towards the seaside for the day near Milford-on-Sea (some 30km from my home) in West Hampshire.

Just a kilometre or so out of Milford-on-Sea is Keyhaven, where it's possible to get a ferry to the magnificent old Hurst Castle Fort (or if you're energetic you can walk up the shingle spit) which guards the western arm of the Solent.

I had some delightful views of the sea, the Isle of Wight and a constant parade of yachts celebrating the change of weather for 'Cowes Week'. I arrived before mid-day and after arranging protection from the sun for myself, the equipment and Mandy my Labrador - started to enjoy myself.

Only a metre or so above high water mark, the road where I parked was provided with parking bays and heavy iron, dam type gates which are closed during high tides! So, it was an ideal spot for h.f. operation. First QSO was with **Liam EI4FX** (Midleton, County Cork) 7MHz s.s.b. followed by my old friend **Ivor G3XLP** - providing great DX from East Cowes about 16km away! and **Charles GM3JUD** in Perthshire, Scotland. All gave me 5&9 'plus' reports.

Things started off quietly on 14MHz but although I consistently heard the Finnish (OH2B) and Madeira (CS3B)

Manufacturer's Specifications

Note: The manufacturer's quoted bandwidth for 3.5 and 7MHz are for the 'phone' sections of the **American '75' metre and '40' metre allocations**. However G3XFD proved that the same v.s.w.r. is achievable for the European allocations in all three antennas tested. Please note v.s.w.r. will vary from vehicle to vehicle and is dependent on individual set-up.

Bandwidth for typical 2:1 v.s.w.r. (without a.t.u.). Power rated at 250W p.e.p.

PHF-80B	(3.5MHz USA) 36kHz
PHF-40B	(7MHz USA) 60kHz
PHF-20	(14MHz) 150kHz

beacons on 14.100MHz I also heard 5Z4B (Mombasa, Kenya), ZS6DN (Pretoria, South Africa) and LU4AA (Buenos Aires, South America) at good strengths. One of the advantages of a clear 'take off' over sea-water!

Running mostly at 25W on s.s.b. I worked **OK1FNV/P** (Near Prague), **HA5FW** in Budapest (a very strong 5&9 plus 20dB with my signals at 9+), **US7MM** and a host of other European stations on 'phone'. Surprisingly I only had two c.w. QSOs on 7 & 14MHz and they provided European stations but when I organise the 'c.w.' side of my car borne h.f. operations better - I intend to do more as I intend to work DX with my relatively low power.

The Future?

For the future I've decided on buying the 7 and 14MHz Pro-Am antennas together with the magnetic mount. I'm even looking into the possibility of using the magnetic base to support a light pole to 'centre support' a light-weight wire dipole.

The 3.5MHz Pro-Am antenna loaded well and I had one QSO - with **Sigmund G3PTN** in Leeds. It was a struggle but we managed the QSO...just.

However, for portable or 'static mobile' working in the daytime conditions on '80' I think a wire antenna would suit me best.

There's one problem - easily overcome - with the magnetic mount and this involves water and heavy rain. In fact during one QSO on 14MHz with **Mike GMOBPU/P**, on holiday in the Hebridean Island of South Uist off the Western Scottish mainland (home QTH Ipswich) he told me that heavy rain affected the base. (He was also using a MM-3401.)

Mike and I think the efficiency of the magnetic base is reduced as water builds up under the magnets between the soft plastic pads. It's easily cured and we both quickly found that the occasional application of a dry towel to the pads cleared the problem. (A small price to pay for a convenient antenna mount for h.f. operations).

I'm looking forward to many happy hours operating /P and 'static' Mobile' in future and thoroughly recommend this system for the purpose. And I hope to work you on the bands when I'm 'out & about'.

PW



Fig. 2: The Pro-Am mobile whip antenna (the PHF-40B in this case) is over two metres long).

My thanks go to the **Short Wave Shop, 18 Fairmile Road, Christchurch, Dorset BH23 2LJ. Tel/FAX: (01202) 490099** for the loan of the Pro-AM PHF-80B, PHF-40B, PHF-20B and MM-3401 Magnetic Mount which they can supply for **£29.95, £19.95, £19.50, & £39.95** (plus **£4 P&P** for the antennas and **£6 P&P** for the mag mount) respectively.

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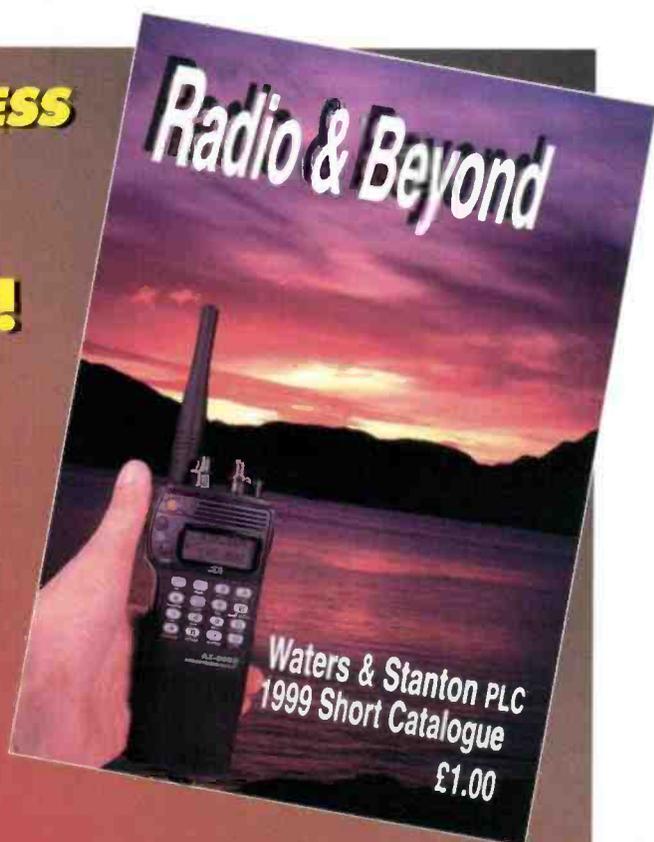
That's right - next month PW readers are in for a real treat, as not only are you going to get a free copy of *Radio And Beyond*, a 16-page catalogue from Waters & Stanton PLC, we're also giving away the first in a series of long-awaited data cards. Next month's card covers the h.f bands, so watch this space for news of a v.h.f. card and the resistor and capacitor cards which are coming very soon!

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Weekend On The Air

The **Bury St Edmunds Amateur Radio Society** are once again indebted to the **National Trust at Ickworth House**, near Bury St Edmunds, for providing the Society with excellent facilities for their annual Special Event Station (now in its fourth year), which was held this year over the weekend of 8/9th August.



Following last year's event, the Bury Society started thinking about how they could improve the weekend and make it more appealing to the visiting public. Packet operation had proved successful at the 1997 event, and so was repeated this year, together with SSTV operation demonstrated the **Remote Imaging Group**.

David Riches G0XEG, a Volunteer Room Warden at Ickworth House approached the National Trust for permission to put a v.h.f. antenna on the roof of the Lecture Theatre, and also to site a 1m diameter satellite receiving dish for *Meteosat 7* on 1691MHz. This request was granted and the Trust also very kindly agreed to provide the Society with a supply of colour postcards and have them overprinted to use as QSL cards.

Setting up for the event took place on the Friday evening with ropes being hung from the Rotunda for the G5RV. The v.h.f. co-linear was carried up the roof and mounted on a short pole, which in turn was placed on one of those plastic bases, used for sunshades over garden furniture!

The Station Manager **Derek Spencer G4DHU** set-up the h.f. station, and **George Woods G3LPT** opened proceedings on the 'key'. **Jim Binnington G0SCM** arrived with his computer and he and David G0XEG set up the weather receiving station. And last but not least, the Packet station was set up.

The event ran very well and an overall interest was shown and

nostalgia shared. The Society didn't work any exotic DX, but enjoyed working many stations, mainly within western Europe - not forgetting a mobile in Iceland!

Members of the Bury ARS would like to extend thanks to all management and staff of the National Trust at Ickworth House for their help over the years and also to the members and s.w.l. visitors who came along to help set-up and pack up - not forgetting the operators and those who supplied refreshments.



RAE Course News

An RAE course starts on **Tuesday 22 September at Chapter School, Strood, Kent** at 7pm to 'serve' students from Rochester, Medway and Gravesend areas who wish to study for the RAE. Further details can be obtained from **Rochester Adult Education Centre** on (01634) 845359 or **Ray Petri** on (01474) 812682.

Those cheeky gremlins managed to find their way into the South Notts College RAE information in last month's 'RAE Course Round-Up'. The times given for this course were 6 - 9.30pm when they should have been 6.30 - 9pm. Apologies for any inconvenience caused by this.

Licence Revocation

The Radiocommunications Agency have informed *PW* of the following Amateur Radio Licence Revocation:

Mr P V Flavell 2E1EUZ

This information was supplied by **Mrs Karen Scott**, Head of Amateur and Citizens' Band Radio Section at the RA and no further details were available for publication.

The 'Droitwich Chron

The GW8DUP Edition

Ron Harris
GW8DUP
provides an
article which,
along with
providing the
development
story behind his
own version of
PW's popular
'Locking The
Robin To
Droitwich'
project, passes
on valuable
'errors & up-
dates' for other
constructors.

The 'Locking The Robin To Droitwich' frequency standard, published in *Practical Wireless* December 1995, is a very useful project. However, it's most unfortunate that enough errors crept in to cause even the most hardened sceptic to believe in 'Murphy's Law'!

As I have built a working unit and made some improvements along the way, the Editor felt that my experiences may be of help to others who may be having problems with the project. So, here they are and I hope you 'reap the benefit'!

Before I could start construction with the original 1995 project a number of errors had to be sorted out. These had been missed in the 'Errors and Updates' section of *PW* (Jan. 96).

Firstly, the resistor shopping list had got somewhat muddled. I have drawn up a corrected list which also contains details for L2. The text dealing with filter alignment has transposed references to R19 and R27, this would make alignment a real 'fun' process!

More serious, is the fact that pins 6 and 9 of IC3 (74LS132) are **NOT** linked on the circuit diagram NOR are they on the p.c.b. track master photo (P32 Jan. 96). Fortunately though, it is correct on the Badger board p.c.b.

Incidentally, I was also surprised to see that no isolating capacitors had been used on the standard frequency outputs. I soon added them! (0.01 μ F).

Earthing Problems

There were a number of earthing problems with the p.c.b. obtained from Badger Boards. Earthing to the ground plane was either by means of soldered pins through the board to the track, or by soldering the component lead where it passes through the board.

Etched clearance circles are required at the leads

which must **not** be earthed. Unfortunately, the artwork did not always get it right!

The clearance etching was misplaced on trimmer C21 and missing at R22 so that a 'Vero' cutter had to be used to provide one. Unwanted clearance was provided at C30 requiring a soldered link!

Pins 2 and 14 (also track) of IC4 and 5 are supposed to be earthed close to the i.c.s by soldering these where they pass through the Ground plane. If sockets are used, they shroud the pins, preventing soldering. I drilled the board under the centre of each socket and soldered a wire link to the track.

Signal Strength Meter

I don't know if others have had the same trouble, but I failed to get the signal strength meter to work. After much thought (and muttering) I felt that the 22k Ω series resistor was causing too much signal loss for correct operation of the low impedance diode.

To overcome the problem I made up an Emitter Follower circuit on a piece of 'Veroboard'. I used a BC107, as shown in Fig. 1, and removed R21 (22k Ω) and C17 (0.1 μ F) from the p.c.b. A signal was then taken from pin 13 of IC2 using a wire lead to the input and the output returned to D1 via another wire lead. I used a 50 μ A meter and changed R27 to 470k Ω and C29 to 47 μ F to suit. It now operates correctly.

The completed unit now seemed to work properly and was capable of acting as the 10MHz timebase for my Black Star 'Meteor 600' frequency counter (the reason for construction). However, I felt that I could make three useful additions to the unit.

Phase Meter Indication

The d.c. control line to the varicap diodes has a range of 0 to 5V. I monitored this line via a high impedance voltage follower built on a small piece of 'Veroboard'. The circuit is as shown in Fig. 2 and uses a CA3140 i.c. driving a 50 μ A meter. It's connected to the control line at the junction of R42 (10k Ω) and C31 (0.1 μ F).

The meter pointer is stationary when phase locked and makes it very easy to set up the crystal. If a centre scale reading is aimed for, then optimum lock range and stability will be obtained.

Temperature Compensation

I found that some form of temperature compensation is necessary for the unit. This is because the temperature in my 'shack' varies by over 20 $^{\circ}$ C during the year.

The crystal and particularly the varicaps are temperature sensitive, and large control voltage changes could be needed to compensate, reducing control range

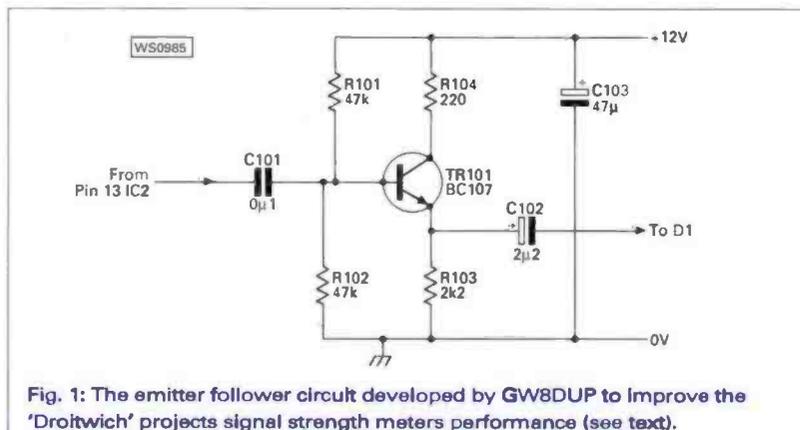


Fig. 1: The emitter follower circuit developed by GW8DUP to improve the 'Droitwich' projects signal strength meters performance (see text).

icles'

Ron Harris GW8DUP's version of the 'Locking The Robin To Droitwich' project utilises an interesting box and meter!

RON GW8DUP PROVIDES SOME INTERESTING MODIFICATIONS TO A POPULAR PW PROJECT



and stability. So, I added a varicap and front panel 'Pot', as in Fig. 3.

The unit was set up at mean shack temperature (18°C) with the potentiometer at mid-value. I can now trim 'spot on' regardless of the seasonal Welsh weather!.

Output Signal Quality

I found that when monitoring harmonics on a 50MHz receiver the 'tone' was very poor, and I experimented for some time to improve the signal quality and found two effective 'modifications'. Shorting out R37 (100kΩ) made a significant improvement and did not seem to have any adverse effect.

Switching extra capacitors (pre-charged) across C30 also made further improvements. I got an extra 60μF before running out of high quality capacitors!

The circuit shown in Fig. 4, uses 50μF in conjunction with a front panel switch. I can now monitor my unit at 430MHz (my practical limit) and still get a very good 'tone'.

Preparation For Use

With all modifications and additions carried out, it is well worthwhile taking extra care in preparing for use. My recommendation is that you **should always switch out** the 'extra' capacitors before turning the unit on.

You should also allow a few minutes warm up, then make any temperature correction using R301 to bring the phase meter to mid-scale. Finally, allow a minute or so for the loop to settle then switch in the EXTRA capacitors.

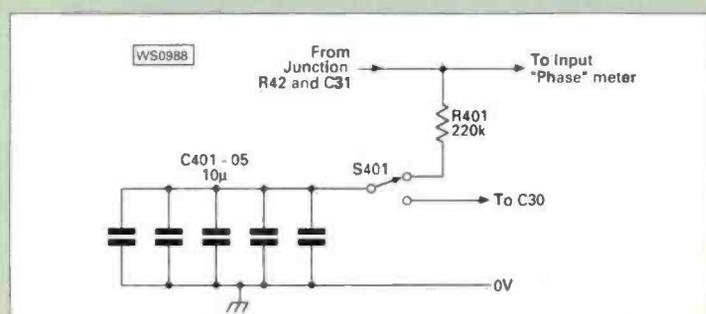
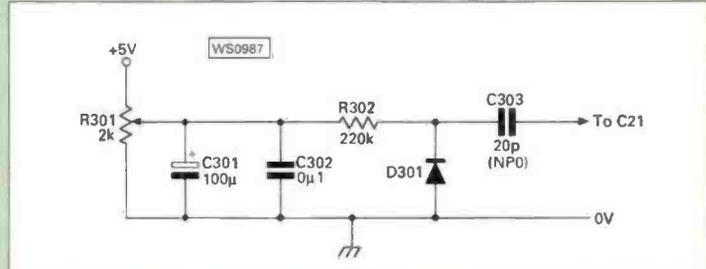
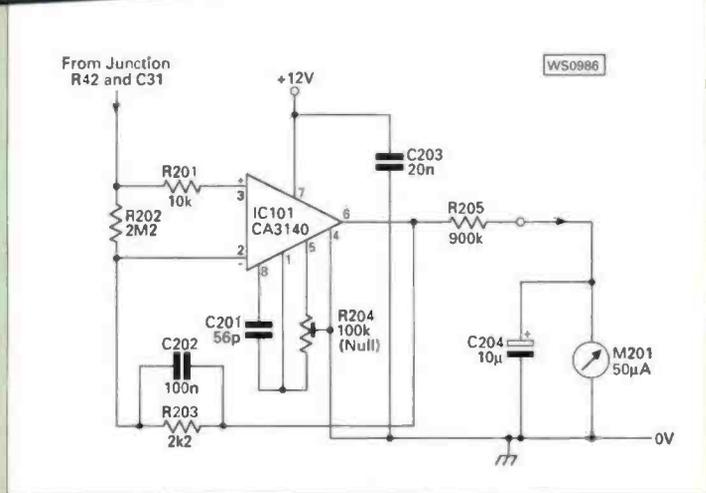
Enjoy using the unit!

PW

Fig. 2 (top right): The circuit illustrated provides indication when the unit is 'phase locked'. The meter pointer is stationary when the circuit is 'locked' (see text).

Fig. 3 (middle right): As the crystal - and particularly the varicaps - are temperature sensitive the author added the circuit illustrated to provide temperature compensation (see text).

Fig. 4 (bottom right): To improve the 'quality' of the harmonics, GW8DUP produced the modified circuit as shown. (See text for further details).



Continued...

Corrected Shopping List

Resistors

Carbon film 0.25W

47Ω	1	R14
100Ω	1	R11
120Ω	2	R39, 40
820Ω	1	R6
1kΩ	8	R2, 3, 4, 7, 8, 9, 10, 35
1.2kΩ	1	R5
2.2kΩ	4	R25, 32, 33, 38
3.3kΩ	1	R12
4.7kΩ	2	R15, 23
10kΩ	5	R13, 16, 22, 36, 42
22kΩ	4	R18, 20, 21, 44
27kΩ	1	R43
39kΩ	2	R30, 31
47kΩ	2	R24, 34
100kΩ	4	R1, 17, 26, 37
270kΩ	2	R28, 29
10MΩ	4	R41a, b, c, d

Inductor 150MH

Toko 10RBH Series

239LY-154	1	L2 Cirkit Stock No: 34-155413
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Shopping List for Modifications and Additions

Resistors

Carbon film 0.25W

220Ω	1	R104
2.2kΩ	2	R103, 203
10kΩ	1	R201
47kΩ	2	R101, 102
220kΩ	2	R302, 401
900kΩ	1	R205
2.2MΩ	1	R202

Min skeleton horizontal

100kΩ	1	R204
470kΩ	1	R27* changed from 100kΩ

Panel mount std shaft

2kΩ	1	R301
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Capacitors

Ceramic

20pF NPO	1	C303
56pF	1	C201
20n	1	C203
100n	1	C202

Polyester

10nF	2	C35*, 36* Output isolating capacitors
100nF	2	C101, 302
10μF	5	C401, 02, 03, 04, 05 RS

Components stock No: 179-4368. NB: in packs of five

Electrolytic

2.2μF	1	C102
10μF	1	C204
47μF	2	C103, 29* Changed from 10μF
100μF	1	C301

Semiconductors

BC107	1	Tr101
CA3140	1	IC101
BB405B	1	D301 Cirkit stock No: 12-01055

Also needed:- two 50μA Meters, one single pole double throw switch (SPDT)



Fig. 5: Inside (top view) of the GW8DUP project

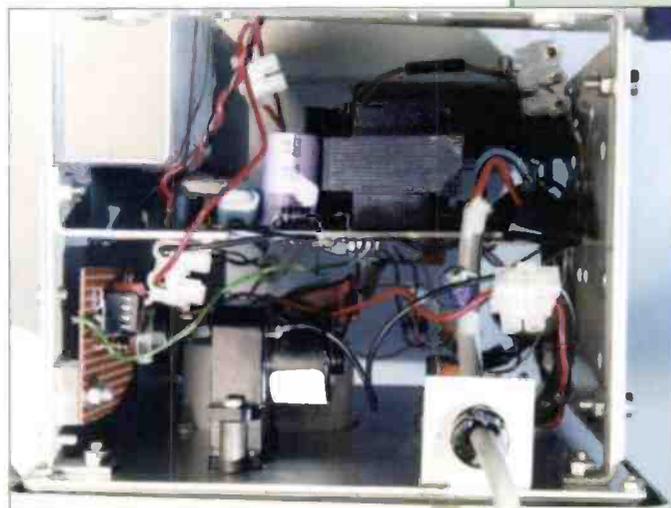


Fig. 6: Inside (under view) of the project.

Editor's appreciation:

I would like to take the opportunity to publicly thank **Ron GW8DUP** for the enthusiasm help and persistence in 'sorting out' the problems associated with the original problem **G3XFD**.



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An Ideal Replacement

The MFJ-259B Antenna Analyser

Mistakes cost 'Tex' Swann G1TEX his original MFJ antenna analyser. So, after buying the newer MFJ-259B model...here's his opinion.

Around four years ago I bought one of the original MFJ-259 analysers to help when experimenting with antennas, and it was of immense help in adjusting any antenna up to 175MHz. The unit performed sterling service until I plugged the wrong power unit into it a few months ago!

If you own a MFJ-259 it may be useful to take note of the mistakes I made. It started when I plugged in an 18V charger and switched the analyser on and nothing happened because I'd destroyed several transistors. But after repairing it, all was well...for a few weeks.

Then I did the same thing again! But on this occasion I'd 'blown-up' the frequency counter part of the MFJ-259. So, this time the unit was beyond my help (or capabilities) to repair. So, I bought the MFJ-259B as a replacement.

Opening The Box

On opening the box of the replacement MFJ-259B I noticed the manual was somewhat thicker, and there seemed to be a few minor changes. However, I was unprepared for the many changes that had been made internally.

The frequency display on the original MFJ-259 was a commercial 10-digit unit that took up most of the width of the front panel. The new display takes up only a little over half the width. The two meters (displaying s.w.r. and approximate impedance) are still there but have been moved across to make room

for two small press switches.

The two white square press-switches to the right of the impedance meter now have individual uses. And when pressed together (and held for a few seconds) change the readings available on the display.

In effect pressing the two switches together places the information display into an 'expert'



Fig. 1: A newly engineered battery box holding 10 AA cells or NiCad rechargeable batteries. A jumper (switch) is used to enable the automatic charging circuit.

mode. In this mode the information is presented in different formats, removing the need to convert the simpler readings shown beforehand.

The readings themselves now seem to be more predictable and uniform thanks in the most part, I'm sure, to the newly-worked main board using many surface mount components. These, by virtue of their small sizes, can have more closely defined component values.

Stud Connector

Another visibly new component is the stud connector which, in conjunction with a 'banana' plug adapter for the SO239 socket, permits rapid connection to simple wire feeders or wires, without needing to fit a PL259 plug. To use these new terminals, connect one line to the chassis of the unit and the other to the inner of the socket via the banana plug.

The two controls for both the broad frequency band and the actual frequency are still there along with the 1.7 to 170MHz coverage. However, the **Power** button had moved from the top panel (where it had been easy to press by mistake) to the front panel, where it looks better and is a safer option.

Ten standard AA-sized penlight batteries can still be used to power the unit, but they're now fitted behind an access panel held in place by two screws. Changing them is only a two minute job now!

Like myself, I think most users will use 10 rechargeable NiCad cells, **Fig. 1**, with the unit. And to enable the on-board charging circuitry, you need only to swap over a jumper (well documented in the manual) on the main circuit board.

To gain access to the jumper still means that you need to take out the eight screws holding the 'U'-shaped back on the unit. But now



Fig. 2: The MFJ-259B in use testing a balun auto-transformer. (See text for more details).

Fig. 3: The reflected resistance of the 190Ω load resistor combination should be 49Ω, but appears here as slightly high at 51Ω.



"... MFJ have managed to make an excellent antenna instrument even better"

you only need to do it once... a nice 'mod' MFJ!

Other changes that have been made to the MFJ-259B involve the way information is displayed. But it's still possible to use the new unit by referring to the two meters and the

TEX GITEK HAS RECENTLY BOUGHT AN MFJ-259B ANTENNA ANALYSER AND SAYS 'MAYBE YOU SHOULD TOO!'

frequency display.

Additionally a PIC computer chip now lurks within the box. (A PIC chip is a type of micro-controller that may be programmed to carry out a series of calculations based on some input values).

The signals that were (and indeed still are) used to drive both meters are turned into digital data, and the PIC then computes and displays other values based on these readings. (I think that even the frequency counter display itself is a function carried out by the PIC chip).

Using The Analyser

Let's now look at using the new MFJ-259B analyser. As with the original model you can just connect the antenna, or feed-point, and adjust frequency whilst looking at both meters (incidentally, they seem easier to read than the original versions) and of course the frequency readout.

But I find a more effective way is to pay more attention to other readings, which are shown around the frequency display. (The photograph in Fig. 2, shows the a small balun transformer under test and attached to the two new connectors).

If you look at the left hand meter, it shows an indicated s.w.r. of a little under 1.5:1 and the impedance meter displays a value of a little over 50Ω. These figure are (for a first approximation) very good, but sometimes more information's required, or you need figures that are more accurately displayed.

Better Indication

The photograph, Fig. 3, provides a better indication of the s.w.r. and impedance information that's presented. And in addition to the frequency of 70.270MHz there are three other values displayed.

On the bottom left is the resistive part (51Ω) of the reflected load (two 390Ω resistors, in parallel to give 195Ω). In the middle of the bottom line of the display is 'X= 13', showing that the reactive impedance has been calculated as 13Ω, and without further investigation you cannot say if it's inductive or capacitive at this point.

The final value presented is an s.w.r. of 1.2:1 indicated on the right hand side of the display. From tests I carried out using a number of resistors between the two connectors, I found that the resistive part is fairly accurate between 10 and 300Ω. (Accuracy does drop off outside those limits, but I feel this is the most useful range).

Reactive Value

The reactive value of 13Ω may be calculated and displayed as either a capacitance value, Fig. 4, or as an inductance value, Fig. 5. The slight changes of frequency are due to disturbing the unit, during photography, and rarely occur in normal use.

It's at this point you can verify if the reactive impedance is inductive or capacitive. Start by displaying the reactance as if it were a capacitor, as shown in Fig. 4., then adding a small value capacitor across the two sense points, noting the results on the displayed capacitance value.

If the displayed capacitance value rises...then reactance was capacitive to start with. Conversely, if the displayed capacitance value falls, then the reactance was inductive initially. Now you can take the appropriate steps to add another reactive component to reduce the effect of the original reactance

(13Ω) to as near zero as possible.

The photographs, Fig. 6 and Fig. 7, show two further ways of displaying the same information. I feel that the 'Match' indication of Fig. 6 is quite informative as it shows that an s.w.r. of 1.2:1 is still transferring 98% of the total energy, and it may not be cost effective (unless you are a 'real' DX hunter) trying to improve matters.

Filter Parameters

In the July 1998 issue of 'Antennas-in-Action', Ed Wetherhold W3NQN, in his article 'Filters - Cutting The Edge' described the information for the filters in terms of 'Return Loss' as a way of defining their effectiveness. And the MFJ-259B can also display information in this form.

Although Fig. 7 shows the return loss ('RL=17dB') of the same balun transformer as used for the other readings, I took time to use the MFJ-259B on one of the filters described by Ed Wetherhold. (In use you connect the low-pass filter to the MFJ-259B socket and the output of the low-pass filter is taken to a 50Ω load resistor).

To measure the effectiveness of the filter, you merely need to sweep the frequency controls and watch the 'return loss' reading. Or display the Match Percentage, as in Fig.6. This is very much quicker than trying to plot the response curves.

Another surprise is that you can find the distance to an open or short circuit in any piece of coaxial cable. However, with this test you need to know the velocity factor of the cable, because the distance to the open or short is shown in 'Feet x the velocity factor of the cable'.

Conversely you can use the same test to calculate the velocity factor itself. Just use a known length of open circuit cable and divide this length by the figure given in the test to get a velocity factor. Neat eh?

My Verdict

Now I come to my verdict about the new version of the MFJ-259B Antenna Analyser. So, what's my opinion to be? - in answer it has to be that MFJ have managed to make an excellent antenna instrument even better.

The many changes have improved the capability of the unit, making it a more versatile piece of test equipment. Not only that...it will also analyse filters.

The MFJ-259B costs £229.95 from Waters & Stanton. But that was before the team here arranged a special offer for readers of PW, so see page 13!



Fig. 4: The 13Ω reactive impedance of Fig. 3, might be a 172pF capacitor...



Fig. 5: ...or it might be an inductance of 29nH. Only further tests will establish what it actually is.

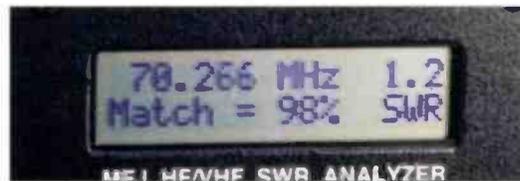


Fig. 6: An s.w.r. of 1.2:1 represents a 98% transfer to the output. It may not be cost effective to try to improve matters.



Fig. 7: The 98% transfer represents a return loss of 17dB between output and input.

A Morse Practice Oscillator

**David McBright -
(formerly G3JQD,
MD5RM and ZB1RM)**
presents an
interesting practice
oscillator to help you
on your way to better
Morse - learning
something about
transistorised Logic
technology at the
same time!

Recently I needed to practice sending Morse code, something I had not done for some 30 years! Key clicks just weren't good enough to judge the quality of the Morse so obviously some sort of audio oscillator was needed. In the junk box I found lurking a 4093 logic i.c. and a piezo-electric resonator salvaged from a musical Christmas card (kept because it might come in useful some time!). To these I added some resistors and capacitors, a 9V battery and the Morse key. And 'Hey presto' I had a practice oscillator.

The components fitted comfortably on a 20 holes by 10 strips piece of Veroboard - also kept in the junk box for just such an occasion.

Four Identical Gates

The 4093 i.c. is a CMOS package containing four identical dual-input (Schmidt trigger) NAND gates. If you haven't used this type of logic before, I'll describe roughly the way it works.

Inputs and outputs like to settle either close to positive supply voltage (called 'Hi' state) or close to negative supply ('Low' state). Any changes between the two states on the output take place rapidly and when its inputs are around about half supply voltage.

Each gate is an inverter. If either input is taken as 'Low' then the output is 'Hi'. But **both inputs** need to be 'Hi' to produce a 'Low' output.

However, a really good thing about CMOS is that the gates themselves draw only a few microamps from the supply when they are in their steady state.

How It Works

Let's now take a look at how it works: Firstly, Fig. 1, shows the circuit diagram. Here, IC1b is the gated oscillator and it

works like this: To start with, let's assume the timing capacitor (C3) is charged up to the supply voltage when the oscillator is 'switched on' by pin 5 going 'Hi'.

Because the gate input (pin 6) is also 'Hi' the output (pin 4) goes 'Low' and the capacitor will discharge through the timing resistors (R3 + R4) until the threshold is reached that will switch the output 'Hi'.

When the output 'Hi' happens, the capacitor starts to charge towards the supply voltage until it reaches the threshold that switches the output 'Low', when it starts to discharge again, and so on...and on. The resulting oscillator output is a square wave of very nearly 9V p-p.

The type of oscillator used in this projection can only be built with Schmidt NAND gates because the 'switch on' threshold is different to the 'switch off' one. For the gate being used this is about 2V different (positioned about half-supply volts) for a 9V supply.

A value of 0.068 μ F for C3 provides a frequency range of approximately 460Hz to 2.7kHz when preset R4 is adjusted. If you want a different frequency then change C3, **but don't use a ceramic or electrolytic capacitor.**

Inverter IC1c is wired in series with pin 5 to enable one side of the Morse key to be at ground potential. The network C2/R1 prevents any 'pick up' affecting the gate inputs if a long un-screened cable is used to connect the Morse key.

The remaining two gates, IC1a and IC1d are connected in parallel. This is to give twice the output drive current, and buffer the oscillator output.

The network R5/R6 and capacitor C4 serves two purposes. Firstly in 'softening' the very sharp corners of the square wave drive to produce a sound that is more pleasant to listen to and secondly, acting as a filter to protect the gate outputs.

... I needed to practice sending Morse code ...

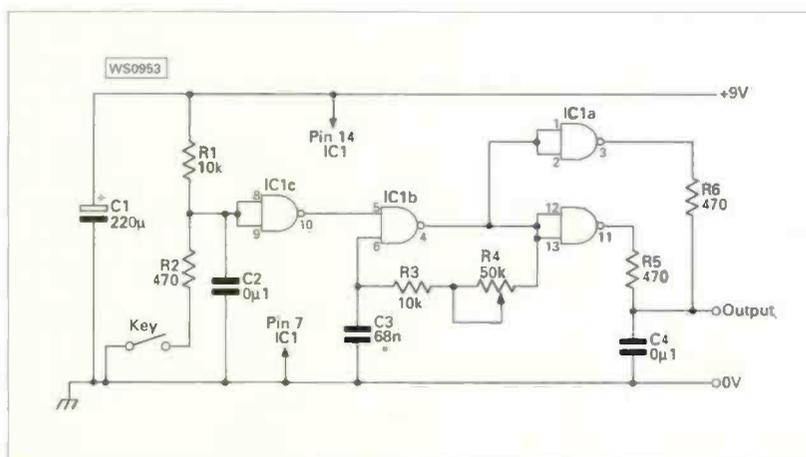


Fig. 1: Circuit of the integrated circuit Morse practice oscillator (see text).

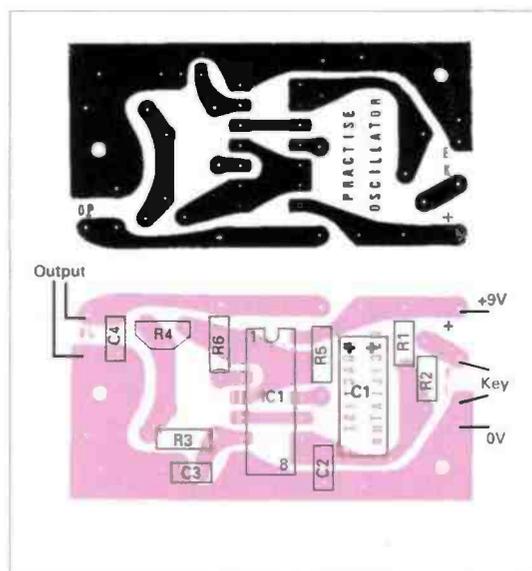


Fig 2: Although the Morse practice oscillator can be built on Veroboard, the author also made a version using this p.c.b. design.

Oscillator

NEED HELP WITH IMPROVING YOUR MORSE? DAVID MCBRIGHT MAY HAVE JUST THE ANSWER!

Finally, C1 has been added across the supply line rails to keep them at low impedance should the battery internal resistance rise, or long leads be used to connect an external power supply.

Although for convenience a 9V battery was used to power the unit, it will work happily from an d.c. power supply with an output between 6 and 12V. A voltage higher than 9V will produce a louder output sound and lower oscillator frequency.

Built On Veroboard

Construction is very straightforward as all the components, except for the potentiometer and sounder, fit comfortably on a piece of Veroboard 20 holes by 10 strips or you can build the circuit on a p.c.b. to the design shown in Fig. 2.

However, the 4093 must be handled carefully and it should be added last (but before the battery is connected). The i.c. can be soldered directly onto the board or it can be fitted into a 14-pin DIL socket soldered to the board.

The piezo-electric resonator used on my original 'oscillator' was quite a small one. And as it didn't make a lot of noise I connected it directly across the output terminals.

The larger diameter resonator specified in the parts list gives a much louder sound output. However, if it's too much then fit a 10kΩ linear potentiometer in series, as in Fig. 3.

The oscillator output will drive a pair of high impedance (something over 600Ω) headphones, but not without a matching transformer the low-impedance type that are used on the 'Walkman' type of cassette player.

Shopping List

R1, 5, 6	470Ω 0.25W carbon film
R2, 3	10kΩ 0.25W carbon film
R4	50kΩ 10mm horizontal trim-pot
C1	220µF 16V working Axial Electrolytic
C2, 4	0.1µF 25V working ceramic
C3	0.068µF 100V working polyester film
Integrated Circuit:1	4093B quad dual-input NAND Schmidt

Miscellaneous

One 10kΩ linear potentiometer (for use with circuit in Fig. 3), 14 pin DIL socket.
 Battery connector for PP3 battery 9V **Note:** If you have an old PP3 battery around you can take it apart and use the top as a battery connector by soldering a couple of wires to it. However, be careful you get the polarity right! Piezo-sounder (wire ended 31mm diameter).

Since the unit quiescent current (when it is silent) is only some 10 or so microamps, I didn't bother with an on/off switch.

Using The Oscillator

Your Morse may sound wonderful when you listen to it while you are sending (mine always does!) but try recording it on a tape recorder and playing it back. You may be due for a shock!

Recording can be done on any tape recorder music centre that has sockets for external inputs. However, the oscillator output will need to be attenuated with a couple of resistors to prevent the recorder input overloading. Suitable values are shown in Fig. 4 & 5, and they should be mounted as close to the recorder inputs as possible.

"Your Morse may sound wonderful when you listen to it while you are sending ..."

PW

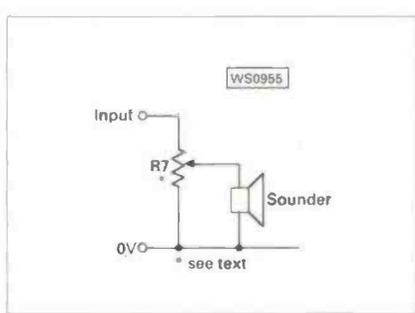


Fig. 3: Modified output circuit for the larger type of piezo-electric resonator (see text).

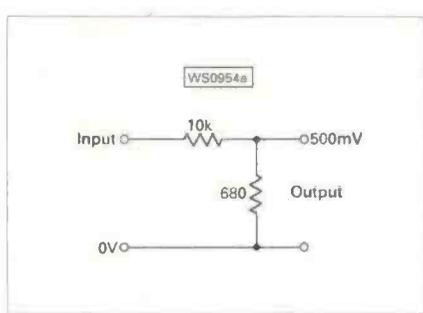


Fig. 4: Output attenuation circuit for tape recorder use (see text).

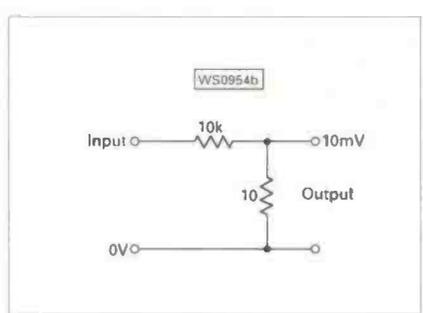
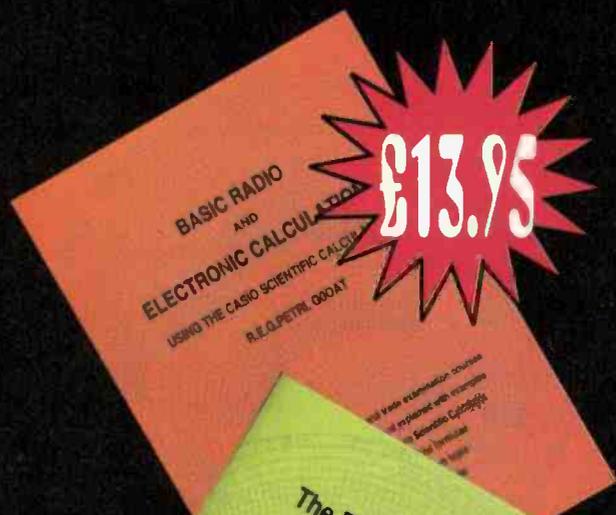


Fig. 5: Additional circuit for attenuating oscillator output level for tape recorder use (see text).

Good luck and I hope you enjoy building the project. It will help your Morse and provide a simple introduction for logic circuitry if you haven't built something similar.

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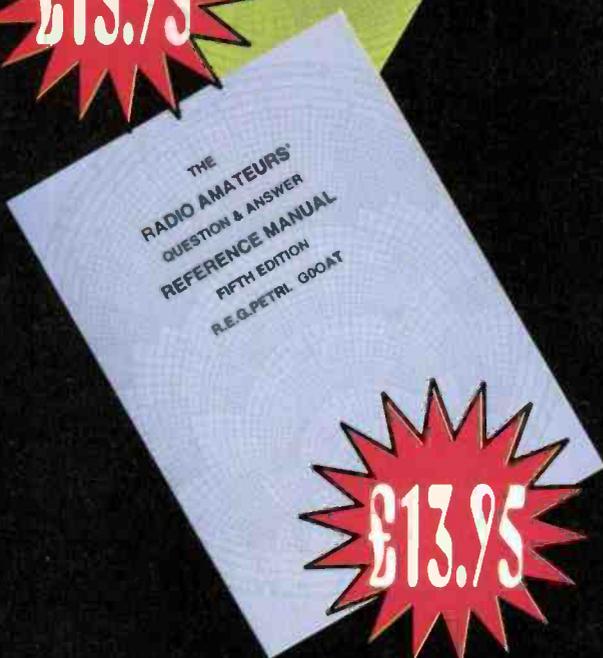
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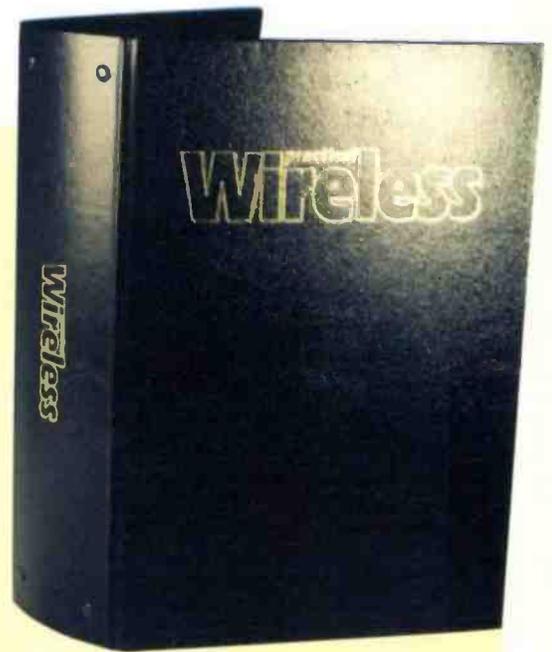
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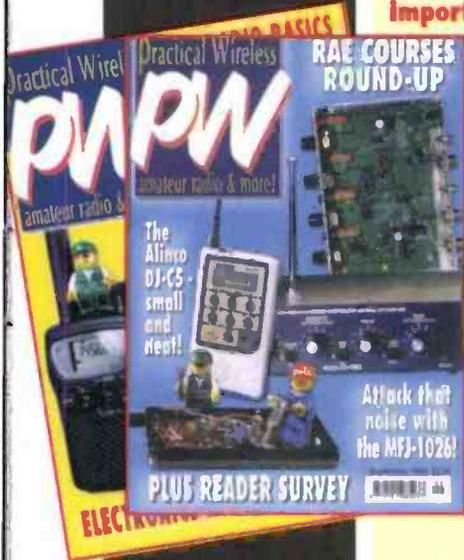
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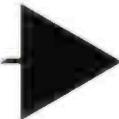
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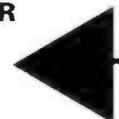
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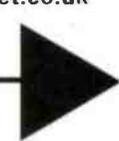
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Leicester Show News



With the 'new look' Leicester Show looming on the horizon we thought we'd give you a 'sneak preview' of who and what you can expect to find in the way of exhibits. Even if you're not attending the show you should hopefully find something of interest on these pages, especially as many new products are traditionally launched at the show.

Lowe Electronics

Richard McLachlan and the team from Lowe will have a large stand at this first show to take place at Donington. One of the main exhibits on offer will be the new receiver from Japan Radio Company - the **NRD 545**.

The manufacturer's claim that the NRD-545 is the first receiver from JRC to make use of digital signal processing (DSP) from the i.f.

stages through to the audio. The result is possibly the highest performance receiver that has ever been available to Amateurs and s.w.l.s, with near vertical sided selectivity characteristics. The addition of a wide-band converter takes this receiver up to 2GHz.

Also on display on the Lowe stand will be the latest generation of data and packet equipment from the Kantronics Corporation, the US manufacturer who have always been in the forefront of this technology. A new product that is being launched is the **KAM 98**, together with upgrades for the **KPC3 Plus**



and **KPC 9612**. The **KAM 98** accommodates h.f. and v.h.f. transmissions through the same port, allowing up to 1200baud at 10 metres (28MHz).

So, there'll be plenty to choose from so why not stop by and check it out?

AOR UK

AOR UK will be displaying their collection of short wave and wide-band receivers including accessories such as the **ARD2 NAVTEX/ACARS** decoder. As well as this,

the new **AR8200** wide-band hand-held receiver will be hooked up to the latest free *Windows* software, which enables data management, spectrum display and unattended logging including sound to disk.

The AR8200 created quite a stir when it was first released at the end of June because of the fact that it includes the new 8.33kHz airband channel



step and optional slot cards. So, if you're interested to find out more, make sure you pay **Richard Hillier** and his team a visit on their stand.

Martin Lynch & Sons

Martin Lynch & Sons or 'ML&S', as they are known these days inform us they will have, as has become usual, the largest stand at the new Donington venue. Among the vast range of new and used products on show, Martin and his team will be presenting a few of the 'latest releases' and these will include:

The **Standard C710** triple-band hand-held. This is a small and compact and designed for use on the 144, 430 and 1296MHz bands and is the only hand-held available with these three bands in one neat compact package.

For all of you who wanted to buy one of those wonderful sounding Heil headsets for an Icom radio but couldn't, due to the rather strange input Icom use, Heil Sound have introduced their new HMP Pre-amp for use exclusively with Icom transceivers and their range of Headsets. The full range of headsets



Leicester Amateur

25th & 26th September 1998, Castle DC

and microphone inserts will also be available. Following on from the success of the earlier Picketts Lock 'show-down' between two of the best selling all-band rigs on the market, ML&S are once again staging a side-by-side comparison. This show-down will be between the **FT-847** and the **IC-74**. Martin tells us his company has sold well over a hundred of each transceiver and they each seem to have their own individual market. Why not pop along and make up your own mind?

JAB Electronic Components

On display on the JAB Electronic Components stand will be three new kits from the Hands RF-kits range. These three new additions are the **LDG Auto tuner** range, a new **0-40MHz DDS3** v.f.o. and the **RDX50** 50MHz transceiver. The LDG tuners are 10 or 100W auto tuners based on the L-Match format. The L/C set offers the MPU controller over a quarter of a million combinations to get the match correct. The Tuner works well with most coaxial feed antennas. The DDS3 is a PIC controlled v.f.o. for 0-40MHz with a 1Hz resolution display. The display may be offset up to 4.2GHz so is ideal right up to microwaves. A disc program is included for an easy PC printer link for upgrades and clock calibration. The RDX50 is a high dynamic range 50MHz transceiver using a TUF1H 17dBm ring mixer. With filters by G4DDK this is the 'ultimate' DX machine. Also on show will be the new **GQPLUS** a multi-band DDS controlled c.w. transceiver for the G-QRP Club.

Waters & Stanton PLC

Peter Waters, Jeff Stanton and their team will have plenty of new products for you to feast your eyes upon including offerings from AOR, Cushcraft, Diamond, Fairhaven,

Icom, MFJ, Opto and Watson. One item to watch out for will be the Optoelectronics **Mini-Scout**, which is a low price version of the original Scout. The Mini-Scout is priced at **£199** and is capable of finding frequencies and 'reaction tune' with radio receivers. Also on show will be a complete new range of Watson power supplies together with additions to the Ten-Tec and MFJ kit ranges. **Mark Francis**, Sales Director also promises some very special offers on Kenwood, SGC and Yaesu products. So, all-in-all the W&S stand should be well worth a visit! Make sure you don't pass it by!

Vann Draper Electronics Ltd

If you're looking for a wide selection of low cost instruments and test equipment then the Vann Draper stand is the one to check out. Among the 'goodies' on offer will be a selection of new Kenwood test equipment at special discounted prices.

The recently introduced **LP130** digital multimeter will be on show. This meter features 44 ranges with 12 measurement functions consisting of a d.c. voltage from 200mV to 1000V and an a.c. voltage from 200mV to 750V. Frequency coverage is from 2kHz to 20MHz, capacitance from 2nF to 20µF and resistance from 200Ω to 2000MΩ. The LP130 features gold plated switch contacts which are designed for long life and comes complete with rubber holster, test leads, battery and operating instructions. The LP130 would normally cost **£69.33** but buy one at the show and you'll get it at the special price of **£49!**



Sales Manager of Cushcraft Antennas, flying in with a new range of antennas especially for the show. Ed will be on hand throughout the show to discuss the range of Cushcraft antennas and to assist any potential customers with the purchase of h.f. antennas. Also joining the Nevada team will be **Terry Clinch** from Australia who will be bringing along the latest in the range of Outbacker h.f. mobile antennas. Terry will also be available to answer your questions on all aspects of mobile h.f. antennas. In addition to this, also on show will be a wide range of products from the Alinco and Titanex antennas as well as Optoelectronics. The **Optotrakker** will be available for **£269.95** and this product enables, among others, the IC-8500 to decode a variety of tone signalling and trunking systems.

Linear Amp UK

With the 50MHz band gaining popularity fast Linear Amp's **6m Discovery** has been selling well and no doubt will continue to attract attention at the show. Recently introduced the **HUNTER SIX** has been developed from Linear Amp's **HUNTER 750**, which has been redesigned to take a larger transformer. Features of the 'SIX' include an in-built heavy duty p.s.u., 3 second soft start delay, π-L input/output circuit and heavy duty by-pass relay. The amplifier can be keyed from most modern transceivers. The **HUNTER SIX** is built in a strong desktop cabinet and gives the operator instant high power with no warm-up. The introductory price is **£895** and at that price is well worth a look! Also on offer from Linear Amp will be the Ranger 811H, the Explorer 1200 and the HUNTER 750.



Nevada

The Nevada stand will have something of an international flavour this year with **Ed Hammond WN11**,



Haydon Communications

Taking advantage of the new venue - Mike of Haydon Communications is using their purpose built 'Q-Tek' display which formed part of their stand at the



Radio Show News

Donington International Exhibition Centre



Friedrichshafen Show in Germany in late June.

The 'Q-Tek' shows a sample of almost the entire range of products. Mike says "It must be worth a look on our stand for visitors"!

Also on offer at the Haydon stand will be four new microphones from Nissei. Mike comments...."they're incredible value...suitable for hand-helds, mobiles and even headsets that fit h.f. transceivers"!

On the antenna side Mike has some interesting 'scanning antennas' from Q-Tek - including one that looks like a miniature radar antenna! Sounds interesting ...so make sure you take a look!



Kenwood Electronics UK Ltd

Dave Wilkins G5HY of Kenwood Electronics UK Ltd., has announced that the latest version of the mid price range transceiver - the TS-570DG is now available.

In his press release Dave G5HY announces that "The DG specification is a technology up-grade, featuring a new main CPU i.c. and a new DSP (Digital Signal Processing) control software EPROM. Together these provide nine new or revised functions.....".

The press release continues ... "These notes also cover the TS-570SG, which is not a European model, hence the reference to the TS-570D/S. **The correct model**

number in the UK is TS-570DG.

As the chassis and hardware are unchanged, all exciting accessories work normally. The final good news is that the list price remains un-changed from the previous TS-570D. Finally, as our stocks of the 'D' are now sold out, all future shipments will automatically be of the new model".

W. H. Westlake Electronics

This year Devon-based W. H. Westlake Electronics are exhibiting an extended range of connectors for the Amateur Radio market.

Included in the 'Devon Connection Collection' are: r.f. plugs and sockets to suit all cables and these will be available in many different grades and styles. The company are also planning to extend their range to be one of the largest in the UK.

So, if you're attending the show why not have a copy (free at the show) and comprehensive up-to-date list of what's available? But if you can't get to the show the list is available by sending a 30p stamp to: **W. H. Westlake Electronics, Clawton, Holsworthy, Devon EX22 6QN.**

Roy Barrett

Roy Barrett is 'the boy to see' at the show if you're following PW's 'Radio Basic's' series. The next project in the series uses a car radio

as a tuneable intermediate frequency (see page 17 of this issue) and Roy Barrett has them on offer at the show - and you can save postage by getting a receiver during your visit.

The same supplier also stocks the very reasonably priced synthetic resin paper board (SRPB) printed circuit board material which features in G3XFD's constructional series. And as this material is also expensive to post - you can save postage by getting yours at the show. You'll find Roy on Stand 5B...right next door to PW on Stand 6!

Yaesu UK Ltd

The full and latest product lines will be on display on the Yaesu stand and this will include the the FT-100 'Field Commander'. The FT-100 is a mobile multi-band transceiver which is due for release in early 1999.

In addition to this will be the FT-847 Earth Station multi-band transceiver and Yaesu's very own ATAS-100 mobile whip antenna which is designed for use with the '847 and '100. The ATAS-100 covers h.f., v.h.f. and u.h.f. and is controlled over the coaxial line from data supplied from the host radio.

You'll also have the chance to meet the 'new' Yaesu team who will be on hand to answer your questions. If you drop your QSL card into the Special Box on the stand you could go home the proud owner of a VX-1R hand-held!



PW Publishing Ltd.

Make sure you 'stop-by' the PWP stand for some great book bargains, subscription offers on PW & SWM and a very friendly welcome. The 'team' will be on-hand to advise, answer questions and help you to decide which books to purchase from our very comprehensive selection. Don't forget that the 11th Edition of Ferrell's will be launched at the show.



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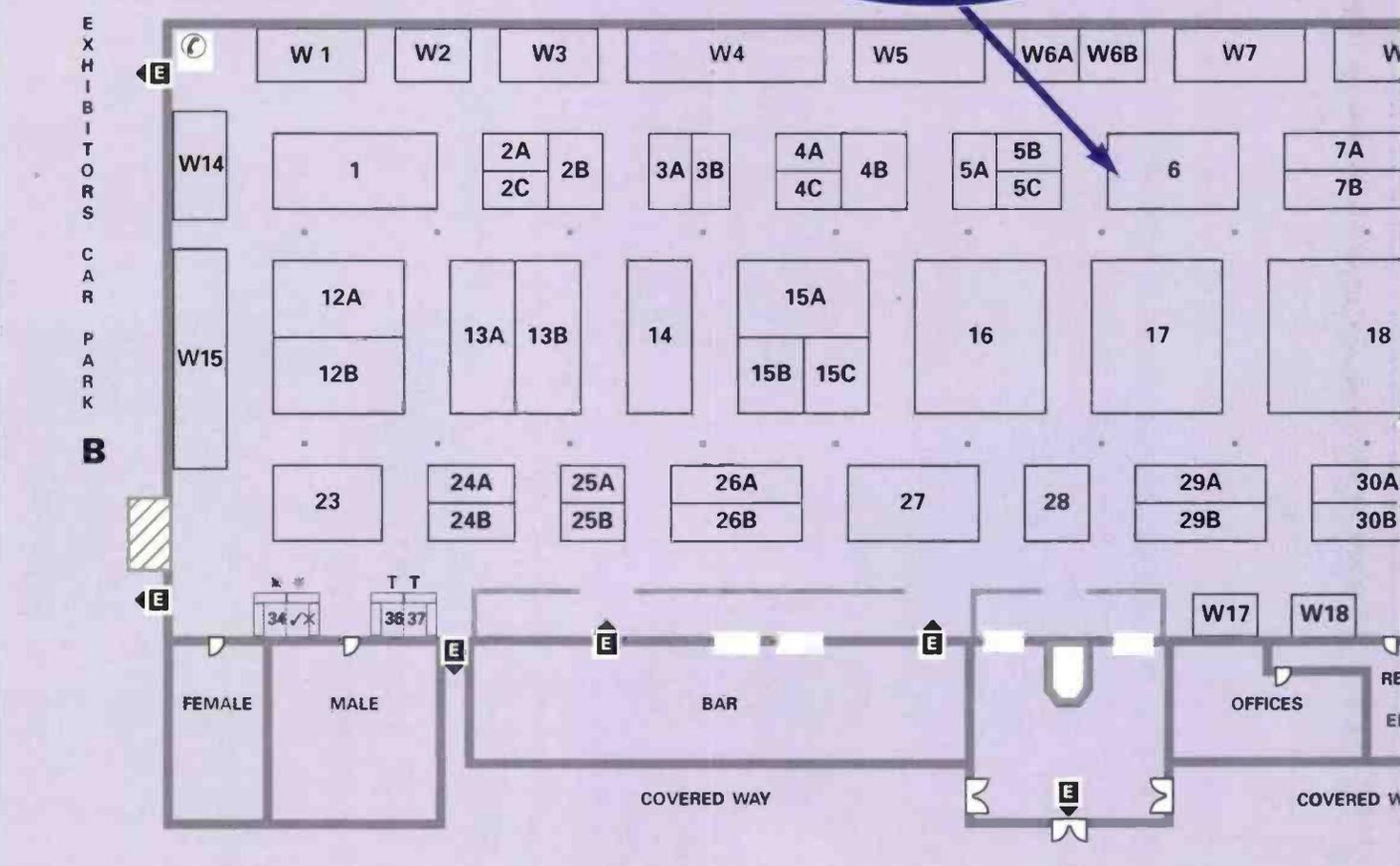
Leicester Amateur

25th & 26th September 1998, Castle Donington

Exhibitor's List

Stand No:	Company
W1	Loutronics
W2	Harwood Trading
W3	A J Paddon
W4	Haydon Communications
W5	Mainline Electronics
W6A	Lake Electronics
W6B	T & M Milman
W7	Videoquip
W8	*
W9	Waters & Stanton PLC
W10	M & B Radio
W11	Strikalte
W12	Manhattan Computer
W13	Satellite Surplus
W14	J P E Ltd
W15	Gemini Electronics
W16	Multicomm 2000
W17	Procom
W18	L M W Electronics
W19	Timestep
W20	Bring & Buy
1	G S Electronics
2A	H Morgan Smith
2B	Huddersfield
2C	MUTEC
3A	I Davies
3B	K M Publications
4A	Armscroft Comms
4B	Telecom Service S W
4C	Microwave
5A	No Nuts
5B	Belcyber Ltd
5C	AOR
6	PW Publishing Ltd - <i>Practical Wireless</i> & <i>Short Wave Magazine</i> Peter Stutt
7A	Westlake Electronics
8	R J Holderness
9A	Office Land
9B	R N Electronics
9C	Malik Electronics
9D	Combitech
10	Radiotronic Services
11	Nevada
11B/T	*
11C/T	*
11D/T	*
12A	Strumec Versa Tower
12B	SMC
13A	Display Electronics
13B	Field Electric
14	Sandpiper Comms
15A	Capital Products
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Radio Show 1998

Donington International Exhibition Centre

Stand No:	Company
15C	Linear Amp UK
16	Martin Lynch & Son
17	Kenwood
18	Yaesu UK Ltd
19	Icom UK Ltd
20	RSGB
21	Lowe Electronics
22A	Mikay Distribution
22B	*
22C	Advance Computers
22D	*
23	J A B Electronics
24A	TLX Electronics
24B	Vann Draper
25A	R A Kent
25B	Howes Communications
26A	J & J Associates

26B	Mirage Designs
27	Taurus Auctions
28	Festival Computing
29A	R A S (Nottingham)
29B	Barencro
30A	Micro Genesis
30B	Ronal
31A	S G S Electronics
31B	Agile Tools
31C	Harp Shareware
32	U B M (London)
33A	Computer Junk Shop
33B	Rich Electronics
34	Mailtec
35	Moonraker
36	*

Tables

T16	Gadget Computer & Satellite Services
T24	DJ7PR

* Stand allocated-but not confirmed

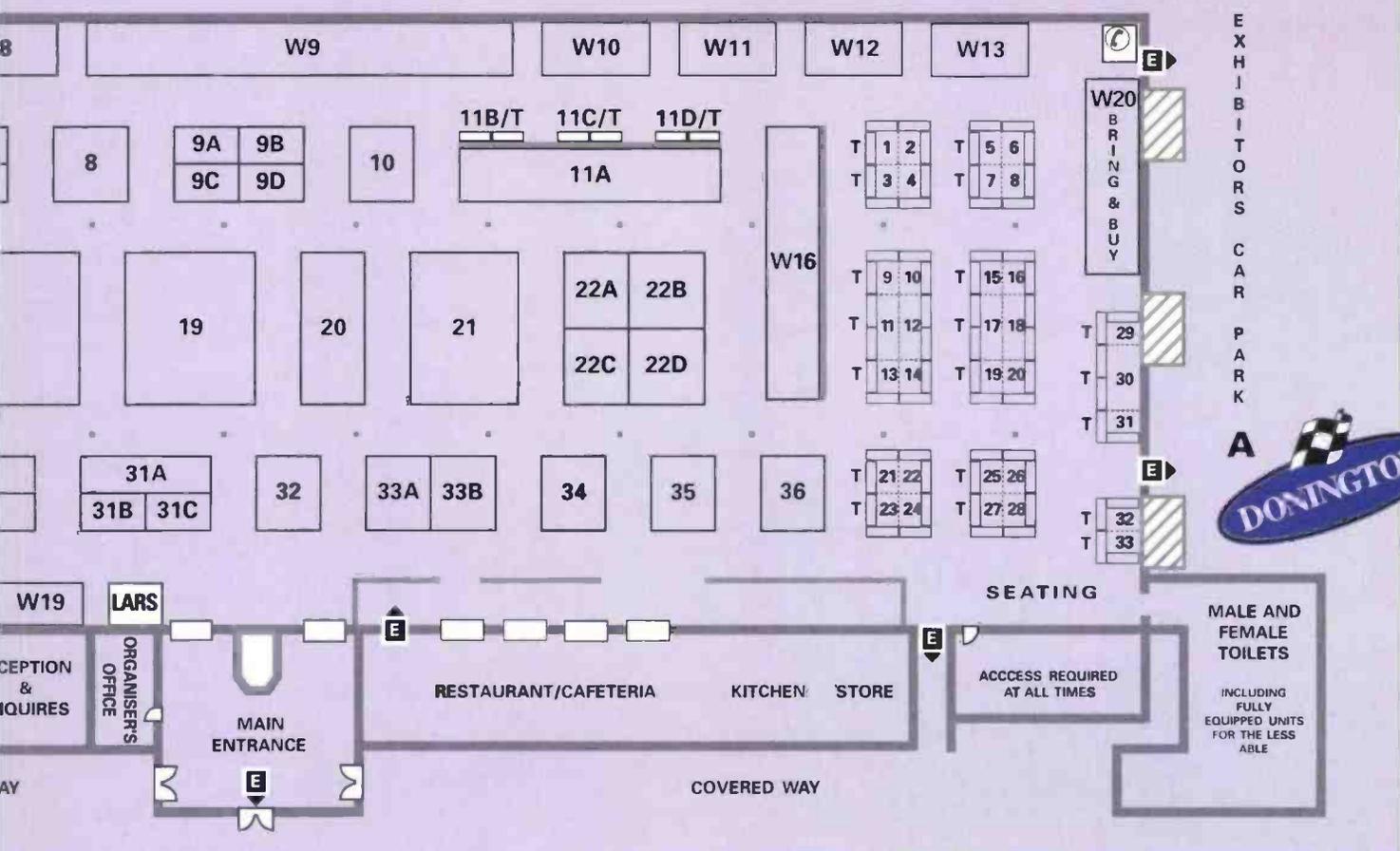


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Leicester 1998 - We'll See You

**Rob Mannion
G3XFD invites
you on behalf of
the PW team to
come and join
us on our stand
at the re-
located
Leicester Show -
at the new
venue at Castle
Donington.**

It hardly seems 27 years since the first Leicester Show arrived on the scene does it? I remember how large the show seemed to be when it was only occupying one hall at the famous (perhaps 'infamous'!) Granby Halls almost in the centre of Leicester. And now the show itself has said 'goodbye' to Leicester and moved farther up the Motorway to Castle Donington where I'm sure it will be a great success.

As the Granby Halls site was well past its 'sell by' date - and now that Leicester City is in the forefront of 'traffic management' trials and could be seen to be discouraging extra visitors - perhaps the move to the new venue was just in the nick of time!

Despite the 'tatty' nature of the Granby Halls venue and the problems associated with the extremely cramped site - the event really had an 'atmosphere' about it - even before the smoky 'Burger Bars' added their own 'atmosphere'!

I've always enjoyed the event and feel sure the 'Leicester' spirit will travel and we'll soon forget all the problems associated with Leicester City itself and enjoy the exciting new venue. Perhaps 'they' (the 'Leicester City Fathers') will appreciate us now that we've moved on, taking with us the considerable benefits that such a show generates for the community.

In all the years I have attended the 'Leicester Show' (I've only missed four events) I've only travelled to Leicester by public transport twice. It was a marathon effort on both occasions and unless - like some clubs are doing - you are able to arrange the inevitable coach trip it was always likely to be difficult. But at the new site things are really different when it comes to getting there!

To The Show

Getting to the show will certainly be much easier for those of us who have no choice but to use our own transport. And before anyone criticises me for not supporting the so-called 'public transport'...you have to experience the reaction from them when you arrive with all the show 'bargains' to load onto their precious vehicle to begin the journey home. I have!

Travelling north to a 'club visit' earlier this year I timed the extra travelling from the usual Leicester M1 slip road exit (Junction 21) to Castle Donington at approximately 40 minutes. I entered the site and had a

quick look round (judging by the vehicles and products I saw - there was a Hotel/Catering Equipment Exhibition or something similar under way) and I was pleasantly surprised at the size of the venue and most importantly

perhaps - the extensive free parking available for private and public transport.

If you're travelling north on the M1 you should leave the motorway at Junction 23A and join the A453 - following the signs to Donington Park Motor Racing Circuit (it's on the same site). Depending on traffic I think you should allow up to 10 minutes for the journey.

If you are coming from the North I suggest you leave at Junction 24, join the A6 (heading towards Derby) and then leave the A6 to head towards Castle Donington (It's well sign-posted). I suggest this because the south bound Junction 23A is a restricted one which only allows vehicles access to the A42 towards Birmingham. However, if you do end up on the A42 heading towards Birmingham - don't worry as you can join the A453 after about three miles or at the Tonge junction.

Those visitors travelling from Birmingham can travel on the M42, which then changes to the A42. Approximately 3 miles or so from the M1 leave the A42 and join the A453 (heading towards Tonge) you then follow the signs to Castle Donington.

Personally speaking, I would advise anyone travelling from the South West and Wales to use the M5 and M42. But of course...I can't be responsible for any sudden outbreak of road repairs anywhere on the route!

Incidentally, for those of us with walking difficulties, the new venue has many advantages indeed. The 'Disabled' parking is immediately outside the front entrance of the large purpose-built exhibition centre (one third larger than the old Granby Halls site) and everything is on one level. No stairs to climb thank goodness!

Train - Bus & 'Plane

A free shuttle bus will operate on the three minute journey from the East Midlands Airport. And for visitors intending to fly in to the show - this airport has very good connections from all over the UK and Schipol Airport in Holland for visitors from across the North Sea (Schipol has become a focal point for many inter-European services which then link up with International flights).

There is a bus link from Derby (to the airport) main line railway station with a non-stop express service to East Midlands Airport costing £1. (the nearest stations are Derby and Loughborough, both on the Midland mainline from London St. Pancras).

Direct bus services also operate from Barnsley, Bradford, Leeds, Leicester, Sheffield, Heathrow & Gatwick. Once at the airport the free shuttle bus will take you to the exhibition site.

Accommodation & Tickets

There are a variety of Hotels and Bed & Breakfast facilities in the area and there are discounts available. For further information on accommodation please contact John Theodorson G4MTP on Tel/FAX: (01804) 790966 or via E-mail: G4MTP@lars.org.uk

For further details on the event generally and advance ticket bookings you should contact Geoff





There On 25 & 26th September!

Dover G4AFJ on (01455) 823344, or via FAX on (01455) 828273. Alternatively you can write to Geoff at: **31 Newbold Road, Kirkybly Mallory, Leicester LE9 7QG.**

If you're equipped with Internet facilities you can 'visit' the Leicester Show Web site at <http://www.lars.org.uk> where you'll find maps, and the latest information on all the show features.

The show will be open from 0900 to 1700 on both days and a one day ticket will cost £3.

Concessionary tickets are available for OAPs and those under 16 years old.

An interesting variation that's being introduced for the new venue is a two-day ticket priced at £5 (concession rate £4). And if your club is arranging a coach trip to the show why not take advantage of

the 'In Advance' ticket price of £2 per person - minimum party of 12 people).



Camping & Caravanning

Now that the Leicester Show has moved to the late September date - and because there's a free facility - if you're a keen caravanner and camper you could make a weekend of it. Personally I've often found that the weather can be just right in September...especially if we have an 'Indian Summer' so why not bring the family too?

What's On Offer?

So, after all the preliminary information - what's on offer at the 'new' Leicester Show? In answer, and from the comprehensive press release information and details provided by the organising committee - there's a great deal happening over the Friday and Saturday.

In all honesty I think the organisers can call the relocated event a 'Convention' rather than just a 'show'. I say this because there's a great deal on offer in addition to the 150 or so trade stands.

For example - on Friday the lecture aspect gets under way with a talk by 'The Kits With All The Bits' man - **Alan Lake G4DWW**. Alan will be passing on his experience under the title of 'QRP & Home Construction' between 1130 and 1230.

From **1400 to 1500 John Heath of AMSAT UK** presents a talk on 'Getting Started in Amateur Radio Satellites'.

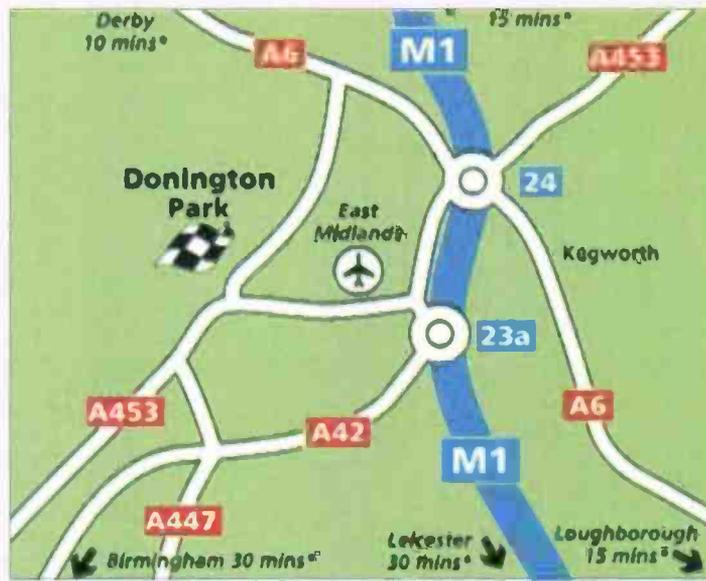
And from **1515 to 1615 a panel of RSGB Council Members will be present to hear your views**. They'll be anxious to know what you think is in store for the future of Amateur Radio in the UK - particularly regarding the future of Morse as a requirement and progressive/incentive licensing.

Also on Friday 25th of September there'll be a 'Centenary of Amateur Radio' Dinner, timed for 1930 at the Thistle Hotel, East Midlands Airport. Further information from **Marcia Brimson** at RSGB Headquarters on (01707) 659015.

On **Saturday** the lecture programme kicks off at **1130 until 1230** with 'Improving Your Performance at HF Contesting' by **Chris Burbanks G3SJJ**, Chairman of the RSGB HF Contests Committee.

From **1400 until 1500** an overview of 'Project Millecom' (the Year 2000 project being co-ordinated by the RSGB on behalf of youth organisations - Scouts, Guides, Air Training Corps, Army Cadets and Navy Cadets) will be provided by **Tony King**.

From **1515 until 1615** 'Portable Operation At VHF' will



be chaired by **Bob Titterington G3ORY**. Join him and learn something of the techniques used by top contest groups such as De Montfort (Leicester) University ARS and the 'Blacksheep' Contest Group.

(All details were correct at 26th July. But please check with the organisers in case of late changes, during the show).

*Approximate journey times only

Package Deal

Airports are often associated with 'package holiday deals' and in the case of the new Leicester Show which is to be held very close to East Midlands Airport it appears - I think we're likely to be on the receiving end of a 'bumper package' indeed!

I'm really looking forward to the event and I feel that the late **Frank Elliot G4PDZ** who was so well known for his work with the long running show - would have been proud of the work carried on by his colleagues.

The true spirit of Amateur Radio lies very close to the hearts of everyone involved in running the event. This is made clear by the statement issued by **Geoff Dover G4AFJ** in his 'note for Editors'.

Geoff states: "The Leicester Amateur Radio Show is organised by a committee of four and run with the aid of members from Leicestershire Amateur Radio Clubs. The proceeds are used to help finance these clubs. 1997 saw the last of 26 shows which were held at Granby Halls in Leicester from 1972 onwards. The move has been necessitated by the closure of Granby Halls. The new venue provides a number of new and exciting possibilities for the expansion of the Show which has been constrained by the old venue for a number of years".

Geoff ends his statement with "Many thanks for your help". And in return I thank Geoff and everyone involved in the show for the many years of enjoyment they've provided and everyone here on PW wishes them just as much success for the future.

So, I'm looking forward to meeting you at the new Leicester Show on September 25 and 26th!

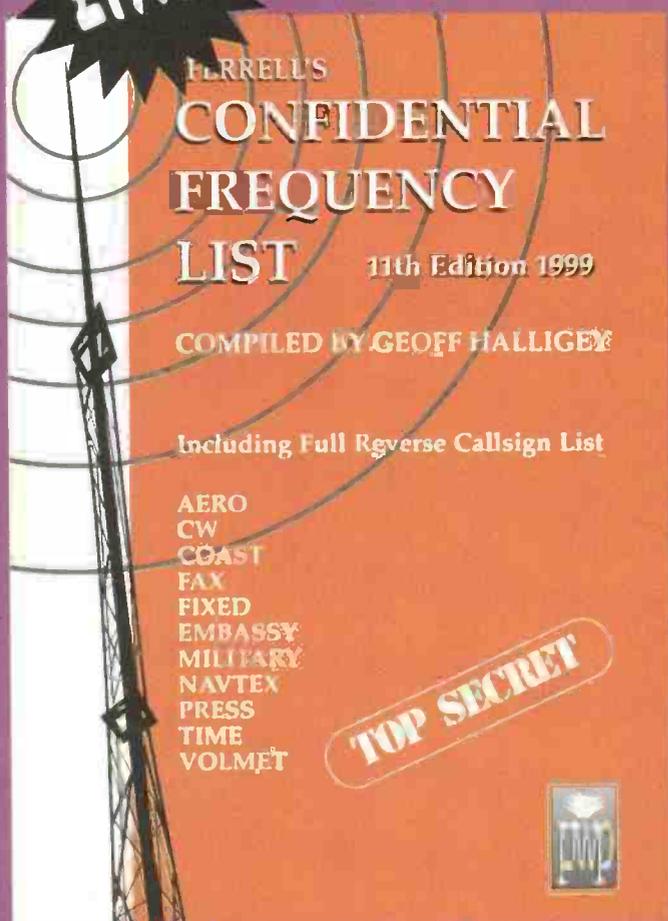


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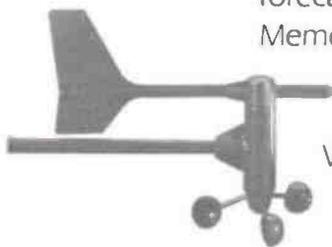
PW Publishing Ltd., will be offering this new edition at the launch price of £19.95 at the show.

The 27th Leicester Amateur Radio Show is being held on September 25 & 26 and PW Publishing Ltd. will be there with other show offers.

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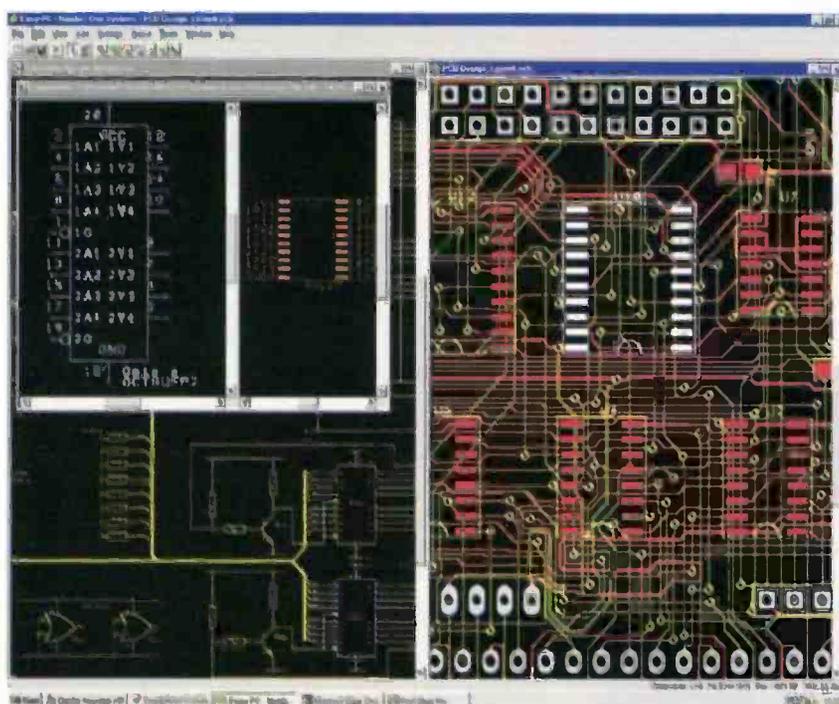
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ELECTRONICS IN ACTION

Welcome to the October 1998 issue of 'Electronics-in-Action' (E-i-A). I'll start with a few items that have fallen onto my desk since the last issue of E-i-A in August. I shall be looking at a pair of temperature controlled soldering stations this month. I also want to go back to a problem about replacing valves with semiconductors. Of course I'm not going to forget to give you the answer to Conundrum 4 that I posed back in August's issue.

I'd like to publish some of your ideas and tips so don't forget, any reader who has a tip or idea published will receive a voucher to spend in the PW Bookstore. So, get your pen (or more probably word processor) out and get writing! **Tex**



An interesting book fell on my desk the other day. From the 'trusty Mac' of Martin Pickering, who describes himself as "a 47 year old author/publisher and repairer/designer who never got around to taking the (RAE) exam. Currently, I write a monthly column for a magazine and I repair satellite receivers. However, a major part of my income comes from selling repair and upgrade kits for satellite receivers, plus a few books".

I'm only too happy to oblige Martin and mention your books. I found that

The (Professional) Screwdriver Expert's Guide to Satellite Repair and Modification (edition 5) costs £19.95, but is filled with a vast amount of repair tips for the many satellite receivers finding their way

onto tables at rallies. Martin also wrote *The CB Eprom Data Book*, which is now out of print, but as Martin said "I still have it on my trusty Mac and can laser print it 'on demand' for anyone willing to stump up a tenner".

For either of these books contact Martin at 10 Bollin Close, Sandbach, Cheshire CW11 1WZ, or on E-mail to repairman@netcentral.co.uk Why not visit his website at <http://www.netcentral.co.uk/satcure/> if you have internet access?

Hand-Held

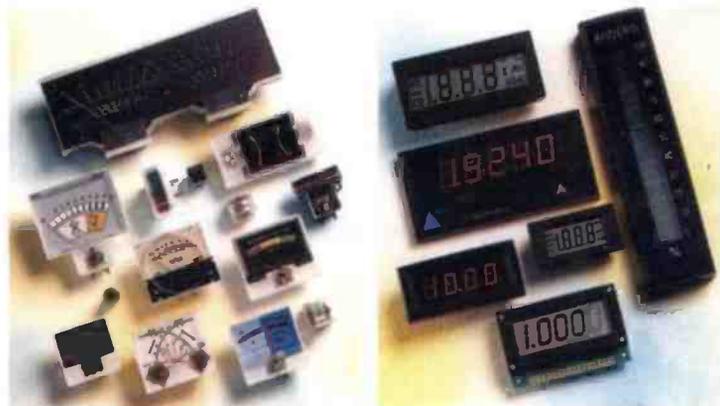
2GHz

Do you fancy a hand-held 2GHz bandwidth spectrum analyser? Then the Protek 2GHz RF Field Analyser 3201 may be just what you want! At a cost of £1295 +VAT it isn't going to break the bank either if you're that keen. Running from AA sized batteries the unit may be coupled to an optional battery powered printer to produce immediate hard copy.

For more information about the unit contact Peter Largesse at Datalines Communications Ltd., Sherwood Place, 155 Sherwood Drive, Bletchly, Milton Keynes MK3 6RT. Tel: +44 (0) 1908 370011, or FAX: +44 (0) 1908 376799. Or E-mail to 101546,3567@compuserve.com

Battery Checking

When operating mobile, a poor battery or charging system can make for trouble starting the car again afterwards. Find out if your system is in good health with the LH1010



Mini meters and Digital Meters from Anders

Clamp-On Multi-Meter from LEM UK Ltd. Operating without disconnecting the battery terminal, the meter, which with a resolution of 0.1A provides a quick and easy way to test a vehicle for charging problems.

For more information contact Frank Healy at, LEM UK Ltd. Geneva Court, 1 Penketh Place, West Pimbo, Skelmersdale WN8 9QX. Or Tel: (01695) 720777.

Analogue Anders Digital

Anders Electronics plc, have a comprehensive series of both analogue and digital panel meters to suit almost any situation or need. The analogue meters range from small simple power indicators to twin movement models designed for professional audio applications. Of particular interest to readers may be the twin movement unit with cross needles, the scales are marked in watts and s.w.r. readings.

For more details of costs and availability contact Anders Electronics plc, at Bayham Place, London NW1 0EU. Tel: +44 (0) 171 388 7171, or FAX: +44 (0) 171 387 2951. Or point your web-browsers at <http://www.anders-electronics.co.uk>

Typing On The Move

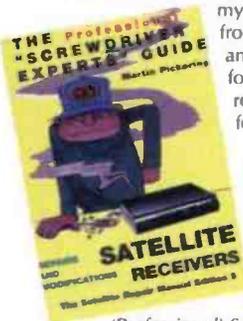
Well it's not quite typing on the move, but it must come very close to it! A combination of a small, very portable digital voice recorder with

replaceable Flash memory modules and *ViaVoice Transcription* software in the office. The Olympus D1000 Digital Voice Recorder can store around 15 minutes of good quality audio on a 2Mb Flash card memory module (around 30 minutes on an optional 4Mb unit).

The recorded audio can be coupled into the sound input socket of a sound-card running *ViaVoice* voice recognition software on an IBM PC or clone running *Windows95* to give almost perfect speech to text conversion after training. The Flash module may be removed and placed into a module reader attached to a computer, freeing up the recorder for more dictation.



For more information about the combination and the options available contact David Houlden at Spacotech Ltd. 1 The Courtyard, Southwell Business Park, Portland, Dorset DT5 2JS. Tel: (01305) 822753, or FAX: (01305) 860483. E-mail to: sales@spacotech.co.uk or point your web browser at: <http://www.spacotech.co.uk>



ELECTRONICS IN ACTION

There's no room this month for a new Tex's Conundrum, although I will be putting one on the internet pages (<http://www.pwpublishing.ltd.uk>). If you don't have internet access, but you'd like a copy of the new Conundrum question, then drop me a line at the editorial offices enclosing a sticky label with your name and address on it (marked Conundrum) and I'll drop you a copy of the new Conundrum in the post.

I must have made the last Tex's Conundrum (No. 4) too easy, as I've had more replies for this one than any of the others. I've had replies on postcards, letters and E-mails, the vast majority with both answers correct. In fact I think only one answer was totally wrong, and that possibly because that person didn't understand the question properly.

But for those who tried that conundrum but didn't reply, or who would just like the answer anyway, the answers to the question posed on page 31 of the August 1998 issue of *PW* are:

Answer 1:

When S1 (not R_x as mentioned in text) is short circuit the resistor R4 plays no part in the action, and so may be ignored. This gives a current of 0.429mA (or 429µA) through M1. This current I'm going to call positive.

Answer 2:

When S1 is open circuit then the

current flows through R4 as well as R3 before arriving at the parallel combination of R1/R2. As the opposite side of meter M1 is now higher in voltage, I shall call this current negative, and there should be some 344µA (0.334mA) now flowing through meter M1.

After throwing all the correct answers into the editorial 'tub', I fished an A4 sized answer from PU3AMB (for whom I've no other information at all) out as the winner of the *PW* Bookstore voucher. And if he (or she) will write in and let me a name and address to send the voucher to, I'll get it on its way by the next post.

Oh - I almost forgot! The winner of this month's 'Brevity Prize', and whoever it was may be the all-time winner, was a reader from the Glasgow area, who forgot to put any call sign or name on his (or her) postcard. However, if that reader recognises himself, he or she, may pat himself on the back as the answers were both absolutely correct!

Plea Answered

Turning now to an answer to a plea for help in a previous E-I-A. Writing from Lancashire, **Jim Tomlinson** suggests that the Heatherlite 'Hands free' circuit diagram that **Eddie Wheaton G7OMK** wants, may be a available from **Peter Rodmell**

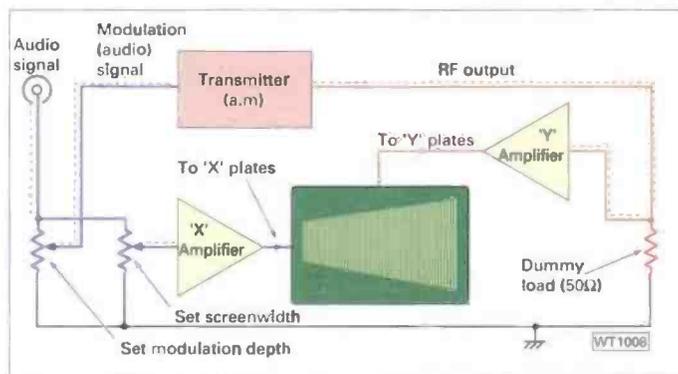


Fig. 1: The basic layout for measuring the modulation depth and linearity of an a.m. transmitter (see text for an explanation).

G3ZRS of Linear Amp UK, Field Head Leconsfield Road, Leconsfield, Beverly, East Yorkshire HU17 7LU. Tel: (01964) 550921. My thanks to Jim on Eddie's behalf, and I hope you get a copy of the diagram to enable you to repair the problem Eddie.

I've also had a plea for help in

testing the linearity of "an a.m. Top-band transmitter, traditional valve type of course, with choke modulation producing about 15W output" that **Nigel Ambridge G4FRL** has built. Nigel has tried the 'trapezoidal method' of checking the modulation depth and linearity with his twin beam 'scope. But he says he's not found it easy, as

all the information didn't really tell him how to get the trapezoid in the first place.

I'll explain this method for anyone who hasn't come across it before. The trapezoidal method of checking the depth and linearity of amplitude modulation can be carried out using a single beam oscilloscope. But the

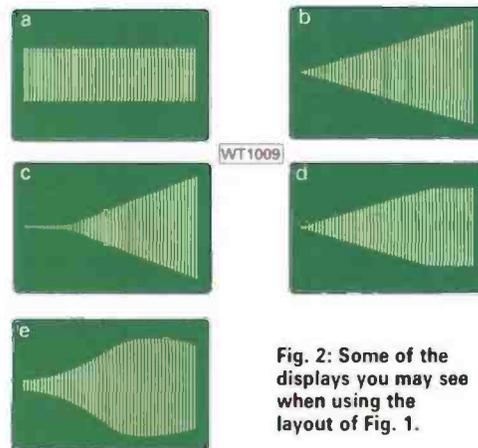


Fig. 2: Some of the displays you may see when using the layout of Fig. 1.

■ ELECTRONICS-IN-ACTION REVIEW! ■ ELECTRONICS-IN-ACTION REVIEW! ■ ELECTRONICS-IN-ACTION REVIEW!



A pair of temperature controlled soldering irons. The SL30 on the left with its digital display, the SL20 with a simpler bargraph on the right.

Soldering Stations

In all of the years I've been active in electronics I've worked my way through a variety of soldering irons. When I say I've worked my way through them I mean that for various reasons I've had to discard them as being no longer adequate for the job. In the dim distant past

before I left school, it was an iron that weighed one and a half kilos and took up the largest gas ring to bring it to the point at which it would melt solder.

I had several irons provided throughout my military career. They were replaced regularly, mainly due to the copper bit

sticking in the barrel of the iron. They also became hot enough to vaporise the 60:40 solder that we used in repairs. Then I managed to get my hands on a Weller temperature controlled iron, that used a magnetic sensor to regulate the bit temperature. Ahh bliss! The Weller iron had bits for differing for various temperatures and jobs, but the one you needed was never in the toolbox when you needed it. What I would like is a variable temperature controlled iron.

Close To Ideal

Now I think I've found what must be close to my ideal soldering iron, available from **Vann Draper Electronics**. The **SL20** and **SL30** temperature controlled irons cover a similar range of settings, but vary only in the method of displaying

the actual tip temperature. The **SL20** covers a temperature range of 150-420°C and the **SL30** covers a range of 150-480°C with the same 24V 48W iron. The soldering iron is very similar in size and weight to my personal Weller unit and is handy to use, rather like a very large pencil.

In use, one of seven differing size tips may be selected, held in place by a barrel that screws over it. The review units came with the same, general purpose type of tip. These were both very heavily plated, and they looked as though they would last many years before they required replacing. Each soldering iron unit is connected by a 1.2m multi-core heat-resistant cable to the p.s.u./control unit.

The control units really vary only in the front face display, both

The few electrons that 'sneak' past the control grid are soon 'grabbed' by the highly attractive voltage of the anode

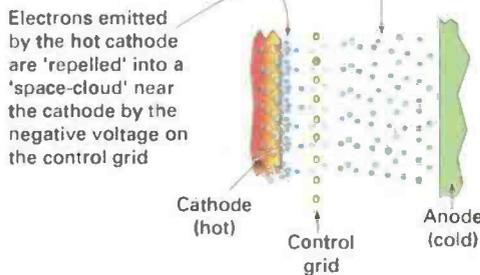


Fig. 3: A stylised cross section of a triode valve. See text for an explanation.

'scope must have direct access to both the 'X' and the 'Y' drive circuits or plates.

Modern 'Scopes

Most modern 'scopes now have amplifiers for both the 'X' axis (horizontal or timescale) and the 'Y' axis (vertical or voltage) making the operation somewhat easier than it was. Have a look at the diagram of Fig. 1 where I've shown the layout of the test operation. Depending on the sensitivity of the 'Y' amplifier you may need to apply the input r.f. signal (shown across the dummy load) to an attenuator to reduce its level.

To test a transmitter follow the general layout I've provided, the audio input signal (around 1kHz) is applied to two variable resistors, one to control the modulation, the other to set the 'X' sweep width on the 'scope. Firstly set the

modulation control to zero modulation and adjust the screenwidth control to give a full side-to-side sweep of the screen. You should then see a pattern something like that of Fig. 2a, that represents the unmodulated carrier wave of the transmitter. You should adjust the 'Y'

gain to give about 40-50% of the overall screen depth.

Now increase the modulation depth using the potentiometer. If you have a perfect (but unlikely) modulating transmitter, you should see a trapezoidal display like the one shown in Fig. 1. The modulation coefficient is (in percentage terms) the (maximum level minus the minimum level) divided by the maximum level. The pattern of Fig. 1's screen display would be about 50% modulation. So, now let's turn to other patterns that you may see.

Again with your perfect transmitter, if you increase the modulation further, you will come to the 100% modulation level as shown in Fig. 2b. The pattern runs smoothly and linearly, from no carrier, to a full level carrier (of twice the unmodulated carrier level) on the right of the trapezoid. This is the ideal modulation and would represent the ultimate in modulation. But it's only with a level single audio tone don't forget.

But what you are more likely to see is shown in Fig. 2c and Fig. 2d, showing overmodulation patterns,

Fig. 2c being overdriven to cut the carrier off for part of the cycle. At the other extreme in Fig. 2d, the modulating system is unable to drive the carrier upwards in line with the audio signal (the carrier is said to be 'flat topped').

As an aside at this point, a modulated transmission that's merely 'flat-topped', but always has some output is acceptable but will sound a little 'muffled'. However, a signal with 'cut-off' modulation, will cause 'splatter' and sound very distorted at the receiving end.

Likely Scenario

The most likely scenario for the average a.m. transmitter is shown in the illustration of Fig. 2e, where the modulation depth is very good at around 80%, but the actual linearity of the modulation is poor. Just how poor, may be gauged by how far the pattern differs from that of Fig. 2b, which I've shown as perfect even if it's probably impossible to achieve.

With a 'Top-band' (1.8MHz) transmitter there are few 'scopes that cannot deal with these sort of frequencies and this method, as shown, should work well. However,

the method can be extended to cover almost any frequency, by rectifying a sample of the r.f. carrier output and applying the resultant recovered audio to the 'Y' amplifier instead of the 'raw' r.f.

I hope that these few paragraphs are of help to you in your quest to test out the modulation of your transmitter, please let us know how you get on!

QEX Article

Now let me turn back to an idea originally sent into me by Roger Grenville (August 1998 issue of E-i-A) saying that he would like to replace the valves in his CR100 with semiconductors. He mentioned an article that appeared in QEX (a magazine published by the ARRL) during 1997.

I had a note from Terry Lambert G8EZL mentioning several other related articles that have appeared over the years. One of which was an article that appeared in the December 1967 issue of Short Wave Magazine (continued in the February 1968 issue) that covers similar ground to the article in QEX. Photocopies of the article, 'Solid State Modules' by D. R. Dryden

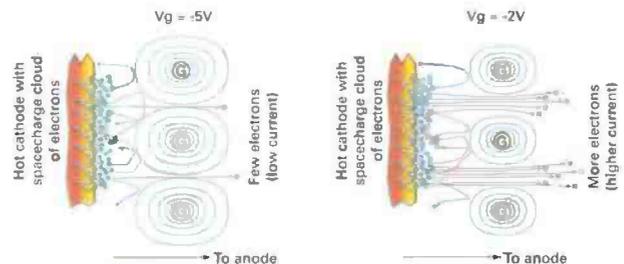


Fig. 4: For an explanation of controlling the cathode current by varying the grid to cathode (Vg) voltage see text.

ELECTRONICS-IN-ACTION REVIEW! ■ ELECTRONICS-IN-ACTION REVIEW! ■ ELECTRONICS-IN-ACTION REVIEW!

supply units have a rotary temperature control. On the slightly cheaper SL20, the indicated temperature of the iron is shown on a 10-l.e.d. bargraph display (six green for 150-300°C and the final four are red, covering 330-420°C) in 30°C steps. One l.e.d. shows the p.s.u. is on, and another when the iron is heating or 'resting'.



The temperature setting on the SL20 solder station, just below the bargraph row of l.e.d.s.

temperature. This unit is very easy to set to within a few degrees, and it appeared to regulate very well over the period that I used it. It was possible to set melt-point temperatures for delicate components with ease. The setting was also very repeatable.

In use, both irons heated up within about 60-90 seconds depending on the set temperature and they both seemed to overshoot the set value, by about 25-30°C for the first heat-up period. But once in use the temperature dropped back

to the set value quite quickly. The large sponge on top of the control unit made the job of keeping the tip clean and bright very easy. I set the temperature to that recommended for the solder in use, and each solder joint produced looked bright and clean with no indication of dry joints.

I would heartily recommend either of these irons as being good value to anyone. One unit and a variety of different sized tips should last any hobbyist a lifetime, whatever type of solder job attempted. Because the irons are so well controlled they're unlikely to fail - but in that event spare parts are available from Vann Draper.

My thanks go to Vann Draper, for the loan of the SL20 and SL30 solder stations for this review. The SL20 costs £69.33 and the digital display



The temperature setting is digitally displayed on the SL30 solder station.

version, the SL30 costs £81.08, both prices including VAT. But for even better prices, see the readers offer on page 61 of this issue.

Hmm - I wonder if they'd notice that only one went back to them?

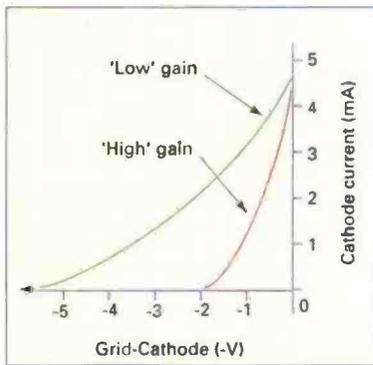


Fig. 5: Plot of the cathode currents of two typical valves when varying V_g , but keeping the anode-cathode voltage constant.

equivalent to the source of a j.f.e.t. and roughly equivalent to the emitter of an *npn* transistor. The control grid (often just called the grid) is equivalent to the gate of a j.f.e.t. or base of the transistor. The anode is equivalent to the drain of a j.f.e.t. or the collector of an *npn* transistor.

The illustration of Fig. 3 shows the cross section of part of a simple triode (three elements) valve. On the left is the heated cathode with the 'space-cloud' of electrons around it (Think of it as the steam over a pan of boiling water on a cold day). For most purposes we consider the cathode to be held at a potential of 0V.

In the middle are the wires making up the control grid, they extend out of the page towards you. At the right

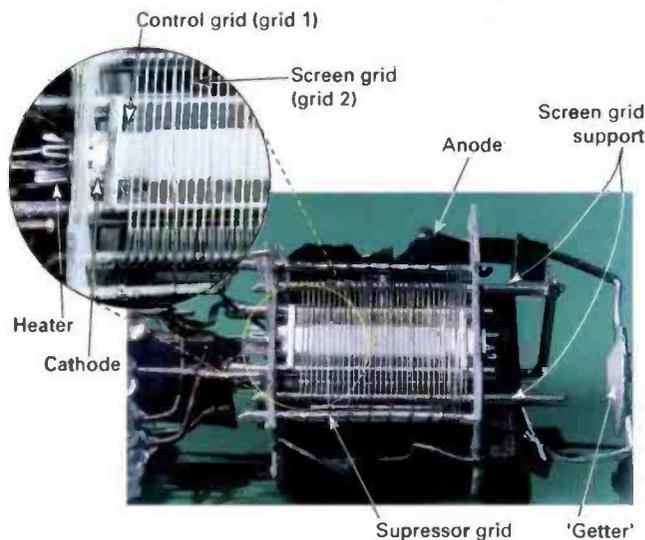


Fig. 7: A naked (glass-less) small signal pentode valve undergoing 'open heart surgery'. (But it will not work afterwards!).

of the many possible states of the grid voltage, V_g , which are when V_g is 5V with respect to the cathode (shown as -5V) and where V_g is -2V relative to the cathode (shown as $V_g = -2V$). When the grid is more negative (-5V) the grid repels the electrons back towards the cathode, and only those very few electrons that 'sneak' through the 'force-field' between any two wires can start towards the anode. This is a 'low anode current'.

shown typical anode volts versus cathode current curves.

When the grid voltage gets nearer to the cathode voltage ($V_g = -2V$) the 'holes' in the grid force-field are so much bigger so, allowing more electrons to 'sneak' through on their way to the anode. This state represents a higher anode current. Many of the possible states of gate to cathode voltage and the cathode currents (in a triode this is also the anode current), are shown in the illustration of Fig. 5. The control grid curves of Fig. 5, show two typical control grid characteristics for a low- and high-gain valves.

In the set of curves in Fig. 6 (for only one valve) each curve is measured with constant values of grid-cathode voltage. As the anode voltage (V_a) is taken higher there is a slight increase in current drawn by the valve. Look at the curve shown with ' $V_g = -8V$ ', here the current varies between about 0.5mA (when V_a is around 100V) to some 1mA (when V_a is 300V).

The gain (normally termed g_m) of a valve is defined as the number of milliamps of cathode current for each volt change of the grid-cathode voltage. Taking the low-gain curve first, and you find that when V_g changes from 0V to -5V, the cathode current change is 4.25mA (from 4.5 to 0.25mA). The valve is said to have a gain of

0.85mA/V. Now have a look at the high gain valve and work the g_m out for yourself (you should get a figure of around 4mA/V if you use the right range of values).

The curves for two type of valve were defined as being measured with the cathode anode voltage being constant, and the grid cathode voltage changing. Changes of grid-cathode voltage isn't the only thing to alter the current flowing through the valve though. In the diagram of Fig. 6 I've

The change in current means that the anode of valve appears to be a resistor with a value of 400k Ω . This apparent resistor value has changed to about 200k Ω when the grid and cathode are at the same voltage ($V_g = 0V$). But don't worry I'm not going to bring maths into this now, as it's just background information.

Inside the Valve

Just for interest let's now have a look inside a real valve. The photograph in Fig. 7 is of a small signal pentode valve from which I very carefully cut the glass away, before splitting the anode to allow us to look inside. It's shown at about life-size. The photograph of Fig. 8 shows the same valve in more detail where you should be able to see the various grids. From the cathode outwards they are Control grid, Screen grid (sometimes called Grid 2) and suppressor grid with, of course, the anode as a cylinder around the outside.

I'll look a little deeper into the subject of how valves work in the next issue of E-i-A, as that's all I have room for this time. And I look forward to speaking to you in two months time in the next issue of 'Electronics-in-Action'.

Tex

G3BKQ and the ARRL CDROM with all last year's QST and QEX

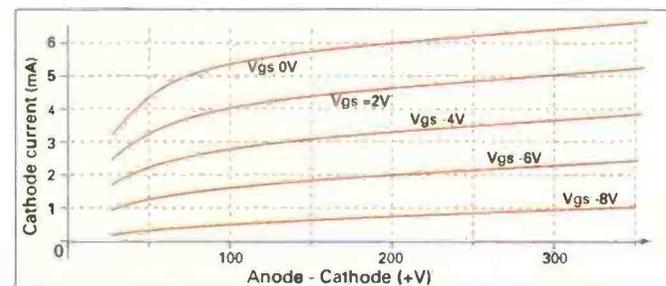


Fig. 6: When keeping V_g stable but at differing values, a family of values of cathode current may be drawn (see text).

hand side is the anode, which is not heated but is at a high positive voltage with reference to the cathode. If the grid is at the same potential as the cathode, then it has no influence on the electrons and they all stream past it towards the anode where they are collected and are called the 'anode current'.

If we apply a positive voltage to the grid, then some of the electrons will be collected by it, and the anode current will be less than the cathode current. This state of affairs is similar to a transistor, but is not how most valves are operated. They're usually operated with a voltage on the grid that is negative relative to the cathode so that no grid current flows.

Possible States

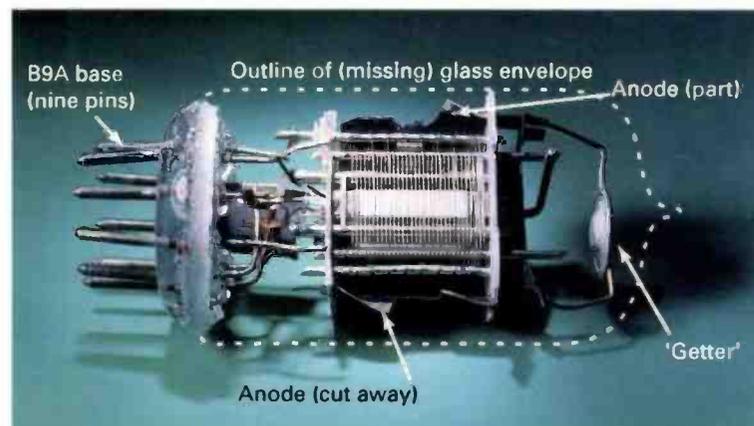
The illustration of Fig. 4 shows two

articles on, are both available from the PW Bookstore (call Michael on (01202) 659930 for more details)

Recap On Valves

As there's still a lot of interest, I'm now going to recap on valves, their operation and physical layout. At their simplest, a valve is a hot chunk of metal, called the cathode, which liberates electrons from a special 'coating', a control grid and an anode where the electrons eventually end up. The cathode is

Fig. 8: The valve shown in Fig. 7 in more detail.



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Book PROFILES

It's that time of year again - the time when everyone realises that the evenings are beginning 'to draw in' again and before long, the shorter days and the dark evenings will be with us once more. Yes, it's time to prepare for the Radio Amateur's Examination course, prepare for the winter project and turn up the central heating!

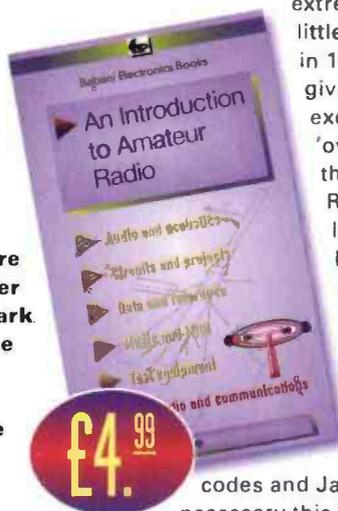
To help your preparation for the future evenings and study - the PW team have selected some more interesting books to help you while away the hours, learn and if you're studying for the RAE - get that coveted 'Pass Slip'.

An Introduction To Amateur Radio

I. D. Poole

This book 'hides' its author behind the initials so effectively that it takes a few moments to realise that it's written by none other than regular PW author **Ian Poole G3YWX**. This fact alone will tell you that the book will be concise, interesting, well laid out and informative - and it's just that!

Following his usual style, Ian has provided an



extremely useful little book which in 150 pages gives an excellent 'overview' of the Amateur Radio hobby. Ideal for the beginner it covers: What is Amateur Radio?,

Types of transmission, Callsigns, codes and Jargon (very necessary this bit!), The h.f. bands (including a look at propagation), v.h.f. and u.h.f., receivers, transmitters, antennas, and 'getting started' (including buying a receiver, etc).

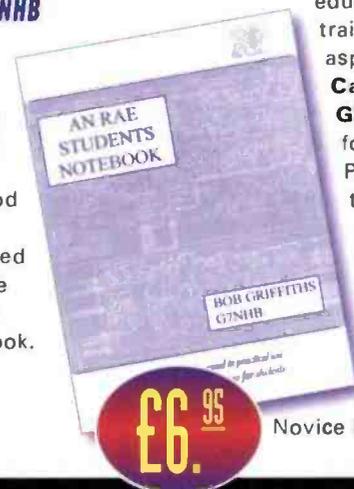
Altogether, this little book - it's a very convenient pocket size - does its job very well. An excellent beginners book, mini-reference work and guide.

Highly Recommended.

An RAE Students Notebook

Bob Griffiths G7NHB

This book - privately published by the author following his experiences over a long period as a successful RAE Tutor is aimed at being what the title suggests - a Student's notebook. The author has presented the comprehensive



information in 'bite size chunks' in a form which all students try to do themselves when in lectures (often losing track of the lecture itself in trying to do so).

With some added humour and well explained notes **Bob Griffiths** has provided all the main topics and information needed to successfully study for the RAE. Although written specifically to 'back up' the RSGB's *Radio Amateur's Examination Manual* by George Benbow G3HB, this book will prove very useful to accompany a formal RAE course and, as the author rightly suggests - *The Radio Amateur's Questions & Answers Manual* by Ray Petri G6CCJ.

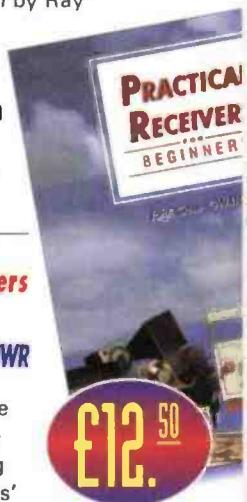
Recommended RAE reading and reference source.

Practical Receivers For Beginners

John Case GW4HWR

This book will be ideal for anyone who is following the 'Radio Basics' series in PW. It's an excellently presented book and is filled with thoroughly practical 'home brew' projects which will provide many hours of fun and interest - not forgetting the educational and training aspects.

John Case GW4HWR, a former President of the Radio Society of Great Britain, is renowned for his attention to the Novice Radio



Amateur scheme - and this book has obviously come as a direct result.

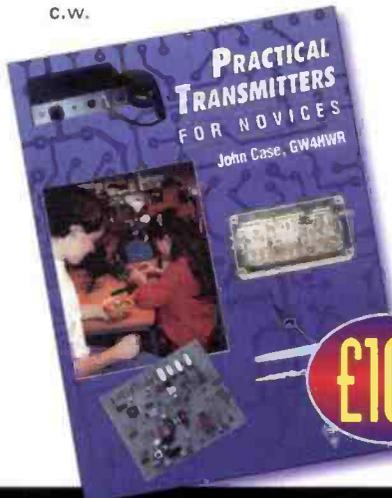
Of particular interest is the 50MHz f.m. receiver project, the direct conversion receivers for 3.5 and 14MHz and the fascinating section entitled 'fun projects' with details on how to build a simple 10GHz (yes - microwaves made easy) receiver complete with 'horn' antenna'. An excellent book, thoroughly readable and enjoyable with many projects. **Very Highly Recommended.**

Practical Transmitters For Novices

John Case GW4HWR

As he's very well known for the huge amount of work for the Novice Radio Amateur Scheme, it's appropriate that John Case GW4HWR should present this collection of theory, techniques, practical projects and advice for anyone (let alone the Novice) interested in building their own transmission and test equipment.

With sections on construction, r.f. probe and absorption wavemeters, simple oscillators, amplifiers and filters - all accompanied by thoroughly tested and eminently practical projects - the book provides a valuable source of ideas. Also included is a 3.5MHz c.w.



project, a double sideband suppressed carrier (d.s.b.s.c.) transmitter project for 1.8MHz and a frequency modulated transmitter for 50MHz.

Also - unusually - the microwave bands have not been ignored and John Case has included transmitters and test equipment for 1.3 and 10GHz. A lot in a small package! **Very highly recommended.**

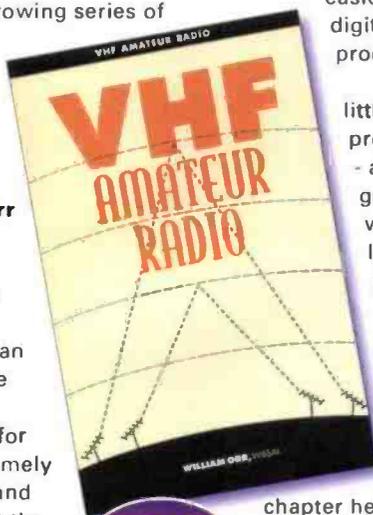
VHF Amateur Radio

William Orr W6SAI

The ever-growing series of books written for the Amateur Radio hobby by **William Orr W6SAI** (often in association with Stuart Cowan W2LX) have gained a reputation for being extremely 'readable' and informed at the same time. This title is a superb example of William Cowan's work - and it's well worth having on your bookshelf for the chapters on propagation alone.

Although of course it's an American book in origin - even the repeater section provides a fascinating insight on the problems associated with repeater operation. Coaxial lines, antennas, interference, moon-bounce and satellite operation are all covered in an exceptionally clearly written text with a host of diagrams and photographs.

Highly recommended for day-to-day use and reference purposes.



Practical Electronic Filters
Owen Bishop

Nowadays the radio enthusiast is bound to come across filters - or the need for them - very frequently. Gone are the days when the only type of 'filter' in general use was the old fashioned 'tone control'. Now we're really into the 'filter age' - with its many advantages and occasional disadvantage - such as manufacturers doing away with good quality r.f. filtering and adopting the easier option of digital audio signal processing!

Owen Bishop's little book provides a helpful - and practical guide for anyone wanting to learn, 'have a go', or be able to get the best out of existing filter circuitry by knowing just what it can or can't do. With

chapter headings including: Introducing signals and filters, resistors capacitors and frequency, passive filters, low pass active filters, high pass active filters and band-pass filters there's a great deal of technical and practical information provided.

The author also looks at digital filtering in some depth and also provides ideas on practical filter designs, how to choose your own filter characteristics and how to tackle a filter project yourself with the characteristics you require. All in all it provides a very practical, informative introductory guide. **Excellent reference and practical project source.**



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The Harwell Box

**Ben Nock
G4BXD says if
you think
Morse is
difficult to
learn
nowadays....it
was much more
difficult during
the Second
World War!**

There is, and has been for years, the seemingly eternal question regarding the Morse code particularly in Amateur Radio. A major argument in the battle has been the difficulty experienced by some in mastering 26 letters and 10 numbers.

In fact, if you use O, three dashes, for zero, then it's only nine numbers, making only 35 groups in all. (I'll forget the comma, full stop and other squiggles for the time being!).

Now, if you really think learning the Morse code is hard today, then read on. I bring you accounts from those who learnt Morse the really hard way.

Bleak Wartime

Let's start by going back to 1940, where it's cold and bleak on the wartime sea front at Blackpool. It's here where RAF students pound out the Morse code with big heavy keys, dah di dah, dah di dah, etc.

Pre-Second World War Wireless Operators (WOs) were trained at radio schools in all the necessary 'basics'. And for operating practice, a

system called 'Out Stations' was used. This consisted of just a building with desk-type open cubicles containing operating positions, key, oscillators and switches, all wired to the other cubicles so that inter-communication, in Morse, could be practised.

The training was aimed at honing the operating procedures. And the RAF were **very strict** on operating procedures!

However, the training procedures did not help at all with respect to simulating airborne conditions and operation of aircraft equipment. This was especially apparent when the need to train thousands of aircrew instead of the pre-hostilities hundred or so had to be considered.

The 'Harwell Box'

The obvious limitations of providing more realistic conditions in WO training resulted in the evolution of a device called the 'Harwell Box'. Originating at RAF Harwell (or so I have been told) the box became a most useful tool in the training of operators.

The Harwell Box simulated the typical WO operating position in a wartime bomber aircraft. It was literally **just a box** ...measuring about 2m tall, just over half a metre wide and about 1.5m deep, with a door on one side measuring less than a metre wide and a little under 2m high.

The boxes were no doubt constructed in the training centre workshops. This was not so difficult because in the early years of the war there must

have been still quite a number of wooden airframed aeroplanes still around, with carpenters available on site.

Inside the box was installed a complete WO position. Packed into the small space were: a transmitter, receiver, crystal monitor, h.t. motor generator, filament batteries, and loop antenna control. Illumination was provided by a typical aircraft light, which was not very good at the best of times.

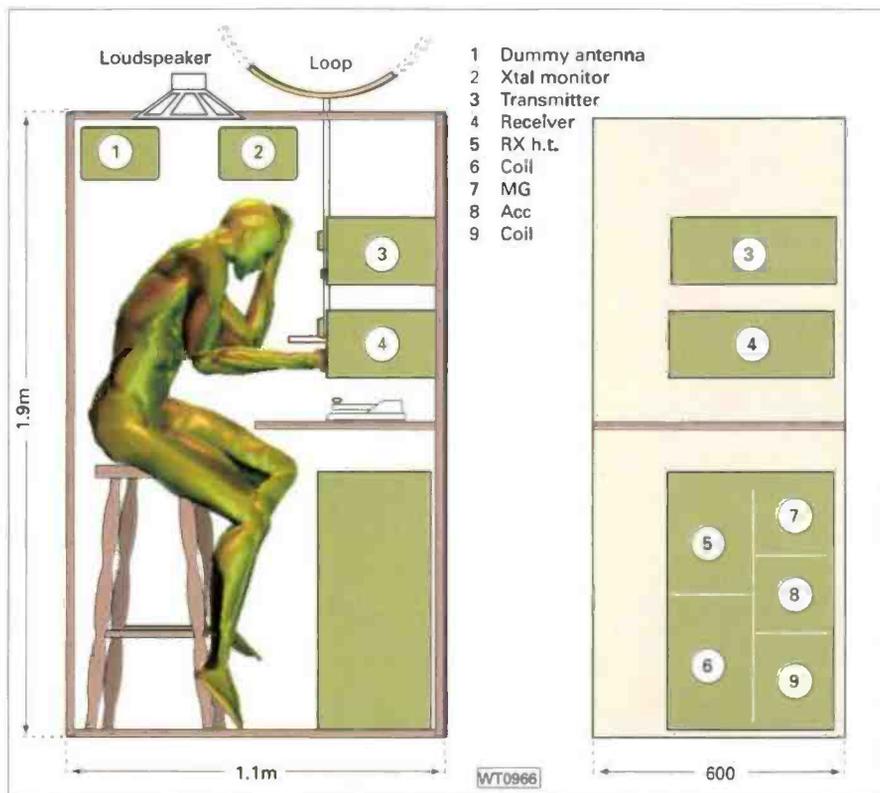
Also inside the box were all the coils or plug-in units associated with the transmitter/receiver being used. It must be remembered that the 'fancy' T1154 and R1155, with its complex wavechange switch, were a while coming and that before them, the R1082/T1083 (see Fig. 2) had plug-in coils and units.

The small box produced a cramped operating position, no windows and no ventilation. And to cap it all, there was a 200mm diameter loudspeaker let into the roof of the box which blasted out 20W of recorded engine noise, just to make the chap inside feel really at home!

Lots Of Boxes

The usual set-up in training schools and Advanced Flying Units (AFUs) comprised of lots of boxes - anywhere from 24 to 48 plus a half dozen high frequency direction finding

Fig. 1: The 'Harwell Box' (see text) with the simulated 'operator' looking rather cramped! The power supplies were series/paralleled lorry accumulators with associated charging units. They supplied the 12V d.c. input rotary converters for the h.t. supplies (12V to 1200V to each 'Box', with the accumulators and charging units outside and converters inside the boxes.



(h.f./d.f.) simulated control stations which the instructors operated.

So, all WO/AGs (Wireless Operator, Air Gunner), as most became, had to suffer many hours in the Harwell Box, making the required number of contacts with the control stations over a two to two-and-a-half hour period at a time. This happened at least once a day over a six week period.

Near the end of this period I'm told all were desperate to get out of the box and on with the real life missions. I also understand that the amount of 'cross interference' between signals was horrifying, as all 24 to 48 operators were trying to work through the exercises at the same time.

On top of the problems mentioned...some extra refinements and diversions were thought up by the instructors. These included throwing 'thunderflashes' (Very loud military style 'banger' fireworks) under the boxes every now and then to give the student the 'simulated' feel of anti-aircraft explosions (known as 'flak!').

In Canada

Towards 1943 most of the pupils came from the Empire Air Training School (EATS) and were generally gathered together in Canada, from all parts of the then British Empire. Put through the various flying and ground training schools, the students finally arrived in the UK for advanced training before posting to operational training units and then active squadrons.

It must be remembered that for Bomber Command, the final operational survival rate was less than 50% - a tough business. Although this rate varied considerably for better or worse depending on the current phase of the war and its various theatres.

The Harwell Box saw action in many locations. The spring of 1942 found one WO in Wigtown in Ayrshire, in charge of the 'Box' section this time. In 43 he and another WO friend were both in Cartmel, near Ulverston, another 'Box' section of happy trainees. The spring of 1945 was then spent on the Isle of Man, in Jurby, setting up more Boxes.

In Practice

Then, once the trainees had spent their joyous(?) 'holiday' at the seaside learning the Morse code they were expected to practice what they'd been taught. But this time it was to be in the air at 20,000 feet.

The nice 'cosy' operating positions shown in Hollywood films of the period and later, the radio operating desk with nice warm seat, the small table and subdued lighting, all gave way to the reality of the actual war time situation.

Take for instance the RAF Bristol Blenheim aircraft. In this aircraft the wireless operator was also the upper turret gunner. His 'office' was a round hole, a fraction over half a metre wide in the fuselage. The radio set, the R1082/T1083, was wedged under the fuselage rim with just enough room between the top of the equipment and the aircraft body to slide in a Morse key.

As well as the radio, the operator had his gun to operate in defence in the event of enemy attack along with the need to maintain a watch for that enemy. The so called 'seat' was in effect nothing more than a bicycle saddle, which went up and

down in conjunction with elevating and lowering the gun assembly.

The receiver and transmitter, as previously mentioned, came with plug in coils. There were two small coils per band for the receiver and two larger units per band for the transmitter. These had to be reached and fitted - on the move, in the dark - and then the charts (from which the frequency and coil tapping setting were found) had to be read and acted upon.

The open nature of the turret canopy (with gaping holes in the Perspex where the guns elevated) meant that the cold air was constantly rushing in. This, together with the noise of the engines, the vibration and claustrophobic nature of the inside of the fuselage all acted on the WO/AG who would be straining to hear the controlling station over the crashing static of the day.

Then there were the '13 chocolate bar missions'. So called apparently because active crews received a ration of a chocolate bar for each hour of flying. The long trips to Norway and back could last from eight to 13 hours, securing the participant a healthy dose of cocoa input afterwards!

The long Norwegian trips also held their own risks. A lot of the flying was beyond radio navigation aids and 'dead reckoning' navigation across a featureless ocean is not to be undertaken light-heartedly.

Not So Difficult?

Perhaps sitting in a nice warm Morse Test Centre, at a show or rally...tapping out a few dots and dashes does not now seem just quite so difficult. We should be grateful.

My thanks and admiration must go to **Bob Tanner** and **Fred Moreton** for their 'Harwell Box' and flying accounts

respectively. As a qualified pilot of light aircraft myself, I think it's bad enough having to lower the gear, drop the flaps, throttle back, fly the plane and talk to the tower, all at the same time, all in the comfort of heated enclosed cockpit. And that's without the obvious annoyance of someone firing at you at the same time...what a different age we live in now!

PW



Fig 2: The RAF's T1083 and R1082 transmitter and receiver combination.

Photograph courtesy of Bob Warner.



Fig 3: The T1083 transmitter with associated coils (see text).

Photograph courtesy of Bob Warner.

"Then there were the '13 chocolatebar missions'"

"... the RAF were very strict on operating procedures"

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This month the Rev. George Dobbs G3RJV describes a useful test equipment project for you to try - along with a very short excursion into philosophy and the French language... courtesy of Monsieur Voltaire!

Carrying on the Practical Way

The words of Voltaire (roughly translated by the PW translation service as 'the unnecessary often seems very necessary, Editor) seem to ring true these days. Standing in a queue (Perhaps I should use the USA-speak 'a line') in America I was surprised to hear a young man say: "I need a coke"!

Now, as far as I know, nobody in the entire world 'needs' a 'Coke'...although many people may 'want' one. It's, indeed, a strange world in which wants have become needs. Sadly it's also like that in Amateur Radio.

I have heard quite rational people say "you need £1000 to set up an Amateur Radio station these days"...or..."you can't save much by building equipment because you need expensive test

equipment". And I think both statements are untrue.

Many people I know well, are active and successful Radio Amateurs through the use of inexpensive or home-built equipment. Most of the better amateur constructors I know do not have an array of expensive test equipment. If

they needed such things they probably would not build anything because they do not want to spend a lot of money on what, after all, is just a hobby.

My Technique

I learned most of my radio construction technique at a time when I had virtually no test equipment beyond an analogue multimeter and a few items I had made for myself. The multimeter had a collection of add-ons to enable it to perform other tasks.

My first signal generator was the local oscillator of a National HRO receiver with a link output - I just had to subtract the i.f. frequency to know the signal frequency. And I felt that I had reached the height of sophistication when I built my first transistor-transistor logic (t.t.l.) digital frequency counter, although it had a habit of only wanting to count on odd days when there was an 'R' in the month! (I never did quite get the hang of digital electronics).

Looking at my workbench now, you would find a collection of ageing,



almost vintage, test equipment. There's also a motley collection of home built bits and pieces most of which I cannot find when I want them. (For those with a collection of old PW's, George's workshop appeared on the the front cover of the December 1993 issue.)

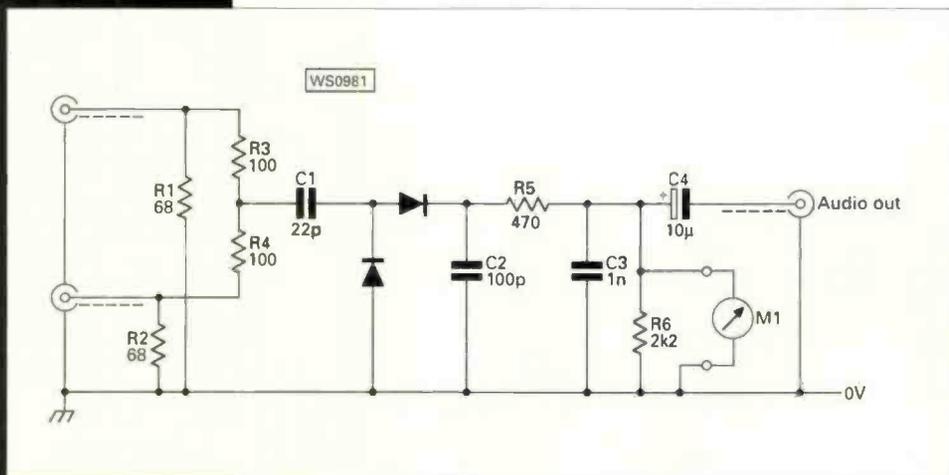
Some of my favourite items are those little circuits, which enable me to perform useful tests on the equipment I am building. I have lots of them - some more useful than others and I still enjoy building and trying new ones.

I was therefore very pleased when PW reader, Terry Lambert G8EZL, sent me a copy of a circuit from James Ashe W2DXH, called the 'James Dandy Mixer'. The idea is over 30 years old, as probably is the expression 'James Dandy'.

And although my American etymology* is not what it should be, I suspect it means 'James Dandy' means the same as 'Jack of All Trades'. However, I've no

**"Le superflu, chose très nécessaire."
Le Mondain (Voltaire 1694-1778)**

Fig. 1: Circuit of the 'Mix Box' project.



doubt a *PW* reader will put me right (they often do - very kindly of course!).

***Editorial note: Etymology - the understanding of the meaning and origination of words. Not to be confused with Entomology - the science of insects...even though G3RJV uses the 'dead bug' method of construction!.**

Practising what I preach...I quickly switched my soldering iron on and quickly built up the little circuit into a small



box and it seems very useful. And I now present my version here as the 'Mix-Box'.

The Mix-Box

The Mix-Box is capable of performing quite a variety of test functions useful to the Amateur Radio constructor. So it will certainly be a worthwhile project!

For example, two common tests for the radio builder are to measure the frequency and the stability and quality of a generated radio frequency (r.f.) signal. My simple method is to listen for the signal on a receiver...but what happens when a receiver isn't available to cover the oscillator frequency?

Even when an appropriate receiver is available it may be difficult to judge the signal quality as the signal may overload a sensitive receiver. No need to worry...the Mix-Box will do this and several other useful tasks.

The Circuit

The circuit diagram of the Mix-Box is shown in Fig. 1. There is very little to the circuit...but it is oddly subtle. The circuit consists of a resistor network feeding a non-linear mixer, or detector, circuit. There are facilities for audio or meter output.

A very simple approach might be to connect two oscillators directly to a diode mixer circuit but this could lead to unwanted interaction. The two input circuits here (input 1 and input 2) are fed to the mixer via the 22pF capacitor through the resistor network so that neither input has much effect on the other. It's also designed to offer an input resistance of around 50Ω to both oscillators.

The resistor network is simple but effective. If you consider input 1 with input 2 as 'open', you'll see a 54Ω load. However, if input 2 is shorted to ground, you'll see 52Ω. With input 2

open 63% of the input at input 1 appears at the mixer and with input 2 shorted this drops to 50%. The result is an almost constant load little affected by changes on either input.

The two diodes can act as a detector or a mixer, to measure one signal or produce an audio output from a modulated signal. Alternatively they can mix two signals to produce beat notes or resolve c.w. and s.s.b. signals.

After simple R/C filtering the voltage generated by the signal appears across the 2.2kΩ resistor. It can then drive a d.c. meter, or an audio amplifier through the 10μF capacitor.

I built my prototype (as shown in the heading photograph) in a 50gm tobacco tin. These are becoming more difficult to obtain these days...even though I'm a pipe-smoker!

Perhaps, as an alternative you can find one of those small mint tins so favoured by American constructors these days. Or you could make a small enclosure from off-cuts of p.c.b. material.

The construction followed the usual 'ugly construction' technique of using the components that are soldered to ground as anchor points for the other components.

The choice of diodes for D1 and D2 is very wide. Germanium diodes or high-speed silicon diodes are both suitable. I used 'something which came out of the box' diodes of unknown origin.

The choice of terminations depends upon what is commonly used in the individual's workshop or whatever is available. I used single hole fixing phono sockets for the inputs, push terminals for the meter output and a 3.5mm jack socket for the audio output. Built with care, the Mix-Box will probably work from high audio frequencies up into the v.h.f. range.

The output measurements can be made using a multimeter on an appropriate d.c. voltage range or audibly by connecting an external audio amplifier to the audio output socket. Naturally the sensitivity will depend upon the gain of the audio amplifier.

Practical Use

In practical use the applications are legion. For example...an oscillator or multiplier stage can be tested by connecting it to either input and using a d.c. meter on the output terminal.

An oscillator can be tested by connecting it (perhaps through a link or pickup loop) to one input and connecting a signal generator to the other input. By tuning the signal generator through the beat note and listening on the external amplifier, the frequency can be determined and the relative purity of the signal judged.

A calibration oscillator could be used in conjunction with an oscillator to work out accurate frequency steps to calibrate a tuning dial. Amplitude modulation (a.m.) or even frequency modulation (f.m.) modulation can be monitored by feeding the signal into one input and listening on the audio amplifier.

Transmissions using single sideband (s.s.b.) can be monitored by feeding them into one input with a signal generator on the other input.

I am sure resourceful *PW* readers will find many uses for this little circuit. It costs very little. **You need it now...but I'm sure you will want it one day!**

PW

Antenna Workshop

over the years with Ian and I getting quite proficient in launching antennas held up by kites. Whilst we were on the beach one day we even had a heart stopping occasion as we had a RAF rescue helicopter fly under the level of our kite. (He was flying very low mind you, almost wave hopping.)

Day Out

So, back to the club day out. We needed to get some wire into the air and the prevailing wind was from the south-west so siting of the station was to be in the centre of the field, not right in the corner as may first be thought. Tests had proved that one very big kite was not the best way ahead. It became unmanageable on the ground. We decided that two or more kites would be much better.

In their most simplistic form, a kite is simply a sheet of material stretched over a frame. The type we used to build as children with cloth stuck over a cruciform of bamboo worked well for a fun day out - but didn't have the lift we wanted. Remember, we would be trying to lift several kilograms of wire!

We often used two or more kites. The upper kite was to be a 'Sked' kite made up of some fairly strong plastic. Even the tougher dustbin liners are okay for this job. We cut it to shape and using 'Gaffa tape' stuck the bamboo to the sheet.

We cut out the holes - I have used two or three on different kites, if using two holes, make them a bit larger. I then added metal strengtheners to fix the twine, forming the kite line, to the plastic.

This junction is the weakest point and more Gaffa tape can be used to strengthen this link.

The 'Sked' kite on its own will have to be pretty big to carry any real weight of wire. I have, in the past, tried one Sked kite that was almost two metres high and one metre wide. In spite of its size, once it started to lift, I had no real trouble holding it.

Mentioning controlling the kite, brings me to my next point. There is no point in having one or more kites, providing lots of lift, if find you cannot control them as they rise. So, some form of line braking and limiting. You will also find that some form of kite recovery system is needed.

To raise the kites a couple of turns of the lifting line around a car tow bar can provide enough braking, if a car tow bar isn't available, use one of the coiled, screw-in earth stake with a couple of turns through the handle loop.

Walk-Down Method

For kite recovery, I've often used the 'walk-down method'. To use this technique, wearing a pair of thick glove, you should hold the line and walk down-wind along the line, pulling it, and the kite, down as you move forward.

When an portion of the line has been brought down to ground level, hold the line with gloved hands and walk back toward the anchor point. At the same time, an associate can wind the line up onto the former as you walk back towards them.

Dick Pascoe GOBPS dreams of a practical full quarter-wave vertical antenna for 'Top-Band', but what to use as a support? The answer may be a kite - or two!

Dreams of enormously high antennas often pester me as I lay in that half wakefulness state as dawn creeps over the horizon and light filters through the curtains. The proverbial 'Sky Hook' will be needed again this winter for the club's 'Top Band' party.

We had permission to use the local farmer's fields for our last outing. Checks we'd carried out showed that there was plenty of room in the field. The water table was a very little way below the surface - well we were in the middle of Romney Marsh in the South of Kent!

There was one small problem though - being open to the south-easterly gales, the only trees were scrub bushes. They were little more than head height, fearing to raise their heads more than a couple of metres above ground level.

Early Plans

Early plans of throwing wires over trees(?) had vanished, hence my lying in bed dreaming of sky hooks. Previous tests of high wire antennas had been made in another field, several miles away, opposite the home of Ian G3ROO. Here we hooked

up to the tow bar on Ian's car, a small kite and got it into the air.

The kite was a trifle small and couldn't lift the wire used, so it didn't fly too high. The answer we found on that day, was to move the car slowly around the field. This was helping the kite a little higher, straightening the wire which gave a better radiated pattern from the antenna.

When we switched on Ian's mobile rig and called CQ, the operator at the other end during this test thought we were driving along a road as I chatted to him. Especially when a sense of fun took over and I told him that there was a motorway bridge ahead and we had to reel in the antenna.

More tests took place

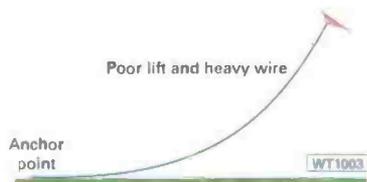
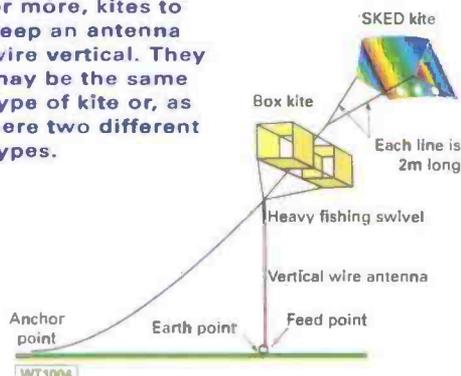


Fig. 1: A poor lifting kite and a heavy wire means high losses in such an antenna.

Fig. 2: Using two, or more, kites to keep an antenna wire vertical. They may be the same type of kite or, as here two different types.



"Never to launch, or fly kites, near overhead power lines"

The diagrams show one Sked kite being used to raise a box kite. Many versions of these are available even the box kites about 600mm long, that formed part of lifeboat stores, have quite a bit of lift.

You could of course use one or more Delta kites as shown, but to get some real lift, several may be flown together. The vertical distance apart will have to be adjusted on test, as it depends on the size of the kite you are using. Many of the stunt kites available may seem ideal for the job, but remember, these are made for manoeuvrability, **not for static flying**.

What is required as a 'sky-hook' kite, is any kite that, in use, will stay in one place in the sky the whole time it is needed. In practice, this may seem impossible, but by using two lines some stability may be achieved.

There are several problems associated with using kites, the major one being the build-up of static electricity. Any length of wire will pick-up static and it can be enough to damage a transmitter.

It is essential that the static charge is dumped to earth as quickly as possible before it has chance to build up too far. But dumping the charge will also cause problems, as we don't want the antenna to be coupled to the ground. Oh well!

Static Belts

Graham G3MFJ has had 'several belts' of static from kite lines and kite-flown antennas. He ended up fitting the a.t.u. with a resistor to earth. **Peter PA3GQD** suggested using a resonant parallel tuner which can be grounded for non-r.f.

Ian G4JQTL considers the best, or at least the 'least worst' option to be a 1:1 (or balun) transformer. This can be set up to give a low resistance path to earth for static on the antenna side whilst allowing the signal to the transceiver.

The consensus of opinion is that there is a danger to equipment and that one simple way to avoid it is to couple the antenna wire to earth via a resistor. It should be of such a value that as static builds up it leaks easily, but r.f. gets to the antenna easily.

Having solved those problems we now face the kite. If a single wire from a fixed point is used, the kite will move about in the air quite a bit as the wind moves. If the cable to the kite is to be used as the antenna, the weight of the wire will make it hang at quite an angle, often taking off from the ground at under 20° until it lifts to 80° or more at the kite.

The whole line/antenna hangs in a curve. The sheer weight of the antenna wire often causes this to happen. Think how much a couple of hundred metres of wire weighs?

One method that I've used with some success is to use not one cable to the kite, but two. A strong fishing swivel just below the kite(s) should join the top end of the two with the two anchors at least 25% of the height apart. (See diagrams).

With this formation, the two cables tend to inhibit the movement of the kite about the sky. This then becomes a fairly stable 'sky hook' from which to hang the antenna. Hanging it from a fishing swivel from the joint of the cables just below the kite.

Further reading:

'High As A Kite' by Alec Adams G3YOA, *PW* May 1997 p30-32

'Five And Nine By Force Four' by Ron Wilson G3DSV, *PW* April 1996 p42-43

With this method, an almost vertical antenna wire can be achieved. The amount of wire raised will depend on the type and number of kites used. It is obviously better, from an r.f. point of view, to keep the antenna vertical and this support method gives a more vertical position.

There is another advantage to this fishing swivel method too. When the station is closed, the antenna can be used to pull the kite closer to earth without straining against the lift of the kite.

Another Method

One other method that I've yet to try (but it's planned for next winter) is to use electric fence 'wire' as both the restraining line for the kite and the antenna. This 'wire' is made from a polypropylene string of quite good strength with several wires running throughout the line.

If you were to use two conducting anchor lines and, they were to be joined at the kite end, a Delta loop could be made up with a horizontal wire. A separate Delta loop could even be hung from the same point and rotated as needed. The options are almost unlimited.

Final Warning

One final word of warning. And it again concerns the high static charges that can build up on antennas hung from kites, especially in stormy weather.

Always have a way of dumping this static to earth and never use kites to raise antennas if electrical storms are about.

Benjamin Franklin used a long dry silken line (a very good insulator) to separate himself from the key that was the discharge point, for the static electricity, to ground in his experiments **Ed**.

I should also remind kite fliers never to launch or fly kites near overhead power lines.

I consider that tough, strong gloves are essential when launching and recovering kites as rope burns are painful. You can get good gardening gloves with leather palms in most d.i.y. outlets these days

The final comment I would make is, when the r.f. is unwilling to 'travel', it's easy to lower the lifting kite to the ground and remove one support leg and the antenna. Then re-launch the kite an just fly it. Great fun can then be had even when the bands have 'died'.

Do try this on your next expedition to a remote site. It works and works very well providing the wind keeps blowing.

‡ Benjamin Franklin performed his celebrated experiment with the kite in 1752. He invented the lightning rod and offered what is called the 'one-fluid' theory in explanation of electricity.

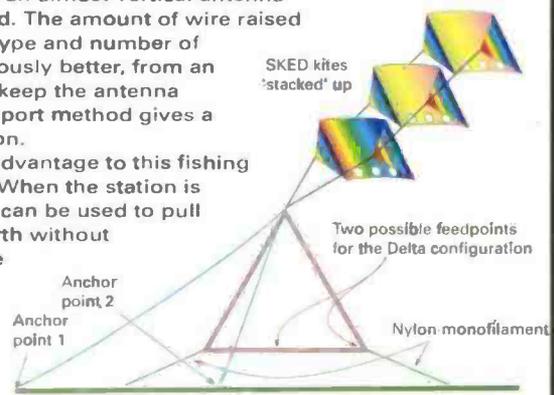


Fig. 3: Three 'Sked' kites give a better lift, keeping a delta loop well formed. If the loop is to be rotated then it should be fed at the mid-point of the bottom run.

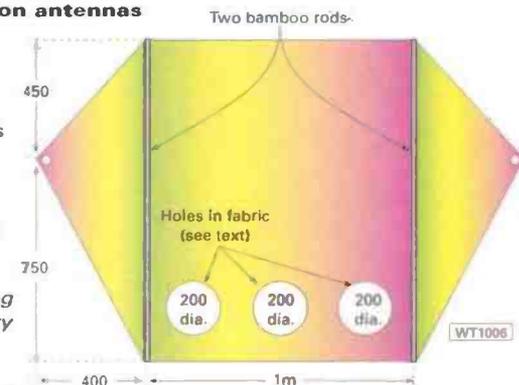


Fig. 4: If you'd like to make your own 'Sked' kite, this is the general layout to follow.

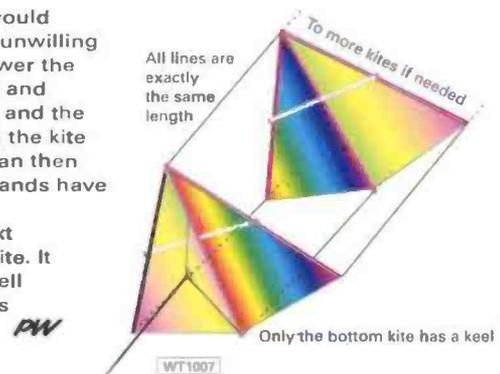


Fig. 5: Delta kites may be flown in a 'stack' by tying the various spar-ends as shown. Only the bottom kite needs a keel in this configuration.

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Valve Vintage

The feeling of a wry sense of humour and the dusty pre-Second World War magazines on the counter announce it's Charles Miller's turn to look after the vintage 'shop'. This time he looks into valve price 'fixing' and says: "The price was right ...for 'The Barker '88' ...and its valves".

One day in July 1944 Miss Vere Hodgson, a London social worker who was in her 30s was out walking when she looked up and saw a German V2 'flying bomb' passing directly overhead. It was the first time she had actually seen a 'Doodle-bug' but many more arrived that day and in the days to follow. In her diary later she recorded that one of them had fallen on the John Barker & Son department store in Kensington.

Just six years earlier Barkers had exploded their own bombshell under the cosy fixed-price system being operated by the **British Valve Association (BVA)**, the British valve manufacturers' cartel. This was so effective in sewing up valve prices that most ordinary radio listeners didn't realise what was going on.

You bought your receiver, already equipped with its BVA valves, and in the excitement of owning a new set didn't pause to wonder how much of the price was made up of the cost of those valves. Then, in 1938 came an event which made a lot of potential set buyers sit up and take notice!

Own Name Superhet

Barkers (their telephone number was then WEst End 5432), began to offer an 'own-name' superhet receiver for the bargain price of only £6. 19s. 6d. It wasn't quite the cheapest superhet on offer because the old established Sheffield firm of **J. G. Graves** was selling its 'Vulcan' model by mail order for £6. 17s. 6d.

But whereas the Vulcan was a four-valve battery set, Barkers' new '88' was an eight-valved, three wave-band a.c. mains receiver with push-pull audio output and a 'magic eye' tuning indicator. It was a sensationally low

price for such a specification and it wasn't just being sold to the customers visiting the Kensington store.

Barkers also had a huge mail order operation which took advertising space in the most popular newspapers of the day, commanding between them tens of millions of readers. Thus anyone who knew anything at all about the workings of radio sets could not fail to be aware of the '88'.

The knowledgeable customers wanted to know how the 'Eight Valves, Eight Watts Output' (which gave the receiver its name) could be achieved at the price. **It certainly wasn't** a cheap and nasty set and was in fact being made for Barkers by an extremely efficient contractor.

The '88' was soundly built, had a proper double-wound mains transformer, a good

energised loudspeaker, sockets for a gramophone pick-up and extension loudspeaker. It was also housed in a good-looking wooden cabinet, in which context it's worth reminding admirers of Bakelite that this material used **then to be thought of as a cheap substitute for wood.**

(Incidentally, the same chassis subsequently appeared in several other 'store' receivers, in which its unmistakable layout and dial always gives it away).

Corners Cut

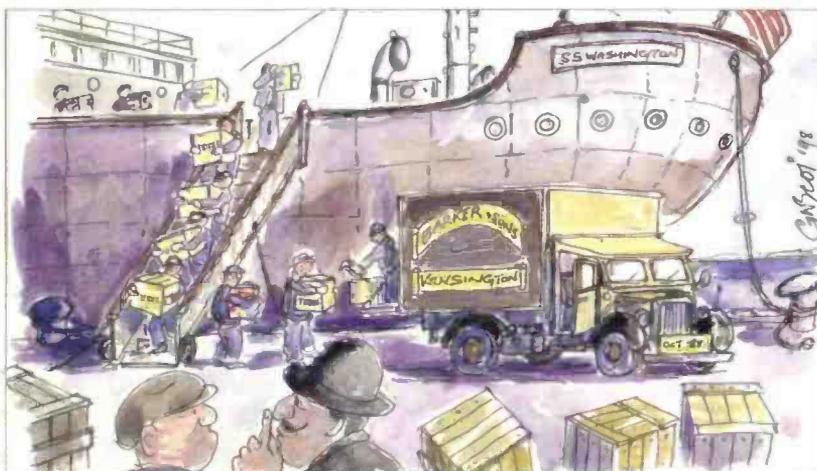
Admittedly, a few corners had been cut in the '88's' construction. For instance, the long and medium wave aerial tuning and local oscillator coils just single-wound types, there was only one i.f. transformer, with inductance-capacity coupling from the i.f. amplifier to the detector, and there was only simple non-delayed automatic volume control (a.v.c.), but the '88' worked and it worked well.

Then there was the question of those eight valves! If you'd bought them separately and ordinarily, courtesy of the BVA from retail outlets they would have cost the better part of five quid, leaving only about a couple of pounds for all the rest of the set, including the manufacturer's and Barkers' profit on the job. Since this just didn't make any kind of economic sense....just how was that low price achieved?

The answer is simple: What Barkers were doing was to import the valves from America, where the average shop price for each 'tube' was around a Dollar, and in those days there were four Dollars to the pound (in fact five shillings - now 25p - was often called colloquially 'a Dollar' and two and sixpence - 12.5 pence - was termed 'half a dollar').

By buying in quantity Barkers undoubtedly would have got a substantial discount, and it's on the cards that the eight valves set them back no more than about a quid (£1). So,

CHARLES MILLER LOOKS INTO VALVE PRICE 'FIXING', NOW IT'S HIS TURN IN THE PM 'WIRELESS SHOP'.



".....just how was that low price achieved? The answer is simple: What Barkers were doing was to import the valves from America".

'Three cheers' for free enterprise in the Land of the Free!

Valve Making In USA

The interesting thing about valve making in the United States (apart from the prices) was that all the firms, and there were a lot of them, used a common numbering system. This had real advantages!

So, you didn't need lists of valve equivalents in the USA as you did over here. For example a 6K8 which was made by RCA was the same as a 6K8 made by G-E or by Sylvania or by Ken-Rad or by any other firm.

Note, by the way, that the example given has no suffix after the 8. This is because it's a metal octal 'tube' of the type introduced in 1935.

Prior to 1935 there hadn't been much of an attempt to standardise valve bases, either in the UK or the USA and in both countries valves grew up fairly haphazardly, with bases having more pins added to suit the increasing numbers of electrodes to be found within the envelopes.

Thus there were British and American versions of 4-, 5-, 6-, 7-, 8- and even 9-pin bases, with some of the pins either off-set or larger than the others to provide location. The principle behind the octal base was to have all the pins a standard size and arranged symmetrically around a central spigot which was keyed to fit in only one position in the valve holder.

The maximum number of pins was eight (hence the name) but fewer could be used as and when appropriate. At the same time, a different type of construction was employed for the valves themselves, using metal in place of the traditional glass for the envelope.

Made In UK

Meanwhile, it wasn't long before octal-based valves started to be made in the UK. Production was initially by firms with American connections such as **Standard Telephones & Cables (STC)**, which was an off-shoot of ITT, and M-OV, which was related via its half-parent EMI to RCA.

The STC concern had previously made valves under the trade name of Micromesh, but dropped this in favour of the acronym BRIMAR, for **British Made American Range**. Their products retained the original US type numbers but M-OV invented new ones for its octals, based on existing letter codes with new suffixes consisting of numbers between 61 and 66.

Brimar offered octals in metal, G and GT form; probably a fair proportion of them, almost certainly the metal types were imported from the States and re-branded. Incidentally, M-OV offered only G type valves, despite having pioneered metal types.

Service engineers loved octals because it was so easy to fit them into their sockets when the latter were awkwardly positioned in a set. All you had to do was to locate the spigot in the centre of the holder and turn the valve slowly until you felt it drop in a little, which meant it was in the correct position for being pushed home. When you were expected to repair up to eight sets a day, five and a half days a week things like that made a lot of difference.

We'll probably never know the exact source of the valves used in the Barker '88' but either the firm laid in very large stocks or was able to get a UK manufacturer to offer similar terms because the '88' continued to be offered during the Second World War, when it's doubtful if importing domestic valves was high on the priority list.

The only valve that Barkers couldn't obtain readily was the 'magic eye' tuning indicator, so the sets were sold minus this but with a promise that it would be sent on later as and when supplies became available. Even the German flying bomb couldn't prevent this promise from being fulfilled...!

The 'metal envelope' technique wasn't quite new, because M-OV had used it over here a year or two earlier in its 'Catkin' range of valves, but these hadn't caught on. Furthermore, a new standard heater voltage was introduced.

Previously, many American valves had employed a 2.5V heater for a.c. mains types but the growing demand for automobile radios made it handy to use a 6.3V heater which would also suit the fully-charged voltage of the 6V storage battery then commonly used in American cars.

All those early octals had the 6.3V heater except for rectifiers, which were rated at 5V. Add to this the fact that octal (metal) valves were perhaps only half the size of standard types and it will be seen that they were indeed a startlingly different innovation.

Original Octal Range

The original octal range comprised a total of ten types, as listed in a data table published in 1935. It was pretty comprehensive, catering for both tuned radio frequency (t.r.f.) and superhet receivers although there wasn't as yet a double-diode-triode type and separate valves would be needed for detector/a.v.c. and a.f. amplifier purposes.

Almost all the types listed were to be long-lived except for the 6D5. This valve seems to have fallen by the wayside early on, as it doesn't appear in 1936 valve lists.

It didn't take long for the octal range to be expanded to dozens of types for every conceivable job in radio receivers. Soon, the metal valves were also supplemented by identical types in normal size glass envelopes, and then in small glass envelopes not much bigger than the metal valves.

As I've mentioned earlier, the metal valves had only the two-digit-one letter number. Normal sized glass types had the suffix G for 'glass' added and small glass types had the suffix GT for 'glass, tubular' added. However, despite a fairly widespread belief there never was a suffix M for metal, and thereby hangs a tale!

Some years ago I wrote an article for a certain magazine in which several metal valves were mentioned. In his wisdom the Editor of this publication decided to add the suffix 'M' to all the numbers I'd quoted, resulting in my getting some very critical letters from the likes of 'Disgusted of Esher', and the only way I could placate them was to send them photocopies of my original manuscript.

Another apocryphal story is that the last digit of a valve type referred to the number of pins used. (Though how that came about I can't imagine, since you've only to glance through any valve data book to see that it doesn't hold water!)

In fact, in that first list of ten types you'll have found the 6C5 and 6D5 each with six pins, the 6F6 and 6H6 each with seven pins and the 5Z4 with five pins!

All you can really be **fairly sure about** is that the first digit (or digits) have some bearing on the filament or heater voltage, e.g., 6 = 6.3V and 12 = 12.6V. You have to watch it with 1, though, because this was used for battery valves with ratings of both 1.4V and 2V.

The list compilers couldn't use 2 for the latter because it was already being used for 2.5V, but why did the 1-V (a rectifier, by the way) have a 6.3V heater? Other myths grew up about octal valves over the years and maybe I'll look at some more of these another time.

Cheerio for now...more tales from radio history next time I'm 'in the shop'.

PW



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EL36	5.00	VR105/30	3.00	6J86C	27.50	6201	8.50
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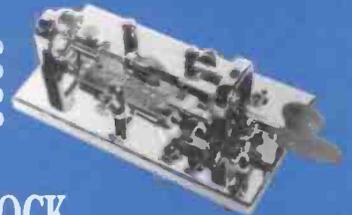
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Dual band SWR watt meter £59.00



MFJ 812
VHF/SWR watt meter + field strength £29.00



MFJ 912
4:1 deluxe balun £32.00



MFJ 986
12kW-roller coaster ATU £225.00



MFJ 962D
1.5kW roller coaster ATU £199.00



MFJ 906
6 mtr ATU SWR/PWR 200W £68.00



MFJ 914
Auto tuner extender £52.00



MFJ 910
Mobile antenna matcher £18.00



MFJ 9420X
20 mtr SSB transceiver £189.00

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Trader

YOUR GUIDE TO SECOND-HAND EQUIPMENT

WATERS & STANTON

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WATERS AND STANTON PLC SECONDHAND STOCK LIST AS AT 2nd May 1998. PLEASE NOTE SECONDHAND ITEMS COME WITH FLU. 3 MONTH PARTS & LABOUR GUARANTEE. FOR MORE INFORMATION PHONE STEVE DAVIES ON 01702-206835 OR FAX 01702-205843

HF TRANSCIEVERS

Icom IC-761 Base Transceiver with Gen.Cov. Mains. £795
Kenwood TS-450S Base Transceiver with Gen.Cov. 12V. £699
Kenwood TS-850S Base Transceiver with Gen. Cov. 12V. £759
MFJ MFJ-9030 x2 20m CW QRP Transceiver. £125
Trio TS-530S Base Transceiver Mains with MC-50, PWR meter. £325
Trio TS-830S Base Transceiver Mains. £375
Yaesu FT-290R II 2m All Mode with 25W Linear and Mobile moon. £335
Yaesu FT-3000M 2m FM Mobile 70W. £275
Yaesu FT-726R 2m,70cm All Mode Base Mains. £499

VHF/UHF BASE/MOBILE TRANSCIEVER

AKD 2001 2m FM Mobile 25W. £125
Alinco DR-605E 2m,70cm FM Mobile 50W,35W. £299
Kenwood TM-231E 2m FM Mobile 50W. £199
Trio TS-711E 2m All Mode Base 25W Mains. £465
Yaesu FT-212RH 2m FM Mobile 45W. £145
Yaesu FT-712RH 70cm FM Mobile 35W. £165
Yaesu FT-290R 2m All Mode Portable. £199
Yaesu FT-290R II 2m All Mode with 25W Linear and Mobile moon. £335
Yaesu FT-3000M 2m FM Mobile 70W. £275
Yaesu FT-726R 2m,70cm All Mode Base Mains. £499

VHF/UHF HAND HELD TRANSCIEVER

Alinco DJ-191 2m FM H/Hand. £129
Alinco DJ-560 x2 2m/70cm FM H/Hand. £169
Icom IC-2SE2T 2m FM H/Hand. £149
Icom IC-24ET 2m/70cm FM H/Hand. £179
Icom IC-P4E 70cm FM H/Hand. £169
Icom IC-W2E 2m/70cm FM H/Hand (with sp. mk.). £199
Kenwood TH-48E 70cm FM H/Hand. £235
Kenwood TH-79E 2m/70cm FM H/Hand. £285
Standard C-508 2m/70cm FM Micro H/Hand. £179
Standard C-528 2m/70cm FM H/Hand with Rapid Desk Charger. £225
Standard C-558 2m/70cm FM Handheld. £299
Yaesu FT-23R 2m FM H/Hand with 12V mic and sp. mic. £129
Yaesu FT-41R 70cm FM H/Hand. £175
Yaesu FT-470R 2m/70cm FM H/Hand. £189
Yaesu FT-811 70cm FM H/Hand with DC adapter. £189

SHORTWAVE RECEIVERS

AKD HF-3 x2 Target 12V Base/Mobile Receiver. £125
AOR AR-7030A 2V Base/Mobile Receiver with NB-700. £699
Grundig YB-800 x2 Portable Receiver with SSB. £185
Icom IC-R70 100kHz-30MHz AM/SSB, CW Mains. £449
Icom IC-R72 x2 Base Station Receiver. £549
JRC NRD-345 100kHz-30MHz AM,SSB,CW,PAX 100Ch. 12V. £549
Lowe HF-150 x3 12V Base/Mobile Receiver. £250
Lowe HF-250 x2 12V Base/Mobile Receiver. £399
Realistic DX-394 x2 150kHz-30MHz AM,SSB Mains/12V. £115
Sony ICF-SW55 Portable Receiver with SSB. £189
Sony ICF-SW77 Portable Stereo Receiver with SSB. £295
Yaesu FRG-7 0.5-30MHz AM,SSB,CW Mains/12V. £149

SCANNERS HAND-HELD

Farmate HP-3000 0.5-1300MHz AM/FM/WFM, 100Ch. £145
Icom IC-R1 0.1-1300MHz AM/FM/WFM. £199
Icom IC-R1 0.1-1300MHz AM/FM/WFM 100Ch. £205
Realistic Pro-43 68-999MHz (with gaps) AM/FM 200Ch. £129
Uniden UBC-220XLT 66-956MHz (with gaps) AM, FM 200Ch. £139
Yupiter MVT-5000 25-550,800-1300MHz AM, FM 100Ch. £119
Yupiter MVT-7200 100kHz-1650MHz All Mode 100Ch. £249
Yupiter VT-125 II 108-142MHz Airband 20Ch. £135

SOUTH EAST COMMUNICATIONS

(REP OF IRELAND)

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H.F. TRANSCIEVERS

Kenwood TS50S. £549
Icom IC706 mk1. £599
Yaesu FT1000mp/ac. £1699
Kenwood TS440sat. £649
Kenwood TS680S. £549
Kenwood TS850S. £799
Icom IC728. £499

VHF/UHF TRANSCIEVER

Alinco DJ191 handheld. £109
Yaesu FT3000m Demo. £275
Alinco DR130. £169
Yaesu FT290 mk2. £249
Alinco DR150. £189

SHORTWAVE RECEIVERS

Kenwood R5000 mint. £599
JRC NRD535 delux base. £899
Lowe HF150 with keypad. £275
Lowe HF225 with keypad. £299
Sony ICF SW55. £175
Sony ICF SW7600 boxed. £99
AKD HF3. £99
Trio R-600. £199
Yaesu FT7000. £149
FRG7. £89

BASE/MOBILE SCANNERS

Icom IC7000 .5-2000mhz. £699
Realistic Pro2037 66-956mhz. £129
Yupiter MVT8000 0-1300mhz. £1199
AOR 8200 Demo. £349
Bearcat 3000xt 25-1300mhz. £129
Icom PCR 1000. £199
Icom ICR7100. £799
Icom ICR-10 +case. £219
MVT9000. £249
AOR 5000 mint. £899

STATION ACCESSORIES

MFJ 259 antenna analyzer. £169
Diamond SX200 swr/pwr meter. £55
Diamond GSU-3000 30amp PSU. £89
Watson frequency counter. £49
Watson multi mode decoder. £49
Datong tutor D70. £39
NB30 30watt 2m amp. £45
GP45XL. £169
Mirage B-34-G amp. £89
GPS mk3. £189
Global AT2000. £69
MFJ 259 tuner. £199
MFJ 949E. £99
Diawu PS304 30amp PSU. £89
Momentum 1100 multi mode decoder. £249

All prices are in Sterling.

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TRANSCIEVERS HF
DRAKE TR-7 COMP LINE UP - REALLY NICE. £599
TEN TEC CORS AIR II. £450
ATLAS 350XL HF 100W TX. £245
ICOM IC725 HF 100W TX. £499
ICOM IC765 HF 100W TX. £995
KENWOOD TS-440S HF 100W TX. £899
KENWOOD TS-520 HF 100W TX. £299
KENWOOD TS-850 SAT HF 100W TX...choice. £1199
KENWOOD TS-930S HF 100W TX. £699
KENWOOD TS-680S 100W HF + 10W 6M. £599
TRIO TS120S 100W HF TX. £275
YAESU FT-107M HF 100W TX. £999
YAESU FT-707 CW MATCHING PSU, 100W HF. £425
YAESU FT-77 + PSU HF 100W TX. £499
YAESU FT-767GX HF + 6M BASE. £699

TRANSCIEVERS VHF/UHF
ALINCO DR610 2M/70CM MOBILE. £349
ALINCO DR606T 6M 10W MOBILE. £145
ALINCO DR606TH 6M 20W MOBILE. £199
DENPA M-22 2MTR MOBILE TX. £129
ICOM IC-228H 2M 45W MOBILE. £185
ICOM IC-2400 DUAL BAND MOBILE. £279
ICOM M56 MARINE MOBILE. £225
KENWOOD R-2000 HF RX. £225
KENWOOD TM-201 2MTR MOBILE. £189
KENWOOD TM-451E 70CMS MOBILE TX. £365
SHAKESPEAR SE2500S 35W MARINE TX. £249
STANDARD C-78 70CMS MOB TX+AMP. £199
STANDARD C-900 2M MOBILE. £199
STANDARD C-900 2M MOBILE. £185
YAESU FT-290R 2MTR MOBILE TX. £399
YAESU FT-290 MK II 2MTR MOBILE + AMP. £225
YAESU FT-480R 2MTR MOBILE. £249
YAESU FT-726R HF/2M/70CMS BASE TX. £699
YAESU FT-2500M + CTCSS 50W 2M. £249
YAESU FT-5100 DUAL BAND MOBILE. £249

RECEIVERS
AKD TARGET HF3 RECEIVER. £125
AOR AR-700 HF RECEIVER. £999
DRAKE JRA HF RX + VHF. £999
DRAKE RFE HF RECEIVER. £999
DRAKE SWR HR RX + AIRBAND. £199
ICOM R-72 HF RX + ACC. £599
JRC 425 QUALITY RECEIVER. £675
KENWOOD R-3000 + VHF RECEIVER. £399
KENWOOD R-3000 HF RECEIVER. £225
LOWE 325 FWA/M + NICAD PCK. £399
REALISTIC DX-394 HF RECEIVER. £100
ROBERTS IC-428 SW RX + CASSETTE. £129
YAESU FRG-9600 SCANNING RECEIVER. £299

HAND-HELD'S
ALINCO ALM-303E 2M H/HELD TX. £149
ALINCO DJ-FJ 2Mtr H/Hand + AIRBAND. £149
ICOM T-41 70CMS H/HELD TX. £185
ICOM IC-41E 70CMS - EX DEMO. £155
KENWOOD TH-26 2MTR H/HELD TX. £95
KENWOOD TH-28E 2MTR H/Hand TX+70CM RX. £169
KENWOOD TH-45E 70CMS H/HELD TX. £145
KENWOOD TH-75E DUAL BAND HANDIE. £159
STANDARD C-500 2M/70CMS H/HELD TX. £159
YAESU FT-50R 2M/70CMS HANDIE. £199
YAESU FT-208R + BASE UNIT/ACCS. £179
YAESU FT-530 2M/70CMS H/Hand TX. £199
YAESU FT-911 20CMS HANDIE. £299

MISCELLANEOUS EQUIPMENT
HFT 1500 COASTER ATU. £275
ICOM PS-55 30 AMP PSU + BOXED. £159
KENWOOD AT300 ANTENNA TUNER. £175
KENWOOD AT730 ATU. £189
KENWOOD AT750 ANTENNA TUNER. £225
KENWOOD TL-120 100W HF AMP. £185
KPC 9612 TNC 1200KVA. £175
MFJ 986 1K PEP TUNER. £249
MW MODULES 433/50 70CMS AMP. £195
TOKYO HL-1666 6M 160W - UNUSED. £299
TOKYO HL-700B HF AMP 600W S/S. £499
TOKYO HX640 6MTR TO HF TVTR. £175
TOKYO SAGRA 600 2M 600W. £699
YAESU FT-2008 HF AMP. £345
YAESU FT-107R 2M/70CMS TVTR. £249

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MAKE	MODEL	PRICE
AEA	PK 96 TNC	£140
AOR	7030 General Cov Remote	£500
AOR	3000A	£500
AOR	8000 Handie	£175
ICOM	IC 737	£600
ICOM	IC 736 HF / 50MHz	£750
ICOM	IC 271E 2m Multi Mode	£350
ICOM	IC R72	£375
ICOM	IC 765 Base HF	£995
ICOM	IC 207H	£280
ICOM	PS 55 Power Supply	£120
ICOM	IC 32E Dual Band Handie	£130
ICOM	IC 706 Mk1	£599
KENWOOD	TS 940 SAT	£775
KENWOOD	TS 940 SAT	£800
KENWOOD	TS 830 Late Model	£380
KENWOOD	TS 850	£750
KENWOOD	TS 850 SAT (X2)	£850
KENWOOD	TS 790E Dual Band Base	£995
KENWOOD	TS 950 SD	£1,395
KENWOOD	TS 870 DSP, mint condition	£1,400
KENWOOD	TS 450 SAT	£700
KENWOOD	TM 255E Multi-Mode 2Metre	£495
KENWOOD	TS 140S	£475
KENWOOD	TS 440 SAT 2X Filters	£695
KENWOOD	TS 50 HF Mobile	£495
KENWOOD	PS 33 20Amp Supply	£130
KENWOOD	TM 221A 2Metre 25W	£130
KENWOOD	TM 241E 2Metre 50W	£160
KENWOOD	R5000 Receiver	£500
KENWOOD	R5000 Receiver with VHF	£595
YAESU	FL 2100Z Linear Amp	£395
YAESU	FT 50R Handie	£195
YAESU	FT 8500 Dual Band	£325
YAESU	FT 5100 Dual Band	£250
YAESU	FT 4700 Dual Band Handie	£155
YAESU	PC 700-Tuner	£95
YAESU	FT 290 mkII Multi-Mode	£275
YAESU	FT 890 HF Gen "as new"	£600
YAESU	FT 890AT HF Gen	£675
YAESU	FT 726R 2-70-6 & HF	£700
YAESU	FT 990AC with 2K Filter	£900
YAESU	FT 890AT HF Gen	£650
YAESU	FT 51R Dual Band Handie	£250
YAESU	FT 23R 2metre Handie	£100
YAESU	FT 707S 10W HF	£200

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Traders Table

YOUR GUIDE TO SECOND-HAND EQUIPMENT

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HF TRANSCEIVERS

2 x Yaesu FT-757GX1 + boxed.....	£761
Yaesu FT-980.....	£799
Yaesu FT-101ZD MkIII + FC-902/FCV-901R incl 2m/6m.....	£799
Yaesu FT-102.....	£375
2 x Icom IC-765 VGC.....	from £1300
Kenwood TS-520.....	£200
Kenwood TS-930 vgc.....	£750
Kenwood TS-120S.....	£761
FL-21002 HF linear.....	£495
Kenwood TS-830M.....	£761
Kenwood TS-440SAT boxed.....	£625
Yaesu FT-9020M + SP-901 & FC-902.....	£599

MOBILE/BASE VHF/UHF TRANSCEIVERS

Kenwood TS-711E +SP430 boxed.....	£761
Alinco DR-112 + book/microphone.....	£115
Navico AMR-1000 2m mobile.....	£160
Yaesu Ft-480R boxed.....	£250
Icom IC-229 - boxed.....	£199
Icom IC-290D.....	£300
Yaesu FT-230.....	£175
Yaesu FT-290RII boxed.....	£325
Yaesu FL-2025.....	£99
Kenwood TR-9130.....	£275
Trio TS-770E.....	£761
TR-9000 & mic/book/lead.....	£275
TM-401A boxed (10 watt output).....	£175
IC-821H Immaculate condition.....	£761
AKD-6001 boxed.....	£100
Yaesu FT-700R boxed.....	£225
Trio TR-2400.....	£90
Trio TR-7500 boxed.....	£761

RECEIVERS/SCANNERS

Yaesu FRG-8800 + FRT-7700.....	£499
Drake R-8E - vgc.....	£650
Icom IC-R71E boxed.....	£599
Regency MX-7000.....	£761
Low HF-225.....	£299
Yaesu FRG-7700M + ATU.....	£325
Realistic DX-394.....	£761
Icom IC-R7000 + book.....	£761
Trio R-600.....	£761
Roberts R-876.....	£85
AOR AR8000.....	£210
Icom IC-R7100 + book.....	£800
Realistic PRO-59.....	£75
Standard AX-700 book & box.....	£299
AOR AR1000 hand-held.....	£125
Yupiter MVT-7100 boxed.....	£150
Roberts R-861 + book & box.....	£125
Realistic PRO-2005 boxed.....	£150

HANDHELD'S

Icom IC-4E.....	£115
Kenwood TH-27 - boxed.....	£125
IC-W2E + extras.....	£150
IC-X21ET & CTCSS fitted.....	£225

MISC.

MJF-784 boxed.....	£175
VC-3000DLP boxed.....	£99
Datong D-70.....	£761
CAP Co SPC-300 ATU boxed.....	£150
Yaesu SP-901 speaker.....	£30

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IIF TRANSCEIVERS

Icom IC725 All Band 100W HF Base.....	£525
Kenwood TS370D Latest 100W HF with DSP.....	£745
Trio TS130S HF & WARC 100W Base HF.....	£295
Trio TS130V HF & WARC 10W QRP + VFO.....	£295
Yaesu FT747GX Basic Spec HF 100W Base.....	£395
Yaesu FT707 Basic HF with VFO and PSU.....	£375
Yaesu FT77 Basic HF with FM Board.....	£325
Yaesu FT77 Basic HF.....	£275

ATUs

Drava CNA1001 - Auto ATU.....	£145
MJF-956 SW/MW/LV Receiver ATU.....	£30
Trio AT130 Matching Compact ATU 120/130S.....	£65

VHF/UHF

Icom IC2350H 2/70 Hi-Power Mobile.....	£295
Icom IC02E 2M Handheld with Keypad.....	£95
Kenwood TM751E 2M Multimode Mobile 25W.....	£395
Kenwood TM751E 2M Multimode Mobile 25W.....	£345
Trio TR9130 2M Mobile Multimode 25W.....	£295
Trio TR7500 2M Channelised Mobile 10W.....	£80
Yaesu FT480R 2M Multimode Base 10W.....	£225
Yaesu FT290R11 - 2M M/mode Bracket & Amp.....	£300

RECEIVERS

Drake SW8 HF Gen Cov Rx with VHF Air.....	£399
Heathkit SB301 Ham Band RX.....	£75
Icom IC-R7000 VHF/UHF Comms Receiver.....	£550
JRC NRD525 Deluxe HF Rx with VHF/UHF.....	£645
Kenwood R5000 Deluxe HF Gen Cov RX.....	£395
Low HF125 HF Gen Cov RX Adjustable Filters.....	£265
Low HF150 Compact Gen Cov Rx with Keypad.....	£295
Low HF150 Compact Gen Cov Rx with Keypad.....	£325
Low HF250 Deluxe Gen Cov RX with Options.....	£450
Trio R2000 HF Gen Cov RX with VHF.....	£325
Yaesu FRG8800 Gen Cov RX with VHF.....	£695
Yaesu FRG8800 Gen Cov RX with VHF.....	£475
Yaesu FRG7700 Gen Cov RX with Mem Unit.....	£275
Yaesu FRG7700 Gen Cov RX with Mem Unit.....	£225
Yaesu FRG7700 Gen Cov RX.....	£195
Yaesu FR101 Basic HF RX (Specific Bands).....	£100

SCANNERS

Fairmate HP100E 1000Ch H/Field Scanner.....	£115
Low F510 10Ch Marine Scanner.....	£75
Realistic Pro50 20Ch FM H/Field Scanner.....	£55
Realistic Pro38 10Ch FM H/Field Scanner.....	£45
Realistic Pro37 200Ch VHF/UHF/Air Scanner.....	£75
Realistic Pro28 30Ch FM H/Field Scanner.....	£85
Trident TR2400 Wide Band Scanner.....	£175
Yupiter MVT7100 Deluxe Wideband Scanner.....	£165
Yupiter MVT125II Civil Airband Scanner.....	£95
Yupiter MVT125II Civil Airband Scanner.....	£99

MISCELLANEOUS

Diamond SX-400 VHF/UHF 200W SWR Meter.....	£59
Drava AF606K Active Audio Filter.....	£75
Microset R432-90 - 90W 70cms Amplifier.....	£349
Microwave Modules 30W 70cms Amplifier.....	£95
Optoelectronics 3300 - Frequency Counter.....	£95
Scopes 456 6MHz Scope - As New.....	£65
Tokyo Hy-Power HX240 - 2M->HF Transverter.....	£145
Yaesu FRT7700 HF RX ATU.....	£39
Yaesu FRV7700 HF->VHF Transverter.....	£39
Yaesu GS00A Elevation Unit + VGC.....	£165

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HF TRANSCEIVERS

Icom IC-761 100W General Coverage transceiver with built-in auto ATU and PSU.....	£999.00
Icom IC-756 (SUPERB) 100W HF General coverage + 6M + VDU + DSP All Mode Still has 18 months warranty.....	£1250.00
JRC JST-135 100W HF General Coverage transceiver ALL MODE fitted with BWC (Variable Bandwidth Control) and PSU (MINT).....	£899.00
Trio TS-770E 2m/70cm multimode base station 10W on both bands. Mains powered.....	£399.00
Yaesu FT-736R Fitted with 2m/70cm & 6m (excl cond).....	£899.00
Kenwood TH-75E 2m/70cm hand-held CW charger, nicad & aerial.....	£199.00

SHORTWAVE & SCANNING RECEIVERS

HF-150 general coverage receiver.....	£249.00
Icom IC-R7100 Wideband HF/VHF/UHF Receiver ALL MODE (SUPERB).....	£629.00
AOR-7030 General Coverage receiver ALL MODE (SUPERB RECEIVER).....	£549.00
Icom IC-R7000 Wideband HF/VHF/UHF receiver ALL MODE, built-in PSU.....	£499.00
Yaesu FRG-100 General coverage receiver (MINT COND) with PSU.....	£349.00
Trio R600 General coverage receiver (ideal starter rig).....	£199.00
NRD-535 General coverage receiver. (AS NEW). Top of the ranger receiver.....	£699.00
Icom IC-R71E General coverage receiver, built-in PSU (SUPERB UNIT).....	£479.00
Kenwood R5000 General coverage receiver fitted with VHF unit (ALL MODE). CW box & manuals.....	£649.00
AOR-3000 Wideband receiver, ALL MODE, computer controllable.....	£429.00
Realistic DX-394 General coverage receiver, ALL MODE.....	£399.00
Yupiter VF-125II Allband handheld receiver (EXCELLENT RECEIVER).....	£109.00
Nevada MS-1000 Wideband receiver AM/FM/WFM (Mobile/Desk).....	£179.00

VHF/UHF TRANSCEIVERS

Yaesu FT-290R11 2M Multimode c/w matching 25W linear, carry case box & manual.....	£439.00
Yaesu FT-290R11 2M Multimode.....	£375.00
Yaesu FT-290R11 2M Multimode.....	£239.00
Yaesu FT-4700 2M/70cms mobile.....	£279.00
Kenwood TM-431E 70cms mobile.....	£239.00
Kenwood TM-701E 2M/70cms mobile.....	£299.00
Kenwood TM-411E 70cms mobile.....	£189.00
Alinco DJ-580E 2m/70cms handheld, wideband receive.....	£199.00
Alinco DJ-F1E 2M handheld.....	£149.00
Alinco DJ-180E 2M handheld (AS NEW).....	£139.00
Kenwood TH-215E 2M Handheld c/w speaker mic.....	£129.00
Kenwood TH-28E 2M handheld c/w speaker mic, case.....	£129.00
Trio TR-9000 2M Multimode 10W.....	£199.00

ACCESSORIES

200W Dummy Load.....	£49.00
LAR VHF ATU.....	£39.00
Datong FL-3 Filter.....	£95.00

MULTICOMM 2000 01480 406770

HF TRANSCEIVERS

ALINCO DX-70TH EX DESIG BOXED.....	£599
Icom IC-706 BOXED AS NEW.....	£599
Icom IC-725 AS NEW.....	£475
Icom IC-725 HF+6 AS NEW, BOXED.....	£635
Icom IC-735 BOXED AS NEW.....	£499
Icom IC-735 BOXED.....	£469
Icom IC-737A BOXED.....	£725
Icom IC-737A BOXED.....	£699
Icom IC-251 GREAT PERFORMER.....	£466
Kenwood TS-440SAT WITH ALL FILTERS.....	£359
Kenwood TS-440SAT WITH FILTERS.....	£369
Kenwood TS-520S-DIGI DIGI DISPLAY AS NEW.....	£295
Kenwood TS-680S HF + 6 METERS.....	£525
Kenwood TS-690S HF + 6 METERS.....	£609
Kenwood TS-850SAT AS NEW, BOXED.....	£699
Kenwood TS-850SAT AVERAGE CONDITION.....	£699
MIZUSHI SX-20 WITH ALL XTALS QRP.....	£169
TENTEC CORSAR/200II IN GREAT CONDITION.....	£499
Yaesu FT-1000 BOXED AS NEW.....	£1499
Yaesu FT-1000IMP BOXED AS NEW 7 WEEKS OLD.....	£1599
Yaesu FT-767 WITH ALL MODULES 62/70.....	£799
Yaesu FT-767GX PLUS 62/70 AS NEW.....	£899
Yaesu FT-990 HF TRANSCEIVER, GREAT CONDITION.....	£625
Yaesu FT-990 BOXED AS NEW.....	£899

VHF/UHF TRANSCEIVERS

Icom IC-2E BOXED AS NEW.....	£99
Icom ICW-21ET DUALBAND HANDHELD.....	£189
Icom ICU-167 70CMS HANDIE.....	£110
KENPRO KT-66 2 METER HANDIE.....	£70
KENPRO KT-66 2 METER HANDIE.....	£70
Kenwood TH-28E 2 METER HANDIE.....	£80
Kenwood TH-28E 2 METER HANDIE.....	£115
Kenwood TH-41E 70CMS HANDIE.....	£75
Kenwood TH-48E 70CMS HANDIE.....	£110
Kenwood TM-2550A 2 METER 70WATT MOBILE.....	£199
Kenwood TM-733 AS NEW WITH MEMORY MODULE.....	£469
Kenwood TR-9000 VHF MULTIMODE.....	£215
STANDARD C-506 DUAL BAND (EX-DEM).....	£199
Trio TR-2300 PORTABLE 2 METER CLASSIC.....	£69
Yaesu FT-206R 2 METER HANDHELD.....	£79
Yaesu FT-23R 2 METER HANDHELD.....	£75
Yaesu FT-280 WITH NICADS 2 METER MULTIMODE.....	£189
Yaesu FT-51R WITH MOBILE KIT AS NEW.....	£199
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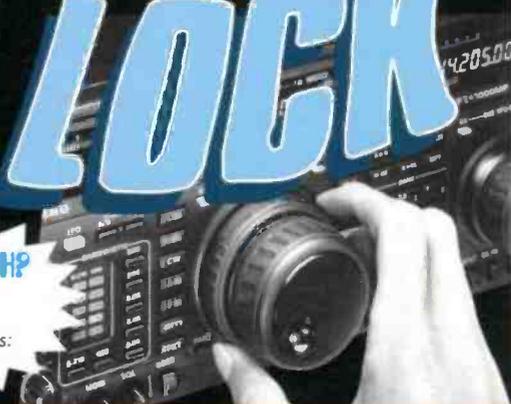


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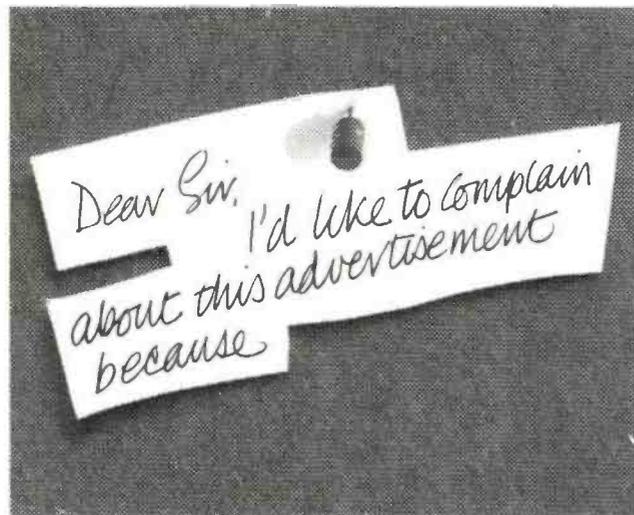
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VHF REPORT

REPORTS & INFORMATION BY
THE LAST SATURDAY OF EACH
MONTH.

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THIS MONTH DAVID BUTLER
G4ASR HAS REPORTS OF
SUPER-DX CONTACTS ON THE
144MHZ BAND MADE VIA TRO-
POSPHERIC PROPAGATION.

Last time I reported about Sporadic-E (Sp-E) openings during June, to Israel and Crete. These contacts were made on the 144MHz band with stations up to 3600km away.

This time around I've got reports of more super-DX contacts being made on the 144MHz band. The distances were not dissimilar, around 3000km, but on this occasion they were made via tropospheric propagation to the Canary Islands.

The 50MHz antennas at the QTH of JA4MBM showing two 11-element Yagis, 15.4m long, stacked 7.5m apart.



I've also got reports of Sp-E openings on the 144MHz band to eastern Europe during July and details of S5-stations being contacted on the 70MHz band. I'm also reporting about openings on the 50MHz band including details of further multi-hop Sp-E transatlantic openings.

But first I've got the really exciting news that **Derek Hilleard G4CQM** claims to have heard the Canadian beacon VE1SMU/H over a 4376km path on the 144MHz band. The reception occurred between 1300-1315UTC on July 6 1998, nearly 10 years since Derek first started listening for North American stations on the v.h.f. bands!

METEOROLOGICAL DATA

For months, Derek G4CQM had been watching for a favourable weather pattern across the Atlantic Ocean. On July 6 the meteorological office data showed a very large high pressure system in the North Atlantic with an isobar stretching from Canada (VE1) to within 800-1000km of the UK. This anticyclone was moving slightly south-east and declining, an ideal situation for an opening via tropospheric ducting.

According to **Dr. Geoff Grayer G3NAQ** (from the *VHF/UHF DX Book*) this surface ducting occurs when a steep negative gradient in refractive index forms immediately above the ground, or sea in this case. This traps the radio waves by refraction from above and by reflection from the surface below.

Surface ducts do not propagate well over land, the ground being a relatively lossy reflector covered with obstacles that absorb and scatter radio waves. However, sea ducts occur quite frequently and since the sea, when calm, is a good reflector these ducts can propagate over very long distances with little loss.

Sea ducts rarely penetrate inland, so you need to be located either on an island or close enough to the coast to be able to beam into the open end of the duct. Such ducts are generally about 15m high, often limiting propagation to the u.h.f. and microwave bands.

However, deeper evaporation ducts around 400m in height form occasionally over warm sea and these are capable of propagating lower frequencies in the v.h.f. range. For example the 4000km path between California (W6) and Hawaii (KH6) opens on a regular annual basis as does the 3000 kilometre path between the Canary Islands (EA8) and the south-western part of the UK. And even longer distances that this are possible via tropospheric propagation.

On February 13 1998 **Shel Remington N16E** on Hawaii reported hearing the Mexican broadcast stations XHME (89.5MHz), XHPVA (90.3MHz) and XHMZO (92.9MHz) at distances between 5200 to 5300km. The QTH of G4CQM is close to Bude Bay, Cornwall (IO70) and has a clear take-off across the Atlantic Ocean. Similarly, the Canadian beacon station is located by a harbour mouth in Halifax, Nova Scotia (FN84), with an excellent sea path to the east. Both locations are therefore in an ideal position albeit 4376km apart!

TRANSATLANTIC BEACON PROJECT

In 1995 the **Irish Radio Transmitters Society (IRTS)** announced a pair of challenge trophies to be awarded to the first stations to establish two-way communications across the Atlantic on the 144MHz band (other than by satellite or moonbounce). The trophies are known as the Brendan Trophies, after Saint Brendan (Brendan the Navigator) who was born in Tralee, Ireland in 484AD.

A number of attempts have been made to succeed in this most stretching of challenges, but none has as yet been successful. Whilst there are theories about whether and how a propagation path might exist across the Atlantic, none has been tested properly by scientific experiment. The chances of making a successful random contact in these circumstances is very low. What is really needed is a research project to further our knowledge and establish just how we might communicate over this distance.

At the International Amateur Radio Union (IARU) Conference in Tel Aviv (held in 1996) a proposal was made by the Spanish society (URE) to establish a chain of high power

beacons along the western coasts of several Region 1 countries (e.g. Spain, Portugal, France, Ireland, UK) beaming across the Atlantic in order to research whether any propagation paths over this extreme distance were possible. One such European beacon (active since January 1998) is F5XAR which operate 24-hours a day.

The unit is located on the north-west coast of France (IN87) on a site 165m a.s.l. with a clear take-off towards the Atlantic Ocean. Operating on 144.405MHz the beacon runs 400W e.i.r.p. from a 9-element F9FT Yagi beaming at 290°. It transmits the Morse code message 'F5XAR IN87KW TRANSATLANTIC BEACON' once at 30 words per minute (w.p.m.) and then three times at a speed of 120w.p.m.

Clearly a propagation experiment will need both transmitters and receivers and IARU Region 1 will be co-ordinating with the Region 2 societies both to set-up receivers in Canada and the USA and to establish reciprocal beacons for reception in Region 1 countries.

CANADIAN BEACON

One of the first transatlantic beacons to be set-up in Region 2 is VE1SMU/H, located at Saint Marys University, Nova Scotia. It's operating on the European s.s.b. calling frequency, 144.300MHz. This, at first sight, may seem an unusual spot to place a beacon but there are two reasons why it is located there.

Firstly, local licence agreements dictate that beacons are located in this segment of the 144MHz band. Secondly, it was suggested that although local s.s.b. callers may cause temporary interference to the beacon reception there was a greater chance of it being detected on this much monitored frequency. The beacon VE1SMU/H runs 250W into an antenna system consisting of 4 x 10-element Yagis, horizontally polarised and vertically stacked on a 20m tower beaming towards Europe. The beacon is active 24 hours a day and sends VE1SMU/H in Morse code every few seconds.

At the QTH of Derek G4CQM the 144MHz system consists of a 9-element Yagi (2.5 wavelength boom), a home-made transverter and a TS-670 transceiver. Having seen the favourable weather pattern on July 6 Derek set his antenna on a beam-heading of 295° and started to monitor 144.300MHz for any possible signs of the Canadian beacon.

At 1300UTC Derek started to hear very weak, almost imperceptible signals on 144.300MHz. Listening intently

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with a pair of headphones (to aid the filtering process) he gradually got all the call sign although signals levels only peaked around S1 with deep cyclic fading.

Derek continued to hear the VE1SMU/H beacon until 1315UTC when it faded out. One of the characteristics of the signal identified by G4CQM was that the beacon frequency was noted to be slightly l.f. of the s.s.b. calling frequency.

Derek tried calling several VE1 stations by telephone and eventually got through to one of the beacon keepers who confirmed that the beacon was 200Hz low of the nominal frequency. Unfortunately no-one was available to switch the beacon off to make positive identification.

As mentioned earlier Derek has been carrying out v.h.f. transatlantic listening tests for nearly ten years. In 1993 he ran a series of two-way tests during the summer Sp-E season with the stations of VE1MQ and VE1HD but despite many hours of monitoring no positive identification was made.

During one test on July 25 1993 at 1445UTC a voice did appear in the noise but it was indecipherable. Attempts were also made during the Perseids meteor shower on August 12 1994 with the station of VE1HD.

Although nothing was heard by G4CQM other than weak unidentifiable s.s.b. signals the station of VE1HD claims to have heard signals from G4CQM. In a telephone call to Derek he said "I heard you, I recognised your accent. I heard your call sign and mine, three S-units above the noise in your 2207 period".

Nine tests in total were made during the period with the three Canadian stations but no positive signals were heard in the UK. Derek also monitors the Band II 88-108MHz i.m. broadcast band with a 5-element Yagi and a Sony receiver.

On June 15 1995 between 2314-2319UTC Derek heard identifiable signals from CBC, Sydney, Nova Scotia on 95.9MHz. The station was also heard again on June 22 1995 between 2148-2158UTC.

Derek reports that he was very encouraged by the latest results via tropospheric propagation during July of this year. In his opinion signals will be very weak when a two-way contact is made and the use of c.w. will be essential.

Sceptics may say that the reception by G4CQM of the Canadian beacon on 144.300MHz is just not possible for such a high latitude. However, two days after that claim the 144MHz band **did** support a tropo path in excess of 3000km between the UK and the Canary Islands.

MARINE DUCTING

Marine ducting is not as uncommon as some people think. Stations located on the east coast of the UK often experience brief openings across the North Sea into Scandinavia on the v.h.f. and u.h.f. bands. Longer paths exist, the best of which is the 3000km UK to Canary Island path.

Stations located in Cornwall, Wales, Ireland and the Isle of Man can expect to make contacts usually on the 144MHz band but sometimes on the 430MHz band a few times every year. And it doesn't stop at the 430MHz band.

In fact the higher in frequency you go the better it gets. The only problem is that this type of marine duct generally doesn't extend very far inland. Sometimes only a distance of a few kilometres.

Unfortunately the lack of microwave operators in the right place both in the UK and EA8 means that records don't get broken very often. Incidentally, I wonder if anyone can tell why the UK to EA8 path is a regular occurrence whereas the shorter UK to CT2 (Azores) or CT3 (Madeira) path has never been accomplished?

One of the characteristics of the UK to EA8 path (certainly at my inland QTH in IO81) is that signals are normally quite weak, between S1-S3 with cyclic fading into the noise. In my experience signals may peak for 5 or 10 minutes and then disappear for maybe 15 minutes or so before re-appearing. This state of affairs can last for a number of hours.

So, if you hear that these super-DX stations are being worked on the band it's no good having a casual listen. You must keep tuning around for a number of hours and keep a close ear to the band. Other stations, located in coastal areas with a clear take-off to the south-west, may well find the DX stations romping in at S9 (and even workable on f.m. as many Cornish stations do every year).

An opening to the Canary Islands via marine ducting

occurred during the evening of July 8. **Jamie Ashford GW7SMV** (IO81) first heard a Spanish station EB1GMC on 144.300MHz around 2145UTC. This station is located on the north coast of Spain (IN52) and was putting in a very strong signal.

At 2215UTC the station of EB88TV (IL18) was heard, also on the s.s.b. calling frequency, with signals peaking around S2. **Jamie** heard this station beyond 2310UTC.

As I've already explained, this path doesn't normally extend a great distance into the UK. However, on this occasion it made it over to the QTH of **David Johnson G4DHF** (IO92).

David's antenna system of 8 x 9-element Yagis and 400W may have helped the two-way QSO but at 3074km it's still a very long way! David reports that EB88TV was heard on two occasions around 2226 and 2332UTC with signals peaking to S4.

Some other good DX was also worked during July on the 144MHz band. On July 15 there was a Sp-E opening (the only one during July) to central and eastern Europe. It started around 1625UTC with **Jamie GW7SMV** hearing the station of SP9FG (JN99) on 144.300MHz.

Other stations heard/worked during the opening were SP9EWO/9 (JN99) by **G4RGK** (IO91) at 1632UTC and OM3TU/P (KN18) at 1633UTC by **G8GXP** (IO93). The Ukrainian station UY5YM (KN28) was spotted by **G4RGK** operating with s.s.b. on 144.302MHz whilst at the c.w. end of the band the station of G4FUF (JO01) found ER1AAF (KN47) operating from Moldova. The brief opening appears to have faded out around 1655UTC. And that, as they say, was the end of the 1998 Sp-E season on the 144MHz band.

Although not super DX many UK stations made contact with the Dutch station PA6BN (JO13) located on a gas transport platform in the North Sea in the period July 10-12. The group consisting of PA2DWH, PA3BZL, PA3DZL, PA3FOC and PA3BIY made 338 contacts via tropo and 33 contacts via meteor scatter on the 144MHz band.

A total of 63 QSOs were made on the 430MHz band and 30 contacts on the 1.3GHz band. The big disappointment though was that no Sp-E contacts were made on the 50MHz band, with only 12 contacts being made via tropo.

SLOVENIA ON FOUR METRES

Now it's time to move down in frequency to the 70MHz band. Last month I reported that

Slovenian amateurs now have access to the band and that the stations of G6WZA and GW6ZMN made the first contacts with S57A on June 18.

Further openings took place during July the first of which coincided with v.h.f. field day on July 4-5. **Steve Bunting M0BPQ** reports that the field day station G3JKY/P (JO00) were called on s.s.b. by S57A.

Boris gave them a serial number of 20 so he obviously made many other contest contacts. The station at G3JKY/P consisted of a home-made transverter with 120W from a pair of modified Pye A200 solid-state amplifiers into a 4-element Yagi.

Another opening took place between 1850-1930UTC on July 21 with S57A (JN65) working stations on 70.200 s.s.b. and 70.450MHz f.m. The station of S57UUD was also heard but did not appear to be having much success. (Maybe his receiver was not optimised for the band.) Another station S58Q (JN76) was heard on July 28 at 1615UTC so it appears that activity is slowly on the increase.

THE 50MHZ BAND

Now, I'll turn to a report received from **Sean Gilbert G4UCJ** (IO92). He mentions that normally he is to be found on the h.f. bands but recently has been active on v.h.f. particularly on the 50MHz band.

Sean's station consists of an Alinco DX-70 transceiver running 4W into a quarter-wave whip placed on top of a heating radiator in the shack. Despite these limitations Sean has been working a reasonable amount of DX via Sp-E openings. His recent contacts have included CT1AL, IS0/IW3FLL, IT9NGN, S57AC, YU1AA, 9A7V and many Italian stations.

All this activity shows the intensity of 'single-hop' Sp-E events on the 50MHz band. Get a small beam outside and you'll hear and work even more DX stations.

For example, here is a very small selection of DX stations that were worked from the UK during July, EK6AD (LN20), EV6M (KO55), EW1EW (KO32), UT1PA (KO21) and 4L50 (LN21). During the last week of July the station 1A0KM (Sovereign Military Order of Malta) located in JN61 was also active. (No it wasn't a pirate but a relatively rare DXCC country).

Further afield were the stations of OD5RAK, OD5SB, 4X1IF, 4X6ON, 4Z4TL, 5B4/EU1AA and 5B4AFB. From the north could be found JX7DFAP (IQ51), OH3JDZ/OH0, OY/PE1PFW, OY4TN, OY9JD, TF3BM, TF3FK and the Greenland

beacon OX3VHF (GP60). The stations of 3C5I and 7Q7RM also showed up on a number of occasions during the month.

Alan Isaachsen 3C5I (JJ43) reports that an opening on July 20 from 1800UTC was very good into G and GW. He contacted G3IBI, G3KOX, G3NSM, G4HBA, G4SEU, G4UPS, G6ION, GW0GIG and GW3JXN on c.w. and the stations of G3GIQ, G3KOX, G4ASR, GW0GEI, GW7SMV and MW1BGE on s.s.b.

MULTI-HOP OPENINGS

On July 7-8, 22 and 28 there were 'multi-hop' Sp-E events on the 50MHz band allowing contacts to be made with stations in North America. The best of these started around 2040UTC on July 7 when ON7GG heard the VO1ZA beacon (GN37).

By 2115UTC the event had spread across the southern part of England and Wales with many DX contacts being made on c.w. and s.s.b. Among the stations reported were Canadians VE1PZ (FN85), VE1YX (FN74), VE1ZZ (FN84), VE2PEP (FN46), VE9AA (FN65), VO1JN (GN37) and VY2SS (FN76).

From the USA were the stations of K3ONW (FM19), K4BI (EM74), N4UK (EM84), WA4YGG (EM85), WB4TEQ (EM73) and N8II (FM19). The beacon FP5XAB situated on St. Pierre and Miquelon (GN16) was also heard as was the beacon VE1SMU (FN84) on 50.001MHz. The opening appears to have faded out around 0100UTC on July 8.

A brief opening took place around 1140UTC on July 22 with the station of VE1YX being reported by G3LAS (JO01) and GW7SMV (IO81). Finally, on July 28 propagation made it's way into Northern Ireland and Scotland with the stations of G1OOTC (IO65) and MM0AMW (IO75) working KP4EIT (Puerto Rico) around 2015UTC.

DEADLINES

That's it again for another month. Don't forget to pay special attention to the 50MHz band in the next few weeks as it will be open to Southern Africa and South America via trans-equatorial propagation. Next time I'll be giving details of this year's Leonids meteor shower which could well be of storm magnitude with many thousands of meteors per hour.

If you want to work guaranteed DX on the v.h.f. bands then schedule Tuesday November 17 into your diary now. Please let me know what you've been hearing on the v.h.f. and u.h.f. bands.

Forward any news, views, comments or photographs

(especially) to the address and by the date given at the top of the column. Alternatively a simple telephone call is all it takes.

THANKS FOR YOUR LETTERS AND GOOD LUCK WITH THE DX. SEE YOU AGAIN NEXT MONTH.

73 David GAASR

HF FAR & WIDE

LEIGHTON SMART GW0LBI, 33 NANT GWYN, TRELEWIS, MID-GLAMORGAN, CF46 6DB WALES TEL: (01443) 710749

LEIGHTON SAYS THAT THE POOR SUMMER HAS BROUGHT HIDDEN BENEFITS AS HE WELCOMES SOME NEW REPORTERS BACKING UP THE THE 'REGULARS' FOR YOUR OWN 'SPECIAL'

It looks as though the atrocious summer (what summer you may ask?) weather conditions have been quite conducive to encouraging our reporters into their radio shacks lately, judging by the amount of reports received this month! However, things might be looking up at last as we're getting a 'mini' heat wave!

There are no less than eight reporters this month, which must be a record for this time of year. It's all due no doubt to the fact that the sun has certainly not been shining much until recently!

However, the sun has been doing a good job in other respects, and propagation conditions have been quite good over the month of July, so perhaps it's not all bad news after all!

YOUR REPORTS

I'm delving straight into your reports now, starting with the 1.8 and 3.5MHz band, as space is limited this time around. First comes Carl Mason GW0VSW, of Skewen, West Glamorgan, who has been operating with higher powers this month.

Using up to 70W of c.w. and a Sandpiper vertical antenna, Carl's log shows contacts on the 1.8MHz band with ES9A (Estonia), EA1MM (Spain), LY2BM (Lithuania), DL9DBI (Germany), and OH5VT (Finland), all contacts taking place between 2200 and 2330UTC.

Next up is arch-QRPer Eric Masters G0KRT of Worcester Park in Surrey, who, on the 3.5MHz band, using mini-power of only 4W of c.w. from an Index Labs QRP Plus transceiver, hooked up with DF0IR (Germany), I1BAY (Italy), OK1FV (Czech Republic), PA0PFW (Netherlands) and closer to home GM4BKV, all between 1100 and 2300.

THE 7MHZ BAND

Now here's a man after my own heart, as I'm always interested in what 'low profile' antennas our reporters use to work the DX. New reporter Alex Shillito G2FRY in Nottingham is using an antenna just 2m or so above ground - and guess what? It's actually his wife's washing line!

Despite such a severely restricted array, Alex managed to work PY1ARS/4 (Brazil), 7X4AN (Algeria), and ZF1WD (Cayman Islands) on the 7MHz band! Not bad eh? Keep up the good work Alex...but does your wife have to wait until the bands have closed before she can hang out the washing?

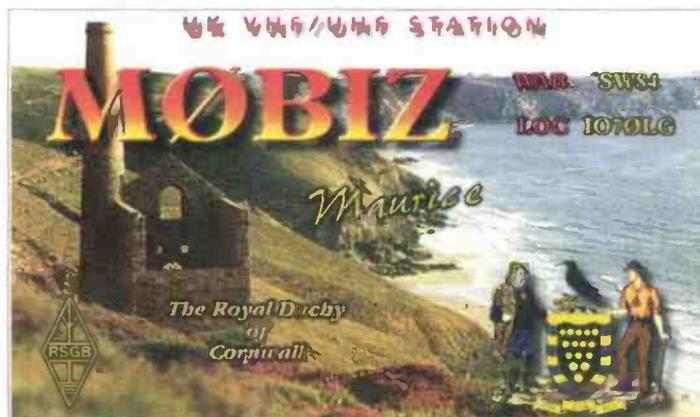
Alex's success reminds me of the time when I loaded up the aluminium rain guttering* on my house and worked three continents in an evening with 3W of c.w. on 7MHz. It really is surprising what distances can be worked using unusual 'antennas'! Welcome to HF Far & Wide, Alex.

*Editorial note: * Published as 'The Welsh QRP Club - Three Watts From A Drainpipe' in the April 1995 issue of PW.*

THE 14MHZ BAND

Up to '20 metres' now and over to Don McLean G3NOF in Yeovil for his 14MHz band report, who lists amongst many others his s.s.b. DX contacts with FG5FC (Guadeloupe) at 2217, 4S7BRG (Sri Lanka), RV0AX (Asiatic Russia), and 7Z1ZZ (Saudi Arabia) QSL via PO Box 16595, Riyadh 11747,

Just the business! Maurice MOBIZ is proud of his Cornish heritage and shows just how much with this colourful card which is used to QSL from his Truro QTH.



Saudi Arabia, all at around 1745. Also logged VK6MV (Australia) at 0808, YB1XUR (Indonesia) at 1750, and 6V1C (Senegal) at 0751UTC, QSL via 6W1QV.

A warm welcome to another new reporter now, in the form of Dave Collins GW0WVF of Penpedyrheol, Mid-Glamorgan, who says he's 'a bit of a DX fan'. Well Dave, your log certainly confirms that!

Using s.s.b. at around 100W output and a rotary dipole, Dave's log for the month of July shows contacts with JT1CO (Mongolia) at 1946, V44NEF (St. Kitts Island) at 2050, S92LB (Sao Tome & Principe Islands) at 1937, HS0/IK4MRU (Phuket Island, Thailand) at 1800, BA1DU (People's Republic of China) at 1844 QSL via W3HC, as well as VK6VWR (Australia) at 12.35, and ZF1PM (Cayman Islands) at 2340UTC.

Angie Sitton G0HGA in Stevenage has been having some rig problems lately, although she did manage to work some HF DX this month. She has listed AD4Z (USA) at 0044, DL9GMM/MM off the coast of Colombia at 0110, FY5YE (French Guyana) at 0143, as well as an old friend of hers, Fergus YV1NX (Maracaibo, Venezuela), the pair chatting away until the unearthly hour of 0250UTC!

Meanwhile, Alex G2FRY, the man with the washing line antenna, hooked (or should I say pegged?) 9V81Y (Singapore), EP2MKO (Iran), VK5GZ (Australia), HS0/G3NOM (Thailand) and FM5BH (Martinique Island) for his 14MHz log.

THE 18 & 21MHZ BANDS

Due to the unexpected hospitalisation of his wife, Ted Trowell G2HKU reports that he's had little time for the radio this month. Well Ted, we all wish your XYL a speedy recovery, so please pass on our regards old friend. (Best wishes

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from the Editorial Team too. **G3XFD**).

Ted did, however, manage to get onto the 18 and 21MHz bands, and has reported his c.w. contacts with K7KU (Wyoming USA) at 1500UTC... "the only station I could hear on 18MHz" says Ted!

Operations up on 21MHz provided Ted contacts with C4A (Cyprus), W1AW/0 (the ARRL station), VO1MP (Newfoundland), and LU1FAM (Argentina) all at around 1400UTC. Later in the afternoon Ted logged CO2OR (Cuba), 4Z5FW (Israel), 6Y6BA (Jamaica), JR4GPA (Japan), 8P0OV (Barbados) and ZP6CW (Paraguay).

Now down to Milton Keynes, and congratulations to **Sean Gilbert G4UC**, who has just received his Runner-Up certificate for the International QRP Day event in June. "It was nice to beat the Americans at something"...says Sean cheerfully.

On to Sean's log now which shows that he's certainly been busy on 21MHz c.w! He worked JQ3QYL (Japan) and K6BU (California, USA) at around 1000, KL7Y (Alaska) and NP3A (Puerto Rico) at 1200, 9V1YC (Singapore) at 1300, 4F3CV (Philippines) at 1400, LT1F (Argentina) and 6Y6A (Jamaica) at 1800, as well as P40HQ (Aruba Island, Netherlands Antillies) at 1900, EP2MKO (Iran) at 2000 and finally TL5A (Central African Republic) at 2240UTC.

THE 28MHZ BAND

Finally, there's just enough room for a very brief look at the 28MHz band. Don G3NOF mentions an s.s.b. contact with V51SG (Namibia) at 1544, while Angie G0HGA hooked up with FBC5PLC (France - special call for the World Cup) with just 2W, and Sean G4UC logged PP2FN (Brazil) at 1500 with LU9AUY (Argentina) and ZP6CW (Paraguay) both later at 2000UTC.

There have also been many openings via sporadic 'E' propagation on 28MHz during the past few months. These bring in stations from Europe at around a maximum of 2000km distant, but as we approach the winter months, keep a watch out on this band for the longer distance 'F' layer propagation.

It's also well worth listening on the International Beacon frequency of 28.200MHz. As the Editor **Rob G3XFD** (he finds

the beacons very useful) has told me "It's astounding how often you can still hear the beacons on 14.100, 18110 and 28.200MHz when they've progressively switched down from the high power to the 100mW output level"!

SIGNING-OFF

Well that's about it for this month, folks! Hope I managed to squeeze you all in okay! Our reporters seem to be a keen and busy lot on the h.f. bands!

THANKS TO ALL REPORTERS FOR THEIR VALUABLE AND VARIED INPUT TO THE COLUMN, WHICH CERTAINLY MAKES 'HF FAR & WIDE' WHAT I HOPE IS AN ENJOYABLE READ FOR PW READERS. AS USUAL, REPORTS AND INFORMATION, (PLUS PHOTOGRAPHS, BECAUSE I'M CLEAN OUT OF THEM!) BY THE 15TH OF EACH MONTH PLEASE. CHEERIO FOR NOW!

73 Leighton GWOLBI

FOCAL POINT

REPORTS & INFORMATION TO ME PLEASE.

GRAHAM HANKINS G8EMX, 11 COTTESBROOK ROAD, ACOCKS GREEN, BIRMINGHAM B27 6LE

E-MAIL: graham@ghank.demon.co.uk

PACKET: G8EMX @ GB75OL

GRAHAM G8EMX HAS ALL THE LATEST ATV NEWS FROM CLUBS AROUND THE UK AND ALSO OFFERS YOU THE CHANCE TO MEET HIM IF YOUR CLUB EXTENDS HIM AN 'INVITE'!

Every year in July, members of the **Ballymena Radio Club** visit Rathlin Island, which is off the coast of Northern Ireland, to mark Marconi's first transmission from the island to Ballycastle in 1898. The club usually set up on the h.f. and some higher bands, under the callsign **GB3MRI**, but to celebrate the centenary of Marconi's original Rathlin to Ballycastle signal (which an

insurance company needed to monitor passing shipping) the Ballymena Club decided to add Amateur TV pictures to their normal expedition this year.

Jack Moffitt G18DMX writes: "With my friend **Sam G18GJX** we tried for ATV using 1.3GHz (24cm), 10GHz (3cm) and 24GHz (1cm). Perfect colour pictures were sent from Rathlin Island to Kinbane Head on 3cm, with a return path on 23cm. **Ian Kyle (G18AYZ/M10AYZ)** President of the Radio Society of Great Britain was among the islanders on Rathlin, the pictures at Kinbane Head being watched by dignitaries from the local Moyle District Council".

Unfortunately, on the day, the 24GHz ATV link didn't work. Jack comments: "The problem was caused by a critical adjustment of the 24GHz local oscillator. We will be trying again when the weather improves. Meanwhile, the local ATV activity is sparse, I have sent pictures on 24cm and 70cm to **Fred G13TIJ** (near Lough Neagh), which is a 50km line-of-sight path. The expedition to Rathlin Island this year will be featured in the RSGB magazine *RadCom* so maybe this will boost the interest in ATV". Thanks for that up-date Jack.

LATEST ISSUE

The latest issue of the **British Amateur TV Club (BATC)** quarterly magazine *CQ-TV* dated August 1998, includes a list of recently licenced ATV repeaters, together with current applications as at May. On the 24cm band, 1.3GHz repeaters approved are **GB3AD** in Stevenage and **GB3VX** near Eastbourne. Also now approved is **GB3BG** (Sedgley, West Midlands) on 10GHz.

The latest details of all UK ATV repeaters and applications can be found at the RSGB Repeater Management Committee's web page <http://members.aol.com/rmcw eb/rmc.htm> To find the BATC web site, point your browser to <http://www.batc.org.uk>

Also featured in the August issue of *CQ-TV* is a 'High Performance ATV Transmitter for 13cm' by **Ian Bennet G6TVJ**. This 2.3GHz unit uses a commercial p.a. module, produces about 1.6W, needs no alignment and the feature gives the p.c.b. layout, although not actual size.

KENT TELEVISION

Chris Gibbs G8GHH is Secretary of the **Kent Television Group (KTG)** and Technical Co-ordinator for 24cm ATV repeater **GB3KT** (Isle of Sheppey). Posting a copy of their June newsletter to me, Chris adds: "Latest information

is that we have added another 3m to the mast at **GB3KT** and replaced the old Alford-Slot antenna with a new one. This has given improved results for almost all ATV stations who use the repeater".

The KTG newsletter Editor is **Paul Prior G8IXC** and the June issue includes off-screen pictures of recent activity, a report of the BATC's Coventry rally and an 'outsider's view of Amateur Television' which makes fascinating reading. The KTG plan to publish their newsletter quarterly, so I look forward to seeing the September issue, folks!

HOME COUNTIES

Radio controlled model cars, planes and boats could be regarded as a completely separate hobby from Amateur Radio, but ATV can result in these two worlds meeting. The **Home Counties Amateur Television Club** was invited to the Modelling Exhibition at Sandown Racecourse, so up went their display of ATV and a link with 24cm repeater **GB3HV**.

The Sandown exhibition had everything for the modeller. There were kits, complete model aircraft, boats, trains and engineering tools. The sight of the Home Counties ATV Club proved that there were lots of Radio Amateurs visiting the exhibition too.

Many had moved to model building and control to escape from what could be seen as the increasingly 'black box' nature of Amateur Radio. As ATV remains very much a construction speciality, the Home Counties appearance proved very welcome, with plans to show at even more model meetings.

The Home Counties ATV Club's repeater **GB3HV** (High Wycombe) is one of the UK's most advanced machines, and the Club's magazine *Line Our* shows what is involved in maintaining such a system. Some recent problems have been: 'Unstable when cold' fault on a masthead receive pre-amplifier'.

The mast camera developed a tendency to snag its long 'Pan & Tilt' umbilical cable on the camera housing clips. When this occurred the functions seemed to reverse, as the low power tilt motor readily reversed direction if stalled (to reduce the chance of damage). However, setting the view to near to the horizon and panning to the north was found to free the hooked cable.

The Home Counties ATV Group secretary is **John Stockley G8MNY**. John adds: "The teletext system on 'HV' is still holding its memory, but it has been months since any fresh pages have been uploaded.



Part of the Home Counties ATV Group exhibition display. The main TV picture shows GB2RS news via repeater GB3HV, with 'Hamtext' on smaller screen.

The teletext reception at Sandown was surprisingly good for the picture quality received, so the last timing adjustments seem to have worked".

TV TALK

If any Amateur Radio clubs around the UK would like a talk on ATV, please contact me, Graham Hankins GBEMX. My chat covers ATV on 435MHz and 1.3GHz 'in depth', a bit on 10GHz, and of course

repeaters. I'll also bring some typical transmitters and receivers along and all I need from an ARC is an overhead projector to be made available!

Before closing, my thanks to recent correspondents, by Packet and by post, who have commented favourably on the 'Focal Point' and other ATV articles in *Practical Wireless*. I enjoy writing them and it's nice to know some of you enjoy reading them! I will be answering your particular ATV

questions individually.

Finally, for this time, a reminder that the next ATV Contest is the International. This will be held over the weekend **September 12-13**, from 1800UTC on the Saturday, until 1200UTC on the Sunday, using all the ATV bands from 435MHz (70cm) up. So, if you are reading 'Focal Point' when this magazine is published, you have just enough time to have a go in the contest!

STOP PRESS!

Alan Kendall G6WJJ, keeper of 10GHz repeater GB3BG, came back from holiday two hours after I had posted Focal Point! However, with a bit of persuasion I've managed to squeeze this in:

The 10GHz ATV repeater GB3BG (Sedgley) will be switched on into service at 10am on Sunday 9 August.

SO, WITH THAT LAST BIT OF NEWS I'LL SAY ... CHEERIO UNTIL DECEMBER, KEEP SENDING YOUR ATV NEWS AND VIEWS TO ME, DETAILS AT THE TOP OF THE COLUMN.

73 Graham GBEMX

SCENE USA

PLEASE SEND ME REPORTS AND INFORMATION FOR THE JANUARY COLUMN BY 15TH OCTOBER.

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A HUNDRED YEARS OF RADIO - AN AMERICAN VIEW. THIS IS THE SECOND HALF OF THE ARTICLE STARTED IN PW APRIL EXPLAINING THE AMERICAN CONTRIBUTION TO RADIO AS WE KNOW IT TODAY. ED N0ED TAKES UP THE STORY FROM 1900 ONWARDS.

Sometimes we look back at predictions and smile at their inaccuracy or shortsightedness. For example a writer from the mid-1960s confidently said that coins and notes would no longer be needed for money in 2000 because we would use electronic cash for everything.

He also predicted that there would be very few private vehicles on the roads, and no traffic hold-ups, since public transport would have reached perfection. I'm still hopeful!

Some forecasts are, however, uncannily accurate. A 100 years ago (actually 1897),

Professor W.E. Ayrton, lecturing in London, suggested: "Some time the day will come, when we are all gone, when copper wire and gutta-percha cables will be seen only in museums; then a man who wants to talk to his friend and does not know where he is, will call him with an electrical voice. He will call 'Where are you?' And only a man possessing a similarly tuned ear will be able to receive the call. The friend will answer 'I am at the bottom of a coal mine near Newcastle,' or 'I am flying across the Andes', or 'I am sailing across the Pacific'.

Make a few allowances for the quaint terminology, after all, there were hardly any telephones then, let alone 'phone numbers, dialling codes and communication by radio (as in cell 'phones). It was quite a leap of imagination to foresee such contrivances in aeroplanes (not yet invented!)

What a remarkable vision of a future that we are now only just achieving! Who would like to try and be as accurate as this about communications and travel 100 years from now?

FROM INDIVIDUAL TO TEAM EFFORT

We expect things to develop rapidly these days. A 100 years ago, there was great expectation of change, although inventions perhaps took longer to appear. There are many differences between now and then, but there's one which I think is

especially important.

In the first 30 or so years of this century, a single individual could make significant contributions to science and technology. (I'll be mentioning some Americans who made discoveries in radio with limited resources). Things changed between the world wars and now it is rare for a person to achieve technological success without the backing of a large organisation.

There are exceptions, but teams of researchers (and plenty of money) contributed to most of the electronic items that we use today. This is no more clearly exemplified than in the invention this century of the valve and the transistor. The valve (or vacuum tube), particularly in its early development, was the work of several men working individually.

The transistor was invented as a team effort, under the aegis of a large American company. So, let's look more closely.

DIODES AND TRIODES

The vacuum tube diode is more or less a light bulb with a separate, extra electrode (the anode). John Ambrose Fleming, a British scientist who worked for both the Edison and Marconi companies, applied the diode to the detection of radio signals. His patent on the device in 1904 set the scene for an even more interesting accomplishment.

The hero of the story was Lee De Forest (see Fig. 1), an American born in 1873. He experimented with the diode, but added a third electrode between the filament (which is now referred to as a cathode) and the anode. This 'grid' had been proposed earlier, but De Forest carried out the work which made the triode into an amplifying device.

You should not underestimate the importance of De Forest's achievement, which has been called the 'foundation of the age of electronics'. Until the invention of the triode, electrical signals could never be made stronger, only weaker. The nearest thing to amplification was provided by the relay, which could take a simple on/off signal and reproduce it for transmission to the next telegraph station.

The availability of De Forest's triode meant that any form of varying signal could be made larger and the process could be repeated (almost) indefinitely. The smallest radio or voice signal could be amplified as much as needed, and many different circuits could be built with these new valves. Some early triodes are shown in Fig. 2.

So, how does the triode work? Without getting into the theory, about which many books have been written, here's a simple explanation. The cathode is heated by passing a current through it (a filament), or by means of a very close 'heater' circuit (a later development). A battery is connected between the electrodes, and then an electrical current (a stream of electrons emitted by the hot

Fig. 1: Lee De Forest, inventor of the triode valve.

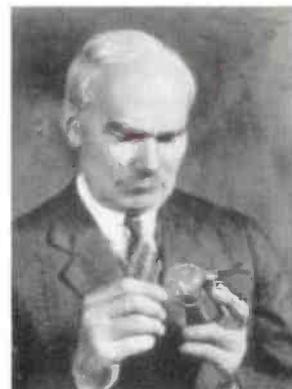


Fig. 2: De Forest's early triodes.



RadioScene

cathode) will flow from cathode to anode.

The grid, or mesh of wire, can be made to control the current flow. A small voltage applied to the grid will cause a large variation in the flow of current from cathode to anode.

De Forest established the circuit conditions under which this amplification takes place, and called his invention the audion, now known as the triode. He received a patent for the audion tube in 1906. Reception and transmission of radio was revolutionised, without this invention, radio would have remained an interesting, but not particularly useful phenomenon.

AMPLIFICATION & OSCILLATION

The process of amplification means that oscillation is also possible. By feeding some of the amplified signal (in the correct phase) from anode to grid, a circuit will increase the size of its own signals until their voltage is as big as the battery can handle.

A valve operating in the way outlined can be encouraged to create a signal of a particular frequency, and not others, by using a tuned circuit. De Forest developed this circuit in 1912, and called it the Ultra-Audion.

By using the ultra-audion, oscillators could generate relatively stable and pure signals in the radio spectrum. In the decade following De Forest's development, valve oscillators almost completely took over as radio frequency signal sources in transmitters.

De Forest had a hard time receiving deserved recognition for his work. The Marconi company claimed that the

triode was merely just an improvement on the diode and should not receive a separate patent.

He also lost a claim for the invention of the triode oscillator, and the courts condemned his: "valueless patents, in particular a three-electrode lamp called an 'Audion' which has proved to be without any interest whatsoever"! It was only towards the end of his life that De Forest's contribution to radio and communications became more widely appreciated.

PROLIFIC INVENTORS

There were many developments in circuitry following the triode's invention. In particular, the tetrode and pentode were invented around 1930, adding extra grids, and improving performance. Some of those working with valves were prolific inventors, and one of the most famous was **Edwin Armstrong**, an American from New York City.

Armstrong claimed to have invented the 'regenerative' receiver in 1913. I should add that this was disputed by De Forest and although the courts decided in favour of De Forest, it's still unclear who was first.

The idea of regeneration was that a controlled amount of feedback was taken from the signal output of a valve, and fed back to the input. By holding the amount of feedback below the level at which oscillation occurs, a large increase in gain can be obtained. This circuit was introduced into domestic radios of the 1920s and 30s, increasing performance of receivers which were still rather low in gain.

Of course, critical adjustment was needed to ensure that oscillation really did not take place. This was often beyond the skill level of listeners and impromptu transmitters were created by people tuning in and adjusting their radios incorrectly. The antennas of those days were

usually long wires in back gardens and so it was easy to cause unwitting havoc with a neighbour's reception!

ANOTHER MILESTONE

Another radio milestone, in 1918,

was the superheterodyne ('superhet') circuit. Again, there is controversy about the real inventor, but Armstrong was heavily involved in its development.

The theory is that a range of radio frequencies to be received is converted to a single (intermediate) frequency by means of 'heterodyning', or mixing with an oscillator signal. It's much more straightforward to deal with a single frequency than a wide range and this principle is used by virtually every radio in the world today. In our amateur rigs, the superhet method is normally used for both transmitter and receiver sections, often with several frequency conversions, not just one.

Armstrong's next idea was the 'super regenerative' radio, invented in 1920. This was a receiver deliberately made to oscillate (but not at the listening frequency), thus having the huge 'gain' associated with a normal oscillator. This had limited popularity, mainly because of the interference-causing potential, but is still occasionally used in v.h.f. circuits. The gain was a bonus in the days when valves were extremely expensive and sparingly used.

In 1928, Armstrong suggested that Frequency Modulation (f.m.) would be an important technology and in 1933 he patented several circuits for wide-band f.m. He was involved in starting a US network of f.m. broadcast stations at around 50MHz, although this project was interrupted by the Second World War and legal battles. It is significant that our major broadcast services now use f.m., and that most radio amateurs have their first exposure to v.h.f. through repeaters on f.m.

There are a number of amusing anecdotes about Armstrong, who must have been quite a colourful character. He had no fear whatsoever of heights and would climb any radio tower that happened to be nearby.

Armstrong married the secretary of **David Sarnoff**, president of the **Radio Corporation of America (RCA)**, see Fig. 3. He, Armstrong, climbed the tower on the RCA building in Manhattan, to make adjustments and repairs. The powers-that-be were not pleased to have this famous inventor risking his life in such a public way!

SILICON STARS

I'll skip through a whole swathe of American developments, to

one of the most important inventions of the century. Surprisingly, 50 years ago, the transistor was announced to an indifferent world. There was little realisation that this device would lead to fundamental changes in our society.

There were several precursors to the eventual creation of the world's first transistor. In 1923, some sort of amplifying semiconductor was made in Russia, and in 1928, a German described something that we would now call a field-effect transistor (f.e.t.). There were also other developments in the 1930s which laid the groundwork for eventual success.

The main reason none of the previous research came to fruition was that the purity of the materials used was not high enough. In addition, the theories that had been advanced to explain some of



Fig. 4: The first transistor, invented at Bell Labs.

the effects being monitored were never fully researched was that the war imposed an urgency on other fields of electronic endeavour.

The transistor was invented by three men working at **Bell Telephone Laboratories** in New Jersey, these were; **Walter Brattain**, **William Shockley** and **John Bardeen**.

The youngest of the team was Shockley, although he was team leader. They focused on trying to understand how certain semiconductors behave next to a metal and concentrated on explaining everything in terms of underlying theory. Amplification was uppermost in their minds; maybe they could find a way of achieving similar effects to those of valves, invented almost half a century

Fig. 5: A first-day cover celebrating Brattain, Shockley and Bardeen, inventors of the transistor.



ED TAYLOR NOED LOOKS BACK AT AMERICAN RADIO PIONEERS

Fig. 3: Edwin Armstrong with his new bride on their honeymoon, and the wedding present he gave her: an early portable radio. Her reaction to the gift is not known!



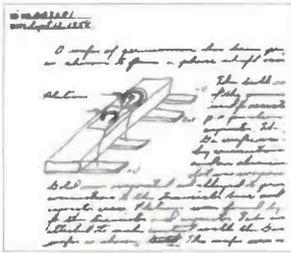


Fig. 6: Jack Kilby's notebook, in which he devised the first integrated circuit.

before.

Semiconductors were already known, having properties in between those of conductors, such as copper, and insulators, such as porcelain. The first transistor, a point-contact device, although making use of semiconductors, was really only a forerunner of the junction transistor, which started the real revolution.

The point-contact transistor has two electrodes next to each other on a germanium ingot. It achieved an amplification of about 100 using voltages much lower than those in valves, and without anything corresponding to cathode heating. The first transistor, from 1947, is shown in Fig. 4.

Shockley developed the theory as to how the point-contact transistor works, and proposed replacing the point contacts by layers of n-type material (containing an excess of electrons) and p-type material (containing an excess of 'holes', that is, lack of electrons). This led to the junction transistor, which was easier to manufacture, and formed the basis for electronic

developments in the 1950s onwards.

The three inventors continued their research, and were awarded the Nobel Prize for their work. They were also commemorated in 1973 on US postage stamps, Fig. 5.

CHIP OFF THE OLD BLOCK

Progress has continued at a rapid pace since the creation of those first transistors. The f.e.t. (which Shockley initially thought he would be developing) came in 1958, and that year also saw the invention of the integrated circuit.

Jack Kilby, working for Texas Instruments, made an elementary chip out of a block of silicon. An extract from his notebook in Fig. 6 shows the way his thoughts were going.

It didn't take long for the silicon chip to become smaller and smaller, and to appear in many household gadgets. Now our society could not operate without it!

THIS SHORT LOOK HAS JUST SCRATCHED THE SURFACE OF US CONTRIBUTIONS TO ELECTRONICS THIS CENTURY. LET ME KNOW IF YOU WOULD LIKE TO HEAR ABOUT ANY OTHER DEVELOPMENTS. DON'T FORGET THE ANNUAL HF CONTESTS, ORGANISED BY CQ, THE AMERICAN HAM RADIO MAGAZINE. THE SSB CONTEST IS ON 24-25 OCTOBER, AND THE CW ONE IS 28-29 NOVEMBER. YOU SHOULD FIND PLENTY OF DX AND REMEMBER TO SEND SIGNAL REPORTS AND ZONE (UK IS 14).

73 Ed NoED

RADIO 'SCAPE

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MIKE RICHARDS G4WNC REPORTS ON A NEW DIGITAL SUPER HIGHWAY THAT COULD BE SET TO 'INVADE' ALL OUR HOMES, AS WELL AS TAKING A LOOK AT A NEW VERSION OF THE ALREADY POPULAR JVFX PROGRAM AND PROVIDING AN UPDATE ON 'CHAT'.

As a result of the corporate giants competing to bring the

digital super highway into your home there have been a host of new technical developments designed to make use of just about every route into your home. The latest to hit the streets or at least the Patent Office is what's become known as the Digital Power Line.

As the name, Digital Power Line, suggests this is a system that enables digital signals to be sent down ordinary domestic power lines. This sounds almost too good to be true and in many ways it is.

In order to get all that data to your house the supplier will have to superimpose the digital signal on top of the normal mains current. To do this the suppliers will have to add a 1MHz or greater signal at a power of around 50mW. Now this may not sound very much, but if you think about how much mains wiring there is you might just start to realise that the potential for radio interference from this system is rather daunting!

If you've ever tried any DX work you will already be aware of the incredible distances that can be worked with extremely low powers and quite modest antennas. That just goes to reinforce the worry that the Digital Power Line system is likely to make a real mess of our precious radio spectrum.

Although the data rate might well be just around 1MHz the harmonics from this data stream are likely to spread right across the h.f. spectrum. Whilst I'm sure the suppliers will fit some form of low-pass filter at the premises of all who take the data service, what about the rest of us?

There's also the question of lamp posts. If you think about it, a lamp post could well make a very effective vertical antenna, which could effectively surround your house with r.f. noise!

The potential problem has been recognised by many of the radio organisations and the Radio Society of Great Britain (RSGB) is doing a lot of work to defend the case for the Radio Amateur. My only fear is that there are considerable profits at stake and this might just get bulldozed through.

If you want to support the case from a Radio Amateurs' point of view I would suggest you get in contact with the RSGB. I might be overstating the problem, but the data that's been made available so far suggests I may well be justified in my fears.

UPDATED CHAT

The other month I was pressing you to have a go at Internet Relay Chat (IRC) using one of the many IRC clients that can be found all over the Internet. Following that review Reg Thomas G1TEY contacted me to let me know about an interesting variant of IRC called ICQ.

The ICQ program is a time limited demo and can be downloaded from <http://www.mirabilis.com> It's available in versions for Windows '95, Windows NT,

Windows 3.1 and Macs so there's no excuse for not having a go!

Once the software's installed the program will register you with one of the network of ICQ servers. Once this has been done you will receive a unique ICQ number and a secret password.

Where the chat system really scores is in the way you can create your own personalised friends and associates list. This has to be other ICQ users but, as you will see, it's very powerful.

Assuming you have some friends on the Internet also using ICQ when you go on-line and run ICQ it will run quietly in the background running periodic checks to see if any of your friends are on-line. If it does find one of your friends it will let you know that they've just come on-line. You can then very easily send them a message or maybe a file or even the latest hot URL.

Providing you have some friends to link-up with it is a very powerful and simple way to keep in touch and chat. You could use this for your local radio club as an on-line chat facility - maybe for problem solving or question and answer sessions.

One of the real strengths is the ICQ program's ability to provide a high speed international chat system. If you've thought of any other neat uses for this system please drop me a line.

NEW JVFX

At last it's here, a brand new Windows based version of the famous JVFX. To match the programs total transformation comes a new name - JVComm32. This lines-up with the program's new lease of life as a full blown 32bit application.

The transformation is so complete you really have to view this as a completely new program rather than an

Fig. 1: Eberhard Backeshoff's web page.



RadioScene

upgrade. Gone is the Hamcomm type comparator interface and in comes decoding via a standard sound card. This is a great step forward and makes it very cheap (providing you have a PC) to try your hand at FAX and SSTV - so there's really no excuse for not having a go!

In addition to sound card decoding you have the option to use any one of a number specialised hardware decoding systems. Typical examples being EasyDSP, PTC-II and HariFAX.

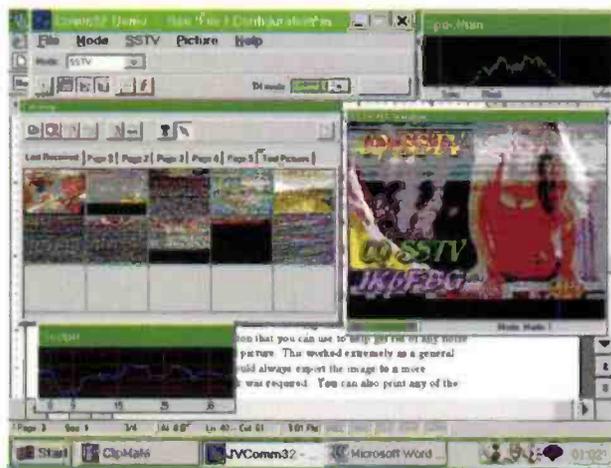
Loading the software is dead easy thanks to the standard Windows '95 software installation compatibility. When installed the program takes up around 3.5Mb of hard disk space.

The first thing you need to do when you run the *JVcomm32* program is decide the interface type you want to use, which for most I'm sure will be the sound card. You are then presented with a top line menu and a blank receive screen and you're about ready to get going.

If you're new to FAX or SSTV work then by far the best course of action is to start by listening. This will get you used to using the program and give you a good insight to the way the mode is used so that you can go on air without causing offence!

When you get to tuning around you will find that *JVcomm32* has a very effective spectrum analyser type tuning display. I found that this worked extremely well indeed and appeared to have a much faster response than the old *JVFAX* system.

Fig. 2: The new *JVcomm32* program receiving an SSTV image.



One thing you may have a problem with is synchronisation of your PC's internal clock oscillator with *JVcomm32*. If this is out of line you will find that any FAX image will be received with a distinct slant. In fact you may find this is so bad that you can't recognise a picture at all - as it was in my case.

Fortunately the author has a simple solution to this problem in the form of a synchronisation button on the top line menu. When you hit this you are presented with a simple explanatory help panel and the mouse cursor turns to cross-hairs.

To correct the slant all you have to do is place the cursor at the top edge of the image and then pull it down tracking the edge of the image. Once you've done this *JVcomm32* will automatically re-calibrate itself to align with your PC's clock.

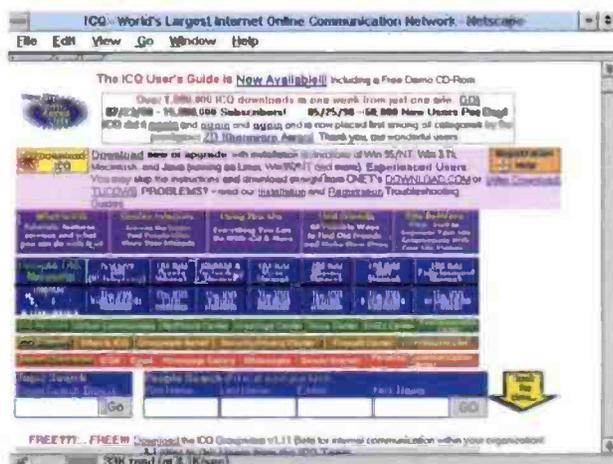
If you want to get this set-up really spot-on you could try using one of the many standard frequency stations as the timing reference. My favourite is to use MSF Rugby on 60kHz, as this frequency is relatively interference free.

To use this type of signal you need to set the program for hiFAX reception with a drum speed of 60rpm. You then tune-in so that you start to see a solid edge appearing.

Next you need to set the synchronisation so that the edge of the image is exactly parallel with the edge of the screen. Once this is done *JVcomm32* automatically stores the new settings so that they're available for use next time you run *JVcomm32*. Having completed this calibration exercise you really should be ready to get stuck in to FAX and SSTV.

For image communications I think you will find that most amateurs have moved to SSTV as the system has become pretty sophisticated and you can send and receive pretty good quality colour pictures very easily. The FAX mode, whilst not being a particularly popular amateur communications system can be really handy for getting up-to-date weather data in the form of FAX charts.

By keeping an eye on FAX charts you can usually get early warning of impending high pressure areas. You can also use the charts to help predict the direction of the 'lift' so you can be there first with your antenna already on about the right heading.



this type of application. You should be able to find it by using one of the many Internet search engines and just typing in *Lview*. If you can't find it go to <http://winsite.com> and head for the graphics section of their Windows '95 programs.

Once you're into the SSTV mode you will find that *JVcomm32* includes some really handy features to make SSTV as easy as possible. First of all there's a 15 image thumbnail display with tabs that enable you to look through the last 15 received images, a stock of five pages each containing 15 images and a further page with a set of handy test images. This is very comprehensive support indeed and makes it dead easy

Fig. 3: The ICQ home page.

If you do decide to give SSTV a go, one of the tools you will need is some form of image manipulation so that you can create your own images. One really powerful extra is to get yourself either a digital camera or maybe a scanner. Both are dropping in price at an incredible rate and can prove fun for the rest of the family as well as your hobby.

Once you have the image digitised in your computer you then need to be able to manipulate it so that you can crop the size and some text (i.e. call sign) or make other changes. Although *JVcomm32* doesn't include any image manipulation tools it does have a handy facility where external programs can be added to the main menu options.

To add external programs you just select the External programs tab from the configuration menu and type-in the name and location of the program you want to add. Once complete, you can then run just about any program you like from within the *JVcomm32* program. This is really a much better idea than trying to design a new graphics package for bundling with the program.

By the way, if you want an easy to use and fast graphics program try *Lview* - it's ideal for

to build-up a library of great images for use on air.

You also have the facility to move images from the clipboard into *JVcomm32* and you can even import data from a TWAIN compliant device. This means that you can directly import from most scanners and digital cameras.

Moving onto the SSTV tuning options, *JVcomm32* utilises the excellent spectrum analyser type display I described earlier plus a handy oscilloscope system that's more appropriate for SSTV work. Just to make everything really simple *JVcomm32* will automatically detect a valid SSTV signal and start the decoding process.

If you're stuck with a noisy signal *JVcomm32* won't lock on to then you just have to hit the QRM button and it works through the interference. It really does work a treat.

Once you've received your image there is a 'denoise' button that you can use to help get rid of any noise spots that may be spoiling the final picture. This worked extremely well as a general purpose noise reduction and you could always export the image to a more

sophisticated program if more work was required. You can also print any of the images if you wish.

As to the future, the author, **Eberhard** is planning to make the program even more impressive. Most of the changes are aimed at the FAX side of the program where he is working on a scheduler to provide automatic time driven operation of *JVcomm32*. This will then be supplemented by automatic movie generation for pictures received from geostationary satellites such as the *Meteosat* series. This will be great for spotting important weather change that could bring enhanced propagation.

For the low orbiting satellites Eberhard's planning to include histogram equalisation to tidy-up the received images. Eberhard is also pondering whether or not to include a FAX transmit mode but progress on this will depend on how much interest is shown.

As you've probably gathered I was very impressed with this revitalised FAX/SSTV program from Eberhard Backeshoff. If you want to give the program a try you can find a demo version on Eberhard's Web site at http://ourworld.compuserve.com/homepages/eberhard_backeshoff/ My thanks to Eberhard for continuing to produce excellent software for the Radio Amateur.

SPECIAL OFFERS

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

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

The software is only available as a set of five disks as follows: IBM PC Software (1.44Mb disks): **Disk A** - *JV FAX 7.1*, *HAMCOMM 3.1* and *WXFAX 3.2*; **Disk B** - *DSP Starter plus Texas device selection software*; **Disk C** - *NuMorse 1.3*; **Disk D** - *UltraPak 4.0* and **Disk E** - *Mscan 1.3* and *2.0*.

THAT'S IT FOR ANOTHER MONTH, SO UNTIL NEXT TIME 'HAPPY COMPUTING' AND PLEASE LET ME KNOW OF ANY INTERESTING WEB SITES YOU COME ACROSS.

73 Mike GAWNC

BROADCAST

REPORTS & INFORMATION TO ME PLEASE.

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PETER SHORE ASKS THE QUESTION HOW DO YOU TELL THE TIME USING YOUR RADIO SET? AS WELL AS ROUNDING-UP ALL THE LATEST BROADCASTING SCHEDULES FOR YOU.

How do you tell the time with your radio set? Simple, just tune into one of the time signal stations that operate around the world. Time stations are controlled by atomic clocks and send out regular time code in pulses that can be input to devices that run everything from the radio-controlled clocks, which you can buy from a number of mail order catalogues these days and drive critical equipment in radio stations.

Now you wouldn't think that anything run by an atomic clock could possibly go wrong, but that's not always the case. On a Thursday morning in early August, MSF (M Standard Frequency) Rugby - Britain's atomic time signal station - suddenly said that the time was 30 minutes earlier than it actually was! This caused computers at a number of broadcasters which rely on MSF for time code to set their internal clocks half-an-hour out, thereby causing programmes to fail and switching controls to happen at the wrong time. Rugby is looking in to what went wrong.

The MSF system operates at 60kHz, way below the bottom of the long wave broadcast band, but there are a number of time stations world-wide which operate at high frequencies that can easily be heard on an ordinary radio set. For example, tune to 5.004, 10.004 or 15.004MHz and you'll probably hear the time pulses from RID/RTZ in Russia. Or try 5 or 10MHz where a number of time signal stations around the world operate.

Time signal stations provide a great way of calibrating tuning scales, as they are always dead on frequency and it's usually quite easy to find one of the stations at any time of the day or night. It's also much cheaper to

get time this way than from a Global Positioning System!

STATION HEARD

Don Vickrage wrote to me from Boscombe in Dorset reporting on a station he had heard in the early summer on 9.7MHz at 2018UTC. The station was in English, and identified as **HSK9, Bangkok**.

I have checked with my current listing for **Radio Thailand**, and there is a 30-minute transmission at 2000UTC on 9.68MHz. I wonder whether this is what Don heard.

Don says that he wrote to the station with a reception report, using the address he noted from the on-air announcements which was given as **Radio HSK9, English Section, Short Wave, Bangkok** - but his letter was returned marked 'address incomplete'. If anyone thinks that Don's station is something other than Radio Thailand, please let me know.

CHINESE COMPETITION

Regular readers will know that I have included details about **China Radio International (CRI)** competitions from time-to-time. The latest copy of the station's magazine has just arrived and it includes an article written by one of the winners of a contest last December about Macao.

Walt Smyth, a CRI listener in the USA won an all-expenses-paid trip to Beijing and Macao designed to show that the 'one country, two systems' policy will be applied to the Portuguese colony just as it is now being applied in Hong Kong. Walt recounts his surprise at finding that the similarities between Chinese and American people far outweigh the differences and that there is a huge anti-litter campaign in Beijing.

So, the message is clearly enter the competitions you hear on radio, as there were winners from Japan, Portugal, Russia, India and Jordan as well as Walt from the USA. And, according to CRI, 270,000 entries were received.

INTERNATIONAL SERVICES

Radio New Zealand's domestic and international services face cutbacks because of the economic difficulties the Pacific nation is facing at the moment. It looks as though some of the programmes heard in the international service may be replaced by more domestic output, while some of the more



costly domestic programmes in turn may be replaced by cheaper material such as music-based programming. Check out Radio New Zealand International's new web site at www.rnzi.com (although it was not working as this edition of *Practical Wireless* went to press).

If you would like to brush up on your Greek, tune in to the **Cyprus Broadcasting Corporation (CyBC)**, which has short wave for half-an-hour each Friday, Saturday and Sunday. The programmes are beamed towards the UK from the BBC transmitting station on Cyprus which is run by **Merlin Communications**. The CyBC is on the air at 2215 on 6.18, 7.205 and 9.76MHz.

Radio Bangladesh has English at 1230 to 1300 and 1815 to 1900 on 7.185 and 9.55MHz, with the **Voice of Islam** appearing on the same channels between 1745 and 1815.

Voice of Turkey will be marking the 75th anniversary of the founding of the Turkish Republic during October, with programmes concentrating on how Ataturk's dictum 'Peace at home, Peace in the world' has been used in Turkish policies over the past three-quarters of a century. Tune into *Turkish Legacy in Europe* each Monday and *Prominent Turks in History* each Tuesday to explore more of Turkey's contemporary history.

English from Ankara is on the air: 0300-0400 on 9.655, 17.705; 1230-1330 on 15.185, 15.29, 17.83; 1830-1930 on 9.445, 11.765 (u.s.b.); 2030-2130 on 7.21 and 2200-2300 on 9.655MHz.

Radio Tajikistan from Dushanbe has English beamed to Asia only, on the air at 0345-0400 on 7.245, 9.905 and 11.62MHz and then at 1645-1700 on 7.245MHz only.

THAT'S ALL FOR THIS TIME BUT BE ASSURED THAT I'LL CONTINUE TO BRING YOU UP-TO-DATE INFORMATION THROUGHOUT THE COMING YEAR, ALLOWING YOU TO KEEP ON TUNING THE BROADCAST BANDS AND FINDING THE STATIONS YOU WANT! SO, UNTIL NEXT MONTH, GOOD LISTENING!

Peter

FREE ADVERTS

Now's your chance to send in a photograph of your equipment (a good idea if it's really unusual) to accompany your advert. Please note that all photos will only be published at our discretion and are non-returnable.

When sending in your advert, please write clearly in BLOCK CAPITALS up to a maximum of 30 words, plus state your contact details. Please use the order form provided.

Bargain Basement

Advertisements from traders or for equipment that is illegal to possess, use or which cannot be licensed in the UK, will not be accepted. No responsibility will be taken for errors.

You should state clearly in your advert whether the equipment is professionally built, home-brewed or modified. The Publishers of Practical Wireless also wish to point out that it is the responsibility of the buyer to ascertain the suitability of goods offered for purchase.

For Sale

Amp Sagra 600, ZX4CX250B, 400V & 2m (144MHz) excellent condition, £550 o.n.o. IC-255E f.m. used for Packet, £110 o.n.o. Tel: Mike on Epsom (01372) 810612.

Antenna Tower, 32ft, two sections, 1 x 15ft, 1 x 17ft, galvanised steel lattice, base, 3ft x 3ft, top: 14in x 14in, supports for 2in mast, dismantled, £170 o.n.o. Tel: Gerry G7VJV, (01296) 432234, leave message if we're not in.

ADR AR7030 Plus, mint, £600, Tel: 0141-562 4571.

AR7030 general coverage receiver plus retro upgrade fitted filters (displayed) 2.1/4.0/4.4/5.1/6.3/9.5kHz, remote control power supply, all as new, £550, Tel: (01278) 783061.

Books for sale, VHF-UHF Manual Fourth Edition, as new, £10, including postage. 1995 Edition **RSGB Amateur Radio Call Book**, £6, including postage. Tel: John Noble (01634) 233058.

CapCo mag. loop for 10/15/20m (28/21/14MHz) with control box, instructions and 30ft cable, £75, Tel: Leeds 0113-266 3846.

Charger unit, 12 & 24V, variable, up to 120A each channel, heavy duty, cabinet enclosed, very high spec, three phase input, constant voltage or current, £100. Details on request. Tel: (0976) 745179 or (01886) 833655. E-mail: flexaco@zoo.co.uk

Circuit and details to convert Communique model HX 507U for 70cm (430MHz). Details and software to run HAMFAX with Commodore 64 for Packet radio. Tel: John Davies (01524) 414820, after 5pm.

Collectors item, ex-Royal Navy reel-to-reel tape recorder, commissioned 1960, Ferrograph deck, complete with its original spare parts kit which contains a Morse training tape, £50 o.n.o. Tel: Wareham (01929) 556142.

Collins receiver filters F455F15: Kokusai mechanical filter - MF 455, 10 CK, RS 456, 009 BNC socket - twin plugs, 50Ω RS 488 - 517 BNC - BNC lead cable, 50Ω. Contact Peter Fernando at No. 67 Church Road, Kandana, Sri Lanka.

Complete station: Collins KVM380, Cushcraft beam, rotator L/P, filters, all coaxial connectors, operating manuals, inspect and collect the lot for £2100 o.n.o. Tel: Dublin (01) 8339031.

Computer bits: SVGA screen, £26 VGA, £20. Mono VGA, £5. Keyboards £350. Also Grundig Satellit 1000 radio, £40.00. Radio swaps welcome - 62 set or ARC-44 anyone? Other computer items available. Page Pete on 0432-570 2285. E-mail: petagus@silicone-alley.com

Crystal set, raro, five range 'Fellowcryst Super', in oak cabinet, complete with original instructions, correct BBC

headphones, in excellent working condition, £235. Oscilloscope, Solastron CD52, quality bench type, operating manual, g.w.o., £70. Tel: (01482) 887938.

Datong Morse Tutor, complete with personal earphone and battery, boxed, as new, £35. Morse books: *Secret Of Learning Morse Code*, *Introducing Morse Code*, *Morse Code For Radio Amateurs*, as new, £6. Write to 14 Rastleigh Avenue, Colbrook, Plympton, Plymouth, PL7 4DA or Tel: (01752) 330490.

Desktop antenna, 100-1300MHz, cost £50 will accept £28. Howes Tuner CTUB, only £20. Tel: Frank (01295) 670108.

Drake C line late model, R4C T4XC p.s.u. M54 extra filters Sherwood 2.1+1.5 spare valves, all leads, good condition, buyer tests and collects, £500. Tel: (01225) 753166.

Eddystone 840A, good condition, £110. Yaesu FT-200 transceiver, £115. MFJ tuneable d.s.p. filter, £100. Psion 3c palmtop computer, 2meg RAM, plus 51k flash memory, £150. Genuine reason for sale. Tel: John G3DHV QTHR, (01892) 664960.

Era Microreader external display, as new, £100. Yaesu FC-102 a.t.u., £195. SP-102 speaker, £45. Yaesu MD1 desk mike, as new, £60. Cushcraft R7000 vertical, £225. CapCo Magloop antenna, £110, all boxed. Tel: Norfolk (0468) 756762.

FDK PLL transceiver, MULTI-700EX, excellent condition and in g.w.o., frequency range 144-145.987MHz, 2m (144MHz) f.m., 1-25W, £110, includes postage. Tel: John Noble (01634) 233058.

FL-2102Z h.f. amp, 160-10m (1.8-28MHz) including VVARC bands, new 572B valve fitted, excellent condition, handbook, £550. Explorer 1200 Dentron 3kW a.t.u., £220. Icom SP3 speaker, £45. Daiwa 144MHz (2m) s.w.r./p.w.r., matching unit, £40. Tel: Norfolk (0468) 756762.

FRG-7700 h.f. receiver, g.c., £200 o.v.n.o. Tel: Ray on Billericay (01277) 625649, evenings and weekends.

Front panels, FT-757II, £10. IC-728, £10. FT-736R, £15. IC-970, £25. IC-575, £15. TS-940S, £25. Heavy duty rotator with preset, £165. 160-10m (1.8-50MHz) vertical, £175. Meteor 600MHz bench counter, £55. MX294 70MHz (4m), £50. Tel: Watton (01953) 684305.

FT-101ZD MkIII f.m., £250. FRG-100 f.m. and p.s.u., £300. Yupiteru MVT-7100, £175. Icom IC-207H, £250, buyer collects. Tel: GM4DHJ (Scotland) 0141-885 2022.

FT-840, mint condition with manuals, £55 o.n.o. FT-50R dual-band hand-held, box, manual, extra battery pack, £180 o.n.o. Tel: (01254) 814009.

Grundig Satellit 600 professional receiver, mains, batteries, d.c. operation, a.m./f.m. bands, s.w. 18-26.1MHz, s.s.b., l.f.o., preselector, etc., excellent condition, £100. Tel: (01278) 783061.

Hand-held scammer, NetSet PRD-44, 68-512MHz with gaps, includes airband, spare battery case, and manual, £85. Kenpro KT44, 433MHz hand-held transceiver, spare battery case, d.c./d.c. converter, manual, boxed, £75 postage extra. Tel: Ian G7BZH QTHR, Cumbria (01229) 582867.

Heathkit model RG-1 general coverage receiver, valve model, 600kHz-32MHz, in near pristine condition, complete with Daystrom G multiplier GPM-16 Daystrom Ltd. Tel: Joe on Barnstaple (01271) 371836, after 6.30pm.

IC-706 MkII with AT180 auto a.t.u., c.w. filter, voice unit, balance of MLS, five year warranty, £700. TS-700G v.h.f. multi-mode with optional vox unit, £200. FC-757 auto a.t.u., £175, buyer collects. Tel: Glos (01453) 765406.

Icom IC-211E base, 2m (144MHz) multi-mode, mint and boxed, £250. FT-707 h.f. TX/RXZ, £250. TS-940S plus SP-940, mint and boxed, £850. Tel: (01722) 743270.

Icom IC-290E, 2m (144MHz), multi-mode, 25W, c.w., spare mic and spare d.c. power leads, v.g. c., £250 o.v.n.o., buyer collects or P&P extra. Tel: Norwich (01603) 478941.

Icom IC-706 MkI, h.f./ch.f. transceiver, as new, boxed, £600 o.v.n.o. Trio TS-9305 transceiver, good condition, boxed, £500 o.n.o. Tel: Barry G3WVSU (01446) 738756.

Icom IC-706 MkII h.f. transceiver, 2 & 6m (144&50MHz), with optional d.s.p., 350Hz c.w. and RTTY filter, 1.9k, s.s.b. filter plus voice synthesiser, boxed, as new, forced reluctant sale, £750 o.n.o. Tel: Tony on London area (01322) 307881 for details.

Icom IC-720A, 100W transceiver, IC-PS15 power supply, IC-SP3 matching speaker, all boxed, excellent condition, manuals. Trio AT-230 a.t.u. Icom set, £450, Trio, £145. Tel: John Laster on Herts area (01707) 872772, after 6pm.

Icom IC-751A h.f. transceiver, internal p.s.u., c.w. filter, microphone, manual,



accessories, boxed, £450. Tranzmatch a.t.u. with dummy load, £60. Power/s.w.c. meter, £30. Two 8Ω base station loudspeakers, £7 each. Tel: John G4UBB, 0181-868 7684.

JIL SX400 ex-nord scanning receiver, 26-520MHz, all-mode, no gaps, unused, mint condition, £200. New 19 set headphones: £25. Racal TA-940B, 100V linear, now/unused, £175. Racal antenna masts. Yaesu FRG-7700, £155. Tel: Jim on Poole. (01202) 668446.

Kantronics, all mode, TNC Packet, RTTY, AmTOR, Packet, GTOR c.w., Navtex, WEFAX, built in mode on v.h.f. Packet, h.f. to v.h.f., gateway on Packet leads, manuals,

software, etc. £160 plus P&P Tel: Don GWOLP QTH, Cardigan on (01239) 811157.

Kenwood R-2000 receiver with VC-10 v.h.f. converter fitted, excellent condition, with manual, boxes, £300 o.v.n.o. Yaesu FRG-7700 receiver with memory unit fitted, in v.g. c., a.t.u., manual, £250 o.v.n.o. Tel: (01450) 379217.

Kenwood R-5000, all-mode h.f. receiver plus v.h.f. board and IF-232C control and software, mint condition, boxed, complete, £650. FDK multi 750E, complete with expander 430, 2m/70cm (144/430MHz) multi-mode, good condition, £250. Tel: Les (01635) 867808 or E-mail: m0bsr@aol.com.

Kenwood R2000, 5-30MHz plus VC-10 airband, 2m (144MHz) fitted, memories, scan, a m/f.m./s.s.b./c.w., two clocks, noise blanker, a g.c., timer, good condition, boxed, like new, £280. Tel: Frank (01295) 670108.

Kenwood R5000 s.w. receiver, perfect condition, only used for listening, manual and antenna in original box, £500. Also R2000 same details, £300. Tel: Greater Manchester (01947) 870954.

Kenwood TH23A 2m (144MHz) handy plus charger, £110. Kantronics 2m power amp, 2V/30V plus pre-amp, £50. Datong FL3, £80. Vibroplex bug key, £90. Lodestar DM-4061 dip meter complete, unused, £30. Tel: Gillingham (01634) 314168.

Kenwood TL-922, £700. TS-130S, VF-0120 (144/430MHz), 50V output, data port, mobile bracket, boxed, as new, manual, detachable front, fan cooled, many facilities, buyer collect or pays postage, bargain at £250, no offers. Tel: Harold GU2WV, (01773) 781290. QTH 97 Nottingham Road, Selston, Nottingham NE16 6BU.

Kenwood TM-733E dual bander, 2m/7cm (144/430MHz), 50V output, data port, mobile bracket, boxed, as new, manual, detachable front, fan cooled, many facilities, buyer collect or pays postage, bargain at £250, no offers. Tel: Harold GU2WV, (01773) 781290. QTH 97 Nottingham Road, Selston, Nottingham NE16 6BU.

Kenwood TS-430S with box and manuals, no f.m. board, fully filtered, good and clean condition, £400 no offers. Tel: John (01422) 831628.

Kenwood TS-450S with Kenwood MC 60 base mic, also with hand mic, v.g. c., boxed with manual, £700 o.n.o. Tel: 2E1FVZ (01795) 510294.

Kenwood TS-811E, 70cm (430MHz), multi-mode base station transceiver with variable power to 25W and 40 programmable memories, £395, any trial, prefer buyer to collect or meet up at a radio rally. Tel: Barry M0APQ, Yorkshire (01274) 880895.

Kenwood TS-830S h.f. all-band transceiver with SP-230 speaker, mint condition, hardly used, manual, £300, could deliver 100 miles or carriage extra at cost. Tel: Ken G3RFH, Blackpool (01253) 341074.

Kenwood TS-850S, £850, Atlas 180 Top

Band transceiver, £250. Kenwood SP-230 speaker, Daiwa NS660P s.w.r./p.w.r. meter, home brew, 1kW amp, £250. Silent key sale G40GJ, excellent condition. Tel: G6VYN (01427) 753798, after 7pm.

Laptop computer, Pentium multi-media 3.5, CD, colour, 1680, stereo, 12.1 screen, HamComm JVFAX, 1.5Gb, 16Mb, Olivetti Professional model, eight months old, extra speakers, keyboard, mouse, two years warranty, £700. Tel: 0181-478 7490.

Linear Kenwood TL-922, immaculate, two new 3-500Zs, £1000 o.v.n.o. Prefer buyer to collect or carriage extra. Pro-44 scamet, 68-512MHz, as new, £60. Tel: Ken on Whitley Bay 0191-253 0504.

Lowie HF-150 backlight keypad, IF150 and software, v.g. c., £200, buyer collects. Also Datong FL3 audio filter, £40. Jim M25, 24-2150MHz, GaAs L.E.J. pre-amplifier, £25, both in good condition. Tel: Bob on Suffolk (01440) 708493.

Lowie HF-225 with a.m. s.s.b./f.m. board, a superb receiver, see the reviews in *PW*, etc., £225. Tel: Mike G8JVE (01903) 770375, after 6pm or at weekends. E-mail: mike.rove@btinternet.com

Magazines: *Racal, Practical Wireless* - 1982-95. *Short Wave Magazine* - 1982-93 almost complete. *Ham Radio Today*, *Amateur Radio* many years complete. Plus others, buyer collects, offers pleasu. Tel: Mark G4YRV, Bournemouth (01202) 418801

Mic Tear Drop, as new, cost £48, sell for £25. EX-VD headphones, £5. Power reducer variable, cost £40, sell for £20. 2m (144MHz) aerial, not been used, cost £40, sell for £15. Tel: John (01283) 221890, after 6pm.

Newnes/McDonalds Radio/TV Servicing 1951-78 (28 volumes) offers welcomed, moving house, also Sharp FV-610 dual conversion ten band portable receiver, manual tuning, digital display, f.m. stereo socket, boxed, mint, £59. Tel: Milton Keynes (01908) 377139.

PC complete with modem, colour inkjet printer, speakers, soundcard and CD-ROM, will exchange for Amateur Radio equipment such as IC-706 MkI or similar, mobile radio which includes 2+6m (144+50MHz), cash adjustment if necessary. Tel: Dave (01993) 212467.

Phillips valve reel-to-reel tape recorder, takes 7in reels, model 3541 with 20 reels of tape, g.w.o., £25. Tel: Dave 0141-632 5408.

Psion 3C 2Mb backlit, 1Mb flash disk, portable SP-120 m/m bracket, £345. SM-220 station monitor with BS8 pan adapter and TS-820/830/940 series TX/RX, £150. All boxed with manuals. Tel: Les on Casterock (01265) 848693.

Pye valved car radio, 6V vibrator pack, overhaul, cube, offers, Hiachi s.w. converter, nine bands, £15. £100 CB, original box, £25. Vibroplex keyer, new parts fitted, dealer, £55. Tel: Bill 0141-562 4571.

RA117, in steel cabinet, g.w.o., £130 o.n.o. Tel: Northants (01604) 763663.

Racal 1792 receiver, complete with manuals, most options fitted except i.s.b., excellent condition, £750 o.n.o. Tel: (01327) 842803.

Racal Dana, model 1991, nanosecond, universal frequency counter timer, as new condition, £495. Tel: Gary (0976) 745179, or (01886) 833655. E-mail: flexaco@zoo.co.uk

Radio parts which include: resistors, plugs; valves; condensers; transformers; books, etc. Tel: 0113-240 3496.

SEM Z-match a.t.u., £45. SEM ORM Eliminator, £40. MFJ 207 Analyser, £45. Diamond V2000 collinear 2-70 (50, 70, 144MHz) unused, £55. Watson 2-70 s.w.r./p.w.r. meter, £40. Ravex s.w.r./p.w.r. meter, h.f./v.h.f., £40. Tel: Norfolk (0468) 756762.

Short Wave Magazine 1971-75, *Radio Communications* 1970-80, various *Practical Electronics*, *Practical Wireless* and *Radio Constructor*, 1970s period,

offers. Tel: (01628) 776216.

Sony ICF-SW1E, micro s.w./l.w./m.w./f.m. stereo receiver, complete with power supply, stereo headphones, manual and frequency guide and Sony SRS-57 stereo speaker system complete with power supply, £165 o.n.o. Tel: Wareham (01929) 556142.

Standard C558 v.h.f./u.h.f. handy TX/RX, extended RX a.m./f.m., 200 memories, AA battery case, plus NiCad pack - offers? Also Kenwood TM-221E v.h.f. mobile - offers? Tel: G4CUI QTHR, Sheffield 0114-263 0704 or E-mail: g.cook@sheffield.ac.uk

Standard C7800 u.h.f. f.m. rig, needs small repair, £20. Transverter: 144MHz In, 28MHz out, £15. v.h.f. Spectrum Analyser, good condition, buyer to collect. £60. Tel: Pete (01179) 633306.

T1154 transmitter, probably one of the



best around, no mods, steel case, also spare output tuning circuits module, plus six spare knobs, best offer over £125. Tel: Colin (01422) 823850 or FAX (01422) 823570. E-mail: 100105.2303@compuserve.com.uk

Trio TS-430S transceiver, PS430 matching power supply, £525. Transmatch a.l.u., full power rated, uses Jackson capacitors (ceramic end plates), £225. Transceiver and a.l.u. together, £700. Tel: (01782) 630940, after 5pm.

TS-830S spare PA and driver valves, boxed, manual, careful owner from new, £395. Yupiteru 7200 scanner, as new, £195. MFJ Deluxe Versa Tuner with dummy load, £65. All o.n.o. Tel: Terry G4CHD, Glos (01452) 857508.

Two speed microcassette recorder, two spare tapes, six months old and rarely used, cost £19.95, will accept £10, including postage. Tel: John Noble (01634) 233058.

Yaesu FR-101 RX and FL-101 TX, v.g.c. with manuals, £275. o.n.o. Heath HW9 QRP, TX/RX, with matching a.l.u. and s.w.r. meter, £275. o.n.o. 4CX1500B valve and base, £75 o.n.o. Tel: Pete on Gloucester (01452) 741036.

Yaesu FRG-7 classic communications receiver, complete with manual, £95. Tel: Wareham (01929) 556142.

Yaesu FRG-7700 communications receiver, £190. Tel: Surrey 0181-643 1297.

Yaesu FRG-7700 h.f. RX plus FRV-7700 v.h.f. converter, good condition, £220 o.n.o., will separate. Tel: Keith 2EQARS, Braintree

(01376) 347736

Yaesu FT-101ZD with f.m., £280, Icom PCR1000, £285. Will exchange either for FR-101 digital or similar AR300XL rotorator with J-beam, 70cm (430MHz) antenna, £40. Tel: Worcester (01905) 756472.

Yaesu FT-208, 2m (144MHz), FT-708, 70cm (430MHz), f.m. transceiver, hand-held with speaker/mic, ams charger, mobile PA3 adapter/charger, four good batteries, £90 each, or £150 both, v.g.c. 2m, 2.5kHz shift or 25kHz. Tel: G4XPR, Slough, QTHR, (01753) 645954.

Yaesu FT-225RD 2m (144MHz) multi-mode transceiver, £225. Yaesu FT-230R, 2m mobile, £80. Realistic PRD-32 scanner, £30. Datong D70 Morse Tutor, £30. Hi-Mound HK-704 key, £10. Matsui VWR-220D digital receiver, £25. Tel: Terry GOMND, QTHR, (01767) 221944.

Yaesu FT-290 2m (144MHz) multi-mode, £85. Jim MX14S 20m (14MHz) QRP hand-held with sidetone unit and mobile mount, extras, £125. Yaesu FL-110 80-10m (3.5-28MHz) h.f. amp, 10W input, 100W output, £60. Tel: Jim MIMOAYD, (01577) 864928.

Yaesu FT-290 MkII with rechargeable batteries, v.g.c., £200. Tel: Henry (0956) 230707.

Yaesu FT-290R multi-mode, 30W linear amp, s.w.r. meter, e.t.c., all in first class condition, £175 the lot. Tel: Tony Clark on Havant (01705) 470383, evenings.

Yaesu FT-290R with MuTek, mobile bracket, case, charger, good condition, £160. Lowe SRX 100 g.c. receiver, £100, AKD 6m (50MHz) with CTCSS, £100. Tel: Ian G7MVR, (01709) 855169.

Yaesu FT-726R, 2.6m/70cm (144/50/430MHz) satellite board, boxed, plus manual, technical manual. Tel: Tony (01253) 697563.

Yaesu FT-736R 2m/70/23cm (144/430/1296MHz), mint condition, boxed with manual and mic, £1095 o.n.o. Tel: (01945) 583411.

Yaesu FT-747GX h.f. transceiver, 150kHz-30MHz, continuous coverage, 100W all bands, c.w. filter fitted, no f.m., v.g.c., £330, no offers. Tel: Russ on (South London) 0181-308 1704.

Yaesu FT-757GX multi-mode, h.f., good condition, boxed, manual, £395 plus P&P. Tel: Mark G4YRY (01202) 418801.

Yaesu FT-790R MKI, 70cm (430MHz) multi-mode, 2.5W output, NiCads included, base or portable use, case included, £150. Postage extra. Tel: 0171-771 0309 and leave message.

Yaesu FT-790R11, 432MHz, multi-mode, boxed, £350. Yaesu FT-C740A, 4m (70MHz),

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Yaesu R-9600, all-mode, v.h.f./u.h.f. receiver, cash adjust. Tel: GW0GHF QTHR (01222) 703429.

ZX Spectrum 8 and 48k with RX4 decode software, RTTY, c.w., AMTOR, £35 including P&P, tape and instructions, £7 including P&P. Tel: Derbyshire (01298) 78268.

Exchange

Datong FL3 filter with auto notch, will exchange for 144MHz, 100W amp, must be g.v.o. Tel: Cardigan (01239) 811157 after 6pm, also answer phone.

FT-757GX/FC-757AT for IBM PC with CD-ROM. Tel: Dave 0181-749 8530.

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Racal RA-217 receiver, no changes to front panel, usual light blue, all original knobs handle/handles present. Vwrite with price and full details of model and condition, stamp refunded. Mr Barker, 29 St. Andrews Court, Benton, Newcastle Upon Tyne NE7 7JT.

Racal RA-218 s.s.b. converter, RA-37A I.T. converter, MA-197B preselector, any condition considered. Tel: David on (01788) 574099.

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Tesla coil builder, seeks info on valve driven coils, using 807s, any info gladly received. Tel: Mr D Butler on Lancs (01253) 722587 or write to 32 Kilmhouse Lane, St. Annes Dn Sea, Lancs FY8 3AA.

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Yaesu FT-650, 6/10/12m (50/28/24MHz), must be v.g.c. Also Icom IC-575H, 6/10m (50/28MHz) transceivers. Tel: GW0GHF (01222) 703429.

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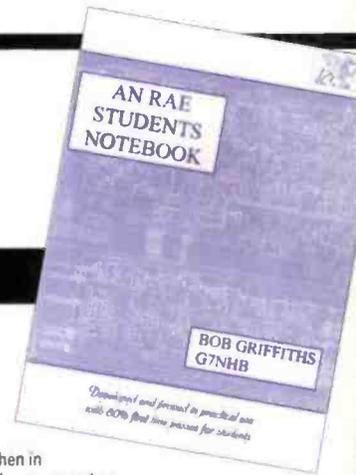
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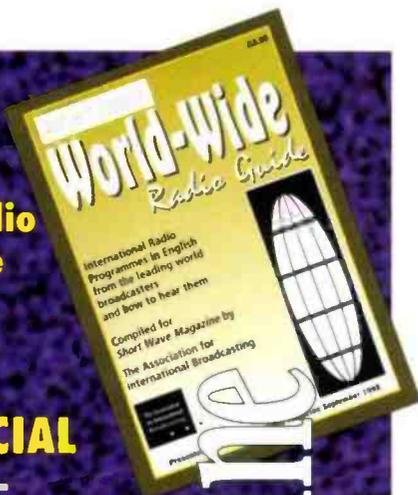
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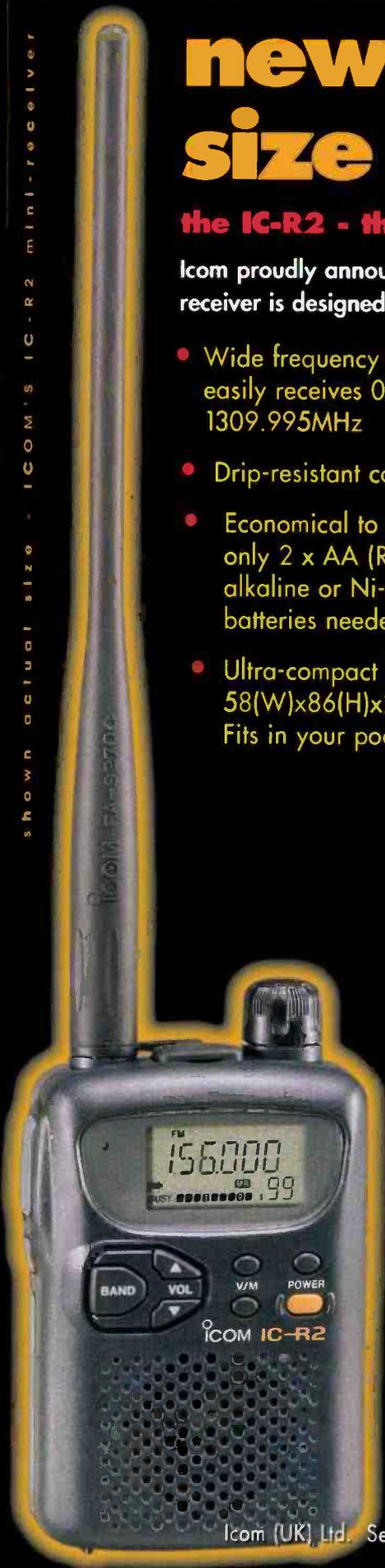
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- Simplified tuning with Shuttle Jog control
- Direct frequency keypad entry
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- RX Freq. (MHz): 0.5-30/50-54 108-174/420-512
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- Freq. Steps(Min): 0.1Hz for SSB and CW 10Hz for AM and FM
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