Eddystone Receivers

Classics In The 1950s And The 1990s

Constructional
A VLF Up-Converter, Valved Active Antenna, CW Filter

Reviewed
The Alinco DJ-180EB 144MHz Hand-Held Transceiver

Antenna Workshop
Peter Dodd Reviews The Barker & Williamson BWD1.8-30 Antenna

Receiving Special
PW Looks Into The World Of The Receiver And Receiving Techniques

New Series
Valve & Vintage - Looking At Older Equipment

Plus Focal Point, Packet Panorama, Satellite Scene & Lots More!
Sensational 6m!

Noisy, crowded frequencies are about as productive as motorways at rush hour. Now you can skip the jams and head for the wide open spaces with the FT-650 from Yaesu.

The three frequency operation lets you win the battle of the bands and communicate clearly on 6m, 10m and 12m frequencies. These less crowded bands put your transmission high in the sky and above the noise.

The FT-650 packs substantial communications power in a streamlined, compact case. A flip-out handle makes it the perfect portable, while an optional power supply lets it function as a base station. Broadcast from anywhere - mountain tops, remote islands, boats, vehicles or just the suburbs - and hear the difference with the FT-650.

With 6, 10 and 12m frequencies you can avoid the crowds

### FT-650

- 100 Watts On All Modes: 25 Watts carrier on AM.
- DDS: Direct Digital Synthesis.
- Low-Noise: (NF 1.2dB) RF preamp with switched 5MHz bandwidth BPF, varactor tuned.
- Extended Receiver Coverage: 24.5 to 56MHz.
- Automatic Seeking IF Notch Filter.
- 100% Continuous Operation Duty Cycle.

### FT-690R1I

- The choice radio for the serious field operations enthusiast.
- All-mode 6 meter (690R1I)/2.5 watt mobile.
- Convenient FM performance.
- Three selectable FM scanning steps.
- Analogue X/P0 meter.
- One-touch reverse split button.
- Selectable SSB and CW Tuning Steps: 25/100/250Hz.
- Full Featured Microprocessor Operation.
- 10 Memories.
- Simplex or Duplex.
- 2 Independant VFOs.
- All-Mode Noise Blanker.
- Optional CTCSS Tone Squelch (FTS-7).
- Semi Break-In CW Keying and Side Tone.

Call today for complete information about this and other Yaesu products.
The latest HF receiver from Yaesu which is tipped to outsell all other shortwave receivers.

FT-290R2
FT-690R2
FT-790R2

Including S-microphone and soft case 70cm version also available.

FT-26/FT-415

FRG-100
The latest HF receiver from Yaesu which is tipped to outsell all other shortwave receivers.

FT-990/FT-990DC
You have the choice with or without P.S.U. never let it be said Yaesu cannot cater for your needs.

FT-736R

SPECIAL PACKAGE
INCLUDING NICADS, CHARGER, CASE.

THIS CAN INCLUDE EVERYTHING, IT'S JUST A QUESTION OF HOW MUCH.

FT-530
The dual bandy handy of the 90s there's not much more that this can include it's all in there!

BEST COMMUNICATIONS RECEIVER 1992

SPECIAL PACKAGE
INCLUDING NICADS, CHARGER, CASE.

This can include everything, it's just a question of how much.

FT-530
The dual bandy handy of the 90s there's not much more that this can include it's all in there!

Time is running out so don't delay phone or fax today!

Tel: 081 997 4476
Fax: 081 991 2565

Curiosity Corner

MVT-7000
The four most popular scanners, now supplied with a very special frequency guide - FREE

IC-R1
DJ-X1D
AOR-1500

TS-850S, TS-450S, FT-890, FT-890UT, IC-728, FT-747GX
All the above HF transceivers supplied with 12 volt, 25 amp power supply – FREE (offer valid until 28/2/93)

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LOWE HF RECEIVERS DO IT AGAIN!

HF-225 voted "RECEIVER OF THE YEAR" in 1990 by W.R.T.H.
HF-225 "FINLANDIA" voted "BEST DX RECEIVER 1992" at
the EDXC Convention in Finland. Final choice was from
HF-225, NRD-535 and IC-R72E.

ONCE
AGAIN
THE BEST IS
BRITISH!

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London (Heathrow): 6 Cherwell Close, Langley. Tel: (0753) 545255
Newcastle: Newcastle International Airport. Tel: (0661) 860418
Cumbernauld: Cumbernauld Airport Foyer. Tel: (0236) 721 004
Bristol: 6 Ferry Steps Industrial Estate. Tel: (0272) 771770
Cambridge: 162 High Street, Chesterton. Tel: (0223) 311230
Bournemouth: 27 Gillam Road, Northbourne. Tel: (0202) 577760
Leeds: 34 New Briggate, Leeds. Tel: (0532) 452657
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OR UNTIL STOCKS RUN OUT

50/726 6m Unit for FT726
£295 Limited Stock

70% Off HX850E SCANNER
60-89, 118-136, 140-174, 406-495 MHZ
Was £385 Now £99.95

45% Off 430/726
70cms module for FT726R
Was £309 Now £169

60% Off 144TV
2m module for FTV107, 707, 901 etc
Was £125 Now £49

ALL OFFER ITEMS SUBJECT TO CARRIAGE CHARGES.

Here at SMC we do stock a wide range of power supplies to suit all applications. There are two major ranges to choose from, the Daiwa range and the Yaesu range. Both ranges are high quality products which will provide many hours of continuous fault free use.

The models range from 4A to 32A continuous with convenient models at 9, 12, 20 and 24A. Many models have comprehensive current/voltage metering with prices to suit all pockets.

<table>
<thead>
<tr>
<th>Model</th>
<th>Voltage</th>
<th>Current/Max</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>FP700</td>
<td>13.8v fixed</td>
<td>10A cont/20A peak</td>
<td>£259.00</td>
</tr>
<tr>
<td>FP757HD</td>
<td>13.8v fixed</td>
<td>20A cont.</td>
<td>£305.00</td>
</tr>
<tr>
<td>FP800</td>
<td>13.8v fixed</td>
<td>20A cont.</td>
<td>£279.00</td>
</tr>
<tr>
<td>FP400C</td>
<td>13.8v fixed</td>
<td>10A cont/20A peak</td>
<td>£165.00</td>
</tr>
<tr>
<td>FP8</td>
<td>13.8v fixed</td>
<td>8A cont.</td>
<td>£165.68</td>
</tr>
<tr>
<td>SMC 120406</td>
<td>13.8v fixed</td>
<td>4A cont/6A peak</td>
<td>£20.39</td>
</tr>
</tbody>
</table>

All the Daiwa range, except the PS140MKII, feature variable voltage with switchable voltage/current metering. Both the PS304 and RS40X feature a cigar lighter socket, convenient for powering your handheld transceiver.

<table>
<thead>
<tr>
<th>Model</th>
<th>Voltage</th>
<th>Current/Max</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>PS120MKII</td>
<td>3-15v variable</td>
<td>9A cont/12A max</td>
<td>£69.95</td>
</tr>
<tr>
<td>PS140MKII</td>
<td>13.8v fixed</td>
<td>12A cont/14A max</td>
<td>£65.00</td>
</tr>
<tr>
<td>PS304</td>
<td>1-15v variable</td>
<td>24A cont/32A max</td>
<td>£129.95</td>
</tr>
<tr>
<td>RS40X</td>
<td>1-15v variable</td>
<td>32A cont/40A max</td>
<td>£189.00</td>
</tr>
</tbody>
</table>

Practical Wireless, February 1993
Main SMC HQ - Branch Distribution Centre
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Ably equipped service department 0703 254247

Retail showroom open 9:30-5:00 Monday-Friday
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Same day despatch wherever possible.

Free Finance on selected items, subject to status. Details available on request.

Up to £1000 instant credit, a quotation in writing is available on request, subject to status.

FT736R
FT650
FT1000
FT990
FT890
FT5200
FRG8800
FRG100

BEST COMMUNICATIONS RECEIVER 1992: WRTH

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FT-25
FT-415
FT-411
FT767GX

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Novell Lane
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Ram-1pm Mon-Fri
Ram-12pm Sat

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SMC Northern
504 Alum Rock Road
Alum Rock
Birmingham 36X
Ram-1pm-4pm Mon-Fri
Ram-12pm Sat

Practical Wireless, February 1993
The DJ-580E hand-held is the most advanced design ever offered to the radio amateur. Building on the winning formula of the DJ-560E, ALINCO have now reduced the size dramatically and introduced a combination of innovative features that will make your operating even more fun and certainly more versatile.

It goes without saying that ALINCO offer you all the standard features you expect from a hand-held including dual watch, dual controls, scanning, searching, priority, etc. Of course ALINCO's standard of engineering and reliability is now becoming the envy of its competitors. (They're also pretty envious of ALINCO's prices!) Naturally you get a full 12 month warranty including parts and labour. It's the extra features that really make this a winner.

For example you now have ALINCO's patented circuit that retains full operation with dry cells even when battery voltage falls by 50%. Great for emergency applications. You get a programmable auto power off feature, battery saver, digital telephone dialler and three output power levels. And we've only just started! Key in a special code on the keypad and your rig will turn into a fully operational automatic crossband repeater. Key in another code and you will open up the receiver for a.m. airband reception and frequency segments up to 995MHz! You can even use the DTMF feature to send and receive two digit code messages.

To learn more about the transceiver that has already taken the Japanese and American markets by storm, phone or write for a full colour brochure.
WATERS & STANTON

HAM RADIO FAST MAIL ORDER

Computerised Despatch 12 Months Warranty 10 Day Money Back Guarantee!

300 Watt Dummy Load
HF - 2 Metres
MFJ-260B £35.95 Post £3.00
1 KW Version 1 - 650MHz
MFJ-264 £69.95 Post £6.00

HIGH POWER ATU's from MFJ

DIAMOND POWER RANGE
Fibre Glass - High Gain
Low VSWR - Pre-Tuned
V-2000 6m/2m/70cm 2/6/8DB 2.5m £109.95
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X-50 2m/70cm 4.5/7/12 1.7m £69.95
X-300 2m/70cm 6.5/9/8 3.1m £139.95
X-910 2m/70cm 8.3/11/13 6.3m £139.95
X-100H 2m/70cm 9.3/14/18 7.2m £209.95
X-5000 2m/70/32cm 4.5/8/18 8.1m £199.95

STATIC PROTECTORS
- DC-600MHz/1500MHz
- Protects Rig
- In-line coax
- Replacement Cartridge

DIAMOND POWER RANGE

DIAMOND RH-9 £23.95
Ideal for all those users of dual band hand-held radios or scanners. This compact, yet efficient aerial has been sold in its hundreds. You get tx 144/430/900MHz plus wide band receive! Just 2.5" long!

DIAMOND RH-2S £10.95
Just the thing for 2m hand-holds. Very efficient and very compact at just 4" long.

DIAMOND RH-8 £29.95
Ideal for all those users of dual band hand-held radios or scanners. This compact, yet efficient aerial has been sold in its hundreds. You get tx 144/430/900MHz plus wide band receive! Just 2.5" long!

SUPER-ROD 2M WHIP £14.95
The ideal way to add power gain to your 2m hand-held at lowest possible cost. Fitted BNC use as a 4 wave or extend to a 34th wave. Adds up to 10dB in performance!

1 kW Version 1 - 650MHz
MFJ-264 £69.95 Post £6.00

HANDY STAND HB-100
Your Handheld Becomes A Base Station!
It's so simple yet nobody ever thought of it until now! Comprises universal adjustable angle mount with rubber feet and none scratch surface. BNC lead and SO-239 base socket. The smartest gadget we've seen for years.

£29.95 Post £1.50

WINDOW MOUNT ANTENNA
WM-BNC £22.95 Post £2
Fits over any vehicle window to permit temporary mobile operation. BNC socket for aerial and thin 50 Ohm cable terminated in BNC plug. ideal for hand-held radios.

HANDY AERIALS!

HANDY AERIALS!

DIAMOND RH-9 £23.95
Ideal for all those users of dual band hand-held radios or scanners. This compact, yet efficient aerial has been sold in its hundreds. You get tx 144/430/900MHz plus wide band receive! Just 2.5" long!

DIAMOND RH-2S £10.95
Just the thing for 2m hand-holds. Very efficient and very compact at just 4" long.

Spare 2m Helical Antennas.
BNC fitting at trade price. Suits any hand-held. £6.95

DIAMOND CP-6 £41.95

PACKET ON A BUDGET!
MFJ-1270 £139 Post £5
- VHF & HF Operation!
- WeFAX Weather Maps
- Mailbox expandable to 128K
- Host Mode
- KISS Interface
- 32k RAM

If you haven't got into Packet Radio and don't feel inclined to build one of our kits, then this is an offer you should not miss! All you need to add is 12V DC and a computer. MFJ dominate the American Packet Radio scene and it's not hard to see why. You get a proper manual and we can supply IBM starter software with cable kit for £25.95

MANUFACTURED BY DIAMOND ALUMINUM PRODUCTS INC.

MILLER MASTS

Diamond CP-6

Power: 200W
Impedance: 50 Ohms
VSWR: Less than 1.5:1
Length: 6m
Radials: 1.8m approx.
Weight: 4.8kg
Wind Rating: 90mph
Mast Fixing: 1.5"-2.5"
Socket: SO-239

The ideal base station aerial for all those with restricted space. It comes absolutely complete including rigid radiators. The low angle radiation of the CP-6 makes it superb for DX working. Easily adjusted, it provides very low VSWR thanks to the matching section which also reduces static. Ruggedly built, it comes with all the necessary clamps for immediate erection.

£249.95 Carriage £6.00

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We can supply almost anything in this magazine within 24 hours!

All Popular HF Rigs from Stock
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Ten-Tec Omni-VI
160-10m 1000W £2,495

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VHF/UHF
All with "N" Connectors

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Our mail order operation is the fastest and best-
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computerised system that keeps all our terminals
and have three staff totally packing goods. We also
take care of you and your order. Everything we des-
patch is carefully checked, packed and insured
against loss or damage. No risk to you whatsoever. And if
the goods are not satisfactory immediately upon
arrival we will offer a full refund or an alternative.

Peter Waters G30JV/GOPEP

AZDEN £239.95!
Direct Factory Prices!

MFJ 20m QRP CQ CW $199

The MFJ-20 is the most comprehensive data controller ever offered by us. It has more modes than any other model and is now outselling all other competitive units. You get 9 modes: Packet (including mail box), FAX, AMTOR, SSTV, RTTY, NAVTEX, ASCII, Electronic keyer, CW reader, plus a feature packed digital receiver. Now is the ideal time to try all these interesting modes from one single box.

Watch the data and pictures come up on the screen; converse with fellow hams around the world and get the most out of your vhf or hf equipment. The MFJ-1278 is the most comprehensive data controller ever offered by us. It has more modes than any other model and is now outselling all other competitive units. You get 9 modes: Packet (including mail box) FAX, AMTOR, SSTV, RTTY, NAVTEX, ASCII, Electronic keyer, CW reader, plus a feature packed digital receiver. Now is the ideal time to try all these interesting modes from one single box.

The MFJ-1278 is different from any other hi transceiver you have used or ever seen. Crafted build, it employs beautifully assembled circuit boards that are easily accessible should you ever need to service them. The factory actually encourage you to take the covers off and examine the craftsmanship. No mass production here!

Receiver experts agree that good old crystal mixing can’t be beaten and using this method the phase noise has essentially been eliminated. The OMNI-VI can receive signals on today’s crowded HF bands that other popular models can’t even hear. Great for contests and DX! A truly quiet receiver.

The OMNI-VI is an engineers dream. Superior IF crystal filters, an automatic notch filter that can handle any number of heterodynes, pass band tuning, 1024 keying and DSP & step audio filters. A 20MHz microprocessor takes care of all the programming with data entry carried out from the front panel. The OMNI-VI has the fastest QSK in the business that gives effortless break-in operation on CW. You also get an iambic keyer, 100 memories, a program pad and a true 100 Watt power control. Now you can run true QRP, even militants with this rig.

We have a colour brochure on this fine transceiver. The price is correct at the time of going to press but may be subject to alterations owing to exchange rate fluctuations.

New Delta II transceiver now available
100 Watt Output plus variable filter £1995

Ameritron HF Linears

G5RV With Compact Option!

Full size
80-10m 1000W £21.95

Half size
40-10m £19.50

COMPACT OPTION

Using our EL-40XC coils you can operate the half size version on 80 meters without affecting its performance on the other bands. The length is increased by only a few feet but in this added length of wire the losses are decreased over all so the overall performance remains the same. 80-10m is 660’ of #18 wire. Calls £18.95 per pair.

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10Hz-3GHz! **£199**

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**NEW!**  
**Maplin Electronics**  
**SENDER** - 145  
**FACTORY PRICES**  
**£169.95!**

2 Metres  
5 Watts  
Rx 130-169Mhz  
Full Warranty

**70 Cms Model**  
**SEND-ER-430**  
**£179.95**

This new exciting handheld from Maplin Electronics is offered to you at a direct factory price. And with the current exchange rate you will agree that this is amazing value. You get a proper English handbook, two battery packs (4 and 6 x AA cells) helical aerial and carry strap. 

Direct keypad entry, 20 memory channels, 1750Hz tone, 5 Watts on 12 Volts and comprehensive scanning all go to make this a unique radio at a unique price. And you'll love its small size (84 x 55 x 31mm) and rugged construction. Other features include: Battery Save, Dual off, Rotary Dial, 6 channel steps, Split frequency, 3 power levels, Dial Light etc.

**DISCOUNT PRICE!**

**ALINCO**  
**DJ-180E 2m Handheld**  
**£189.95**  
Free Ni-Cads Free Charger Free Delivery

- LCD Display  
- 10 Memories  
- Repeater Shift  
- 2 Watts Output  
- Ni-Cad Pack  
- AC Charger  
- Auto Power Off  
- Battery Warning  
- 5kHz-25kHz steps  
- Supercap Audio  
- Helical Aerial  
- 132 x 58 x 33mm

At this price the ALINCO DJ-180E represents your last chance to purchase a top brand name handheld at yesterday's prices. The DJ-180E offers more features per Pound than any other rig. Take advantage of this offer and pocket the difference. You'll get a superbly engineered radio with a quality name and our 12 month warranty. There are plenty of accessories to follow including a memory expansion module to give you 50 or 200 channels. Offer subject to current stocks only.

**NEW!**  
**Special Offer**

The DJ-F1E is outselling any other 2 metre handheld we stock. Its performance, reliability and construction are unsurpassed. So convinced are we that the DJ-F1E offers the greatest value ever, we are happy to offer you a full refund if you are not immediately happy with its performance or features. That's right, return the transceiver to us within 10 days of purchase and we'll offer you a refund or an alternative, the choice is yours! That's confidence. **Peter G3OJV**

**DJ-F1E 2m FM**  
**£259**

- Tx: 144-146MHz  
- Rx: 108-174MHz  
- 5 Watts output (12V DC)  
- 40 Memories  
- 3 way Power Setting  
- Illuminated Key Pad  
- 6 Programmable steps  
- Programmable Shift  
- 1750Hz tone  
- Frequency Lock  
- PTT Lock  
- Beep on/off  
- Automatic Lamp  
- DTMF Tones  
- Reverse Repeater  
- 8 Scan modes  
- Battery Saver  
- 5 meter  
- Priority Channel  
- Fast tune function  
- Rotary Dial  
- Illuminated LCD  
- Quick touch Squelch  
- Protected Output  
- BNC socket  
- Ni-Cad Pack 700mAh  
- AC Mod Charger  
- Many Accessories

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Important Notice: some prices may be subject to alteration owing to exchange rate variations. Please check when ordering.

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- All components  
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- Proper Manuals  
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- Brings Back the fun in Ham Radio

Anybody can build these kits. They are simple but very effective. Use alone or as a basis for larger projects. Full back-up service.

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**HR-Series D.C. SSB/CW/AM receivers** for 80, 40 or 20m (Specify which band)...£39.95

**GRP-TX Complete 1 Watt voxel transmitters** for 80, 40 or 20m (Specify which band)...£29.95

**P-IBM The famous Packet Radio Kit. Self-powered with software**...£59.95

Add £2.00 Postage & Insurance

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The UK's Largest Selling Scanning Directory

- Completely Updated  
- Thousands of Frequencies  
- 26MHz - 2250MHz  
- Full Duplex Information  
- Air, Sea and Land  
- Military & Civil  
- Government & Commercial  
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Famous throughout the world of radio, this latest edition is better than ever before and carries all the latest information. A must for all scanning enthusiasts. Do not confuse this with some poorly printed literature around: this contains more information than any other publication of its kind. Used by enthusiasts and professional bodies; there is no substitute for this guide. Order your "fresh off the press" copy today for delivery in February. **£9.95 Postage £1.50**
TOMORROW'S RADIO TODAY....
New prices have finally arrived - the increase is high due to the devaluation of the pound, but I'm offering you a deal to INSTANTLY EASE YOUR POCKET. You'll still get top trade-in prices for all your existing equipment, which can be used as a deposit and then pay the balance over nine whole months, WITHOUT ANY INTEREST!

Interest Free - ZERO % APR !

FT 990 100W H.F. multimode Gen. cov. DEPOSIT £902 plus 9 x £133
rx plus ATU. DC version also available.

FT 1000 Is it the world's no.1 TCVR. Should be. 200w multimode. Rx-100k -30MHz DEPOSIT £1499 plus 9 x £199.99

FT 890 Selling like hot cakes. The HF minute, mobile, multimode, multibander. DEPOSIT £299 plus 9 x £100

FT 520 Latest all band handy. 5w 2m and 70cms. Dual rx on 1 band. Spectacular! DEPOSIT £149 plus 3 x £100

FRG 100 New arrival high performer rx 50k-30MHz. Ultra stable. Ideal decoder! DEPOSIT £199.99 plus 3 x £100

FT 530 Latest all band handy. 5w 2m and 70cms. Dual rx on 1 band. Spectacular! DEPOSIT £299 plus 9 x £100

FT 290R Mk2 New concept in portable base rigs. Add an optional linear! DEPOSIT £199.99 plus 3 x £100

FT 736 R VHF/UHF base with 25w on 2m and 70cms. Special price Just for you! DEPOSIT £569 plus 9 x £111.11

FT 5200 Super 'mobile pagers? So hi-tech. Ask Martin for mind blowing details! DEPOSIT £235 plus 9 X £55.55

ICW21E Super handy TCVR's . Receives both 2m and 70cms simultaneously. DEPOSIT £131 plus 3 x £98

Guide to Amateur Radio Shopping in the U.K...
Remember! Buying Amateur radio Equipment is expensive and can be a risky business, especially when using Mail-Order. You may well see better prices advertised elsewhere, but when you next get a quotation, before parting with your hard earned cash, THINK ABOUT THE FOLLOWING:-
1/ Is the equipment to full U.K. spec?
2/ Has the equipment been tampered with in the U.K. to meet U.K. factory specification, or is it FACTORY FRESH SEALED FROM JAPAN?
3/ Is the serial number logged with the official U.K. Distributor for possible contact on updated modifications to your new purchase? If so - ask what is the serial number?
4/ Do you see an advertised price, go to place an order, only to be told to ADD 3.5% to use your credit card?

Still a super way to handle the headache of buying gifts! No time limit on spending, top up with anything legal. Wonga is ideal! (see above)

MARTIN LYNCH G4HKS
THE AMATEUR RADIO EXCHANGE CENTRE

MARTIN LYNCH £25 GIFT VOUCHERS

CALL, WRITE, OR FAX FOR YOUR 4 PAGE COLOUR MARTIN LYNCH NEWSLETTER PACKED WITH GOODIES, BARGAINS AND INTERESTING NEWS. WOULD YOU LIKE TO CONTRIBUTE?

Practical Wireless, February 1993
WITH 9 MONTHS TO PAY!!!

I've listed some typical examples for you to see, but it's available on all new equipment - if you don't see the item you want listed - GIVE ME A CALL NOW. Just dial 081-566 1120 for an instant quotation today! (Remember too, the MARTIN LYNCH PRICE PROMISE is still in force. If you are offered a better deal in writing from any other U.K. dealer, show it to me and I'll match it....I must be crazy!

Interest Free - ZERO % APR !!

5/ Do you see an advertised price, phone to place an order only to be told that 'the last one went this morning', BUT ENCOURAGED TO SEND A DEPOSIT and you'll get it sometime in the future?

6/ Visit the supplier to view your latest probable purchase, only to find NO STOCK WHATSOEVER - not even empty cardboard boxes?

7/ Is the supplier AUTHORISED BY THE OFFICIAL DISTRIBUTORS IN THE U.K. TO SELL YOU THE EQUIPMENT, guaranteeing you spares, latest mods, and full accessory back-up? This is important, whatever you are told, there are good reasons why retailers are not 'appointed' to sell you U.K. approved equipment. Contact the Distributors for a full explanation.

8/ Ask about accessories, only to be told that SUPPLY ISN'T AVAILABLE!

The list is endless - USE YOUR DISCRETION, there's nothing wrong with shopping around, I do it myself....who doesn't?

THE BITTER TASTE OF POOR SERVICE REMAINS LONG AFTER THE SWEET TASTE OF LOW PRICE IS FORGOTTEN...

OPENING HOURS: Mon-Sat 10am-6pm, Late-nite Thurs!
286 Northfield Avenue, Ealing, London, W5 4UB Tel: 081-566 1120 Fax: 081-566 1207

CALL OUR SALES LINE ON: 081-566 1120 NOW!
You can now feast your eyes (and ears) on the wide range of top brand, budget HF transceivers at THREE Radio Hamstores! Here are a few of the best...

**Icom IC-728**

**Yaesu FT-890**

**Kenwood TS-850S**

We also stock items by AEA, AXD, Alinco, AOR, Borencor, Comet, Cushcraft, Davis, DeaComm, Diamond, Icom, JRC, Kenwood, Lowe, Microset, MFJ, RSGB Publications, Sony, Toyo, Yaesu, Yupiteru etc. Second-hand & ex-demo equipment is also available.

Part-exchanges and payment by Access, Visa and Switch welcomed. Finance arranged (subject to status). Interest free credit on selected new ICOM products. If you cannot visit an ICOM HAMSTORE in person, why not use our efficient Mail Order Service. Stock items are normally dispatched within 24hrs.

We give full warranty on all ICOM products bought from authorized ICOM UK dealers. In some cases the equipment will be replaced if the fault is deemed beyond speedy and satisfactory repair. Any ICOM equipment purchased from an unauthorized dealer is not covered by ICOM warranty.

Gordon G3LEQ & John G8VIQ at Birmingham, Chris G8GKC at Herne Bay and Doug G0LUH & Paul G7MNI in our new London Store are all looking forward to seeing you.
Packet radio enthusiasts among PW readers will be pleased to learn that, despite my news in last month's issue, 'Packet Panorama' will be appearing every month. Roger Cooke G3LDI will continue to explore the packet world, and on his monthly page, he'll bring news, reviews and something for those keen to discover packet for themselves.

'Satellite Scene' will also continue to appear monthly, and Pat Gowen G3IOR will take his regular look at amateur radio in orbit. In his new single-page format, Pat will be aiming to pass on the latest launch details, news from around the world and something for anyone new to amateur radio in space.

This month, PW has another new feature, which is aimed purely at helping the reader. The 'Arcade' section, to the rear of the magazine, as its name suggests, is designed so that the reader can find important services and information in one place.

The PW 'Arcade' will be open for business from now on. You'll find the Book Service, Subscriber's Club, special coupons, magazine information and all our 'essential services' gathered under one roof, so to speak. I think that readers will think the title of the new section to be rather apt!

Recently, I've had several letters on the subject of a 'No Code HF Licence'. Interested readers have brought to my attention the proposals, at the discussion stage at the time of writing, of the RSGB, before the possible negotiations begin. Of the letters I've received so far, there doesn't seem to be any strongly felt objections. In fact, one letter writer reminded me that there's no longer an international requirement for ship's radio officers to be able to read Morse.

So, what do you think? Do you consider that a specific working requirement of the Morse code should remain for h.f. operation? Or do you think that you should be able to work on h.f. without knowing any Morse? I would be most interested to hear reader's opinions on this point. Speaking for myself, I get a great deal of pleasure from operating on c.w. As many of you know, I like to talk, and when operating in Morse, unlike normal speech, I always know when I'm talking too much...because my arm starts to ache!

Even though there are many keen c.w. operators, should we here in the 1990s still force everyone operating on h.f. to learn Morse? Although the Royal Signals and Royal Navy confirmed they still teach the code, I understand that the ability to read Morse won't be necessary for marine radio operators quite soon. So, perhaps it's time for the amateur radio hobby to take another look at the necessity to learn the code.

What do you think?

Rob Mannion G3XFD

COMPETITION CORNER
Spot The Rig

Have a go and try and identify this month's puzzle rig - it's more difficult than you think. Steve Hunt our Art Editor, modified the photograph of the well-known piece of equipment just before Christmas (need we say more?). We look forward to receiving your entry!

First Prize
A year's subscription to Practical Wireless or a £20 book voucher.

Second Prize
Six month subscription or £10 book voucher

Name.................................
Address..............................

Send your entry (photocopies acceptable with corner coupon) to: Competition Corner, Spot The Rig Competition, February '93, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Editor's decision on the winner is final and no correspondence will be entered into. Entries to reach us by Friday 26 February 1993.
Dear Sir

As a licensed amateur, I like to have a shot at making up the odd circuit board now and again, but lack the space for the equipment needed, or the time and facilities to fabricate p.c.b layouts from scratch. Your excellent magazine often prints track layouts for circuits, which with the best will in the world are hard to copy or duplicate if you do not have access to a photocopier, etc!

What are your opinions as to the feasibility of the following idea? How about component catalogues, list sheets of tracks and pin layouts for you to lay out your own circuits, by rubbing down the required image.

Could not this process be developed, to enable a complete circuit to be rubbed-down onto a prepared copper clad board? This would ease the problem of duplicating circuit layouts, and would, if printing was to the correct size, enable a perfect copy to be made. The layout on the other side of a double-sided board could also be printed by this method. A one-sided board, by the use of a water-soaked paint transfer could be used to print component positions, etc., after the board had been etched, achieving a professional finish.

This is of course an idea in outline, and may well have been thought of before, I would however appreciate your thoughts on the practical and economic use of the suggestion. I feel sure that quite a lot of people would construct many more projects if this system works. I cannot claim to have invented the system, but would lay claim to the implementation!

Jack King G4EMC

Kent

Editor’s reply: Your suggestion seems a good one to me Jack. I would be very interested to hear if readers would find the idea useful.

Dear Sir

I write regarding the last two editions of PW with emphasis in QSOs in foreign languages. I have to tell you that I found myself completely useless when trying to use all my five languages I normally speak.

This is because in the other end, the reply forcibly comes in broken English, the real international language all we foreigners speak.

Frankly, I cannot understand why English language speakers insist in learning another language. It is a complete waste of time, when they are in a superior advantage as masters of Queen’s English.

Lenio Marobin PY3DF

Brazil

Editor’s reply: Thank you for your letter Lenio. Your excellent written English seems to add emphasis to your point. However, I feel that I can get more out of life and my hobby by learning other languages. It also means I can read some more of the foreign language amateur radio magazines that regularly arrive in the office!

Dear Sir

It was with great interest that I read ‘Learning Foreign Languages’ by Angelika Voss, as I am not a linguist, languages are a sort of hobby with me. In her text, the author made mention of Esperanto, and it’s this topic which I’m writing about.

I was persuaded by a school friend in 1937 to learn Esperanto. This I did quite quickly, having been brought up on a diet of French, Latin, Greek and some scientific German.

By the pen-pal route, I very soon put it to use, reviving the local Esperanto Group. I had cycling holidays in Holland in 1939/40, meeting many Esperantists on the way.

The language was devised and published in 1887 by Dr L. L. Zamenhof, a Polish occultist, under the pseudonym Dr Esperanto (‘one who hopes’). He hoped it would become everybody’s second language, thus making international understanding easy. This has not happened as he wished, but it has nevertheless spread world-wide.

At the annual Universala Kongreso de Esperanto this summer in Vienna, there were over 3000 people from 69 countries, all happily chatting together!

As for amateur radio, there’s ILERS (Internacia Ligo de Esperanta Radio-Amatoroj, which hardly needs translating!), with contacts occurring on a regular basis and with a well attended contest every November.

Any Esperantist radio amateur wishing to join in, is invited to contact Barry Foreman GOEKS, 10 Wilmington Close, Brighton BN1 8JE. Those wanting information on Esperanto are invited to write to: Esperanto-Asociato de Britujo, 140 Holland Park Avenue, London W11 4UF, who offer a free introductory correspondence course.

I have been using Esperanto from time-to-time on the air ever since I was licensed in 1948. I have no regrets about learning it, having made many friends in various countries.

Walter Farrar G3ESP

Ackworth, Pontefract

Editor’s comment: I had the pleasure of meeting G3ESP at the Rochdale QRP Convention in October. I think his callsign is most appropriate!

Dear Sir

Regarding your lack of knowledge on Mr H. J. Van der Bijl, mentioned in Practical Wireless September 1992 page 22. I am including an article out of the Standard Encyclopaedia of Southern Africa (SESA) on Mr Van der Bijl. Hope you will find it interesting. Your magazine’s articles and layout is very neat, and the quality of the drawings very professional.

D. Z. Visser
Cape Province
Republic of South Africa

Editor’s comment: Thank you Mr Visser. I passed on your information on your late countryman Mr Van der Bijl’s contribution to radio, to George Dobbs G3RJV. No doubt, George will share it with us soon.

★★★★ Star Letter ★★★★

Dear Sir

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Dear Sir

I like your October issue of Practical Wireless, and it brought back a lot of memories. Especially the ‘Using those Versatile Vacuums’ and the ‘Magic Eye Grid Dip Oscillator’.

Some time ago I built a g.d.o. using f.e.t.s and built it in an Eddystone die-cast box. But when I completed it after hunting around for the f.e.t.s. I found it did not work, and it had blown f.e.t.s. The coils I made, are for approxi-mately 145 to 450MHz, this is the range I am interested in.

I’ve now completed it as far as I can go, and I’ve even made the power supply. The only part I’m hunting for is the magic eye valve to complete it. I’ve got all faith in this circuit of working. I am unemployed and cannot afford much money to spend on my projects. I have to hunt around the rubbish skips and dustbins for most things. Can anyone please donate a magic eye?

Ian Ruddock G8NCZ
Harlow
Essex

Editor’s reply: Ian should have his magic eye by the time this issue of PW appears. I hope you find it useful Ian.
Dear Sir

With reference to 'Keylines' report of Mr Burton's licensing experience with Subscription Services Ltd., it would appear that the licensing authority has now got its act together.

The following is a timetable of my experience:

- RSGB Morse Test: 17 October 1992
- Slip from RSGB announcing a Pass: 22 October 1992
- Acknowledgement of my application received form SSL: 24 October 1992
- Licence received from SSL: 29 October 1992

The above reflects considerable merit, not only on SSL, but also on the RSGB examiners, and the RSGB HQ staff for processing the paperwork so expeditiously.

Incidentally when mentioning my experience to another recently licensed amateur, G9RFT, he stated that he had been a similar experience. Normally I am too indolent to put pen to paper, but I felt that the improved performance of SSL merited some effort on my part.

PS: As an amateur recently 'returned to the fold' (I had an AA licence in 1933), may I say how much I have enjoyed reading the articles and letters in the Jubilee and other recent issues of PW, relating to the radio scene of those distant years.

E. T. Wadsworth GOSPD
Amersham
Buckinghamshire

Editor's reply: I was pleased to hear of your satisfaction Mr Wadsworth, and I hope you enjoy your return to the hobby. Thanks for the comments on the magazine and the early days of radio. I think you'll enjoy Ron Ham's new column 'Valves & Vintage', which starts this month.

Radio Diary

Editor's reply: The editorial team were saddened to hear of your wasted journey Peter. We publish such information in good faith, and weren't told that this event was cancelled, or why. In future, we shall continue to urge readers to check before leaving, when we have been provided with a telephone number by the organisers.

New address: PW and Short Wave Magazine have moved to Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Full details on page 50.

January 24: The Lancastrian Rally will be held at the University of Lancaster. Doors open 10.30am for the disabled. Sue G10HH on (0524) 74293.

February 7: South Essex ARS Radio Rally will be held at The Paddocks, Long Road (A130), Canvey Island, Essex. Doors open 10am. Trade stands, Bring & Buy, home-made refreshments, free parking. Park outside main door for disabled visitors. Talk-in on S22. Ken Hendry G0BBN on (0258) 755350.

February 21: The East Coast Amateur Radio & Computer Rally will be held at Clacton Leisure Centre, Vista Road, Clacton-on-Sea, Essex. Doors open 10.30am. Richard (0255) 474292.

February 27: Tyneside ARS 5th Annual Rally will be held at the Temple Park Leisure Centre in South Shields. All usual trade stands, free parking. Talk-in S22. All the amenities of the Leisure Centre, including heated pool & gymnasium. Jack Pickersgill G0DZG on 081-265 1718.

March 13/14: The London Amateur Radio & Computer Show will be held at Picketts Lock Centre, Picketts Lock Lane, Edmeston, London N9. Large trade presence, free parking, lectures, disabled facilities, Bring & Buy, special interest group section. Talk-in on 144 & 430MHz. (0223) 678770.

March 21: Twerton South West Radio Club Mid-Dorset Rally will be held at the Panmier Market, Twerton. Easy access, any minutes from junction 27 on the M5. Two halls of trade stands, free parking, Bring & Buy, snack bar. Club room bar open throughout day. Doors open 10am, talk-in S22. G4TSW, PO Box 3, Twerton, Devon.

March 27: Bournemouth Radio Society's 8th Annual Sale will be held at Kinson Community Centre, Pelhams Park, Millhams Road, Kinson, Bournemouth. Doors open 11am to 5pm. Talk-in from G1BRS on 144MHz S22. Amator radio & computer traders, clubs & specialised groups. Refreshments & sales. Entry £1, including free raffle ticket. Ian G2BDV on (0202) 886887.


April 28: The Bury (Lancashire) RS will be holding another Hamfest/Rally at the Leisure Centre, Bolton Street, Bury. Laurence G4KLT on 061-762 3310.

May 3: Dartmoor Radio Club Rally will be held at Yelverton War Memorial Village Hall, Meavy Lane, Yelverton, Devon. Doors open 10.30am. Talk-in G2RNE & G7LLG on (0822) 825566.

May 9: The 9th Yeovil QRP Convention will be held at the Preston Centre, Monks Dale, Yeovil, Somerset. Featuring lectures, displays of home-made QRP equipment & vintage radio, on-air QRP stations & trade stands. Refreshments, doors open 10am, admission £1.50, talk-in S22. This convention is not a rally, but a convention for amateurs not only to attend interesting lectures about the technology & practice of low power communication, but also to meet other QRPers. There will also be the usual friendly QRP Contest on 3.5 & 7MHz, during the evenings of the previous week. This event is known as the QRP 'Funrun' by Peter Burridge G3COR, 9 Quarr Drive, Sherbourne, Dorset DT9 4HZ. Tel: (0935) 813504.

May 16: The 2nd National Vintage Communications Fair will be held at the NEC, Birmingham. Doors open 10.30am to 5pm. Hundreds of items for sale, including vintage radios, telephones, gramophones, jukeboxes, radiograms, etc. Admission will be £3. Jonathan Hill on (0309) 33132.

May 30: Maidstone YMCA Radio Rally will be held at YMCA Sportscentre, Melrose Close, Maidstone, Kent ME15 6BD. Doors open 10.30am (10am for disabled). Entry is £1 per adult. Exhibition station OX3TRA (on ft.). All-day video show for juniors. Refreshments & snacks available. Bring & Buy tables for hire. Brenda Puncher G0JUK on (0622) 850277.
Kenwood Amateur Radio Launch

The photograph shows Kenwood amateur radio dealers attending the launch of a new nationwide dealership at Kenwood’s UK headquarters in Watford. As of 1 December 1992, Kenwood took over distribution of its amateur radio products in the UK and Ireland. Distribution was previously carried out by Lowe Electronics.

Maplin CD Earphones

New to Maplin Electronics are the CD Earphones - part of the large range of earphones featured in the 1993 Maplin Buyer’s Guide.

The inner earphone set, supplied in a tough plastic carrying case, are so compact they can be taken and worn anywhere. They are ideal for travelling, feature great sound quality and offer excellent value for money at just £4.95 (including VAT).

Lightweight and comfortable to wear, they are ideally suited for listening to CD and digital material, in particular portable CD players and personal stereos.

The lightweight, sensitive unit has a 1.2m long lead, which is terminated in a gold-plated 3.5mm plug, and a converter plug is included to use with standard 1/4in sockets.

Specifications: sensitivity 102dB/mW; frequency response 20Hz to 20kHz; weight (excl. cord) approximately 5g.

Order details: CD Earphones BZ59P.

Maplin Electronics
PO Box 3
Rayleigh.
Essex SS6 8LR.
Tel: (0702) 562911

Liverpool & DARS 80th Birthday Award

The Liverpool & DARS 80th Birthday Award has been introduced to celebrate the 80th birthday of the Society. The award is open to any licensed amateur or short wave listener living outside the postcode boundaries of Liverpool.

Duration: between 1 January 1993 and 31 August 1993.

Frequencies: any for which amateur is licensed.

Scoring: One point will be awarded for each contact with a member of the Liverpool & DARS on each band or mode. Three points will be awarded for each contact with a special club station e.g. G3AHD, G8WCL or any special event stations run by the society.

Logs: These must include date, time, band and mode (for s.w.l.s, the callsign of the station worked must also be clearly shown).

Logs must be sent to GOIFK no later than the 30th September 1993 and must include an s.s.a.e. (DX two IRCs).

First prize is a trophy and runner-up certificates are also available.

The output power can be selected from 5W*, 2.5W, 500mW and 20mW (output miser) for your operating convenience. With the 5W output, long distance communication is possible, and a large aluminium die-cast rear panel provides heat dissipation. With the 20mW output, communication range is short, but operating periods are very long. *An external 13.8V d.c. power source is necessary for 5W output.

Other features are: 10 memory channels which can store repeater information; 24-hour system clock which is constantly indicated; lock function which electronically locks switches to prevent accidental frequency changes and function access; LCD lighting with a five second off-timer for night-time operation.

The IC-2iE comes complete with belt clip, wrist strap and charger. Priced at £255, inclusive of VAT (£217.02 ex. VAT).

Icom (UK) Ltd., Sea Street
Horne Bay, Kent CT6 8LD.
Tel: (0227) 741741.

Pocket-Sized Communication!

Icom have great pleasure in introducing the IC-2iA/E 144MHz and IC-4iA/E ultra-slim size transceivers, designed for maximum portability and convenience.

Including a NiCad battery pack, these slim transceivers can fit in your shirt pocket, inner jacket pocket or jeans pocket, as well as a handbag.

At Sale Magistrates Court in Cheshire on 29 May 1992, two radio amateurs were convicted under Section 1 of the Wireless Telegraphy Act 1949, having pleaded guilty to charges of using radio apparatus other than in accordance with a licence. The defendants, Mr. Gale Heslop and Mr. James Barton, were conditionally discharged and ordered to pay costs of £112 each. All equipment was forfeited.
Dorset Morse Festival Weekend 1993

Are you keen on Morse? Do you want to take the test, or make a final practice before taking the plunge? If so, then why not join The First Clayesmore Morse Festival Weekend, on Saturday and Sunday March 27 and 28th. There will be trade stands, RSGB Morse tests and lectures. The organisers say you’ll also have the chance to meet other c.w. enthusiasts!

The Morse Festival, hosted by the school radio society G0RSC, is to be held at Clayesmore School, between Shaftesbury and Blandford, in Dorset. The festival runs from 10am Saturday to mid-day on the Sunday. Morse fans can go for the day, or stay for the weekend. Overnight accommodation and food will be available at the school, at an inclusive reasonable price.

Full details are included in the Morse Festival Information Pack, which is available by sending an A4 s.a.e. to 'Dorset Morse Festival Weekend' Clayesmore School Iwerne Minster Blandford Dorset DT11 8PH.

New Look RadioLine

January 9 saw the first edition of the 'new look' RadioLine from Short Wave Magazine. Professionally produced, it now includes news, views, station idents and signature tunes, big prize write-in competitions and a monthly technical feature on various aspects of short wave listening. Subscribers - listen-in for the prize subscriber number - and if it's yours, let Short Wave Magazine know and a prize will be on its way to you! So, make a note of the RadioLine number (0891) 654676. Updated each Saturday, calls charged at 36p per minute cheap rate, 48p per minute at all other times.

New In-Car DC Plug Adaptor

Technotrend are manufacturing a new quality 'in-car' d.c. plug adaptor, designed to ensure consistently reliable contact with all common types of vehicle cigar lighter sockets.

Incorporated in the adaptor is a universal mounting stainless steel, four-pronged grounding contact and spring-loaded fuse housing. It is supplied with an i.e.d. indication of power and high quality curled cable for connection.

This versatile product can be used to charge small electronics equipment, NiCad batteries, etc., or as a regulated d.c. power supply for personal stereos, cellular telephones, portable computers, fluorescent d.c. lights, emergency flashing lights, d.f. equipment, etc.

For further information, contact Barry Bateman on (0252) 373242.

Buccaneer Seal Survey

A. F. Bulgin & Company, have been working closely with Conservation and Technical Officers of the Dyfed Wildlife Trust over the past three years. This has been in order to provide durable and dependable connections for the various complex arrays of electrical and electronic equipment used in their field studies.

The latest in these developments is a complete electronic connection system for their new 6.5m Tornado - Rigid Hull - inflatable recently launched in order to carry out the Atlantic Grey Seal Census.

Under the control of the Country Side Council for Wales, Pembrokeshire National Park, The Dyfed Wildlife Trust and the National Trust, the team's three year project is to count all Atlantic Grey Seal pups born from September to January each year. The Coastal area from Aberystwyth to Tenby is to be swept every 15 days to count and dye-mark Seal pups before they leave their beaches and caves.

In the arduous winter conditions, the call for high quality products is paramount. All on-board, survey, datalogging and lighting electrical and electronic equipment is connected by using various types from the Buccaneer Range, providing cable to cable, surface fitting and through panel mounting versions for power and BNC connections, together with standard sealing caps which enables equipment to be removed for service or security.

The Bulgin range is fully approved to IP68 and BS5490: 1977. It's also accepted by Lloyds Register of Shipping and is now available in half-size mini-Buccaneer providing a further range of 23 types.

A. F. Bulgin & Co. Plc, Bypass Road, Barking, Essex IG11 0AZ. Tel: 081-594 5588.

Solihull ARS Chairman Honoured

Tony Plant G3NXC, attended a recent Investiture at Buckingham Palace to receive an MBE. Tony, who is Chairman of the Solihull ARS, was awarded the honour for services to the aerospace industry.
Stolen

Stolen in the Edinburgh area, Icom Receiver model IC-R9000 serial no. 01060. Any information to PC M. Forsyth (PC3467) Lothian & Borders police on (0506) 31200 (24 hours).

Children In Need Appeal

The Submarine ARC based at HMS Dolphin, Gosport, put on a sponsored station GBONC on Saturday 14 and Sunday 15 November, in aid of the BBC Children In Need Appeal. The station was operated from the Southampton College of Higher Education Warsash Campus, by kind permission of the principal. The QSL cards were paid for by Anchor Surplus of Nottingham, and the total number of contacts was 329. The amount raised will be in the region of £250. The Submarine ARC thank everyone who worked the station.

Great Ormond Street Hospital

Between 24th and the 27th of February 1993, a special event station is to be held at the Great Ormond Street Hospital in London. Operating frequencies will be 3.740, 7.070, 14.170, 21.170 and 50MHz, plus 144 and 430MHz, between 8am and 8pm. All radio equipment for the above bands will be supplied by South Midlands Communications, whilst Waters & Stanton are supplying antennas. The event has two purposes, to raise as much as possible for the hospital, and also to widen awareness of the Novice licence. The event will be opened at approximately 10.45 by the Duke of Edinburgh, in an opening contact with King Hussein of Jordan.

The radio station is hoping to gain a sponsorship from the 'individual' and company alike, on a cost per contact basis, although a fixed sum would be most appreciated. A target of 300 contacts per day has been set. While this isn't high for three transceivers and five operators, a contest style operation is not intended, giving plenty of time for children, staff and guests of the hospital to speak with amateurs. A vehicle anti-theft system has kindly been donated by Vecta (Essex), worth over £400, which will be awarded to the person raising the highest amount above £400. If you would like to make a donation, or would like to have a sponsor pack sent, then please call Pippa Foreman at Great Ormond Street Fund-Raising Department on 071-916 5678.

Dubus

Dubus is the Anglo-German magazine published by amateurs, for amateurs. It is a non-profit making organisation, and the magazine contains no advertisements.

Based upon the v.h.f./u.h.f./s.h.f. aspects of amateur radio, Dubus provides articles on antennas, filters, wave guides, measuring equipment, oscillators, power amps, pre-amps, receivers, transmitters and transverters. Test reports on manufacturers devices and products appropriate to Dubus projects are included. Also, information on technical topics, hints and kinks, meteor-scatter, aurora, tropo, contest news, and lots more. A yearly subscription of four issues, costs £13.25. Ken Hatton G41ZW Hamilton House, Boat Road, Bellingham, Hexham, Northumberland NE48 2AP. Tel: (0434) 220636.

The Golden Antenna

Every year, on the occasion of the German-Dutch Radio Amateur Festival (DNAT), the Town of Bad Bentheim awards the 'Golden Antenna' to radio amateurs for an exceptional humanitarian deed in the field of amateur radio. This award has, up to now, been given to radio amateurs from many countries.

The 12th award of the 'Golden Antenna' is to take place on the occasion of the 29th German-Dutch Radio Amateur Festival, on 27 August 1993, in Bad Bentheim. Radio amateur organisations all over the world, as well as every radio amateur and every individual who has been helped in any way by radio amateurs, are called upon to submit proposals for individuals or groups of radio amateurs. The respective detailed documents, substantiating their proposal, must be received by 15 May 1993, at the latest, to the following address:

Stadt Bad Bentheim
PO Box 1452
D4444 Bad Bentheim

The jury will be considering proposals referring to the period of time between 1 September 1991 to 31 April 1993. Those eligible for the award include individuals, as well as groups of licensed radio amateurs, in emergency situations, rendered their services to other people self-sacrificingly.

The services may be rendered in the humanitarian field or in connection with rescue operations on the occasion of military conflicts, disasters and catastrophes. The only thing that counts is that radio amateur broadcasting has played an important part in the rendering of the humanitarian deed.

The town of Bad Bentheim will invite the award winner to the ceremony, defraying the cost for travel as well as for accommodation.

Pioneering Work On 50MHz

Pictured here is Major Ken Ellis G5KW (centre) receiving a silver salver when he visited Jersey in late October for his pioneering work on 50MHz. The salver was presented by Geoff Brown GJ4ICD, Chairman of the UKSMG (left) and Mike Turner G30PDJ, Jersey ARS President (right).
Rhyl & DARC. 1st & 3rd Mondays, 8pm, WRVS Centre, 116 Vale Road, Rhyll. January 18 - ATV Demo G3OJZ. 25th - CD-ROM Demo G4AMZ. Ken Padley G7IAR on (0745) 338276.

Wrexham ARS. Maesgwyn Community Centre, Maesgwyn Road, Wrexham. January 19 - visit to British Telecom, Oswestry, February 16 - video night - Amateur television. Ian Wright G1MVML on (0978) 845858.

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Wrexham ARS. Maesgwyn Community Centre, Maesgwyn Road, Wrexham. January 19 - visit to British Telecom, Oswestry, February 16 - video night - Amateur television. Ian Wright G1MVML on (0978) 845858.

Cornwall

Comish RAC. Village Hall, Perranwell Station, Perranwell, nr. Truro, 7.30pm. February 4 - a talk by St John's Ambulance Service, 9th - Activities night. Geoff Bate on (0209) 820836.

Derbyshire


Derby & DARS. Wednesdays, 7.30pm. 119 Green Lane, Derby. January 20 - North American Travels by Martin Shardlow G3SZJ, 27th - The Anaesthetic Room a talk about putting people to sleep, February 3 - Junk Sale, 10th - Video Show. Richard Buckby G3VW on (0705) 82475.

Devon


Down


East Sussex

Southdown ARS. 1st Mondays, 7.30pm. Main hall of the Chasewater Home for Disabled Ex-Servicemen, South Cliff, Eastbourne. Wednesdays (Morse) & Fridays (Novice & RAE) 7.30pm at the clubrooms, Haslem House Street Centre, Vicarage Road, Hailsham. February 1 - PMR problems by Keith G6HGK. John Vaughan G3QOO on (0323) 485704.

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Herts. January 21 - Talk by Brook Verral on his Radio collection, February 4 - natter night. Roy G4UNL on 081-804 5643.

Stevenage & DARS. Ground Floor Rear Suite, Sitec Building, Ridgmond Park, 7.30pm. January 19 - Arrangements for forthcoming Annual Dinner challenge G7IEG, 28th - Sacklog.DAL, 2nd - SSTV by G8OWN, February 1 - Proposed rig check night by Eddie Brownlow. The Morse Test by Ron MA, February 5 - So you think you know your Amateur Radio by Peter Crosland G6JNS. Mr Taylor G6GJG on (0602) 691099.

Humberside


Kent

Sevenoaks & DARS. January 18 - Semiconductor manufacture by Eddie Brownlow. The Secretary, c/o Sevenoaks District Council, Council Offices, Argyle Road, Sevenoaks, Kent TN13 1HG.

Lancashire

Hesketh ARC. Every other Tuesday, Birkdale, Southport. January 19 - AGM. Bernie G7DEM on (0704) 63344.

Preston ARS. January 21 - AGM - all members to be present please. Eric Eastwood G1WQO on (0722) 688708.

Lincolnshire


Merseyside


Wirral & DARC. Irby Cricket Club, Mill Hill Road, Irby, Wirral, 8pm. January 20 - D & W, Black Horse, Lower Heswall, 27th - Surplus equipment sale. Paul Robinson G6ZJP on 051-548 5892.

Middlesex

Eschelford ARS. Community Hall, St. Martin's Court, Kinston Crescent, Ashford, Middlesex, 7.30pm. January 14 - natter night, 28th - Packet Radio for Beginners by Peter Burton G3ZPB, February 11 - Intruder Watch by J. Cleeve G3JVC. P. G3ZPB, February 11 - Intruder Watch by J. Cleeve G3JVC. P.

Northants

Derham ARC. 2nd Thursdays, 8pm. St. John's Ambulance Hall, Yaxham Road, Dereham. February 11 - SSTV by G4UK. Mark Taylor G0LGJ on (0362) 691099.

Somerset

Taunton & DARC. 1st & 3rd Fridays, 7.30pm. The Basement, County Hall, The Crescent, Taunton. Other Fridays informal - for station operation, Morse code class, natter. January 22 - Weather Satellites by M. Platf MA, February 5 - So you think you know your Amateur Radio by Peter Crosland G6JNS. Mr Linsdell-Smith G3WNL on (0639) 689778.

Yeovil ARC. Thursdays. Red Cross HQ, Grove Avenue, Yeovil, Somerset. January 14 - Introduction to Club Project Transmitter Board G3MMY, 21st - 80/20mtr project, Circuit Theory by G3PCJ, 28th - Completion of club project G3MWM & G3PCJ, February 4 - Satellite Working by G4JBJ, 11th - Vintage Radio by G7LNY. Cedric White G4JBL on (0258) 73845.

South Glamorgan


South Yorkshire

Barnsley & DARC. Mondays. Radio club room & shack, at the rear of the Darton Hotel, Station Road, Barnsley. January 18 - Lecture to be arranged, 29th - Proposed rig check night by G8OBW, February 1 - on the air.

Scotland


Warwickshire


West Midlands

Barr Beacon RC. 1st & 3rd Wednesdays, 7.30pm. 112 Walsall Road, Aldridge, West Midlands. C. J. Baker G0GNL on (0202) 36162.

West Yorkshire

Keighley ARS. The ingrow Cricket Club, Ingrow, Keighley, 8pm. January 21 - natter night, 28th - AGM, February 4 - natter night, 11th - night on the air GDXKRS, G7XKC. Kathy Conlon GORLO on (0274) 496222.

Wiltshire

Trowbridge & DARC. 1st & 3rd Wednesdays, 8pm. Southwick Village Hall, 8pm. February 3 - Surplus equipment sale. Ian GOGRI on (0225) 864698.
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See pages 4 & 5
There's no doubt in my mind that operating a piece of home-built radio equipment is a revelation. This article covers my experience in building a general coverage receiver, from initial thoughts to completion.

Hopefully, you'll get enough ideas to have a go yourself. You can build a full specification receiver, or attempt a less complex design based on my experience and ideas gained from the project in the form of a helpful constructor's guide.

### A Receiver Constructor

Many radio enthusiasts have a pipe dream that they'll build that special receiver. Roger Bennett G3SIH designed and built his, and now shares some of the experience and ideas gained from the project in the form of a helpful constructor's guide.

#### Dual Conversion

I decided to go for the dual-conversion superhet arrangement, as shown in Fig. 1b. My receiver uses both i.f.s and discrete components.

The circuit I used covered 1.7 to 30MHz without a break. The receiver employs a tuneable i.f. (not shown on the block diagram) which is centred around 1.6MHz, followed by a second i.f. of 455kHz.

The receiver modes are a.m., s.s.b. and f.m. Selectivity is controlled by a commercial home-brew filter.

I decided to use ready-made coils, and based my work on the readily available Toko range. In some cases, these needed modifications to suit my needs.

The difficult part of the receiver, the front end, consists of r.f. stage, mixer and oscillator. The range 1.7 to 30MHz is split into three bands, each with a tuning ratio of 3:1. I chose a tuneable i.f. of 1.35 to 1.85MHz, below the signal frequency circuits.

At this point, you may be wondering why I restricted my design to three ranges, when I could have used more. The reason was so that I could avoid making the receiver switching more complex than necessary.

#### Band-Switching

The main thing that detracts from building a complex receiver, is the 'rat's nest' that invariably develops around the band-switching. This problem can be avoided by arranging each band to have its own r.f./mixer/oscillator board.

With the separate board method, everything is simplified. The only switching functions then required are: tuning capacitor, power supply, r.f. gain, antenna and output.

There are other benefits of the separate board approach. Particularly helpful is the fact that the coil, trimmer, padding capacitor and other components are mounted on their own boards. This is very convenient, because when modifications are made, only the board under modification is disturbed.

Stability is also aided by the single-band board method. This is directly due to shorter wiring to the tuning capacitor and band-switching circuits.

#### Filter Circuits

The T-notch filter is one of the most valuable circuits to be incorporated in a receiver. Generally they are used in receivers with i.f.s of 50, 85, or 100kHz, where the width of the notch is easier to achieve with the lower i.f.

Of paramount importance is the Q of the coil in the resonant circuit. The higher the Q, the better the selectivity. Normally at 455kHz, the selectivity curve will be too wide to be useful with the Q values normally achievable at this frequency.

Fortunately, it's possible to increase the Q value at 455kHz by using the Q-multiplier technique. This is done by providing a controlled amount of feed-back in the circuit, bringing the circuit near to the point of oscillation.

Two automatic gain control (a.g.c.) systems were decided on. One was for a.m. reception, and the other for s.s.b. and c.w. I opted for an audio derived a.g.c. for s.s.b./c.w. reception.
Experience

A noise blanker was added as an afterthought, but I incorporated two crystal markers into the design from the outset. The oscillators provided signals at 100 and 500kHz.

The Circuit Boards

Let's look at the circuit boards so far. There's the r.f. amplifier/mixer board, and the tuneable i.f. board.

There's also the main i.f. board, the a.m./s.s.b. detector board and the f.m. detector board. The b.f.o. and crystal calibrator units were also on their own p.c.b.s.

My modular approach was employed throughout the receiver. I used separate boards for the T-notch filter, power supply, audio a.g.c., noise blanker and the audio pre-amplifier.

Mechanical Construction

I gave much thought to the mechanical construction of the receiver. The final decision on how to build, had to revolve around whether to miniaturise the project, or build for experimentation and modification.

In the end, I chose to construct the receiver so it could be easily modified. To do this, I bought a piece of surplus gear built into a 19in rack. After stripping it down, I built the project into the chassis.

Apart from the main physical constructional aspect, the other major mechanical consideration was the tuning mechanism. To make a really good system, you need a good reduction drive, in conjunction with the best tuning scale you can make or find.

There are many ways a good-quality tuning system can be obtained. One of the best, is to use an Eddystone 898 tuning mechanism.

Although they're not made nowadays, the 898 dial can still be found, and they can often be recovered from older home-brew equipment. Other sources of mechanical tuning mechanisms are those from previously scrapped CR100, and AR88 receivers.

Computer Aided Design

I decided to use a computer-aided design (CAD) system to help me produce the tuning dials. But there's nothing to stop you making them by other methods.

The lettering for dials, controls and the rear panels can be made from rub-down lettering. However, if you have access to a computer in your shack, it really is worthwhile using a CAD package if it is available.

It cannot be stressed enough, that spending time on producing a professional-looking dial and control panel is well worth the job. It's really worthwhile spending time on the dial, for there's nothing worse than using a receiver with a mediocre tuning assembly.

Overall Performance

Once I had completed my receiver project, the overall performance was better than expected. In particular, the oscillator stability was found to be good, although I'd anticipated it being quite a problem.

Considering that there are three oscillators...
an excellent finish to a receiver. This type of tuning mechanism can be used with an I.c.d. frequency counter display, providing the operator with the advantages of analogue and digital frequency control.

running simultaneously, and one of these
at a high frequency, the stability is good.
The b.f.o. stability is also surprisingly
good, being only 500Hz from cold in 30
seconds, stabilising to within 2Hz within the
next 30 seconds.
The tuneable i.f. drift is approximately 500Hz
in the first 30 seconds from switch-on, stabilising to
within 2Hz during the next 60 seconds. It's possible
to listen to broadcast stations around 1.5MHz on
zero beat for some very considerable periods of
time.

With the completed project switched to 5MHz, it
suffered oscillator drift of only 1.7kHz during a
period of 20 minutes. Thereafter, it stabilised to
within 200Hz. At 2MHz, stability is achieved within
20Hz after one minute following switch-on.
So, you can realise from what I've reported, that
it pays to spend time on the receiver front-end. The
reward is given in stability, and I've no doubt that
much of the stability is obtained by using the
separate front-end boards for each band.

Extremely Effective
As I've already mentioned, in operation, the T-
notch filter is extremely effective. The filter I've
incorporated in my design, can be tuned over a
frequency span of ±5kHz about the mean frequency
of 455kHz.
The notch is capable of reducing the marker
signals at 5MHz to almost inaudible levels. The
notch filter will also reduce the most persistent
interfering heterodyne, to an exceptionally low
level.
From my tests, it would appear that the notch
depth obtained with the filter, is 50dB and possibly
more. I've estimated the notch width at 1.5 to 2kHz,
so you'll realise that I recommend fitting a Q-
multiplier even though there's a slight insertion loss.
The noise blanker has proved effective on
impulse type noise, and the 'woodpecker' type of
noise. The blanker in effect, silences the receiver for
the duration of the pulse.
The blanker type of filter is fine for the well-
spaced type of impulse interference like lightning
discharge. But if the pulses are closer together, say
every 250ms (milliseconds), the blanking gives the
impression of being continuous. So, although the
blanker has its uses, generally speaking, I don't use
it that much.

Operation Of Receiver
I found that with my project, the operation of the
receiver itself, was best carried out with the
tuneable i.f. set to 1.6MHz. I then carry out the
tuning using the main dial.
In practice, with the approach I've adopted,
tuning the receiver is straightforward. The ability to
tune the i.f. independently is very impressive, as it allows the receiver
frequency to be set precisely.
An independently-tuned i.f. is also
useful in allowing you to tune locally
around a small segment of a favourite band. I
really think that a tuneable i.f. is a good system,
and recommend other designers to adopt the idea.

Image And Other Signals
As with all designs, there are image and un-
wanted signals. However, I have found that
problems like this can be effectively reduced by
using an antenna designed for the frequency in use.
The tuned antenna will assist the receiver, by
discriminating against signals falling outside of its
resonant frequency. Sometimes, it's possible to
evitably eliminate an unwanted signal by simply
switching from one fixed antenna to another.
The fixed antenna method is particularly
effective when using amateur band dipoles for
general listening over the 3 to 30MHz band. It's
especially effective if the antenna orientation varies
from dipole to dipole.

Antenna Tuning Unit
The next important item ahead of the receiver, is
the antenna tuning unit (a.t.u.). The a.t.u. enables
the antenna to be matched to the receiver, and aids
the selectivity of the system as a whole, by
discriminating against off-frequency signals.
When it comes to choosing an a.t.u., there is a
very wide choice. It's up to the individual as to what
circuit to use, but I think that the band-pass type of
tuner is probably the best for the job.

Tuned Preselector
Another item that can be used with a receiver, is
a tuned pre-selector. I use a double-tuned circuit,
and it offers enough rejection to a 15MHz image,
with a receiver tuned to 12MHz to permit normal
listening.
My preselector (there are many other suitable
published circuits) is currently under development.
It is continuously tunable from 1.7 to 30MHz,
using varicap diodes.
The unit can be left tuned to the centre of the
required band. Peaking is only carried out when the
desired station or frequency is found. As I had some
of the old Denco coils, I used these, but there's
nothing to stop you using others, including toroidal
types.

Temptation Arises
The trouble with home construction is that as
soon as the finalised project is started, the
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temptation to modify the job arises. My receiver was no exception to this problem!

The modifications I’ve ended up with include:

1: Extra input terminals to the tuneable i.f., enabling the i.f. to be used as a receiver in its own right, with the r.f. front-end being turned off by an otherwise spare section of the band-change switch.

2: The 455kHz i.f. input can be terminated on the front panel, in order to enable the receiver to be used as an i.f./a.f. strip.

3: Both crystal markers can be terminated on the rear apron, together with the input to the a.f. amplifier, together with the 9 and 12V d.c. supply lines.

All these modifications and additional features will be very helpful especially when I’m testing ancillary home-constructed equipment.

In Retrospect

In retrospect, if I were to build my receiver again (what a thought!), I would build the project with some modifications. The main modification would certainly involve the main front-end.

To help prevent oscillator pulling, I would build the r.f. front-end physically larger. Each section would be completely screened in its own metal enclosure, and the separate screened enclosures would then be supplied via feed-through capacitors.

Additionally, I think that I would also do away with three-gang tuning capacitors, and opt for varicap tuning diodes. This would bring the tuning directly onto the p.c.b. associated with each band, improving stability even more.

Digital read-out on the tuning would almost certainly be incorporated, if I attempted another receiver of this type. It’s a virtual necessity in any case, as the tuning potentiometer rotates through approximately 300°. Despite this, with some careful selection of the resistors controlling varicap voltages, it is possible to obtain the necessary tuning range over just 180°.

Another very worthwhile improvement, could be the restriction of the tuneable i.f. tuning range. This can be reduced to 1.66MHz ±50kHz, providing a total tuning span of 100kHz, instead of the original 400kHz. With this modification, a receiver could provide dial calibration to within 1kHz.

Other Filters

I’ve also had other thoughts regarding filters. The incorporation of two T-notch filters in-series is a particularly interesting idea.

The addition of an audio notch filter instead of the i.f. filter could be an alternative. Various 455kHz i.f. filters can also be fitted. They can be switched in and out as required, to cover the bandwidths from (for example) 500Hz to 16kHz.

Story So Far

Well, that’s the story so far, and what an interesting experience it was! I’ve built many projects before the one that provided the ideas for this article, but this particular receiver was by far the most complex.

The final result was a receiver that works well, is a pleasure to use and can be easily modified. The very fact that every part of the receiver was familiar to me, was a valuable asset, providing extra encouragement towards further ‘fine tuning’.

There are aspects of the receiver that can be improved, but that’s the fun of home construction, as there’s always something to think about. So, why don’t you have a go at your own pet project?

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ORDER YOUR COPY NOW!
Making A Valved Active Antenna

This receiving project uses a valve working with only 12V h.t. If you suffer from local TV timebase interference or computer hash, then it's worth a try. The project covers the frequency range 1 to 10MHz (30MHz with reduced gain).

The letters page in PW gave me a strong hint that quite a few radio enthusiasts are interested in valved circuits. However, the main difficulty seems to be with the high voltage supplies required.

The heater requirements, typically 6.3V at 0.3A, are a bit wasteful. But if the equipment is operated from mains or from a car battery, then it doesn't matter too much.

A surprising number of valves can be used at low h.t. voltages. Circuits such as audio oscillators and add-on b.f.o.s can often work with only a 12V anode supply.

Some years ago there were car radios using 12V h.t valves. I've recently become quite interested in applications where 12V serves as both the low tension or l.t. heater supply and the high tension h.t. anode supply.

This little circuit uses the low voltage technique. Although it is not so good on the higher h.f bands, it's useful on 1.8, 3.5, and the 7MHz amateur bands and up to the 9MHz broadcast band.

Simple Concept

You might be wondering what an active antenna is, and I have to admit that the term may mystify the uninitiated. Actually it's a very simple concept, so let's take a look at the circuit, in Fig. 1.

In practice, an 'active antenna' is a small antenna followed by an amplifier. Despite this, the active antenna does have some special properties, although there are pitfalls in its design. But they have something to offer the amateur (even those with large gardens).

First of all, we'll look at the "small antenna". And, for our purposes, I'll suppose this is a vertical whip 1m long. A whip antenna of this size will have sufficient pick-up at h.f., to have approximately 1µV of background noise at the base.

Most receivers can operate with an input of around 1µV, so there is no point using a larger receiving antenna. Or is there?

The main problem, is one of mismatch between the whip antenna and the receiver. The whip is roughly equivalent to a small capacitor of, let's say, 10pF.

At 1MHz this represents a high impedance (or reactance) of about 16kΩ. If it's connected directly to a receiver having a 50Ω input impedance, most of the signal will be lost.

What's needed next, is some sort of matching device which will keep the 1µV delivered by the antenna, and deliver it to 50Ω receiver input socket. This can be done using an amplifier having a very high input impedance, and low output impedance.

In the world of valves, the traditional circuit to match a high to a low impedance is called a cathode follower. Nowadays, it has a modern equivalent, in the emitter follower with bipolar transistors, and the source follower when f.e.t.s. are used.

As PW has a receiving them this month, Adrian Knott G6KSN, looks at an old idea, for solving a very modern problem. Adrian's active antenna should prove useful and interesting, even if you're not into valve work.

![Circuit Diagram](image)

**Construction**

Fig. 1: Circuit of the valved active antenna, with the valve diagram and pin-out numbering shown in Fig. 4. The power supply insertion unit circuit is also shown (see text).

Fig. 2 (a,b and c) below: Diagrams illustrating screening effect of a ground plane, and why the coaxial cable needs to be screened from the active antenna. The author's practical, and proven ground plane is also shown with working dimensions (see text).

Practical Wireless, February 1993
Eliminate Interference

By using a small whip antenna mounted well away from TV sets, dimmer switches, vacuum cleaners, computers etc., it's possible to eliminate much of the interference heard on the lower h.f. bands. The reduction can be dramatic.

It's most unusual to find a quiet 3.5MHz band at most amateur stations. This is because the large antenna used for transmitting, picks up all interference sources in the locality.

Additionally, the average antenna provides far more pick-up than a modern receiver needs. Once the atmospheric noise is audible, there's no point using a large antenna, as both noise and wanted signal increase together.

The active antenna, on the other hand, is physically small and in use is placed well away from interfering devices. In practice, this form of antenna is only just large enough so that atmospheric noise is audible. This level of input leaves the receiver lots of overload margin for stronger signals.

Problem Feeder

There is one particular problem in the design of active antennas. It's that the feeder itself will pick up far more signal than the whip antenna itself, along with lots of interference.

The main unwanted pick-up of signals, tends to happen on the outer braid of the coaxial cable. So, because of this, it's necessary to avoid the feeder introducing signals into the whip.

Reducing the problem from the feeder, is done by providing a good ground plane made of wire netting or cooking foil. The diagram, Fig. 2, shows how to avoid the whip 'seeing' the feeder.

In engineering terms, we can say that the electric field lines from the whip antenna, must terminate on the ground plane and not the feeder. You may ask, why not use a dipole as the small pick-up antenna? The difficulty of using a dipole, is that to avoid the interference on the feeder getting into the antenna, there would need to be perfect balance. Unfortunately, it's simply not possible to achieve the necessary degree of balance.

I'll suggest an example and say it was specified that an interference level of 1mV on the feeder, should only gives 1μV on the antenna. In practice, this requires 60dB of rejection, which is very hard to achieve.

At the higher end of the h.f. range, there are less advantages in using an active antenna. This is because the atmospheric noise level is lower.

So, at the higher h.f. frequencies, the amplifier could, with advantage, have a little more gain. Because of this, I would recommend the present design more for the lower frequency bands.

Small Box

The amplifier is built into a small metal box, large enough to accommodate the few components. The valve holder is mounted on a metal plate fitted across the box, although any type of construction will do.

The output connector is fitted to the lower side of the box, and the antenna wire is brought out through a large hole in the top. It's very important to avoid capacitance between the antenna wire and earth, as this shunts the signal. I used a ceramic insulator at this point, but it's not really necessary.

The pin connections to the valve are shown in the inset, on the circuit diagram, Fig. 1. These are numbered looking from below the valve in a clockwise direction starting from the gap. This is opposite to modern i.e. pin-out numbering.

Suitable Valves

There are many suitable valves for this project. I used a 12AT7 (also called ECC81). This easily obtainable valve contains two triodes, in a single glass envelope.

To improve the performance, I connected the
FOR THE PRICE, YOU’D EXPECT THE WORLD.
YOU’LL GET IT.

The TS-950SDX is at the very pinnacle of the Kenwood HF transceiver range. And when you look at its specification, that’s not surprising.

It boasts a number of highly advanced features like built-in Digital Signal Processing, 50 Volt MOSFET finals, AIP (advanced intercept point), built-in sub-receiver and built-in automatic antenna tuner. To name but some of its world-leading technical tours-de-force.

Just as important, it’s made with Kenwood’s traditional attention to detail and reliability, to stand up to a lifetime’s use. A fact which your Kenwood dealer will be proud to demonstrate when you visit for a closer look at this world-leading transceiver.

The TS-950SDX is part of a range of Kenwood HF transceivers priced from around £1000 to £3500. And although quality is never cheap, it’s still a small price to pay to have the world of amateur radio at your command.
valves in parallel. However, the two heaters, which require 6.3V each, were connected in series to operate from a 12V supply.

The antenna itself is 3m of wire, which in my case, is tied to the rafters as an inverted 'I'. You can support the antenna vertically if you wish, by using a wooden pole or bamboo.

My ground plane was made from a roll of aluminium cooking foil measuring 3m by about 0.5m wide. This is ideal for loft installation. If the system is to be used outdoors, either a similarly sized piece of wire netting or a few wire radials would be more suitable.

Don’t forget that the idea of the ground plane, is to screen the antenna from the feeder. So, if you’re using the antenna outdoors, run the feeder along or under the ground in the vicinity of the active antenna itself.

The d.c. power is fed up the feeder to the amplifier, using r.f. chokes to separate it from the signal. This is the same technique used in masthead amplifiers, employed in TV applications.

As the consumption is about 300mA, it’s necessary to keep the resistance of the chokes below about 30Ω total, to avoid an excessive voltage drop. However, this was more or less achieved with the prototype without any special precautions from me!

Testing And Warm-up

When you’re testing, don’t forget that valves take some time to warm up. It’s easy to be misled, and most TV producers forget this fact when they’re producing wartime plays, and their radio warms up in about two seconds!

As the valve reaches its operating temperature, signal levels will suddenly rise. You should find the bands sounding quite clean, with a little hash from TV sets.

Signals will be much weaker than those received when a full-sized wire dipole is used. Despite this, the signal-to-noise ratio of signals will be better.

Don’t be misled by the effects of the automatic gain control (a.g.c.) when assessing results, as it tends to raise noise in-between words. My own impression was that 7MHz sounded more like 14MHz, and listening was much more pleasurable.

Intermodulation

Active antennas are often accused of causing intermodulation when there are strong signals. However, this valve circuit is difficult to overload itself, and does not have enough gain to overload the receiver. Normally, it’s the receiver mixer which is the vulnerable item, and it is important not to use too much gain ahead of this stage.

It’s worth mentioning that arrays of active antennas can be built. For instance, a 2-element array could be made by using two active antennas spaced a quarter of a wavelength apart. Such an array has virtually no coupling between the antennas to complicate matters.

Closer spacings, other than quarter wavelengths, can also be used. But, if you do try closer spacings, there will be a reduction in signal which may not be tolerable.

Fun Project

I’ve presented this valved active antenna as a fun project. It’s very easy and interesting. If you want to try a solid state version, then by all means go ahead, but I suggest you use a f.e.t.

If you’re thinking of purchasing an active antenna, be most careful over the specifications. This is because normally simple statements like ‘gain’ and ‘noise factor’, need careful definition when the amplifier is intended for this unusual application where the source is a very high impedance.

Have fun with your valved active antenna. It’s virtually ‘bomb-proof’ and great fun to build and use.

PW

How Difficult? Beginner

How Much? Approximately £10
(depending on spares box)

Shopping List

<table>
<thead>
<tr>
<th>Resistors</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Metal film 0.6W type.</td>
<td>1 R2</td>
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<tr>
<td>1kΩ</td>
<td></td>
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<tr>
<td>15kΩ</td>
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<tr>
<td>High voltage disc ceramic</td>
<td>2 C2, 3</td>
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<tr>
<td>1nF</td>
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</tr>
<tr>
<td>10nF</td>
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<table>
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<tr>
<th>Inductors</th>
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</thead>
<tbody>
<tr>
<td>Radio frequency choke</td>
<td>2 RFC1, 2 100μH (max resistance 1.5Ω)</td>
</tr>
<tr>
<td>Valve</td>
<td>1 V1 (see text)</td>
</tr>
</tbody>
</table>

Miscellaneous

Valveholder (B9A), suitable aluminium box (die-cast with rubber seals for outdoor use), coaxial cable plugs and sockets, self-amalgamating tape (for sealing purposes). The inductors, L1 and L2, can be made up by winding 40 turns of thin connecting wire over a suitable length of ferrite rod. Virtually any resistors will do for the circuit, and Maplin 0.6W metal film types are suitable. High voltage disc ceramic capacitors (Maplin JLO3D and JLO4E are suitable).

Valves and Valveholders are available from: Colomor (Electronics) Ltd., 170 Goldhawk Road, London W12 8HJ. Tel: 081-749 3934.
J. Birkett, 25 The Strait, Lincoln LN2 1JF. Tel: (0522) 520767.
RST Mail Order Co., (Langrex Supplies Ltd.) 1 Mayo Road, Croydon, Surrey CR0 2QP. Tel: 081-684 1166.
KENWOOD APPROVED DEALERS

AXMINSTER
Reg Ward & Co, 1 Western Parade,
West Street, Axminster, Devon.
Tel: 0297 34918

BELFAST
GM Electronics, 1-3 Evelyn Avenue,
Belfast, Northern Ireland.
Tel: 0232 471295

BIRMINGHAM
South Midlands Communications,
504 Alum Rock Road, Alum Rock,
Birmingham. Tel: 021 327 1497

BIRMINGHAM
Ward Electronics, 422 Bromford Lane,
Ward End, Birmingham.
Tel: 021 328 6070

BOURNEMOUTH
Lowe Electronics, 27 Gillam Road,
Northbourne, Bournemouth.
Tel: 0202 577760

BRISTOL
Lowe Electronics, 79 Gloucester Road,
Patchway, Bristol. Tel: 0272 771770

BRISTOL
AMDAT, 4 Northville Road, Northville
Bristol. Tel: 0272 699352

CAMBRIDGE
Lowe Electronics, 162 High Street,
Chesterton, Cambridge.
Tel: 0223 311230

CARDIFF
PMR Ltd, Industrial Estate, Gwaelod-y-Garth, Cardiff. Tel: 0222 810999

CLACTON ON SEA
Coastal Communications, 19 Cambridge Road,
Clacton on Sea, Essex.
Tel: 0255 474292

CORK
Intronic Ltd, Windsor Hall,
Glounthaune, Cork, Eire.
Tel: 010 353 2135 4422

COUNTY TYRONE
Tyrone Amateur Electronics, 44 High Street, Omagh, Co Tyrone, Northern Ireland. Tel: 0662 242043

CUMBERNAULD
Lowe Electronics, Cumbernauld Airport
Cumbernauld. Tel: 0236 721004

DONCASTER
Alan Hooker, 42 Nether Hall Road,
Doncaster, South Yorkshire.
Tel: 0302 323690

EALING
Martin Lynch, 286 Northfield Avenue
Ealing, London. Tel: 081 366 1120

EASTCOTE
Lowe Electronics, 223 Field End Road,
Eastcote. Middx: Tel: 081 429 3236

EDGWARDE
Haydon Communications, 132 High Street, Edgware, Middx.
Tel: 081 931 5782

FIFE
Jaycee Electronics, 20 Woodside Way,
Glenrothes, Fife. Tel: 0592 756962

HANGER LANE
A R E, 6 Royal Parade, Hanger Lane,
London. Tel: 081 997 4476

HAYWARDS HEATH
Bredhurst Electronics, High Street,
Hampden, Haywards Heath, West Sussex. Tel: 0444 400786

HOCKLEY
Waters & Stanton Electronics, Spa
House, 22 Main Road, Hockley, Essex
Tel: 0702 206835

LEEDS
South Midlands Communications,
Nowell Lane Ind Est, Nowell Lane,
Leeds. Tel: 0532 350806

LEEDS
Lowe Electronics, 34 New Briggate,
Leeds. Tel: 0532 452657

MAIDSTONE
Lowe Electronics, Chatham Road,
Sandling, Maidstone. Tel: 0622 692773

MATLOCK
Lowe Electronics, Chesterfield Road,
Matlock, Derbyshire. Tel: 0629 380800

NEWCASTLE
Lowe Electronics, Newcastle Airport,
Woolston, Newcastle.
Tel: 0661 860418

NEWPORT PAGNELL
Photo Acoustics Ltd, 58 High Street,
Newport Pagnell, Bucks.
Tel: 0908 610623

NEWTON LE WILLOWS
Amateur Radio Comms Ltd, 38 Bridge
Street, Earlestown, Newton Le Willows
Merseyside. Tel: 0925 229881

NORFOLK
Eastern Communications, Cavendish
House, Happisburgh, Norfolk.
Tel: 0692 650077

NORTH HUMBERSIDE
Peter Roddell Communications, Field
Head House, Leconfield, North
Humberside. Tel: 0964 550921

NOTTINGHAM
R A S Nottingham, 3 Farndon Green,
Wollaton Park, Nottingham.
Tel: 0602 280267

PORTSMOUTH
Nevada, 189 London Road, Portsmouth
Hants. Tel: 0705 662145

SLOUGH
Lowe Electronics, London Heathrow,
6 Cherwell Close, Langley, Slough,
Berks. Tel: 0753 345255

STOURBRIDGE
Dewsbury Electronics, 176 Lower High
Street, Stourbridge, West Midlands.
Tel: 0384 390053

KENWOOD
HOME AUDIO, CAR AUDIO, COMMUNICATIONS EQUIPMENT, TEST AND MEASURING INSTRUMENTS, TELECOMMUNICATIONS
We asked Richard Newton G0RSN, to tell us his thoughts about the new mid-priced Alinco hand-held transceiver.

The Alinco DJ-180EB is one of the latest easy-to-use, mid-range hand-held transceivers that are coming onto the market. Aimed firmly at the new user, or as a second set, the DJ-180 is very competitively priced. So what do you get for your money?

The Alinco DJ-180EB comes with a very neat and professional package. The radio itself is finished in a smart matt grey metal and plastic case. It comes with a belt clip, carry strap, helical antenna, a smart ‘sit in’ style charger and a 7.2V 700mAh NiCad battery pack. It also comes with a 23-page instruction leaflet including a schematic diagram.

**Good Judge**

My father told me that a handshake was a very good way to judge character, a yardstick I’ve always remembered and used with success. A yardstick, the DJ-180EB passed with flying colours.

It is a lovely radio to hold, being compact but not so small that controls and readouts become lost. It is small enough to fit in a pocket or small handbag, but has the feel of being substantial. This feel gives you the confidence that it will do its job, and do it well.

The radio has simple and clearly labelled controls. No matter whether you are left or right-handed, the essential controls fall naturally at your fingertips.

**On Charge**

As I was eager to find out what the DJ-180 could do, I put it on charge, which takes 12 to 14 hours. I used this period to have a look at the manual. The supplied battery pack, gives 2W output on high power. Low power is a mystery however, for nowhere could I find any mention of what the output is on this setting. I presume it was about 500mW.*

Now with a fully charged battery, off I went pedestrian mobile, immediately working two stations in a local contest. I received very favourable reports from both stations, the most distant being about 15km away as the crow flies.

From my location on the outskirts of Bournemouth, I could access the local repeater with ease on low power. I could also hear the repeaters at Wells in Somerset, and Portsmouth in Hampshire. Although I was unable to access them, I was most impressed with the sensitivity of the little radio.

**Good Value**

The DJ-180 strikes me as good value for money. It has basic, down to earth controls and functions. It doesn’t waste time or space with gadgets or ‘gismos’.

On the top panel is a BNC antenna connector, external microphone and speaker sockets. The controls consist of a low profile, but easy to use variable squelch control, a good sized on/off/volume control knob and a matching rotary type frequency control.

The PTT, toneburst and function switches are located on the side of the radio. They are in the form of rubber membrane covered switches.

On the front of the transceiver is an l.c.d. frequency display, which can be read at virtually any angle. However, some readers may find the smaller function symbols a little difficult to see.

There are also push buttons to control v.f.o/memory operation, scanning, call frequency, lamp, monitor and tone. Each button has a second function. The buttons and their second functions are well labelled and are easy to use.

The DJ-180 has a variable off-set frequency function, and this can be set up to ±15.995MHz. The offset, along with the main frequency, can be set in steps of, 5, 10, 12.5>15>20 and 25kHz. * See specifications for PW tests.
There are 10 memories for use. Pressing the call button recalls the information in memory 0. On scan, the radio will either scan the whole v.f.o. range or the 10 memories, stopping for about five seconds on a busy signal before resuming.

Another feature I found to be useful was the auto power-off facility, a must for all those as forgetful as I am! The lamp is, I think, marvellous. It back-lights the display very well indeed for five seconds and then turns off. It will remain on for as long as the buttons are being used.

There’s another useful feature too. For quick tuning you can depress the function button and turn the frequency control to move up and down the v.f.o. range in 1MHz steps.

**Power Socket**

I must admit to have been slightly disappointed with some of the aspects of the DJ-180. It would, for example, have been useful to be able to set up a lower and upper limit for the v.f.o. scan, and to my utter dismay there is no external power socket.

The lack of an external power socket I must admit did surprise me, even when considering this to be a budget radio. A d.c. power adaptor is, however one of a very comprehensive list of optional extras that are available. The list of add-ons, also includes DTMF (dual tone multi frequency) and a 50 or 100 channel memory pack.

**More Versatile**

Due to information I found in the packing, I turned the DJ-180 on while holding down two specific buttons, and to my amazement, the radio no longer covered 144 to 145.995MHz, but became fully operational from 130 to 173MHz inclusive.

The wide-band reception can be just as easily reversed. The only disadvantage of a very wide-band coverage, is that the v.f.o. scan now becomes an arduous task. In my opinion though, the benefits outweigh that slight inconvenience.

**Summing Up**

On the whole and summing up, I think that the DJ-180ED is a smart and professional looking package. The radio is compact, being about the size of a regular pack of playing cards, and its controls are easy to use and well set out. I constantly got good audio reports, and I cannot fault the receiver sensitivity. With its extended coverage and supplied accessories costing only £189.85, I believe it to be excellent value for money.

What more can I say, I was sorry to have to hand it back.

My thanks go to, Waters & Stanton, of 22 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835 or 204965 for the loan of the review model. The Alinco DJ-180EB is available with antenna and a.c. charger supply for £189.85 plus p&p. PW
I’m sure many more operators would use Morse if it weren’t for reception problems on crowded h.f. bands. Trying to copy one varying Morse signal among the scream and howl of other signals is not the easiest of things to do.

Morse is a super mode, given a good filter, either crystal - in the i.f.- or in the audio stages. A crystal filter can cost anything between £50 - £60, so a cheaper alternative was sought.

Cheaper Option

I decided that an audio filter, based around a ‘tuned’ amplifier would be a much cheaper option. After buying the coil and the integrated circuits, and assuming a good junk -box, the cost of this audio filter should be around £6. I also decided to use an LC tuned input circuit, and a broadly tuned filter stage, rather than the more usual complete frequency modelled one.

I reasoned that the simplicity and sharpness of an LC tuned circuit would be easier to design and build. The broadly tuned amplifier stage is, in reality, a combined low-pass and high-pass filter, which gives a peak in its response curve.

The Circuit

The circuit diagram, Fig. 1, shows details of the complete c.w. filter. The project comprises an LC tuned circuit (L1/C1) an amplifier with frequency modelling (IC1), and a low-pass filter (R6/C5). An LM380 audio amplifier (IC2) completes the circuit. Capacitor C1 is calculated to resonate with L1 at 800Hz, and the value should be made up from several smaller capacitors. If you use a 330mH coil for L1, then C1 must be changed to 120nF, which is an easier combination to achieve. I just happened to have a 350mH coil, so I chose C1 to suit.

In the low-pass filter combination of R6/C5, capacitor C5 is also chosen to suit, and its value should be made up from a variety of smaller values.

The input to the circuit is taken from the loudspeaker or headphone socket of a receiver. The audio output is then taken to a loudspeaker or low impedance headphones.

Tuned Amplifier

The tuned amplifier stage is based on the 741, or similar type, integrated circuit, operating from a single supply rail. The non -inverting input is held at half the supply voltage, created by the resistor pair R4/5. There are two frequency sensitive combinations in the overall negative feed -back loop.

The combination of C3 in series with R2 sets the lower frequency point, and C4 in parallel with R3 sets the upper frequency. The two frequencies are called the upper, and lower, cut-off points. They are not absolute cut-off points, but are frequencies at which the gain of the stage starts to vary. These are where the gain of the stage has fallen by 3dB (down to half power).

The two frequencies are arranged to be either side of the 800Hz centre frequency of the tuned circuit (or whatever centre frequency you choose). The values quoted give cut-off points of about 720 and 880Hz.

Tuned Circuit

The tuned circuit, consisting of L1 and C1, is centred (resonated) on 800Hz. This 800Hz frequency is considered 'the normal' offset used when receiving c.w.

The centre frequency can be set to almost anything, and by using a pre-wound coil (of 350mH) the resonating capacitor can be found from the formula:

\[
f = \frac{1}{2 \sqrt{LC}}
\]

From my calculations, the capacitor C1 has to be 113.08nF for a frequency of 800Hz. The actual capacitance will probably be slightly less, due to stray capacitance in the wiring. The capacitance will need to be made up of several capacitors in parallel to make up the odd value. For more accurate work, an oscilloscope and signal generator are useful for setting up the peak response.

** C1 and C5 see text for more details

Fig. 1: The circuit diagram of the 800Hz c.w. filter.
Low Pass Filter

The output of the tuned stage is fed to a low-pass filter comprised of R6 and C5. Capacitor C5, like C1, is made up from several capacitors in parallel.

This filter has a cut-off frequency of 900 Hz with the values specified. However, this can be varied to suit the user’s requirements.

The Audio Stage

The audio power amplifier stage is an LM380 in a standard circuit. It can supply up to 2.5 W of audio power.

A switch is used to connect the speaker either to the output of the filter or bypass it completely, thus enabling the internal speaker to be used as an extension speaker for voice, or as a filtered speaker for c.w.

More than enough output can be obtained from an LM380, even with a 9 V supply. The variable resistor R7 is adjusted to give the same volume on c.w. as the other modes.

Computer Simulation

I used a circuit simulation program on my computer to create the original of the filter response curve, shown in Fig. 2. The vertical scale denotes attenuation (-dBs), while the base line is the frequency from 500 Hz to 1.4 kHz.

Construction

For construction, Veroboard or matrix board (perfboard) can be used, or you could produce your own p.c.b. I opted for the ‘land’, or ‘surface mount’, technique on a p.c.b.

Using this method, the components are placed on the same side as the tracks. This saves the need for drilling and makes for simple construction.

You should remember that, if you’re using the ‘surface mount’ method, you’re laying out for the right side. I have shown the layout I used for my filter in Fig. 3. The layout isn’t that important at these frequencies, so go ahead and build it into a case.

I used a plastics box to house the project, battery and the speaker. No problems were experienced using a 100 W transmitter nearby. If you have a higher r.f. field in your shack, you might need to enclose the filter in a metal screened box. The circuit may be powered from an internal battery, making it more portable.

Setting Up

If all is well with the soldering, etc., then connection to a suitable receiver is all that is needed. With the filter switched out, the radio’s output, is connected directly to the loudspeaker acting as an extension speaker.

With the filter in, the audio should take on a tunnel-like sound. Tuning across a c.w. signal should produce a most pronounced peak at resonance. The variable resistor R7, is then adjusted to give a similar volume to the unfiltered audio.

Further reading:

Shopping List

Resistors
Carbon Film 1 W 5 %
2 Ω 1 R8
Carbon Film 0.25 W 5 %
10 kΩ 1 R2
47 kΩ 1 R1
100 kΩ 4 R3, 4, 5, 6
Variable trimmer
2 MΩ 1 R7

Capacitors
Polyester
1.8 nF 1 C4
10 nF 1 C11
22 nF 2 C2, 3
0.1 µF 2 C6, C8
Electrolytic 16 V working
4.7 µF 1 C7
220 µF 2 C10, C12
470 µF 1 C9
For C1 and C5 see the text for more information.

Semiconductors
741 1 IC1
LM380 1 IC2

Miscellaneous
A small section (to suit) of Veroboard or ‘perfboard’, a two-way change-over switch, small 8 Ω loudspeaker, interconnecting wire, sockets to suit, and a medium-sized plastics box.

Fig. 2: Using a computer to simulate the circuit, Ben Nock G4BXD, ended up with this type of response. It is centred rather than higher than the designed frequency, but he didn’t notice any difference. The overall phase angle is shown dashed.

Fig. 3: The author’s circuit followed this layout, and you might like to build your filter along these general lines.
Dipole Field Strength Meter

A field strength meter (f.s.m.) is an extremely useful piece of equipment in any amateur’s workshop. With the f.s.m., evaluations and comparisons can be made on any home-built, experimental or commercial antenna.

The following design requires no batteries and is both simple, in design and construction, as well as useful over a very wide band of frequencies. Look at the drawing of Fig. 1 to see just how simple it is to make. The meter was a small unit removed from a tape recorder, but almost any general meter of around 100-200mV would be suitable.

It may be used with either vertical or horizontal polarisation, detecting peaks and troughs in the r.f. field, as well as a relative front-back ratio of the antenna under test. It can also be used to show if an antenna has a ‘squint’ in its radiation pattern.

Operation

In operation, for maximum sensitivity, each half of the antenna should be adjusted to a $\lambda/4$ at the working frequency. In practice this is only possible at v.h.f. and u.h.f. When used at h.f., each of the telescopic rods is extended to its maximum length. The trim-pot is adjusted to give a suitable reference reading on the meter (M1) before making comparisons.

In tests at my location, signals from a 144MHz transmitter, with an e.r.p. of about 100W, could be easily measured at about 20m distance.

Fig. 1: The circuit diagram of the f.s.d., the telescopic elements should ideally be $\lambda/4$ at the working frequency at v.h.f./u.h.f., or as long as possible at h.f.

Modifications

For greater sensitivity at h.f., helically wound sections could be fitted at the base of the telescopic elements. A little experimentation would be necessary for these sections. A starting point to try is 250 turns of 0.5mm (26s.w.g) enamelled copper wire, close-wound on a 12mm diameter wooden dowel. This takes about 18-20m of wire for each side.

D. J. Smillie GM4DJS
Wishaw
Strathclyde

Cheap Change-Over

I have two transceivers for the 144MHz band, one for each mode of working. After a while, reaching round the back of each of the rigs to connect the power amplifier stage became a chore.

There had to be an easier way of doing it. Of course there was, and only a change-over switch was needed. But change-over switches are very expensive, and naturally being of frugal nature I investigated a cheaper option.

The solution shown was my cheap option change-over. It should work in all cases, not just between different mode rigs.

Hector Cole G3OHK
Seaton
Cumbria

Home-Brew Antenna Connections

“How much did you say that antenna cost”, you ask incredulously, as you learn the extent of the damage for the few pieces of aluminium rod, and the couple of lengths of wire, you inquired about. “But after all, it’s only a few sections of rod and wire”.

The trouble is, that it’s the shape and positions of those few pieces of aluminium and copper that make the difference.

Super Antenna?

My ‘Wagi’ should help you turn a collection of wire into a super antenna. One of the problems encountered when working with wire antennas, is that of adjustments, and making a good connection. Not every soldering iron is fitted with a 20m lead, or is adequate to maintain an adequate temperature in the slightest of breezes.

Small portable butane-powered soldering irons go some way towards offering an answer, but often run out of gas at the critical moment. Stood at the top of a swaying ladder with two pieces of hot, but not hot enough to melt solder, wire is not my idea of fun. At least not when I’m that person isn’t!

Well what is it? The answer is of course ‘choc-bloc’ connectors. These are available in a variety of sizes to suit almost any size of wire. They also cut through the covering of almost all forms of insulated wire available these days, and give a good air-tight joint.

To minimise wind resistance they are removed from the plastics section in which they normally reside. Look at the drawing and I’m sure that all will fall into place. They provide an easy, convenient and above all, secure fixing, that can be changed quickly to create that perfect collection of wires and metal.

Michael Stott G0NEE
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Northumberland
£30 off Europe’s best selling oscilloscopes!

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**PART NO.**  | **DESCRIPTION** | **USUAL PRICE** | **OFFER PRICE**
---|---|---|---
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HM205-3 | 20MHz, digital storage/analogue ‘scope | £716.75 | £686.00
HM604 | 60MHz, dual channel, 1mV/cm, delay time base | £716.75 | £686.00
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TM 5375 | Frequency range (20MHz) and HFE test | £36.95 | £28.99
TM 115 | AC & DC current (10A), HFE and continuity test | £53.50 | £44.95
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Some readers will doubtless possess a communications receiver. Whilst the majority of these sets perform very well in the h.f. band, most do not cover the frequency range below 300kHz. My interest in l.f./i.f. was aroused some years ago, when I found an article on decoding time transmissions from the atomic clock signal on MSF (on 60kHz).

Transmissions below 150kHz, potentially, have ranges of many thousands of kilometres. Signals in this band include radio navigation, standard frequencies and submarine communications. There are also naturally occurring phenomena between about 1kHz and 20-30kHz.

The converter described here translates frequencies, in the range 500Hz to 150kHz, up into the 3.5MHz amateur band. A standard communications receiver will then allow you to listen in on this rather strange, and intriguing part of the electro-magnetic spectrum. If you look at Fig. 1 you will see the range of signals.

Converting A Signal

Converting a 60kHz signal to 3.560MHz presents no real problem, but consider converting 10kHz up to 3.510MHz. With the converter local oscillator running at 3.5MHz and a conventional mixer all hell is let loose.

What we have done is to generate a very strong signal (the l.o.) only 10kHz away from our wanted (and very much weaker) signal. The result of the strong nearby signal, is to overload the front end of the communications receiver (and probably the i.f stages as well if a mediocre filter is used). This will result in our v.i.f. signal being lost under an enormous blocking signal.

The answer to the converter problem is to use a balanced mixer in the up-converter. Using a balanced mixer, results in a great reduction in the l.o. breakthrough. But in addition, variable resistors, R25 and R27, improve the balance of the mixer, reducing l.o. breakthrough to a minimum.

Crystal Controlled

The converter oscillator is crystal controlled, and almost any parallel resonance fundamental crystal in the range 3-5MHz will do. Transistor Tr4 and its associated components form a crystal controlled, Colpitts style, local oscillator.

Capacitor C13 may be a 60pF trimmer if precise control of frequency is required. The output of the oscillator is taken from the emitter of Tr4, and fed into the mixer via identical networks C20, R23 and C21, R24.

The up-converted output from the mixer, is taken from the collectors of Tr5 and Tr6 via the output transformer T1. Transformer T1 primary is 24 turns, centre-tapped, of 0.27mm (32s.w.g.) enamelled copper wire. The secondary is 12 turns of the same wire.

In the prototype, T1 was wound on two ferrite beads, or you could use a T50-2 toroidal ferrite core. Both methods are shown in Fig. 3. Either method should prove satisfactory. The number, and ratio, of turns could be experimented with, to give best overall results.

Straightforward

Construction is quite straightforward, and the unit can be built on Veroboard or similar. Layout is not critical, as long as the following guide-lines are observed:

1) Keep the input of Tr1 as far away as possible from the output of Tr2.

2) Tr5 and Tr6, should be laid out on the board as symmetrically as possible and leads kept as short as possible.

3) If the oscillator is some distance from the input to the mixer then it should be fed via screened cable to avoid stray pick up.

4) The case of the crystal XL1 should be earthed by means of a short length of wire soldered firmly to the ground.

5) The finished projects should be mounted in a metal (preferably die-cast) box in order to minimise local oscillator radiation.

What Antenna

What kind antenna to use? A long-wire antenna has a very high impedance at these frequencies, unless it is several kilometres long. This form of antenna also seems to suffer from electrostatic breakthrough.

A resonant loop system was developed to interface into a load of about 10K. This reduces Q of the loop for easier tuning, and accommodates the bandwidth of some of the signals found.
The circuit of the antenna is shown in Fig. 4. It consists of 34 turns of 1mm covered copper wire, wound to give a loop diameter of 60cm (yes that's right - 24 of the old inches). A length of thin plywood or hardboard could be used to make up a former for the loop.

The loop is tapped to give 12 possible values of inductance. The tapping points are chosen so that moving along the coil by one tapping point, results in a frequency change of approximately 10%.

A 12-position switch S1 selects the appropriate tap. The parallel resonating capacitors, C_L and C_H are selected by S2, giving frequency coverage from 11.8 to 36.4kHz with C_L, and 37.3 to 115.3kHz with C_H respectively.

Loop resonant frequencies are dependent on the setting of S1 and S2. The two switches, and associated capacitors, may be mounted in the same case as the converter.

The loop itself could be attached to the converter case. Alternatively, the loop could be remotely mounted in an auxiliary case and connected to the converter by means of a short length of coaxial cable. The exact method of construction is a matter of personal preference, and the drawing of Fig. 4 is merely a guide.

Setting Up

To start setting up, apply 12V to the unit, and check that the converter oscillator is working. To do this, tune a receiver to the oscillator frequency.

A short length of wire, connected to the emitter of Tr4, should create quite a strong signal for the receiver. If a known accurate receiver is available, and you have chosen to make C13 variable, then you can set the local oscillator frequency.

Set the b.f.o. on the communications receiver to centre point. Now trim C13 to give zero beat at 3.5MHz, or whatever other crystal frequency you have chosen. Remove the wire 'antenna' from Tr4, and connect the converter directly to the communications receiver by means of a good quality coaxial lead.

At this point the local oscillator signal may well give a reading of 60dB over S9 on the meter of the receiver. However, by careful adjustment, and re-adjustment, of R25 and R27, it should be possible to reduce the converter oscillator, to become less than an S5 signal.

Practical Wireless, February 1993

Fig. 2a: The circuit of the pre-amplifier and phase splitter section of the project.

Fig. 2b: The local oscillator and balanced mixer section. Points A and B couple to the similarly marked points in Fig. 2a.

Man-made Signals

The unit has been in use at my location for some time now, and some very strange signals have been heard. The omega signals around 12kHz are reasonably strong and GBR, DH038, MSF and some other unidentified signals are received and indicated full-scale on the S-meter.

Since a lot of the signals present on v.l.f. are either data or RTTY, I think that a computer terminal/modem would be a useful addition to my shack. This is to be my next line of investigation.

Continued over
Natural Signals

Whistlers, Growlers, Tweeks and other types of naturally occurring v.f.f. signals, have also been heard. The levels of these atmospheric signals are at times, strong enough to obliterate the Omega Navigation beacons.

In many hours of continuous listening, the v.f.f. band has proved to be very interesting. The very low frequency band has proved to be a useful addition to my communications receivers, which lacked coverage of this fascinating part of the electromagnetic spectrum.

PW

Fig. 3: Two possibilities for transformer T1.

Fig. 4: A representation of the antenna loop. The actual diameter of the loop is 600mm (24 inches).

Shopping List

**Resistors**

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<tr>
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**Variable miniature trimmer**

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**Capacitors**

**Low voltage polystyrene**

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**Miniature polyester**

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**Miniature electrolytic 16V working**

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**Semiconductors**

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<tr>
<td>C9V1</td>
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</table>

(trn-6)

| (any 500mW 9.1V zener diode would be suitable)
| (any 500mW 9.1V zener diode would be suitable) |

**Miscellaneous**

Crystal of 3.5MHz (or other suitable frequency), 1m of 0.27mm enamelled copper wire, about 70m of 1mm covered (enamelled) copper wire for the antenna coil, die-cast box to house the finished project. Various sockets to suit, miniature coaxial cable, and link-up wire, a single-pole 12-way switch for S1, and a single-pole change-over switch for S2.

Further Reading

'The Largest Antenna In The World' by Brian Dance in the September 1983 issue of *PW*, pages 40 /41. *Guide to Facsimile Stations* by Jeorg Klingenberg, has frequencies for facsimile stations in the 50-145kHz band. *Guide To Utility Stations* by Jeorg Klingenberg, has frequencies for utility stations in the 50-145kHz band. There is a group of people, who would like to utilise this band for communicating with caving research and rescue operation. For more information, contact Cave Radio and Electronics Group, c/o Davis Gibson, 21 Well House Drive, Leeds LS8 4BX. Tel: (0532) 481218.

* These items are available via the *PW* Book Service.
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<table>
<thead>
<tr>
<th>Model</th>
<th>Brand</th>
<th>Frequency Coverage</th>
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<tr>
<td>TS940</td>
<td>ICOM</td>
<td>2m/70cm FM</td>
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<td>TS450</td>
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**KENWOOD**

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<td>TM241E</td>
<td>2m, 50 watt</td>
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<tr>
<td>TM702</td>
<td>2m/70cm FM, 25W</td>
<td>£495.00</td>
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**VHF/UHF MOBILES**

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<tr>
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<tbody>
<tr>
<td>Yaesu FT2100R</td>
<td>2m, 45 watt</td>
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<tr>
<td>Yaesu FT2400R</td>
<td>New 2m, 50 watt</td>
<td>£340.00</td>
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**ICOM ACCESSORIES**

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<td>Auto-tuner</td>
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<td>FYS2</td>
<td>D19 Voice Storage</td>
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<td>SP6</td>
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<td>SP7</td>
<td>Mobile Speaker</td>
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**VHF/UHF MOBILES**

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<tr>
<td>Yaesu FT2100R</td>
<td>2m, 45 watt</td>
<td>£250.00</td>
</tr>
</tbody>
</table>

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  - Large digital frequency display
  - Fourteen memories - tuning knob
  - Built-in clock and alarm. Radio turns on automatically at preset frequency input auto scanning, manual scanning memory recall and manual tuning knob

**HANDBETHES**

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<tr>
<td>TM210</td>
<td>270cm</td>
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**Mail/Telephone order by cheque or credit card**

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<tr>
<td>Cheques cleared before goods despatched.</td>
<td>Delivery/Insurance Prices in brackets (free)</td>
</tr>
</tbody>
</table>

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Although they are not involved in the amateur radio field nowadays, PW couldn't ignore the contribution that Eddystone Radio receivers have made to our hobby. So, what could be more appropriate than having a front cover, showing an Eddystone ‘classic’ from the past, alongside one of their products from the 1990s in our themed issue on receivers?

Eddystone Radio Ltd., now a Marconi Communications Systems Company, still operate from the Eddystone Works, Alverchurch Road in Birmingham. However, this famous factory now produces a range of high-tech communications and military specification radio equipment.

Nowadays, the firm produces a wide range of radio communications and broadcasting equipment. And, perhaps without realising it, many radio enthusiasts probably listen to v.h.f. radio every day, totally unaware that it’s an Eddystone Radio Band II v.h.f. f.m. transmitter that’s providing the power behind the programme.

While PW pays tribute to the famous Eddystone name, many radio enthusiasts, continue to use their receivers. It’s good to know, that although they’re not into amateur radio nowadays, the famous Eddystone lighthouse logo continues to shine with confidence in the 1990s.

---

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<th>Learn French With The Linguaphone Visa Cassette Course</th>
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<tr>
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<td><strong>£19.95</strong></td>
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**Card No.:**

**Valid from**

**Tel:**

**Signature**

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Practical Wireless, February 1993

43
Coils - The Basic Building Block

Coils are to be found in almost every radio set, but how can we identify the various types? We asked Stefan Niewiadomski to give us a summary of the Toko 10K and 10EZ series of coils that seem to be found in most sets.

There's a bewildering range of adjustable inductors in the Toko range of coils. However, closer inspection of the specifications of these components reveals great similarities between many of them. The tables used in this article catalogue the most useful coils in an order that should make these similarities obvious.

The full code for each coil is not shown, only the unique identifying number. In Table 1, for example, the full code for coil type 7752, is RW06A7752EK, whereas the full code for the 6438 type is 15FN8A6438EK. Details of these codes can be found in the Bonex, Cirkit and Mainline mail order catalogues, along with the ordering code specific to the distributor.

A new aspect to the miniaturisation of coils has recently reached the amateur scene, in the form of surface mount components, but, again, these have not been considered here. Incidentally, the 10, 7 or 5mm dimension refers to the nominal outer width and breadth of the can.

As well as showing the inductance and colour of the core, the tables show the number of turns between the pins for each coil. These figures are useful where a tapping point and/or where the ratio of the primary/secondary windings needs to be known. The tables used in this article reveal great similarities between many of them.

Antenna And Oscillator

General purpose, antenna and oscillator coils are shown in Table 1. This range of coils is suitable for use in antenna input filter, oscillators and other general applications.

In an application where only the primary winding of a coil is used (that is the pin 1-3 winding), there's not much too choose between coils with the same inductance. For example, if a 5.4H coil is required, the type 334, 6439, 6440 or 3337 would be suitable. Where these coils differ, is in the primary/secondary ratio and, where the primary winding is tapped. Even so, the 6439 and 6441 are so nearly identical that it is doubtful that any difference in performance could be detected in amateur applications.

The 4174 and 4173 are intended for use in 5MHz v.f.o.s and 9MHz (c.i.o.) respectively.

When coil data is tabulated as in Table 1, it can be seen that the colour of the core (or a ring of plastics visible from the top of the can) is a good indication of the inductance of the coil. This can be a good way of identifying a coil which has had its markings rubbed off, which can easily happen when they are handled.

A better way of being sure which coil is which, is to scratch the codes onto the cans when coils are received. Then, even if the original markings are lost, the scratched code will still be visible. (The method I use is to paint fishing rod varnish, available from fishing tackle suppliers, over the original markings. Editor)

Lower Frequency

The coils shown in Table 2 are suitable for use in lower frequency i.f. strips in the range 455-468kHz. In practice there's not much to choose between coils which are specified for use at 455kHz and 468kHz.

Enough adjustment range is available for either type of coil to be used at either frequency. In fact, there is sufficient adjustment to go considerably above 468kHz and below 455kHz if required.

The different ratios of primary/secondary windings are intended to give different input/output impedance transformations. The 4A888 and 17105 are particularly useful, since they have centre-tapped primaries, making them useful for integrated circuit i.f. amplifiers which have push-pull outputs, such as the MC1350 or the NE/SA602.

Generally Suitable

All the coils shown in Table 3 were designed for use in f.m. i.f. systems at 10.7MHz. However, coils designed for 10.7MHz are generally suitable for use at 9MHz, a popular i.f. with amateurs. The adjustment available by screwing the core in and out is usually about ±30% of the nominal value.

All the coils except the 30455 have an internal capacitor fitted which resonates the coil at the i.f. frequency, which can be set exactly by adjusting the coil's core.

Again, the different ratios of primary/secondary windings are intended to give different input/output impedance transformations. As in the low i.f. coil range, there are coils in this category, namely the 3892, 3893 and 3894, that have centre-tapped primaries.

Standard Pins

Luckily, there's a standard layout used for pins, at least on the Toko range of coils. The pin numbers for the windings shown in the tables refer to the pin-out shown in Fig. 1. Here the coil is viewed as looking onto the pins, or from the track side of the p.c.b.
Main Suppliers

Here in the UK, there are three main sources of Toko coils, they are:

Bonex, 12 Elder Way, Langley Business Park, Slough, Berks. Tel: (0753) 49502.
Cirkit, Park Lane, Broxbourne, Herts EN10 7NQ. Tel: (0992) 444111 or FAX (0992) 464457.
Mainline Electronics, PO Box 235, Leicester LE2 9SH. Tel: (0533) 780891 or FAX (0533) 477551.

There are several smaller firms who carry stocks of the Toko series of coils. Many of these small firms are to be seen at rallies throughout the year, so take these pages with you. You never know when they will come in handy!

Table 1: General purpose, antenna and oscillator coils.

<table>
<thead>
<tr>
<th>Code</th>
<th>Inductance</th>
<th>1-2</th>
<th>2-3</th>
<th>1-3</th>
<th>4-6</th>
<th>Colour</th>
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<tbody>
<tr>
<td>7752</td>
<td>630uH</td>
<td>9</td>
<td>114</td>
<td>123</td>
<td>13</td>
<td>green</td>
</tr>
<tr>
<td>6408</td>
<td>360uH</td>
<td>95</td>
<td>3</td>
<td>98</td>
<td>13</td>
<td>red</td>
</tr>
<tr>
<td>331208</td>
<td>330uH</td>
<td>2</td>
<td>92</td>
<td>94</td>
<td>8</td>
<td>red</td>
</tr>
<tr>
<td>64356</td>
<td>158uH</td>
<td>3</td>
<td>64</td>
<td>66</td>
<td>7</td>
<td>blue</td>
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<tr>
<td>80046</td>
<td>158uH</td>
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<td>79</td>
<td>81</td>
<td>9</td>
<td>blue</td>
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<tr>
<td>33333</td>
<td>45uH</td>
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<td>41</td>
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<td>4</td>
<td>violet</td>
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<tr>
<td>6438</td>
<td>45uH</td>
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<td>30</td>
<td>40</td>
<td>8</td>
<td>violet</td>
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<td>3426</td>
<td>38uH</td>
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<td>48</td>
<td>51</td>
<td>4</td>
<td>white</td>
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<tr>
<td>6440</td>
<td>38uH</td>
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<td>31</td>
<td>41</td>
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<td>32695</td>
<td>23uH</td>
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<td>45</td>
<td>48</td>
<td>6</td>
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<td>3334</td>
<td>5.5uH</td>
<td>7</td>
<td>11</td>
<td>18</td>
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<td>6439</td>
<td>5.5uH</td>
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<td>10</td>
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<td>yellow</td>
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<tr>
<td>6441</td>
<td>5.5uH</td>
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<tr>
<td>3337</td>
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<td>4174</td>
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<td>4612</td>
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<td>4172</td>
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<td>2225</td>
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<td>8</td>
<td>9</td>
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<tr>
<td>3335</td>
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<tr>
<td>3767</td>
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<td>8</td>
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<td>3428</td>
<td>1.1uH</td>
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<td>8</td>
<td>10</td>
<td>3</td>
<td>blue</td>
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<tr>
<td>3766</td>
<td>1.1uH</td>
<td>2</td>
<td>6</td>
<td>8</td>
<td>5</td>
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Table 2: 455kHz/468kHz IF coils.

<table>
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<th>Code</th>
<th>Capacitor</th>
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<th>4-6</th>
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<td>11038</td>
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<td>25</td>
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<td>4</td>
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<tr>
<td>12374</td>
<td>180pF</td>
<td>127</td>
<td>38</td>
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<tr>
<td>11100</td>
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<td>104</td>
<td>36</td>
<td>140</td>
<td>20</td>
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<tr>
<td>1A589</td>
<td>180pF</td>
<td>15</td>
<td>125</td>
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<td>1A590</td>
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<td>140</td>
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<td>4A688</td>
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<tr>
<td>17104</td>
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<td>67</td>
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<td>17105</td>
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Table 3: 9MHz/10.7MHz IF coils.

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<td>30465</td>
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<td>9</td>
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<tr>
<td>4520</td>
<td>50pF</td>
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<td>7</td>
<td>15</td>
<td>1</td>
<td>red</td>
</tr>
<tr>
<td>3892</td>
<td>82pF</td>
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<td>7</td>
<td>14</td>
<td>2</td>
<td>red</td>
</tr>
<tr>
<td>3893</td>
<td>82pF</td>
<td>7</td>
<td>7</td>
<td>14</td>
<td>3</td>
<td>red</td>
</tr>
<tr>
<td>3894</td>
<td>82pF</td>
<td>7</td>
<td>7</td>
<td>14</td>
<td>4</td>
<td>red</td>
</tr>
<tr>
<td>1566</td>
<td>51pF</td>
<td>3</td>
<td>12</td>
<td>15</td>
<td>2</td>
<td>black</td>
</tr>
<tr>
<td>6184</td>
<td>82p</td>
<td>10</td>
<td>3</td>
<td>13</td>
<td>3</td>
<td>black</td>
</tr>
</tbody>
</table>
YAESU RADIO

Yaesu FRG174GX - Still on unbelievable performer across the H.F. bands and one of the top 5 in budget H.F. Transceivers. Top Band to Ten, you won’t be disappointed...£P/X Special

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- Soft Case

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- Automatic signal operated tape recorder switching
- All metal case for improved EMC compatibility
- Receives: 500kHz - 6000MHz, 805 - 1300MHz

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JIM CHA4 - Mobile holder for handheld scanners. £9.95
Special versions now available. Please call to order.
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Stand and power supply/charger for handheld scanners now)
(Call and reserve your optional stand and power supply/charger for handheld scanners. Suitable for most popular models.
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£6.95

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£120
Drake WHF Power/WHF Meter...
£65
JRC NVA-88 Matching Extension Speaker...
£99
Yaesu FT2009 boxed 2m. H/H...
£135
Kenpro KT-22 2m. H/H...
£110
Yaesu & channel X-TEL 2m. H/H/c/w base charger...
£85
Kenpro KT-44 70cm. H/H/c/w base charger...
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JIM BHA3 - Desktop stand for handheld scanners...
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JIM CHA4 - Mobile holder for handheld scanners in the car...
£6.95

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JIM BHA3 - Desktop stand for handheld scanners...
£9.95
JIM CHA4 - Mobile holder for handheld scanners in the car...
£6.95

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£9.95
JIM CHA4 - Mobile holder for handheld scanners in the car...
£6.95

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JIM CHA4 - Mobile holder for handheld scanners in the car...
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JIM CHA4 - Mobile holder for handheld scanners in the car...
£6.95

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£9.95
JIM CHA4 - Mobile holder for handheld scanners in the car...
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New high quality wide band to 10 from only...
Antenna Workshop Review - The Barker and Williamson Model

This month's workshop from the PW antenna specialist Peter Dodd G3LDO, takes the form of a review. Presenting the evaluation, Peter reports on an antenna he first saw while on holiday in Tahiti.

The view from the window of our room at the Hotel Mahina-Tea in Papeete, Tahiti, was unusual enough to justify me taking a photograph. However, my wife Erica was incensed, because the subject of the photograph was an antenna!

She was upset because this was the first stop on our once-in-a-lifetime, round-the-world trip. And all I could find to photograph were antennas! However, this collection of hardware was a little different.

Masts And Towers

The masts and towers visible above the palm trees and the roofs of the local gendarmerie (police headquarters) supported a conventional cluster of v.h.f. arrays. But between these masts, were strung what appeared to be wide-band folded dipoles.

Each of the folded dipoles had a long tubular lump at the centre, that spanned across both wires of the antenna. Inside were two cardboard tubes on one side of the antenna, and others with open wire feeders.

I had never seen anything like these antennas used in amateur radio, although in the back of my mind I did recall seeing something in an article or book somewhere. I wondered if the antennas were perhaps some kind of wide-band dipole.

We continued our holiday, and apart from my photograph, I thought that was the end of the story. It seemed it was, until G3XFD called me!

During a recent telephone conversation with the PW Editor, I was told about a Barker and Williamson antenna he said he would like me to review. As he described the antenna, I soon realised it was very similar to the one I had seen from a hotel window in Tahiti nearly a year earlier.

What a strange coincidence! I accepted the job of course, because I was more than interested to see how the antenna would perform on the amateur radio bands.

Antenna Delivered

The antenna was delivered in a box measuring 700 x 180 x 260mm. Inside were two cardboard tubes on which were rolled the two halves of the ‘dipole’. The installation instructions were printed on both sides of a single A4 sheet.

The manufacturers also included instructions for fitting and diagrams for various configurations. The Barker and Williamson Model BWD1.8-30 broadband dipole is designed, as the name suggests, for operation from 1.8 to 30MHz. The antenna comes fully assembled and pre-tuned, so no measuring or cutting is required.

The complete antenna is weather rated at 1 to 2kW peak envelope power (p.e.p.) c.w./s.s.b amateur or intermittent commercial service. These specifications permit use of the full capabilities of today’s continuous coverage transceivers.

An added useful feature is the single feed-line operation on all bands. The system is also robust, because the BWD1.8-30 antennas are made from 14s.w.g. stranded copper wire, with a balun and matching unit.

Very Rugged

The BWD1.8-30 antenna is certainly very rugged, and it appears to have been designed for commercial use. The metal fittings are made from stainless steel, and the antenna in appearance does, as I’ve already mentioned, look like a folded dipole.

The antenna is 27.4m long, with approximately 450mm spacing between the two elements of the fold. In the centre of each element, there are two rather heavy tubular units made from plastics material.

The unit in the top element is described by the manufacturers as a balancing network. The unit in the lower element, where the coaxial cable feeder is connected, is described as a balun. The coaxial cable is connected to the balun via an SO-239 female connector.

To try the system on the bands, I decided to mount the antenna on the chimney of my house. The reason for this decision, was that all previous multi-band wire antennas used in this location proved difficult to feed and were inefficient.

There are probably several reasons why the house appears to be a radio frequency black hole! One reason may be the spider’s web of telephone wires radiating from a nearby distribution pole to many of the houses in the area. Another reason why there have been problems in the past, could be the house plumbing. This comprises a mixture of steel, lead and copper pipes.

Chimney Pole

The top of the chimney where I mounted the antenna, is about 9m above the ground. When erecting the system, I fixed a 2.5m length of scaffolding pole to the chimney with a double TV lashing kit.

![Fig. 1: On his way to the top of his profession! Peter Dodd G3LDO preparing to erect the BWD1.8-30 antenna on the stub mast on his QTH chimney.](image1)

![Fig. 2: The BWD1.8-30 balun (left) and the matching unit (on top of the stub-mast) ready for mounting on the house chimney. The units shown are mounted in heavy duty plastics containers, and all metal components are manufactured from stainless steel.](image2)
The scaffold pole gave the antenna a reasonable clearance above the roof. The centre of the dipole was attached to this, so that it supported the heavy balun and balancing unit.

The sides of the antenna were connected to short poles on either side of the house. Erected in this way, the antenna formed an inverted V.
Five minutes after the antenna was erected, the coaxial cable was connected and everything was ready. I switched on my FT707, which happened to be on 21.280MHz.

I heard a station, and with an eye on the s.w.r. meter, because this was the very first time I had used this antenna, gave him a call. It turned out to be J28GG in Djibouti, who happened to be on 21.280MHz.

The sides of the antenna were supported by a three pole installation on the other side of the house. Erected in this way, the antenna a reasonable clearance above the roof. The centre of the antenna was on top of the 12m mast. The scaffold pole gave the antenna a reasonable clearance above the roof.

I was really surprised how well the antenna worked in such a poor location. I worked DX (outside Europe) on all bands, and as I had never worked on the 18 and 24MHz bands before, the operation was a new experience.

I also tried the antenna in a different location, on top of the 12m high mast in the back garden. The new site provided a slight improvement on receive, in as much as the noise level was lower.
Over the next four weeks of the tests, the improvement in the antenna’s location, was matched by the same improvement in signal reports from DX stations. The signals were stronger, but only by about one S-point.

**Performance**

In both test locations, the BWD1.8-30 gave a reasonable performance. It worked well on the 3.5, 7 and 28MHz bands, and particularly well on the 18 and 21MHz bands.
On 21MHz, I was even able to break into a QSO between ZL6GFA and special event station ZL2EF. I also managed several long path QSOs with Japanese stations.
Several USA stations were also worked on the 24MHz band. I also had a couple of transatlantic QSOs on 28MHz, but I felt that the performance was down compared with 21MHz.
On 14MHz, the performance appeared less than on other bands.

My results showed it was approximately two S-points down on the 2-element Double-D (Compact 2-element mono-band beam) that normally sits on top of the 12m mast.

Mind you, the antenna performance on 14MHz may be a physiological effect. You’ve got to remember that 14MHz is a ‘heavyweight’ band, where you have to compete with high power stations with big beam antennas.

**What Is It?**

The BWD1.8-30 antenna does not behave in the way of resonant dipoles, which I’ve tried many times before in these locations. So what is it?

In response to a phone discussion with Peter Swallow G8EZE, I did some research and read John Heys G3DBQ’s book Practical Wire Antennas. The G3DBQ book had a section describing the ‘T2FD’ (Terminated Tilted Folded Dipole) antenna. It also described a design with the lowest frequency of 7MHz. The book goes on to say that it will give a considerable improvement in signal reports from DX stations.

In this article, the antenna is described as an aperiodic system. It goes on to say that it will give uniform output over a frequency range of approximately 5:1 ratio, with non-directional characteristics and without critical adjustment.

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In this article, the antenna is described as an aperiodic system. It goes on to say that it will give uniform output over a frequency range of approximately 5:1 ratio, with non-directional characteristics and without critical adjustment.

The article goes on to say that when this antenna is mounted horizontally, the polar diagram will exhibit a pronounced minima at the ends, rather like a resonant dipole. However, when it is tilted to an angle of 30°, it becomes non-directional for all practical purposes.

Naturally, I was interested in the quoted polar diagram changes below 30°. So, I’m going to do some experimental work on this aspect, and I’ll report back. Watch this space!

**Figures**

![Fig. 3: The antenna erected and under test. The wire elements and spreaders are actually difficult to see, and have been computer-enhanced to provide an idea of scale.](image)

![Fig. 4 (top right): (Caption on drawing)](image)

![Fig. 5 (bottom right): (Caption on drawing)](image)
antenna, for a frequency range of 3.5 to 17.5 MHz, are 28m long with a spacing of 900mm. The antenna is fed with 600Ω line in conjunction with a 600Ω terminating resistor.

Whether the BWD1.8-30 is a T2FD is not possible to say, because a description of how it operates is not included in the literature. When I asked the importers, I was told that it's an improved version of the T2FD, and that it is covered by US Patent No. 4423423.

The description of the T2FD characteristics, go some way in explaining why the BWD1.8-30 antenna performs reasonably well at low heights. This is assuming that the characteristics of the BWD1.8-30 are similar to the T2FD.

The inverted V configuration I used over the house, if the literature is to be believed, is vertically polarised. Because of this, any coupling into the nearby telephone wires would be minimal.

**Aperiodic Antenna**

The BWD1.8-30 has the disadvantage of an aperiodic or multi-band antenna. This means that it will radiate any harmonics generated by the transmitter fairly efficiently.

Despite being aperiodic in operation, when the antenna was installed on the roof of my house, the v.h.f radio and the TV antennas were within 2m of the BWD1.8-30's centre, I didn't notice any interference. If harmonics are a problem, a low pass filter should be used.

Another solution would be to use simple band-pass half-wave filters, one for each band. Incidentally, I'll be writing about this subject in a later 'Antenna Workshop'.

However, the fact that the s.w.r. is so flat over the frequency range means that an a.t.u. is not necessary. This can be quite an advantage if operational simplicity is required, as it would be for a disabled or white-stick operator.

**Summing Up**

In summing up my feelings regarding this antenna, I believe that it's a far better solution to multi-band operation than the G5RV or a multi-band doublet with tuned feeders and a.t.u. I think it's also better than the parallel dipole arrangement.

The reason I say this, is because of its good performance, for a 3.5MHz dipole type antenna, on the higher frequency bands. I also think that the BWD1.8-30's apparently low susceptibility to metal objects, such as nearby telephone wires, would be another helpful factor for many locations.

My thanks for the loan of the Barker & Williamson BWD1.8-30, go to R. F. Engineering Ltd., of Woeful Lake, Sherbourne, Gloucestershire GL54 3PR. Tel: (0451) 844237, FAX (0451) 844253, who can supply the antenna for £229.95 including VAT plus £5 carriage.

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**Fig. 6: Peter Dodd's graph showing v.s.w.r. versus frequency with variations (from the manufacturer's graph) on the amateur bands marked (see text).**

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**New Home For Practical Wireless**

We're moving house! As from 14 January 1993, *Practical Wireless* and *Short Wave Magazine* are moving to new offices. The new headquarters are located at Broadstone, on the outskirts of Poole.

So, as from January 14, please address all correspondence to *Practical Wireless* or *Short Wave Magazine* at:

**Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW.**

The new telephone numbers for both magazines are:

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- **Advertising & Art Departments:** (0202) 659920
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First of all, may I welcome you all to my new column in which, as the title says, I am going to concentrate on the wide range of the now vintage radio equipment designed around the various types of thermionic valves.

Battery Operated

Apart from a battery operated electric train set at the age of seven, my first real sight of electricity at work came three years later when I was shown the complex set of relays and wiring inside the control box of a set of traffic lights. My personal 'Elmer' maintained those lights and, at that time, 1940, he gave me the parts to build a one valve wireless set.

In 1944, at the age of 13, I was lucky enough to see and tune the dials of the RAF's famous R1155 communications receiver. Also around that time, I was privileged to sit inside a Canadian tank and operate a brand new WS-19.

By the age of 14, I was working for a cycle and wireless dealer, which began my practical experience of various subjects from ball-bearings to television. In those days, most young engineers learnt their trade on the job and were involved with the service and installation of a wide range of radio, electrical and allied equipment. The incentive to gain experience was rapidly rewarded when customers or trade-colleagues asked you to carry out such work for them.

In my young days, (1931-43), a corner table in the dining room supported a Philips 'Super Inductance' wireless-set, which was only switched on and tuned by father. We heard the One o' clock news when he was home for lunch to turn it on. The same applied to the Six o'clock news and a couple of hours entertainment in the evening listening to such programmes as Henry Hall's Guest Night, In Town Tonight and Monday Night at Eight.

Over-night, the outside long-wire antenna was 'earthed' via a porcelain change-over switch to protect the set from possible lightning. This was typical of most families who were fortunate enough in those days to have a wireless-set.

The family receiver was known in a multitude of homes as 'father's wireless', because it was his and to him an expensive item. A good set cost between £9 and £12 and that amount, from an income of around £100 per annum, was a lot of money. A repair, such as a valve replacement, could cost a weeks wages. Make no mistake about it readers, wireless or radio, call it what you will, was relatively more expensive and a far greater luxury in the 1930s and 40s than it is today.

Practical Wireless

The prime object of this new column is to try and offer practical wireless help, for those of you who have an interest in the valve era and/or are keen to restore an 'old' wireless. Among my favourites by these respective authors are Practical Wireless Service Manual first published in 1938, The Manual of Modern Radio 1933 and the 1944 edition of The Superheterodyne Receiver. I have seen these books on shelves marked 'Electrical', 'Radio' and 'Science'. On one occasion, I found a book about (wireless) 'valves' in the motoring section, hi.

However, if your interest lies with a specific piece of equipment, then try and get a service manual for it. Sources for these often appear among the advertisements in PW and our sister journal Short Wave Magazine.

Real Enemies

In addition to gradual wear and tear, heat and damp are three real enemies of elderly radio equipment. Throughout their working lives, the components, both electrical and mechanical, are subjected to heat generated inside the cabinet by five or six valves and from the mains transformer or mains-dropping resistance.

This of course depends on how the set is powered. Dust is attracted by the heat, which dries up and hardens the lubrication in moving parts like control shafts, dial drives and wave-change switches and causes some cable insulation to perish.

Long storage in damp conditions can create rust in some metal parts and the breakdown of insulation in capacitors and transformer windings. On examination, you could also find the dial cord rotted, the mains lead perished and corrosion building up at resistor ends and in valve sockets.

Avoid Temptation

No matter where you find a vintage radio, be it in a relative's loft, at a jumble sale, second-hand shop or car boot sale, avoid the temptation to plug it in to see if it works. Examine it thoroughly first and look for the points I have already mentioned.

If you are satisfied with the equipment's electrical condition, then lightly lubricate the moving parts and pay special attention to the
beings on the main tuning capacitor, the dial drive pulley shafts and the wave-change switch. Clean the inside of the cabinet, chassis and loudspeaker. On reassembly, make sure all fixing screws inside the cabinet are tight, unless you want an annoying rattle when the speaker produces a bass note.

Be Careful

You may get tired of me saying this, but please readers, be very careful when attempting or servicing elderly sets. Lethal voltages are employed, especially around the mains transformer and rectifier and in some cases the metal chassis is at full mains potential. If you are not sure, either get proper advice from a radio engineer, or, be wise and leave the job alone.

Live Chassis

The live chassis can be a hazard. Many domestic receivers were designed to work on a.c. or d.c. mains, because, up to about 1955, a number of districts of the UK still had a direct current (d.c.) electricity supply. Such sets were called 'universal' and the power requirements for the valves are wired in a totally different way to a set designed to work on alternating current (a.c.) only.

Special safety precautions were taken in their manufacture to insulate metal parts from the user’s touch. Typical safeguards are chassis bolts recessed in the base of the cabinet and covered with an insulating material, securing screws on control knobs are inside a deep slot which was often filled with a waxy substance and special components were used to isolate the external antenna, earth and loudspeaker sockets from the ‘live’ areas of the chassis. All such safety precautions must be restored after repairs are carried out.

Valve Sockets

Obviously, the pins on a valve base must fit snugly into their sockets to make good electrical connection with its associated circuitry. However, although the heat from long working hours may have weakened the cement securing the glass envelope to the base and the top-cap to the glass, the pins are likely to be tighter in their sockets.

Should you find the slightest movement in the top cap, don’t try and force its connecting clip off. This will certainly break the cap’s internal connection at glass level and render the valve useless.

Never unplug a valve by pulling on its glass envelope, because of the risk of the ‘bulb’ parting from the base and breaking the wire connections to the pins. Examine a valve before removal, if there is a ‘white’ or ‘milky’ looking area inside the envelope (known as soft) then the glass is cracked and weak and likely to shatter on removal. Keep all these points in mind and always remove a valve with care and ease it out by firmly holding the base. Next time I will offer a few more servicing tips, but now let’s consider another form of electromechanical equipment.

The Telephone

I would imagine that the largest number of Christmas and New Year greetings was a close run thing between a card in the post and words on the telephone. No doubt, thousands of telephone units were given as Christmas presents, especially as it is now so easy to buy an instrument to suit a user’s special requirements. The majority of these (make sure they are BT approved) connect to the national network via a plug and socket and transmit and receive their intelligence through an electronic exchange.

The radio-phone is now very popular, and I have frequently heard a ‘ring’ in the street and seen the call answered on a pocket-sized handset. However, it was not so long ago that the local automatic telephone exchange was a complex electromechanical arrangement, installed in a dedicated building and the home or office telephone was a robustly constructed hard-wired unit.

Rural Telephone

Throughout the UK, there were many tiny automatic exchange buildings linking rural communities, by telephone, to the outside world. Now, thanks to the Worthing section of the Institute of British Telecom Engineers (IBTE) under the direction of David Rudram, one such exchange has been reconstructed at the Amberley Chalk Pits Museum.

The building, complete with fenced garden, in the 1930s Post Office style, Fig. 2, was modified and prepared for the equipment by a team of museum volunteers.

Visitors, looking through the open door, can see the rack-mounted apparatus, Fig. 3, the back-up accumulators and the engineers tools, work-bench and chair, Fig. 4.

The installation is a ‘Unit Automatic No. 13’ with mechanical, two-motion, selectors of the Strawger type after the style first introduced by the Post Office in 1936. As originally designed, this exchange could cope with 400 lines, but at the Chalk Pits only 50 will be in use. In addition to including such items as the engineers steps, cleaning bucket, test-gear and work orders, David has connected a contemporary telephone for visitors to dial a number and see the system work.

Special Interest

I have a special interest in this telephone building because it is situated to the right of the museum’s Wireless and Communications exhibition, where Joan and myself spent our Sundays and Bank holidays for more than 12 years, Fig. 5.

When I retired as Honorary Curator of the Wireless Exhibition, in April 1991, David Rudram, a member of the British Vintage Wireless Society, took over my work. During our years at the Chalk Pits, I met many of our readers and had the pleasure of showing them the story of communications from the electric telegraph of the 1890s, through two world wars, to remote controlled television of the 1980s.

The 90 years of technical achievement that made the world ‘smaller’, provided entertainment and education for the masses and almost instant all-purpose communication on land, sea and in the air.

Cheerio for now, and don’t forget, I’m looking forward to your letters, news and views on valved and vintage equipment. You can write to me at ‘Faraday’, Greysfriars, Storrington, West Sussex RH20 4HE.
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OSCAR-10 Downlink

Signals from OSCAR-10's 145MHz downlink monopole antenna are excellent at times. With no command capability, the satellite is permanently on 'B' mode now, unless poor sun angles dictate a low battery, it then goes off. There are few users for OSCAR-10 compared with OSCAR-13.

Heavy Workload

The extremely heavy workload at the University of Surrey has further taken attention away from the uploading and command of OSCAR-11 for several months. Now ex-AMSAT President Doug Loughmiller KOSI has joined the UoS team, so the programme will start up again and loading of the bulletin board with the latest news will become a regular feature. The satellite appears to be in excellent health, and its 145.825MHz signal is heard on a regular basis.

Radio Sport RS-10/11

The Radio Sports RS-10 on 'A' mode is on 24-hours per day and every day with total reliability. More stations use this in Europe than all the rest of the satellites put together. The recently lowered 21MHz via F2 rather than the stations heard on the downlink are available on RS-14/OSCAR-21's line-of-sight path and down, is available on RS-14/OSCAR-21's line-of-sight path (footprint) covers many thousands of square miles, the number of potential users when over highly populated amateur areas like Europe are enormous.

Thus, brief QSOs are necessary at busy times in order to give all stations, particularly hand-portables and mobile, the opportunity of a QSO. Low power stations are advised to experiment with low population density on passes close to overhead at night or in the early mornings.

Satellite Scene

In response to readers' requests, this month Pat Gowen G3IOR reviews the operational status of the presently active amateur radio satellites, and gives a few tips on using them to best effect.

OSCAR-13

All OSCAR-13 devotees will be happy to know that G3HSD's prediction calculations on the falling orbit have been borne out in practice. The last few sets of Keplerian elements have shown that OSCAR-13's perigee is now on the way up again.

Performing Well

Despite the radar problem, OSCAR-13 is performing well. At the times when the antenna pointing is favourable, surprisingly strong signals have been heard. Many new DX stations have been coming onto the satellite. The DX/1 and many individuals contact reports recent current and future activity from Morena by John JO, 21MHz uplink, is being planned on the Wednesday experimental days, when selected satellites with matching uplinks and downlinks can 'see' each other across space to enable G4CUO's experimental 'DOHOP' (Double-Hop) work.

Reminder

The Mode K only, 21MHz up, 29MHz down, is available on RS-10 all day and every day whilst RS-13 is being kept in reserve. Most stations heard on the downlink are using 21MHz via F2 rather than the satellite. In these winter and early spring months when the m.s.u. is well up, sub-horizon tests with many participating Gs and Ws and ZL3GQ take place.

Uplinks Tests

Uplinks tests of the different uplinks pose a necessity to effect fully quieting access were carried out when the -12dB attenuator in the receiver uplink was commanded in and out. At full satellite receiver sensitivity, when the radar QRM and other amateur QRO was absent, I was able to QSO DB2OS running only 1W, and work W stations with the satellite at my extreme western horizon.

User

Users need a reminder that the f.m. crossband 435.016 to 145.987MHz 'repeater' can carry on only one transmission at any one time. As RS-14/OSCAR-21's line-of-sight path (footprint) covers many thousands of square miles, the number of potential users when over highly populated amateur areas like Europe are enormous.

Thus, brief QSOs are necessary at busy times in order to give all stations, particularly hand-portables and mobiles, the opportunity of a QSO. Low power stations are advised to experiment with low population density on passes close to overhead at night or in the early mornings.

Whilst cross-polarised high gain antennas can effect excellent quieting, it is easy to lose the satellite if one-off-points the beam, so some 50 or so watts to omni-directional antennas, such as crossed dipoles (tumstiles), can prove more effective in the long-term. Using high-power to produce the normally advantageous f.m. capture effect, can prove counter-productive, as the -12dB attenuator automatically switches in if the transponder is over-driven. This takes virtually everyone out.

Reminder

It is believed that the PAVE PAWS radar stations in Europe and the UK, which have been placed into the 435MHz amateur satellite band, are the main cause of this particular problem.
The new software loading to OSCAR-16 was completed by November, so users can now use the same ‘PB’ and ‘PG’ programs as they do for OSCAR-22, which include the directory broadcast. The Raised Cosine (RC) transponder is in use, with its downlink frequency on 437.050MHz. Jim White W0DBE recommends that RCHP (Right Hand Circular Polarisation) antennas are used for best results.

The DOVE

The DOVE-OSCAR-17 is still not fully operational even after all this time. Its software is still being reloaded, the 145.825MHz downlink is off, but the S-Band downlink is on.

WEBERSAT

Imaging continues as usual on the WEBERSAT-W0-US, and the current transmitter is still on 437.1040MHz using the RC TX.

Lusat Transmitter

The raised cosine transmitter is in use on Lusat-OSCAR-19 437.1255MHz. For broadcast downloads PB.EXE version 910509 is recommended by LURDVFT, and for the directory and file uploads PG.EXE version 910207r. The broadcast bulletin is active on Mondays.

Inverting Wednesday

Fuji-OSCAR-20 is now in its 145.900-146.000MHz ‘JA’ mode c.w. and s.l.s. uplink with inverting 435.900-435.800MHz u.s.b. downlink every few hours, which on the 435.795MHz digital ‘JD’ BBS mode at all other times.

Due to the infrequency of appearances, so very few users have been noted. At times, the only signals to be heard on the analogue mode have been stations in Europe illegally using the 145.800-146MHz space band for terrestrial f.m. QSOs!

We are hoping to get more ‘JA’ time, as Dave Rowan G4CUO is anxious to progress with his ‘DOHO’ experiments. He needs such transponders as FO-20 or on to give the 145 to 435MHz signals to pass across AO-10, 13 or 21 (RS-14) then to take back to 145MHz.

OSCAR-22 Busy

The BBS is operational and is very busy indeed on OSCAR-21, and is now passing lots of traffic at high speed. Packet radio messages that have been known to take up to six weeks to reach the USA by the h.f. mailboxes, are arriving at their final destinations within two days when OSCAR-22 is employed. This

poplar use has produced complaints by those attempting to download files and pictures.

SARA Heard

The SO-23 ‘SARA’ satellite is being heard, often listened to when both in and out of range of Jupiter, when there appears to be no noticeable changes in its telemetry. SARA appears to send ‘88s’ most of the time. Whilst BBSs from a French YL called SARA are stimulating, it doesn’t do much for those who would wish to follow the amateur experiment!

Korean Command

The KITSAT-1 satellite continues to have its loading accomplished from the Korean Command station. Image file downloading continues, one of which shows an excellent cloud-free picture of the coastline of Burma, Laos, Thailand and Bangladesh.

The University of Surrey control are arranging that picture and BBS use do not compete. The Digital Signal Processor is working, as for a few days we heard it playing military style music!

Awful Mix-Up

An awful mix-up resulted soon after the August 10 ARIANE multiple launch of TOPEX/POSEIDON, S80/T and KITSAT-1. This occurred because NORAD/NASA produced sets of Keplerian elements for each of the launched object numbers, but sadly not the right numbers for the right satellites. They assigned Cat. No. 22077 to KITSAT-1, which stands, as after the error was identified, they put the KITSAT-1 Keplerian elements into that set.

Further confusion resulted when the correct drag factor of zero went into the KITSAT-1 element sets, as this was a predicted and not a measured level. Thus, many trackers thought KITSAT-1 to be ‘off’ during calculated pass times. Set 220877 must be used, and not 22079 as given.

Both the uplink and downlink frequencies were found to be 10kHz lower than supplied, the spacecraft’s callsignal changed three times in 10 days, and yet a further complication arose when someone decided to start to call KITSAT-1 by the name of ‘OSCAR-23’, which rightfully belonged to SARA.

OSCAR Numbering

No one in AMSAT is officially in ‘charge’ of OSCAR numbering. It has automatically been the case that up to now that (with the singular exception of the ‘RS’ series) each amateur satellite, once in orbit and internationally available, would have its original ‘ground’ name changed to the next serial OSCAR number.

The term ‘OSCAR’ is merely an acronym for ‘Orbiting Satellite Carrying Amateur Radio’, and although RS-1, 2, up to 12 and 13 maintained their own individual identities, the latest joint Russo/German co-operative venture is known as RS-14 (it’s ‘callsign’) and OSCAR-21.

With the method mentioned, the last University of Surrey satellite became UO-22 (OSCAR-22) and the following French BELAMSAT SARA became SO-23 (OSCAR-23). KITSAT-1 is being mistakenly called ‘OSCAR-23’ also. No problem really!

Remember the words of the gardener who wrote in ‘Romeo and Juliet’ ‘...What’s in a name? A rose by any other name smells just as sweet!’. If we ALL assure the rightfully belonged to SARA. ‘SARA’ or ‘KITSAT’, little ‘SO’ and ‘KO’ prefix, and refer also to the ground names as being ‘ground’ name changed to the next serial OSCAR number.

Crimea Relays

Next comes PA0DLG, who reported that 143.625MHz MIR to ground f.m. link with the ground station at Yevpatoriya on the Crimea which relays the voice, telemetry and even packet radio signals to the Control Centre TUSUP in Kaliningrad, is now only being heard over Europe. Due to funding cuts, the ships that were relaying MIR signals to TUSUP in the past, are now only operational.

When out-of-range of the CIS ground stations, MIR communications are often relayed through ‘Luch’ or ‘Altair’. These are a transponder system ‘Sputnik ReTranslator’ (SRT) for voice, telemetry and television, built into a geostationary communications or television relay satellites, similar to the way the RS amateur radio transponders have been built into the COSMOS satellites.

The mainly used ‘SRT’ in our region is a geostationary satellite positioned at 106°E longitude listed as ‘ZSSRT-2’, an abbreviation for the Russian words for ‘Western geostationary satellite transponder’. There is also an eastern SRT situated at 167° east (193° west) longitude, probably located in ‘Gorizont’ ‘Raduga’ or ‘Ekrann’. Although ‘officially’ listed at 10.835GHz, the SECAM colour television signals from MIR are relayed through the western SRT at 10.829GHz or both ‘ZSSRT-2’ and ‘SRT’ frequencies. There is also a circular antenna polarisation. As the satellite antennas are pointed towards Yevpatoriya, the signals are relatively strong, so a dish of at least 1.5m diameter is required.

Voice signals from MIR’s voice signals can be found near the same frequency on a 30kHz sub-carrier with s.s.b., but only when no television signals are being relayed. When there is television, the voice signals are probably encoded in the video signals, but this is still under investigation. Also, other frequencies may be involved, but if so, these have not been found yet.

To help point your antenna at the satellite, you may use the strong 11.4GHz telemetry signal from the geostationary satellite involved.

Helen’s Card

Finally, our photo shows Helen Sharmans’s QSL card, now out for QSOs with her GB1MIR week-long mission. It shows the now well built-up MIR, with all modules and an approaching SOUYZ manned ferry coming in to dock.
GOT PROBLEMS WITH YOUR RIG?

Call Castle for Immediate Assistance!

We are now fully authorised and equipped to repair, service and maintain, all rigs by...

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Full workshop facilities plus a new, computer controlled spares store, we are now No.1 in UK! We can arrange for collection and delivery direct to your own QTH. Average turn round 7-10 days. (Trade enquiries welcome)
This month, Roger Cooke G3LDI, brings you good news about the changes to his column, before introducing the first of the packet user groups.

The Pac-Comm TNC-220 is a widely used in v.h.f./u.h.f. packet TNC, and is snapped up quickly when found on the second-hand market.

Colin’s article to be published, I should receive acknowledgement of my suggested bandplan by the year 1997!!

Israeli Techsat Project

Jim 4X1RU, and I met at this year’s Amsat Symposium, where we had a long chat over lunch. We are both members of HFNET, operating on 14/21 MHz and are both interested and involved in Amsat operations. Jim tells me that he is now working part-time on the Israeli Techsat project.

Techsat is the Israeli Pascat project, which is primarily an experimental platform for space research. Jim is responsible for the integration of the onboard computer and communications channels, plus the ground command station. The launch is planned for July 1994, on an Ariane rocket from Kourou, French Guiana. This new job, along with the work Jim does on h.f. forwarding, and maintaining other links, looks like keeping him very busy.

That’s about it for this month. Don’t forget that ‘Packet Panorama’ is still monthly, so get communicating and let me have your news, views and ideas.

I’m QTHR for ‘snailmail’ or on packet as ‘G3LDI @ GB7LDI’ 73 and happy packeting de Roger G3LDI.
Andy Emmerson G8PTH

Greetings at the start of a new year and here we are back on schedule with the amateur television activity round-up of the past quarter.

An idea for a future article in 'Focal Point' would be information on exactly what equipment is necessary to enable one to get going in ATV, and also where to purchase this equipment from. Over the last couple of months I have taken an interest, I can honestly say that I have never seen any advertisement in PW (or any other amateur radio publication) of stockists of this kind of gear. I really think an article of this kind would be appreciated by all who would be interested in ATV enthusiasts alike and would, I am sure, help promote more interest and use of ATV.

This kind of letter is a little disappointing, because I wrote two articles on exactly the subject Mr Shannon is asking about, namely a beginner's guide to satellite ATV. It was published in PW's sister publication Short Wave Magazine in two issues last summer, and I too was disappointed it could help all who would be interested in ATV enthusiasts alike and would, I am sure, help promote more interest and use of ATV.

Yes, thanks John. All photos are of use and welcomed with open arms. So are letters, and here's one from Jose ON7TP in Liege, Belgium. "Here in Belgium the ATV activity but do not forget we have Flemish and Walloon people! A different in the language is like a barrier. The club ATTV is still active and our yearly assembly was on October 3 in Heist op den Berg (always the first Saturday of that month). I'll try to write a small report. I learned English while doing ATV in Germany - it is the truth!"

Our last letter this time, is from Mike Sheffield ZL1ABS in New Zealand; here's what he has to say. "The recent level of activity in Auckland has been very welcome. Five stations in the same weekend working through the ATV repeater qualifies as 'a pile-up', compared to one in the winter season. There are more transmitting stations under construction by Rod ZL1VLZ, Scott ZL1UVQ and newly licensed Ashley ZL1VDX (nearly got QSO but he got, eh?). The monthly ATV interest group meetings are continuing to be well attended. They are usually on the last Sunday of the month and are very valuable for exchanging ideas, showing off your latest home-brew item, swapping video tapes, getting technical help with equipment and just having a good face-to-face chat."

A construction team of Michael ZL1ABS, GB2OST, Ian ZL1TDQ and Rod ZL1VLZ are building some 'bells and whistles' for the ZL1BQ ATV repeater in Auckland. Michael is building a stepping tones audio generator and may later add a digital speaking clock for repeater use. Bruce is building a two-way electronic A-V switch and a video sync detect to operate it from the repeater's receiver. Ian is building a new channel 81 (815.25MHz) transmitter and driver stage. Rod is building a black and white SSTV receiver for the repeater. Further items will be made when there is someone with time to build them.

"The repeater already has a four-page teletext-style beacon, DTMF receivers, colour bars and two other test cards. Input is 75cm (443.25MHz) and output is 50cm (channel 39 or 815.25MHz). FM sound sub-carrier frequencies are 5.5MHz. The beacon text runs 24-hours a day and there is a regular ATV net on the repeater on Sunday evenings, starting at 8.45pm. The two metre liaison frequency is 147.40MHz for simplicity using a digital speaking clock for repeater use."
Practical Wireless, February 1993

To nine days is in prospect.

Departing around February 21, Palmyra and Kingman Reef is in prospect for February/March 1993. Howland Island (S9 for now), Bill and Coco (S9 plus a lot!), CT3FF, GORTJ, DL8TCC, PA3DFU, TF3CW Net to net, they rarely net a high score save on the low-power frequency of 7030kHz.

On the WARC bands, Vince 9HMHP and sideband first; Vince went to 24MHz for UK. Our QRP specialist Eric GOKRT on Market Reef, 9K2JR, SUIA/L2, HC2R6, 2Z1EE, JU83C6 (Mongolia), 38BDA, BW2WB/P, AT1CH, S59AM (Singapore), AT1H, T49AB (Cuba) and 9A2LH; turning to 18MHz did the trick with CYONSM (Sable Is), OH1AF/OJO, V73D0, EV1S, PY0F/PPI6C, BW2WB/P, PY0TSN (Timbeke), V47K, SUIA/L2 and S57MN.

Now to 2E0ACG; I find John has been raking ’em in on 10MHz; 350W from possibly an ’Ox’ managed DL3AI, GZ5AGN, F61MGU, 2MDAC1, FD1ODS, HB9NT, DKS7UD, F9ORL, PA3FDBW, DK8WF, OK3CSA, DL1EKU, DL1SUF, DL1GKE, PA3ACX, DK2BPU and FE1JG.JP. Other than the 2M and DL1GKE, all the rest were using high power. For a gripe, John notes the number of phone nets and RTTY stations sitting in the Novice segment. Come on, give the novices a chance, folks!

For GM3JDR 10MHz c.w. served up 9V1YS, 3DA/G3TXF, TA7/KUOJ, ZA1W, ZA1D, ZA1, ZAIC, OH3ES/DH, OK4MJ, ZL2D, 2MU8BR, VZ2WXJN, JZ5S, WA5 and W7s. For 18MHz, VU2LO, EU1O, ZA1C, T7C7, OH1AF/OJO, EV1S, RL8FY were dealt with. Despite all the problems, Ted G2HKU keyed on 10MHz with Y9BYU,
Back-Scatter

Solar Data for November 1992

During the period November 1-9 there was a large increase in geomagnetic activity due mainly to a massive X9 flare (the largest for several years) which occurred on November 2 at 0245 UTC. This pushed the daily A index on the 2nd to an estimated level of 23 units and 24MHz he found VP9MN, OH6NPJ, DL7CY, G3ADV, W2FJ, G3L10; on 18MHz for WA2IBX, ZF1UK, ES8ZD, WA7EGA, ZF2JI, ZD8Z, ZS5HAM, CB1AC, 9K2HA, WB2KOG, CT3FT, HK4CAD, VD3AT, 3DA/G3TXF, SVOJG - all with a couple of watts and a 40 receiver to a long-

VHF Up

Reports to
David Butler G4ASR
Yew Tree Cottage
Lower Maescoed, Herefordshire HR2 0HP

Tropo Conditions

There were a number of days during November when tropo conditions were excellent on all v.h.f. bands through to microwaves. The actions on the sun (the key).

auroral activity on earth and two, the

occurs and take appropriate steps. As I've already mentioned, auroral events were recorded. On November 9, there was a massive solar magnetic storm, but very little in the way of auroral activity was observed during this period, with only minor openings occurring on November 1 and 4th. Another auroral opening was detected on November 23, this being preceded on November 22 by three small M-type flares.

Auroral Openings

As I've already mentioned, auroral openings during November were very few and far between. Only weak events were detected in central England on November 1 and 2 at 2300 UTC, November 2 at 2340 UTC and November 23 at 2045 UTC. Very little in the way of 'real' signals were reported and I guess it event for such a band as G3BMK (50.060MHz), GB3NGB (50.062MHz), GB3LER (50.064MHz/144.965MHz) and SK4MIP (144.960MHz) then most of these brief openings have been missed.

Auroral Calendars

In last months column, I mentioned the need to keep your 27-

day auroral calendars up-to-date, but I didn't actually describe how or why they work. Very simply, you only have to remember two facts. One, certain activity on the sun causes auroral activity on earth and two, the sun is a gaseous body and takes approximately 27 days to rotate. The actions on the sun (the actual mechanism need not be discussed at this stage) can be likened to that of a spray from a rotating garden hose. The sun squirts material out in a broad 'spray' and the earth can be effected (discussed at this stage) can be

Back-Scatter

NA-67), NP2E, OA4ANR, P40A, PJ1B, R09F, SS16E, SSJEK, VDT0N (L=Ve), VFK7D, VE2ZZZ, VP9E2, VP5D, XR5AW, 8P9Z, S1A1 and ZK2L. It was also for Don GM3GJR hereabouts and VP5P, ZA12, UZ0LWC and EH4MC. On the other hand, sideband all the time for John G3GJD on 21MHz, to give him FH8CB, DJ1GWD, DJRMC3, YG0GH, 9W1VW, 40X4R (Banjaluka, Serbia), 9K2JG, CS3/NOFL and TAJA. It was up here as usual, and Angie G0HGA mentions an R/AATTN, I suspect is a typing slip for RA/AATLN, plus 4J1FM.

The 14MHz Band

Nothing, alas, since the space has run out!

New Look

Our new look arrives in March, send it in all next time as usual, by the middle of the month, to the address above. Meanwhile, 72, and 6L.

NA-07, NP2E, DA4ANR, P40A, PJ1B, R09F, SS16E, SSJEK, VDT0N (L=Ve), VFK7D, VE2ZZZ, VP9E2, VP5D, XR5AW, 8P9Z, S1A1 and ZK2L. It was also for Don GM3GJR hereabouts and VP5P, ZA12, UZ0LWC and EH4MC. On the other hand, sideband all the time for John G3GJD on 21MHz, to give him FH8CB, DJ1GWD, DJRMC3, YG0GH, 9W1VW, 40X4R (Banjaluka, Serbia), 9K2JG, CS3/NOFL and TAJA. It was up here as usual, and Angie G0HGA mentions an R/AATTN, I suspect is a typing slip for RA/AATLN, plus 4J1FM.

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On the 144MHz band, he runs either 1W QRP or the full-blown 25W into a 9-element Yagi and it is sufficient to work around the country when using c.w. Recent contacts have included G4DWA (1104) and a two-way QRP contact with G0RAX/K, presumably static but you never can tell!

**Moonbounce**

On to moonbounce now. David Law GO4LKB reports that his 144MHz e.m.e. system, consisting of four 9-element Yagis and a 4CX1000 amplifier, is working very well, and that he can quite often obtain echoes with 250W.

The system seems to be properly optimised, because on September 2 he made a random s.s.b. contact with 9S5MR, a mode that is not normally used. During the ARRl e.m.e. contest, held in October/November, a total of 50 c.w. contacts were made with stations located in DA, EA, F, G, GM, I, JA, LA, LZ, OE, OH, OK, ON, OZ, SM, UA2, VE and W. David mentions that he hopes to be active during 1993 on 1296MHz e.m.e., as he is planning a joint venture with Jon Naylor G4KLX.

**Single Yagi Stations**

Conditions during the second leg of the Arrl e.m.e. contest, held on November 14-15, appeared to be quite good. The conditions allowed a number of single Yagi stations to make QSOs via the moon with some of the bigger systems.

Colin Morris GOCUZ, using only a 5-element Yagi, heard 9S5MR so well that he was able to relay his signals over the telephone to GO4LKB. Another station, G4KLX, heard 9S5MR with a 4-element Yagi and DL5KN on the 430MHz band with only a 9-element Yagi!

This is quite amazing considering the strength of his signal must have been quite weak. It is good to see that this is possible with a well-engineered system.

**Four Yagis**

A group of operators, including Dennis VE3ASO, Ray W2RS and Mike W9IP, had made plans to use a massive 50m radio astronomy dish. The dish is owned by York University, Toronto, but because of very bad weather and a power outage, they were unable to be operational. Using the callsign VE3D0NT, it was the intention to be active on the 430MHz band with a 938W power output, which was coupled into a short helical feed to produce circular polarisation. With a system of this size, it would have been easy to work single-Yagi stations running less than 100W.

The dish was reported by W9IP that the same group of operators are planning to use the dish on the 430MHz band during Spring 1993, possibly coinciding with the REF e.m.e. contest. Later in the year they are also planning a 3-band e.m.e. effort on the 144MHz, 430MHz and 1296MHz bands. That should certainly burn a hole in the moon!

**The 50MHz Band**

Time to look at the 50MHz band. In November 1991, many UK stations reported contacts with Australia (VK) on November 4 and 20th, the continent of Africa (CN, TR, TU, V5, ZS, ZS9), on November 1, 2, 3, 4, 10 and 17th, with South America (IX, HC8, IU, PJ4, PY) on November 2, 3, 4, 7, 16, 18 and with the North American continent ( KP2, KP4, PJ7, VE, W5, YF4) on November 2, 3, 5, 13, 14, 17, 18, 21 and 23rd.

(And it was even better in 1989 and 1990 as the QSL card in Fig. 2 shows). By contrast, only one DX station outside of Europe, CN8ST, was reported during November 1992, and even this was no big deal. North America is still normally heard within the QSO distance of the UK and is regularly worked via that mode in the summer. On the other hand, if you don't use c.w., you may not have heard him at all.

Now here's a good idea! Instead of listening to white noise on 50MHz, why don't you spend the time learning c.w., then next time you'll know who it is rattling off those dots and dashes! And then you'll also start working the real DX in auroral openings and on meteor scatter and one e.m.e., etc., etc. Meanwhile, off the soap box and back to the reports.

Neil Carr GOJC (JN83) mentions that he has only heard one signal on this band during the year so far, a 5W station from January 22, all of these openings were outside of Europe were EHS9MH (country 111) on July 26, TA52A on June 27 and many VE and UA stations are heard via Sp-E, he will put out a CB, but very few stations are raised. Where is everybody? I can answer this quite simply. Like it or not, most operators only want to work DX on the band and are not prepared to work local stations. Of course, columns such as this don't help in this respect, as the DX may not have heard him at all.

The problem is that no one compels you to work short distances on 50MHz and generally most operators have degenerated into the 'I must only work DX and take no more than 1W' attitude, rather than discovering some of the band's other potentials. And again, to be truthful, I suspect many operators enjoy that 'anti-social' way of operating.

Ramon E3HAQ (JN118B) is using 30W into a 5-element Yagi and is very interested in trying meteor scatter tests on the band, especially with stations over 2000km away. He was active during the Geminids shower, December 12-13, using high speed c.w. on 50.168MHz. Over in Eire, 6395G has recently upped his power to 25W (previously 3W) following a donation by G3K0X of an amplifier which was shipped to Meilina by the UK Six Metre Group (UKSMG).

The Baghdad club station Y11BGD has received a permit to operate on the band and is looking for a 50MHz transceiver. If anyone is prepared to donate a rig, preferably a mono-band set, please contact Nick Waite G3KOX (Tel: 0438) 715713 who can arrange carriage for Iraq.

The beacon ODSS1X arrived in the Lebanon (via the UKSMG) on November 24 and is now operational on 50.078MHz sending "ODSS1X KM76". It runs 8W output into a vertical antenna.

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**Fig. 1: An auroral calendar.**

**Fig. 2: There was no DX on 50MHz in 1989/90.**

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Colin Morris GOCUZ, using only a 5-element Yagi, managed to work 9S5UN on the 144MHz band, as did Bob Harrison G4UJS, who was using an FT28SR into a GridQ06A04a amplifier and a 9-element Yagi fed with 45W of 7R67 feeder! The Texas station sent G0Z and then received full callsigns on the next over. Excellent stuff!

At my QTH, the banana-shaped (it's very windy lately) 18-element Cushcraft BoomYagi enabled me to work SMS5FR, KB3RE and W5UJN, and to hear DL8BAT, 1XIWC, IK3MAC (he got my callsign as G4AS3H), U2Z2VKA and WALUKN7, with all stations being heard when the moon was between 10°-20° above the horizon.

Ron G0W3YDX is now and 5-element Yagi and DL9KR on the 144MHz band, with stations in 27 countries and five continents.

Some of the more interesting callsigns included J1L2C, J4A4L, K8FBG, U4AXN, RAHH1, U4HFAD, VK5AM and Z1LBV. Not bad for a line-of-sight V.H.F. band!

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**Massive Dish**

Neil Carr GOJC (JN83) mentions that he has only heard one signal on this band during the year so far, a 5W station from January 22, all of these openings were outside of Europe were EHS9MH (country 111) on July 26, TA52A on June 27 and many VE and UA stations are heard via Sp-E, he will put out a CB, but very few stations are raised. Where is everybody? I can answer this quite simply. Like it or not, most operators only want to work DX on the band and are not prepared to work local stations. Of course, columns such as this don't help in this respect, as the DX may not have heard him at all.

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**3W output in the shack into a 60cm offset fed dish at 10m above ground. During the same evening as working SM6ESP, he also contacted Z12HDA (J047) and SM6HYG (J058) at a distance of 1089km. On September 16, he worked HB9AM/P and HB9MIN/P, both in J3N7 on 10GHz s.s.b. at 59 bothways, these contacts bringing his locator square total for the 5GHz region up to 2*.

The system at the station of Richard Girling G4FCD consists entirely of G3WGD modules and runs 200W bothways into a 60cm dish. Richard comments that no problems were encountered in building or alignment and he congratulates G3WGD for a very repeatable design. Interestingly, Richard had only been on air on the band for a few weeks before becoming the UK 10GHz DX record holder.

Details of the G3WGD 10GHz module kits can be obtained from Petra Suckling G4KGC, 314a Newton Road, Rushden, Northamptonshire NN10 0SY, (please enclose an a.s.e.). Tel: (03332) 411465.

Another station looking for highpower schedules is Colin Douglas G3GUD (J001). He is on 80m on a wideband f.m. band and located fairly close to the east coast of the UK, so he may have a good take-off into F, DN and PA. You can contact Colin via his packet radio mailbox @ GB7ICE.

**New DXCC Countries**

In last month’s column, I gave details of the ARRL DX Advisory Committee (DXAC) recommendation to create new DXCC countries from the former Yugoslavia. The recommendation were passed to the ARRL Awards Committee, who voted unanimously to accept three recommendations from the DXAC. The following countries are now added to the DXCC list: The Republic of Croatia - 9A (formerly YU2), The Republic of Slovenia - S5 (was YU3) and The Republic of Bosnia- Herzegovina - YU4, 4NA.

Contacts with Croatia and Slovenia can be counted from 26 May 1991 and those with Bosnia- Herzegovina from 15 October 1991. A DXAC recommendation to add The Republic of Macedonia - YU5, 4NS to the DXCC list was not accepted, and remains under study until a later date. The remaining entity of Yugoslavia, (YU1, YU6, YU7 and YU8) continues on the DXCC list.

**Contests**

A series of 70MHz cumulative contests have been arranged to take place on January 24 and 31st, February 21 and 28th and March 14, each session running between 1000-1200UTC. In addition to exchanging callsigns, report and serial number, stations must also give locator and OTH information.

An RSBG 144MHz c.w. contest will be held on Sunday January 17, between 1000-1600UTC. There are sections for the single operator fixed station, all others and listeners and competing stations exchange callsigns, report, serial number, locator and county.

A 430MHz DX contest will take place on Sunday February 7, between 0900-1500UTC. This contest has not been open to individuals (who must be RSBG members) but is also open to teams of operators belonging to an RSBG affiliated society (AFS) who need not necessarily be RSBG members themselves. The contest exchange consists of callsigns, report, serial number and locator.

The Nordic activity contests (mentioned last month) will be held between 1800-2000UTC on January 18 (Microwaves), February 26 (50MHz), February 2 (144MHz) and February 9 (430MHz).

To stimulate DX activity on the 144MHz band, the German VHF-DX Group, has organised an activity contest lasting one calendar year, commencing 1 January 1993. For every contact over 500km, one point may be claimed. Repeat contacts with the same stations are not allowed.

The total score is the number of different DX contacts multiplied by the number of locator squares worked. You may count any locator squares worked in the year irrespective of distance. A full set of rules, including a locator map, can be obtained by sending me an s.a.e.

**Tables**

Final entries for the yearly tables must be received by me by the end of January. They will appear in the April issue of PW, on sale 11 March 1993.

**Deadlines**

As usual, please send your letters to reach me by the end of the month at the very latest, as I normally write up the column around the 15th of each month.

The editorial team will be pleased to hear your comments and suggestions on the new look specialist columns. You can write to us at our new editorial address at: Practical Wireless, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW.
In the last editions of PWI have been reporting on the Dutch government's deliberations on the future role of Radio Netherlands, the Dutch international radio service. Whilst there is the suggestion that there needs to be new strategy, development of the station's broadcasting took a leap into the New World Order with the announcement in late November that transmissions to Asia would now be beamed on transmitters in Russia and other parts of the former Soviet Union.

The transmissions started on New Year's Day, and the schedule to March 6 appears in European News later in this column. And Radio Netherlands is now talking with other European broadcasters about the possibility of starting joint programme streams in English, French and German beamed to European listeners. BBC World Service, Radio France International and Deutsche Welle have met in recent weeks to talk about establishing new programme services and on how to reach areas of the world, such as the Pacific or North America, where international services are not widely listened to. Perhaps an EC station will emerge in the not too distant future.

As we went to press, reports came in that Azerbaijan Radio in the majority of broadcasters in the Band I allocation of 66 to 74MHz. In Band II, 87.5 to 108MHz, replacing v.h.f.-f.m. radio broadcasts are to be announced that by the year 2005 all broadcasting world. Poland has transmissions are one hour in length. starting to enter the west's countries in eastern Europe are traces the transmission, please drop transmissions to Europe. No details in the not too distant future. Perhaps an EC station will emerge in the west. The YLE Radio Service, Radio France International to European listeners. BBC World Service is not widely listened to. establishing new programme services and on how to reach areas of the world, such as the Pacific or North America, where international services are not widely listened to. Perhaps an EC station will emerge in the not too distant future.

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