This latest radio transceiver from ICOM is aimed at operators who need excellent performance and reliability at a sensible price. The IC-756 will appeal to all users from entry-level upwards and makes an ideal base rig for all HF/50Mhz enthusiasts.

**FEATURES INCLUDE:**
- Integrated 4.9in. Data Display
- Band Scope
- Soft Key for Function Assignment
- Visible Tx Message on Memory Keyer
- DSP/Dual-Watch as Standard
- CW Filter Options
- Voice Synthesizer
- All Usual ICOM Desk-Top Accessories.

**WANT TO KNOW MORE? - CONTACT YOUR LOCAL DEALER TODAY!**

ICOM - manufacturers of top performing base-stations, mobiles, handheld transceivers and receivers.
Icom (UK) Ltd. Sea Street Herne Bay Kent CT6 8LD. Telephone: 01227 741741. Fax: 01227 741742. INTERNET: http://www.icomuk.co.uk/ E-MAIL: icomsales@icomuk.co.uk.
9 EDITOR'S KEYLINES
9 RADIO DIARY
10 RECEIVING YOU
12 NEWS 1996
13 HOLLY'S HOBBY
Buddling Novice Holly Sibley shares her thoughts on building the Pitney.
16 CLUB SPOTLIGHT
18 AMATEUR TELEVISION - AN INTRODUCTION
Graham Jenkins G8EMK's comprehensive article will leave you wanting to enter the world of ATV.
24 XMAS SUBS
Order a PW Subscription as a present for a fellow radio enthusiast and they'll get a free gift too!
26 COMPUTING & RADIO - DO THEY MIX?
Mike Richards G6WNC shows you how you can use a computer in conjunction with amateur radio.
28 BITS & BYTES - THE COMPUTER IN YOUR SHACK
PW's monthly round-up of computing news.
30 COMPUTING TECHNICALLY
Gerald Stancey G3MCK advises you on how the computer can help with radio calculations.
32 REVIEW - THE MYDEL MULTI-TRAP ANTENNA
Eric Gray G3PCS, a keen h.f. operator, tests an antenna designed to fit in most suburban gardens.
34 TIPS & TOOLS - WORKSHOP PRACTICES
Clive Hardy G4SLU offers some handy hints and tips for the home-brew enthusiast.
36 SOLDERING SUCCESS ISN'T A SECRET!
After reading Paul Essery GWXPE's article you too should see that there are no secrets behind making a good solder joint.
39 PLUGGING COILS
Ray Loveland G2ARU describes how to make plug-in coils from 'party poppers'!
40 ANTENNA WORKSHOP
Gerald Stancey G3MCK helps you overcome your fears when faced with a Smith Chart.
42 VALVE & VINTAGE
It's Phil Cadman G4JCP's turn to man the 'wireless shop' and whilst in charge he continues with his look at valued regenerative receivers.
44 CARRYING ON THE PRACTICAL WAY
George Dobbs G3RJ/V shows you how to build a regenerative short wave receiver.
48 BOOK REVIEW
Rob Mannion G3KFD gives Basic Radio & Electronic Calculations by Ray Petri G0OAT a vote.
49 HF FAR & WIDE
Leighton Smith G4WLB provides a monthly report on the h.f. bands.
50 VHF REPORT
This month David Butler G4ASR has news of trans-equatorial propagation.
54 EQUIPMENT SPECIFICATIONS
Ian Poole G3WXR looks at power supplies in the list of his popular series.
55 BROADCAST ROUND-UP
Peter Shore takes you on a trip around the broadcast bands.
56 THE PRACTICAL WIRELESS 1996 INDEX
58 BARGAIN BASEMENT
63 BOOK STORE
64 PROFILES
Looking for a Christmas present - look no further!
67 COMING NEXT MONTH
68 ADVERTISERS' INDEX
### SOUTH MIDLANDS CO

**THIS MONTH’S SPECIAL OFFERS**

**YAESU FT-900**

HF REMOTE MOUNTABLE MOBILE TRANSCEIVER.

Options: ATU 2 auto ATU. £239
FP800 Mains PSU. £299

**STANDARD C-188 2m Handi**

WIDEBAND RX 5W OUTPUT

---

### HF TRANSCEIVERS

<table>
<thead>
<tr>
<th>Brand</th>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>KENWOOD</strong></td>
<td>NEW TS-570D</td>
<td>£3995</td>
</tr>
<tr>
<td></td>
<td>TS-950SDX</td>
<td>£3995</td>
</tr>
<tr>
<td></td>
<td>TS-870S</td>
<td>£2399</td>
</tr>
<tr>
<td></td>
<td>TS-450S</td>
<td>£2199</td>
</tr>
<tr>
<td></td>
<td>TS-450SAT</td>
<td>£2199</td>
</tr>
<tr>
<td></td>
<td>TS-50S</td>
<td>£1059</td>
</tr>
<tr>
<td></td>
<td>TS-60S</td>
<td>£999</td>
</tr>
</tbody>
</table>

**YAESU**

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>FT-1000MP</td>
<td>£2599</td>
</tr>
<tr>
<td>FT-990</td>
<td>£2199</td>
</tr>
<tr>
<td>FT-980/DC</td>
<td>£1799</td>
</tr>
<tr>
<td>FT-900C</td>
<td>£1199</td>
</tr>
<tr>
<td>FT-900AT</td>
<td>£1399</td>
</tr>
<tr>
<td>FT-900</td>
<td>£1199</td>
</tr>
<tr>
<td>FT-840</td>
<td>£959</td>
</tr>
</tbody>
</table>

**ICOM**

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>IC-706</td>
<td>£1199</td>
</tr>
<tr>
<td>IC-703</td>
<td>£1049</td>
</tr>
</tbody>
</table>

**VHF/ UHF HANDIS & PORTABLES**

<table>
<thead>
<tr>
<th>Brand</th>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>YAESU</strong></td>
<td>FT-50R</td>
<td>£339</td>
</tr>
<tr>
<td></td>
<td>FT-10R A06</td>
<td>£249</td>
</tr>
<tr>
<td></td>
<td>FT-40R</td>
<td>£289</td>
</tr>
<tr>
<td></td>
<td>FT-51R</td>
<td>£499</td>
</tr>
<tr>
<td></td>
<td>FT-11R</td>
<td>£299</td>
</tr>
<tr>
<td></td>
<td>FT-41R</td>
<td>£369</td>
</tr>
<tr>
<td></td>
<td>FT-290R2</td>
<td>£599</td>
</tr>
<tr>
<td></td>
<td>FT-690R2</td>
<td>£649</td>
</tr>
<tr>
<td></td>
<td>FT-790R2</td>
<td>£749</td>
</tr>
<tr>
<td></td>
<td>FT-416G</td>
<td>£329</td>
</tr>
</tbody>
</table>

**VHF TRANSCEIVERS**

<table>
<thead>
<tr>
<th>Brand</th>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ICOM</strong></td>
<td>IC-716</td>
<td>£794</td>
</tr>
<tr>
<td></td>
<td>IC-25E</td>
<td>£286</td>
</tr>
<tr>
<td></td>
<td>IC-8500</td>
<td>£549</td>
</tr>
<tr>
<td></td>
<td>IC-142E</td>
<td>£269</td>
</tr>
</tbody>
</table>

| **KENWOOD** | TH-79E | £479 |
| | TH-22E | £254 |
| | TH-42E | £289 |
| | TH-28E | £319 |
| | TH-48E | £369 |

---

All discounts are based on RRP. CARRIAGE: ROTATORS/PSUs £13.50 BASE ANTENNAS £9.50 TNCs £8.50 MOBIL Showroom/Mail Order 9:30-5pm, 9-1pm Sat Tel: (01703) 251549 Service Dept Tel: (01703) 255111 9-5 Mon-Fri SMC Sisk |
COMMUNICATIONS LTD

ANTENNA ROTATORS

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR203</td>
<td>Light duty</td>
<td>£48.95</td>
</tr>
<tr>
<td>G-450XL</td>
<td>New medium duty model</td>
<td>£368.00</td>
</tr>
<tr>
<td>G-550XL</td>
<td>New HD version of G-450XL</td>
<td>£368.00</td>
</tr>
<tr>
<td>G-805SDX</td>
<td>450° deluxe model</td>
<td>£429.00</td>
</tr>
<tr>
<td>G-1005SDX</td>
<td>H/D version of G-805SDX</td>
<td>£499.00</td>
</tr>
<tr>
<td>G-2006SDX</td>
<td>H/D rotator 450°</td>
<td>£112.99</td>
</tr>
<tr>
<td>G-500A</td>
<td>Elevation rotator</td>
<td>£299.00</td>
</tr>
<tr>
<td>G-5400B</td>
<td>AZ/EZ rotator</td>
<td>£529.00</td>
</tr>
<tr>
<td>G-6000B</td>
<td>AZ/EZ rotator H/D</td>
<td>£629.00</td>
</tr>
<tr>
<td>RCS-1</td>
<td>Medium duty create....</td>
<td>£39.99</td>
</tr>
<tr>
<td>RCS-3</td>
<td>Medium duty x preset</td>
<td>£49.99</td>
</tr>
<tr>
<td>RCA-3</td>
<td>HD created + preset</td>
<td>£269.00</td>
</tr>
<tr>
<td>RCS-5</td>
<td>V/HD/cut and preset</td>
<td>£99.99</td>
</tr>
<tr>
<td>ERC5A</td>
<td>Heavy duty elevation</td>
<td>£1095.00</td>
</tr>
<tr>
<td>GCO18B</td>
<td>Lower clamp G-1000, 1000</td>
<td>£25.00</td>
</tr>
<tr>
<td>GCO38G</td>
<td>Lower clamp G-500</td>
<td>£25.00</td>
</tr>
<tr>
<td>MCI</td>
<td>Lower clamp create...</td>
<td>£49.95</td>
</tr>
<tr>
<td>GS-90O</td>
<td>Rotary bearing up to 1/15 mast</td>
<td>£25.00</td>
</tr>
<tr>
<td>GS-965N</td>
<td>Rotary bearing 2° mast</td>
<td>£45.00</td>
</tr>
<tr>
<td>CK6</td>
<td>Create rotating 2° mast</td>
<td>£57.00</td>
</tr>
<tr>
<td>CD-45</td>
<td>Telex meter controller</td>
<td>£315</td>
</tr>
<tr>
<td>HAM IV</td>
<td>Medium duty controller</td>
<td>£44.00</td>
</tr>
<tr>
<td>HAM V</td>
<td>HAM IV with digital controller</td>
<td>£49.00</td>
</tr>
</tbody>
</table>

We now have the widest range of data products in the UK, and we must be by far the number one choice for package equipment.

Siskin Multi Cat
Computer interface suitable for most HF & VHF Transceivers with CAT interface socket.

£69.00

(AEA)

PK12 | 1200 baud TNC | £129.00
PK96 | 9600 baud TNC | £219.00
PK24/80 | Multimode data modem | £319.00
*DSP255 | Multimode data modem | £479.00
*PK90 | Multimode data modem | £479.00

Free Pack - Win software

PacComm
Tiny 2 | 200 baud TNC | £139.00
PicoPacket | 12 baud portable TNC | £119.00
Spirit 2 | 9600 baud TNC | £219.00

Kantronics
KPC3 | 1200 baud TNC | £139.00
KPC6412 | 120+9600 dual port TNC | £275.00
Kam+ | Multimode data modem | £395.00

Symek
TNC2H | 9600 baud TNC | £179.00

BayCom Modems
USCC 4 port plug in card W/O Modems | £107.00

Modems
1200 baud | Plug in for USCC | £39.00
HF | Plug in for USCC | £59.00
9600 baud | Plug in for USCC | £79.00
Mini-Pak | 1200 baud 8 pin “O” plug | £69.95

Custom-made leads available for most leading brands of transceivers. £14.95. Only £7.50 if purchased with a TNC.
1997 SHORTWAVE FREQUENCY GUIDE

worldwide broadcast and utility radio stations!

484 pages · £23 or DM 50 (including airmail)

Finally ... a really up-to-date handbook with the latest 1997 broadcast schedules compiled end November and available here in Europe only ten days later! Modern layout allows easy use and quick information access. User-friendly tables include 11,500 entries with all clandestine, domestic, and international broadcast stations worldwide from our 1997 Super Frequency List on CD-ROM (see below). Another 13,800 frequencies cover all utility stations worldwide. A solid introduction to real shortwave monitoring is included as well, plus 1,160 abbreviations. The right product at the right moment for worldwide listeners, radio amateurs and professional monitoring services alike - at a sensational low price!

1997 SUPER FREQUENCY LIST ON CD-ROM

now includes all broadcast stations worldwide!

£27 or DM 60 (including airmail)

11,500 entries with latest schedules of all clandestine, domestic and international broadcasters on shortwave, compiled by top expert Michiel Schaay from the Netherlands - now available as a standard .dbf file for open access! 13,800 special frequencies from our international bestseller 1997 Utility Radio Guide (see below). 1160 abbreviations. 14,100 formerly active frequencies. All on one CD-ROM for PCs with Windows™ or Windows95™. You can search for specific frequencies, countries, stations, languages, call signs, and times, and browse through all that data within milliseconds. It can’t get faster than this!

1997 GUIDE TO UTILITY RADIO STATIONS

includes latest Red Cross and UNO frequencies!

588 pages · £36 or DM 80 (including airmail)

The international reference book for the really fascinating radio services on SW: aero, diplo, maritime, meteo, military, police, press, and telecom. The conflicts on the Balkan and in Africa and Asia are perfectly covered. 13,800 up-to-date frequencies from 0 to 30 MHz are listed, including the very latest frequencies used now during the sunspot minimum. We are the world leader in advanced teleprinter systems monitoring and decoding! This unique reference book lists just everything: abbreviations, addresses, call signs, codes, explanations, frequency band plans, meteofax and NAVTEX and press schedules, modulation types, all Q and Z codes, and much more. Thus, it is the ideal companion to the publications above for the "special" stations on shortwave!

Special package price: CD-ROM + SW Frequency Guide = £45. More package deals available. Plus: Internet Radio Guide = £23. Worldwide Weatherfax Services = £27. Double CD Recording of Modulation Types = £45 (cassette £27). Radio Data Code Manual = £32. Sample pages and colour screenshots can be viewed on our superb Internet World Wide Web site (see below). We have published our international radio books for 28 years. Payment can be made by cheque or credit card - we accept American Express, Eurocard, Mastercard and Visa. Dealer discount rates on request. Please ask for our free catalogue with recommendations from all over the world! ☺

Klingenfuss Publications · Hagenlower Str. 14 · D-72070 Tuebingen · Germany
Fax 0049 7071 600849 · Phone 0049 7071 62830 · E-Mail 101550.514@compuserve.com
Internet http://ourworld.compuserve.com/homepages/Klingenfuss/
You're an amateur radio enthusiast.
Meet a professional rig.

Introducing the Kenwood TS-570D. The HF transceiver that raises the standard by which all others are judged. 16-bit DSP AF signal processing for extremely effective interference reduction. High quality TX and RX audio. CW Auto Tune to enable you to zero in on targets at the touch of a button. And a host of other features which make the TS-570D the only choice for mobile or base station, rag-chewing to DX.

You may be an amateur radio enthusiast. But why be enthusiastic about anything less than a professional radio?

KENWOOD

For more information phone 01923 816869.
Please mention Practical Wireless when replying to advertisements

Beware
There May Be Impostors Out There

ONLY THE RSGB CAN DO ALL THIS FOR YOU

1. Represent your interests at Government level with UK, Europe and internationally through the IARU
2. Send RadCom post free every month to your door
3. Provide 15% discount off all books/products that we sell
4. Give EMC advice to help you with those interference problems
5. Provide advice on obtaining antenna planning permission
6. Provide technical advice
7. Discounted equipment insurance - which now includes breakdown cover

ALL for less than 10p per day

DON'T BE OUT THERE IN THE COLD - JOIN US AND WE WILL HELP YOU TO ENJOY AMATEUR RADIO TO THE FULL

Yes, please rush me my RSGB Membership Application form!

Name
Callsign
Address
Post Code

Internet: WWW.rsgb.org

Radio Society of Great Britain (Dept PW/1196)
Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE.
Telephone: 01707 659015

FREE 32 page full colour Computer Equipment Catalogue
with the Winter 96/97 Cirkit Catalogue

The Winter 96/97 Edition brings you:

- Even further additions to the Computer section extending our range of PC components and accessories at unbeatable prices.
- WIN! a 28,800 Fax Modem in our easy to enter competition.
- 100’s of new products including Books, Connectors, Entertainment, Test Equipment and Tools.
- New Speakers, Mixers and In-Car Amplifiers in the Entertainment section.
- £25 worth discount vouchers.
- 248 Page main Catalogue, plus 32 Page full Colour Computer Catalogue, incorporating 24 Sections and over 4000 Products from some of the Worlds Finest Manufacturers.
- Available at WH Smith, John Menzies and most large newsagents, or directly from Cirkit.

Get your copy today!

Cirkit Distribution Ltd
Park Lane, Broxbourne, Hertfordshire, EN10 7NQ
Tel: 01992 448899 • Fax: 01992 471314
Email: mailorder@cirkit.co.uk

Cirkit

£1.95 + 30p p&p
### SUNRISE ELECTRONICS
**CENTRAL LONDON'S ONE-STOP COMMUNICATIONS CENTRE**

**229 TOTTENHAM COURT ROAD, LONDON W1P 9AE**

**MAIL ORDER HOTLINE**
Fax: 0171 - 637 3728

**0171-637 3727**

---

**MAGELLAN GPS**

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS-2000</td>
<td>£145.00</td>
</tr>
<tr>
<td>GPS-3000</td>
<td>£199.00</td>
</tr>
<tr>
<td>GPS-4000</td>
<td>£239.00</td>
</tr>
<tr>
<td>MERIDIAN XL</td>
<td>£249.00</td>
</tr>
<tr>
<td>TRAILBLAZER</td>
<td>£279.00</td>
</tr>
<tr>
<td>NAV DLX10</td>
<td>£479.00</td>
</tr>
<tr>
<td>SKYBLAZER</td>
<td>£POA</td>
</tr>
</tbody>
</table>

- Full range of Magellan GPS in stock (new only).
- **Discount for Scouts**
- **Discount for clubs & institutes**

---

**GARMIN GPS**

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS-38</td>
<td>£159.00</td>
</tr>
<tr>
<td>GPS-40</td>
<td>£199.00</td>
</tr>
<tr>
<td>GPS-45XL</td>
<td>£229.00</td>
</tr>
<tr>
<td>GPS-75</td>
<td>£399.00</td>
</tr>
<tr>
<td>GPS-89</td>
<td>£349.00</td>
</tr>
<tr>
<td>GPS-90</td>
<td>£469.00</td>
</tr>
<tr>
<td>GPS-120</td>
<td>£354.00</td>
</tr>
<tr>
<td>GPS-MAP 130</td>
<td>£619.00</td>
</tr>
<tr>
<td>GPS-MAP 175</td>
<td>£619.00</td>
</tr>
<tr>
<td>GPS-MAP 210</td>
<td>£884.00</td>
</tr>
<tr>
<td>GPS-MAP 220</td>
<td>£1188.00</td>
</tr>
</tbody>
</table>

---

**ALL ACCESSORIES FOR MAGELLAN & GARMIN GPS IN STOCK**

- Power data cable
- PC kits
- Marine antenna
- Mounting brackets
- Training video
- Car adaptor
- Extension antennas
- Car antennas
- Software for PC available

---

**SCANNSERS/TRANSCEIVERS**

**Stockists of Kenwood, Yaesu, Alinco, Yupiteru and AOR. Call us now for further information.**

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>AOR-8000</td>
<td></td>
</tr>
<tr>
<td>YUPITETRUMVT-7100</td>
<td>£365</td>
</tr>
<tr>
<td>YUPITETRUS-1000E</td>
<td>£285</td>
</tr>
<tr>
<td>WELZ</td>
<td>£310</td>
</tr>
<tr>
<td>AOR-2700</td>
<td>£189</td>
</tr>
<tr>
<td>YUPITETRVT-125</td>
<td>£169</td>
</tr>
<tr>
<td>YUPITETRVT-225</td>
<td>£230</td>
</tr>
<tr>
<td>ALINCO DJ-S41</td>
<td>£130</td>
</tr>
<tr>
<td>YAESU FT-50R</td>
<td>£295</td>
</tr>
<tr>
<td>ICOM IC-T7E</td>
<td>£295</td>
</tr>
<tr>
<td>KENWOOD TH-22E</td>
<td>£230</td>
</tr>
<tr>
<td>KENWOOD TH-28</td>
<td>£280</td>
</tr>
<tr>
<td>ALINCO DJ-190E</td>
<td>£175</td>
</tr>
</tbody>
</table>

---

**NIGHTVISION**

**PRICES FROM £199.00**

- Moonlight NV-100 with illuminator. Tremendous night vision performance at an economical price.
  - **£319.00**

- Moonlight Mini Sleek, miniaturised design – only 5.5” long.
  - **£269.00**

---

**SECOND GENERATION**

**PRICES FROM £699.00**

- ITT QUEST 100  ......£699.00
- ITT QUEST 150  ......£899.00
- ITT QUEST 250  ......£1699.00
- NEW ITT QUEST 300 ......£POA

---

**NEXT DAY DELIVERY AVAILABLE. QUANTITY DISCOUNTS AVAILABLE. EXPORT ENQUIRIES WELCOME. TRADE CUSTOMERS CALL FOR BEST PRICES. ALL PRICES SHOWN INCLUDE VAT.**

Practical Wireless, December 1996
Reviewed PW
November 1996

ALINCO DJ - S41
From Alinco a complete 350mW 70cms handheld. Look at the price! Includes CTCSS, 20 memories and repeater shift!!

PRICE MATCH
We'll match or beat our competitors' prices on all new current stock sourced from UK official importers.

PHONE!!

 YAESU Deals
Model       RRP      Price
FT-1000MP-DC £2599 £2299
FT-1000MP-AC £2849 £2249
FT-990DC     £1999 £1599
FT-736R      £1999 £1399
FT-50R New   £329  £299
FT-840       £399  £299
FT-2500      £399  £329
FT-51R       £529  £499
FT-290RI     £599  £429

KENWOOD Deals
TS-870       £2399 £1969
N-5000       £1099 £885
TH-79        £479  £409
TH-22        £254  £219
TH-790       £1999 £1649
TM-753F      £729  £529
TM-251E      £419  £355

ICOM Deals
IC-706       £1195 £995
IC-776DSP    £3699 £3099

ALINCO Deals
DX-70        £89.95
DR-130       £329  £289
ALINCO DR - 605 Dual-Band Mobile

The Amazing Micro-Mag
Mobile Aerials
WSM-270 Dual Band 2m/70cm £24.95
WSM-1900 25-1900Hz scanning £29.95
Each comprises latest Japanese "super" 29mm diameter magnet, black element and 2.75m of coax cable terminated in BNC. WSM-270 40cm, WSM-1900 400mm

Super Earpiece
As used by US Police
* 8 Ohms driver
* Left or Right Mode
* Soft earclip
* Removable Pad
* Height adjust
* Right-angle 3.5mm plug
* 1.15m lead

The Ultimate Earpiece!

POWER SUPPLIES
3 Amps to 30 Amps - Fully Protected

IC-706 £995

Waters & Stanton

01702 206835

Reviewed PW
October 1996

ALINCO DR-605 Dual-Band Mobile

Price
£495

Mobile Aerials
WFH-7000 Dual-Band Helical

Price
£19.95

2m/70cms optimised - 205mm with BNC

The ideal replacement antenna for those poor factory jobs

New Triple Banbe

W-2000 6m - 2m - 70cm

The Model Designed for UK Bands no USA!

IN STOCK NOW

W-30 2m/70cms 3/5d8 1.15m £39.95
W-50 2m/70cms 4.5/7.2d9 1.8m £34.95
W-300 2m/70cms 6.5/9d8 3.1m £59.95
W-2000 2m/70cms 2/618.5d13 2.5m £89.95

The Only One to have Packed New EMC Reg!!

W-36 3 Amp 12V current/heat protected £22.95
W-6A 5 Amp 12V current/heat protected £29.95
W-10A 10 Amp 12V current/heat protected £49.95
W-10AM 10 Amp 3 - 15V variable £59.95
W-25AM 20 Amp 3 - 15V variable £99.95
W-30AM 30 Amp 3 - 15V variable £119.95

Shop: 22, Main Road, Hockley, Essex. SS5 4QS Tel: (01702) 206835 Fax: 205843
MAIL ORDER (01702) 206835 / 204965 - 24 Hour Answerphone Fax: 205843
Open Mon. - Sat. 9am - 5.30pm

VISA
ACCESS
Rob Mannion’s viewpoint on the World of Amateur Radio

Editor’s Keylines

December 96

November 16: The Rochdale & District Amateur Radio Society are holding their 2nd Traditional Radio Rally at St Aidan’s Church Hall, Sudden, Rochdale. (Same venue as the GRP Convention). This rally is for the constructor and fettler, with components and ‘junk’ being the main theme. Tables are available at £5, so why not empyt your loft? Doors open 10.30am to 4.30pm (10am for disabled visitors). Entry is only £1. Talk-in on S22. Two minutes from M62, J20. John G7DAI on (01796) 815737 (office) or (01706) 376204 (home).

November 16: The London Amateur Radio & Computer Christmas Rally is being held at the Lee Valley Leisure Centre, Picketts Lock Lane, Edmonton, London N8. Doors open 10am to 5pm. New, pre-Christmas one-day event. Trade shows, Bring & Buy, on-demand Morse tests, talk-in on 2m & 70cm, facilities for the disabled, priority admission for disabled visitors, bars, restaurants, ample free parking.

November 17: The Bishop Auckland Radio Amateurs Club (BARAC) rally will take place at Newton Aycliffe Leisure Centre. There will be the usual stalls, Bring & Buy, catering and bar facilities. The venue also boasts good parking with easy access. As you can imagine, there is lots to do for all the family within the confines of the leisure centre for those of the family not quite so interested in radio. Doors open at 11am (10.30am for disabled visitors). More details from rally organiser Mike G7SMF on (01923) 892529.

November 24: The Red Rose Rally is being held at Horwich Leisure Centre, Victoria Road, Horwich, Nr Bolton off J6 M61. There will be a cafe, bar, Bring & Buy, RSGB stand, special interest groups, pools for car parks, 200 cars, free cash draw every hour, children’s activity room up to seven years, supervised by parent. Doors open at 10.30am and admission is £1, free for children. Talk-in on S22.

December 8: The SDX Cluster Support Group Radio, Electronics & Computer Rally is being held at the Maryhill Community Centre Halls, Maryhill Road, Glasgow. The halls are located approx. 1 mile from junction 17 of the M8 motorway and five minutes walk from St. Georges Cross underground station. As well as the normal traders, radio, electronics, computers, antennas, etc., a series of lectures are planned for the day. There will also be an RSGB Forum, which will be attended by members of the RSGB General Council. A cafe will be run throughout the day, serving hot/cold drinks and light snacks. Talk-in will be provided by Strathclyde Raynet on S22. Fees: Adults, £2, UB40 holders, £1.50. Senior Citizens, £1.50 and children under 14, free of charge with adult. John Dundas GM0QPS on 0141-438 7670 or packet GB7SAN, GB7SDX.

December 9: The Verialam AR Rally is to be held at the Watford Leisure Centre, Horseshoe Lane, Garston, Watford, Herts, off A405 near M1 junction 6 and M25 junction 21A. Doors open 10am to 4pm. Features include trade stands, Bring & Buy, grand raffle, cafe, licensed bar and free parking. Morse tests will be available. Details from Walter G4JMF on (01923) 262100 or Ralph G1BSZ on (01923) 265512.

January 9: The Oldham AR Mobile Rally will be held at the Queen Elizabeth Hall, Civic Centre, West Street, Oldham, Lancs. Doors open at 11am (10.30am for disabled visitors). This event will feature all the usual traders and a Bring & Buy stall. Morse tests are available on demand. Talk-in on S22 via GB4ORC, commencing at 7.30am. Mobile contact prize up to 2pm. Refreshments and free parking available, (01706) 846143 or 0161-652 4164.

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

The Editorial staff of PW cannot be held responsible for information on Rallies, as this is supplied by the organisers and is published in good faith as a service to readers.

If you have any queries about a particular event, please contact the organiser direct.

Editor

*Practical Wireless & SWM in attendance

Practical Wireless, December 1996
Limited Companies

Dear Sir

The RSGB Again! It is fashionable nowadays to treat all organisations as if they were limited companies, in business to sell their goods or services. Limited companies have shareholdings, management, a work force and customers and they trade in competition with other companies. I believe that many critics treat the RSGB in this simplistic way.

The RSGB is not that kind of organisation. Its purpose is not competitive trade, but the furtherance of amateur radio. It has something in common with a learned society or a professional institution. It has neither share holders nor customers (except perhaps for the sale of books). It is a special interest society and like other similar societies, it has members. The members are the society and the society’s interests are the consensus of those members who bother enough to express their views.

In common with other societies it does employ a small management/work force team, but most of its activities are ‘run and done’ by unpaid members, and especially by those who are voted into office by other members - those who care enough to vote.

The RSGB exists because the early wireless experimenters needed a national society to represent their interests in dealing with our government. In a sense it is kind of ‘trade union’, relating to the policies and attitudes of the government’s licensing authority.

Unfortunately, the attitudes of the various national authorities over the years have not always been helpful. At times, government departments attitudes are downright hostile to our activities, forcing the RSGB members to fight for amateur radio’s corner. The present authority, the RA, seems co-operative, but it has to reflect the views of government politicians, as well as having to oversee international rules and regulations. It is hard enough to get a committee of 6 to agree to anything, let alone international governments!

I would like to see ‘phone patch permitted, free passage of third party messages, a progressive licence, a more relevant RAE and something more sensible that the Morse test to grade amateurs. At a time when government politicians talk of ‘selling off’ bits of the radio spectrum, as though it was a nationalised industry, the RA is unlikely to agree to radio amateurs doing as well please on the air. The British government is unlikely to change the rules for me, but politicians might listen more closely to the RSGB is the great majority of radio amateurs belonged to it. Criticism of the RSGB is not likely to change things - joining it might.

David H. Wright
Dorset

Awards Data

Dear Sir

You ask in the current PW for a source of data on awards. Clearly the Internet isn’t the font of all knowledge, which I suppose is just as well for PW. Anyhow, I doubt if you will find a more comprehensive list than the K1BV Awards Directory, produced annually by K1BV (Ted Melinosky). It contains details of 2445 awards (in this year’s edition), from the basics (WAC, DXCC, WPX, WAZ, etc.), through fairly sane ones (working all the Polish provinces or all the Japanese perfected) to some that are downright whimsical. Some are fairly easy (Worked Twelve Islands) and some fiendishly difficult or they would be for me (Worked 300 countries on 5W).

Costly? Surface mail (doesn’t take too long), $18, air mail, $25. Ted is at: 65 Glebe Road, Spofford, New Hampshire Tel: (01346) 24411 and on Internet k1bv@top.monad.net and no, I’m not an agent and I don’t get a cut! But,

mention my name/call, he might give me a percentage off my next copy!

Rod Stevens G3TVI
Hampshire

Letters Received Via The Internet

Editor’s comment: Thanks for the information Rod, which I’m also passing on to Leighton Smart G0WBLI (carrying ‘IF Far & Wide’ column). Leighton would find any information such as that supplied by G3TVI, to be of great interest for his readers. So, to help other DXers, I ask all you keen ‘Certificate Hunters’ to keep Leighton informed by writing to the address on his page.

Samuel Morse

Dear Sir

I was interested to read in your July issue about Samuel Morse and his original code. It reminded me of my days as an operator at ZL1, Awarua Radio in the deep south of South Island in New Zealand. Sadly, the station closed some time ago as the use of Morse in the maritime service decreased. Most of Morse’s code was different to the ‘modern’ version and has been forgotten but his ‘O’ is still to be heard and was certainly used in the maritime service. Morse’s ‘O’ was two dots, not quite an ‘I’ and not quite two ‘E’s but somewhere in between and is often used in ‘OK’ or the abbreviation ‘ON’ (Old Man). A bit of a trap to the new operator.

I enjoyed the July issue as, for those who appreciate it, Morse operating is a delight. But I can also understand the feelings of

Apologies To Rudyard Kipling

Dear Sir

Please find enclosed an item for ‘Receiving You’. I was reading Rudyard Kipling recently and was inspired to compose an amateur radio version of ‘IF’. This may seem an unusual subject for verse, but I think I have composed an amateur radio version of ‘IF’. This may seem an unusual subject for verse, but I think I have

if you can keep your frequency when all about you are losing theirs and blaming it on you.

if you go back to any station that will shout you and never once give way to shouting too.

if you can say how circuits are constructed to multiply, divide or synthesise, and how if, current is conducted and yet not sound too smart, nor talk too wise.

If you encourage each and every small sign of interest from the young fraternity, maintain the continuity of call sign, keep hands on bands when you’re a silent key, if you can copy code and contacts spoken all accurately logged within the rules and when you find the field day rig is broken get back upon the air with makeshift tools.

If when it’s over, though you did not win you’re glad that you took part and found it fun, yours is the earth and everything in it and which is more, you’ll be a ‘Ham’ my son!
those for whom it is a curse and merely an obstruction on the route to h.f. operation.
Brian Drum
New Zealand

Editor's reply: Nice to hear from one of our New Zealand readers Brian. But it's a great pity I can't get down to see you for the price of an airmail stamp. Any chance of an invitation (complete with airline ticket) to provide a chat talk in New Zealand?

Bricks & Flying Objects!

Dear Sir
Having sat down and digested all the comments, bricks and other flying objects over the last few months I thought it was time to put pen to paper. What the amateur population needs to realise is that as far as the regulatory body is concerned we serve very little purpose and contribute small amounts of revenue for the amount of work we generate. Professional bodies would give their eye teeth for our v.h.f. allocations and be prepared to pay the going commercial rate (far more than our licence fee). Unless we stick together and negotiate with one voice we stand no chance of surviving in the 21st century.

Look in the amateur press and you'll find bickering about c.w., RSGB, CB, Novice and now the UKRS. What has to be realised is that we serve no real purpose, the regulatory body is not really interested in us, as long as we are there looking for a slice of the action and small groups of people experimenting in electronics put together an order of that magnitude. Are Maplin trying to tell us in a roundabout way that they are not really interested in supplying the lonely hobbyist! It would be interesting to hear how they justify such a swinging increase which is many times the inflation rate.

Mike Rowe G8JVE
West Sussex

Editor's comment: To seek an answer to Mike Rowe's questions and comments, I wrote to Maplin and received a reply from their Managing Director:

"Maplin Electronics remain fully committed to both its hobbyist and trade customers. We have chosen to realign our carriage charges to reflect normal industry practice and to provide free carriage for the first time to the large number of hobbyist customers who order goods to the value of over £30 inclusive of VAT.

Last year the carriage and packing charges varied between £1.55 and £7.55 depending upon the weight of the items ordered. You will appreciate that we incur a fixed administration and picking cost with each order and we believe that the new charge structure reflects more fairly the nature of our cost base. We do not seek to make any profit out of this charge, but simply to recover our costs.

The new September catalogue does bring the following benefits to our many hobbyist customers:
- quantity discounts available to everyone
- improved section layouts
- products easier to find over 17000 hobbyist and industrial products in one catalogue
- full semi conductors pin-out information for the major logic families
- same day despatch for all orders received before 5pm.

We are launching a new store opening programme (starting with the new Luton Store in the Arradale Centre on 10 October 1996) to bring the 'world of electronics' directly to many more hobbyists. Remember, many hobbyists go to their nearest Maplin store and thus avoid carriage charge altogether.

We now publish our full catalogue twice yearly to ensure that the latest products are more readily available. Far from abandoning the hobbyist, we are investing significantly to serve his developing needs and provide value for many products and services".

A. D. 'Sandy' Black
Managing Director
Maplin Electronics PLC
PO Box 777, Rayleigh, Essex SS6 8LU

Mail Order Charges

Dear Sir
I wonder how many of your readers have noticed the excessive increase in the small order handling charges brought in with the issue of the new MPS (Maplin) catalogue. Last year the handling charge was £1.55 and, considering the cost of a 'padded' bag and a first class stamp, I would have thought that this left a quite reasonable margin to cover the cost of picking and packing the order, especially as this was probably done on a computer generated list.

This charge has now gone up to £2.25 (nearly double!). True, there has been a slight increase in the cost of a first class stamp, but I very much doubt that stiffy bags have soared in price by a factor of over a pound. (If they have, I'd better get some shares in the company).

You do get free delivery if you order over £30 worth of goods, but how many people experimenting in electronics put together an order of that magnitude. Are Maplin trying to tell us in a roundabout way that they are not really interested in supplying the lonely hobbyist! It would be interesting to hear how they justify such a swinging increase which is many times the inflation rate.

Mike Rowe G8JVE
West Sussex

Editor's comment: To seek an answer to Mike Rowe's questions and comments, I wrote to Maplin and received a reply from their Managing Director:

"Maplin Electronics remain fully committed to both its hobbyist and trade customers. We have chosen to realign our carriage charges to reflect normal industry practice and to provide free carriage for the first time to the large number of hobbyist customers who order goods to the value of over £30 inclusive of VAT.

Last year the carriage and packing charges varied between £1.55 and £7.55 depending upon the weight of the items ordered. You will appreciate that we incur a fixed administration and picking cost with each order and we believe that the new charge structure reflects more fairly the nature of our cost base. We do not seek to make any profit out of this charge, but simply to recover our costs.

The new September catalogue does bring the following benefits to our many hobbyist customers:
- quantity discounts available to everyone
- improved section layouts
- products easier to find over 17000 hobbyist and industrial products in one catalogue
- full semi conductors pin-out information for the major logic families
- same day despatch for all orders received before 5pm.

We are launching a new store opening programme (starting with the new Luton Store in the Arradale Centre on 10 October 1996) to bring the 'world of electronics' directly to many more hobbyists. Remember, many hobbyists go to their nearest Maplin store and thus avoid carriage charge altogether.

We now publish our full catalogue twice yearly to ensure that the latest products are more readily available. Far from abandoning the hobbyist, we are investing significantly to serve his developing needs and provide value for many products and services".

A. D. 'Sandy' Black
Managing Director
Maplin Electronics PLC
PO Box 777, Rayleigh, Essex SS6 8LU

This Month's Star Letter

The 934MHz Citizens' Band

Dear Sir
Reference the pending closure of the 934MHz Citizens Band. Representing all 934MHz users along the south coast from Hastings to Littlehampton, and on their behalf, I would like to express a vote of thanks to you for your comments in the Editor's Keylines (October edition) of Practical Wireless.

How nice to hear the Amateur Radio Fraternity, sympathising with us in our hour of need. We do condemn the decision to close this very pleasant and user friendly citizens band and we will fight on until the very final 'over' at the end of 1998.

Multi-million pound radio telephone businesses go on expanding, taking up every spare section of the radio frequency spectrum, and obviously the RA has given way to the pressure for even more of it, including our little segment at 934MHz. It's no way to treat the stepping stone frequency for amateur radio, since this is how it has developed. In fact, many users have gone 'amateur' and have even turned back to it occasionally.

The loss of 934MHz Citizens' Band radio could be the thin edge of the wedge for cuts into the amateur radio band plan, who knows what the future holds. Those of us still using 934MHz have indeed spent vast sums of money over the years since 1982, so why should we have to ditch all this equipment? Without response from anyone either! Perfectly good radio equipment that will become obsolete and useless and illegal after midnight December 31 1998.

I appeal to all users of 934MHz nationwide, fight for the postponement of the closure, write to your MP, to the Minister for Telecommunications, to the 934MHz Club UK, the Radiocommunications Agency, the DTL, to the Publishers of the CB Magazine, in fact, everyone and anyone who may help use in our cause. Remember, united we stand, divided we fall!

Thanks again Editor, please, please keep up the pressure, we are a minority but we do love our 'gentleman's band' as you call it. It has been, and always will be, an example of how Citizens' Band radio should be used and all users are proud to be associated with it.

John Hardy
West Sussex

Editor's reply: In my opinion John is right...the loss of the 934MHz CB allocation could really be 'the thin edge of the wedge' as the pressure on the 'non professional' (limited revenue earning) spectrum such as Amateur Radio and CB is unrelenting. We should not be complacent, the 430MHz band is already a prime target as recent events have proved!

Practical Wireless, December 1996
Short Wave Home Page

The International Short Wave League (ISWL) now has its own Home Page on the Internet. The page contains details about ISWL's activities, current Club operators, QSL information, Net trellis and Membership details. The page can be viewed at http://www.abcr.ac.uk/~argiswl.html

Young Amateur Of The Year Is MOAAU

The 1996 Young Amateur of The Year is 14 year-old Christopher Davies MOAAU from Shrewsbury in Shropshire. Runner-up is Benjamin Clarkson G7WHO, also 14 years-old from Reading in Berkshire.

The announcement of the winner and runner-up was made during a special ceremony at the RSGB's HF & IOTA Convention at the ICL Beaumont Conference Centre in Old Windsor on Sunday 6th of October.

Christopher Davies MOAAU became interested in radio at 12, became the youngest Novice in Shrewsbury and sat the RAE when 13. He's a keen antenna constructor, Raynet member and is working for his Duke of Edinburgh's Award at school. Benjamin Clarkson G7WHO passed his Novice RAE soon after his 12th birthday - despite suffering from colour blindness and severe dyslexia. He regularly helps the St. John's Ambulance Brigade and has supported the IOTA event and has broadcast on the BBC Active 8 programme.

Prizes were presented by Roger Louth on behalf of the Radiocommunications Agency, RSGB President 1996 Peter Sheppard G4EJP, Peter Simpson of Wray Castle (College), Dennis Goodwin G4SOT of Icom (UK) and Tom Crosbie G6PZZ of Lowe Electronics.

Everyone on the PW team would like to congratulate Christopher and Ben, and pass on our good wishes to them. Editor.

Weekend Workshops

A series of practical workshops are being run by Rob Keyes GW4IED of KeySolar Systems starting in November and running through 1997. The idea of the workshops is to give people the opportunity to work with others in a well equipped workshop on projects that they perhaps wouldn't normally be able to undertake.

The workshops will be held in Newport close to the M4 Junction 25 on Saturdays 12 - 6pm and Sundays 9am - 4pm. There is accommodation available close by and an area suitable for caravans.

For more information and details on how to get involved telephone or FAX GW4IED on (01633) 280958 during office hours.

Mosley Winner

John Morris G4BXS of Yelverton in Devon was the lucky winner of a Mosley Beam antenna kindly donated by Tim Thirst of Eastern Communications of Norfolk for a PW competition. John entered the PW Antenna Wordsearch competition run in the April '96 issue and his was the first entry pulled from the Editorial biscuit tin!

John is pictured here holding one of the trap assemblies from his Mosley Beam antenna. If you would like to know more about the range of Mosley antennas why not contact Tim of Eastern at Cavendish House, Happisburgh, Norfolk NR12 0RU. Tel: (01692) 659077.

New Catalogue

The newly published Waters & Stanton 1997 Annual Product Catalogue has recently landed on the 'Newsdesk'. As in previous years the catalogue is in A4 format but has been enlarged to 144 pages and contains over 400 products of interest to radio amateur's and hobbyists alike. Copies are available now by sending £2.50 to Waters & Stanton Electronics, 22 Main Road, Hockley, Essex SS5 4JS.

And that's not all! A new brochure containing the range of Watson Radios accessories is now available from W & S. The full colour 4 page brochure contains a brief description together with a photograph of each product. To get your copy just send your name and address to the aforementioned address.

New Books

Several new titles have been added to the Book Store shelves this month and three that you should look out for are the RSGB Amateur Radio Call Book And Information Directory 1997 priced at £13.90, the ARRL Handbook For Radio Amateurs 1997 priced at £25 and Passport To World Band Radio 1997 priced at £11.50. All the books mentioned are in stock and available now!

So, don't delay place your order today. That way you'll be sure of getting your books in time for Christmas.

Nevada's New Addition - The PW Baby

Mike Devereux G3SED of Nevada Communications and Marcia Brogan formerly of PW's Advertising Department are pleased to announce the birth of their first baby, Marianne, who weighing in at 6lbs 1oz was born on the 10th September. Mike and Marcia first met through PW and when Marcia left the magazine she moved to Portsmouth to set-up home with Mike, where they have lived for the past four years.

Mike says he has already enlisted Marianne's help in reading weak DX stations on 'Top Band' but that her Morse technique still has some way to go! So, no doubt it won't be long before Marianne is helping out 'Dad' on Nevada's shop floor.

Both Mike and Marcia say they would like to offer a big 'thank you' to PW Publishing for the birth of their baby, as if it hadn't been for the magazine they never would have met! So, you could say it's PW's baby too.

Everyone on the PW team would like to congratulate Mike and Mariana on the birth of Mariana and pass on their good wishes to all three. Editor.
Drayton Now In Somerset!

The latest kit to come from the Walford Electronics stable is the Drayton broadband crystal controlled c.w. transmitter. The Drayton is capable of working anywhere within the 1.8 to 15MHz band and is supplied with a 358kHz ceramic resonator for 3.5MHz.

The Drayton’s on-board trimmer allows a 40kHz swing thus making it possible to cover all the 3.5MHz, 7 and Novice sections. For use on other bands the operator only has to change the crystal.

Also included is a side tone oscillator, RX muting, antenna changeover relay with a set of spare contacts, semi or full break-in control with netting facilities. The Drayton kit comes complete with all the hardware for use with Martock and Pitney receivers and is said to be an ideal project for the novice.

The Drayton is available for £24 plus £1 P&P but if you order a Martock receiver at the same time the pair will cost you £60 post paid (normal price of the Martock is £36 plus P&P). For more information on the Drayton or any of the other kits in the Somerset Range send an s.a.e. to Tim Walford at Walford Electronics, Upton Bridge Farm, Long Sutton, Langport, Somerset TA10 9NJ.

Holly’s Hobby

Building The Pitney

We start them young in Dorset! And nine-year-old Holly Sibley describes in her own words how she tackled the Pitney receiver from Walford Electronics with guidance and advice from Clive Hardy G4SLU.

I am nine years old and am a member of the Badgers group at the Winsborne Division of the St. John Ambulance. This year I took the Communications badge, which I needed to pass before I could use the St. John Ambulance radio.

I had to learn the proper radio procedures. It is very important to use the correct procedure, especially when it gets busy, or there are urgent messages to pass.

As I was taking the badge, I decided to try for the Novice Radio Amateur Exam as well. As part of the badge work our group visited the Dorset Police control room, where Richard GORSN gave us a guided tour. He is a member of the Dorset Police ARS, and together with some other members, my Dad fixed around the ceiling of my bedroom. It works very well and I have had great fun listening to the Pitney.

The tuning is very precise, so a very steady hand is needed to pick-up stations clearly, but that’s all part of the fun. I would certainly recommend it to other novices for a first time kit. I’m looking forward to seeing the matching c.w. transmitter that is being designed to go with the Pitney.

Practical Wireless gratefully acknowledges Tim Walford G3PCI’s help in donating the Pitney kit built by Holly. The kit costs £27 plus £1 P&P and is available from Walford Electronics, Upton Bridge Farm, Long Sutton, Langport, Somerset TA10 9NJ. Tel: (01458) 241224.
HAYDON COMMUNICATIONS

WARNING!! Not all advertisers in this magazine are authorised stockists for the products they sell. Manufacturers advise customers to purchase from authorised dealers to ensure full company guarantee back-up. HAYDON COMMUNICATIONS sell only brand new factory sealed stock direct from the manufacturers and are authorised for all its brands.

VHF/UHF HANDHELD's

YAESU FT-50R
New ultra compact dual band transceiver with wideband RX. 76-990MHz (AM, FM, FM-N). RRP £295.95.

ICOM IC-735
Excellent condition £699.95.

ICOM IC-756
As new with PSU £729.95.

ICOM IC-751
As new £699.95.

ICOM IC-750
As new £699.95.

ICOM IC-750S
As new £699.95.

ICOM IC-735
As new £699.95.

ICOM IC-706
As new £729.95.

ICOM IC-705
As new £729.95.

ICOM IC-704
As new £729.95.

ICOM IC-700
As new £729.95.

ICOM IC-671E
70cm all mode £649.95.

ICOM IC-760R
2m all mode £1099.95.

ICOM IC-760R
2m all mode £1099.95.

ICOM IC-760R
2m all mode £1099.95.

ICOM IC-701
2m all mode £1099.95.

ICOM IC-701
2m all mode £1099.95.

YAESU FT-290R
2m all mode transceiver. £2199.95.

YAESU FT-1000MP (AC)
State of art HF transceiver. £2199.95.

YAESU FT-1000MP (DC)
State of art HF transceiver. £2199.95.

ALL MODE TRANSCEIVERS

YAESU FT-290R II
2m all mode transceiver. £2199.95.

IMPEX IC-821H
The very latest all mode dual band base with built in satellite functions that make satellite operation easier than ever. Also feature excellent support for c.w. operation along with (9600bpsi. Packet capability. A superb all rounder with 45/40W output. £1399.95.

ACCESSORIES

Nissei RS-402 125-525 MHz (200W) FWD/REV/AVE/PEP PWR + SW receiver + VHF con £249.95 P & P £4.

TSA-6601 144-444MHz (60W) pocket PWR/SWR meter £34.95 (P&P £1).

NB-30W 2M FM handheld amplifier. 1.5-5W input 30W output (for 5W ip). £49.95.

MFJ-259 HF digital SWR analyser + 1.8-170MHz counter/resistance meter. £249.95 P&P £5.

VECTRONICS VC-300DLP
UK's best selling ATU. 300V (PEP), dummy load, VSWR meter, 3 way ant, switch & balun for open wire feeders. £129.95.

VC-300M 300V mobile ATU £89.95.

Nissei EP-300T Over the ear earpiece with lapel mic & PTT. Fits Kenwood, Alinco, Yaesu or Icom £22.95 P & £1.

HANDHELD MOUNTS

MA-399 Mobile holder. Fits all h/held radios. Sticks onto dashboard of car. £9.95 P & £1.

QS-200 Air-vent h/held holder £8.99.

QS-300 Desk top h/held holder £19.99.

LONDON SHOWROOM & MAIL ORDER:- 0181-951 5781/2 FAX:- 0181-951 5782

DELIVERY NEXT DAY

Practical Wireless, December 1996

OPTO XPLORER
OPTO LYNX
OPTO SCOUT 3.1-Mk2 OUR PRICE £399.00

OS200 air vent h/held holder
AR -5000 comms receiver
Case for 8000
RRP £159.00
an' over voltage protected.

MI IN

£10

MT -3302
MT -1301
ACCESSORIES P&P £2.50

DB-285
CBPF2
1313-7900
MOBILE ANTENNAS P&P £4.50

CFX-514
TSA-6003
GP15N Comet6m/2m/70cm 3.6/2.8/6.1 dB (112.4m) £124.95
V-2000 Diamond Ern/2m/70cm, 2.1/6.2/8.4dB (2.5ml £112.45

TSB3608
TSB -3303
TSB -3302
TSB -3002
TSB -3001
SERENE BASE ANTENNAS(P2;:fp8A-IT

Ira10MHz-2.86Hz frequency

THE SCANNER AND SHORTWAVE SPECIALISTS

nics & charger
RPP £39.00

OPTO CUB
10MHz-2.8GHz frequency finder. Supplied with antenna, nics & charger
RPP £39.00

OPTO SCOUT 3.1-Mk2 OUR PRICE £299.00
OPTO CYNX OUR PRICE £129.00
OPTO XPLORER OUR PRICE £899.00

NEW FROM NISSEI

QUALITY PRODUCTS AT AFFORDABLE PRICES

TELESCOPIC MASTS
5 section telescopic mast. Starting at 2½" in diameter and finishing with a top section of 11/16" diameter we offer a 8 meter and a 12 meter version. Each mast is supplied with guy rings and stainless steel pins for locking the sections when erected. The closed height of the 8 meter mast is just 5 feet and the 12 meter version at 10 feet. All sections are extruded aluminium tube with a 16 gauge wall thickness.
8 mtrs £69.00. 12 mtrs £98.00. Carriage £8.00.

PORTABLE 12V POWER STATION
Will deliver 50 amp peak. Charges from AC mains or trickle charge from car cigar lighter using lead supplied. RRP £54.95

A.E.A. PRODUCTS
DSP-232 OUR PRICE £479.95
PK-222MBX OUR PRICE £319.95
PK-96 OUR PRICE £219.95
PK-12 OUR PRICE £129.95
Free P&P

A.R. PRODUCTS
High gain wideband antenna with wideband receive (14" long BNC). OUR PRICE £879.95

DIGITAL AUDIO FILTERS
DSP-589ZX RRP £369.00
DSP-59 PLUS RRP £299.00
DSP-9 PLUS RRP £239.00

ALL AEA PRODUCTS INCLUDE SOFTWARE

HS-1000
Marine ssb/phone receiver
RRP £1,099.00

MFJ 7848 RRP £259.95

THE SCANNER AND SHORTWAVE SPECIALISTS

AR-8000
The ultimate handheld receiver covers everything from 500KHz-1900MHz. All mode (AM, FM, WFM, USB, LSB, CW)
OUR PRICE £369.95

Case for 8000 £17.95
AR-5000 comms receiver £1599.00
MA-39 mobile h/held holder £9.99
QS-200 air vent h/held holder £9.99
QS-300 desk top h/held holder £19.99

OPTO CUB
10MHz-2.8GHz frequency finder. Supplied with antenna, nics & charger
RPP £39.00

OPTO SCOUT 3.1-Mk2 OUR PRICE £299.00
OPTO CYNX OUR PRICE £129.00
OPTO XPLORER OUR PRICE £899.00

POLICE STYLE HOLSTER HHC-2
Matches all hand holds. Can be worn on the belt or attached to the quick release body holster.
£19.95 P&P £1

ICOM IC-8500
The ultimate all mode base receiver covers everything from 100KHz-2GHz. Deposit: £45
10 payments of £25 (Interest free credit)
£1695.00

YUPITERU
MV7-7100EX Wideband handheld scanner covers 100KHz-1650MHz (all modes). RRP £299
OUR PRICE £269.95

SANGEAN ATS-818
Award-winning portable shortwave receiver (all modes) 0-30MHz. RRP £136.95
OUR PRICE £139.95

T-2602
2m/70cm/23cm (2/3/5.5dB) flexible antenna with wideband receive (14" long BNC). OUR PRICE £22.95 P&P £1

DB-770H
High gain 2m + 70cm telescopic antenna with wideband receive. OUR PRICE £24.95 P&P £1

TSA-6671
New ultra small BNC magmount. Allows you to use any existing BNC antenna from your scanner to transceiver on your car without having to purchase a car antenna. OUR PRICE £22.95 P&P £1

Please mention Practical Wireless when replying to advertisements

West Midlands Branch: Tel: 01384 481681
Address: 132 High St. Edgware, Midddx HA8 TEL 0181-951 5782

Practical Wireless, December 1996

15
Weekend On The Air '96

Following the success of the special event station GB10ONT last year, the Bury St Edmunds Amateur Radio Society asked the National Trust at Ickworth House if they could operate a station at the same site again. They agreed and the weekend of the 10 and 11th August was fixed.

The idea was to run a demonstration station using the club callsign G2TO with the addition of the club ‘X’ prefix, which meant that non-licensed members could send greeting messages under supervision. The club also asked Chris Brown GOJRM if he would like to take advantage of the glass display cabinets in the lecture theatre at Ickworth to stage an exhibition of vintage broadcast receivers and equipment depicting the history of radio.

The chairman of the club, Kevin G1VGI 'arranged with some of his friends' to put ropes over the upper branches of an oak tree some distance from the house on the Saturday, prior to the event so that one end could be anchored to the G5RV antenna. The Other end was fixed through a ring in the window near the top of the famous Roundla! This time it was the help of the Treasurer's friends!

On the evening of Friday 9th, a working party assembled to put up the G5RV and install the equipment. Chris Brown arrived with a car full of exhibits and returned for a second load, which were duly set out in the display cabinets. It was decided that the club’s FT-1012D and the home-built a.t.u. would be used in order to minimise the amount of equipment which members would need to provide.

Saturday came with a fine morning and a good attendance of members to operate. Things started off with a session on the key on ‘80’, then continued on ssb throughout the rest of the day with a break in the afternoon to give Chris a chance to give working demonstrations of 1920s receivers. Roger G0KME had kindly brought along his KW Atlanta transmitter as a back-up and had a session on ‘90’, using a little more power than the 100W max from the FT-1011!

Sunday dawned with the weather turning thundery with heavy showers which became prolonged as the day went on! In spite of static, the club managed quite a few contacts and Roger G0KME put his Atlanta to good use in the afternoon.

The DX bands were not very good, so the club decided to stay on ‘80’ and have a little more power in each station rather than the contest style of rubber stamp QSO! Just under 100 stations were worked over the two days and nearly 90 QSL cards were sent out via the bureau. Taking the antennas down and loading the equipment into the cars was rather a wet operation, but in the end, the weekend was declared a success and enjoyed by those who came along to join the fun. Several of those present asked if it would be possible to repeat the visit another year, so it is up to you all!

Perhaps if the club can get a station on the air at Calford, it will fulfil the same purpose and give members a chance to operate and when the G2TO call is in use, the club can allow non-licensed members to send greeting messages. We shall see!

The club would like to say thanks to everyone who came to help to make the weekend the success it was. In particular, there’s a special thanks to Chris G0JRM for his exhibition and demonstrations, which attracted more attention than the modern amateur equipment and really did have the visitor’s ‘dancing in the aisles’ to the 1930s street tempo dance bands, such as the Savoy Hotel Orphans and crooners like Al Bowlly!

Last, but certainly not least, the club are indebted to the National Trust at Ickworth and in particular the House Manager, Alan Langstaff and his wife Linda for allowing the club to hang antennas from their flat windows. A suitable letter and a small thank you gift has been sent.

Glamorgan Success

The Mid-Glamorgan Amateur Radio Group was primarily set up as a teaching group. The club boasts 21 passes in the Novice RAE and six in the full RAE, with a total of five Novice instructors and two Morse instructors.

The Morse group is always busy and can also boast many successes. Construction projects are run and the group have recently completed eleven ‘Sudden’ receivers.

The Mid-Glamorgan Amateur Radio Group are an unusual group in that there is no committee as such, just several key people who have lots of experience to give advice when needed. No committee means no formal meetings so its radio, radio and a bit more radio!

All the members agreed that there is too much ‘hassle’ at work with meetings, stress and decisions. So, they say by having no committee means no arguments, and it apparently it works like clockwork! There is no joining fee and all tuition is free.

Members meet every Thursday night in the Sports & Athletic Club in Aberkenfig, Bridgend, and normally about 25-30 people turn up. Find out some more details from Roger GW3XJC on (01656) 733729.

What’s With The Web?

Bob Giagov GM4UYZ from the Cockenzie & Port Seton Amateur Radio Club has recently E-mailed ‘Club Spotlight’ with news that their radio club has a World Wide Web (WWW) page. The Web page appeared back in February of this year and has been read a great number of times. It can be found at: http://www.eece.napier.ac.uk/-ajd/cpsarc.htm

Information, including the history of the club and organised events for the year are all on the Web page. Bob says that in a way the club is special as they are a club in name only. Apparently, there is no official structure ie. chairman, treasurer, etc., and since the club was formed in 1984, this has worked extremely well.

Find out more by looking the club up on the Web page, or get in contact with Bob on (01875) 811723.

A member of the Felisstowe District Amateur Radio Society, Alan Taylor G7UAJ, has E-mailed with news that they too, have a Web page, and have done for quite a few months! He says to check out: http://homepages.enterprise.net/g7taylor/ftars/club.html

Ray Gamble of Sharward Promotions has also notified ‘Club Spotlight’ that they are on the Internet. You can obtain a complete list of events from http://www.keme.net/~sharward/htmindex/ for the remainder of 1996 and all of 1997.

Or, alternatively, write to: Knightsdale Business Centre, 30 Knightsdale Road, Ipswich, Suffolk IP1 4JJ or phone on (01473) 741533, FAX on (01473) 741361 or E-mail on services@sharward.keme.co.uk

Hambleton Amateur Radio Society

The Hambleton Amateur Radio Society recently contacted ‘Club Spotlight’ with details of their forthcoming programme schedule and news of Tim G0TYM (Chairman) in winning the G3AWL Trophy, the competition established in memory of Tom Luxmore. Well done Tim!
Lightships & Lighthouses Wanted!

Anne-Grete Eriksson OZ2AE has written into "Club Spotlight" in a plea to explore the possibility of making a joint European Lightship & Lighthouse Award. Here she tells us all about it. It's very interesting!

"Almost three years ago a group of Danish amateurs got together to raise an amateur radio station in the radio room of the museum lightship FYRSKIB XXI, which is lying in a newly built museum harbour for wooden ships that were formerly in public service.

OZ7DAL, "Danish Amateur Lightship" has been the National (Club) Station since 25 March 1994. One cabin in reserved by Danish amateurs and all year round they live on board and use the ship's facilities. By being QRV in the old radio room and talking to the museum's visitors, we can show an otherwise "hidden" hobby, create goodwill and possible help in 'procuring' the next generation of radio amateurs.

We also invite all radio amateurs to visit and become QRV in the radio room is manned. As Ebeltoft is the centre of a recreation region, by now almost 700 Danish and about 125 foreign amateurs have visited, making the old gallery-cum-mess a cozy meeting place when Gallions of 'lightship' coffee is consumed (amateurs only) and many stories of life on the airwaves is being narrated. The radio room is open if a Danish radio amateur has "signed on", which was the case in 155 days during 1995!

So, we set about to contact the known activities and possibly find new in order to determine the interest in making a Joint European Lighthouse & Lightship Award. We have thought of the lamp as the dominant feature on the award.

In spite of having set letters (during the latter part of April and in May) to almost all national amateur radio societies in Europe (bordering the sea). I have yet to receive just one letter of response!

For some countries, I know I'll have to wait a little longer as I had a cheap - chance of reaching Finland, the Border States, Russia and Poland via the XI Baltic Seminar, where the theme was Pilots, Lighthouses and Navigational Aids, which was held in Finland during the first days of August.

For more information, please write back (preferably by country) to OZ7DAL, DK-8400, Ebeltoft, Denmark including your ideas, suggestions and opinions. It saves postage getting it altogether as once!"

Only Another 1400 Miles To Go!

The Sutherland & District ARC's AGM was held back on 31 August 1996, in Golspie, Sutherland (IO78AX) at the club shack at Dunrobin Farm. The SADARC is probably one of the smallest clubs in Britain with only 12 members, but with a membership travelled a combined distance of over 1400 miles just for an AGM! That must be a world record.

Kevin G1FYS and Len, s.w.l., travelled up from Huddersfield, Yorkshire (467 miles) just for the AGM! Other members came from Inverness (54 miles), Nairn (70 miles), Betty Hill (95 miles), Achafay (85 miles), Inver (25 miles), Edderton (19 miles), Lairg (20 miles) and Dornoch (12 miles). Add that lot up and it comes to 1438 miles, now, that's not bad for only 12 local members!

A great night was had all, cakes being provided by Ken GM2CWL's wife, which went down very well, in fact, not a crumb left!

Ken and his wife Dorothy are better known throughout the Highlands as Mr Ban & Mrs Ban!

This Mr & Mrs Ban title was given by another local amateur, Norman GM4INB (Great Uncle Bulgaria) due to the fact that when you visit Mr Ban's QTH, you get a cup of tea and a lovely slice of cake, this along with a great aroma of baking coming from the bakery brings in amateurs for miles around!

'Mr Ban' now has a whole 'bakery on the air' now. His son Colin MM1AEL and Colin's son Bryan 2M1EAU. All members of the Sutherland club.

Sutherland is the biggest county in Europe, with least number of people. In fact, it has more deer than people! It also has one of the rarest squares in the UK, IO86 or the good old X-ray Sierra (XS) which up until a year ago had no amateur living in it. Now it has three, GM0HLV, GM7ASN and GM0JOL. All active, so there is no excuse not to work it!

The Sutherland club meet every Friday night at 1930 at Dunrobin Farm throughout the year. Visitors are always welcome, so if you're around or just passing through, give GM0IYP a call on 145.500.

After travelling all that distance, I'm surprised all of the members of the Sutherland club aren't sat down! Do you travel a long way to go to your club meetings? If so, write in and let's hear all about your club and it's activities. You never know, you might even recruit new members too!
Amateur Television

By Graham Hankins G8EMX

If you’re an avid reader of Graham Hankins G8EMX’s ‘Focal Point’, but haven’t actually got around to ATV operating or want to know more, read on - this comprehensive introduction will no doubt leave you wanting to have a go!

Picture this. It’s 10am on a Sunday morning, date - somewhere in the nearish future. All over the UK, thousands of radio amateurs and electronics enthusiasts are ready to receive the national and local news transmission from the Radio Society of Great Britain (RSGB).

For years, receiving the RSGB news had just meant turning on their h.f. or v.h.f. rig and listening to a voice. But for the next half-hour, Class A licences, Class B stations and Novices to the amateur bands are going to be watching their favourite hobby on TV.

The network of 1.3GHz Amateur Television Repeaters have been temporarily joined together by 10GHz links and are about to deliver, in vision and sound, the weekly RSGB news service for all radio amateurs.

At 10.15am the 10GHz links will be broken, then each repeater will independently carry a quarter-hour of local news, presented by members of the British Amateur Television Club (BATC) who are switching between colour cameras, video tape and computer-generated graphics.

My futuristic ‘vision’ could and may all happen. Thanks to the extension of the regular on-air activity, pioneering developments and vast possibilities offered by amateur fast-scan TV (FSTV), the transmitting and receiving of standard television pictures on the amateur radio bands.

Fast-scan amateur television adopts the same video system as terrestrial broadcast i.e. 625 lines top to bottom, 25 complete pictures (frames) every second. A broadcast-quality signal will contain video frequencies from d.c. up to 5.5MHz, line rate synchronising (sync.) pulses at 15625Hz, frame sync. pulses at 50Hz, and colour signals on a 4.43361875MHz sub-carrier.

Amateur TV can and does nearly achieve broadcast quality, depending on equipment and frequency band being used. A received ATV picture is reported by ‘P’ numbers, with a ‘P5’ picture achieving near broadcast clarity i.e., noise free, good definition, solid locking.

Progressively lower picture quality gives P4 down to a P1. This rating represents a very noisy image, just discernible with difficulty.

Generating and transmitting pictures is a specialist branch within the broad hobby of amateur radio, so dedicated ready-built ATV equipment is scarce. This means that there is plenty of scope for the most diverse and inventive construction still plays a big part. If you have so far only used speech and are keen to begin seeing other amateurs in vision, here’s how.

Before Camcorders

Before the development of camcorders and security systems, video cameras were only found in broadcast TV studios. The early ATV operator built their own, even colour!

Now, video cameras come in all sorts of sizes and weights! Consumer camcorders produce good definition colour pictures, are lightweight but not particularly cheap if you’re only going to use them for ATV.

You may happen to have one already. If not, perhaps borrow one from a friend or neighbour, they may even become interested in ATV themselves!

An amateur radio rally is the best place to find a used camera. There are plenty of small ex-surveillance units to be found, but the picture definition may be poor, or more likely the pick-up tube (if it uses one) may have a faint burnt-on image due to long periods focussed on a single scene. Good enough for ATV, but try to choose the best, or least worst, example!

Still smaller are the micro-video cameras now available from a number of dealers. Measuring only slightly larger than a 50p coin, these solid-state devices could even be put in a model boat or aircraft to send pictures from otherwise inaccessible angles.

To the truly besotted ATVer, though, the larger the camera the better. So the ‘holy grail’ is broadcast-quality video from a camera that needs two to lift it!

Whatever camera you eventually settle on, it should have a ‘video out’ socket, ideally BNC but phono will do. We don’t want modulated r.f. - yet. And if it is or can be powered from 12V, so much the better this means you can take it portable!

You may show your own production of received images, provided it conforms to the restrictions of the amateur radio licence. However, you
An Introduction

should not show feature films or other entertainment material.

Computers
Computers can be very flexible for test-cards, captions and large text but remember you need a 625 line 50Hz video signal, which is not normally available from the PC. Machines most commonly used for ATV are the BBC Model B and the Sinclair Spectrum. Both types can still be found at rallies, computer fairs or from classified advertisements.

Dedicated Video
A dedicated video card is where home-construction comes into its own. Many keen ATV'ers design and build their own particular video generating or processing card, but provided you can use or are willing to try wielding a low-power (eg. 25W) soldering iron, then p.c.b.s are available and only need populating with components.

For just putting on-air your own callsign within a test pattern, for station identification, the dedicated circuit board on a single p.c.b is small and quick. Usually ROM-based, a stack of EPROMs can be manually switched (to give for instance your callsign /P when operating away from home) or automatically cycled with repeater news and information. Video switching or processing boards are as boundless in design and function as the needs of their users require.

Whatever picture sources you have, they should all produce a standard I V peak-to-peak composite video waveform (see Fig. 1). Amateur TV is permitted on all the UK u.h.f and microwave amateur bands. However, the most activity is presently to be found around 436MHz (70cm - ATV is not available to Novices), 1.3611z (24cm) and 10GHz (3cm), see the various band plans for more detail. So, now let's see what's needed to get 'in vision'.

Transmitting ATV
Amateur TV on 436MHz uses amplitude modulation (a.m.) and the picture frequencies should be limited, with a filter, to 3MHz and no colour. You may already have nearly enough kit to transmit and receive an ATV picture on the u.h.f band.

First take a normal 430MHz "phone transmitter, 'black box' or home-brew, with its frequency modulation reduced to zero or disabled. Feed the 436MHz output into a wide-bandwidth (ie. 6MHz - 2 x 3MHz) power amplifier fed by a video modulator and you will be transmitting ATV! (see Fig. 2).

Note that after modulation the waveform is inverted, sync. pulses giving maximum carrier, peak white minimum carrier. This is called 'negative' modulation. And it's the system used by terrestrial broadcast TV so 430MHz ATV is easily receivable with any domestic set.

Receiving ATV
An up-converter connected to the antenna socket of your TV is the easy way to receive ATV on the 430MHz band. An incoming ATV picture at around 436MHz is mixed with the converter's local oscillator (l.o) to produce a signal at around u.h.f. Channel 36. Tune your TV to low in the broadcast band and you should find that ATV station.

An up-converter p.c.b. may be available from the BATC and some leading Amateur Radio magazines carry simple home-brew designs. There are some limitations with 430MHz ATV. It's vision only (voice talkback has to be on another band, usually 144MHz), this band is not available to Novice licencees and there is considerable other traffic on
Icom IC-775DSP

**SAVE £800!!**

Icom's flagship machine offering a massive 200 watts of power and DSP. Despite its size, the IC-775DSP is relatively light thanks to a high power switch mode supply fueling the transceiver and huge brightly lit display.

- 200 Watts output
- Massive display
- Twin PBT on each I.F.
- Twin RX with display
- DSP Noise reduction
- Twin Antenna input
- Auto Notch
- APP on CW
- 1Hz tuning
- Triple Band Stacking register

**RRP £3599 ML Price: £2899**

NEW! Icom IC-821H

**SAVE £275!!**

When Icom introduced the ICR-700 ten years ago World Governmental organisations and true "enthusiasts" queued up to place orders. The ICR-7100 then followed and today ICOM bring you the new ICR-8500. Another masterpiece for "AllBand" monitoring? If it was a painting, you'd hang it on the wall!

- 100kHz-1999 99999Hz continuous
- All mode as standard
- 1000 Memory channels
- All alphanumeric
- Optional 500Hz CW/Data Filter
- Built in RS-232C interface
- APF and IF shift
- Digital AFC function
- Multiple tuning steps
- Three antenna inputs
- Optional voice announcement module

**RRP £1699.**

**SPECIAL PACKAGE DEAL FROM MARTIN LYNCH & SON**

New boxed ICR-8500, FL52 5000Hz CW/Data Filter (worth £125), Mains PSU (Worth £20), FIVE YEARS Breakdown & Accidental Damage cover (worth £126)

**ALL FOR £1699.00 SAVE £275!!**
NEW! Standard C-156

The latest addition to the STANDARD CORP family, the C-156 will become the real "standard" in 2m handies. Typical Standard engineering with features that price for pound are unheard of in today's market. Take a look:

- Coverage 100-200MHz RX
- DO T Matrix LCD & Menu Display
- Message delivery, 10 fixed, 9 customised by user
- 39 tone encoder + 1750Hz tones built in
- 100 Capable memory channels, incl. Alpha tag. Repeater/simplex, offset, Tone Squelch frequency (option), + more
- Upto 5 Watts output with optional CNB 157 or 13.8V input
- Lightweight & very compact, only 290g with batteries!

PRICED AT ONLY £149.95 WITH CELL CASE OR £199.95 WITH NICADS & CHARGER

Yaesu FT-900AT

The best mini HF base station available. Full feature including 100 watts all mode. General Coverage and 100 watts all mode. Full feature including base station available.

The best mini HF
Lightweight & very compact, only 290g with
Upto 5 Watts output with optional CNB 157 or
100 Capable memory channels. incl. Alpha tag,
IN 39 tone encoder + 1750Hz tones built in
Message delivery, 10 fixed. 9 customised by user
IN Coverage 100-200MHz RX
todays market. Take a look:

OR /199.95 WITH NICADS & CHARGER

Yaesu FT-8000 Dual Bander

THE LATEST DESIGN FROM THE YAESU STABLE. A SMALL COMPACT HIGH POWER DUAL BAND MOBILE, OFFERING THESE FEATURES:

- Wide Band RX, 110-550 / 750-
- 1300MHz.
- Smart Search sweeps a band and
loads active frequencies in dedicated frequency banks.
- 108 Memory Channels, storing repeater offset, Optional CTCSS, Packet Speed & Power level.
- Digital DC Voltage display.
- Dual receive on same or cross band, plus cross band repeat facility.
- Full 50 Watts output on 2m, 35 Watts on 7cm.
- 1200 or 9600 Band Packet available per memory channel with easy interface via a dedicated input socket.
- ADMIS: 1D Windows programming software.

NEW! Albrecht AE-550

"NO-NONSENSE LOW COST 2M MOBILE"

- 25 Watts
- 5/10/12.5/20/25kHz steps
- 144-146MHz (extendible)
- Compact size: 140mm (w) x 125mm (h) x 41 mm (d)
- Easy to use - DOESN'T MAKE TEA!
- 10 YES, ONLY 10 memory channels
- Programmable calling channel

Remember the days when you could buy a rig for two metres that didn't require a maths degree to operate it? Probably not. It's that long ago.

Enter the no frills, no messing AE-550. Simple to use - great in operation. Even better price...

£199.95
INCL. VAT. NO.

JVC GR-DV1

Not only has JVC invented the worlds smallest lightest hand held CamCorder, they've produced it in the new "Mini DV" digital video format.

Offering quality of picture and audio that can only be described as breathtaking, the versatility offered by a unit so small, (it really can fit in your jacket pocket), is yet to be matched by any of the competition.

- Up to 60 mins recording with M-DV60ME tape
- 1/3" CCD (670,000 pixels)
- 5/10/12.5/20/25kHz steps
- 13.8V input.

 Canon Power Shot 600

For those looking at a more professional approach to digital photography, take a closer look at the new Canon Power Shot 600.

- Satires images on optional PCMCIA internal Hard
- Drive or Flash card
- Captures 486x640 pixel stills
- Maximum of 2500 images stored
- Sound recording facility with each image
- Industry standard file format (JPEG & WAV)
- Free Image Editing software
- Auto exporation, auto focus & auto flash
- High quality lenses
- Close-up (macro) feature & optional wide angle lens
- Parallel interface for downloading images direct to a PC
- Twin power
- Maxime 570% C C D
- Size 139w x 92h x 570mm
- Weight 380g (exc. battery)

PRICE: £899
or £999 deposit & 12 payments of 64.28
Cost of loan: £71.56
Internal PCMCIA card available at £699.
Amateur Television - an Introduction

430MHz. So, keep the video filtered off at about 3MHz to give a ‘black and white’ but still perfectly viewable picture.

Even with the constraints mentioned, 430MHz is in regular use by many devotees. But to transmit a colour picture with sound, just like domestic TV, ATVers need to go up to 1.3GHz.

Low Microwave Bands

The very mention of operating or building kit for the low microwave bands used to send a cold shiver into many a radio amateurs’ heart! Critical circuit layouts, prohibitively expensive power devices and very few other stations around even if you did become operational.

Three major factors changed the face of microwaves for ATV. These were the affordability of medium power s.h.f. semiconductors, the improved performance of passive components at GHz frequencies and maybe the most significant, the almost universal adoption of frequency modulation for both vision signal and the sound.

The 24cm (1.3GHz) amateur band is 85MHz wide. This gives enough room in any one area for the input and output channels of an ATV repeater plus two other stations in direct contact.

All the video sources used with 430MHz can be fed into a 1.3GHz system. If you have successfully and readily built a p.c.b. generator card, try a 1.3GHz ATV transmitter kit.

No searching for components, these come with everything other than signal connectors and a potentiometer! A power of 1W of r.f. is good enough for a local contact and will probably get you into your local repeater. Ready-built transmitters are available too, but if you are watching cost, the kit is the one to go for.

Easiest To Receive

Using a satellite TV tuner is the easiest way to receive ATV pictures on the 1.3GHz band and if you can find a manually tuneable one at a rally, better still. Feed the tuner into the antenna socket of your TV, same as you did with 430MHz, and if an ATV transmission is available, a picture should be seen.

Again there are snags with trying to adapt domestic TV equipment for the amateur bands. Satellite tuners are expecting a high r.f. signal strength with wide f.m. deviation. Our ATV signals have much lower carrier deviation and certainly give a weaker incoming r.f. level, unless the ATV station is very close by!

So, a pre-amplifier is often needed. These can be built or bought as a first step to improving your 1.3GHz receive set-up.

Then, maybe the tuner’s f.m. demodulator can be modified for the lower amateur deviation. This will improve the picture contrast.

The ideal, though, is to use a dedicated 1.3GHz ATV receiver which will deliver composite video and sound into your monitor.

The 1.3GHz band brings not only colour and sound, it’s also the first band where ATV repeaters are licensed to operate. Unlike voice repeaters, which do not transmit until accessed, ATV repeaters can be continuously radiating.

Most ATV repeaters put out a cycle of test cards and news pages, unless accessed by detecting incoming sync pulses from an ATV station. Then, a repeater automatically switches to re-radiate the received sound and vision.

Amateur TV repeaters are managed and developed by a local Repeater Group, which may vary in size from just a handful of keen individuals to something along the lines of the huge Seaview ATV Group in Bristol. A pro-active Group will encourage usage of their repeater, improve its performance and facilities and may even publish a members’ newsletter.

Here is a list of ATV repeaters, all are 1.3GHz f.m. unless other stated.

- GB3TV
- GB3SR
- GB3EJ
- GB3SY
- GB3VR
- GB3ZQ
- GB3SG
- GB3VI
- GB3HE
- GB3G
- GB3HL
- GB3MV
- GB3T
- GB3TH
- GB3K
- GB3GA
- GB3R

When you have used 1.3GHz for a while you’ll discover that microwaves are really quite friendly. You will no doubt then be eager to take the next step onwards and upwards to 10GHz (3cm).

Onwards And Upwards

So, onwards and upwards! The 10GHz band is not really an ATV beginners’ band, but there is a rapidly growing availability of easy kits or ready-to-use 10GHz transmitters and receivers, particularly from BATC members.

An Up-converter (left) and a 100mW transmitter constructed from BATC designs for 436MHz.
be sent across the sea from the UK to the Dutch coast. Evidence suggests a surface ducting effect is responsible and this could eventually lead to the formation of UK to Europe ATV links!

Another propagation effect at microwave frequencies appears to be scatter from rain clouds and links in excess of 100km have also been established.

**Quite Tolerant**

Radio amateurs enjoying a voice-only QSO are quite tolerant of received signal strength. The ear is a very selective organ so, provided the other station can be heard and is intelligible, noise and interference caused by a weak r.f. signal is often ignored.

Eyes and television systems are far more critical. Even slight noise on a picture is quickly and obviously apparent, as signal strength reduces, loss of colour occurs.

At still lower r.f. carriers, line and frame synchronisation become weaker, giving the familiar 'roll' or 'line teetering' effect on screen. During contest exchanges this may not be of much concern, other than affecting the score, but for normal ATV contacts you are after as much received signal strength as you can get.

For 436MHz and 1.3GHz, installing good low-loss coaxial cable is probably the first step to take. Maybe you could also add a low-noise pre-amplifier, ideally close to the antenna. The conventional Yagi is still used up to 1.3GHz, with the loop-Yagi a common variation on the familiar design.

By mutual agreement, ATV uses horizontal polarisation. This reduces interference (by 30dB i.e. 1/1000) to the vertically-polarised modes: voice, data and, ensuring your antenna is sitting the same as the other fella (or lady!),

Achieving the horizontally-polarised circular pattern needed by most repeaters is a bit more tricky. So, many of the 1.3GHz units use the Alford Slot antenna design.

A horizontal field pattern is put out by 10GHz but into very different antennas. Horn reflectors are effective for local working, while greater distances need perhaps an ex-satellite dish and waveguide feeder.

**First Contact**

To make your first contact on 430MHz and 1.3GHz, start with the 144MHz ATV calling frequency of 144.750MHz. But please move off this channel after contact has been made. If you access the packet network as well, and why not, see if the times of any ATV 'Nets' are on your local Bulletin Board.

Your first ATV contact will probably not be on 10GHz. Even experienced users of this band still make direct contacts by arrangement, not by calling 'CQ'. There are three 10GHz repeaters operational, so if you live in the Burton, Dunstable or Bristol area, look for GB3XT, GB3TV or GB3XG.

So, there you are, that's what the many ATVers get up to! We all love it, think it's great so why don't you join us?

If you have any specific questions or would appreciate more details, write to me at 11 Cottesbrook Road, Acocks Green, Birmingham B27 6LE, mentioning Practical Wireless. Or send a packet enquiry to GBXCM @ GB3SOL.GB.GBREU and you might get an individual reply but any messages I receive will be answered via my 'Focal Point' bi-monthly column.

---

**The British Amateur Television Club**

The BATC represents the activities of amateur television enthusiasts in the UK and abroad. Amateur TV circuits, p.c.b.s, components, kits and news are published in their quarterly magazine CG-TV, which is sent to the almost 2000 members.

The BATC club offers assistance to the many affiliated Repeater Groups, organises two specialist ATV rallies each year and represents ATV interests to the RSGB and Radio Authority. Membership to the BATC is open to anyone who has a keen interest in hobby television, whether they are licenced or not.

Belonging to the BATC could be regarded as almost essential for anyone active with ATV or considering becoming so. The annual subscription is only £12, but many members decides to join or renew for more than a single year and enjoy a discount scheme, £22 for two years or £32 for three years membership.

If you have a computer and modem (and who doesn't?) then the BATC operates a telephone Bulletin Board System on (01638) 614765, and, yes, (of course!) the BATC internet address is http://ourworld.compuserve.com/homepages/pawson/ If you want to actually write to someone, you still can. The BATC membership secretary is Dave Lawton, GB3XG, Dunstable or Bristol area, look for GB3XT, GB3TV or GB3XG.
DOES SOMEONE ELSE READ YOUR COPY OF PRACTICAL WIRELESS EVERY MONTH?

Then why not surprise them and buy them a PW GIFT SUBSCRIPTION? And they'll also receive a radio accessory gift worth up to £10!

Why not give your loved one, your best friend or a fellow radio enthusiast (or why not treat yourself?) a subscription to their favourite magazine this Christmas.

Order a subscription to Practical Wireless now and we'll send a card telling them that their gift from you will be their own personal copy of Practical Wireless delivered by the postman every month next year. They'll also receive a FREE accessory item worth up to £10 (please tick the appropriate box below).

Fill in the form on this page and send it back to us by December 13 (UK orders only) and the order will be despatched in time for Christmas. But, remember, overseas orders take longer to reach their destination.

**Offer 1**

Watson WEP-300 Earpiece, designed for use with hand-holds, fits firmly over the ear, has a lead length of 1.5m and an 8C2 3.5mm plug. The WEP-300 is available in two versions, one to fit Kenwood radios and one for other models (please specify when ordering).

**Offer 2**

A Watson SP-150 Mobile Speaker which is a slimline 8Ω mobile speaker capable of delivering 5W of power. It measures just 28 x 75 x 65mm with a 2m lead terminated in a 3.5mm plug - the ideal simple solution for amateurs on the move.

**Offer 3**

A Watson WHB-1 Handy Clip designed to fit comfortably on the back of hand-holds and then clip easily onto a belt. It also has a quick release feature making it a versatile and practical accessory.

---

To: PW Publishing Ltd., Subscription Offer, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW.
Credit Card Orders taken on (01202) 659930.

PRACTICAL WIRELESS 1 YEAR SUBSCRIPTION RATES
- £25 (UK)
- £30 (Europe Airmail)
- £32 (Rest of World Airmail)
- £37 (Rest of World Airsaver)

Please send a one year subscription to Practical Wireless, starting with the January 1997 issue together with a free:

- SP-150 Mobile Speaker
- WEP-300 Earpiece (Kenwood or Other Offer)
- WHB-1 Handy Clip

To: RECIPIENT'S NAME & ADDRESS
Name: ...........................................................
Address: ........................................................................
........................................................................
........................................................................
Postcode: ........................................

NAME, ADDRESS AND PAYMENT DETAILS OF PERSON GIVING GIFT
Name: ........................................................................
Address: ........................................................................
........................................................................
........................................................................
Postcode: ........................................

I enclose cheque/PO (payable to PW Publishing Ltd) £

Charge to my Access/Visa and the amount of £

Card No: ...............................................................
Valid from ... to ...
Signature: ...............................................................

Practical Wireless, December 1996
UNIT 5
PARSONS GREEN ESTATE
BOULTON ROAD
STEVENAGE, HERTS

* THE FIRST OF A WHOLE NEW RANGE *
* A QUALITY COMMUNICATIONS RECEIVER AT AN AFFORDABLE PRICE *

FREQUENCY RANGE 30kHz-30MHz
1kHz steps with clarity control
Audio output 2 watts
Bandwidth SSB = 3.8kHz AM = 6kHz
Modes USB/AM/LSB
Headphone socket

ON DISPLAY
AT PICKETTS LOCK
SATURDAY NOV 16TH 1996
STAND C

NEW! HOWES DC2000
Beginner’s SSB/CW Receiver Kit – £22.90

The ease of construction, the sensitivity and the low quiescent current consumption make this a great little receiver for both the first time builder and hobbyist. It covers a single band at a time, but uses the same interchangeable band modules as the DX20, to give the choice of any HF band on a simple plug-in basis. Choose from 160, 80, 40, 20, 15 & 10m amateur bands. Also suitable for BM11 and BM54 HF airband modules. Like our other receivers, the DC2000 will interlink with many of our other kits to form a complete station. A digital frequency display, “S meter”, sharp ON filtering, a matching transmitter? There are many reasons why building the DC2000 is a great way to start your station!

NEW! HOWES DC2000 Electronics kit – £22.90
Includes standard 8014, or your choice of band module. Extra band module kits are £7.90 each.
HA22R Hardware (pictured): £18.90

ACCESSORY KITS
AP1 Automatic Speech Processor £16.90
AP2 Mic Amp with active filtering £29.90
ON2 Quality Electro Mic with VIDAD £13.90
QB4 Internal SSB & CW Filter for our RXs £19.90
OS2 “S Meter” for direct conversion RXs £10.90
CB2 Counter Buffer (Kit to Rs to feed DDS) £9.90
CM1 Crystal Calibrator £6.90
(Cost excludes local hardware costs to suit the above Kits – there is not enough space to list all here)

Top Value Receiving ATUs

CTU8. Covers 500kHz to 30MHz. Matches antenna impedance and helps reduce spurious signals and interference with extra front-end filtering for the receiver. 5O239 sockets. Factory Built: £49.90. Kit (including case and all hardware): £29.90.

CTU9. As CTU8 plus balun, bypass switch and terminal posts. The fully featured Rx ATU. Factory Built: £69.90. CTU9 Kit (including case and all hardware): £39.90.

Please add £4.00 P&P, or £1.50 P&P for electronics kits without hardware.

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

73 from Dave G4KQH, Technical Manager.
Computing & Radio - Do They Mix?

By Mike Richards G4WNC

Our resident computer expert Mike Richards G4WNC gives you a few reasons to justify buying that computer so that you can use it in conjunction with your amateur radio set-up - read on to find out more.

So, you've got your amateur radio licence, bought your rig and are now wondering if you should buy a new computer or maybe put your existing computer into action in conjunction with your radio set-up.

Listening around the bands you can hear that lots of people do use a computer, but why bother? What can you do better and is it all worth the effort? These are a few of the questions asked by both new and experienced amateurs when it comes to deciding whether or not to use a computer in the shack. In this article, I'll attempt to throw some light on the subject and give you a few clues as to where to start.

A Few Tips

Let's start with a few tips on what to buy for those of you who are thinking of buying. And firstly, if your budget can stand it I would recommend going for a new IBM-PC - but which one?

A look through the adverts of the major PC magazines will probably confuse more than help, as there are very good service, but still offer very competitive prices. From my own personal experience, DAN Computers fall into this category and provide a very good range of PCs with good prices and excellent back-up.

The Pitfalls

Now, before you get too carried away with the huge potential offer by a computer in the shack, I think it's only fair to point out the pitfalls. First and foremost, all computers create r.f. noise.

I doubt there's a station out there that can say, hand-on-heart, there is no increase in noise "floor" when the computer's switched-on! However, the interference can be reduced to extremely low levels and most modern PCs are very well screened - but there will always be some noise.

Secondly, computers are undoubtedly anti-social beasts that cause you to spend inordinate periods of time staring at the screen trying to get the latest time saving program set-up just the way you like it! Computers can also be the cause of countless family arguments as spouse and off-spring fight to play the latest game and end-up crashing the whole system!

Despite all this, many radio amateurs believe the benefits outweigh the problems. So, if you're still with me, let's take a look at just what can be done.

Radio Related Programs

Radio related computer programs can be divided into three main groups. These groups are Transmission systems, Utilities and Log Books.

So, let's start with a look at a few of the transmission systems that are available. You will find that the addition of a computer to the shack opens-up a whole new world of digital communications from Morse code through to FAX and Slow Scan TV (SSTV).

If you're not sure where your interests lie and just want to try out a few different systems, the best way is to get hold of some free software. Although not really free, amateur radio shareware is available in abundance for PCs.

The most popular transmission mode packages are Hamcomm, IVFAX, EZSSTV, DLASAW and MSCAN. In addition to being available at very low cost, an additional attraction of these programs is their use of a common interface to make the connection between the computer and the transceiver.

Whilst each of those I've mentioned can be enhanced with a more sophisticated interface, the basic unit provides surprisingly good results. The interface simply comprises a comparator integrated circuit that turns the incoming audio signal into a square-wave that swings between voltages representing logic one and zero.

The squared-up signal is then applied to the PC's serial port. In each program analysis of the audio signal is carried out by measuring the time between each zero crossing of the squared-up signal.

For the transmit signal, the PC generates the necessary tones using one of its programmable timers, this is also available via the serial port. This signal is rather crude and needs some basic filtering before being connected to the microphone socket of your transceiver.

These simple interfaces are dead easy to build yourself and may be...
bought in kit form from a number of suppliers. If you just want to get down to business you can also get ready-built units from the same sources.

Let's now take a look at what the programs can do for you. Firstly, Hamcomm gives access to Radio TeleType (RTTY) based systems including the more sophisticated AMTOR error correcting mode. The program also features Morse transceive and can resolve/translate the coded weather transmissions that abound on HF.

Secondly, there's JVFAX which is the next most popular program, as it provides facilities to send and receive both FAX and SSTV signals. Although FAX is still used by some amateurs, SSTV is generally much easier to use and provides surprisingly good colour pictures.

If you want to take a look, tune in to 14.23MHz on any Sunday morning. While FAX is less popular, the ability to receive FAX weather charts can be extremely useful if you're into v.h.f/h.f. DXing. Regular examination of this weather information can provide early warning of potential "lifts".

Log Keeping
There's a lot of debate surrounding computer based log keeping and those with a good index card system will claim that they can beat any computer system hands down when it comes to matching a name to a call. But for many, this is the prime reason for using a computer based log.

Where a computer based log book really scores is if you want to search for something other than just the name or call. Most of the ever changing range of log book programs have the facility to search on any part of the entry.

So you could, for example, search for any previous contacts that used a particular rig or maybe lived in a particular area. It's these extra facilities that can give computer based logs the edge over manual systems.

Computer based logs can also be a great boon to the contest operator. Some of the best systems will automatically increment the serial number and print-out the contest entry sheets for you. A classic example of this is popular Super-Duper logger (dreadful name, but neat program!).

Utilities
The utilities group is a pretty general term that covers just about everything else! Once you have some computing power in the shack, it can be really useful to simplify many of the number crunching operations that the keen amateur encounters.

For example, if you like building your own antennas there are programs around that will help with the dimensions and even plot a theoretical radiation pattern! A look through the software catalogue of a shareware supplier will reveal a host of these utility programs.

Another rapidly growing area for computer utilities is in the control of suitably equipped transceivers. Most modern transceivers have a built-in control port and these useful utilities allow you to control many of the transceiver's functions directly from the computer keyboard. This has many advantages, not the least of which, is to add a wide range of custom memories.

There are even a few programs that combine rig control with the log book to make for really slick operation. You will also find several propagation utilities that will help select the best time of day and frequency to reach a particular part of the world. You can even design and print your own QSL cards by using one of the many desktop publishing packages that are available.

Get The Software
Now I've whetted your appetite, you're probably wondering how on earth you can get at all this software! There are two basic routes: (A) purchase the software on disk from a shareware supplier or (B) download software from bulletin board systems or the Internet.

Starting with option (A), probably the best place to begin is to visit one of the larger radio rallies. You will usually find several shareware firms that specialise in radio related software and make them available at very reasonable prices. If visiting rallies isn't convenient, a good bet is the Public Domain and Shareware Library (PDSL) in Crowborough (Tel: (01892) 663298). They have a very comprehensive range of software available and all the programs are very well catalogued.

If you have a CD-ROM, I can thoroughly recommend the QRZ HAM RADIO CD-ROM. Although it has a strong American bias, it's packed with amateur radio data including, the full FCC Call Book and thousands of radio related programs.

If you're keen to get on-line and download your own software, you will need to get yourself a decent modem. With most modern programs getting ever larger, it's important to buy the fastest modem you can afford.

You should consider a minimum of 14.4kbs with 28.8k being the preferred option. Once you have the modem, you can dial-up a number of BBS such as PDSL on (01892) 661149.

If you choose to use the Internet you will need to join-up with an Internet Service Provider (ISP) to provide the necessary access. Once you have this you can scan the world for the latest software!

However, if you want a few pointers to set you off in the right direction, you could start with my Web page: http://dialspace.pipex.com/mike.richards/ Here you'll find links to most of the more popular radio related sites, plus direct links to many of the common programs.

I hope this has given you a taster as to how you can hook-up your computer with your amateur radio station and make the two work together. Of course there are other ways you can use your computer in the radio shack. Don't forget if you want to know more make sure you read 'Bits & Bytes' every month here in Practical Wireless for the latest computing in radio news.
I've finally taken advantage of the free Web space offered by my Internet supplier, Pipex. Much promised and now finally here, my new Web pages are now on-line and ready for action.

I've put the pages together as a way of ensuring that those with Internet access can easily get the very latest software and news. Rather than having to search around for useful sites, a visit to my Web page should take you straight to the prime sources of radio information and software.

Updating the site literally takes just a few seconds, so it's easy for me to add new information at any time. As well as containing lots of useful links, I'm adding a new feature where I will publish questions from reader's letters. You then have an opportunity to help with the replies.

Now for some news of an interesting winter project for any radio club that's technically inclined. Texas Instruments have been at the forefront of DSP technology for many years and have just launched a brand new teaching system.

The new Texas package is based on the TMS320C50 DSP chip which features a 40MHz clock rate and 10k words of on-chip RAM. The DSP chip is supplied ready-assembled on a custom starter kit p.c.b. with all the ancillary electronics to enable it to be used for a wide range of applications. The starter kit is powered by a simple plug-top power unit (supplied) and features two phono jacks for audio input and output plus a 9-way D-connector for the link to a PC. This is basically an updated version of the older TMS320C30 DSP starter kit that has been used for a number of amateur related applications.

The important difference with the new Texas teaching kit is the reference and educational information that comes bundled with the package. The teaching material has been produced as a joint venture between Texas and the University of Hertfordshire and the material has been tested out at several universities across Europe.

In addition to the starter kit, there's a comprehensive instructors guide and a full set of overhead transparencies. This is supported by a number of software packages that provide practical demonstrations to back-up the lectures.

Each of the five lecture sessions is designed to last around 50 minutes with another 30 minutes of practical demonstration - just right for a club night! The lectures appear to start at a suitably basic level with an introduction to DSP followed by a study of sampling and conversion techniques and then moving on to filtering, Fourier Transforms and finally speech and image processing.

The starter kit itself is well worth further mention as it comes complete with an assembler/debugger and all the necessary connecting leads. Just to wrap-up the whole package there's a CD-ROM Multimedia Reference Guide that contains a huge database of DSP products and useful programs.

The price of the complete teaching package is extremely attractive at around £130. For UK distributors try Arrow-Jermyn on (01234) 270027 or Macro Marketing on (01628) 606000. For Internet based information try the Texas Instruments home site at www.ti.com.

A few readers have contacted me to say that they've been unable to locate the Great Circle Maps program from the address I featured a couple of issues ago. Just to clear up any confusion, here's a location I've double checked.

ftp.funet.fi/pub/hainiarrlibbs/progr
ams/gcmwin2l.zip

And now for something completely different! As I think it's about time I put together a few tutorials on the various amateur digital modes. Although not the most common mode, the technology behind RadioTeleTYpe (RTTY) forms a good introduction to the subject.
That's all the computing news I've got for you this month so, until next time 'happy twitting' and don't forget to keep your news and views coming to me Mike Richards CONC, 'Bits 6 Bytes', PO

Practical Wireless, December 1996
The advent of personal computers has given the average amateur the opportunity to undertake the calculations that hitherto would have been beyond his means. It has also meant that the scope for getting things wrong has increased by the same magnitude!

I've written this article to show some of the areas where errors can occur and suggest techniques which will reduce the chance of errors in your computer calculations. The first thing to appreciate is the term GIGO. The term GIGO is an old computer acronym that means 'Garbage In Garbage Out'. In other words, if you put rubbish into a computer you will get rubbish out. It might seem obvious, but errors can occur and they may not be so simple to find.

The following list shows a few of the areas where things can, and often do, go wrong:
- errors in your program
- input data which is incorrect
- input data which has been incorrectly entered
- errors in someone else's program
- errors in the compiler
- errors in the utilities
- errors in the operating system
- hardware errors
- mains supply errors

The only areas over which you have complete control are the first three items so, we will consider these in some detail.

### Failure To Obey

Programming errors mainly occur through failure to obey the rules of the programming language; simple keyboard errors when entering your program into your computer, or faulty logic in the design of your program.

Failure to obey the rules of the language should be detected by the compiler but this cannot be guaranteed. Faulty logic errors are probably going to be un-detectable and will be difficult to identify.

Input keying errors should be detected by carefully reading the program listing which should always be printed out. However, most people are poor proof readers and even getting someone to check it for you is no guarantee that all the errors will be detected.

A good example of an error that can easily escape detection is to enter a statement such as 'A=B+C' instead of the correct statement 'A=C-B'. In this case the rules of the language are met, but the program is wrong. The symbols '+' and '-' are also very easily mistaken.

The last six items in the list are areas over which you have very little control. In fact all most people can do is to use hardware and software that is supplied by a reliable manufacturer and hope for the best!

### Error Detection

Fortunately there is one technique that will identify most of the errors that may occur irrespective of their source. This technique is called 'testing'. In testing you input data which will give you known answers and check what the computer says against what you know to be correct.

When you have done enough trials and got agreement every time you may then be reasonably confident that your program is doing what you want it to do. Simple and easy isn't it?

However, this begs the questions of how do you know the correct answer in the first place and how many tests do you have to do.

Regrettably the only way you can find the correct answer is by hand calculating it. This means using such aids as: mental arithmetic, pencil and paper, tables, slide rule, pocket calculator, etc. The wise amateur will use the aid which is most appropriate for the job in hand and not be misled by the dictates of fashion.

The amount of testing you need to do depends on the complexity of the calculations which you are computing. It is rare that one hand cranked calculation will be sufficient. This being the case you should really consider whether you should even be using a computer to solve a one-off problem.

However, back to testing, and let's assume that you are going to calculate the results of many variations in input to one formula (this is just the area where the computer is ideal). For simplicity let us now assume you are calculating the effect of varying two quantities and expressing the results in a table.

Your output could look something like Fig. 1. This shows the total attenuation of different lengths of coaxial cable which have different attenuations per unit length and has been chosen solely to illustrate the point in a simple fashion.

In this simple case the minimum hand checks would be to calculate the results for the following cells: middle of bottom row, middle of right hand column, bottom right hand corner, and a cell near the centre of the table.

If after you’ve calculated the various cells out, you get agreement between your hand calculated results and what the computer says you can be reasonably confident that the computer has got it right.

There is however, still one more test to carry out. And that is to simply look at the results table created. Does the table make sense? Consider Fig. 1 again. Common sense tells you that the cell values should show general increase as you go along a row from left to right or down a column. It is also reasonable in this demonstration to expect the cell in the bottom right corner to hold the largest value. All these things occur so the table ‘looks’ correct.

If, on ‘looking’ at the flow of values in the table, you find unexpected variations in the figures, it’s essential that you check by hand the suspect cells and the neighbouring cells.

### Other Programs

Now let’s consider when you are using a program which has been written by someone else. If the program has been supplied by a reputable source it is not unreasonable to expect that it has been professionally written and tested. It may also be completely beyond your ability to do other than take it at face value.

However, it is essential that you thoroughly understand the documentation and know that you are using the program correctly. In other words:
- are you supplying the data it wants
- is the data supplied by you within the range that the computer and program can handle
- have you correctly keyed in the input data

If the program comes from an unknown source it should definitely be tested with caution until you have validated it to your own satisfaction by submitting it to a comprehensive testing schedule.

---

**Fig. 1:** A simple table used as an example by Gerald.

<table>
<thead>
<tr>
<th>Length</th>
<th>Attenuation @6/30cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0.70</td>
</tr>
<tr>
<td>20</td>
<td>0.23</td>
</tr>
<tr>
<td>30</td>
<td>0.70</td>
</tr>
<tr>
<td>40</td>
<td>0.70</td>
</tr>
<tr>
<td>50</td>
<td>1.17</td>
</tr>
<tr>
<td>60</td>
<td>1.63</td>
</tr>
<tr>
<td>70</td>
<td>2.10</td>
</tr>
<tr>
<td>90</td>
<td>3.10</td>
</tr>
</tbody>
</table>

**Laborious**

All the above steps may appear very laborious but they really are necessary if you are to have any confidence in the results which are calculated by your computer. You may believe you are so good that you do not need to waste your time with such trivia.

Your track record may support this approach but have no doubt Murphy will get you in the end and it will be at the most embarrassing time.

The adoption of program testing techniques such as those described in this article will reduce the risk of getting your head in the sand.
Listen to Your World!

Subscribe to *Monitoring Times* and *Satellite Times* Magazines

Do you own a radio, a shortwave receiver, a scanning receiver, or a ham radio? Then *Monitoring Times* is your magazine! Each monthly issue of *MT* offers 20 pages of worldwide, English language, shortwave broadcast schedules; departments on aero, military, government, public safety communications; broadcast band, satellite television, long-wave coverage; reviews of new products and radio-related software; technical articles and projects for the hobbyist; feature articles, and much, much more.

If it's on the radio, it's in *Monitoring Times*!

*Satellite Times* is the world's first and only full-spectrum satellite monitoring magazine, exploring all aspects of satellite communications, including commercial, military, broadcasting, scientific, governmental and personal communications as well as private satellite systems. The satellite industry's most respected experts contribute to every bi-monthly issue of *Satellite Times*, addressing both amateurs and experts alike.

If it's in orbit, *Satellite Times* covers it!

**MAIL THIS SUBSCRIPTION FORM TO:** PW PUBLISHING LTD., FREEPOST, ARROWSMITH CT. STATION APPROACH, BROADSTONE, DORSET BH11 3PW.

**SUBSCRIPTION RATES INCLUDE SPEEDY AIR MAIL SERVICE!**

- **1 YEAR *Monitoring Times* - £38 (12 issues)**
- **1 YEAR *Satellite Times* - £32 (6 issues)**

**NAME__________________________**

**ADDRESS__________________________**

**POSTCODE__________________________**

**TELEPHONE__________________________**

I enclose cheque/PO (payable to PW Publishing Ltd.) £

Or charge to my Access/Visa Card the amount of £_________

**CARD#__________________________**

**VALID FROM__________________________**

**THRU__________________________**

**SIGNATURE__________________________**

**TEL__________________________**

CREDIT CARD ORDERS TAKEN ON (01202) 659930

FAX ORDERS TAKEN ON (01202) 659950

---

Please mention Practical Wireless when replying to advertisements.
Keen h.f. operator Eric Gray G3CPS reviews an interesting antenna. Eric says that the Mydel “will fit in most suburban gardens. It can give good results when up at low heights”.

Two Dipoles

The MyDel Multi-Trap antenna consists of two separate dipoles, fed from a common 52Ω coaxial feeder. The shorter dipole, which covers 14, 21 and 28MHz, is just over 6m long and the longer dipole for 3.5 and 7MHz is 20m long.

I found that the antenna is well constructed. The wire used is a thick multi-stranded copper type covered with a transparent plastic insulation. There are two traps encased in aluminium tubing in the h.f. dipole, and two loading coils covered with black plastic in the l.f. dipole. The centrepiece has an integral balun and an SO239 socket for the feeder. The centrepiece and the antenna’s four insulators are made from a blue, high impact plastic. A bracket is supplied for fixing the centrepiece to a 40mm outside diameter mast.

On the 14, 21 and 28MHz dipole there’s a loop on the far side of each trap, and again, small metal clamps for securing them. The photograph, shows the antenna and the parts described before I installed it.

Instructions & Installation

The instruction leaflet supplied with the antenna states that during installation the two longest elements (3.5 and 7MHz) should be deployed in an inverted ‘Vee’ configuration, at an inclination of about 35°. The two shorter elements (14, 21 and 28MHz) should be, if possible, positioned at 90° relative to the longer elements. The tips of the elements must be supported at least two metres above the ground.

The MyDel Multi-Trap antenna on review was positioned in the centre of my back garden, almost exactly as recommend by the makers. The 3.5 and 7MHz elements were in a straight line from SW to NE and the 14, 21 and 28MHz elements in a straight line from SE to NW.

The centrepiece of the antenna was attached to an insulator and hauled up to 6.5m through a plastic ring attached to an aluminium scaffold tube. It was connected to 34m of 50Ω RG58 cable.

Manufacturer’s Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impedance</td>
<td>52Ω</td>
</tr>
<tr>
<td>Power rating</td>
<td>1kW</td>
</tr>
<tr>
<td>Weight</td>
<td>2.5kg</td>
</tr>
<tr>
<td>Trap type</td>
<td>Multi-band</td>
</tr>
<tr>
<td>Overall length</td>
<td>20m</td>
</tr>
<tr>
<td>Slope of elements</td>
<td>35°</td>
</tr>
<tr>
<td>v.s.w.r. (max)</td>
<td>1.4:1</td>
</tr>
<tr>
<td>Adjustments</td>
<td>3 bands only</td>
</tr>
</tbody>
</table>

The MyDel antenna (centre) on test. The low visual impact of the antenna is clearly demonstrated by the photograph itself, when compared to the support mast (see text).

For securing them. The photograph, shows the antenna and the parts described before I installed it.

Instructions & Installation

The instruction leaflet supplied with the antenna states that during installation the two longest elements (3.5 and 7MHz) should be deployed in an inverted ‘Vee’ configuration, at an inclination of about 35°. The two shorter elements (14, 21 and 28MHz) should be, if possible, positioned at 90° relative to the longer elements. The tips of the elements must be supported at least two metres above the ground.

The MyDel Multi-Trap antenna on review was positioned in the centre of my back garden, almost exactly as recommend by the makers. The 3.5 and 7MHz elements were in a straight line from SW to NE and the 14, 21 and 28MHz elements in a straight line from SE to NW.

The centrepiece of the antenna was attached to an insulator and hauled up to 6.5m through a plastic ring attached to an aluminium scaffold tube. It was connected to 34m of 50Ω RG58 cable.

Manufacturer’s Specification

The manufacturer’s specification sheet claims a maximum v.s.w.r. of 1.4:1. Personally, I think that they should have added ‘at resonance’ for this condition was not possible on 3.5MHz because of the shortness of the antenna.

After adjustment, better s.w.r.s were obtained at the h.f. ‘DX’ end of the band. My results are tabulated below and are samples of the many readings I took using the station s.w.r. meter.

Adjusted Antenna

Wishing to work some DX on 3.5MHz, I adjusted the antenna and shortened the length of the wires. I achieved this by turning back and tapping the loops at the far ends of the 3.5/7MHz elements next to the insulators.

The adjustments gave me resonance at 3.800MHz. As it happened, it also gave me better results over the whole band – (see Table 6). Note: that to maintain balance, equal adjustments should be made to each side of the antenna.

From the tables, you’ll see that on 3.5MHz, without any adjustment, resonance is about the centre of the band. And for an s.w.r. of 2 or less, a bandwidth of about 40kHz is possible.

By shortening the antenna as I did, the top 60kHz had an s.w.r. of 2 or less. I’m also sure that by lengthening the antenna by the required amount, a similar result
would be possible for the c.w. end of the band.

**Without Adjustment**

Without adjustment I found that from 28.20 to 29.00 MHz, the s.w.r. is 2:1 or better. But unfortunately, it is higher on the c.w. portion of the band and no adjustment is possible for this band.

On 7, 14 and 21 MHz the whole of each band has an s.w.r. better than 2:1.

I found that on the WARC Bands - the s.w.r. on 10 and 24 MHz exceeded 10:1. But it fell to only 5:1 on 18 MHz. I was able to match the antenna on all the WARC bands using my Yaesu FC-102 a.t.u. I also used the antenna quite satisfactorily on 1.8 MHz with the feeders strapped.

**On The Air**

I was pleasantly surprised with the results on the air, the exception being the 3.5 MHz band. During the tests I used power levels of 30, 100 and 200 W using a TS-830S, an IC-725 and sometimes a TL922 linear.

Brief tests were made with an output power of 400 W and the traps and coils were well able to handle this power. No TVI was experienced on any band.

The antenna was used exclusively for five weeks during July and early August, but only during the afternoons and evenings until 2300 UTC. Comparisons were made with our own antennas, ie. a Mosley 2-element beam for 14, 21 and 28 MHz, a rotary dipole for 18 and 24 MHz, a 41 metre long doublet and a 54 metre long end fed. (All the antennas were at the same height as the MyDEL Multi Trap).

Many Europeans were worked on all bands from 1.8 through to 28 MHz and the following DX was worked: 3.5 MHz VK2XN, 7 MHz PY2OU, K1JXS, JZ4TA, R9ACLH (Asia) and VK5KJC. On 14 MHz I worked HL1CiG, 76EAA (Japan) and ZH0ES N. Marianas, who came back to my CQ call. On 21 MHz I worked CESLZR and on 10 MHz I logged UA9WGU and ZS6QU.

**Comparison Reports**

I’ve compiled a comparison of reports received, using other antennas:

On 1.8 MHz the MyDel was two S points down on my 54 m long end-fed antenna. And on 3.5 MHz it was one or two S points down on my 41 m long doublet.

On 7 MHz the MyDel was better than with my 41 m long doublet and my 54 m long end fed antenna. On 14, 21 and 28 MHz the MyDel was usually one, but sometimes two S points down on my 2-element tri-band beam.

Reports on the WARC Bands for 7, 14 and 21 MHz were similar to those received using other antennas: On 1.8 MHz the MyDel was two S points down on my 54 m long end-fed antenna. And on 3.5 MHz it was one or two S points down on my 41 m long doublet.

On 10 MHz reports were similar to those received using other antennas: On 1.8 MHz the MyDel was two S points down on my 54 m long end-fed antenna. And on 3.5 MHz it was one or two S points down on my 41 m long doublet.

**Most Gardens**

The MyDEL Multi-Trap dipole is a small antenna which will fit into most suburban gardens. It can give good results on all bands 1.8 to 28 MHz including the WARC band when up at low heights.

On 7 and 14 MHz, even during the present sunspot minima, the antenna will provide an occasional DX contact. For local ‘natters’ on 1.8, 3.5 and 7 MHz it’s quite adequate. I’m sure too, that when 21 and 28 MHz are open again and the sunspots are to our advantage, it could provide many DX contacts on these bands.

Bearing in mind that my MyDEL Multi-Trap Antenna was only at 6.5 m, much better results would be possible if it was higher and in the clear. I am indebted to my friends Bill Staples G8AKY (who took the photographs) and to John Heys G3BDQ for their valuable help.

---

The MyDEL Multi-Trap Antenna is available from Martin Lynch & Son of 140-142 Northfield Avenue, Ealing, London W13 9SB. Tel: 0181-566 1120 who kindly supplied the antenna for my review. The cost is £69.95 plus £7.50 postage and packing, and in my opinion, represents good value for money.
Tips & Tools
Workshop Practices

By Clive Hardy G4SLU

Clive Hardy G4SLU, a busy 'home-brew' enthusiast provides tips and hints based on the workshop practices and techniques he uses when building projects on behalf of PW.

As a radio amateur, I would put myself in the 'licensed listener' class. I've never had that overwhelming urge to work every country and prefix ever invented, but I do like tinkering about on the bench.

More 'midnight oil' has been burned by me when trying to make some circuit or other work, than when chasing DX. Having the licence gives me the option of trying out the bits and pieces I've built on the air. Amateur radio is a pure hobby to me, so what I've learnt about the workshop is pure trial and error. I hope that what I can pass on from my experience will be useful.

For those who haven't ventured into home-brew yet, you've nothing to lose but sleep, patience, and sanity! But, the satisfaction derived from completing any project, however simple, is immense. It's the same whether you do it by yourself or with friends. It's the same whether that really simple bit of building is your first, or one hundredth and first.

No one turns into an expert constructor overnight. I'd like to think that I'm reasonably competent now, but some of my early efforts were, to put it mildly, less than mediocre! Many mistakes were due to lack of knowledge. Doing is learning.

In The Beginning

In the beginning you may ask how do I start? What do I need? Well, my first answer is what you do need is a bit of space to work in. Not a great deal, but don't consider the dining room table if you value domestic harmony!

Most home-brewers work in a space on the workbench that is slightly smaller than whatever the item is they're working on. This is an unwritten rule of technology. I try to break it, but often fail. My own work area is just about a metre square, on the end of the shack bench.

Good Lighting

Good lighting is essential. Even eyes in perfect working order don't like being used to look at poorly illuminated small components close up.

When it comes to close work, I haven't tried any of those magnifying spectacles or similar attachments, but I have found that a X2 (times two magnification) jeweller's eyeglass is more than adequate for checking small components and soldered joints. My wife has one of those magnifying lights for her craft work. It's a bit bulky to work around when looking through the glass, but the close-in light is wonderful.

Ventilation is also important. Soldering is an integral part of construction, but the fumes are best avoided. I'm moving rapidly to the idea that my next soldering related purchase will concern fume extraction.

My present soldering iron is a 25W type with a 2.5mm or 3mm bit. It's big enough and hot enough for most tasks. Components today seem robust and can take a fair amount of thermal abuse. Fortunately most home-brewers work in a space on the workbench that is slightly smaller than whatever the item is they're working on. This is an unwritten rule of technology. I try to break it, but often fail. My own work area is just about a metre square, on the end of the shack bench.

For pliers I have a box jointed snipe nose pair for most work. I also have a non-descript pair of the electrician's variety for brutal jobs. Incidentally, 'Box joints' remain stable under pressure much more so than lap joints, and that keeps the jaws properly positioned in relation to each other. This is even more important with wire cutters. Chopping through coaxial cable doesn't require the best cutters, but for board work I have cutters with small pointed jaws.

The small pliers could double as a heat sink when soldering. Fortunately though most components are pretty robust and can take a fair amount of thermal abuse.

Sets of high-quality piers, end and side cutters are available from many outlets.
tools. Non metallic ones are essential for adjusting variable inductors.

In the non essential category (but still very useful) is a 'pearl catcher for fishing (forgive the obeliterate pun!) out dropped components from the depths of equipment.

Searching through the tool box I find that there's a reamer, a short imperial or metric steel rule and a small craft knife. There's also a 'Junior' hack saw blade, the odd Allen key, and a set of BNC spanners completes my tool collection.

It may seem a small quantity of tools, but I've found that's about all I need. However, with so few tools it's worth spending the money for good quality. (All the tools I use are available mail order from the usual suppliers).

The Multimeter

It's perhaps restating the obvious, but if ever one item of equipment is essential, it's the multimeter. And if ever one item of equipment is required components readily to hand. Otherwise the enthusiasm might wane before the soldering iron gets plugged in!

Some people suggest, to save money, using bits removed from old equipment. This needs time to sort them out, and somehow they are never the types you subsequently want. (So much better to know for certain you have the necessary components).

I think the best way to start a serious component collection is to buy those bargain packs containing hundreds of resistors or capacitors. At the same time I suggest you get some multi strand hook up wire in four or five colours.

For the rest of the shopping get some ideas by doing some armchair construction. Look at construction articles in books or magazines. See what components are commonly used.

It is likely to be small signal transistors, diodes, and trimmer capacitors. Light emitting diodes have high play value!

Nowadays I tend to buy twice the components I need for a project. Firstly because I'm sure that I'll break some of them during construction. Buying the extra of course ensures that nothing gets broken. Secondly it means my junk box continues to be replenished.

I hope my thoughts have been of some help. Now that the long evenings are here it's time to warm up the soldering iron and get busy!
Soldering Success
Isn’t a Secret!

By Paul Essery GW3KFE

Paul Essery GW3KFE casts his very experienced eye and years of practical work onto soldering techniques. And as we all know...you either get it right or very wrong!

Soldering success is not a secret...and by the time you've read this article I hope you'll agree! And if you start by looking at Fig. 1, you'll see that you can weld, as in Fig. 1a. and 1b., or glue, as in Fig. 1c., or solder as in Fig. 1d., two pieces of metal together.

Welding joins by melting some of the 'parent' metal. With glue, it's smeared on the surfaces, brought together and left for 'setting'. (Glue grips the surfaces, so these are 'roughed up').

With soldering (or brazing which is the same in effect), the workpiece is heated together with an alloy (solder). At the right temperature the solder then runs and can fill a gap of between two to six thousandth of an inch by capillary action. It can also 'wick' upwards for as much as 50mm.

In each of the cases I've mentioned you should notice that a good joint presupposes chemical cleanliness. (Very important!).

Solder mixture

Solder is an alloy made up of a mixture of tin and lead. Lead melts at 327°C, tin at 232°C. The mixture (in all but one of the possible proportions between 18% and 98% tin), the alloy begins to melt at 183°C. Between 183° and the temperature of complete melting, a 'pasty' phase called 'liquation' is seen. The temperature at which melting starts is called the 'solidus', and melting is complete at the 'liquidus'. (Liquation is a damned nuisance to us, but it helps the plumber or car body repairer!). The one proportion that shows no liquation is 61.9% tin 38.1% lead. Its melting point is at precisely 183°C - the 'eutectic' alloy.

Liquation Nuisance?

So, why is 'liquation a nuisance? To discover answer, start by considering Fig. 2 and imagine the iron is controlled at 250°C and a chemically 'clean' workpiece is used. The temperature gradient is as illustrated in Fig. 2. I've applied the solder in the proper place as shown. Only the 'eutectic' mixture has penetrated, leaving the rest in the 'filler' the joint is mostly lead, and weaker than it should be. Hence: for a good joint everything must be heated above the liquidus.

Now let's look at a nicely tinned soldering iron as Fig. 3. At the top there's solder, at bottom the copper of the iron. Between, there are two layers of copper/tin alloy, tin-rich at the top, copper-rich below. (The copper comes from the slow erosion of your iron's bit so you must file it back to shape occasionally).

The bond between top and bottom layers in Fig. 3 is metallurgical and quite strong. Incidentally, the hollow in an unfilled iron can have edges sharp enough to cut the tracks in printed circuit boards (p.c.b.s).

The effect shown in Fig. 3 will also occur to a degree with a copper wire wrapped round a tag. If the wire is properly wrapped round the tag, capillary action occurs and fills the tiny gap.

Slag result

Now it's time to look at slag, the result of heat, decomposing flux, dirt or impurities. Begin by imagining a bead of slag in Fig. 2.

The capillary action must be strong enough to drive the slag right through the joint and out. Slag must also escape; if it's trapped in the joint it prevents adhesion there and is probably also corrosive.

Flux is used to ensure chemically clean surfaces so the alloying actions of Fig. 3 can take place. It also enables capillary action to occur, filling the joint with solder and driving out slag. (In doing its job, flux turns into slag). Note: anything trapped in the joint is invisible and unreachable: hence the need for solder flow to force flux and slag out.

At room temperature soft solder strength is about a tenth that of hard ("silver") solder. At 100°C soft solder is a quarter of its room-temperature strength. At 170°C it's a mere tenth. (Not very strong!). High Melting Point (HMP) solder is strongest at higher temperatures.

Honest Joint

Let's be honest...everyone makes the odd bad joint! See Fig. 4a. And to help you remember here's a little mnemonic: Beady Joints are Bad.

To help you recognise a good joint: see Fig. 4b. Here the solder has "melded" in to the copper at the edges. Any joint deviating from the Fig. 4b standard towards Fig. 4a is to be regarded as suspect.

To achieve a good joint cleanliness, flux, solder and heat are needed. Remember Fig. 2! It argues a need for a temperature controlled 'watty' (powerful) iron.

I use a 60W Weller soldering iron for most work and change the bit to change the temperature. The 15W jobs cause more dry joints than you need! Additionally, the work heats slowly and p.c.b. tracks are liable to lift, so I prefer a tiny bit in the Weller iron.

Don't forget also, that heat transfer from iron to work is maximised if your iron has liquid solder floating on it.

Occasionally you'll form a 'solder bridge'. When this happens I use a solder sucker for preference. A few strands of tinned wire can also be used as a wick to mop up (using capillary action).

Some pitfalls

Now I'll move on to discuss some of the pitfalls. And to start off, that bit of emery cloth on your work-bench is surely oily!

The emery cloth may also leave particles of abrasive embedded in the joint to cause a total refusal to 'take'. If

Practical Wireless, December 1996
you must abrade use pumice powder in water, or *wet-and-dry* cloth used wet.

Some solder tags look mucky but 'take' easily. Take note of what you see, so you recognise next time! If it plays up, give it a good clean and try again. With both wire and tag pre-tinned, the iron's heat will make the solder flash round and almost guarantee a good joint.

**Flux-Cored Solder**

If possible used a flux-cored solder, 60/40 tin/lead to British Standard (BS). I like to use solder about 20s.w.g. My advice is that you buy a reel of solder. Those little cards in d.i.y. shops are very expensive.

After tinning, put a drop of solder on the iron, then take it to the job: placing the iron one side and cored solder on the other. (This bit of hot solder increases the heating effect and puts flux in the right place).

The flux in the grades I've specified can actually protect the joint. Similar fluxes in paste form are to DTD 599A or BS. If all else fails, you might try tallow, or go into supermarkets with some vinegar.

**Third Hand**

A 'Third Hand' is useful. My cheap version is shown in Fig. 5. I clamp the thing in the vice, then grip wire in one peg, small connector in the other. It leaves two hands for the soldering operation. The same device will hold complete p.c.b.s for soldering or inspection.

If you try to hold a wire on to a tag with one hand and the iron with the other, your hand will shake and you will produce 100% 'cold' joints. It's best to use some form of clamp.

**Special Solders**

Special solder, such as HMP, to 95A in the British Standard is far stronger than ordinary stuff at 100°C. But not much better at room temperature.

The HMP can be used to avoid the job coming apart if you start with it and then use 60/40 for the final work. On the low temperature side, 'Woods Metal' melts at 71°C. (Most low temperature formulas use Cadmium). 'Silver Solder' is much stronger but needs far more heat. Some formulas contain Cadmium and require special fluxes. You can soft solder over silver solder, but you can't silver solder over soft. There are several grades with different melting temperatures.

**Health & Safety**

A soldering Iron is hot and I'm offering a little health and safety advice. 'Purf' it in a suitable stand that won't tip over.

Keep wires away from the hot tip of a parked iron. If you use a handy gas-fired iron (for example on National Field Day), you also need to be sure where the flame is going when you put it down.

Cadmium (already mentioned) is a known hazard and recent research indicates there may be respiratory problems even from resin core or paste fluxes. For both, the answer is ventilation improvement. I have a 'Muffin' fan from a club junk sale sucking the fumes away.

Finally, when you finished the job, inspect every soldered joint. You might even find a wrong one! Any deviation from Fig. 4b in the direction of Fig. 4a or even any doubts, then remake (re-flow) the offending joint.

---

I've tried to explain the mechanics of soldering and how we make 'cold' or 'dry' joints. I hope you find it a help, because making a good solder joint needn't be a secret!

---

Practical Wireless, December 1996
COLOMOR (ELECTRONICS) LIMITED
170 Goldhawk Road, London W12 8HJ
Day Tel: 0181-743 0899 Fax: 0181-749 3934

O-ver A Million Valves In Stock. Please Ask For A Quote

£100 each
DA30 - GEC
£80 each
EL37 - Mullard
£70 each
EL34 Mullard
£60 each
KT88 - GEC
£55 each
KT66 GEC
£50 each
EL84
£40 each
EL41
£35 each
EL36
£35 each
EL34B
£25 each
EL34S
£25 each
EL32
£20 each
14.5 each
FF95
£15 each
EF91
£10 each
EF89
£10 each
EF86
£10 each
EF80
£5 each
EF50
£5 each
EF41
£5 each
EF37
£5 each
ECL80
£5 each
ECH81
£5 each
ECH42
£5 each
ECH35
£5 each
ECF80
£4 each
ECC91
£4 each
ECC82
£4 each
ECC81
£4 each
EBL21
£4 each
EBL1
£4 each
EAF42
£3.50 each
VALVES WANTED - NEW & BOXED

P&P - Orders up to £3 it £1.95, £5 6 £2.25, £15 OVER A MILLION VALVES IN STOCK. PLEASE ASK FOR A QUOTE

170 Goldhawk Road, London W12 8HJ

Over £20 6 £4.55. Over 2Kg at cost. VAT included in all prices.

£10.95
7.20
1.45
5.10
2.35
KT88
3.30
GZ37 MUL
8.25
5.60
3.45
2.60
2.25
9.90
2.90
1.55
1.60
1.20
3.80
EL84 MUL

Tel: 0956 374918

Send orders and remittances to:
Badger Boards, 87 Blackberry Lane,
Four Oaks, Sutton Coldfield B74 4JF.
Tel: 0956 374918

PRACTICAL WIRELESS PCB SERVICE

Printed Circuit Boards for Practical Wireless constructional projects are available from the Practical Wireless PCB Service.

The boards are made in 1.5mm glass-fibre and are fully tinned and drilled.

When ordering PCB's please state the article title, magazine cover date and the board number.

Mark your envelope Practical Wireless PCB Service.

Cheques to be crossed and made payable to: Badger Boards.

Please print your full name and address in block capitals and do not enclose any other Practical Wireless correspondence with your order.

Please allow 28 days for delivery.

Send orders and remittances to:
Badger Boards, 87 Blackberry Lane,
Four Oaks, Sutton Coldfield B74 4JF.
Tel: 0956 374918

VERULAM RALLY 96
Sunday 15th December 10am to 4pm

WATFORD LEISURE CENTRE
Horseshoe Lane, Garston, Watford
5mins M1 junction 6, M25 junction 21A
off junction A405/412
Food and Bar
Trade stands, Bring and Buy
RSGB stand, PW & SWM stand, Morse Tests

Admission £1.50
(concessions £1.00 - Children under 14 free)

Talk-in S22

INFORMATION 01923 265572

J. BIRKETT

SUPPLIERS OF ELECTRONIC COMPONENTS

25 The Direct Line, Lincoln, UK
Tel: 01522 520767 Partners J.H. Birkett J.L. Birkett

Trade stands, Bring and Buy
Access, Switch and Barclaycard accepted. P&P £1.50 under £2. Over £2, unless otherwise stated.

Sunday 15th December

INFORMATION 01923 265572

Verulam Rally 96

subscribe To Practical Wireless Every Month

Practical Wireless, December 1996
Plugging Coils

By Ray Loveland G2ARU

I needed some plug-in coils for a piece of test gear, and a search of various catalogues failed to produce anything suitable. So, I decided to make them up and this is how they were constructed.

I began looking for a suitable base and experimented with the solid plastic pin protectors found on ex-government valves. They’re moulded in plastic and available in both B7G and B9A sizes. The pin holes are already drilled in the base but to hold the coil support rod a 6mm hole should be drilled in the base. The support rod can be of almost any plastic material, but I’ve found that Perspex rod isn’t suitable.

Whichever type of rod you use, it should be cut to length, drilled and tapped at both ends. Alternatively, self-tapping screws can be used, but you need to drill exactly the right sized hole, otherwise the rod will split when the screw is tightened.

Suitable Former

By fitting a piece of 6mm plastic rod vertically at the centre of the base and using short pieces of tinned copper wire for the pins, a suitable former can be made. For the pins, I used lengths of 1mm (about 20s.w.g.) wire. The wire should be stretched by pulling until the wire is felt to ‘give’ slightly. This straightens the wire perfectly. Next, cut the wire into suitable lengths and insert them in the base.

Heat each ‘pin’ with the soldering iron and allow solder to run into the recesses on both sides of the base. This locks the pins in position. Once the coil and its supporting rod are fitted to the base, connect the wire ends to the pins. A coil at various stages of construction may be seen in Fig. 1.

You can either wind the coil before, or after fitting the rod to the base. After sealing the winding as a protective cover for the coil I used the plastic sleeve from a discarded fluorescent lamp starter. The cover may be wrenched ‘carefully’ from its base and then a hole drilled top centre.

In order to give a close fit for the cover, a plastic sleeve may be needed between the base and the cover itself. I found a piece of neoprene tubing just the right size in the junk box. As higher h.f. and lower v.h.f. ranges when smaller inductances are needed a support rod may not be needed. And for the lower h.f. ranges, when inductance values need to be greater, the coil can be wound on the outside of the cover.

An alternative base can be made using B7G or B9A plugs often to be found at rallies. These plugs can be fitted with the coil former as described above as they already have a central hole.

Party Popper

Not being a party person I wasn’t familiar with ‘Party Poppers’. But when introduced to them recently, I immediately saw their potential as plug-in coil formers.

I used them in a similar way as already described. But as the base of the party popper has a rather large diameter the pin protectors base cannot be used in the same way.

You’ll need a base plate, about 23mm diameter, cut from some insulating material to fix the pin protector to. The top section of the popper has an internal diameter to provide excellent anchorage for the coil support rod.

To strengthen the body of the popper I used a starter lamp cover pushed into it. You may need a couple of turns of tape to give a tight fit in the popper.

My plug-in coils, made in the way described, have proved to be excellent use. They are robust and will easily withstand the handling that inevitably occurs with plug-in coils.

Repeatable Coils

Making repeatable coils for a project is often very much of a hit-or-miss affair. Making it, putting it into the circuit and subsequently trying to remove or add turns is a process familiar to us all.

What is needed is to be able to check the coil before it’s fitted and fixed on the former. And in the dim and distant past I’d seen a circuit, using a signal generator, a diode, a calibrated capacitor and a meter for checking coils.

I tried several arrangements and finally settled on the circuit shown in Fig. 2. For some signal generators a 1mA meter will be adequate but a 250 or 100pA unit may be better.

A unit I made up for the higher h.f. and low v.h.f. ranges has a 50pF variable capacitor and a 100pA meter, but a more general unit has a 500pF capacitor.

If a separate panel meter isn’t available, leads can be brought for a multi-range test meter to be used. Any signal diode is suitable. The signal generator should be set for maximum output. As the circuit is bought into resonance it presents a much higher impedance and the current reading will drop with a sharp dip.

I have made many coils using this device and generally they prove to be correctly wound. It’s much easier to alter the turns at this stage.

Tuning Range

The device described doesn’t of course measure the inductance of the coil directly but can show the tuning range of the coil (this is after all you really needs to know). You could readily calculate the actual inductance from the resonant frequency using the normal formula or from data charts.

To calculate the inductance the variable capacitor needs to be calibrated (this should be done with a bridge if one is available). You could also use the substitution method using close tolerance silver mica capacitors.

I have found this device of great help in making my coils. I wonder how I ever managed without it!
I suspect that the majority of radio amateurs coming across the Smith Chart have hurriedly turned the page and found something else to read. This is a pity because the Smith Chart is very easy to use and is a powerful tool for solving transmission line problems.

In this article I’ll explain the basic use of the chart. For simplicity I’ll assume that the transmission lines are loss-less, a reasonable assumption which makes the introduction to the Smith Chart much easier. Later you can expand your knowledge of the Smith Chart to use it in more complex situations, including when it’s essential to allow for line losses.

The prime use of the Smith Chart is to estimate the input impedance at the end of a mis-matched transmission line. However, to do this accurately you need other information. You need to know the characteristic impedance of the line, its length, its velocity factor and the impedance of the load with which it’s terminated, see Fig. 1.

You could ask "why not use an impedance bridge and measure it"? Firstly, not everyone has an impedance bridge. And secondly even if you have a bridge, there are few bridges that work effectively on open wire lines.

And thirdly not only does the Smith Chart allow you to calculate the feedpoint input impedance, it also gives you a visual representation of how the impedance varies along the line.

Let’s have a look at the variation of impedance on a mis-matched line. If a 50Ω line is terminated with a 17Ω resistance the line will operate at an s.w.r. of 3:1 (well nearly 3:1 as 50/17 = 2.94). The graphs of Fig. 2 show how the resistive (R) and reactive (±jX) components of the impedance vary along the length of the line. This pattern of the variation of impedance repeats itself every half wavelength along the line. So, if you are dealing with a 50Ω line operating at an s.w.r. of 3:1 this chart is most helpful.

Let’s look at how we can use the chart by considering a line 0.4λ long terminated in a resistive load of 17Ω. The impedance at the input end of the line, is shown by the graph to be 24Ω resistive in series with 30Ω capacitive reactance, or (24-j30Ω).

Similarly if the line was 0.8A long you would take the values given at (0.8-0.5λ) or 0.3λ from the load, which gives the figure of (85+j67.5)Ω. These figures are read off the left hand vertical scale. For non-resistive loads begin the measurements from the point on the chart that corresponds to the reactance of the load (instead of the origin). If you go off the right hand side of the chart, then wrap round as before.

The simple chart can also be used for a line of any characteristic impedance that is operating at an s.w.r. of 3:1. This ‘trick’ is done by proportioning all the values. For example if the impedance of the line is 600Ω, then all you need to do is re-calibrate the chart by multiplying all the left hand scale values by 12 (ie. 600/50).

In fact if we calculate (and calibrate) the resistance and reactance scales in terms of a line of 1Ω characteristic impedance. Then all we have to do is use the line’s actual impedance as a multiplier (or divider) to get the real values. So 600Ω equals to 1.0 and 17Ω becomes 17.0/0 = 0.34Ω, and so on.

The technique is known as normalising and is often used in engineering to make sets of tables and graphs of universal applicability. The right hand scale of Fig. 2 is normalised in this way.

Unfortunately if you want to work with a line operating at any other s.w.r. you will need another chart. The graph of Fig. 2 is specially calculated and drawn for an s.w.r. of 3:1. For another s.w.r. value another chart would have to be generated.

Fig. 1: The basic problem is to calculate the s.w.r. on the line, the impedance seen at the input when the line is terminated with other than the characteristic impedance.

Fig. 2: The graph of the impedance variations along a line for an s.w.r. of 3:1. When no line loss is assumed, the pattern is repeated every half wavelength.

Problems Solved

Happily with the Smith Chart your problems, (of creating a new graph for each s.w.r. value) are solved. This drawback of multiple charts was solved by using some clever maths, about which we need to know nothing.

Because the Smith chart is circular, it makes going off the scale at the right-hand end much easier to handle. And it’s usually normalised to a line impedance of 1Ω.

A simplified diagram of the Smith Chart is shown Fig. 3. Round the perimeter is a scale calibrated in wavelengths; this is just the same as the x-axis in Fig. 2. The circles (tangential at B to the line F-G) carry the resistive values and the curves marked ‘L’ and ‘C’ carry the reactive values. The lines labelled L represent inductive reactance and the C lines being capacitive reactance.

Purely resistive impedances lie on the line BOA. Any impedance which is represented by a point to the right of the line BOA contains inductive reactance. Similarly, any impedance which is represented to the left of the line BOA contains capacitive reactance.

For example, point P on Fig. 3 shows where a normalised impedance of (1+j0.5)Ω appears on the chart. Of course in a 50Ω system this would represent an impedance of (50+j25)Ω.

Now we know the basic chart scales let’s see how an s.w.r. of 3:1 is portrayed. It’s too simple
Fig. 3: The basic, simplified curves of the Smith Chart. See the text for an explanation.

to be true! You just draw a circle, centred on O, that passes through the value 3 on OB, see Fig. 4. This chart is now the direct equivalent to the graph Fig. 2.

Let’s now transfer some values to the chart. Point P is the load which has a normalised value of 0.33 (17Ω) and is purely resistive. The point Q represents (23-j30)12 normalised to (0.47-j0.6).

Extend the line OP to the outer (wavelength) scale and step round, from this point, in a clockwise direction 0.4k. The line from this new point to the centre of the chart (O) passes through Q on the s.w.r. circle. This point Q on the s.w.r. circle is the equivalent of Q on Fig. 2.

A Worked Example

Let’s do a worked example that brings all these ideas together. Consider a 60m long, 50Ω line that has a velocity factor of 0.66, being used at 3.515MHz feeding a load which is 2552 resistive in series with 5012 inductive. What is the s.w.r. on the line, and the line input impedance?

Step 1
Normalise the load by dividing by 50, so the load becomes 0.5+j1.0. Plot this point on the Smith Chart as point P in Fig. 5.

Step 2
Draw a circle centred on O which passes through point P. This circle passes through the line OB at 4.4. So the s.w.r. is 4.4.

Step 3
Find the electrical length of the line. At 3.515MHz one wavelength is 300/3.5 = 85.35w. Therefore 60m is 60/85.35 = 0.703 wavelengths. Allowing for the velocity factor: 0.703 x 0.66 = 0.465 wavelengths.

Step 4
Extend the line OP to the wavelength scale. Then and move round in a clockwise direction 0.065 wavelengths. This brings us to 0.20 which we join to the centre (O) by a straight line. In fact we go round the chart two and bit times as the line is 1.065 wavelengths long. Where this line intersects the s.w.r. circle (Q) read the normalised impedance (1.65+j1.90Ω). Multiplying this value by 50 gives the actual impedance (82.5+j95Ω). The input impedance of the line is therefore 82.5Ω resistive in series with 95Ω inductive reactance.

Easy isn’t it? Try it yourself but change the operating frequency to 3.8MHz. You will see that the s.w.r. remains unchanged but you get a different value for the input impedance. That’s all there is to using the Smith Chart in its basic mode and for many amateurs this is all you will ever need to know.

Next time I’m in the ’Antenna Workshop’ I’ll show how the Smith Chart can be used to help you to design an antenna tuning unit.

Practical Wireless, December 1996
Greetings, 'vintage types'!

Did anyone watch the film on BBC 2 a while back that told the story of the beginnings of radio broadcasting in the USA? Entitled 'Empire of the Air - The Men Who Made Radio', it told the story of Lee De Forest, Edwin Howard Armstrong and David Sarnoff and was fascinating!

The names De Forest and Armstrong should be familiar to you but I expect Sarnoff will be a bit of a mystery. He began life in the USA as a poor Russian immigrant and went on to become the head of RCA, the giant Radio Corporation of America. That's what's called success!

Modification Time

Now, it's modification time and I'm looking back to the "t.r.f." circuit featured in my June column. Then I told you how I found it difficult to find a tapping point in my June column. Then I told you how I found it difficult to find a tapping point on the coil that gave both good audio and adequate sensitivity.

To improve matters I've modified the original circuit along somewhat more traditional lines. The new circuit is shown in Fig. 1.

The difference between the two circuits is how the regeneration is obtained. The cathode tap has gone and a new feedback winding, L2, has appeared.

Here's what to do if you've already built the original detector and want to try the new arrangement. First, disconnect the cathode of V1 from the tap on L1 and take it straight to the h.t. negative (h.t.-) rail. Next, put a radio frequency choke (r.f.c.) of about 1mH inductance in series with the anode of V1.

Then, from the anode of V1 take a length of wire and wrap it around the earthy-end of L1 about ten times. Take the other end of the wire to the fixed vanes of a 150pF variable capacitor. The moving vanes should be connected to the h.t. negative as usual.

Try to keep the additional wiring as short as possible and clear of the grid circuit of V1, including components R3 and C3. The value of capacitor C8 is not critical, you can use higher capacities but try not to exceed 350pF.

How It Works

Let's take a look at how it works. And (fortunately!) the operation of this circuit is a little easier to visualise than that of the original. For example, it's quite obvious that the incoming signal will be amplified by V1.

A proportion of the amplified r.f. signal is fed back into the grid circuit by means of the coupling between L1 and L2. The amount of feedback (regeneration) is then controlled by adjusting the value of capacitor C8.

If you set C8 to minimum there's almost no feedback. The very high reactance of C8 effectively blocks any r.f. signal current flowing through L2.

As the capacitance of C8 is increased the amount of feedback will also increase. (The lower reactance of C8 allowing more current to flow in L2.)

Eventually, the amount of feedback will be great enough to cause the circuit to oscillate. It's then time to back off a little. The most sensitive and selective point is just before the detector begins to oscillate.

In case you're wondering, the 1mH choke in the anode circuit of V1 is there to stop the amplified r.f. signal being shunted to the h.t. negative via C6. The choke has no real effect on the demodulated audio present at the anode of V1, passing it with little attenuation although this 'pathway' is seen as a high impedance to r.f. signals. Any r.f. signal that does get through RFC1 is removed by capacitor C6.

Best Results

To adjust the new circuit for best results, you should first attach an aerial several metres long to C1. Then set C8 to minimum and find a reasonably strong station. Next, adjust R1 to give the best demodulated audio quality. Once set you won't need to touch R1 again in a hurry.

Remove the long aerial and replace it with just couple of metres of wire and tune C2. Now, as you gradually increase C8 the signal should get progressively louder until the inevitable howling starts. Back C8 off a little and that's it. (Except that it might not be so easy!).

There is a right and a wrong way for the direction of the winding sense of L2. This is because clearly, the feedback provided by L2 should be positive.

If the direction of L2 is wrong then the feedback will be negative and you won't get the smooth increase in volume as C8 is rotated. Although the detector may eventually oscillate it will be difficult to tune and the demodulated audio will sound poor.

Even if the circuit works wonderfully first time around do take the trouble to take off L2 and try it the other way round, i.e. clockwise instead of anti-clockwise or...
Heard All Continents Again

Only two days after: I sent my September offering into the PW office I found a short article about the Heard All Continents (HAC) Company in Radio Bygones. It was written by Mr. C. M. Lindars who used to work for the company.

On reading the article, I was surprised to learn that the company began way back in 1935 and closed as recently as 1983. And at least some HAC sets used Denco coils, which is appropriate considering Denco coils are available once again.

I was reminded by reader Mr. J. Dickinson of Tamworth that last time I didn’t give Denco’s address, so to make good the omission here it is:

Denco (Clacton) Ltd., 259/265 Old Road, Clacton-on-Sea, Essex CO15 3LU. Tel: (01255) 422213.

Again

Not Kind

Unfortunately, half-wave rectification circuits are not kind to transformers for reasons which I won’t go into now. Suffice it to say that the a.c. current rating of the h.t. secondary winding should be at least three times the expected r.m.s. output current.

Remember too that during the first few seconds after switching on the valves won’t be drawing any h.t. current (their cathodes will still be cold). Under this, albeit brief, no-load condition capacitor C1 will charge up to the peak a.c. voltage of the h.t. winding.

For example, I’ll consider a h.t. secondary of 250V a common value. The peak a.c. voltage will be 250 times 1.414 (the square root of two, i.e. peak voltage) giving 353.5V. So, that’s why I think it’s best use a silicon rectifier with a p.i.v. rating of 1000V or more.

Peak Inverse Voltage

Another important consideration is the peak inverse voltage (p.i.v.) the rectifier will be subjected to. Theory would suggest twice the peak a.c. voltage of the transformer secondary but that’s neglecting the rise in voltage under no-load conditions and the occasional mains surge.

For safety, I always choose a p.i.v. rating about 50% greater than the theoretical figure. Just to give you an idea of the numbers involved, I’ll provide an example, using the 250V a.c. transformer secondary already mentioned.

The peak voltage will be 353.5V. Doubling that gives 707V. Why double?

Remember, the cathode of a 1N4007 or BY127 rectifier holds 353.5V positive by the capacitor, the anode then swings up to 353.5V negative as the mains waveform completes the next half-cycle.

Adding my 50% safety factor gives a total of 1000V. So, that’s why I think it’s best use a rectifier diode with a p.i.v. rating of 1000V or more.

Half-wave rectification is not used for high current power supplies (unless there’s no financially viable alternative) so current is not a problem if a silicon rectifier is used. A 1N4007 or BY127 rectifier diode would be fine.

One final point: the ripple voltage across C1 will be quite large (too large for feeding small-signal circuits). Consequently, the reservoir capacitor will be followed by at least one resistor-capacitor smoothing filter.

Next Time

Next time around I’ll cover full-wave rectifier circuits and say more about smoothing capacitors. I’ll also mention some of the companies I know that sell new h.t. transformers.

In the meantime, take note of what’s available whenever you visit a radio rally or show. And don’t forget radio club junk sales. If you’re lucky they can produce some bargains priced transformers.

Oh well, the Editor is looking at his watch so it must be time for me to put the ‘shutters up’. So, until it’s my turn ‘in the shop’ again I’ll say cheerio and, as you won’t be hearing from me again ’til next year may I wish you all a very merry Christmas and a happy and prosperous New Year. Remember, send your letters and E-mails to me either via the PW offices, via E-mail to phil@oldpark.demon.co.uk or direct to me, Phil Cadman G4/JCP 21 Scots Green Close, Scots Green, Dudley, West Midlands DY1 2DX.

Cheerio from Phil, see you in March.

Avoidance of danger...and not just of getting electrocuted (Heaven forbid) but
The Rev. George Dobbs G3RJV describes a practical idea, an old favourite - a regenerative short wave receiver - that can provide a lot of fun and good results.

"You see, wire telegraph is a kind of a very, very, long cat. You pull his tail in New York and his head is meowing in Los Angeles. Do you understand this? And radio operates exactly the same way: you send signals here, they receive them there. The only difference is that there is no cat."

Albert Einstein

Without doubt the thing that brought me into amateur radio was building simple receivers as a schoolboy. I guess that applied to many people who entered the hobby in my era. I've been surprised to meet lots of radio amateurs who have never had the thrill of hearing the first signals on a receiver they had actually built themselves. However, in more recent times amateur radio receiver building has had somewhat of a renaissance. This came with the rediscovery of the single heterodyne receiver, we call it the direct conversion receiver.

Another very common receiver technology of the 1920s and 1930s, largely ignored today, was the regenerative receiver. The regenerative technique was discovered by that amazing radio pioneer, Edwin H. Armstrong.

Armstrong also invented the superhet receiver and frequency modulating! When experimenting with the early de Forest audion valves, he thought of feeding the oscillating current from the plate (anode) back into the grid.

The Armstrong receiver would not only be a detector of electromagnetic signals, it would also be an amplifier of the signals. What began as an experiment to squeeze the maximum amount of usage from very expensive valves produced a very effective method of receiving radio signals.

(However, it's only fair to point out that a very long battle was fought between Armstrong and de Forest as to who had first discovered the principle of regeneration).

Another Advantage

There's yet another advantage but this is where matters become a little more complex. Regeneration introduces 'negative resistance' into the circuit. Assuming the amplifier to be tuned, negative resistance results in a vastly increased selectivity in the tuned circuit. The circuit's selectivity, or 'Q', is equal to its net reactance divided by its net resistance.

The negative resistance effect

Continued on page 47
OPEN TO CALLERS MON - FRI 9AM - 4PM. CLOSED SATURDAY.

If your garden is a bit like this advert, lacking in space, then you're probably not able to erect the best antennas for the H.F. bands. Or maybe you don't want to advertise the fact that you have expensive equipment in your house.

The AD270 and AD370 Active Receiving Antennas from Datong Electronics offer an ideal solution to your problems. Offering compact size they have a frequency coverage of 200kHz to well over 30MHz. Their performance is comparable to a full size dipole, without the disadvantage of being tuned to a specific frequency.

The use of dipole in the AD270/370 design eliminates any noise that is picked up by the coaxial cable, unlike a mono-pole antenna. A switchable pre-amplifier enables an extra 12dB of gain to be added if required.

The AD270 is for indoor use while the AD370 is designed to withstand the British weather.

At a cost of £70.44 for the AD270 and £93.94 for the AD370 they offer excellent value for money. The price also includes a Power Supply, VAT and Postage.

For Converters, Filters and Active Antennas call now for a catalogue and information.

Datong Electronics Ltd

Clayton Wood Close, West Park, Leeds. LS16 6QE
Tel: 0113-274 4822 Fax: 0113-274 2872

---

If you have been chasing elusive DX and not being heard? Lift your signal out of the noise with one of our amplifiers. We have a range of three HF amplifiers and two VHF models to suit most needs.

**EXPLORER 1200**
- Uses 2 x 3-500ZG valves
- 10-160m including WARC
- Will give 1200W O/P for hours

The new **CHALLENGER HF amplifier**
- Produces in excess of 1500 watts
- 10-160m including WARC bands
- Uses a pair of 3C500A7 ceramic triodes
- Full protection including grid trip and overload
- Internal 1.5VA power supply
- Forced air cooling

2m and 6m DISCOVERY VHF amplifiers also available.

**HUNTER 750**
- Single 3-500ZG valve
- Gives 750W O/P to lift you out of the noise
- 10-160m incl WARC

Suggestions for your Christmas stocking:
- MOBILITE hands-free microphone for mobile radios (control box has integral tone-bass)
- Standard plug £39.95
- Modular plug £12.50
- For hand held radios (headset with single earpiece) £24.55
- 'SOFT-START' louser protector for your existing amplifier. Ready to plug in with 13A plug and socket £89.00

We are pleased to offer a 10% discount on your order. Please mention Practical Wireless when replying to advertisements.
**MULTICOMM 2000**  
**LARGE SHOWROOM & FULL MAIL ORDER**  

**SPECIAL OFFERS**

<table>
<thead>
<tr>
<th>Product</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>YAESU FT-8500</td>
<td>£469.00</td>
</tr>
<tr>
<td>ICOM IC-7TE</td>
<td>£289.00</td>
</tr>
<tr>
<td>KENWOOD TS-870</td>
<td>£1959.00</td>
</tr>
<tr>
<td>KENWOOD TS-50</td>
<td>£875.00</td>
</tr>
<tr>
<td>ICOM IC-2350</td>
<td>£465.00</td>
</tr>
<tr>
<td>YUPITERU MVT-7100 Scanner</td>
<td>£259.00</td>
</tr>
<tr>
<td>ALINCO DX-70</td>
<td>£875.00</td>
</tr>
<tr>
<td>ALINCO DR-605</td>
<td>£485.00</td>
</tr>
<tr>
<td>YUPITERU MVT-7200 Mobile</td>
<td>£345.00</td>
</tr>
<tr>
<td>KENWOOD R-5000</td>
<td>£885.00</td>
</tr>
<tr>
<td>AOR AR-7030</td>
<td>£725.00</td>
</tr>
<tr>
<td>IC-950</td>
<td></td>
</tr>
<tr>
<td>IC-271E</td>
<td>£399.00</td>
</tr>
<tr>
<td>KENWOOD R-5000</td>
<td>£625.00</td>
</tr>
<tr>
<td>KENWOOD R-5000 VHF</td>
<td>£735.00</td>
</tr>
</tbody>
</table>

**BARGAIN BASEMENT**

<table>
<thead>
<tr>
<th>Product</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICOM IC-2PET</td>
<td>£149.00</td>
</tr>
<tr>
<td>IC-970</td>
<td>£559.00</td>
</tr>
<tr>
<td>ICMR-71E</td>
<td>£575.00</td>
</tr>
<tr>
<td>ICM-9100</td>
<td>£625.00</td>
</tr>
<tr>
<td>ICMR-7100</td>
<td>£925.00</td>
</tr>
<tr>
<td>YAESU FT-790</td>
<td>£299.00</td>
</tr>
<tr>
<td>YAESU FRG-7</td>
<td>£145.00</td>
</tr>
</tbody>
</table>

**SALES HOTLINE:** 01480 406770  
Unit 3, 86 Cambridge St. St Neots, Cambs PE19 1PJ  
Fax: 01480 406770  E-mail: 100302,2651 @compuserve.com
Produced by regeneration is less than its fixed positive resistance when the circuit is just below self oscillation. When held in this state, a regenerative stage provides an amazing increase in gain and selectivity. What a useful technique!

But like most simple things, there are problems! There is a critical point at the threshold of oscillation when the circuit’s positive and negative resistances are equal.

The 'threshold' point, at which the net circuit resistance is zero, is very difficult to maintain. The smallest change in the signal (anything from random noise to the hand capacitance of the operator adjusting the knob) will push the circuit into oscillation.

Once above the oscillation threshold, a whole new set of characteristics appear. Strange secondary oscillations are introduced, and they can turn off (quench) the main oscillations under certain conditions producing circuit gains of up to a million times. (This effect was also discovered by Armstrong and called 'Super Regeneration', and was a technique used in the very first v.h.f. receivers. But that's another story!).

Amplification & Sensitivity

Regeneration could be summed up as a technique which allows one stage to produce a lot of amplification and good selectivity. But it is difficult to control.

Most practical regenerative receivers use a regenerative detector stage. A very economical approach as the one stage selects the signal, detects it and amplifies it.

In the recent revival of interest in simple regenerative receivers, several radio amateurs have used circuits which have a regenerative r.f. amplifier ahead of a simple detector. One of them is Chris Garland G3RJT, who hail from Holmefirth in Yorkshire, the site of the famous BBC TV series 'Last of the Summer Wine'.

Chris used an N8L as an infinite impedance detector (another good old technique) fed with radio signals via a regenerative amplifier. The idea was further developed by Colin Davis G3YMU, as the 'Nicky TRF' and appeared in Sprat, the journal of the G-QRP Club. I built the Nicky and rate it as about the best regenerative receiver I've used.

More recently in the Communications Quarterly (Fall Autumn - 1995 issue), Charles Kitchen NI1EV, in a very extensive article on regenerative receivers, used a regenerative amplifier to feed a crystal detector. And the receiver I'm describing is based upon the ideas in that article.

Classic Set

The diagram, Fig. 1 shows a classic Crystal Set. If you have never built one, you should be ashamed of yourself!

The circuit in Fig. 1 is that brought radio from the laboratory into the home. In reality it's just a tuned circuit to select the desired signals and a diode to detect the r.f. signals feeding headphones. Very simple, but the received signals are weak (no amplification) and the selectivity is so poor that often several stations can be heard at the same time.

The diagram Fig. 2 shows one way of improving the basic crystal set. The simple detector remains but ahead of it is a regenerative r.f. amplifier.

Addition of the amplifier will provide a high degree of selectivity together with a lot of r.f. amplification of the radio signals. The detector is followed by an audio amplifier which is capable of driving a small loudspeaker.

A further advantage is that the regenerative stage can be operated just below the point of oscillation for a.m. signals. It is operated just above the point of oscillation to provide a heterodyne for c.w. and s.s.b. signals (it's a multimode receiver!).

The full circuit for a regenerative crystal receiver is shown in Fig. 3. The transistor Tr1 is a Hartley Oscillator where C4 is the feedback capacitor to a tapped coil L1.

The requirement is to operate Tr1 at the point of oscillation. To this end the voltage supply to Tr1 is very small. Three diodes, D1, 2, 3, act as a voltage regulator supplying 18V.

The current through Tr1 is controlled by R1. Setting R1 for maximum gain without inducing oscillation is critical but once the setting is achieved the amount of gain is quite amazing.

Fig. 4: The 'Paupers Receiver', dual-band option (see text).

Fig. 5: Coil winding details of L1 (see text for other winding details).

Fig. 6: Illustrating the 'Ugly Bug' style construction.
I can honestly say that Ray Petri deserves success with this book. If it had been available when I was at school, I could have achieved more.

The purist may claim that by using a calculator the student is cheating. They may even go so far as to say that the student is cheating. But I say that nobody should criticise the author, book or calculator the student is using. The key point is that the student is learning.

Aimed at the radio enthusiast heading for the RAE and various trade examination courses, this book will certainly encourage anyone to have a go and understand. Ray's book takes the fear out of mathematics and will find use in RAE courses, colleges and in schools.

I'm sure it will become a classic and it's something I'm going to have on my bookshelf...because it's never too late to learn. But first I'll have to buy a new Casio Calculator...it'll be worth it!
Scottish Awards
From the GM6X group of Scotland, I’ve received news of two new Scottish awards. They will no doubt appeal to award-chasers.

The first is ‘The Islands Of Scotland Award’, aimed at encouraging operators to work the Scottish Islands, (the ‘Chaser’ section). There’s a separate section which also encourages the more adventurous amongst us to actually get out there and to activate the islands (the ‘Activator’ section!).

The second award relates to the reintroduced ‘Scottish Activity Weekend’. This is intended to encourage activity by all Scottish amateur stations, and to promote world-wide interest in working Scottish stations.

There’s also a short wave listener category for both awards. Details of both can be obtained from:

Scottish Awards
via: <75564.16120CompuServe.

News Snippets
News ‘snippets’ from the RSGB’s DX Newsheet now. Rev. (formerly TR5DR) is now active from the Malagasy Republic, as 5B6FJ, along with his wife Donnie, who is also known as 5B6FJ. Both are active on 7MHz c.w.

On Macquarie Island, Graham VQ5WG will be active as VQ5WG from 15th of November, and in Senegal, Rick K3IPK will be operating under the callsign 6V6U, with QSLs to his home call.

I’ll start this month with a request for help from Henry (Hank) K3IPK. He is seeking the QSLs to his home call. Operating under the callsign 6V6U, Senegal, Rick K3IPK will be from the 15th of November, and in 7MHz c.w.

Details of both can be obtained from:

Scottish Awards
via: <75564.16120CompuServe.

Your Reports
I’m starting your reports with 7MHz and the higher bands. This is because it seems that is where most of our reporters’ activity has been concentrated.

Although many reporters mention that conditions have ranged from ‘patchy to poor’, it seems that they have nevertheless managed to work all parts of the globe! Just goes to show what skill and operating experience can do under rough conditions eh?

For my part, however, I’ve just been ‘ragchewing’ around 1.8MHz s.s.b. when my work schedule and family commitments allow.

Unfortunately I must add, this isn’t very often of late.

The 7MHz Band
First with his 7MHz band report comes Charlie Blake MOIAJ of Milton Keynes. He’s currently in negotiation with the local authority over the erection of an antenna (best of luck, Charlie!).

However, while still in the ‘s.s.b. mode’ Charlie reports s.s.b. reception on 7MHz of 8R1Z (Guyana) in contact with IK5SNR (Italy) at 0548, T90GAP (Guatemala) working SP4LVH in Poland at 0556, YV3FNI (Venezuela) and XE1STL (Mexico) working 5S5D in Slovenia at 0526, VK3AJ (Australia) in contact with SM3HWC (Sweden) at 0656UTC.

Charlie also picked up the special call UY7GHA chating to SS1ST at 0601 (QLS via UT7DX). He also logged 9A2FV/MM located at 44°15E working Tony G0EKD in Bedford at 0817UTC.

A fellow ‘early bird’ is Ted Trowell G2HKU on the Isle of Sheppey, who has also been up at the crack of dawn on 7MHz. Using up to 70W of c.w. Ted lists contacts with KP4XX (Puerto Rico), S9V/S1VAD (Crete) 9H3LJ (Malta), CM72PL7 (Cuba) and 9H3RJ (Gozo Island), all at around 0500UTC.

The 14MHz Band
As usual, the 14MHz band still carries the bulk of h.f. DX traffic. However, reporters indicate that 18 and 21MHz are offering reasonable DX opportunities at time.

Listener Derek Blundon BR5 171057 in Westlea, Swindon, reckons that 14MHz was the best band for him this last month. Derek reports 16 new DXCC countries this time. His s.s.b. log includes s.s.b. reception of TY1JJ (Benin) and 9V1MD (Togo) at 0930, and 2Z2JE (Zimbabwe) at 0800UTC.

Afternoon DXing sessions for Derek produced 5B4AB (Cyprus) at 1347, J50KGU (Japan) at 1400, 9070TR (Zaire) at 1500.

Down to Skeven in West Glamorgan now, and Carl Mason G0VWV, who has been ‘ragchewing’ the key quite a lot of late. Using 90 watts of c.w. into a G5RV dipole, Carl has logged 2Q1LO (USA) at 1215, C9NMC (Morocco) at 1037, CD5B9 (Cuba) at 1217, and OK522/09O (Aland Island) at 0800UTC.

A quick ‘phone call from Eric Masters G0KRT of Worcester Park brought me the news that he’s been extremely busy with his studies of late. As a consequence, the radio has taken a very firm back seat! However, Eric reports just one contact on 14MHz in the form of a 5W c.w. contact with EA8DA/DRP for his first OQP/DRP contact with the Canary Islands, at 2128UTC.

The 18MHz Band
The regular monthly report from Don Mclean G3NDF from YeoVil indicated that the 18MHz band has opened for a few days on the short path to Asia at around 1200UTC. He says it’s mostly Japanese stations being heard.

Don also noted that African stations have been coming in during the late afternoons. On the other hand, north America has been prominent both around 1300 and from 2100UTC onwards.

The G3NDF 18MHz log includes s.s.b. DX contacts with AP2JLB (Pakistan) at 1620, D2F1B (Angola) at 1941, HS7QO (Korea) at 1344UTC.

There’s a string of Japanese stations between 1200 and 1400, YJ6HF (Jordan) at 1348, TT5SP (Chad) at 1601, G3L via F50JZ, Z02CS (Zimbabwe) at 1739, 5N8JM (Nigeria) at 1544, and 5X1D (Uganda) at 1727UTC (QLS to SM6BFJ).

Signing-Off
Well, that’s just about all the space I have this month folks and it’s signing-off time! My grateful thanks to all reporters for their information and support.

I’m only sorry that I’m not able to squeeze it all in! all the best for now, and keep up the good work! Good DXing!

Charlie Blake MOIAJ would perhaps rather fancy an antenna like this, but living in a ‘New Town’ he is taking the sensible approach and negotiating with the planning authorities first (see text).
Trans-Equatorial Propagation

Propagation on the 50MHz band during September was generally very poor. This is normally expected at that time of the year. There were a few Sp-E events enabling contacts to be made with stations in LA, OH, OZ and SM on September 8 and to CT and EH on September 27. Other openings occurred at other times during the month but were so brief as to be insignificant. It was pleasing to note a number of small auroral openings. These were observed on September 19, 22, 23, 26 and 27.

According to my records the last aurora heard at my QTH was on May 27. Last time I mentioned that the station of JAVOK had heard signals from Taiwan and Malaysia making him wonder whether the autumn trans-equatorial propagation (Sp-E) paths had started to open up. Well I can tell you that the t.e.p. has definitely returned to the 50MHz band. On September 28 the 50MHz band was open to southern Africa between 1600-1800UTC.

The first ‘sighting’ in the UK was probably when Ken Osborne G4IGO (1080) heard the Namibian beacon V51VHF (JG67) at 1800UTC, initially it was very weak but slowly built up to peak at 579. For much of the time however it averaged 559 with little fading and a clear tone. Ken remarks that he was alerted to the rise in southerly propagation by the reception, at 1525UTC, of west african television on 48.250MHz. These TV signals, which he has received many times in the past, faded out at 1740UTC just before the loss of the beacon V51VHF some six minutes later.

Ken also heard 7Q7RM in Malawi between 1740-1745UTC but no two-way contact was established. At my QTH I heard the V51VHF beacon (50.017MHz) between 1725-1755UTC peaking 539 with slow SQ8. The distance from my QTH to V51 is something in the order of 8500 km. The opening to V51 was also observed by Neil Carr G6JHC in IO83. Unfortunately it appears that no further activity was heard in the UK.

However, F1MXE LUNIS heard the 7Q7RM beacon (50.002MHz) peaking 529 at 1800UTC. He then went on to work the two resident 50MHz operators in Malawi 7Q7JL and 7Q7RM. Both stations by the way are located in KH74.

Another brief opening was spotted on the following day, September 29. At 1525UTC, Keith G4UFF (J001) heard the V51VHF beacon peaking 539. No other activity was noted apart from the station of V51DM who was working a number of stations located in France and Italy.

Ionospheric Characteristics

Trans-equatorial propagation involving reflection from the ionospheric F-layer has a number of worth noting. The ionisation occurs in two belts located north and south of the geomagnetic equator.

Although the position of the ionised belts are independent of the type of year they become unbalanced in intensity as the sun favours either one or other region. However, during the period of the equinoxes (September 23 and March 21) when the sun crosses the equator the intensity of the two regions are at their greatest. This is because the length of day and night everywhere are of equal duration and therefore the ionisation effects are similarly balanced.

After about the very specific about the date when the sun crosses the equator, in radio terms the t.e.p. season is generally accepted to be between September/November and February/April. Propagation is confined to paths at ninety degrees to the geomagnetic equator (not the geocentric one) and extend to approximately 4000km north and south of it.

In this part of the world the northern limit is generally accepted to be in the Mediterranean area. The UK is situated too far to the north for most (if not all) t.e.p. events and access to the ionised zones will normally be made via the help of another propagation mode.

It's interesting to note that both before and during the t.e.p. opening on September 28 there was Sp-E propagation between the UK (and other parts of Europe) to southern Spain. It is very likely therefore that the opening to V51/7Q7 was a combination of Sp-E + t.e.p. This is not unusual and has occurred many times in the past.

Of course by the time you read this column these t.e.p. openings may well have disappeared. If you want to catch these type of events (or other propagation modes) it's no good reading about them two months after the opening!

You need to subscribe to one of the v.h.f. discussion groups on the internet (majordomo@dxlist.com or make use of the DX Cluster (via packet radio)). Apart from actually listening to your radio 24-hours a day these two are probably the most practical methods of ensuring that nothing is missed.
Packet Software

Regarding packet radio, I'm now using ClusterMaster (Ver 2.0) software written by Tony IJX (a well known 50MHz operator). The freeware (it doesn't cost anything) consists of a suite of programs allowing DX Cluster operation and control of Icom and Kenwood computer aided transceivers (c.a.t) via an RS232 interface.

Some of the main features include: voice control of incoming DX spots (it's amazing, just turn the volume up and it tells you that the 50MHz band is open) and separate PacketCluster windows for your own traffic and general traffic in monitor mode.

There's also full two way integration between PacketCluster and rig control. No need to turn your radio to the wanted DX frequency. The RigMaster/RigMate software does it all for you.

Another feature (for Kenwood rigs only) is an automatic antenna s.w.r. graphic plot based upon the internal s.w.r. meter readings. There's also a facility to produce antenna gain polar plots based upon the 5-meter readings obtained whilst the antenna is rotated on a steady beacon signal.

I run the IJX software on a Pentium 120 but any reasonably equipped PC (with soundcard) should be sufficient. Two serial ports are required if you wish to enjoy all the program features.

One port is connected to the packet radio terminal mode controller (t.n.c.) and the other to the RS232 link to provide automatic rig control. If you have trouble obtaining the software (it's on the Internet and other sources) you can obtain a copy by sending me a formatted 1.4Mb 3.5in disk (with return postage). I would however appreciate a few lines for the column in return.

Activity In Tunisia

Frank BLVHR has sent a report about his recent activity with QD2V and DK3DM from the 3VBB Club station in Tunisia. Permission to operate on the 144MHz band from this country had only recently been granted and therefore many v.h.f. DXers were queuing up to make skeds with the club station.

Initially the group used a single 10-element Yagi which was changed to a 17-element F8T Yagi after three days of operation. By the end of their first week the group had succeeded in building a 4 x 17-element Yagi array capable of receiving echoes from the moon.

Using a p.a. consisting of 2 x 8874 triodes 3VBB made QSOs on the 144MHz band with stations in 95 locator squares. A total of 60 contacts were made via ionoscat latter, 10 via earth-moon-earth (e.m.e.) communication, 12 via field aligned irregularities (f.a.i.) and 13 via meteor scatter (m.s.). Stations in the UK known to have made an m.s. contact with 3VBB include G6CZU, G0FJC, G06EMS, G0KAS, G1HWY, G3MVX, G3WGT, G4AEP, G4OFU, G4PQG, G4RV and G4YTL.

Beacon Operational

The beacon GB3REB is now operational again on 70.010MHz following a move of QTH to its new site near Camberley, Surrey. The beacon is running 28W e.r.p. from a 2-element Yagi beaming at 330°. Reception reports should be sent to the beacon keeper D. Ferigan G3ZYV.

Changes have recently been made to two of the three operational from the GB3RE beacon site situated in the Shetland Isles. The 6m (50MHz) unit is again radiating on 50.84MHz after successful installation of a new antenna.

Another feature for Kenwood rigs only is an automatic antenna s.w.r. graphic plot based upon the internal s.w.r. meter readings. There's also a facility to produce antenna gain polar plots based upon the 5-meter readings obtained whilst the antenna is rotated on a steady beacon signal.

I run the IJX software on a Pentium 120 but any reasonably equipped PC (with soundcard) should be sufficient. Two serial ports are required if you wish to enjoy all the program features.

One port is connected to the packet radio terminal mode controller (t.n.c.) and the other to the RS232 link to provide automatic rig control. If you have trouble obtaining the software (it's on the Internet and other sources) you can obtain a copy by sending me a formatted 1.4Mb 3.5in disk (with return postage). I would however appreciate a few lines for the column in return.

Beacon Operational

The beacon GB3REB is now operational again on 70.010MHz following a move of QTH to its new site near Camberley, Surrey. The beacon is running 28W e.r.p. from a 2-element Yagi beaming at 330°. Reception reports should be sent to the beacon keeper D. Ferigan G3ZYV.

Changes have recently been made to two of the three operational from the GB3RE beacon site situated in the Shetland Isles. The 6m (50MHz) unit is again radiating on 50.84MHz after successful installation of a new antenna.

The power output for GB3LER is 45W in a folded dipole aligned for maximum north-south radiation. The antenna was designed and built by Dee-Com as the request of an anonymous supporter of the beacon project.

The beacon keeper, Andy Steven GM4PKP, passes on his thanks to both Dee-Com and the very kind person who arranged the procurement of the antenna. Without that support it would have been many more months before the beacon was heard to have returned to service.

The 2m unit (144.955MHz) operating on 144.955/2 uses two 5-element Yagis, one beaming at 45° and the other beaming at 135°. This beacon has been running on reduced redundancy for some time with full power (150W) in the north-east feed and low power (10W) in the south-east feed. (Normally both antennas are fed with 150W each!)

During September the situation was reversed with full power being connected to the south-east antenna to cover any possible tropo openings experienced during the autumn months. The low power in the north-east direction will still provide adequate auroral ionospheric scatter coverage during periods of low solar activity. Andy reports that he took the decision to leave high power in the north-east feed during the summer to provide indication of ionospheric scatter modes in northern latitudes during this period. During 1995 the GB3LER beacon was heard on many occasions in northern Scandinavia via this propagation mode.

Tables Return

I haven't run v.h.f. tables for a number of years but now intend to return them for the 1997 period. Hopefully it will stimulate some more activity on the various bands above 30MHz.

Entries can be for any band, any mode. You are to resolve some outstanding issues with the high power installation. It's expected that both p.a. stages will be returned to operational service at that time.

Allan Duncan GM42UK is now the beacon keeper for the GB3ANG series of beacons currently operating on 70.020, 144.975 and 432.980MHz. Allan is considering building a beacon for the 1.3GHz band if there is sufficient interest. Please contact him if you support this proposal.

Carrying on the Practical Way - Continued from page 47

L1 is open to experimentation. The tapping ratio of L1 seems to work well at about 3:1.

When experimenting with turns for L1, the main requirement is to be able to use R1 to induce (and stop) oscillation across the whole tuning range. Try in L1, I think it's best to build the receiver 'back-to-front'. Tr1 above the base board and the other components placed by bending over and soldering the emitter lead upwards. Remember to count the pin numbers as you go, and be careful not to overheat the emitter lead! The breadboard technique would probably be the best approach for the receiver. However, I built mine "ugly" fashion on a piece of printed circuit board (p.c.b.) material.

The front panel does need to be metal to prevent hand capacitance disturbing the regeneration point. And again I used a piece of p.c.b. material, with sloping 90° sides. I mounted on the bottom of the varicon capacitor to the base board using a hot glue gun. This capacitor is fitted with a 8.1 in-line epicyclic slow motion drive.

The 35mm canister was cut down in size and also mounted to the base board with hot glue. The controls Tune, Bandspread and Volume are front panel mounted.

The audio amplifier chip is wired 'dead bug' fashion on the base board with the pins pointing upwards. Remember to count the pin numbers as fitted. Transistor Tr2 is mounted leads upwards held in place by bending over and soldering the emitter lead to ground. A three tag group board is used to mount Tr1 above the base board and the other components are point to point wired around Tr1.

I think it's best to build the receiver 'back-to-front'. Build the audio amplifier first and test it, add the audio pre-amplifier and test it. Then complete the rest of the receiver.

Real Radios

Regenerative receivers are real radios...the user has to operate them! For a.m. stations the feedback control is set just below the point of oscillation and for c.w. and s.s.b. signals just above the point of oscillation.

The correct point is usually marked by a rushing sound in the output. The tuning is by means of C2 with use of the bandspread, if fitted, to allow fine tuning.

The main problem is that these controls interact with each other. The feedback control will require readjustment as the receiver is tuned and further re-adjustment according to the strength of the received signal. So it's a real "hands-on radio" receiver.

My approach is to roughly set the feedback control according to the tuning point, find that station and then re-adjust the feedback. The bandspread control, if fitted, is set at midway and then adjust to fine tune required signals. But the process is soon learned by using the receiver.

There's enough audio output to drive a small loudspeaker but walkman type phones work well. I did not bother to fit an on/off switch but used the snap on connector for the PP3 battery.

My advice is to just build the receiver. It can be done in an evening at low cost and will give a lot of enjoyment and a real insight into the earlier days of radio reception. Go on...have a go and rediscover "real radio"!
Please mention traders’ table when enquiring about any items on these pages!
Table
YOUR GUIDE TO SECOND-HAND EQUIPMENT

ARC EARLESTOWN 01925 229881

PHOTO ACOUSTICS 01908 610625

MULTICOMM 2000 01480 406770

SHORTWAVE SHOP 01202 490099

SMC GROUP 01703 251549

Disclaimer
Advertisements from traders for equipment that is illegal to possess, use or which cannot be licensed in the U.K. will not be accepted. While the publishers will give whatever assistance they can to readers or buyers having complaints, under no circumstance will the magazine accept liability for non-receipt of goods ordered, late delivery or faults in manufacture.

 PLEASE MENTION TRADERS' TABLE WHEN ENQUIRING ABOUT ANY ITEMS ON THESE PAGES!
Many amateur radio stations possess a separate power supply. They are almost essential in today's stations, to power anything from a small piece of ancillary equipment up to the main rig. However, when looking at power supplies there are a host of specifications used to describe what they are capable of producing and how well they perform.

Voltage And Current

Obviously the most important parameters for power supplies are the voltage and current. Most supplies used for amateur purposes operate at around 12V, although many give the nominal 13.8V to enable them to equate to a fully charged automotive battery. In fact on most there is an adjustment to allow the final voltage to be altered to give the correct value, although this may be inside the equipment.

Even though most power supplies have a fixed voltage, some are fully variable. These types are more expensive and usually used for experimentation and prototyping. Their voltage may be capable of being adjusted up to as much as 25 or 30V and even more in some cases.

Be very careful if the supply is to be used for a 12V transceiver, even if only as a temporary measure. The full voltage may drop or there may be a rise in the level of ‘hum’ under peak loads. Knowing the right current for an f.m. transceiver is fairly easy because the current drawn is constant during transmit. For a sideband transceiver it’s more difficult to judge because it varies, rising under speech peaks. Here it’s usually necessary to consult the equipment handbook to see how large a supply is needed.

Ripple And Regulation

After the basic voltage and current requirements, it’s obviously wise to know how well the power supply performs its functions including of course ‘ripple’ and regulation. Most supplies today are fully regulated.

Many power supplies use a linear regulator where the output voltage is maintained by varying the resistance of the series transistor or field effect transistor (f.e.t.). Nowadays switching regulators are becoming more popular. Here a series element, normally a f.e.t., is switched on momentarily to charge up a large reservoir capacitor to the required output voltage. As it discharges the series switch turns on to give another pulse to maintain the output at the right voltage. In both of these types of regulator, the ripple and output stability when the load is changed are the two major factors.

The ripple is the amount of cyclic variation, normally measured as an r.m.s., or peak-to-peak value, for a linear regulator the ripple will be 100Hz - twice the mains frequency. For a switching regulator the frequency will be much higher. Usually between 50 and 200kHz. Also beware the ripple for switching regulators is normally measured as an r.m.s. value, but there are usually sharp ‘spikes’ which can cause havoc with some circuits. As the spikes are very sharp and short they do not affect the r.m.s. value significantly, but they can be quite large as shown in Fig. 1b.

The other aspect is load regulation. When a large load is applied to the output, the voltage will change by a small amount. This is what is called the load regulation and it’s a measure of how well the supply can maintain its output voltage as the current changes. For many the output may change by 10mV for a load change from 0 to 100% (i.e. no load to full load), See Fig. 2.

Line regulation is also given. This indicates how much the output voltage changes for a change in mains input voltage. Typically this might be a few millivolts for ±10% input voltage change.

Circuit Protection Required

Protection is required because most power supplies use some form of series transistor or f.e.t. to act as either a linear regulator or as a switch in a switching regulator. In either case if this series element fails and becomes a short circuit, it can mean that a large voltage can appear at the output.

In some cases it may be twice or even more than the required output. Naturally this could have a disastrous effect. To overcome this an ‘over voltage’ protection circuit is often included.

Over voltage protection circuits can operate in a number of ways, but the one shown in Fig. 3 is one of the simplest and most effective I’ve come across. It operates very simply. When the output voltage rises above the danger level the zener diode starts to conduct, This fires the thyristor which forms a virtual short circuit.

The short circuit then blows the fuse, removing the supply from the regulator and hence the set. Simple but effective!

In view of the damage which can be caused by the unlikely event of a regulator failure, it is well worth having over voltage protection. It may cost a bit more money or effort to include it in the design, but it may save its cost many times over if the power supply fails.

IAN POOLE G3YWX brings this series to a close with a look at power supplies and the essential role they play in amateur stations.
Peter Shore takes his monthly look at the broadcast bands after starting off with an idea for a listener's ideal Christmas present.

Passport To World Band Radio has been described by the New York Times as the closest thing to a TV guide for world band radios. Buy yours now from the PW Book Store!

If you are searching for a Christmas present for a fellow radio enthusiast (or if you're the wife/girlfriend/husband/boyfriend of an enthusiast and have sneaked a look at this edition of Practical Wireless in the hope of some Yuletide inspiration), you could do worse than get him or her a copy of the 1997 edition of Passport to World Band Radio. It has been described by the New York Times as 'the closest thing to a TV guide for world band radio', and the publishers claim it's the world's largest selling short wave guide.

Passport to World Band Radio is cleverly aimed both at complete Novices, and people with an intimate knowledge of international radio listening. For people who have ever switched on a radio set to listen to stations abroad before, there are simple, straightforward explanations of how to operate a short wave radio, and how to improve reception.

Then there are profiles of the principal international stations, from the Voice of Russia (VOR) to Radio France International (RFI), and a comprehensive section about what programme is on the air at what time. New for 1997 is a country-by-country listing of times and frequencies of broadcasts in English followed by a similar section covering the national languages of each broadcaster, from Arabic out of Saudi Arabia to French, German and Italian from Switzerland's SRI.

And to conclude Passport to World Band Radio - well, actually it's the last third of the publication - are the fabled 'Blue Pages'. These comprise a frequency-by-frequency table of all the short wave frequencies used by the world's global broadcasters. The blue pages are relatively simple to use, particularly if you are an experienced listener, but may be a little daunting for newcomers. They are right up-to-date, with information for the winter period that started on 1 December.

In fact, the blue pages are more current than the white pages, as in all the white page entries the BBC is shown as using 15.07MHz, which it stopped using at the end of October, but the blue pages show the replacement channel of 15.575MHz! All in all, the book represents good value at £15.50 in the UK - and of course it is available by mail order through the PW Book Store!

Developments

Look out for developments at Voice of America (VOA). The station VOA Europe, broadcast on satellite and medium wave across the continent (and to other parts of the world too) may change its name. Voice of America is negotiating with other US broadcasters on the formation of a consortium which would take over VOA Europe and run it as a private station. More news on this as it develops. Also from VOA comes news that it is to build a short wave relay station on the Mariana Islands in the Pacific. The new station, which will cost around US$21 million, will broadcast VOA and Asia-Pacific Network programmes. Transmitters from the former Radio Free Europe/Radio Liberty relay station in Portugal will be used, giving the station three 500kW transmitters.

Radio France International's (RFI) 24-hour-a-day French service has been relaunched as an all-news station. The change, which took place on 16 September, is in response to a change in the way people in Francophone countries have been using the station. It seems that they want more news, so RFI is now providing ten minutes of news every half-hour.

Radio Denmark's English programme has funding only until the end of this year, so if you want to be certain of hearing it before it could, theoretically, be cut, tune in at 0900UTC on the first and third Sunday of the month on 13.80 or 15.22MHz. Contact the station at PO Box 666, DK-1506 Copenhagen, Denmark, or via E-mail through the English service producer, Julian Isherwood at jui@dr.dk.

Further Afield

Harold Burgin has been listening to stations further afield. He reports that at his home in Witney, Oxfordshire, he has managed to log on to Radio Melopía in Arequipa, Peru on 5.995MHz; Radio Victoria in Lima, Peru on 6.018MHz; Radio Union, also in Lima, on 6.115MHz and Radio Eduacion in Mexico City on 6.185MHz. Harold has heard all of these from around 0600 until fade out (although he has not specified what time that is!). If anyone else has some interesting logs, please let me know via the PW offices.

One other Mexican station that can sometimes be heard in Europe is Radio Mexico International (RMI), although its target is the Americas. The station has Spanish and English language programmes on either 9.705 or 5.985MHz between 2300 and 0500, 1200 and 1600 and 1800 and 2300 UTC. The station's address is RMI, Apartado 21-300, 04021 Mexico City.

European News

Back in Europe, the Maltese Voice of the Mediterranean (VOM) is back on the air, this time from Russia. Tune in to English at 1900-2100 on 9.765MHz which should be easy to hear as the transmitter is 500kW!

South Africa's Channel Africa will be funded by the South African Government up to next March. The government commission looking into the future of external radio from South Africa was swayed, according to Broadcasting Minister, Jay Naidoo, by the support Channel Africa received from major international organisations, other broadcasters, African states and human rights bodies.

Meanwhile in Britain, BBC World Service announced a plan to reduce its costs by more than £6 million, against a potential short fall in the 1997-98 budget of £12 million. Output of some language services would be cut, including Czech to Europe, and Cantonese.

More use would be made of the Internet to deliver Cantonese language programmes into Hong Kong. And 90 jobs would go, with volunteers sought for redundancy instead of compulsory redundancies. All this happened just a few weeks before the opening of the BBC's new Thai language station on 31 October. The station has two 250kW transmitters, with two more to follow by next Spring.

The transmitters will come from the Hong Kong relay station which has now closed. (If you want to hear BBC World Service from Thailand, try 9.58, 6.065 and 5.99MHz for English).

That's all from me this month. Have a good few weeks listening to the short wave bands until we meet in print again next month.

Peter Shore
Practical Wireless, December 1996

The Kenwood Story by Richard McLachlan G3OQT
The Low Down On T3 by David Butler G4ASR
Those Amazing Auroras by Ian Poole G3YWX
Three Legged Winners by Ron Ham
Tips & Tools - Workshop Practices by Clive Hardy G4SLU
Trips To Triangles & Squares by Patrick Alley G3KJW
To Would You Be Eligible? by John Worthington G3UGJ

Theory

Antenna Workshop - Delta Yags by Ray Faulkney G3ASG
Antenna Workshop - Planning Permission by Gerald Stancey G3MCK
Antenna Workshop - SWR Fact or Fiction? by Dick Passlow G0BPS
Antenna Workshop - Tuner & Skeleton Cone by George Dobbs G3RJV
Antenna Workshop - Three-Band Indoor Pi Match Antenna by John Heys G3BDQ
Antenna Workshop - Trapeze Dipoles by Ray Faulkney G3ASG
Antenna Workshop - Vertically Polarised 50/100MHz Antennas by David Butler G4ASR
Antenna Workshop - VHF Discone & Skeleton Discone by John Heys G3BDQ
Antenna Workshop - VHF/UFH Antenna Questions by David Butler G4ASR
Antenna Workshop - Voltage Standing Wave RATIO by Gerald Stancey G3MCK
Antenna Workshop - The Smith Chart by Gerald Stancey G3MCK
Crystal Clear Future by lan Poole G3YWX
Looping Over The Lawn by Ben Nock G4BXD
Make One Or Buy One? by Denis Payne G3KCR
RAE Casebook by Murray Ward G3KCB
Your Coastal Cable - Any Good? by Don Johnson K7UGG

Book Reviews

Basic Radio & Electronic Calculations (Using The Casio Scientific Calculator) 48 Dec
Electronics Service Manual 48 Jan
More Out Of Thin Air 48 Jan

Reviews

ADI - AR-146 Mobile Transceiver by John Goodall G0SXR 20 Apr
AKD Target HF-3 Communications Receiver by Rob Mannion G3XFD 21 Nov
Alinco DJ-190 VHF FM Transceiver by Elaine Richards G4LAM 28 May
Alinco DJ-814/50MHz Transceiver by Ken Smith G3LXJ 53 Nov
Alinco DR-605 VHF/UFH FM Transceiver by Leighton Smart G3OLB 38 Oct
Citroweb Antenna by John Heys G3BDQ 32 Apr
Cuscraft R7000 Vertical Antenna by Steve Locke GW5SGL 28 Sept
Garmin GPS 45 Personal Navigator by Peter Barville G3XJS 18 Mar
Icom IC-706 HF & VHF Mobile Transceiver by Richard Newton G0RSN 20 Feb
Icom IC-770 Dual-Band FM Transceiver by "Tex" Swan G1TEX 32 June
Kenwood TRC-80 Professional HF Transceiver by Mike Davenport G3SED 23 May
MFJ-9400 50MHz Transceiver by David Butler G4ASR 22 July
Quickroute 3.5 by Tex Swan G1TEX 44 July
Rever W200 SWR & Power Meter by Leighton Smart G3OLB 19 Aug
SwR-5050R Antenna Tuning Unit by "Tex" Swan G1TEX 28 Apr
The Chelcom 3-Band Windom Antenna by John Heys G3BDQ 30 Oct
The MyDel Multi-Trap Antenna by Eric Gray G3CPS 32 Dec
Watson 2030M Add-On Linear Amplifier by "Tex" Swan G1TEX 36 Jan
Yaesu FT300M 144MHz Mobile Transceiver by John Goodall G0SXR 21 June
Yaesu FT-50R Dual-Band Hand Held Transceiver by Clive Hardy G4SLU 36 Aug

Show Guides

The Essential Guide To The London Show
Picketts Lock - The Beginning 37 Mar
Editor's Corner 38 Mar
Editor's Corner 38 Mar
Floor Plan 41 Mar
Queenslounge 42 Mar
Vintage Fair 48 Mar

The Leicester Show
25 Years and Counting 40 Nov
Floor Plan 42 Nov
Show News 44 Nov
Editor's Corner 52 Nov
Practical Wireless Index Volume 72 January to December 1996

Regulars

Bargain Basement

Bits & Bytes - The Computer In Your Shack by Mike Richards G4WNC

Book Profiles
64 Oct, 48 Nov, 64 Dec.

Broadcast Round-Up by Peter Shore

Buyers Guide
80 Nov.

Carrying On The Practical Way by George Dobbs G3RJV

Club Spotlight

Competitions
Wordsearch
9 Feb.
Spot The Difference
9 Mar.

Dayton '96 Promo
18 Jan, 33 Feb, 49 Mar.

Editor's Keylines by Rob Marnell G3XFD

Endnotes 67 Jan, 67 Feb.

Equipment Specifications - The Mysteries Explained by Ian Poole G3YWX
46 Jan, 51 Feb, 64 Mar, 49 May, 55 June, 47 Aug, 53 Sept, 54 Dec.

Focal Point - The World of AN by Graham Hankins GBEMX

HF Far & Wide by Leighton Smart GWOLBI

News '96
26 Jan, 26 Feb, 12 Apr, 12 May, 12 June, 12 July, 12 Aug, 12 Sept, 12 Oct, 12 Nov, 12 Dec.

Novice Natter by Elaine Richards G4LFM

Packet Panorama by Roger Cooke
58 Jan, 74 Mar, 57 May, 57 July, 56 Sept, 74 Nov.

PW Book Store
63 Jan, 63 Feb, 79 Mar, 63 Apr, 63 May, 63 June, 63 July, 63 Aug, 63 Sept, 63 Oct, 48 Nov, 63 Dec.

Radio Diary

Receiving You
10 Jan, 10 Feb, 10 Mar, 12 Apr, 10 May, 10 June, '10 July, 10 Aug, 10 Sept, 10 Oct, 10 Nov, 10 Dec.

Scene USA by Ed Taylor WT3U
49 Jan, 48 Mar, 48 July, 52 Oct.

Valve & Vintage by Ben Nock G4EXO
49 Feb, 48 May, 48 Aug, 62 Nov.

Valve & Vintage by Charles Miller
40 Jan, 44 Apr, 46 July, 46 Oct.

Valve & Vintage by Phil Cadman GLCJP
62 Mar, 46 June, 46 Sept, 42 Dec.

VHF Report by David Butler GAASR
54 Jan, 52 Feb, 68 Mar, 54 Apr, 50 May, 50 June, 52 July, 50 Aug, 48 Sept, 50 Oct, 64 Nov, 50 Dec.

Special Offers
Cushcraft R7000 Multi-Band Vertical Antenna
37 Sept

More Out Of Thin Air
18 Apr

Practical Wireless Subscriptions - Free Binder
19 June

Practical Wireless Subscriptions - Free Book
16 May

Practical Wireless Subscriptions - £50 for 3 years
18 Sept

Practical Wireless Subscriptions - Free Reference Chart, 2m & 70cm Datacards
20 July

UK Scanning Directory
29 Aug

Practical Wireless Free For 1 Year
21 Oct

Practical Wireless Christmas Subscription Offer - Free Earpiece, Speaker or Clip
24 Dec

Special Prize Competitions
CobWebb Antenna & Mosley Antenna
25 Apr

ADI AR-146 Mobile Transceiver
17 May

IC-706 HF & VHF Mobile Transceiver Part 1
30 May

IC-706 HF & VHF Mobile Transceiver Part 2
9 June

IC-706 HF & VHF Mobile Transceiver Part 3
21 July

Air Tattoo Tickets 20 & 21st July
31 June

Star Buy
The ARRL Handbook for Radio Amateurs 1996
62 July

Passport To World Band Radio 1996
62 Aug

Practical Wireless Binders
62 Sept

Radio Amateurs Examination Manual & How To Pass the RAE
82 Nov

Radio Amateurs Map Of The World & OTH Locator Map Of Europe
63 May

More Out Of Thin Air
62 Dec

Subs Club Special Offers
17 Feb

Free Gifts
The Practical Wireless Handy Reference Data Chart
Jan

PW Pull-Out Wall Planner
Feb

The Practical Wireless Antenna Data Reference Chart
May

The Practical Wireless Morse Data Chart
Aug

1997 MFJ Radio Products Catalogue
Dec

Don’t forget we have still available PW back issues for 1996 as well as 1991, 1992, 1993, 1994 and 1995. But hurry as stocks are limited. To order back issues either use the Order Form on page 62 of this issue or telephone the Credit Card Hotline on (01202) 659930. Back issues for 1991 and 1992 are available for just £1 including P&P, all others are £2.30 including P&P.
Adverts should be sent to: Zoë Crabh, Bargain Basement Free Ads, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW.

Advertisements from traders or for equipment that is in good condition to pass, are welcome. All adverts are considered, but responsibility for the correctness of the description rests with the advertiser.

Zoe Crabh, Bargain Basement Free Ads, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW.
Erdiciliefte
£100 plus free RX mate mount aerial. All as arranged. Chris, Cambs. Tel: 1014801 466410
computer interface and software for the IBM
cress pointer swz. meter, Siskin Elecumects
Tel:101705)386184.

Faso MS hi. TWILL plus TC7B digital
CapOn SPC300 a.t.o.. 0100. Simpson frequency
madam. Telephom me if you have either of
decent Clarke mast err similar, may accept
£60. Mick GCE Portsmouth. Tel: MODS)
adapter. battery cases, soft case, f 175. Netset PRG44
870076.
70M1-11 r.f. stitched pre-amplifier£ 15. Geoff. speech processor£511, RN. Electronics LNAIQ
Paean FT -707 b.f. transceiver£275, FP -707
£230 one. Steve, Bognor Regis. Tel: (01243)

Please insert this advertisement in the next available issue of Practical Wireless,

Your advert, you decide!

Please use the older km
that all photos will safely be
nt area-ricturuilin.

Free ads? Yes it’s true! Now all
free are FREE of charge, to
readers and subscribers.
Now your news is a service in a
prospecting of your equipment (or
idea if you want to locally)
what photos will all be
published at our discretion.
when you see something
in BLACK and资本s.

BARGAIN BASEMENT ORDER FORM

Please insert this advertisement in the next available issue of Practical Wireless.

Name
Address
Telephone Number

For Sale
For Rent
For Exchange

Please write in details the contact person you wish to be contacted by,

you do want your name & address, or just your telephone number?

Your advert, you decide!

Thanks.
For Sale

TECHNICAL MANUALS: AR88, CR100, R210, HR0, F5 each. Circuits £11.50. Hundreds available. SAE list, Bentley, 27 De Vere Gardens, Ilford, Essex IG1 3EB. Tel: 0181-554 6631.

EAGLE HIGH PERFORMANCE YAGIS from 50MHz to 1296 MHz. A5-size SAE for details. Eagle Communications, Unit E3, Bank Top Industrial Estate, St Martins, Shropshire SY10 7RQ. Tel: 01691 777511 Fax: 01691 777516.

RF-8000 24 BAND RECEIVER - reasonable offer accepted. Quartz crystals large range £1.00 each. Collection quartz Y-bar. Also Lists. Lists available. Electronic Design Associates 0191-391 0545 Fax 0191-381 5256.

TECHNICAL MANUALS for WW1 radio, radar etc. RAF, Army, Navy, Luftwaffe, Wehrmacht, US Forces. Tel: 0151 722 1178 or SAE with requirements to Vintage Technical Services, 28 Welbourne Road, Liverpool L16 6AJ.

G4TNY is buying and selling top quality used amateur equipment. My low overheads mean a better deal for you. Whether buying or selling, we work on the lowest margins around. Go on, give me a call. G4TNY Radio, 41 Onslow Crescent, Colchester, Essex CO2 8UN. Phone or fax on 01206 752558, or E-mail me: dw4tny@aol.com.uk. Callers by appointment please.

KENWOOD TS 140S Excellent condition, boxed with manuals £450. D1/R210 HF Tx/Rx £60 spares kit, buyer collects £60. Contact: W Powell 01763 245887 (Royston, Herts).

TRIO TS 520 SSB/CW only no top band or 16 or 24 MHz 100 watts plus £250. Paul 01829 270436 (Cheshire).

THE UK'S LARGEST SOURCE for Vintage Service data, circuits and manuals from 1900 to the 1970s. Free brochure from Tudor & Margaret Gwilliam-Rees, 50 Meddon St, Bideford, The Little Margaret, North Devon, EX39 2EQ. Tel: 01237 424280.

INTERESTED in Vintage Radio? Send SAE for latest list of books and components. Old Time Supplies, PO Box 209, Banbury, Oxon OX16 7GR.

BBC ILR offshore European USA radio recordings from only £2.50. Write to Dept PW, BBC ILR, 7 York Street, Ayr KA7 8AR.

B.C.O. KITS Resolves single side-band on almost any radio. £16.49. H. CORRIGAN, 7 York Street, Ayr KA7 8AR.

Computer Software & Hardware

JVFAX/STTV, HAMCOMM, PKTMON 9FD/25FD covered interface, programs, manuals, pictures, £29.95. Other services, software, SASE for leaflets. Your Pervissel 'demodulator' modified Tx/PTT £12.50. Peter Lockwood G4SLB, 36 Davington Road, Dagenham RM2 2LR. Tel/Fax: 0181-595 0823.

WANTED FOR CASH Valve or solid state communication receivers Pre-1980. Preferably working and in good condition. Non working sets considered also domestic valve radios. Items of Government surplus wireless equipment and obsolete test equipment. Pre-1965 wireless and audio components and accessories. Pre-1975 wireless and TV books and magazines. Also, most valves wanted for cash. Must be unused and boxed. CR8, 157 Dickson Road, Blackpool, FY1 2EU. Tel: 01253 751858 or Fax: 01253 302979.

FERRITE ROD AERIALS. Must be half inch in diameter - no more or less. Must be six inches long or more. Contact Peter Tankard on Sheffield 0114-266 5253 anytime.

PRE-WAR RADIOS and any Heathkit and Hacker products wanted. Phone: 0181-693 3555.

Miscellaneous

VALVE ENTHUSIASTS: Capacitors and other parts at attractive prices! Ring for free list, Geoff Davies (Radio), Tel: (01788) 574774.

DOMESTIC RECEIVERS AND EQUIPMENT. Also used/new spares and valves, amps radio-grams etc. Magazines and collectables. Tel: (01788) 574774.

Some of the products offered for sale in advertisements in this magazine may have been obtained from abroad or from unauthorised sources. Practical Wireless advises readers contemplating mail order to enquire whether the products are available for use in the UK and have full after-sales back-up available.

The publishers of Practical Wireless wish to point out that it is the responsibility of readers to ascertain the legality or otherwise of items offered for sale by advertisers in this magazine.
EDUCATIONAL

CITY & Guilds Radio Amateurs EXAM.
Pass your exam the easy way with an RRC home study course. For details write or phone THE RAPID RESULTS COLLEGE, Dept. JX400, Tuition House, London SW19 4DS. Tel: 0181-947 2211.

RAE: Pay-as-you-learn correspondence. £3 per lesson, includes tuition. Ken Green C.Eng., MIEE, Chylean, Tintagel, Cornwall. Tel 01840 212262.

HEATHKIT EDUCATIONAL PRODUCTS UK distributor/spares and service centre. Cedar Electronics, 12 Isbourne Way, Broadway Road, Winchcombe, Cheltenham, Glos GL54 5NS.
Tel: (01242) 602402.

FRIENDLY RAE correspondence course reaches where classes can’t! Details: G4EGQ, 6 Highland Close, Folkestone, Kent CT20 3SA.

muTek limited

0115 9729467

Specialists for low noise amplifiers and frequency transverters.
Unique suppliers of replacement front ends for Yaesu, Icom and Tri. Also for power amplifiers, power supplies, band pass filters and sequencers.
Write for free catalogue of full product range to:
PO Box 24, Long Eaton, Nottingham NG10 4NQ
or visit our WEB PAGE at http://ourworld.compuserve.com/homepages/mutek

An RAE Students Manual

A collection of lesson notes written for, and used by, students of actual RAE courses. An invaluable aid to studies for the Radio Amateur Examination.
Price £8
including post and packing:
R.W. Griffiths
Ridgeview, 4 Wolrige Way, Plympton
Plymouth, Devon PL7 2RU

RACE TO GET YOUR OWN COPY OF
practical Wireless
AT YOUR LOCAL NEWSAGENTS

Slow Scan Television Interface...
Using your own computer 386 or better and amateur radio you can receive/transmit Slow Scan Images. Complete with 23 and 9 pin com port plug literature and images to get you started. Easy to follow instructions. Only £30 inc post & packing.
Cheques P.O. or C.D.D. to:
A.S.D. Astley House, Johnson St., Tyldesley, Manchester, M29 8AB
Tel: 01942 893573. Also arr 01942 895798

IS YOUR CLUB PLANNING OR HOLDING AN EVENT OR RALLY?

(01202) 659920

To find out the special advertising rates for clubs

ORDER FORM FOR CLASSIFIED ADS
PLEASE WRITE IN BLOCK CAPITALS

The prepaid rate for classified advertisements is 42 pence per word (minimum 12 words), box number 70p extra. Semi-display setting £13.90 per single column centimetre (minimum 3cm). Please add 17.5% VAT to the total. All cheques, postal orders, etc., to be made payable to PW Publishing Ltd. Advertisements, together with remittance, should be sent to the Classified Advertisement Dept., Practical Wireless, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel: (01202) 659920, Fax: (01202) 659950

Please insert this advertisement in the ……… issue of Practical Wireless (if you do not specify an issue we will insert it in the next available issue of PW) for ……… insertion/s. I enclose Cheque/P.O. for £ ……… (42p per word, 12 minimum, please add 17.5% VAT to total).

Name:
Address:

Telephone No.:
Box Number @ 70p. Tick if appropriate

Category heading:

A. H. SUPPLIES
Unit 12, Bankside Wks, Darnall Road, Sheffield S9 3HA
Tel: 0114-244 4278

Practical Wireless, December 1996 61
Get More Out Of Christmas!

More Out Of Thin Air is a compendium of antenna theory, design and construction that no antenna enthusiast should be without! Contained within its 112 pages you'll find articles on the theory behind all types of antenna, for all frequencies, together with constructional features to aid you in building your own h.f., v.h.f. and u.h.f. antennas.

The popular designs from the late Fred Judd G2BCX such as the Slim Jim and ZL Special are featured, as are articles on Antenna Ideas for Novice, Antenna Data and many more. If you enjoy designing, building and experimenting with antennas, then More Out Of Thin Air is an essential book for your bookshelf.

Copies of More Out Of Thin Air are available from the PW Book Service for just £6.95 including P&P (UK only, overseas readers please add £2 P&P). And at that price wouldn’t it make an ideal Christmas present for a fellow antenna enthusiast?

Order your copy of this essential antenna book NOW!
Offer only open until 12 December 1996.

To order please use the form above or telephone Michael or Shelagh on (01202) 659930 and quote PW12.
The books listed have been selected as being of special interest to our readers. They are supplied direct to your door. Many titles are overseas in origin.

LISTENING GUIDES

AIRBAND
AIR BAND RADIO HANDBOOK 5th Edition. David J. Smith...
AIR TO GROUND RADIO FREQUENCIES. Ken Davies...
AIRWAYS 96. 100 pages £6.95
AIRWAYS EUROPE. 114 pages £6.95
AIRWAYS 96. 144 pages £6.95
FLIGHT ROUTINGS 1996. Compiled by T.T. & S.J. Williams...
INTERNATIONAL AIR BAND RADIO HANDBOOK. David J. Smith...
THE AIRBAND JARGON BOOK. Ron Swindell...
UNDERSTANDING ACARS (3rd Edition). Aviation Communications Authoring and Reporting System. Ed. Byrne...
WORLDWIDE AERONAUTICAL COMMUNICATIONS FREQUENCY DIRECTORY (2nd Edition). Robert F. Evans...
WORLDWIDE AERONAUTICAL HF RADIO HANDBOOK. Maryn B. Cooke...

BROADCAST
A GUIDE TO THE WORLD'S RADIO STATIONS BP355. Peter Shore...
FRIENDLY GUIDE TO THE WORLD'S RADIO STATIONS. G. H. Broad...
GUIDE TO UTILITIES STATIONS. Hiro Kimura, Jong Klangston...
GUIDE TO WORLDWIDE WEATHERSFiAS. 16th Edition. Jong Klangston...
INTERNET RADIO GUIDE. 1st Edition. Jong Klangston...
WEATHER REPORTS FROM RADIO SOURCES. Philip Mitchell...
POCKET GUIDE TO RTTY AND FAQ STATIONS. Bill Grove...
RADIO DATA CODE MANUAL. 5th Edition. Jong Klangston...
INTERCEPTING NUMBERS STATIONS. Langley Piero...

DXTV
DXTV FOR BEGINNERS. Simon Haner...
GUIDE TO DXTV. Keith Farnie & Gary Smith...

FREQUENCY GUIDES
1996 SUPER FREQUENCY LIST. Jong Klangston...
PASSPORT TO WORLD BAND 1997. 528 pages £15.95
UN SCANNING DIRECTORY. 4th Edition. 560 pages £18.95
VHF-UMF SCANNING FREQUENCY GUIDE. Bill Lawer...
WEATHER REPORTS FROM RADIO SOURCES. Philip C. Mitchell...
WORLD RADIO TV HANDBOOK 1996 (50th Anniversary Issue). 608 pages £17.95

GENERAL
EVER PATWOPING ON THE BRITISH MILITARY. Michael Carron...
THE COMPLETE SHORT WAVE LISTENER'S HANDBOOK 4th Edition. Hank Bennon, Harry John & David Hardy...
SHORT WAVE COMMUNICATIONS. Peter Rose GW4GKO...

MARINE
MARINE SSB OPERATION. J. Michael Gale...
MARINE VHF OPERATION. J. Michael Gale...
SCANNING THE MARINE BANDS. P. J. O'Brien...
SHORT WAVE MARINE COMMUNICATIONS. B. E. Richmond...
SHIP TO SHORE RADIO FREQUENCIES. Ken Jones...
SIMPLE GPS NAVIGATION. Mo Chenery...

SATELITE
AN INTRODUCTION TO AERIAL COMMUNICATIONS SATELLITES. BP328. A. Pickard...
AN INTRODUCTION TO SATELLITE COMMUNICATIONS HANDBOOKS. F. A. Wilson...
NEWGEO GUIDE TO SATELLITE TV. Derek Stephen...
SATELLITE TV - A Complete Guide to Satellite TV Theory and Practice. John B. Drink...
SATELITE EXPERIMENTER'S HANDBOOK 2nd Edition. Haris Donabed EZ1DC...
SATELLITE HACkERS HANDBOOK. Colin A. Grelk...
SATELLITE TELEVISION. A layman's guide. Peter Pearson...

AMATEUR RADIO
ANTENNAS & TRANSMISSION LINES
25 SIMPLE AMATEUR BAND AERIALS BP125. E. M. Bull...
25 SIMPLE INDOOR AND WINDOW AERIALS BP346. E. M. Bull...
25 SIMPLE SHORT WAVE BROADCAST AERIALS BP312. E. M. Bull...
25 SIMPLE TROPICAL AND SW BAND AERIALS BP145. E. M. Bull...
ALL ABOUT VERTICAL ANTENNAS. W. H. Onslow & S. D. Cowan W2LX...
ANTENNA IMPEDANCE MATCHING (ARRL). Wilfred N. Carter...
ANTENNAS FOR VHF AND UHF BP301. L. D. Poole...
ARRL ANENNA COMPOUND Volume One...
ARRL ANTENNA COMPOUND Volume Two...
ARRL ANTENNA COMPOUND Volume Three. Edited by Jim Full K18TD...
ARRL ANTENNA COMPOUND Volume Four...
BUILD YOUR OWN SHORTWAVE ANTENNA. 2nd Edition. Archer Toker...
CUBICAL QUAD ANTENNAS 3rd Edition. William Onslow W4NJO and Steve Cowan W2LX...
HF ANTENNA COLLECTION (RSGB). Edited by Edward David G4AGQ...
HF ANENNA FANS FOR ALL LOCATIONS (RSGB). Leo Munson GO1GM...
MORE OUT OF THIN AIR (PWP). P. L. Linsey G4PRL...
PRACTICAL ANTENNAS FOR NOVICES. John Heri G3QHQ...
PRACTICAL ANENNAE HANDBOOK 2nd Edition. Joseph G. Carr...
PRACTICAL SHORTWAVE ANTENNAS (GB). G6BDN...
RADIO AMATEUR ANTENNA HANDBOOK. W. H. Onslow W4NJO & S. D. Cowan W2LX...
RECEIVING ANTENNA. John Carr G3BQ...
SIMPLE LOW-COST WIRE ANTENNAS FOR RADIO AMATEURS. W. H. Onslow W4NJO & S. D. Cowan W2LX...
W1PB' S ANTENNA NOTEBOOK (ARRL). Doug Dobson W1PB...

BEGINNERS (INC RAF)
AMATEUR RADIO AMATEURS FOR BEGINNERS. Victor Brand G3JBR...
AN INTRODUCTION TO AMATEUR RADIO BP257. L. D. Poole...
AN INTRODUCTION TO THE ELECTRAGONNETIC WAVE BP135. F. A. Wilson...
KIT BOOK OF ELECTRONICS. Don Budke...
HOW TO PASS THE RADIO AMATEURS EXAMINATION (RSGB). Glrve Smith G1HFX and George Beshoy G1HJU...
THE NOVICE RADIO AMATEURS EXAMINATION HANDBOOK (BP175). Les Green G3QPG...
RAE MANUAL (RSGB). G.L. Beesley G1QW...
RAE EXAMINATIONS NOTES (RSGB). G.L. Beesley G1QW...
REVIEW QUESTIONS FOR THE NOVICE RACE (RSGB). Barry T. G1HSE...
THE NOVICE LICENCE STUDENT'S NOTEBOOK. John Case G1HJR...
SHORT WAVE RADIO LISTENING FOR BEGINNERS. Jeff Morley GO1HJN...
THE NOVICE LICENSE A MANDAL FOR THE INSTRUCTOR [RSGB]. John Case G1HJR...
W1FB'S HELP FOR NEW HAMS (ARRL). Doug Dobson W1PB...

CALLBOOKS
Christmas Present Profiles

This month we have selected titles from the 'Book Store' that we think would make ideal stocking fillers. So, go on solve all your Christmas present worries in one go or why not treat yourself and order your selections today!

Passport To World Band Radio 1997

This already popular publication is billed as the 'World's No 1' short wave guide and as 'being the closest thing to a TV Guide for world band radio'. It has just been fully revised and updated for 1997. Passport contains everything from a 'Complete Idiots Guide to Getting Started', through 'What To Listen With' to the famous 'Blue Pages'. The Blue Pages contain the broadcast schedules for the world's short wave broadcasters in a channel by channel format.

In keeping with previous editions there's also the usual authoritative articles and reviews designed to keep you fully up-to-date with the latest in short wave equipment. So, if you are partial to listening to short wave broadcasts from around the world or are just entering the fascinating world of listening then this is the book for you. At only £15.59 for over 500 informative pages it surely deserves a place on your bookshelf.

The RSGB Amateur Radio Call Book And Information Directory 1997

New in this month is the latest edition of the UK Call Book. This year's edition contains over 61,000 callsigns covering up to M0DAB, M1AVK and 2E0AOX and 2E1FGD.

As in previous editions the directory continues to carry a Surname and Town index designed to aid in the looking-up of callsigns, together with the WAB square and IARU locator listing for most entries. The IARU locator information has been expanded to include amateurs listed in Northern Ireland. A new innovation for 1997 is the introduction of "tabs" down the side of the pages (very like that used in address books) to make callsign finding easier.

As well as all this information on Band Plans, Clubs, Beacons, Contests, Licensing, Special Event Stations and much more is included within the Call Book's 480 pages.

The Amateur Radio Call Book And Information Directory really is the radio amateur's 'Bible' and is truly an invaluable reference book containing much more than just names, addresses and callsigns. So, go on what are you waiting for? - At only £13.50 it's well worth it.
The Klingenberg Selection

In the world of data communications the name of Joerg Klingenberg reigns supreme when it comes to information. The fifteenth edition of the Klingenberg Radio Data Code Manual has almost 600 pages of information.

Broken down into 23 sections the thick book covers the weather organisations, types of code, civil aviation organisations, air traffic messages and how to decode them and the aircraft designators.

There is also many sections covering the method of transmission, modulation methods, and RTTY codes. You can identify the meteorological observation stations throughout the world from their index numbers given in the book.

There’s over a hundred pages covering the non-standard teleprinter systems, before proceeding a reference sections with areas such as: Amateur radio, clubs and newsgroups, geography intelligence, meteorology, navigation publications, radio stations and satellites.

For anyone interested in propagation there’s also the page addresses for solar and geophysical data sites.


These 24 sections cover topics such as how to monitor the transmissions, how to identify the station you’re hearing and the mode of transmission. If you want to find one particular station, you can search by both frequency or name to winkle it out. To catch the news before the radio and television transmission it listens to the news services. A list of press service stations is available in both alphabetical and chronological sequence. A short section about NAVTEX transmissions on 518kHz precedes a reference sections with areas such as the “Z” and “Q” codes, SINPO and SINPEMO codes, types and modes of transmissions. Price £35.

A newcomer to the Klingenberg stable of reference guides is the Internet Radio Guide Edition 1. This new guide is only marginally slimmer that the more well established Klingenfuss guides but is just as well packed with information.

The internet is vast connection (or web) of computers throughout the world. These computers have an immense amount of data available, but finding the ‘bit’ you want can be like looking for a needle in a haystack. This guide shows you where to look for ‘pages’ of data and pictures about topics such as: Amateur radio, clubs and newsgroups, geography intelligence, meteorology, navigation publications, radio stations and satellites.

If you’re looking for the radio information needle in a haystack - this book is just the magnet you need to find it and at £21 is well worth it.

Interested In Modelmaking?

The PW Book Store is noted for fast service and range of radio-related books. Now it’s expanding to stock books on other topics.

These modelling books offer value for money - ideal presents for anyone interested in models!

**Model Railway Operation**

Operation tends to be neglected by UK railway modellers. How to run your model like the real thing. 176 pages, hardback.

**Complete Car Modeller 1**

The techniques used to make breathtaking models of stunning cars. 136 pages, hardback.

**Complete Car Modeller 2**

The techniques used to make breathtaking models of stunning cars. 128 pages, hardback.

**Radio Control Model Manual**

A step-by-step guide to the remote operation of models by radio control. 160 pages, hardback.

**Complete Garden Railway Manual**

Step-by-step guides to building and operating model railways. In the garden or indoors. 192 pages, hardback.
ROCKINGHAM, Beds. YR45XY

VOX 48 7

WEIGHTS

AMATEUR PRODUCTS
AUTO TONEBURST 1750Hz repeater toneburst, high stability, 7-18V supply, 28mm square, 12mm high. Type AT110. PCB Kit £15.00, PCI Built £1.50.
PIE TONE End of transmission beep. PT1000. PCB Kit £7.25, PCI Built £11.75.
KEYTONE End of transmission morse letter K. Type KT1000. PCB Kit £2.25, PCI Built £15.50.
FM BOARDS For Yaezu and Triquenwood AMS89CW rigs. FT101, B, E, Z. FT102, M. TR860, etc. RX board F03-11X £66.75. TX board F0200 £19.75.
SPEECH PROCESSOR Audio clipping and bandpass filtering. Increases the average power output of SSB rigs by about 10 times. Can be supplied with connectors to suit most rigs. Type SP448. Boxed Kit £27.50, Boxed Built £42.25.
MASTHEAD PREAMPS For 2M or 43MHz, 26dB gain, 1dB NF, 100W handling power. RF switched, DC via feedpoint. Boxed Kit £39.50, Boxed Built £49.50.

SEND SAE FOR CATALOGUE OF AMATEUR KITS AND BUILT UNITS

WEATHER SATELLITE SYSTEM
WEATHER SATELLITE RECEIVER 5 channel crystal controlled receiver with scan facility and effective signal meter. Good immunity to adjacent channel signal interference. Monitor loudspeaker and remote switching facility. Output suitable to drive computer interface. Type WSR. Boxed Kit £227.50. Boxed Built £419.25.
SATELLITE ANTENNA 2 element crossed Yagi phased for circular polarisation and beam heading. Clamps to tin (52mm) max. stub, mast. 'Offset' type mounting. Vertical load carrying 45kg. Max. mast and takes thin (38mm) stub. Fitted above rotor. Price £49.99. (Part F03-11X £66.75)

WEATHER SATELLITE SYSTEM
WEATHER SATELLITE RECEIVER 5 channel crystal controlled receiver with scan facility and effective signal meter. Good immunity to adjacent channel signal interference. Monitor loudspeaker and remote switching facility. Output suitable to drive computer interface. Type WSR. Boxed Kit £227.50. Boxed Built £419.25.

SATELLITE ANTENNA 2 element crossed Yagi phased for circular polarisation and beam heading. Clamps to tin (52mm) max. stub, mast. 'Offset' type mounting. Vertical load carrying 45kg. Max. mast and takes thin (38mm) stub. Fitted above rotor. Price £49.99. (Part F03-11X £66.75)

WEATHER SATELLITE SYSTEM
WEATHER SATELLITE RECEIVER 5 channel crystal controlled receiver with scan facility and effective signal meter. Good immunity to adjacent channel signal interference. Monitor loudspeaker and remote switching facility. Output suitable to drive computer interface. Type WSR. Boxed Kit £227.50. Boxed Built £419.25.

SATELLITE ANTENNA 2 element crossed Yagi phased for circular polarisation and beam heading. Clamps to tin (52mm) max. stub, mast. 'Offset' type mounting. Vertical load carrying 45kg. Max. mast and takes thin (38mm) stub. Fitted above rotor. Price £49.99. (Part F03-11X £66.75)

WEATHER SATELLITE SYSTEM
WEATHER SATELLITE RECEIVER 5 channel crystal controlled receiver with scan facility and effective signal meter. Good immunity to adjacent channel signal interference. Monitor loudspeaker and remote switching facility. Output suitable to drive computer interface. Type WSR. Boxed Kit £227.50. Boxed Built £419.25.

SATELLITE ANTENNA 2 element crossed Yagi phased for circular polarisation and beam heading. Clamps to tin (52mm) max. stub, mast. 'Offset' type mounting. Vertical load carrying 45kg. Max. mast and takes thin (38mm) stub. Fitted above rotor. Price £49.99. (Part F03-11X £66.75)

WEATHER SATELLITE SYSTEM
WEATHER SATELLITE RECEIVER 5 channel crystal controlled receiver with scan facility and effective signal meter. Good immunity to adjacent channel signal interference. Monitor loudspeaker and remote switching facility. Output suitable to drive computer interface. Type WSR. Boxed Kit £227.50. Boxed Built £419.25.

SATELLITE ANTENNA 2 element crossed Yagi phased for circular polarisation and beam heading. Clamps to tin (52mm) max. stub, mast. 'Offset' type mounting. Vertical load carrying 45kg. Max. mast and takes thin (38mm) stub. Fitted above rotor. Price £49.99. (Part F03-11X £66.75)
YOUR LOCAL DEALERS

LONDON
HAYDON COMMUNICATIONS
For all your amateur radio equipment.
NEW, SECONTHAND, EX-Demo
132 High St., Edgware, Middx. HA8 7EL
Tel: 0181-951 5782
Fax: 0181-951 5782

SURREY
Chris Rees
G3TUX
The QRP Component Company
PO Box 88, Haslemere, Surrey GU27 2AF
Tel: (01483) 417731
Fax: 01483 467794
Stock lists of:
• Howes Kits
• Jones Keys
• Vargarda Aerials
• Sino pieces! Go Lrases

MID GLAMORGAN
SANDPIPER COMMUNICATIONS
Unil 5, Enterprise House, Cowbridge Industrial Estate, Aberdare, Mid Glamorgan CF44 0AE
Tel: (01685) 876425
Fax: (01685) 876104
A full range of transmitting & receiving antennas available for the amateur commercial market.

LONDON
MARTIN LYNCH & Son
For all your amateur radio needs
140-142 Northfield Avenue
Ealing, London W13 9SB
Tel: 0181-566 1120
Fax: 0181-566 1207

C.B. RADIO
SEND LARGE SAMPME ADRESSED ENVELOPE FOR INFORMATION ON C.B. FOR CATALOGUE
WE SELL ALL MAKES OF C.B. EQUIPMENT
MANNERS AND WINDSOR
132 High St., Edgware, Middx HAS TEL COMMUNICATIONS: NAPE EMCAPPiFS WE\ COME FOR ALL YOUR AMATEUR RADIO EQUIPMENT.
LONDON SEND LARGE STAMPED ADDRESSED ENVELOPE FOR INFORMATION FOR CATALOGUE OR £2.99 FOR CATALOGUE

To reach almost 40,000 readers every month,
ing Lynn on 01202 659920 and advertise YOUR company

DERBYSHIRE
Low Electronics
The HAM RADIO SUPERSTORE
Kenwood, Icom etc. always in stock.
Cheresterfield Rd., Matlock, Derby DE4 5LE
Tel: 01246 580880 Fax: 01246 580020
E-mail: info@lowelectro.co.uk

SCOTLAND
JAYCEE ELECTRONICS LTD
20 Woodvale Way, Garmouth, Fife T7 5TV
Tel: (01939) 760030 (Day or Night)
Fax: 01939 760041
Open: Tues-Sat 9-5, Sun 1-4
KENWOOD, TAI-SJE & ICOM APPROVED DEALERS
A good stock of new and secondhand equipment always in stock

KENTS
KANGA PRODUCTS
For QRP kits
A variety of kits for RECEIVERS, TRANSMITTERS & TEST GEAR.
Send an AS SOL for a free copy of our catalogue

DORSET
THE SHORTWAVE SHOP
Novice/C.B./Amateur/SWL Equipment.
Full range secondhand equipment always available.
18 Fairmile Road, Christchurch, Dorset BH23 2LJ
Tel/Fax: 01202 490099

ESSEX
Coastal Communications
Meeting your demands.
FOR ALL YOUR AMATEUR RADIO NEEDS.
19 Cambridge Road
Clacton-on-Sea, Essex CO15 3QJ
Tel: 01255 474292 Fax: 01255 475521
Mon-Sat 8am-8pm Wed 8am-2pm

SOUTHAMPTON
SMC Ltd
Main Dealer for Yaesu, Kenwood, Icom AOR & Coaxcraft
SM House, School Close, Chandlers Ford Industrial Estate, Easleigh, Hampshire S01 3BY
Tel: (01703) 285411 Fax: (01703) 243507

Index to Advertisers

A H Supplies..........................................................61
Aerial Techniques..................................................67
AKD.................................................................25
ARC.................................................................48
Crichton Distribution..............................................6
Colomer Electronics..............................................38
Cricklewood Electronics.........................................45
Datong Electronics..............................................45
Fairhaven Electronics..........................................67
Haydon Communications.......................................14/15
Howes, C M........................................................25
Icom UK.............................................................IFC
J Birckett.............................................................38
Kenwood Electronics UK......................................5
Klingenuff Publications.........................................4
Klingenfuss Publications.......................................4
Klingenuff Publications.........................................4
Langrex Supplies................................................45
Linear Amp UK..................................................45
Martin Lynch & Son............................................20/21
Mauritron Technical Services..................................67
Mauritron Technical Services..................................67
Linear Amp UK..................................................45
Martin Lynch & Son............................................20/21
Monitoring Times...............................................31
Multicom 2000..................................................46
muTek..............................................................61
PCB Service......................................................38
RAS Notts..........................................................67
RSGB..............................................................6
SMC...............................................................2/3
Spectrum Communications....................................67
SRP Trading......................................................31
Sunrise Electronics...............................................7
Verulam Rally....................................................38
Vintage Audio Co...............................................67
Waters & Stanton...............................................8
Yaesu UK........................................................OBC
ANTENNAS IN ACTION
The First of a Bi-monthly 8 page special devoted to antennas and associated products.

FREE!
Office, Shack or Home - DON'T RUSH OUT AND BUY A YEAR PLANNER FOR 1997! There's one FREE with next month's PW

EXCLUSIVE! - REVIEW
The New Kenwood TS-570D HF Transceiver
Plus all your regular favourites

THE UK'S BEST SELLING AMATEUR RADIO MAGAZINE
COMING IN JANUARY'S PW

Rob Mannion G3XFD helps and welcomes newcomers to amateur radio through his new Beginners' column

CAN YOU AFFORD TO MISS IT? - ON SALE 12 DECEMBER 1996 - PLACE YOUR ORDER TODAY

SPACE SPECIAL

"..BOLDLY GOING..........."

Space Special Lawrence Harris
John Wilson G3FCY Reviews the AKD Target HF3 Receiver
60 Years of BBC TV - Keith Hamer & Garry Smith
Intermodulation & Active Antennas Andy Ikin

Plus Regular Columns covering:
Frequency Exchange, Utility and Data Modes Listening, WXSATs, Scanning, Broadcast News Logs and much much more....
Ultra Compact Dual Band Handheld FT-50R

One tough little dual bander!

Features
- Frequency Coverage
  Wide Band Receive
  RX: 76-200 MHz, 300-540 MHz, 590-999 MHz*
  TX: 144-146 MHz, 430-450 MHz
- AM Aircraft Receive
- MIL-STD 810 Rating
- Digital Coded Squelch (DCS)
- 112 Memory Channels
- 12V DC Direct Input
- High Speed Scanning
- Alphanumeric Display
- CTCSS Encode (Decode w/FT-12)
- Auto Range Transpond System™ (ARTS™)
- Dual Watch
- Direct FM
- High Audio Output
- ADMS-1C Windows™ Programmable
- Four Battery Savers:
  Automatic Power-Off (APO)
  Receive Battery Saver (RBS)
  Selectable Power Output (SPO)
  Transmit Battery Saver (TBS)
- Time Out Timer (TOT)
- 2.5 and 5 Watt Versions Available
- Optional Digital Voice Recording System (DVRS)
- Full line of accessories

For the foremost in top-performing, durable, dual band handhelds there is one choice. The FT-50R. Manufactured to rigid commercial grade standards, the FT-50R is the only amateur dual band HT to achieve a MIL-STD 810 rating. Water-resistant construction uses weather-proof gaskets to seal major internal components against the corrosive action of dust and moisture. And, the rugged FT-50R withstands shock and vibration, so throw it in with your gear!

Dynamic and exclusive features set the FT-50R apart, too. Wide Band Receive includes 76-200 MHz (VHF), 300-540 MHz (UHF), and 590-999 MHz*. Dual Watch checks sub-band activity while receiving on another frequency, then when a signal is detected, shifts operation to that frequency. Digital Battery Voltage displays current operating battery voltage. Digital Coded Squelch (DCS) silently monitors busy channels. Auto Range Transpond System™ (ARTS™) uses DCS to allow two radios to track one another. And, the FT-50R is ADMS-1C Windows™ PC programming compatible too. To round out the FT-50R, it has four battery savers, and super loud audio—remarkable in an HT this size.

A reliable companion where ever you go, the FT-50R is one tough little dual bander with all the features you want!

YAESU...leading the way

For the latest Yaesu news, hottest products, visit us on the Internet! http://www.yaesu.com

YAESU UK LTD. Unit 2, Maple Grove, Business Centre, Lawrence Rd, Hounslow, Middlesex, TW4 6DR, U.K. 0181-814-2021
Specifications subject to change without notice. Specifications guaranteed by Yaesu authorized dealers. Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details. Cellular blocked
Waters and Stanton Electronics present the
1997 MFJ
Radio products catalogue

Americas largest communications accessory manufacturer present their 1997 product lineup for the radio enthusiast and electronics hobbyist direct from their sole U.K distributor - Waters and Stanton Electronics.

MFJ helpline order number: 01702 203353

Quote "P. H. order" to ensure free delivery and voucher discounts (see back page).

AMERITRON MIRAGE

Over 500 lines - Antenna tuners - Antenna analysers - Data products - Transceivers - Receivers
MFJ 3 KW Roller Inductor Tuner

...Gives you absolute minimum SWR ... Simple 2-knob tuning ... Lighted Cross-needle SWR/Wattmeter ... 6-position antenna switch ... Balun for balanced lines ... 1.8-30 MHz coverage ...

MFJ's innovative Differential-T™ Tuner uses a differential capacitor that makes tuning easier than ever. It ends constant re-tuning with broadband coverage and gives you minimum SWR at only one setting.

The MFJ-986 is a rugged 3 KW PEP SSB roller inductor antenna tuner that covers 1.8-30 MHz continuously, including 160 Meters. MARS and all the WARC bands.

MFJ's exclusive AirCore™ Roller Inductor gives you absolute minimum SWR—something a tapped inductor just can't do. A 3-digits turns counter plus a spinner knob gives you precise inductance control—so you can quickly retune to your frequency. A lighted peak and average reading cross-needle meter shows you SWR, forward and reflected power at a single glance!

You get a 6-position antenna switch that lets you select two coax lines and/or random wires (direct or through tuner), balanced line and external dummy load.

The MFJ TrueCurrentBalun™ for balanced lines minimizes feedline radiation that causes field pattern distortion, TVI and RF in your shack. Ceramic feedthru insulators for balanced lines withstand high voltages and temperatures.

**New Antenna Tuner Technology**

MFJ brings you three innovations in antenna tuner technology: a Differential-T™ circuit simplifies tuning; a directional coupler gives you more accurate SWR, forward and reflected power readings; and the MFJ TrueCurrentBalun™ reduces feedline radiation.

**Differential-T Tuner™...**

**A New Twist on a Proven Technology**

Replacing the two variable capacitors with a single differential capacitor gives you a wide range T-network tuner with only two controls—the differential capacitor and a roller inductor.

Simple 2-knob tuning makes tuning easier than ever, gives you minimum SWR at only one setting and has a broadband response that ends constant re-tuning. You'll spend your time QSOing instead of fooling with your antenna.

**MFJ AirCore™ Roller Inductor**

MFJ's exclusive super heavy duty AirCore™ Roller Inductor has an air core that can't burn up. You get ultra high-Q, the lowest loss, highest efficiency and highest power handling of any roller inductor in ham radio.

MFJ's exclusive Self-Resonance Killer™ keeps potentially damaging self-resonances away from your operating frequency. Large, self-cleaning wiping contact gives excellent low-resistance connection without contact arcing or burning. A solid 1/4 inch brass shaft with self-align bearings gives smooth non-binding rotation, constant re-tuning. You'll spend your time QSOing instead of fooling with your tuner. The compact 10% x 4% x 15 inch cabinet has plenty of room to mount the roller inductor away from metal surfaces for highest Q—you get high efficiency and more power into your antenna.

The wide-spaced air gap differential transmitting capacitor lets you run 3 KW PEP SSB. **Accurate SWR and Power Reading**

MFJ's Cross-Needle SWR/Wattmeter gives you accurate SWR and power readings over its entire frequency range.

You can read forward/reflected power in 2 ranges: 200/50 and 2000/500 watts. The meter lamp is front panel switched and uses 12 VDC or 110 VAC with MFJ-1312.

**MFJ TrueCurrentBalun™...**

**Reduces Feedline Radiation**

Nearly all commercially built tuners use a "voltage" balun. A "voltage" balun forces the voltages to be equal on the two antenna halves. It minimizes unbalanced currents only if the antenna is perfectly balanced—not the case with practical antennas.

The MFJ-986 uses a true current balun to force equal currents into the two antenna halves. Even if your antenna is not perfectly balanced, you get minimum unbalanced currents.

**The MFJ TrueCurrentBalun™ gives superior balance over voltage baluns.**

**The MFJ TrueCurrentBalun™ minimizes unbalanced current which reduces field pattern distortion.** This concentrates your power for a stronger signal—plus it reduces TVI and RF in your shack caused by feedline radiation.

**Call your Dealer for your Best Price and get absolute minimum SWR**

In stock at ham dealers everywhere! Order today or pick one up at your favorite dealer or hamfest—no shipping, no waiting.

**MFJ 1.5 KW Versa Tuner III**

...lets you use your barefoot rig now and add up to a 1.5 KW linear amplifier later

Why settle for a 300 watt tuner when a few extra dollars lets you step up to the more powerful 1500 watt MFJ-962C? Two continuously variable capacitors give you the precise control you need to get your SWR down to a minimum. Plenty of inductance gives you the widest matching range possible.

**A lighted peak and average reading Cross-Needle SWR/Wattmeter makes tuning quick and easy.** At one glance you can read SWR, forward and reflected power. Handles 1500 watt PEP SSB. Meter light uses 12 VDC or 110 VAC with MFJ-1312.

A 6-position ceramic antenna switch lets you select 2 coax lines (direct or through tuner), random wire and balanced lines.

You get a heavy duty MFJ TrueCurrentBalun™ for balanced lines. High-voltage ceramic feedthru insulators let you operate high power into balanced feedlines. For highest Q and the most compact size, the wide range switched airwound inductor is mounted horizontally away from metal surfaces for efficiency and maximum power into your antenna.

**Measures 10½ x 4½ x 15 inches.**

**MFJ... the world's most trusted name in antenna tuners!**
MFJ-989C 3 KW Antenna Tuner

More hams use MFJ-989s than any other 3KW tuner in the world! Why?  
...Because MFJ uses super heavy duty components to make the world's finest 3 KW antenna tuner...  

In Stock at ham dealers everywhere!  
Call your dealer for your best price  

MFJ-989C

*New for 1996 -- MFJ AirCore™ Roller Inductor  
* Super Heavy Duty Components * Made in U.S.A.  
* Handles 3000W PEP SSB  
* peak/average Cross-Needle SWR/Wattmeter  
* Antenna Selector * Balun * Built-in Dummy Load

More hams use MFJ-989s than any other 3 KW tuner!

MFJ uses super heavy duty roller inductor, variable capacitors, antenna switch and balun to build the world's most popular 3 KW antenna tuner.

The rugged MFJ-989C handles 3 KW PEP SSB and covers 1.8 to 30 Mhz, including all MARS and WARC bands.

MFJ's new 1996 AirCore™ Roller Inductor, three-digit turns counter and spinner knob gives you exact inductance control for absolute minimum SWR.

You can match dipoles, verticals, inverted vees, random wires, beams, mobile whips, shortwave -- nearly any antenna. Use coax or balanced lines.

You get everything you've ever wanted in a high power, full featured, antenna tuner -- widest matching range, lighted Cross-Needle SWR/Wattmeter, antenna switch, built-in dummy load, balun, convenient flip-stand -- all in a sleek, compact cabinet.

MFJ builds the world's most popular 3 KW antenna tuner using these super heavy duty components...

**MFJ AirCore™ Roller Inductor**

MFJ's exclusive super heavy duty AirCore™ Roller Inductor has an air core that can't burn up! You get ultra high-Q, the lowest loss, highest efficiency and highest power handling of any roller inductor in ham radio.

MFJ's exclusive Self-Resonance Killer™ keeps potentially damaging self-resonances away from your operating frequency.

Large, self-cleaning wiping contact gives excellent low-resistance connection without contact arcing or burning.

A solid ¼ inch brass shaft with self-align bearings gives smooth non-binding rotation.

Some competing "legal limit" tuners use a lossy, low Q, solid core with erratic electrical contacts and have potentially damaging self-resonant frequencies. This can cause excessive heating and can destroy the core.

**Massive Transmitting Capacitors**

Look inside...you'll see two super heavy duty transmitting variable capacitors that can handle 6000 volts. Extra wide (0.27 inch) stator plate spacing gives you arc-free operation.

Specially shaped plates give low minimum capacitance when unmeshed. This and a hefty 250 pf maximum give you an extremely wide matching range -- even on 160 and 10 Meters.

The nearest competing "legal limit" tuner has variable capacitors physically much smaller than the MFJ-989C's. Theirs is rated at 4500 volts -- a full 25% less than the MFJ-989C.

Their's is more likely to arc -- **not what you want in a "legal limit" tuner!**

**Super Antenna Switch**

The MFJ-989C super heavy duty antenna switch is made of two individual ceramic wafers wired in parallel. Extra wide spaced, heavy duty contacts handle extreme voltages and currents.

We've never burned one up!

You can select two coax antennas (directly or through tuner), balanced line/random wire, or built-in dummy load.

**3 KW Current Balun**

MFJ's super heavy duty 3 KW true current balun for balanced lines uses two giant 2½ inch toroid cores. It's wound with Teflon® wire connected to high-voltage glazed ceramic feedthrough insulators.

The MFJ-989C lets you safely operate high power into balanced feedlines without core saturation or voltage breakdown.

Some "legal limit" tuners have inferior voltage baluns with smaller diameter toroid cores and use soft plastic feedthrough insulators that can arc and melt.

**More reasons why the MFJ-989C is the world's finest 3 KW tuner**...

**Built-in Dummy Load**

A full-size 300 watt non-inductive 50 ohm dummy load is built into the MFJ-989C.

You'll find it handy for transmitter tuning, testing and repairing your rig, setting power level, adjusting your mic gain and more.

Some "legal limit" tuners don't have a built-in dummy load. They want you to pay for an external dummy load that just gets in your way.

**Lighted Cross-Needle Meter**

MFJ's lighted Cross-Needle SWR/Wattmeter lets you monitor SWR, forward and reflected power simultaneously. Read both peak and average power in two power ranges.

**Sleek and Compact**

The compact MFJ-989C slides right into your operating position -- you'll hardly know it's there. It's just 10¼x4½x15 inches. Do you really want a bulky "legal limit" tuner that's bigger than your amplifier?

**Superior Cabinet**

The MFJ-989C's premium, low-profile all-aluminum cabinet has a sub-chassis that adds strength and RFI protection.

Every cabinet is chemically treated and has a tough, scratch-proof vinyl cladding -- not paint that can scratch or chip off. You won't find a tougher, longer-lasting finish anywhere.

Detailed logging scales and legends are permanently silk screened on real aluminum front and back panels -- they aren't decals or glued-on paper strips that can peel off.

**Superior Construction**

Every MFJ-989C uses PEM nuts (not self-tapping screws), wing-nut for ground post (not a cheap nut), fire-retardant epoxy glass PC board (not canvas based), heavy gauge wire throughout (not small gauge), locking compound on nuts/bolts (not loose hardware).

**No Matter What Warranty**

Every MFJ-989C is protected by MFJ's famous one year **No Matter What™ unconditional warranty.** We will repair or replace your MFJ-989C (at our option) no matter what for a full year.

Others may give you a limited warranty on defects in material and workmanship.

But what do you do if your "legal limit" tuner burns up and they say, "Sorry, your limited warranty does not cover that?"

**Outstanding Customer Service**

We're here to help keep your MFJ-989C performing flawlessly -- **no matter how long you own it.**
The new MFJ-941E gives you a 300 Watt antenna tuner that covers everything from 1.8-30 MHz -- plus you get a lighted Cross-Needle meter with on/off switch (Light uses 12 VDC or 110 VAC with MFJ-1312B), antenna switch and 4:1 balun ... for an incredibly low price.

The new Cross-Needle meter shows SWR, forward and reflected power -- all at a glance. It reads forward/reflected power in 300/50 and 3/5 watt ranges.

Compact Mobile HF Antenna Tuner
New! Covers 6-Meter Band and has antenna bypass switch!

Don't leave home without this mobile tuner! Have an uninterrupted trip as the MFJ-945E extends your antenna bandwidth and eliminates the need to stop, go outside and readjust your mobile whip. Handles 300 watts. Small 8x2x6 inch black aluminum cabinet uses little room. The new Cross-Needle meter shows SWR, forward and reflected power -- at a glance. It reads forward/reflected power in 300/50 and 3/5 watt ranges. Has on/off lamp switch. Requires 12 Volts for lamp. Convenient placement of controls makes tuning fast and easy while in motion. Antenna switch lets you bypass tuner and still use the SWR/Wattmeter. Back panel has SO-239 connectors for transmitter and coax and a wing nut post for your ground. Efficient airwound inductor gives you lower losses and more watts out. 1000 volt capacitors. Covers 1.8-60 MHz. Use it at home in your base station when you're not in your RV, boat or car. Mobile mount, MFJ-20. Add shipping for bracket if ordered separately.

MFJ Antenna Tuner/Artificial Ground
Turns random wire into effective antenna MFJ-934

Throw up a random wire anywhere and work the world!

Sounds great -- but that don't work -- never has, never will. Why? Because a random wire or longwire antenna requires a ground to work. Many of you found that out the hard way -- with hours of calling CQ and no QSO. No ground, don't work.

But a random wire can be an effective antenna -- you have to do two things.
1. Match the random wire impedance to your transmitter.
2. Provide an adequate ground for the random wire to work against.

The new MFJ-934 Antenna Tuner/Artificial Ground combines a versatile antenna tuner with an artificial ground. It turns a random wire into an effective antenna that works. It's great for traveling, emergency or as a makeshift antenna.

MFJ-931 Artificial RF Ground
Create an artificial RF ground with the new MFJ-931! It effectively places your rig near actual earth ground potential even if your rig is on the second floor or higher with no earth ground possible! Also, it electrically places a far away RF ground at your rig.

How's your RF ground? Do you have RF "hot spots" that "bite" you when you transmit? Do you have RF feedback that causes your rig to quit working on some bands? Do you have TVI/RFI that makes your neighbors hard to live with? Do you get weak signal reports because of extreme ground losses or radiation pattern distortion? These problems could be caused by poor RF grounding, especially if your rig is on a second floor with no ground at all. Even if you have a good ground, a long connection wire can ruin its effectiveness by isolating true RF ground from your rig.

The new MFJ-931 creates an artificial RF ground! It resonates a random length of wire thrown along the floor and produces a tuned counterpoise. This artificial ground effectively places your rig near actual earth ground potential even if your rig is on the second floor or higher with no earth ground possible.

Also, the MFJ-931 electrically places a far away RF ground directly at your rig -- no matter how far away it is. The MFJ-931 reduces the electrical length of the connection wire to virtually zero by tuning out its reactance. The MFJ-931 connects between your rig and a random length of wire or a connecting ground wire. It's tuned for maximum ground current using the built-in RF ammeter. It covers 1.8 to 30 MHz and measures 7/4x3/5x7 inches.

MFJ's smallest Versa Tuner
New! Covers 6-Meter Band and has antenna bypass switch!

The MFJ-901B is our smallest -- 5x2x3/4 in. -- (and most affordable) 200 watt PEP versa tuner -- when both your space and your budget are limited. You can operate anywhere in a band or get low SWR. You'll get maximum power out of your rig and it'll run cooler and last longer.

It matches dipoles, vees, random wires, verticals, mobile whips, beams, balanced and coax lines continuously from 1.8 to 30 MHz. Excellent for matching solid state rigs to lines. Efficient airwound inductor gives you lower losses and more power.

You get SO-239 connectors for transmitter and coax, binding posts for random wire or balanced lines and a wing-nut ground connection. A 4:1 balun for balanced lines is also built into this sturdy, compact tuner. Works with solid state and tube rigs. Fits into your station and your car.

You get the best features of the MFJ-941E Cross-Needle Antenna Tuner and the MFJ-931 Artificial RF Ground in a single compact 10x4x3/4x7 inch cabinet -- and the MFJ-934 cost less.

You get a 300 watt full featured, general purpose antenna tuner that covers 1.8-30 MHz. It has a two range, lighted Cross-Needle Meter that lets you read SWR, forward and reflected power all in a glance and a 4:1 balun for balanced lines. Plus, you get an efficient airwound inductor, special high current/voltage 12 position inductor switch and two 1000 volt air-variable capacitors. It tunes all types of antennas and feedlines including random wire, coax and balanced lines. The MFJ-934 is unique because it has a built-in artificial ground. A Ground Matching knob lets you switch inductance to bring an attached wire to a low impedance current point to form an artificial ground. A push button switch lets you use the Cross-Needle Meter to monitor for maximum ground current.

With an adequate artificial ground to work against, you'll be surprised to see how well a random wire can work. Don't be surprised if you can work the world without hours of calling CQ. The MFJ-934 with an artificial ground wire and a random antenna wire makes a complete, effective antenna for use anywhere -- during emergencies, camping, RV parks, hotels, on vacations, nearly anywhere. When you don't need the artificial ground feature, you can use the MFJ-934 as a full featured general purpose antenna tuner.
MFJ-949E Deluxe 300 Watt Tuner

More hams use MFJ-949's than any other tuner in the world!
Why settle for an imitation when you can have the real thing?

Includes FREE AC adapter for meter light

More hams use MFJ-949's than any other antenna tuner in the world!

Why? Because the world's leading tuner has earned a worldwide reputation for being able to match just about anything.

MFJ-949's have been highly refined and have years of proven reliability.

Every MFJ-949E comes with:

- MFJ's famous one year No Matter What unconditional guarantee
- first-rate performance... unbeatable quality... the best tuner value in ham radio -- all from the world's most trusted name in antenna tuners.

Now the latest MFJ-949E gives you even more features and more value than ever at a new lower price.

Why take chances with an imitation when you can have the real thing from the world's most trusted name in antenna tuners.

More reasons why more hams use MFJ-949's than any other antenna tuner in the world...

Full 1.8-30 MHz Operation

1000 volt tuning capacitors, extra heavy duty inductor switch, Teflon® insulating washers and proper L/C ratio gives you arc-free no worries operation with up to 300 watts from 1.8 to 30 MHz.

Lighted Cross-Needle Meter

MFJ's lighted Cross-Needle Meter shows you SWR, forward and reflected power simultaneously. It reads both peak and average power on 300 or 30 watt ranges.

The meter is illuminated for easy reading in dim light and has an ON/OFF lamp switch. The meter lamp uses 12 VDC or 110 VAC. A free AC adapter is included at no extra cost.

Tunes any Antenna

The MFJ-949E tunes out SWR on dipoles, verticals, inverted vees, random wires, beams, mobile whips, shortwave receiving antennas... nearly anything!

Use coax feed, random wire or balanced lines. Has oversized heavy duty 4:1 balun.

Super Antenna Switch

MFJ's 8 position super antenna switch lets you select two coax fed antennas, random wire/balanced line or built-in dummy load for use through your MFJ-949E or direct to your transceiver.

MFJ's Cross-Needle SWR/Wattmeter is always active for monitoring forward and reflected power and SWR.

QRM-Free PreTune

MFJ's QRM-Free PreTune lets you pre-tune your MFJ-949E off-the-air into a built-in dummy load without causing QRM.

Pre-tuning into a dummy load makes tuning your actual antenna faster and easier.

Why take chances?

Why take chances with an imitation when you can have the real thing from the most trusted name in antenna tuners?

Full Size Dummy Load

The MFJ 949E has a full size non-inductive 50 ohm dummy load measuring 3/4 inch diameter by 5 inches. It easily handles 300 watts of abusive tune-up power.

You'll find it handy for tuning, testing and repairing your rig, setting power level, adjusting your mic gain and more.

Watch out for cheap midget size dummy loads that changes resistance as it heats up -- marginal ones could burn up your transceiver.

Custom Inductor Switch

The inductor switch is the most likely component to burn up in any antenna tuner.

The inductor switch in the MFJ-949E was custom designed to withstand the extremely high RF voltages and currents that are developed in your tuner -- it's not a flimsy plastic switch made for small signals and wired with tiny gauge wire.

Superior Cabinet

Each MFJ-949E cabinet is chemically treated and has a new tough scratch-proof vinyl cladding -- not paint that can scratch or chip off. You won't find a tougher, longer lasting finish anywhere.

Detailed logging scales and legends are permanently silk screened on a real aluminum front panel and back panel -- it's not merely a plastic decal or glued-on paper strip that can peel off.

No Matter What Warranty

Every MFJ-949E is backed by MFJ's famous one year No Matter What unconditional warranty. That means we will repair or replace your MFJ-949E (at our option) no matter what for a full year.

Others may give you a limited warranty on defects in material and workmanship.

But what do you do if it burns up and they say, "Sorry, your limited warranty does not cover that?" Have no fear, our reputation is backed by the world's leading tuner.

Continuing Service

Only MFJ gives you a direct toll-free technical help line answered by electronic technicians who are experts in antenna tuners.

We're here to help keep your MFJ product performing flawlessly -- no matter how long you own it.

Call your dealer for your best price

In stock at ham dealers everywhere! Order your MFJ-949E today or simply pick one up at your favorite dealer or hamfest -- no shipping, no waiting, no hassles.
Tune any antenna with your Automatic Tuner!
MFJ greatly extends matching range of your Automatic Antenna Tuner -- you can match ANY antenna automatically! No pre-tuning, no manual tuner needed...

MFJ-914

Does your HF rig's automatic antenna tuner have limited matching range?
Can't auto-tune your antenna on all bands?
Have to pre-tune your antenna with a manual tuner before your automatic tuner will work?
MFJ's latest innovation greatly extends the matching range of your automatic antenna tuner -- you can match nearly any antenna automatically!
MFJ's new AutoTuner Extender™ transforms your antenna impedance -- up or down by as much as 10 times! Puts nearly any antenna into the matching range of your automatic tuner.
It's easy to use. Just bypass your auto-tuner and turn the MFJ-914 knob for minimum SWR. That's it -- you're ready to auto-tune. Never manually pre-tune with an external tuner again!
By transforming your antenna impedance so your tuner can be used in a low Q mode, you can handle more power without arcing your tuning capacitors.
It also extends the range of manual antenna tuners.
You can use any transceiver from 160 through 10 Meters with up to 300 watts.
An OFF position grounds your antenna to bleed off static and protect your receiver. OFF also connects your transceiver to an external dummy load for safety. The MFJ-914 also has a bypass position.
The MFJ-914 is a heavy duty, wide band, wide range, impedance transforming device. It has been very carefully designed for flattest frequency response and lowest loss.

NEW Tune up your antenna without transmitting!

MFJ-212

This new MFJ-212 MatchMaker™ lets you tune up your antenna tuner without transmitting a single milliwatt!
You can't cause QRM -- there's no radiated power.
You can precisely tune your antenna tuner for a 1:1 SWR -- no additional "tweaking" needed.
Protect your transceiver and antenna tuner. Avoid dangerous overheating and arcing caused by high SWR and long tune-ups.

MFJ 6 Meter Antenna Tuner

MFJ's new 6 Meter antenna tuner for the Magic Band gives you low SWR with practically any coax fed antenna -- mobile whips, dipoles, verticals, vee, random wires, verticals, beams.
With low SWR, you'll get more power out of your 6 Meter transceiver and into your antenna for more DX.
With low SWR, your rig will be more efficient. It'll run cooler and last longer. You'll protect your expensive transceiver from overheating due to high SWR.
A lighted Cross-Needle SWR/Wattmeter shows SWR, forward and reflected power simultaneously in 300/60 and 30/6 Watt ranges and has an ON/OFF lamp switch.
With MFJ's built-in bypass switch, you can bypass your tuner and connect your transceiver directly to your antenna.
The MFJ-906 handles 100 Watts FM and 200 Watts SSB PEP. Works with all solid state and tube rigs and is perfect for home and mobile stations. Covers 50-60MHz. Measures 8 x 2 1/2 x 3 inches. Lamp uses 12 VDC.
The MFJ-903, Same as MFJ-906 but less SWR/Attmeter and bypass switch. Measures 5 x 2 1/2 x 3 inches.

Random Wire Tuner Mobile Antenna Matcher

Operate all bands 1.8-30 MHz -- anywhere with any transceiver -- using a random wire and this MFJ antenna tuner that's small enough to carry in your hip pocket -- 2 x 3 x 2 inches.
Handles up to 200 watts output. Match high and low impedances by interchanging input and output. Has SO-239 connectors.

Use this MFJ compact Mobile Antenna Matcher at the base of your mobile whip to lower your SWR and to provide more power into your antenna. Your solid state rig runs more efficiently, puts out more power with less heat. Matches mobile antennas 10 through 80 meters. Easy plug-in installation. 2 1/4 x 2 1/4 x 1/2 inches.

Choose 144/220 MHz or 440MHz Tuner

MFJ-921 or MFJ-924

This new MFJ-921 Dual Band VHF tuner covers both 2 Meters and the 220 MHz band. Has a built-in SWR/Wattmeter. It handles 200 watts, matches a wide range of impedances, and is excellent for mobile and base operation. SO-239 input/output connectors. Wing nut post for ground. Eggshell white and black aluminum cabinet. Measures a compact 8 x 2 1/4 x 3 inches. It comes with MFJ's famous No Matter What™ full one year unconditional guarantee.
MFJ-924. Similar to MFJ-921 but covers only 440 MHz band.
MFJ's Cross-Needle 1.8-60 MHz SWR/Wattmeter

Large 3 inch meter

MFJ-815B
- Read Peak/Average Power
- Built-in Meter Lamp

Dual Band SWR/Wattmeter

Large 3 inch meter

MFJ-817
This lighted MFJ-817 144 and 440 VHF/UHF Cross-needle SWR/wattmeter features large 3 inch meter. Reads SWR and peak or average for forward and reflected power simultaneously— all at a glance. Power ranges: 200/2000 watts forward and 50/500 watts reflected. Reads SWR from 1:1 to 8:1. Covers 1.8 to 60 MHz. Has mechanical adjustment to accurately zero meter. Push button selects range, meter lamp on/off and peak/average power. SO-239 connectors. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312. Black aluminum cabinet measures 7 1/4 x 4 1/2 x 3 1/2 inches. Made in USA.

Why buy a copy-cat? This MFJ original gives you the most for your money and you get MFJ's famous No Matter What™ one year unconditional guarantee.

VHF SWR/Wattmeter

MFJ-812B
MFJ-812B is the world's most popular -- VHF SWR/Wattmeter. Has built-in Field Strength meter. Covers 2 Meters and 220 MHz. Reads forward and reflected power in 2 ranges -- 30 or 300 watts. Reads SWR from 14 MHz thru 220 MHz. Also reads relative field strength from 1 to 220 MHz. Has binding post for field strength antenna. Two color meter. 4 1/2 x 2 1/4 x 3 inches.

HF SWR/Wattmeter

MFJ-816
MFJ-816 HF wattmeter lets you read forward and reflected power on 2 scales -- 30 and 300 watts -- and SWR from 1.8 to 30 MHz. Toroid current pickup gives uniform sensitivity. Easy push-button operation. Sturdy eggshell white and black aluminum cabinet, SO-239 connectors. 2-color meter scale. Compact size -- 4 1/4 x 2 1/4 x 3 inches -- makes it ideal for portable use.
- Cross-Needle Meter

MFJ Cross-Needle HF, VHF, UHF SWR/Wattmeters

Covers HF thru VHF . . . 1.8-60 MHz, 144 MHz, 440 MHz

New

This new MFJ Cross-Needle SWR/Wattmeter covers HF thru VHF -- 1.8 to 60 MHz, 144 MHz, 440 MHz Bands -- for an incredibly low price!
You can read forward and reflected power and SWR simultaneously at a single glance.
It features separate HF and VHF/UHF directional couplers, each with its own set of SO-239 coax connectors.
This lets you connect your HF and VHF/UHF transceivers at the same time. You can then monitor SWR and power of either transceiver at the flick of a switch. Others have a single set of connectors -- you have to plug and unplug to use separate HF or VHF/UHF rigs.
Power ranges -- 30/300 watts forward and 6/60 watts reflected. Each power range for each band is individually calibrated. Schottky diodes are used for best accuracy.
Single knob operation makes it easy to use and the meter is lighted for easy reading.
The attractive all metal black cabinet has a tough vinyl cladding that won't scratch or chip off. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312B. Measures 7 1/4 x 2 1/4 x 2 1/4 inches.

MFJ-864
- Cross-Needle Meter
- Covers HF/VHF/UHF
- Dual Sensors for HF and VHF/UHF
- Schottky diodes for best accuracy

MFJ-862 covers 144/220/440 MHz

Similar to MFJ-864 but covers 144 MHz, 220 MHz, 440 MHz. 30/300 watts forward, 6/60 watts reflected ranges. 5 1/4 x 2 1/4 x 2 1/4 inches. Has one sensor for all three bands.

MFJ-860 covers 1.8 to 60 MHz

Similar to MFJ-864, but for 1.8-60 MHz. Push button selects 30/300 watts forward, 6/60 watts reflected ranges. 4 1/4 x 2 1/4 x 3 inches.
MFJ 440 MHz UHF SWR Analyzer™

New MFJ UHF SWR Analyzer™ lets you read the SWR of any antenna from 420 MHz to 450 MHz.

The New MFJ-219 UHF SWR Analyzer™ lets you read the SWR of any antenna from 420 MHz to 450 MHz -- just plug in the coax of your antenna, set the frequency and read the SWR on the MFJ-219.

This full-featured MFJ-219 lets you read SWR where it is really counts -- directly at the antenna's base or feedpoint. Even small changes are critical at UHF, and can make a big difference in the way your antenna system performs. Now you have the perfect tool to do the job right.

The MFJ-219 uses the latest high-tech microwave integrated circuits and microstrip technology to produce an affordable UHF SWR Analyzer™ for only. MFJ-219/N, with "N" connector. Has jack for external frequency counter. Use 9 volt battery or 110 VAC with MFJ-1312B. 4x2½x2¼ inches.

MFJ Bandswitched Dip Meter™

The MFJ-203 is a sensitive MFJ-203 Bandswitched Dip Meter™ that covers all hams bands from 160-10 Meters. There are no plug-in tuning coils to keep up with or break.

It's the easiest dip meter you'll ever use -- just tune for a dip. There's no sensitivity control to constantly adjust.

Saves time and takes guesswork out of winding coils, measuring inductance and capacitance, measuring velocity factor and electrical lengths of coax. Determine resonant frequency of tuned circuits. Measure Q of coils. Also use as signal generator.

Has detachable coupling coil, dual FET oscillator, op-amp meter amplifier and jack for external frequency counter. Use 9 volt battery or 110 VAC with MFJ-1312B. 7½x2½x2¼ inches.

MFJ 10-160 Meter HF SWR Analyzer™

If you're an HF man, this compact MFJ-207 HF SWR Analyzer™ will help you build antennas that'll make working DX almost routine.

HF SWR Analyzer™ finds the SWR of any antenna from 135-156 MHz.

Just plug in your coax to find the SWR of any HF antenna on any ham band 10-160 Meters. Has jack for external frequency counter. Use 9 volt battery or 110 VAC with MFJ-1312B. 7½x2½x2¼ inches.

For Commercial VHF Radio

Same as MFJ-208 but for commercial VHF. MFJ-217, covers 30-50 MHz and MFJ-21, covers 150-170 MHz.

Just plug in your coax to find the SWR of any HF antenna on any ham band 10-160 Meters. Has jack for external frequency counter. Use 9 volt battery or 110 VAC with MFJ-1312B. 7½x2½x2¼ inches.

MFJ 2 Meter VHF SWR Analyzer™

MFJ-208 2 Meter VHF SWR Analyzer™ finds the SWR of any antenna from 135-156 MHz.

Jack for external frequency counter. Use 9 volt battery or 110 VAC with MFJ-1312 B. 7½x2½x2¼ inches.

For Commercial VHF Radio

Same as MFJ-208 but for commercial VHF. MFJ-217, covers 30-50 MHz and MFJ-21, covers 150-170 MHz.

Just plug in your coax to find the SWR of any HF antenna on any ham band 10-160 Meters. Has jack for external frequency counter. Use 9 volt battery or 110 VAC with MFJ-1312B. 7½x2½x2¼ in.

MFJ RX Noise Bridge

MFJ-202B

Let's you quickly adjust your dipole, inverted vee, beam, vertical, mobile whip or random wire for maximum performance. Tells whether to shorten or lengthen your antenna for minimum SWR. Measure resonant frequency, feedpoint resistance and reactance. Works with any receiver or transceiver.

Individually hand-calibrated resistance scale, expanded capacitance range (±150 pf) and exclusive built-in range extender.

MFJ Antenna Bridge

Now you can quickly optimize your antenna for peak performance with this portable, totally self-contained antenna bridge. Your antenna coax lead connects directly to this unique Antenna Bridge.

No other equipment needed. Take it to your antenna site. Determine if your antenna is too long or too short, measure its resonate frequency and antenna resistance to 500 ohms. It's the easiest, most convenient way to determine antenna performance. Built-in resistance bridge, null meter, tunable oscillator-driver (1.8-30 MHz). Use 9 volt battery or 110 VAC with optional AC adapter, MFJ-1312. 4x2x2 inches.

MFJ Antenna Current Probe

This MFJ Antenna Current Probe lets you monitor RF antenna currents--no connections needed! Determine current distribution, RF radiation pattern and polarization of antennas, transmission lines, ground leads, building wiring, guy wires and enclosures.

Indicate transmission line radiation due to high SWR, poor shielding or antenna unbalance. Detect re-radiation. Pinpoint RF leakage in shielded enclosures. Locate the best place for your mobile antenna. Use as field strength meter. 4x2x2 inches. Use 9V battery (not included).

600 MHz 10 Digit LCD Counter

Add this handy MFJ-346 frequency counter to your station and get high accuracy frequency measurements to 600 MHz with 10 digit precision.

Compatible with MFJ SWR Analyzers™, Dip Meter™, Antenna Resistance Meter™ and Antenna Bridge™.

Four gate times, .1 Hz resolution, high accuracy 1 ppm 10 MHz crystal time base. Use 9 volt battery or 110 VAC with MFJ-1312B. 4x1½x5¼ inches.
What the MFJ-259 Does

The MFJ-259 gives you a complete picture of your antenna's performance anywhere between 1.8 and 170 MHz, you can even check SWR outside the ham bands without violating FCC rules. Set the bandswitch and tune the dial—just like your transceiver. SWR is displayed instantly.

**RF Resistance Meter**

Does 2:1 SWR mean 25 ohms or 100 ohms? The new MFJ-259 tells you at a glance.

Now you can measure RF resistance up to 500 ohms at minimum SWR — instantly — on MFJ's exclusive side-by-side RF Resistance and SWR Meters!

Take the guesswork out of building matching networks and baluns for your antennas.

Watch the effects of spacing on radiation resistance as you adjust your antenna.

**Here's What You Can Do**

Find your antennas' true resonant frequency from the shack.

Tune the antennas on your tower and watch SWR change instantly as you make each adjustment. You'll know exactly what to do by simply watching the display.

Tune critical HF mobile antennas in seconds — without subjecting your transceiver to high SWR.

Measure your antenna's 2:1 SWR bandwidth on a single band, or analyze multiband performance over the entire spectrum from 1.8 to 170 MHz!

Measure inductance, capacitance, resonant frequency of tuned circuits, transmission line velocity factor/impedance/loss; Test RF chokes, transformers, baluns.

Adjust your tuner for a perfect 1:1 match without creating QRM.

And this is only the beginning! The MFJ-259 is really four test instruments in one: an accurate RF Resistance Meter, a high resolution 170 MHz frequency counter, RF Resistance Meter and an SWR Analyzer.

**Free Manual**

MFJ comprehensive 18 page instruction manual is packed with useful applications — all explained in simple language you can understand!

**MFJ SWR Analyzer**

*1.8-170 MHz SWR Analyzer*

MFJ-249

MFJ-249 HF/ VHF SWR Analyzer has all the features of MFJ-259 but less RF resistance meter. Includes 1.8-170 MHz continuous coverage, 10-digit LCD frequency counter and smooth vernier tuning. It's fully portable, powered internally by 8 AA batteries or 110 VAC with MFJ-131. Take it to remote sites, up towers, on DX-peditions — anywhere your antennas are located.

**Dip Meter Adaptor**

Plug a dip meter coupling coil into your MFJ SWR Analyzer and turn it into a sensitive and accurate bandswitched dip meter.

With a dip meter you'll save time and take the guesswork out of winding coils, measuring inductance and capacitance. Determine resonant frequency of tuned circuits and measure Q of coils. Set of two coils cover 1.8-170 MHz depending on your MFJ SWR Analyzer*

**Carrying Pouch**

Tote your MFJ-29B, MFJ-249, or MFJ-209 SWR Analyzer anywhere with the MFJ-29B custom Carrying Pouch.

Made with a special foam-filled fabric, the MFJ-29B cushions, deflects scrapes, and protects knobs, meters and displays from harm.

Wear it around your waist, over your shoulder, or clip it onto the tower while you work—the fully-adjustable webbed-fabric carrying strap has snap hooks on both ends.

Has clear protective window for frequency display and cutouts for knobs so you can use your MFJ SWR Analyzer without taking it out of your pouch.

MFJ-39, less protective window and cutouts for knobs. Must remove MFJ SWR Analyzer from pouch to use.

**Protection**

Protect your investment and keep your analyzer safe and looking like new.

(continued from MFJ-201)
MFJ's Heavy Duty Coax Antenna Switches...

**MFJ-1704**
- Mounts this 4-position SO-239 switch on your operating desk and you'll have more than the convenience of being able to instantly select any of 4 antennas in any ground position - you'll also get the replaceable lightning surge protection device that helps protect against distant lightning induced surges and static. It handles a full 2.5 KW PEP. Extremely low SWR. Isolation is rated from better than 60 dB at 30 MHz to better than 50 dB at 500 MHz. Negligible insertion loss. 50 ohm.
- MFJ-1704N. Like MFJ-1704 with "N" type connectors.

**1 KW Dummy Load**
- MFJ-250X VERSALOAD KW dummy load lets you tune up fast! Extends life of finals! Run 1 KW CW or 2 KW PEP for 10 minutes. 1.5 KW CW or 1 KW PEP for 20 Minutes. Continuous duty with 200 watts CW or 400 watts PEP. Complete with derating curve. Quality 50 ohm non-inductive resistor. Use transformer oil (not included). Low VSWR to 400 MHz. Under 1:2 to 30 MHz 1:1:5:7 to 300 MHz, 2:1 300-400 MHz. Ideal for testing both HF and VHF rigs. SO-239 connector. Vented for safety. Removable vent cap. Carrying handle. 7¾ inches high by 6¾ diameter. MFJ-250, includes transformer oil (no PCB).
- MFJ-250X.

**1.5 KW UHF/VHF/HF Dry Dummy Load**
- MFJ-1702B
- This MFJ-1702B 2-position Coax Switch has a new Center Ground Position! It handles 2.5 KW PEP, 1 KW CW. It has better than 60 dB isolation at 300 MHz and better than 50 dB at 450 MHz. 50 ohm.
- The unused terminal is automatically grounded for static and RF protection. It has less than 0.2 dB insertion loss and SWR below 1.2:1. The MFJ-1702B has heavy cavity type construction and uses SO-239 connectors. Mounting holes, 3x2x2 inches.
- MFJ-1702BN. "N" connectors, covers DC-1.1 GHz.

**MFJ HF Antenna/Transceiver Switches**
- MFJ-1701B Six position switch. 1.8-30 MHz. Unused terminals grounded. SO-239. Handles 2 KW PEP, 1 KW CW. 50-75 ohm loads.
- MFJ-1700B. Six position switch. 1.8-30 MHz. 10x3x1¾ inches. SWR below 1.3 to 30 MHz into 50 ohms. Full load for 30 seconds, derating curve to 5 minutes. MFJ-260C (300 W). SWR: 1.1:1 to 30 MHz, 1.5:1 30-650 MHz. 2½x2½x7 in. MFJ-260CN. With "N" connector. MFJ-5803. 3 foot coax with connectors.
- MFJ-1702BN. Supports 1 KW PEP, 1 KW CW. 50-75 ohm loads.

**New MFJ Low Pass Filter**
- If your harmonics are causing TVI problems, an MFJ-704 MFJ-704 could keep your neighbors happy while you have fun hamming. The MFJ-704 Super LowPass filter simply plugs between your rig and antenna. It suppresses TVI, RFI, telephone and other interference by reducing unwanted harmonics going to your antenna. At the same time your HF signal passes on through with low loss so you can snag rare DX. Nine Chebyshev poles, MFJ's exclusive Teflon Dielectric Technology™ capacitors, Hi-Q inductors, ground plane shielding, an RF tight cabinet give you excellent TVI and RFI protection. These Exclusive Teflon Dielectric Technology™ capacitors give you extremely low loss and eliminate voltage breakdown and capacitor heating—even at full legal power with a 2:1 SWR load!
- MFJ-704.
- MFJ-1702B.

**MFJ RFI Free Choke Eliminates RFI**
- MFJ-701
- MFJ-701 RFI-Free Choke Kit makes it easy to eliminate common RFI problems. You simply wind the offending cable around MFJ's RFI suppressing toroid to get rid of RFI.
- You get four square ferrite toroids that's formulated especially for eliminating RFI from 5 to 200 MHz. Each toroid separates into halves to make it easy to wind on all kinds of cable—including computer ribbon, TV coax, power cord, telephone wire, VCR video cables and stereo audio cables. Then the halves mount in a tough snap-together plastic frame to form a first rate RFI suppressor.
- For severe RFI problems and to accommodate large diameter cables, individual toroids snap together into a stack. Includes helpful "How to Eliminate RFI" guide to aid you in getting rid of difficult RFI.
- MFJ-701R.

**MFJ W9INN Balun Box**
- MFJ-912
- Let's you use coax from your antenna tuner to the MFJ-912 mounted outside the building. The MFJ-912 then converts the unbalanced coax to the balanced transmission line (ladder line).
- Provides the same function as an internal balun except it is located away from tuner. Great 2 core balun wound with teflon wire connected to high voltage ceramic feedthru insulators handles full legal power with ease. 3¼x2¼x7 inches.
MFJ Integrated CW Station

Transceiver, tuner, power pack fastens together to form tiny 6x6x4½ inch integrated CW station. Save! Buy's complete.

- MFJ CW Station.
- Includes MFJ CW Transceiver, MFJ-971 tuner, MFJ-4114 power pack, portable antenna order MFJ-9140B, 40M; MFJ-9130B, 30M; MFJ-9120B, 20M; MFJ-9115B, 15M.

MFJ-9020 CW Transceiver

QRM and noise to the max.

Smooth and Stable VFO: Wide-spaced reduction drive VFO capacitor glides slowly across the easy-to-read dial.

RIT: True RIT tuning control with center-decent emits a signal that even the most sensitive receivers can hear.

Easy on your Ears: Smooth AGC tracks the receiver back at full gain after a snap.

RIT during transmitting?

Built-in Speaker: Three 100 milliwatts of audio per channel. Even the weakest signals on the band come through loud and clear.

Rugged Construction: MFJ CW transceivers use very little power -- only 0.5 milliwatts average on receive and 1.2 amp peak on transmit. Perfect for battery operation in remote locations!

Great Options: Add the MFJ-726 narrow audio filter, and you can switch in four poles of active audio filtering for single-sideband operation.

Add the MFJ-412 Curtis chip iambic keyer module, and plug in your favorite set of paddles! Both modules install in seconds -- without soldering or modifications.

New MFJ High Current Multiple DC Outlet

The MFJ-1118 is MFJ's most versatile and highest current Deluxe Multiple DC Power Outlet. It lets you power two HF and/or VHF transceivers and six or more accessories from your transceiver's main 12 VDC power supply. You get two pairs of super heavy duty 30 amp 5-way binding posts for powering your transceivers. Each pair is individually fused and RF bypassed. They handle a total of 35 amps. An LED indicates power "ON". Six pairs of heavy duty, RF bypassed 5-way binding posts lets you power your accessories. They handle a total of 15 amps and are protected by a master fuse, have an ON/OFF power switch and an LED power indicator. You get 6 feet super heavy eight gauge color-coded cable with ring tongue terminals. Built-in 0-25 VDC voltmeter, binding posts space for standard dual banana jacks. Heavy duty aluminum construction. 12½x9x4½ in. 1 year unconditional warranty. Made in USA.

Get a Free Manual

Want to know more? Write or call MFJ for a free transceiver manual (please specify band). This comprehensive booklet has operating instructions, advice on setting up your station, DX-hunting tips, antenna suggestions, theory instructions, advice on setting up your station, Brazos Valley, Missouri, and look for our June issue!
MFJ 20 Meter and 75 Meter potent speech processing!

MFJ-9420

New Bands:
40 Meter and 75 Meter Available!

Turn on the MFJ-9420, and you'll marvel at how well it performs.

Weak stations roll in with surprising clarity, faithfully reproduced by the MFJ-9420's single-conversion receiver.

On transmit, MFJ's exclusive Constant Current™ speech processor cuts through noise and QRM like a far more powerful radio.

Now you can take world-class DX performance along on your next vacation or business trip; the MFJ-9420, microphone, power supply, AND antenna easily fit into your brief case or carry-on luggage.

At home, in the car, or on the road, you'll be amazed at what the MFJ-9420 can do!

Here's what you get...

Simple Operation: There's no "microprocessor mumbo-jumbo" with the MFJ-9420 -- you'll have it set up and operating in minutes!

Truly Portable: It's the smallest rig of its kind! The MFJ-9420 - plus microphone, power supply, AND antenna -- easily fit into a small brief case or gym bag!

Great Sensitivity: The MFJ-9420 features a quiet double balanced mixer front-end, single-conversion clarity, and plenty of gain with a powerful audio amplifier. If a signal is there, you'll pull it in loud and clear.

Analog S-Meter: You get a real calibrated S-meter -- not a useless LED bargraph -- that makes peaking a tuner or finding the best beam heading clear-cut. The meter also monitors speech processing levels during transmit.

Excellent Selectivity: Eight poles of tight IF filtering cuts adjacent chatter and focuses transmitter power where you need it most.

Smooth VFO: No annoying "synthesizer jump" or obscure keypad commands to deal with. Enjoy effortless tuning with a custom-built reduction-drive ball-bearing VFO capacitor.

Powerful Audio: You get big audio -- even in noisy locations -- from a special Signetics audio chip and a rugged 3 inch speaker.

RF Speech Processing: MFJ's exclusive Constant Current™ RF speech processing slashes through noise and QRM like a full-sized radio running many times more power.

Low Current Requirements: You'll never have to lug around a heavy bulky power supply to run your radio. The MFJ-9420 transmitter was especially designed from the ground up to deliver maximum talk power from popular easy-to-carry power sources such as NiCad D cells or the special MFJ-4110 wall adapter supply.

Rugged Transmitter: The bullet-proof PA transistor runs cool and easily tolerates 3:1 VSWR and accidental feedline shorts or opens.

Proven On-Air Design: You may have already worked a MFJ-9420 without knowing it. Designer Rick Littlefield, K1BQT, literally developed the MFJ-9420 on-air, under the same real-world operating conditions you'll experience every day!

Built To Last: Conservative design, premium plate-through PC board, quality components, handsome brushed-aluminum panel and a tough vinyl-clad case ensure years of dependable service.

MFJ-9420 covers 14.150 - 14.350 MHz, MFJ-9440 covers 7.150 - 7.300 MHz, MFJ-9475 covers 3.750 - 4.000 MHz. 12 watts PEP output. One watt audio output at 10% THD. Draws 50-100 ma on receive and 2.2 amp peak on transmit at 13.8 VDC. 2½x6½x6 inches.

MFJ No Matter What Guarantee

MFJ will repair or replace (at our option) your MFJ-9420 no matter what for a full year.

Free MFJ SSB Travel Radio™ Manual

Includes installation instructions, setup your station, DX techniques, antenna suggestions, trouble shooting guide, parts placement, schematic, parts list and more.

For a free manual write or call MFJ.

CW Adapter

Install the optional plug-in MFJ-415, for MFJ-9420/MFJ-9420X, Shipping Code A, CW adapter, and jump to the low end of 20 Meters for some CW action! Module includes semi-break-in/TR switching, sidetone generator, key jack and CW/SSB switch.

Dynamic SSB Microphone

Serious DXers know not all microphones sound alike. The MFJ-290 was selected because its on-air characteristics especially complement the superb speech processing system. You'll like the way it sounds -- and love the way it cuts thru noise and QRM. A winning combination!

Special offer MFJ-9420X/MFJ-9440X/MFJ-9475X

- both small, lightweight, and/or MFJ Portable Battery/AC Power Packs fasten to Travel Radio™. Microphone only.

MFJ-290, add s/h available separately.

Get Yours Today

Order your SSB Travel Radio today. At home or on the go, you'll enjoy countless hours of operating pleasure.

MFJ SSB and CW Transceivers Operating Accessories

MFJ Portable Antenna Tuner

Tunes coax, balanced lines, random wire 1.8-30 MHz.

Cross-Needle SWR/Wattmeter has two switchable ranges: 30, 300 or user selectable 6 watt ranges. Tiny 6 x 6½ x 2½ inches matches MFJ SSB and CW Transceivers. Fastens to MFJ SSB and CW Transceivers and/or MFJ-4114 Power Pack to form single unit. MFJ-27 handle for MFJ SSB and CW Transceiver stations available separately.

MFJ Portable Power Pack

MFJ-4114

Matching portable Battery/AC Power Pack for MFJ CW and SSB Transceivers or other low power radios. Provides power from Ni-cad D cells, regular or alkaline D cells or 110 VAC. Has charging circuit for Ni-cads D cells. 6 x 6½ x 3½ inches. For AC operation only, order MFJ-4110.

MFJ Portable Antennas

Efficient low SWR folded dipole. Lightweight, easy to carry. Easy to put up. MFJ-1774, 40-Meter; MFJ-1773, 30-Meter; MFJ-1772, 20-Meter; MFJ-1771, 17-Meter, MFJ-1770, 15-Meter; MFJ-1776, 6-Meter.

Power Packs fasten to MFJ CW Transceivers and/or MFJ-971 to form single unit. Batteries not included.
Oscillator, hook the straight key to your transmitter and go on the air cleaning up your sloppy fists with the MFJ-557 Deluxe Code Practice Oscillator. When you're finished for private listening. Plug in an external speaker (like MFJ-280) for "squeaky" to low "booming" tones. You even get an earphone jack wherever you go. A volume control lets you adjust it from barely audible to blaring full sound. You can practice without bothering anyone. A tone control lets you adjust your dot-dash-space ratio to make your signal distinctive to bust through pile ups. It also lets you compensate for the turn-on delay of your transmitter.

This lets you send characters such as C, K, and R with a single squeeze. It turns an inexperienced fist into a professional sounding CW operator.

MFJ Deluxe Electronic Keyer

You get everything you need to send beautiful CW from this Deluxe MFJ Keyer -- easy access front panel controls, all keyer modes, dot-dash memories, jam-proof spacing, weight control, sidetone, built-in speaker and more.

You get speed, weight, tone and volume controls and tune, semi-auto and off-switches all on the front panel for easy access.

By plugging in a dual paddle squeeze key such as the MFJ-564, you can use the fully automatic iambic mode. In this mode, dot-dash memory makes keying extremely easy. It lets you insert a dot before a dash finishes or insert a dash before a dot finishes. Also, squeezing both paddles generate alternating dots and dashes.

MFJ Econo Electronic Keyer II

The MFJ-401C Econo Keyer II lets you send iambic, automatic, semi-automatic or manual with your squeeze, single lever or straight key.


Econo MFJ keyer also features dot-dash memories, self-completing dots and dashes, jam-proof spacing, instant start. RF proof.

Front panel controls. Smooth linear speed control selects from 8 to 50 WPM. Tone control gives you a wide range. A tune switch lets you key your transmitter for tuning.

Internal controls: Weight control adjusts dot-dash ratio, makes your signal distinctive to penetrate QRM. Tone control for desired side tone pitch.

Ultra-reliable solid state keying: grid-block, cathode, solid state transmitters (-300V, 10 mA max, +300V, 100 mA max.). Fully shielded. Use 9 volt battery (not included) or 110 VAC with MFJ-1312B.

MFJ-557 Deluxe Code Practice Oscillator

Deluxe Morse straight key for code and sending practice features a heavy steel base, tone and volume controls and an earphone jack . . .

The MFJ-557 Deluxe Code Practice Oscillator features a Morse straight key on a non-skid heavy steel base that stays put on your table. The MFJ-557 lets you practice sending code at home, work, riding in your car -- practically anywhere -- because it's so easy to take it along wherever you go. A volume control lets you adjust it from barely audible to blaring full sound. You can practice without bothering anyone. A tone control gives you a wide adjustment, from high "squeaky" to low "booming" tones. You even get an earphone jack for private listening. Plug in an external speaker (like MFJ-280) for extra volume in the classroom.

It runs on a 9 volt battery (not included) or 110 VAC with MFJ-1305 that plugs into a jack on the side. When you're finished cleaning up your sloppy fists with the MFJ-557 Deluxe Code Practice Oscillator, hook the straight key to your transmitter and go on the air sounding just like you were born working QSOs.

Don't pass up this super buy. Built-in speaker. Adjustable contacts. Solid. 8½x2¼x3¾ inches. Black. It comes with MFJ's one year unconditional guarantee.
A powerful Morse code trainer lets you practice or teach code in Farnsworth or normal mode. You can select letters, numbers, punctuation marks or prosigns or any combination for practice. You can use standard 5 character groups, more realistic random 1 to 8 character groups or select specific six character sets to work on.

You can instant-replay a random session to check your copy. You can store custom code practice sessions in memory for later replay.

Menu Driven Memory Keyer/Bencher Paddle Combo

Here's what you can do with Message Memories...

Menu Driven Memory Keyer

Menu Driven Memory Keyer/Bencher Paddle Combo

MFJ-490

Message Repeat™ lets you repeat messages continuously. You can also insert pauses within a message. This lets you call CQ, listen for an answer and then resume calling CQ by pressing a single button. Each pause can be up to an hour long. This makes an excellent Automatic Beacon.

Message Call™ calls other messages and Message Queue plays messages in sequence. You can store QTH, rig, weather and other information in separate message memories and play these in any sequence you want.

Message Edit™ lets you correct mistakes while recording a message -- you don't have to start all over if you make a mistake.

While you're playing a memory message you can break-in at any time and insert dot/dash paddles and then resume playing your message.

You can insert commands within a stored message. As you play it back, these commands will execute. For example, you can insert automatically incrementing serial numbers, replay messages continuously, call and play other messages, insert pauses or combine all these in one message!

When you play your messages back, automatic word and character spacing make your CW sound like perfect code. Or you can adjust the spacing for a more distinctive individual sound that DX stations will notice.

Plus more...

You get contest serial numbering (0-9999) with auto-increment. You can send an N for 9 and a T for 0 to save time.

MFJ's Analog Set™ lets you adjust speed, weight and sidetone just as smoothly as a knob -- dot/dash paddles are used as an up/down control.

You get built-in sidetone, speaker, front panel volume control knob and adjustable 300-3000 Hz tone.

You can use automatic, semi-automatic bug or handkey modes, reverse dot/dash paddles, select iambic A or B, non-iambic modes.

You can adjust weight from 5 to 95% and compensate for transmitter distortion with a special transmitter compensation feature.

A tone feature lets you key your transmitter for tuning.

You can turn off the keying output so you can practice without keying your transmitter or unplugging your keyer.

You get direct and grid block keying. Keys are solid state and tube free.

Special MARS characters are recognized and can be used in messages.

Uses 9 volt battery, 12 VDC or 110 VAC with MFJ-1312B. 65x22x6 inches. Uses 9 volt battery, 12 VDC or 110 VAC with MFJ-1312B. 55x22x6 inches.

MFJ-80, Memory Expansion Kit. Expands your MFJ-492 to 8000 characters and adds four additional message.

MFJ-492X, Memory Expansion Kit installed.

MFJ-78, Full function Remote Control puts message memories and menu control at your fingertips for real convenience.

You get all the features of the MFJ-492 plus these...

You get 32,000 characters of memory.

You can bypass the menu by keying in simple two letter commands. When you select a feature the keyer tells you its status in CW.

Memory expandable to over 8000 characters

You can expand the MFJ-492 standard 192 character memories in four soft sectored message memories to over 8000 characters in eight message memories by simply plugging in the MFJ-80, Memory Expansion Kit. Memories backed-up by lithium battery.

Smooth Speed Control

Matching your CW speed to a QSO is best done by ear. The MFJ-492 lets you match speed by turning a knob or by using MFJ's Analog Set™. In this mode, pressing the dot or dash paddle smoothly increases or decreases speed from 5 to 100 WPM. You can also customize the range of the speed knob for precise control.

Powerful Morse Code Trainer

MFJ Super Menu Driven Memory Keyer™/Keyboard
MFJ Super CW Keyboard

Send effortless CW as soon as you turn on this MFJ Super CW Keyboard -- there's no computer to boot up, no program to load -- just start typing.

You get a standalone MFJ CW Keyboard that includes an RFI suppressed keyboard, a two line 16 character LCD display, eight 250 character nonvolatile message memories, a 150 character type-ahead buffer, iambic keyer, plus a powerful Morse Code Trainer and much more for an incredibly low price!

Paddle not included.

Big 200 Character type-ahead Buffer
Even "hunt and peck" typists can send perfect sounding CW because a large 150 character type-ahead buffer smooths out your typing and gives you time to compose.

MFJ Perpetual Memory™
Eight 250 character message memories let you store often used messages.

MFJ's unique nonvolatile Perpetual Memory™ saves your messages and settings up to 20 years without power or batteries.

Unlike short term memory, you won't lose your messages and settings every time you turn power off.

LCD Display
Only MFJ gives you an easy-to-read LCD display that simultaneously shows what you're typing on one line and what you're sending out on another line.

You can review stored messages, keyboard settings and spot typing errors that you can quickly correct by backspacing.

LCD display is mounted on a sloped front panel and has a contrast control.

MFJ AutoCommand™
MFJ AutoCommand™ lets you execute commands stored within a message.

For example, you can insert pauses and incrementing serial numbers, play messages continuously or call other messages.

Included RFI Suppressed Keyboard
Keyboard included -- you won't have to supply your own keyboard.

It has excellent RFI suppression -- it won't lockup or send characters you don't want because of RF and you won't hear digital hash in your receiver.

SingleTouch™ Function Keys
No complex keystrokes! MFJ's SingleTouch™ function keys make it simple to store and recall messages, set speed, weight and tone, setup serial numbering, turn on/off transmitter tune, keying and handkey mode.

Prosigns
Commonly used prosigns are assigned keys for easy use. You can also create any prosign by pressing Alt and any characters.

Full Featured Iambic Keyer
For fast break-in, plug in an iambic paddle and use it as a full featured keyer.

You can pause your playing buffer or message, insert your comments with your paddle and then resume playing.

Powerful Morse Code Trainer
You can practice or teach Morse code in Farnsworth or normal mode.

Select letters, numbers, punctuations or prosigns or any combination for practice. Use standard 5, random 1 to 8 character groups or select specific six character sets.

Plus much more
Has speaker, sidetone, volume control and jack for external speaker or earphones.

You can vary speed from 5 to 100 WPM, weight from 5 to 95%, sidetone from 300 to 3300 Hz and serial number from 0 to 9999.

Has buffer and memory full audible indicators. Keys solid state and tube rigs.

AT101 compatible keyboard plugs into compact 3½x⅞x⅞ inch interface. Use 12 VDC or 110 VAC with MFJ-1312B.

MFJ-452X, not including keyboard
MFJ-452, including keyboard. Paddle not included for MFJ-452/452X

MFJ Dedicated CW Keyboard
MFJ-451X

For an incredibly low price, you get a dedicated CW Keyboard that includes an IBM-AT compatible keyboard, a 200 character type-ahead buffer and two 100 character nonvolatile message memories plus much, much more.

You can send effortless CW as soon as you turn it on -- there's no computer to boot up, no program to load -- just start typing. If you make a mistake simply backspace to correct it.

Even "hunt and peck" typists can send perfect sounding CW because its huge type-ahead buffer smooths out uneven typing and gives you plenty of time to compose your thoughts.

You can repeat stored messages and insert automatic serial numbers and pauses (up to 99 minutes and 99 seconds) into stored messages.

There's no complex keystroke sequences to remember -- OneTouch™ function keys make it simple to store and recall messages, set speed, weight and tone, setup automatic serial numbering, turn on/off transmitter tune, keying and handkey mode.

Hi-tech nonvolatile memory saves messages and settings for up to 20 years without power or batteries.

Commonly used prosigns are assigned to character keys. You can also create any prosigns by pressing Alt and any characters.

For fast break-in operation, you can plug in an iambic paddle and use it as a full featured keyer complete with dot-dash memories.

You can pause while your buffer or stored message is playing, insert your comments and then resume playing.

A built-in speaker with sidetone and front panel volume control lets you monitor your sending. You can also plug in an external speaker for room filling volume.

You can key nearly any modern solid state or older tube type transmitters with the MFJ-451.

You can vary speed from 5 to 100 WPM, weight from 5 to 95%, sidetone from 300 to 3300 Hz and serial number from 0 to 9999. It has buffer and memory full audible indicators.

The IBM-AT compatible keyboard plugs into a compact 3½x⅞x⅞ inch cabinet that contains the electronics. Keyboard supplied may vary from the one shown here. Use 12 VDC or 110 VAC with MFJ-1312B.

MFJ-452X, including keyboard.

MFJ CW Keyboard with LCD Display, QSO Simulation and 32K RAM

Want the world's most powerful CW keyboard with all the features of the MFJ-452 Super CW Keyboard, 32K of lithium battery backed up message memory, plus much, much more?

Choose the MFJ-498 and you'll also get... an FCC ExamsSimulator™ that sends random QSOs exactly like FCC exams -- when you can copy these random QSOs, you're ready to pass your exam and upgrade... MFJ's QSO Simulator™ simulates on-the-air contacts -- answer a CQ, call a station, enjoy a QSO and get operating experience while boosting your code speed... MFJ's new WordRecognition™ mode gives you hundreds of commonly used words -- learn to copy entire words in your head without writing it down, just like the pros. 0½x2½x¾. Use 12 VDC or 110 VAC with MFJ-1315.

MFJ-498X

MFJ's exclusive AnalogSer. speed control lets you customize your speed range.

MFJ-498X, without keyboard. MFJ-498, including keyboard. Paddle not included for MFJ-498/498X
Learn Morse code anywhere with this pocket size MFJ Personal Morse Code Tutor™

When you have a spare moment, no matter where you are, you can enjoy a code practice session... at home, going to work, in a hotel, on vacation, on a plane, car, train, bus or just waiting.

This pocket size tutor takes you from zero code speed with a beginner's course to Extra Class with customized code practice. A Random QSO Mode lets you practice copying plain English QSOs to get you ready for your FCC code exam. You also get a Word Recognition Mode that lets you practice copying entire words -- just like the pros on 40 Meters.

Beginner's Course
There's a special beginner's course based

Realistic Plain English QSOs
You can practice copying realistic on-the-air style plain English QSOs. They'll help get you ready for your FCC code exam. When you're comfortable copying these, you're ready to pass your exam and upgrade!

Copying these on-the-air QSOs will also give you plenty of confidence before you make your first contact.

MFJ Word Recognition Mode™
You can select MFJ's Word Recognition Mode. It gives you hundreds of commonly used words in amateur radio for you to practice recognizing entire words instead of individual letters. With practice you can learn to copy words in your head without writing it down and carry on an entire CW conversation without paper -- just like the pros on 40 Meters.

Easy-to-Use Menu
It's so easy-to-use you won't need to read your instruction manual!
You simply select a menu and then activate a feature within that menu using just two pushbuttons. There's no keypad, no complex sequences, nothing to remember.

Pocket Size
You can take it anywhere because it's only 3x1½x5½ inches. It easily fits in your briefcase, travel bag or pocket. It uses a 9 volt battery (not included) or 110 VAC with optional MFJ-1312. You can use earphones for private practice without disturbing anyone or you can use its built-in speaker for group practice.

Tapes Can't Compare
Unlike tapes, you'll never memorize these computer generated code practice sessions. You can select the character sets you need the most practice on and set the speed and tone for each session. Tapes just plays the same recorded sessions over and over. You'll pay as much for a few sets of tapes as you would for a MFJ-411 Personal Morse Code Tutor™. In the long run, it's less expensive and more effective to own a MFJ-411.

Get Yours Today
No matter where you are, use your spare moments to learn code and upgrade so you can enjoy more ham band privileges.

Call now and order your MFJ-411 MFJ Personal Morse Code Tutor™ code tutor today.

MFJ Voice Keyer unfair During Contest
Gain an unfair advantage during a contest by cloning your voice
Has pre-wired microphone connector, programmable for most radios... Kenwood, Icom, Yaesu, Alinco

MFJ-432
Store frequently used phrases like: "CQ Contest this is AASMT"... "You're 59"... "QTH is Mississippi."
Let this new MFJ Voice Memory Keyer™ call CQ, send your call and do contest exchanges for you in your own natural voice!
Operate most of a contest by pressing a few buttons and still have your voice after the contest.
You can store four natural sounding messages in a total of 20 seconds. EEPROM technology keeps messages stored for up to 10 years -- no backup battery needed.
You can also repeat a message continuously. It makes it sooo easy to call long CQs during poor band conditions.
It's easy to use -- just plug your 8 pin microphone cable into the MFJ-432 and plug it's cable into your transceiver's 8 pin mic connector. Internal jumpers let you customize it to your rig.
Built-in speaker lets you monitor stored messages. Has jack for remote control operation. Uses 9 volt battery (not included) or 110 VAC with MFJ-1312B. 6½x2½x6½ inches.

MFJ Deluxe Hybrid Phone Patch
Has pre-wired microphone connector, programmable for most radios... Kenwood, Icom, Yaesu, Alinco

MFJ-624D
MFJ-624D Deluxe Hybrid Phone Patch gives you crisp, clear, hum-free audio, and that's what phone patching is all about. It's jumper selectable for Kenwood, Icom, Yaesu and Alinco rigs with 8 pin mic connectors.
You can use either VOX or push-to-talk. RF pi-filters and PC board construction eliminates RF feedback. Use with virtually any rig.
Built-in VU meter monitors phone line levels to prevent crosstalk. Adjust null depth for maximum isolation between receiver and transmitter. Separate transmitter and receiver gain controls eliminate the need to readjust your rig after patching. Null control. Standard phone Connection, RJ-11. Jacks for speaker, audio in and audio out. 8 x 2 x 6 inches. Use 12 VDC, 9 volt battery or 110 VAC with MFJ-1312B.
This USA made MFJ-624D gives you more quality and more features than competing phone patches that cost much more. MFJ-624D is FCC approved. Get yours today!
MFJ tunable DSP filter

MFJ's tunable super DSP filter automatically eliminates heterodynes, reduces noise and interference simultaneously on SSB, AM, CW, Packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX, weak signal VHF, EME, satellite -- nearly any mode.

You get MFJ's tunable FIR linear phase filters that minimize ringing, prevent data errors and have "brick wall" filter response with up to 57dB attenuation 75 Hz away.

Only MFJ gives you 5 tunable DSP filters. You can tune each lowpass, highpass, notch, and bandpass filter including optimized SSB and CW filters. You can vary the bandwidth to pinpoint and eliminate interference.

Only MFJ gives you 5 factory pre-set filters and 10 programmable pre-set filters that you can customize. Instantly remove QRM with the turn of a switch! You get MFJ's automatic notch filter that searches for and eliminates multiple heterodynes. You also get MFJ's advanced adaptive noise reduction. It silences background noise and QRM so much that SSB signals sound like local FM.

The automatic notch and adaptive noise reduction can be used with all relevant tunable pre-set, tunable and tunable FIR filters.

Automatic gain control (AGC) keeps audio level constant during signal fade.

Automatic notch filter

MFJ's automatic notch filter searches for and eliminates multiple heterodynes in milliseconds. It's so fast that even interfering CW and RTTY signals can also be eliminated.

With up to 50 dB attenuation, you'll copy stations otherwise masked by heterodynes. Voice signals aren't degraded because the notch is extremely narrow.

Turn on automatic notch and you'll never hear unwanted heterodynes of tuner-uppers.

You can selectively remove unwanted tones using the two manually tunable notch filters -- an MFJ exclusive! Knock out unwanted CW stations while you're on CW.

Adaptive Noise Reduction

Turning on noise reduction silences background noise. It reduces fatigue and makes noisy signals readable.

Noise reduction works in all filter modes and on random noise -- white noise, static, impulse, ignition noise, power line noise, hiss.

The LMS algorithm gives you up to 20 dB of noise reduction. Noise reduction is adjustable to prevent signal distortion.

Tunable highpass/lowpass filters

For Voice and Data, nothing beats MFJ's exclusive tunable highpass/lowpass FIR linear phase "brick wall" filters.

You can tune the center frequency from 300 to 3400 Hz, and vary the bandwidth from 30 Hz to 2100 Hz -- from super-tight CW filters to razor-sharp Data filters.

As you narrow the bandwidth, interfering signals drop out, because, just 60 Hz away, they're down by over 47 dB.

You can use narrower bandwidths to fight tough QRM because these linear phase filters don't distort signals with unequal time delays.

Even with the narrowest 30 Hz bandwidth, you'll never have a problem with ringing.

One position gives you two tunable filters you can use together. For example, tune one to mark, one to space and set the bandwidth tight for an incredibly sharp RTTY filter.

15 pre-set filters -- factory set or you program

You can select from 15 pre-set filters. Use for SSB, AM, CW, Packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX or any mode. If you don't like our pre-set filters, you can program your own -- an MFJ exclusive! Save center frequency, bandwidth, lowpass/ highpass cutoffs, auto/manual notch, noise reduction -- all filter settings -- in 10 programmable filters.

Only MFJ gives you both tunable filters to eliminate nearly any QRM and convenient pre-set filters customized for any mode.

Plus more...

A push-button bypasses your filter -- lets you hear the entire unfiltered signal.

5/2 watt amplifier, volume control, input level control, speaker jack, PTT sense line, line level output. 9/4x2/4x6 inches.

Plugs between your transceiver or receiver and external speaker or headphones. Use 12 VDC or 110 VAC with MFJ-1315. Cable Pack, MFJ-5184, includes receiver cable, DC cable, and 2 open-end TNC cables.

Software Upgrade

For MFJ-784, order MFJ-55. Gives you most features of the MFJ-784B.

DSP for your MFJ-1278/B

Only MFJ gives you tunable and programmable "brick wall" DSP filters.

Plug a MFJ-780 "brick wall" DSP filter into your MFJ-1278/B multimode and you won't believe your eyes when you see solid copy from signals completely buried in QRM! The MFJ-1278/B automatically selects the correct DSP filter for Packet, AMTOR, PACTOR, RTTY, ASCII, FAX, Color SSTV, Navtex or CW. Get the MFJ-780 now and watch your MFJ-1278/B copy signals that other multimodes can't.

Has built-in automatic self-test for all digital circuitry and controls. 4.5/2.5/2.5x5 inches.

Uses 10-16 VDC or 110 VAC with MFJ-1312B.
Tap into Secret Shortwave Signals

Turn mysterious signals into exciting text messages with this new MFJ Multi Reader™

Ever wonder what those mysterious chirps, whistles and buzzing sounds are on the shortwave bands?

Much of it is RTTY, ASCII, CW and AMTOR(FEC) signals passing commercial, military, diplomatic, weather, aeronautical, maritime, amateur and other traffic.

Tap into these "secret" Signals

Plug this self-contained MFJ MultiReader™ into your shortwave receiver's headphone jack. Then watch these mysterious signals turn into exciting text messages as they scroll across an easy-to-read LCD display. You don't need a computer, interface, program, special cables or any other equipment.

Eavesdrop on the World

Eavesdrop on the latest breaking news as press agencies from all over the world relay them on RTTY -- it's like having a private wire service in your home.

You'll hear the world's commercial and government press agencies transmitting unedited news in English -- China News Agency in Taiwan, Telam Press in Argentina, Iraqui News Agency in Iraq, TANJUG Press in Serbia plus many others.

Copy RTTY weather stations from Antarctica, Mali, Congo and many others. Listen to military stations passing traffic from Panama, Cyprus, Peru, Capetown, London and others. Listen to hams as they chat to their friends, listen in on diplomatic, research, commercial and maritime traffic.

Listen to maritime users, diplomats and amateurs send and receive error free messages using various forms of TOR (Telex-Over-Radio).

Monitor Morse code communications from hams, military, commercial, aeronautical, diplomatic and maritime coastal stations from all over the world -- Australia, Russia, Hong Kong, Japan, Egypt, Norway, Israel, Africa, Portugal, USA, Spain and others.

There's plenty of exciting non-voice traffic on shortwave that'll keep you fascinated -- traffic your friends can't read -- unless they have a decoder.

All you need is your receiver and the MFJ-462B MultiReader™

Printer Monitors 24 Hours a Day

The MFJ's exclusive TelePrinterPort™ lets you monitor any station 24 hours a day by printing their transmissions -- even if you're not there or you're fast asleep. Only the MFJ-462B gives you this wonderful feature without costing you an arm and a leg.

Simply plug your computer's Epson compatible printer into the MFJ-462B TelePrinterPort™ and you're ready to print.

MFJ MessageSaver™

You can save several pages of text in 8K of memory for re-reading or later review using MFJ's exclusive MessageSaver™.

High Performance Modem

You'll consistently get solid copy from MFJ's high performance PLL phaselock loop modem technology.

It really digs out weak signals buried in noise and even tracks slightly drifting signals. Both mark and space tones are copied to give you greatly improved decoding under adverse conditions.

Easy to use, tune and read

It's easy to use -- just push a button to select modes and features from a menu. It's easy to tune -- a precision tuning indicator makes tuning your receiver for best copy on all modes quick and easy.

It's easy to read -- the 2 line 16 character LCD display has contrast adjustment for easy reading.

Copies Standard Shifts and Speeds

You can copy most standard shifts and speeds in all modes and you get MFJ AutoTrak™ automatic Morse code speed tracking. Even with sloppy fists you'll be surprised at the copy you'll get with its powerful built-in software.

Use 12 VDC or use 110 VAC with MFJ-1312B AC adapter, 64x2½x6¾ in.

Receiver cable, MFJ-5162. Cable connects MFJ-Multi-Reader to your radio's external speaker (3.5mm jack).

Printer cable, MFJ-5412.

Toll-free Help Line

If you even need help using your new MFJ MultiReader™, you can call MFJ's exclusive toll-free technical help line 800-647-TECH(8324) and talk to a friendly MFJ Customer Service Technician.

No Matter What™ Guarantee

You get MFJ's famous one year No Matter What™ unconditional guarantee. That means we will repair or replace your MFJ MultiReader™ (at our option) no matter what for a full year.

Try it for 30 Days

You're not taking a chance when you buy from MFJ Enterprises, Inc. Order an MFJ-462B MultiReader™ from MFJ and try it in your own setup -- compare it to any other product on the market regardless of price. Then if you are not completely satisfied, simply return it within 30 days for a prompt and courteous refund (less shipping). So order today and try it -- you'll be glad you did.

MFJ SSB/CW Audio Filters

MFJ-752C

MFJ-722

This MFJ-752C all mode dual tunable filter lets you zero in and pull out your favorite stations and notch out interference at the same time. Two independently tunable filters let you peak, notch, low or high pass signals to eliminate heterodynes and interference--even on the most crowded bands. Tune both filters from 300 to 3000 Hz. Vary bandwidth from 40 Hz to almost flat. Notch depth to 70 dB. Works with any rig. 2 watts for speaker. Inputs for 2 rigs. Switch selectable. Switchable noise limiter for impulse noise through clipper removes background noise. OFF bypasses filter. Use 9-18 VDC or 110 VAC with MFJ-1312B. 10 x 2 x 6 in.

MFJ-722. The MFJ-722 "Optimizer" switch selectable SSB/CW filter offers razor sharp filtering with switch-selectable bandwidths (80, 110, 180, 250, 500, 1000 Hz)

MFJ All Band Transceiver/Preselector

MFJ-1045C

MFJ-1040B


MFJ-1045C. No attenuator, xcvr auto bypass, delay or PTT.

(continued from MFJ-722)

MFJ-1040B

50, 180 Hz centered on 750 Hz), steep-skirted SSB filtering, 300-3000 Hz tunable 70 dB notch filter. Plug into phone jack. Speaker. Built-in 2 watt amp. Headphone jack. Use 9-18 VDC or 110 VAC with MFJ-1312B.
Enjoy World Band shortwave listening from all over the world as you drive.

This MFJ World Band Explorer™ converts your AM/FM car radio into a World Band shortwave receiver at a push of a button. You’ll hear late-breaking news as it happens from all over the world, listen to a soccer game from Germany, enjoy a concert from Vienna and learn about the culture of other nations. These and many interesting, informative programs on the shortwave World Bands are there waiting for you to tune in and enjoy.

Unlike local FM and AM radio stations that fade out after a few miles and broadcast the same monotonous programming, you can enjoy thrilling World Band shortwave stations throughout an entire trip, day or night. Enjoy programming not found on AM, FM or tapes.

The MFJ-306 World Band Explorer™ covers the entire 19, 25, 31 and 49 Meter international shortwave broadcast bands.

On these World Bands, you’ll hear stations from all over the world at various times of the day and year — including: Europe, Africa, Middle East, Asia, Australia, North and South America.

The World Band Explorer™ is easy to install. Just unplug your car radio antenna and plug it into the MFJ-306. Then insert the MFJ-306 cable into your radio antenna jack and connect 12 VDC.

It’s easy to use. Push a button to choose a band and tune in exciting World Band stations on your car radio. It works with all automotive radios including the newer digital tuning radios and older radios with tuning dials.

A built-in clarifier knob lets you tune in World Band stations lodged between standard AM stations on newer digital radios. It measures just 5x11/4x3/4 inches — small enough to fit anywhere in your vehicle and it has a push button to select World Band reception or your AM/FM radio. It gives you excellent sensitivity and selectivity when used with your automotive receiver. Has standard Motorola antenna plug and jack.

Order your MFJ-306 World Band Explorer™today and enjoy exciting programs from all over the world.
MET Shortwave Regenerative

elements fed in phase on the 108-174 MHz aircraft/VHF high bands and inch pole with one U-bolt (supplied). 8' high, 2' boom. Signals are amplified at the antenna before going into your coax.

high outdoor in the clear and feed it with long runs of inexpensive coax.

as resonant halfwave elements on 30-50 MHz

MFJ Super Sensitive Scanner Antenna

Your scanner will come alive with signals you never knew existed when you use this new super sensitive antenna.

You’ll hear distant mobiles — even handhelds — as they talk to base stations.

You’ll pull in weak ground signals from distant control towers and air-traffic centers — even hear both sides of conversations!

The MFJ-1864 combines new weak-signal technology — an extremely low noise amplifier — with a resonant high gain omni-directional antenna.

You get 20 dB of extremely low noise amplification that’ll let you hear signals down to the noise level.

The sensitive high gain antenna operates as two collinear 5/8 wave elements fed in phase on the 108-174 MHz aircraft/VHF high bands and as resonant halfwave elements on 30-50 MHz VHF low band.

For really long range reception, you can mount your antenna up extra high outdoor in the clear and feed it with long runs of inexpensive coax.

Coax loss won’t degrade your signal. That’s because weak signals are amplified at the antenna before going into your coax.

Sidemounts to your existing tower, TV mast or any 1 to 1 ½ inch pole with one U-bolt (supplied). 8’ high, 2’ boom.

For Mobile Scanners

Maximum Gain 5/8 Wave

Gives maximum gain of any single element mobile antenna on 108-174 MHz, resonant 1/4 wave on 30-50 MHz, 48”, magnet mount. MFJ-1828B, BNC, MFJ-1828M, Motorola.


MFJ Shortwave Regenerative Receiver Kit

• Covers all or part 75/80, 49, 40, 30, 31, 20, 25, 22, 19, 17, 16, 15, 13 meter bands
• Listen to AM, SSB, CW, WWV, RTTY and packet
• Smooth vernier reduction drive
• Smooth regeneration control, RF Stage

MFJ-8100K

Remember hunching over your regenerative receiver for hours with a pair of phones pressing uncomfortably against your ears?

You could hear just about anything that fancy superhets could hear. Sure, you had to play around with the regeneration control just right and have a steady hand to tune but you could hear ‘em.

Don’t you wish you could relive some of this fun and excitement of your youth — share some of it with your kids and grandkids?

Well, you can — with the MFJ-8100 World Band Shortwave Radio Kit.

Spend a fun evening with your child or grandchild and help him put this simple kit together. When you two finish, watch him glow with excitement as he tunes the world bands — just like you did — and remember for life. It might even inspire him into a career in electronics.

This baby performs. It has an RF stage to really pick up the weak ones and it goes into regeneration smoothly without pops or dead spots. Stations all over the world will come in loud and clear with just a 10 foot wire antenna.

With a 10 foot wire antenna, you’ll be amazed at what you can hear — stations all over the world will come in loud and clear.

Listen to international shortwave broadcasts, hams on SSB and CW, WWV, RTTY, packet and much more. Covers all or part of 75/80, 49, 40, 30, 31, 20, 25, 22, 19, 17, 16, 15, 13 meters in five bands.

It has vernier reduction drive, bandswitch, volume and RF gain controls, uses a 9 volt battery and is built into a rugged aluminum cabinet.

Two earphone jacks let you and your child or grandchild listen together with your Walkman style earphones or plug-in speakers. 7m by 2½ inches.

Order one as a special gift for your child or grandchild ... or for yourself.

MFJ-8100K, kit; MFJ-8100W, wired and tested.

2 Meter Repeater Monitor Receiver Kit

Enjoy a fun evening building this high quality tunable 2 Meter receiver kit and you’ll have a super sensitive repeater monitor that’ll rival receivers costing hundreds of dollars more.

It makes an ideal second receiver for your kitchen or bedroom so you can keep up with what’s happening on 2 Meters. It’s perfect for monitoring packet.

Loan one to a prospective ham — you’ll whet his appetite by getting him involved.

Look at these impressive features you get for an incredibly low price . . .

• A low noise, high gain RF preamp gives you excellent 0.1 microvolt sensitivity — lets you hear weak signals loud and clear.

• An air variable tuning capacitor with a velvet smooth 8:1 reduction drive makes tuning easy and comfortable with no noticeable drift.

• Dual conversion superhet receiver with sharp ceramic filters and crystal controlled second oscillator gives you excellent selectivity and stability.

• MFJ’s exclusive TailFree™ squelch eliminates annoying squelch tails. A shaped audio response reduces background noise on weak signals.

• 19-inch ¼ wave whip antenna is included. A 50 ohm antenna input lets you plug in an external groundplane or Yagi so you can reach out and pull in outlying repeaters.

• Has tune, squelch and volume controls. Built-in speaker.

• High quality components with glass epoxy PC board and attractive all metal cabinet. Excellent step-by-step instructions including directions for aligning your receiver without instruments. Uses 9 volt battery, 9-12 VDC or 110 VAC with optional MFJ-1312B.

MFJ-8400K, kit; MFJK-8400W, wired and tested.

FREE instruction manual available for more details.
**MFJ FAX, WeFAX, RTTY, CW, ASCII Interface**

This new MFJ-1214 Multimode Computer Interface lets you use your computer and radio to receive, display and transmit brilliant full color photos and incredible WeFAX weather maps with all 16 gray levels. It also receives and transmits RTTY, ASCII and CW . . . . Complete with software, power supply and computer cables for an incredibly low price.

**MFJ-1214PC**

This new MFJ Multimode lets you join the exciting new world of digital hamming for an incredibly low price. You'll enjoy RTTY, ASCII and CW, as well as WeFAX and Color FAX.

Is it going to rain? The WeFAX mode lets you see for yourself when you receive highly detailed weather maps that even show you cloud densities in all 16 gray levels. You can transmit and receive brilliant full color FAX photos and exchange them with your ham buddies around the world.

Full featured RTTY Baudot and ASCII modes are perfect for ragchewing and contesting. You can even read tomorrow morning’s newspaper copy as it is transmitted to newspapers by shortwave RTTY.

Turn yourself into a CW powerhouse with the easy to use and versatile CW mode. It’s perfect for contesting and DXing.

What do you need to transmit and receive these exciting digital modes? Your radio, computer and the MFJ-1214 package. That’s all.

Everything is included. All you do is plug it all in, run the friendly software, and tune in a station. Then sit back and enjoy the wonderful world of digital communications as digital transmissions come to life on your computer screen.

**Everything you need is included**

You get the MFJ-1214 multimode, software, computer and radio interface cables (you have to add a connector for your particular radio) and AC power supply.

You also get MFJ’s unmatched full one year No Matter What Guarantee.

**Gray Scale Weather FAX**

The MFJ-1214 lets you receive and transmit WeFAX weather maps and wire photos with all 16 gray levels. You’ll be thrilled when the data in your house appears on your computer screen with cloud densities displayed.

16 gray scale weather map received off HF with the MFJ-1214, radio and computer. FAX picture can be zoomed, reversed, colorized or retransmitted.

A timer function lets you begin automatic reception of weather maps at any time of your choice. They can then be automatically saved to disk, printed out on your printer, or both.

**Full Color FAX Photos**

You’ll can transmit and receive brilliant full color FAX photos and exchange them with your ham buddies around the world. The MFJ-1214 supports the display of up to 32,000 colors, depending on your computer graphics.

The timer function lets you set your MFJ-1214 to automatically receive pictures at any time. They can then be automatically saved to disk, printed out on your printer, or both.

**Versatile Zoom function**

You’ll enjoy the versatile RTTY mode. MFJ-1214 gives you all standard shifts and speeds. “Syn” and “QRM” features give you greatly improved copy under poor conditions.

A superb on-screen tuning indicator makes it super easy to lock stations in perfectly.

You also get a full fledged text editor that lets you enter, save and transmit text files.

“Shorty” messages let you create and transmit short messages during receive. These messages can be instantly saved to disk for later use.

**Tuning Indicator for RTTY makes tuning easy. No more guessing—RTTY Automatic Signal Analyzer™ lets you simply tune and enjoy.**

You can transmit and receive all 7 bit ASCII using the same features as are in the RTTY mode. This gives you ARRL bulletins and other ASCII transmissions.

**CW**

The MFJ-1214 makes working CW a breeze—even if you’re rusty.

**Automatic speed tracking locks onto received CW. CW regeneration gives you a nice clean tone with no QRM—sounds like a code practice oscillator.**

**Tuning is easy with on-screen tuning that tells you when you’re locked in. Also a unique Tune-by-Ear™ feature lets you smoothly tune in CW by matching received tone with regenerated tone.**

**The CW Keyboard mode**

lets you send perfect CW effortlessly. You get type ahead, adjustable sidetone, transmitter tune and you can transmit message files conveniently stored on disk.

**Optional Pre-wired Radio Cable**

Solves your wiring headache with the MFJ pre-wired MFJ-1214-to-radio cables. See page 36 for details. TNC/Mode switch allows you to switch between Microphone and MFJ-1214 without disconnecting cables. MFJ-1272B.

**Order Yours Now**

MFJ-1214PC works with IBM and compatible computers. FAX operation requires system with 512K RAM and 10 MHz or faster and VGA graphic system. Order your MFJ-1214PC today.

**RTTY/ASCII/CW Computer Interfaces**

The MFJ-1225 computer interface lets you use your IBM compatible or Commodore 64/128 computer as a full featured RTTY, ASCII, CW station. Then sit back and enjoy the wonderful world of digital communications as digital transmissions come to life on your computer screen.

Copies all RTTY shifts and speeds. Copies on both mark and space. Sharp 8 pole active filters 170 Hz shift and CW. Built-in tuning indicator supports the display of up to 32,000 colors, depending on your computer graphics.

The timer function lets you set your MFJ-1214 to automatically receive pictures at any time. They can then be automatically saved to disk, printed out on your printer, or both.

Versatile Zoom function gives you incredible details of pictures and maps. A zoom function lets you isolate and enlarge and display any part of a picture or map.

**Radioteletype (RTTY)**

You’ll enjoy the versatile RTTY mode. MFJ-1214 gives you all standard shifts and speeds. “Syn” and “QRM” features give you greatly improved copy under poor conditions.

A superb on-screen tuning indicator makes it super easy to lock stations in perfectly.

You also get a full fledged text editor that lets you enter, save and transmit text files.

“Shorty” messages let you create and transmit short messages during receive. These messages can be instantly saved to disk for later use.

**Automatic speed tracking locks onto received CW. CW regeneration gives you a nice clean tone with no QRM—sounds like a code practice oscillator.**

**Tuning is easy with on-screen tuning that tells you when you’re locked in. Also a unique Tune-by-Ear™ feature lets you smoothly tune in CW by matching received tone with regenerated tone.**

**The CW Keyboard mode**

lets you send perfect CW effortlessly. You get type ahead, adjustable sidetone, transmitter tune and you can transmit message files conveniently stored on disk. Optimal Pre-wired Radio Cable. Solves your wiring headache with the MFJ pre-wired MFJ-1214-to-radio cables. See page 36 for details. TNC/Mode switch allows you to switch between Microphone and MFJ-1214 without disconnecting cables. MFJ-1272B.

**Order Yours Now**

MFJ-1214PC works with IBM and compatible computers. FAX operation requires system with 512K RAM and 10 MHz or faster and VGA graphic system. Order your MFJ-1214PC today.

**RTTY Cross- Pattern Tuning Scope Adapter**

A simple properly tuned RTTY receiving demodulator can outperform a more expensive unit that’s tuned off frequency, especially under noisy conditions.

Serious RTTY operators use cross-pattern tuning on an oscilloscope display. They simply tune for maximum cross-pattern size and they’re precisely tuned in for best copy.

With MFJ’s new RTTY Cross-Pattern Scope Adapter you can have the same precision tuning indicator at very low cost.

It plugs between your received audio and any oscilloscope with separate X and Y inputs to display a cross-pattern on your scope.

**Analyze your Signal at a Glance**

The cross-pattern tells you when there is no RTTY signal -- only noise and speech, when you are receiving wide or narrow shift, when you are properly tuned or when you have a weak noisy RTTY signal that’s not limiting.

Has audio in, filter out, mark and space scope out jacks.

Audio in and filter out level controls. On/Off bypass switch. "ON" LED. Use 9 volt battery or 110 VAC with AC adapter MFJ-131ZB. 3.4x6 inch cabinet.

Order MFJ-44X, (pictured) for MFJ-1278s and other RTTY demodulators or order MFJ-44, plug-in Scope Adapter module for MFJ-127BB, installs internally.
<table>
<thead>
<tr>
<th>Product</th>
<th>Price £</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFJ-43</td>
<td>34.95</td>
</tr>
<tr>
<td>MFJ-432</td>
<td>119.95</td>
</tr>
<tr>
<td>MFJ-44</td>
<td>35.95</td>
</tr>
<tr>
<td>MFJ-44X</td>
<td>59.95</td>
</tr>
<tr>
<td>MFJ-451</td>
<td>129.95</td>
</tr>
<tr>
<td>MFJ-451X</td>
<td>94.95</td>
</tr>
<tr>
<td>MFJ-452</td>
<td>149.95</td>
</tr>
<tr>
<td>MFJ-452X</td>
<td>109.95</td>
</tr>
<tr>
<td>MFJ-45A</td>
<td>17.95</td>
</tr>
<tr>
<td>MFJ-45B</td>
<td>34.95</td>
</tr>
<tr>
<td>MFJ-45C</td>
<td>179.95</td>
</tr>
<tr>
<td>MFJ-462B</td>
<td>179.95</td>
</tr>
<tr>
<td>MFJ-46A</td>
<td>59.95</td>
</tr>
<tr>
<td>MFJ-46B</td>
<td>79.95</td>
</tr>
<tr>
<td>MFJ-46C</td>
<td>249.95</td>
</tr>
<tr>
<td>MFJ-47A</td>
<td>59.95</td>
</tr>
<tr>
<td>MFJ-47B</td>
<td>79.95</td>
</tr>
<tr>
<td>MFJ-47C</td>
<td>249.95</td>
</tr>
<tr>
<td>MFJ-48</td>
<td>29.95</td>
</tr>
<tr>
<td>MFJ-48E</td>
<td>34.95</td>
</tr>
<tr>
<td>MFJ-48X</td>
<td>29.95</td>
</tr>
<tr>
<td>MFJ-490</td>
<td>189.95</td>
</tr>
<tr>
<td>MFJ-490X</td>
<td>119.95</td>
</tr>
<tr>
<td>MFJ-492</td>
<td>109.95</td>
</tr>
<tr>
<td>MFJ-492X</td>
<td>124.95</td>
</tr>
<tr>
<td>MFJ-493</td>
<td>149.95</td>
</tr>
<tr>
<td>MFJ-498</td>
<td>199.95</td>
</tr>
<tr>
<td>MFJ-498X</td>
<td>169.95</td>
</tr>
<tr>
<td>MFJ-49B</td>
<td>44.95</td>
</tr>
<tr>
<td>MFJ-49BM</td>
<td>44.95</td>
</tr>
<tr>
<td>MFJ-50</td>
<td>49.95</td>
</tr>
<tr>
<td>MFJ-5022</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5022X</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5022Y</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5022Z</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5024</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5024X</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5024Y</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5024Z</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5026</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5026X</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5026Y</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5026V</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5026Z</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5080</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5080M</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5080MX</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5080MYV</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5080MZ</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5080X</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5080Y</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5080YH</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5080YV</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5080Z</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5082</td>
<td>12.95</td>
</tr>
<tr>
<td>MFJ-5084</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5084M</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5084MX</td>
<td>16.95</td>
</tr>
<tr>
<td>MFJ-5084MYV</td>
<td>16.95</td>
</tr>
</tbody>
</table>
MFJ HT Compact Speaker/Mics

Here's a Compact Speaker/Mic that fits comfortably in your hand and has a full size speaker for crystal clear audio.

No need to remove your handheld from your belt to talk or monitor calls. Clip it near your ears so you can easily hear every call with the volume turned down.


HT Range Extenders

Telescoping Antennas for handhelds

A. The Long Ranger™ 2 Meter Halfwave, MFJ-1714. For really long range this MFJ ended halfwave is hard to beat. It outperforms a 5/8 wave on a handheld because the 5/8 wave needs a ground plane. The MFJ halfwave doesn't. It's shorter, lighter, has more gain and places less stress on your antenna connector than a 5/8 wave antenna. When collapsed, it performs like a rubber duck. 40" extended, 10½" collapsed.

B. The Dual Band Ranger™ for 2 Meters and 440 MHz, MFJ-1716. Got a new dual band handheld or separate units? One antenna fits all. It's a 1/4 wave for 2 Meters and a 5/8 wave with gain for 440 MHz. 7½" collapsed, 19" extended.

C. The Pocket Linear™ ½ Wave, 2 Meters. MFJ-1710. Carry this pen size antenna in your pocket like a ballpoint pen. When you're using your rubber duck, on the fringe and noisy, put on The Pocket Linear™, extend it to 24½" and carry on your QSO. Has pocket clip. 5½" collapsed.

MFJ 2-Meter Pocket Roll-Up Halfwave J Antenna

MFJ-1730

Roll up this halfwave 2 Meter J-antenna and stick it in your pocket! This new MFJ Pocket Roll-Up™ is the perfect gain antenna for traveling. Get home station performance on the go. Just hang your Pocket Roll-Up in the clear, plug the handy BNC connector into your handheld and enjoy some great QSOs.

It's omni directional and has significant gain over a 1/4 wave. It doesn't need a cumbersome ground plane so it's convenient for indoors and works great with handhelds.

AC Line Monitor

MFJ-850

Guard against low voltage "brown out" conditions and surges that can damage your expensive electrical equipment. Just plug in this MFJ-850 and it shows you your line voltage. Leave it plugged in for constant monitoring. It comes with a one year guarantee. Color coded scale reads voltage from 95-135 volts. 2½% accuracy. 2½x2½x1½ in.

Compact Speaker

MFJ-280

Enjoy superb audio and convenience with this economical mobile speaker. Just set the magnetic base on a surface, plug in the 3.5 mm phone plug and enjoy. Mounting plates with 2-sided tape allow mounting on non-metallic surface. Screws included. Matches 8 and 4 ohm impedances. Handles 3 watts, 30 inch cord. 2½ x 2 x 3 in.

2 Meter Handheld Power Meter

MFJ-840 MFJ-840 lets you accurately check the power output of your 2 meter handheld into a 50 ohm dummy load. Lets you check your battery charge so you can estimate how much longer you can use your handheld on batteries. 5 watts full scale. BNC connector. Compact 2½ x 2½x1½ makes it easy to take along. Attractive black color.

2 Meter Handheld SWR/Wattmeter

MFJ-841

Connects directly in line between your handheld and antenna. Read SWR up to 6:1 and power output to 5 watts. 2½ x 2½ x 1½. Black. Three position switch selects SWR, SWR set or forward power, SWR set pot.

MFJ HT Mini Speaker/Mics

Tiny MFJ Speaker/Mic are so small and so lightweight you'll forget they're there--until you get a call.

Excellent audio from electret mic element and speaker. Has swiveling lapel/pocket clip, PTT button with transmit LED, earphone jack, lightweight retractable cord. Available with L or regular connector. Tiny 2x1½x¾ in.


Dual Band HT "Flexible" Ducks

A. MFJ-1717. High Gain Dual Band 144/440 MHz "Flexible" Duck Antenna for Handhelds. When other rubber ducks just give you noise, you'll enjoy dependable QSOs with the MFJ-1717. Only 15¼ inches in length, it's a halfwave on 440 MHz that gives you a hearty 2.15 dBi gain.

On 2 Meters you get an efficient full size ¼ wave antenna for full size performance. MFJ-1717 is precisely-tuned at the factory for low SWR. High-Q, low loss construction gives you maximum radiated power and a NNC connector. It's rugged! It'll take all the bending, twisting, flexing and tugging you can dish out, and just pop right back up. The radiator is protected by a durable synthetic rubber compound and has a hard protective tip. A strong rigid base protects the matching network from flexing and changing frequency.

B. MFJ-1716, MFJ Dual Band 144/440 MHz "Flexible" Duck HT Antenna. Similar to MFJ-1717. 8¼ inch length. ¾ wave on 440 and efficient loaded ¼ wave on 2 Meters.

C. MFJ-1718. Add this strong, flexible "Shorty" 4'/4 inch rubber duck to your 2 Meters handheld and enjoy outstanding signals! Its super efficiency, high-Q helical wound radiator specially impedance-matched to handhelds for maximum gain.

MFJ 144/440 MHz Duplexer

This MFJ-916 duplexer lets you use a dual band 2 Meter/440 MHz antenna with separate 2 Meter and 440 MHz transceiver without a built-in duplexer. You can also use separate 2 Meter and 440 MHz antenna with a dual band 2 Meter/440 MHz transceiver that has only one RF output.

A heavy duty die cast enclosure houses the low pass networks that separate or combine the 144 MHz and 440 MHz signals. It has a low loss SO-239 connector for the combined signal and PL-259 connectors for separate 144 MHz and 440 MHz connectors. All ports are 50 ohms and it can handle 200 watts PEP combined.

Shipping Code A
For an incredibly low price, you can boost your 2 Meter handheld to 35 watts — the power of an expensive mobile! Your handheld becomes a powerful mobile or base station. Power Curve chart shows typical output power for your input.

**160 Watts on 2 Meters!**

You’ll talk further, longer and clearer on all modes — FM, SSB, CW and hear weak signals better than you’ve ever heard before! Low noise GaAsFET preamp gives you excellent 0.6 dB noise figure for pulling out weak signals. Select 20 dB or 15 dB gain to minimize receiver overload and intermod.

The **B-34-G** is legendary for its ruggedness. We know of one that has been in constant use since 1979! Your **B-34-G** is fully protected with features found only in pricey commercial amps.

The **B-35** prevents damage from high SWR or excessive input power by bypassing the power amplifier. LED warns you.

Your expensive power transistors are protected from overheating by MIRAGE’s **Therm-O-Guard**. The **B-35** knows when you’re transmitting and kicks in 160 watts of power. Adjustable time delay gives you smooth transmit/receive switching. Also has remote external keying.

**MIRAGE Dual Band 144/440 MHz Amp**

- **B-34-G**
- **B-35**

MIRAGE has the world’s most rugged VHF/UHF amplifiers — and the largest line — 51 models. 6 meters through 70 cm, all modes FM/SSB/CW, continuous duty repeater, Amateur TV, even commercial.

**Call your dealer for your boot priest***

---

*MIRAGE . . . the world’s most rugged VHF/UHF amplifiers*

---

**MIRAGE . . . 35 Watts for handhelds!**

Add this Mirage amp to your 2 Meter handheld and get 35 watts output . . . Talk further, longer, clearer . . . 18 dB GaAsFET preamp . . . All modes: FM, SSB, CW . . . Mobile bracket . . . Reverse polarity protection . . . Works with all handhelds . . .

---

*Here’s why the Mirage B-34-G is MIRAGE RUGGED!*

- First-class strip-line techniques and modular construction — gives you superb RF performance and unsurpassed reliability.
- Custom wrap around heatsink — runs cool for extra long life.
- Reverse Polarity Protection — this Mirage feature can save your amp — and your pride — if you connect power backwards.
- Low input SWR — keeps your handheld safe from overheating.
- Positive-action RF sense transmit/receive switch — ensures precision transceiving.
- LED indicators — On-Air, receive preamp and power — gives you confidence.
- Pushbuttons — select FM/SSB, receive preamp on/off and power on/off.
- Free mobile mounting bracket.
- Full one year MIRAGE warranty.
- Legendary MIRAGE ruggedness.

**35 watts, FM only . . .**

**B-34. 35 watts out for 2 watts in.**

Like B-34-G, FM only, less preamp, mobile bracket. 3.5x1.7x2.4 inches.

---

**B-34-G**

**Power Curve** — typical Mirage B-34-G output power.

- **Watts Out**
  - 18
  - 30
  - 33
  - 35
  - 35
  - 35
  - 35
  - 35

- **Watts In**
  - 1
  - 2
  - 3
  - 4
  - 5
  - 6
  - 7

---

**B-5016-G**

**Power Curve** — typical Mirage B-5016-G output power.

- **Watts Out**
  - 130
  - 135
  - 140
  - 145
  - 150
  - 155
  - 160
  - 165
  - 170

- **Watts In**
  - 20
  - 25
  - 30
  - 35
  - 40
  - 45
  - 50
  - 55
  - 60

---

**MIRAGE's most popular amplifier gives you 160 watts of brute power for 50 watts input!**

The B-5016-G is ideal for your 20 to 60 watt 2 Meter mobile or base station. Power Curve chart shows typical output power for your input.

---

**6 Meter Amplifiers (50-54 MHz)**

Bust through 6 meters with 150 watts of brute power and work exotic DX! The A-1015-G is the world’s most popular all mode FM/SSB/CW 6 Meter amplifier. For 1 to 15 watt transceivers. 150 watts out for 10 in. A-1035-G, 350 watts out for 10 in.

---

**70 cm Amplifiers (420-450 MHz)**

**MIRAGE's most popular 70 cm amp — the D-3010N** — gives 100 watts output for 30 in. For 5 to 45 watt mobile/base.

---

**MIRAGE's most rugged VHFIUHF amplifiers**

- **Full Duplex Operation**
- **Single Connector for dual band radios and antennas**
- **Includes mobile bracket "On-Air" LEDs**
- **Works with all FM handhelds up to 7 watts**
- **One Full Duplex Amp Tm lets you talk on one band and listen on the other band at the same time — just like a telephone conversation!** (Requires compatible HT).

---

**Amateur TV Amps**

- **Industry standard ATV amps —**
  - D-1010-ATVN, 82 watts PEP out / 10 in.
  - D-1000-ATVN, 82 watts PEP out / 10 in.

---

**Call your dealer for your best price***

---

MIRAGE Communications Equipment
300 Industrial Park Road
Starkville, MS 39759, USA

Technical: 601-323-8287 Fax: 601-323-6551
Ameritron's new...  
AL-811 linear amplifier gives you plenty of power to bust thru QRM.  
You get a quiet desktop linear that's so compact it'll slide right into your operating position -- you'll hardly know it's there ... until QRM sets in. And you can conveniently plug it into your nearest 120 VAC outlet -- no special wiring needed.  
You get three tough 611A transmitting tubes, extra heavy duty power supply, all HF band coverage, pressure-regulated ventilation, dual illuminated meters, adjustable ALC and much more ... for an incredibly low, low price.

The first 60 watts makes the most difference  
The AL-811 gives you 600 watts PEP output -- that's nearly 2 full S-units over your barefoot rig. That could mean the difference between hearing, "You're Q-5 armchair copy" and, "Sorry can't copy you, too much QRM."  
Now you won't have to stand aside while the "big guns" steal your DX. You'll be able to log some of those stations first.

Going from 600 watts to the full legal limit gives you less than one S-unit increase. But is that fraction of an S-unit worth the 3 to 4 times more money it'll cost?

The AL-811 gives you a powerful punch at a price that's easy on your wallet.  
It's all band, all mode coverage.  
The AL-811 covers all HF bands (10/12 meters with easy user mod). There's no compromize on WARC and most MARS bands -- you get a 100% rated output.  
You can operate the AL-811 on all bands. You get 600 watts output PEP SSB and 500 watts output CW. You even get 600 watts on demanding continuous carrier modes like RTTY, SSTV, FM and AM.  

How the low cost 811A tube resists premature failure - even when your amplifier is mistuned  
811A tubes resist premature failure in two ways.

First, they're constructed with widely spaced elements that minimize the chance of elements touching and causing a short -- even if the plate gets hot enough to melt.

Second, they use a directly heated thoriated tungsten filament cathode that prevents the electron emitting layer from instantly stripping off -- even if mistuning causes a sudden, severe current overload.  
Ameritron's AL-811 is excellent for the newcomer because it's tough enough to withstand momentary mistuning. And the tubes are so insensitive that you can replace one for mere pocket change.

The Ameritron Advantage: extra heavy duty power supply that gives you peak performance year after year  
The heart of the AL-811 power supply is its heavy duty power transformer with a high silicon steel core weighing a hefty 17 pounds.

A Full wave bridge using 52.5 uf of total capacitance (four 210 uf, 470 volt capacitors) produces 1500 volts under full load and 1700 volts capacitance (four 210 uf, 470 volt capacitors) on each band and built with quality RF components.

The result is peak performance over each band, wide impedance matching range and exceptionally smooth tuning with efficiencies close to 70%. Even a 3:1 SWR load won't damage the tubes or tank components.

A ball bearing vernier reduction drive makes plate tuning precise and easy.

Quiet pressure-regulated ventilation keeps your tubes safely cooled  
A quiet fan pressurizes the cabinet with over 20 cubic feet per minute of cool air.  
This large volume of air flow keeps the 811A tube temperature safely below the tube manufacturer's rating -- even with a key down carrier at 500 watts output.

Ameritron exclusive  
Adapt-A-Volt™ power transformer  
Too high line voltage stresses components and causes them to wear out and fail. Too low line voltage causes a "soft-tube" effect -- low output and signal distortion.

Ameritron's exclusive Adapt-A-Volt™ power transformer has a special back-boost winding that lets you compensate for stressful high line voltage and plate current to warn of abnormal conditions.

Output tank: optimum Q on each band  
The low loss pi-network output tank of the AL-811 has been carefully designed for optimum Q on each band and built with quality RF components.

The result is peak performance over each band, wide impedance matching range and exceptionally smooth tuning with efficiencies close to 70%. Even a 3:1 SWR load won't damage the tubes or tank components.

A ball bearing vernier reduction drive makes plate tuning precise and easy.

Quiet pressure-regulated ventilation keeps your tubes safely cooled  
A quiet fan pressurizes the cabinet with over 20 cubic feet per minute of cool air.

This large volume of air flow keeps the 811A tube temperature safely below the tube manufacturer's rating -- even with a key down carrier at 500 watts output.

Two illuminated meters  
Two illuminated meters give you a clear picture of your AL-811 operating conditions so you can tell right away if something is wrong.

The Grid Current meter continuously checks for improper loading. The other meter switches between high voltage and plate current to warn of abnormal conditions.

Ameritron exclusive  
Adapt-A-Volt™ power transformer  
Too high line voltage stresses components and causes them to wear out and fail. Too low line voltage causes a "soft-tube" effect -- low output and signal distortion.

Ameritron's exclusive Adapt-A-Volt™ power transformer has a special back-boost winding that lets you compensate for stressful high line voltage and plate current to warn of abnormal conditions.

Eight modes like RTTY, SSTV, FM and AM  
These tubes are so inexpensive that you can replace one for mere pocket change.

The AL-811 gives you a powerful punch at a price that's easy on your wallet.

Plus more...  
An Operate/Standby switch lets you run barefoot, but you can instantly switch to full power if you need it.

A transmit LED tells you when your rig is keying your AL-811.  
A 12 VDC keying relay makes it compatible with all solid state and tube rigs. A built-in back-pulse cancelling diode protects your rig's keying circuit.

Shielded RF compartment.  
One year limited warranty. Compact 16" D x 13 3/8" H x 8 1/2" W, 30 pounds. UPS shippable. Shipped with transformer installed and wired for 120 VAC. Draws 8 amps at 120 VAC, Export model AL-811X wired for 240 VAC and includes 10 and 12 meters.

Made in USA  
Made in USA. You're keeping your money here at home and helping fellow Americans. If you buy a foreign made product, how do you get service? Are you willing to pay expensive freight and duties to a foreign country for service?

Call your dealer for your best price  
Get 600 watts of real power and the most for your money. Call your favorite dealer for your best price and order your AL-811 today.

Ameritron...the high power specialists  
116 Willow Road  Starkville, MS 39759  (601) 323-8211  FAX: (601) 323-6531  Free Catalog/Nearest Dealer: 800-647-1800 8 a.m. - 4:30 p.m. CST, Monday - Friday
Ameritron doubles average SSB power . . .

AL-80B kilowatt output desktop linear can double your average SSB power output with high-level RF processing . . . runs cooler because its Eimac 3-500Z tube completely turns off between words . . .

Ameritron's AL-80B kilowatt output desktop linear can double your average SSB power output with high-level RF processing using Ameritron's exclusive Dynamic ALC™. You get cooler operation because the AL-80B's exclusive Instantaneous RF Bias™ completely turns off the Eimac 3-500Z tube between words. It saves hundreds of watts wasted as heat.

You get a full kilowatt PEP output from a whisper quiet desktop liner. It's a compact 8½" H x 14" D x 15½" W and plugs into your nearest 120 VAC outlet. Covers all bands 160-15 meters, including WARC and MARS (user modified for 10/12 Meters with license). You get 850 watts output on CW, 500 watts output on RTTY, an extra heavy duty power supply, genuine Eimac 3-500Z, nearly 70% efficiency, tuned input, PPI-L output, intense current protection, multi-voltage transformer, dual-Cross-Needle meters, QSK compatibility, Two-Year Warranty. Made in USA, plus much more.

**Dynamic ALC™** doubles average SSB power

The AL-80B's exclusive Dynamic ALC™ gives you high-level low-distortion RF processing. When activated, it can more than double your average SSB power and produce up to 6 DB improvement in intelligibility. It maximizes your talk power without distortion and splatter.

A convenient front panel control lets you adjust your output power level.

**Instantaneous RF Bias™ eliminates heat**

The AL-80B's exclusive Instantaneous RF Bias™ completely turns off the Eimac 3-500Z tube (except filament) between words and dots and dashes. It eliminates hundreds of watts wasted as heat to give you cooler operation and longer component life.

**Gutsy Heavy-Duty Power Supply**

The guts of the AL-80B is its heavy duty power supply. A 26 pound transformer using a high silicon steel core, computer grade capacitors, heavy duty blower and ten 3 amp, 1000 V power rectifiers give you a stiff 2700 volts fully loaded. Many amplifiers using 3-500Zs use such small power supplies they don't deliver much more power output than the AL-80B.

Other competitive amplifiers use substandard power supplies that peak at only 2500 watts. The AL-80B's separate heavy duty power supply is capable of 2500 watts PEP. Step-Start Inrush Protection™ stops damaging inrush current with a start up sequence that's easy on your tube and power supply components.

**Multi-Voltage Power Transformer**

Excessive line voltage stresses components and causes them to wear out. Low voltage causes a "soft-tube" effect - low output and signal distortion. Ameritron's exclusive Multi-Voltage Power Transformer lets you optimize for different line voltages. Select from 14 different primary voltages from 90-130 VAC and 205-250 VAC. High voltage selection is wired to reduce plate voltage for efficient operation below 400 watts for use outside the USA.

**Dual Illuminated Cross-Needle Meters**

Ameritron's dual illuminated cross-needle meters give you four separate meters to monitor your operating conditions - you can tell right away if something is wrong.

Grid current, plate current and forward PEP output power are continuously monitored to tell you of improper loading and abnormal conditions.

The fourth meter is switched to monitor your 3-500Z tube DC plate voltage, reflected PEP power and the SWR of your antenna, ANT voltage to your rig and the grid current that starts ALC action - you get a clear operating picture of your AL-80B.

**QSX Compatible**

The fast open frame T/R (transmit/receive) relay in the AL-80B switches nearly as fast as some vacuum relay QSK switches. For lightning fast QSK operation use the optional external electronic PIN diode QSK-5 T/R switch or the internal QSK-5. Plus more . . .

**Operate/Standby switch** lets you run barefoot, but can instantly switch to full power if you need it. Use your own 12 VDC, 220 mA accessory jack; 12 VDC keying relay for solid state and tube rigs; tough, nearly indestructible Lexan-over-aluminum front panel. Two year limited warranty.

---

**Ameritron HF Linear Amplifiers with Eimac™ 3CX800A7**

**NEW**

<table>
<thead>
<tr>
<th>AL-80H</th>
<th>AL-800</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two tubes</td>
<td>Single tube</td>
</tr>
<tr>
<td>1500 Watts plus</td>
<td>1250 Watts</td>
</tr>
</tbody>
</table>

**Output power:** 1250 watts PEP, single 3CX800A7 1200 watts plus, two 3CX800A7's

All band operation: 160-15 meters including WARC bands. User modifiable for 12 and 10 meters.

**Genuine Eimac® 3-500Z Tube**

The AL-80B uses a genuine Eimac® 3-500Z tube warranted by Eimac® - not cheap less reliable 3-500Zs used by some competitors.

70% efficiency

The AL-80B is built on a rugged steel chassis. It has a separate RF compartment that's fully shielded to keep RF from leaking out. This keeps RFI and TVI to a minimum.

Superb RF design and layout, Hi-Q tank circuit and commercially rated RF power components give you nearly 70% plate efficiency over the entire operating range. Your power goes into your antenna instead of heating up your amplifier.

A whisper quiet internal fan draws in cool air over power supply components and pressurizes the 3-500Z tube compartment to remove heat for longest life.

**Tuned input lets your rig deliver full output**

A 50 ohm broadband Pi-Network tuned input is used. Even the fullest solid state transmitter will deliver full power to your AL-80B.

**P/P/L Output Network**

A carefully designed P/P/L output network using the optimum Q for each band gives you exceptionally smooth tuning, extremely wide matching range, full band coverage and peak efficiency at all power levels.

Ball bearing veler reducer drives with logging scales on both the plate and load control make tuning precise and easy. It also lets you rapidly return to your favorite frequency.

**Dynamic ALC™**

Step-Start Inrush Protection™ stops damaging inrush current with a start up sequence that's easy on your tube and power supply components.

**Multi-Voltage Power Transformer**

Excessive line voltage stresses components and causes them to wear out. Low voltage causes a "soft-tube" effect - low output and signal distortion. Ameritron's exclusive Multi-Voltage Power Transformer lets you optimize for different line voltages. Select from 14 different primary voltages from 90-130 VAC and 205-250 VAC. High voltage selection is wired to reduce plate voltage for efficient operation below 400 watts for use outside the USA.

**Dual Illuminated Cross-Needle Meters**

Ameritron's dual illuminated cross-needle meters give you four separate meters to monitor your operating conditions - you can tell right away if something is wrong.

Grid current, plate current and forward PEP output power are continuously monitored to tell you of improper loading and abnormal conditions.

The fourth meter is switched to monitor your 3-500Z tube DC plate voltage, reflected PEP power and the SWR of your antenna, ANT voltage to your rig and the grid current that starts ALC action - you get a clear operating picture of your AL-80B.

**QSX Compatible**

The fast open frame T/R (transmit/receive) relay in the AL-80B switches nearly as fast as some vacuum relay QSK switches. For lightning fast QSK operation use the optional external electronic PIN diode QSK-5 T/R switch or the internal QSK-5. Plus more . . .

**Operate/Standby switch** lets you run barefoot, but can instantly switch to full power if you need it. Use your own 12 VDC, 220 mA accessory jack; 12 VDC keying relay for solid state and tube rigs; tough, nearly indestructible Lexan-over-aluminum front panel. Two year limited warranty.

---

**Ameritron offers the best selection of legal limit linear amplifiers!**

These 3 rugged linear all use a super heavy duty Hypersil+ power supply capable of 2500 watts!

**Ameritron's most powerful amplifier**

AL-1500

Ameritron's super power amplifier uses the herculean Eimac® 8877 ceramic tube.

It's so powerful that 65 watts drive gives you full legal output - and it's just loading because the power supply is capable of 2500 watts PEP.

**Ameritron's Dual 3-500Z linear**

AL-82

This linear gives you full legal output using a pair of Eimac® 3-500Zs. Some competing linear using dual 3-500Zs don't give you 1500 watts because their lightweight power supplies can't use the tubes to their full potential.

**Ameritron's 3CX1200A7 Linear**

AL-1200

Get ham radio's toughest tube with the Ameritron AL-1200—the Eimac 3CX1200A7! It has a 50 watt control grid dissipation. What makes the Ameritron AL-1200 stand out from other legal limit amplifiers? The answer: a super heavy duty power supply that knafs at full legal power and delivers a real output of more than 2500 watts PEP on two tone output for a half hour.

---

**AMERITRON offers the best selection of legal limit linear amplifiers!**

These 3 rugged linear all use a super heavy duty Hypersil+ power supply capable of 2500 watts!
Ameritron’s revolutionary ALS-600 is amateur radio’s only linear amplifier that uses four rugged TMOS RF power FETs — gives unequalled no tune solid state performance.

- Includes Ameritron’s no tune FET Amplifier and a 120 Vac, 50/60 Hz AC power supply for home operation.
- Instant bandswitching, no tuning, no warm up — just turn on and operate.
- Over Power Protection — if output forward power or reflected power exceeds safe level, output power is automatically reduced to prevent amplifier damage by controlling ALC to exciter.
- Extremely quiet — low speed, low volume fan is so quiet you’ll hardly know it’s there, unlike noisy blowers used in other amps.
- Very Compact — 6 x 9/8 x 15 inches — fits in nearly any mobile installation; weighs only 7 pounds, that’s less than some mobile HF transceivers.
- Extends life of power supply components
- Illuminated Cross-Needle SWR/Wattmeter — lets you read SWR, forward and reflected peak power simultaneously.
- Operate/Standby Switch — lets you run “barefoot”, but you can instantly switch to full power if you need it.
- Front Panel ALC Control — exclusive Ameritron feature — convenient front panel control lets you adjust your output power.
- Transmit, ALC, SWR LED indicators — keeps you informed.
- 12 Vdc output jack — lets you power low current accessories.
- Separate ALS-600PS power supply (included) can be placed conveniently out of the way and plugged into your nearest 120 Vac outlet — no special wiring needed.
- Made in USA.
- Enjoy 600 Watts of no tune solid state power. Call your favorite dealer for your best price and order your ALS-600 with power supply today.
AMERITRON RCS-8V Remote Coax Switch

Replace 5 coax feedlines with one! Ameritron's Remote Coax Switch lets your remotely switch up to five separate antennas -- so you can replace five coax feedlines with a single coax.

Eliminate a tangle of troublesome coax and have a simple and neat installation -- with just a single coax feedline.

The RCS-8V consists of two units -- the weatherproof switching box that mounts on your tower or mast and the control unit that's placed at your operating station.

VSWR is less than 1.2 from DC to 250 MHz and slightly higher at 450 MHz with less than 0.1 dB loss at 150 MHz -- if you operate HF to VHF/UHF. This RCS-8V is for you.

It handles 5 KW below 30 MHz and 1 KW at 150 MHz. You can ground unused positions or leave them open.

The indoor control unit is all metal to prevent RFI and TVI. It also has LEDs to indicate the antenna you've selected.

RCS-8VN, same as RCS-8V but with N-type connectors in place of SO-239 coax connectors.

SPECIFICATIONS:
Number of antennas positions: 5
Loss at 150 MHz: less than .05 dB
VSWR: under 1.2 to 1 from DC to 250 MHz
Impedance: 50 ohms
Power Capability: 5 KW below 30 MHz, 1 KW at 150 MHz
Power requirements: 120 Vac 50/60 Hz at five watts.
Connectors: SO-239 for RCS-8V; "N" for RCS-8VN.

AMERITRON RCS-4 Remote Coax Switch

The Ameritron RCS-4 is a remote controlled coax switch that selects one of four outputs by supplying all control voltages through the coax. The elimination of control cables gives your a fast, neat and inexpensive installation with only one coaxial line for four antennas.

You get two units -- the switching box that can be tower, mast or wall mounted and the control console that is located at your operating station.

The attractive indoor console has bright LED antenna selector indicators. A steel enclosure provides 100% shielding to prevent RFI and TVI. Switching time is 50 ms. SO-239 connectors provide reliable connections.

The weatherproof switching box uses three heavy duty 10 ampere contact relays on a rugged G-10 fiberglass circuit board.

Quality components are used throughout the entire unit to ensure maximum life for the sometimes difficult-to-reach switching box.

The RCS-4 operates from 120 Vac or 220/240 Vac power sources and allows safe operation with 14 volts control voltage. Frequencies from 1.8 through 30 MHz are covered by this excellent station accessory. Handles 1500 watts continuous.

SPECIFICATIONS:
Number of antenna positions: 4
Loss at 30 MHz: less than .05 dB
VSWR: 1:1 from 1.8-30 MHz
Impedance: 50 ohms
Power Capability: 1500 Watts average continuous
Antenna select time: 50 ms.
Power requirements: 120 Vac 50/60 Hz at 5 watts.
Connectors: SO-239.

AMERITRON brings you the finest high power accessories!

Step-Start Inrush Current
Legal Limit Dummy Load
QSK-5 Pin Diode T/R Switch
Legal limit antenna tuner

AMERITRON sells Eimac® tubes at low, low prices . . .
**MFJ Super Hi-Q Loop™ Antenna**

... 36 inch diameter -- it's the smallest, high efficiency 10-30 MHz continuous coverage antenna ever made for ham radio...

- Tiny 36” diameter, covers 10-30 MHz continuously
- Automatic Band Selection™, SWR/Wattmeter
- Round conductor more efficient than flat strip
- Welded butterfly capacitor, no rotating contacts
- All welded construction
- No control cable needed

Only 36 inches in diameter, the MFJ Super Hi-Q Loop™ is the smallest high efficiency 10 to 30 MHz continuous coverage antenna ever manufactured for ham radio.

Its rugged all welded aluminum construction is ideal for home installations where space is limited -- apartments, small lots, mobile homes, attics, closets. You can take it with you and have it up and operating in minutes from nearly anywhere -- on trips, vacations, from hotels, DX-peditions, camping, motorhomes.

Vertical mounting gives you both low angle radiation for excellent DX and high angle radiation for close-in local contacts -- it's like having a vertical and dipole combined in one. You can also mount it horizontally for omnidirectional coverage.

The MFJ Super Hi-Q Loop™ is a remotely tuned high-Q antenna with a narrow bandwidth that reduces transmitter harmonics, receiver overloading and interference.

It does not need a ground, radials, counterpoise or antenna tuner. It covers 10-30 MHz continuously including the WARC bands with low SWR and handles 150 watts.

More Radiated Power

You radiate more power because the MFJ Super Hi-Q Loop™ has a more efficient radiator. Its large 1.050 inch diameter round radiator has less RF loss resistance than a thin flat-strip radiator.

Built like a Tank

It's built like a tank with extra thick wall aluminum tubing, all welded construction, no mechanical joints, welded butterfly capacitor with no rotating contacts.

No Control Cable Needed

You don't need a separate control cable -- the coax feedline carries both RF power and tuning control signals.

Superb Tuning Capacitor

Each plate in MFJ's superb tuning capacitor is welded for low loss and polished to prevent high voltage arcing -- you get a smaller, lighter more refined tuning capacitor with a wider tuning range.

Tuning capacitors with unpolished plates and sharp edges require much greater spacing between plates to prevent arcing.

Super Remote Control (included) makes MFJ Super Hi-Q Loop® extra easy-to-tune

MFJ's exclusive Automatic Band Selection™ auto-tunes the MFJ-1786 to your desired band and lets you know with a beep. Dual Fast and Slow tune push buttons make it easy to tune.

Built-In SWR/Wattmeter

A two range Cross-Needle SWR/Wattmeter is built-in so you won't need a separate SWR meter.

No Control Cable Needed

You don't need a bulky control cable because the coax feedline carries both RF power and tuning control signals.

No Power Cord Needed

You don't need a separate power cord because it uses AA batteries (not included). You can also use an isolated power supply included with your MFJ-1786. 6x6x3 inches.

The consequences? The capacitor is larger, bulkier, heavier and has more stray capacitance to limit tuning range.

MFJ's superb tuning capacitor is welded to the radiator for super high efficiency, has nylon bearing, anti-backlash mechanism, limit switches and a continuous no-step DC motor for smooth precision tuning.

It's a nightmare tuning a loop antenna that uses a stepper motor and is plagued with backlash -- especially, if your desired frequency is between motor steps.

A heavy duty 1/8 inch thick ABS plastic housing with ultraviolet inhibitors protects the tuning unit from the weather.

MFJ-1782 Super Hi-Q Loop™

Same as MFJ-1786 Super Hi-Q Loop™ but has remote control with fast and slow tune buttons. Separate control cable is not required. Does not have SWR/Wattmeter or Auto Band Selection™. MFJ-1782.

No Matter What™ Guarantee

You're protected by MFJ's famous one year No Matter What™ unconditional guarantee. That means we will repair or replace your MFJ Super Hi-Q Loop™ (at our option) no matter what for a full year.

Call Your Dealer for Your Best Price

Enjoy ham radio no matter how little space you have. Call your dealer for your best price and get your MFJ Super Hi-Q Loop™ today.

---

**MFJ Box Fan Portable Loop**

No, it's not a fan -- it's a high efficiency portable loop antenna that's about the same size and shape as a 2x2 foot box fan, complete with carrying handle.

Carry it like a suitcase, tuck it in a corner of your car or check it as baggage on a plane.

When you get there, set it on a table or desk and enjoy ragchewing or DXing...

All welded construction, covers 14-30 MHz continuously including WARC bands, handles 150 watts. Remote control has fast/slow tune buttons. Separate control cable not needed. Power supply included with your MFJ-780.

---

**MFJ Portable Antenna**

**DXCC, WAZ, WAC, WAS have been won with MFJ's portable antenna!**

The MFJ-1621 lets you operate in almost any area electrically free area--apartment, campsite, resort hotel, even at the beach. It lets you work 40, 30, 20, 17, 15, 12 and 10 meters by using a telescoping whip antenna that extends to 54 inches. The antenna is mounted on a self-standing 6x3x6 inch cabinet. It also features a built-in antenna tuner, field strength meter and 50 feet of RG-58 coax cable. Handles 200 watts.

The MFJ-1621 is a complete portable multi-band antenna system. It can be used in practically any location. Just place in any electrically clear location, set the bandswitch, tune the capacitor for maximum field strength and operate!
MFJ halfwave vertical Antenna

Operate 40, 20, 15, 10, 6, 2 Meters with this MFJ-1796 ground independent halfwave vertical antenna -- no radials or ground ever needed!

It's only 12 feet high and has a tiny 24 inch footprint! You can mount it anywhere from ground level to the top of a tower -- on apartments, condos, small lots, even on a motorhome. You can take it anywhere -- vacations, field day, DX-pedition, camping, nearly anywhere you go.

Frequency selection is fully automatic -- there are no moving parts, nothing to adjust -- all you do is transmit. It handles up to 1500 watts PEP. You'll work your share of DX because its low angle of radiation really reaches out and brings in DX.

During a contest, you'll love being able to quickly work one station after another from all directions because of its omni directional pattern. It's so easy to put together that you can have it on the air in an afternoon.

How does MFJ achieve maximum efficiency in such a compact multiband antenna?

The key is end loading -- the most efficient form of loading known. The entire length of the antenna is always radiating power. There are no lossy traps to reduce effective length.

End loading provides multiband operation and full electrical half wavelength on each HF band. An optimum combination of capacitive hat and inductive end loading delivers a close 50 ohm match without a lossy impedance matching network.

Efficient high-Q loading coils are wound on low loss fiberglass forms. Large 1/4-inch diameter aluminum radiators are used to keep losses to a minimum.

No Radials or Ground Ever Needed!
The MFJ-1796 is balanced and center fed to totally eliminate the need for radials, counterpoises or a groundplane -- you don't have the kind of ground losses that's common with a quarter wave vertical.

No Feedline Radiation
There is no feedline radiation that causes pattern distortion and wastes power. The bottom loading unit is mounted at right angle to the radiator. This provides a low impedance point to decouple the 50 ohm Teflon® coax feedline.

MFJ's G5RV Antenna
Operate all bands through 10 Meters, even 160 Meters, with a single wire antenna!

The famous G5RV antenna has got to be the most popular wire antenna in ham radio! You hear G5RVs putting out good, strong signals from all over the world.

And it's no wonder... it's an efficient, all band antenna that's only 102 feet long -- shorter than a full size 80 Meter dipole.

Use it as an Inverted Vee or Sloper, and it's even more compact.

With an antenna tuner, you can operate all bands 80 through 10 Meters and even use it on 160 Meters as a Marconi with a tuner and ground. MFJ's fully assembled, full legal limit G5RV. Just add some coax feedline and some rope or other nonconductor, and you're on the air.

Super 80/40 Meter Vertical Antenna
Designed as a high performance antenna for MFJ-1792 80 and 40 Meters, the MFJ-1792 features a full size quarter wave radiator for 40 Meters -- that's a full 33 feet of ruthless radiating power -- no other quarter wave vertical radiates better.

End loading -- the most efficient form of loading -- is used for 80 Meters. It's accomplished by a virtually lossless 4½ foot capacitance hat and a high-Q coil wound with Teflon® covered wire on a low loss fiberglass form.

The entire length of the antenna is always radiating power. It has a unique built-in L-network for lowest SWR, is made of high strength 6061-T6 aluminum tubing, super strong solid fiberglass insulating rod and stainless steel hardware. Handles 1500 watts PEPSSB. Includes heavy duty mount. Requires guying.

For maximum performance on these low bands, you need to use radials, counterpoises or a ground screen.

80/40/20 Meter Vertical Antenna
Same as MFJ-1792 but includes full size 20 Meter quarter wave radiator. MFJ-1793.
MFJ dual band 144/440 MHz Yagi

... 7 elements on 440 MHz ... 4 elements on 2 Meters

Get two Yagis for the price of one ... put two Yagis in the space of one with single coax feed! Get 7 elements on 440 MHz and 4 elements on 2 Meters.

MFJ's exclusive dual band balanced feed with FerriteChoke® decoupling prevents pattern skewing and gives you low SWR. 1/4 inch diameter driver

MFJ-1798
Operate 10 bands -- 75/80, 40, 30, 20, 17, 15, 12, 10, 6 and 2 Meters -- with this MFJ-1798 vertical antenna and get full size performance with no ground or radials!

Full size performance gives you high efficiency for more power radiated. The result? Stronger signals and more Q-SOs.

Full size performance also gives you exceptionally wide bandwidths so you can use more of your hard earned frequencies.

You get very low radiation angle for exciting DX, fully automatic bandswitching, omni-directional coverage, low SWR and full 1500 watts PEP SSB power handling.

Full size performance is achieved by using separate full size radiators for 2 through 20 Meters and highly efficient end loading for 30, 40 and 75/80 Meters. You get highest possible efficiency and exceptionally wide bandwidths.

MFJ's unique Elevated Top Feed™ puts the maximum radiation point high up in the clear where it does the most good -- your signal gets out even if you're ground mounted.

Self supporting and just 20 feet tall, the MFJ-1798 mounts easily from ground level to rooftop top -- on small lots, backyards, apartments, condos, roof tops, tower mounts.

Separate Full Size Radiators
Separate full size quarter wave radiators are used on 20, 17, 15, 12, 10 and 2 Meters. On 6 Meters, the 17 Meter radiator becomes a 3/4 wave gain radiator.

The active radiator works as a stub to decouple everything beyond it. In phase antenna current flows in all parallel radiators. This forms a very large equivalent radiator and gives you incredibly wide bandwidths.

These radiator stubs provide automatic bandswitching -- there is absolutely no loss due to loading coils or traps.

End Loading
End loading -- the most efficient form of loading -- provides highly efficient performance on 30, 40, 75/80 Meters with excellent bandwidth, low angle radiation and automatic bandswitching.

MFJ's unique Frequency Adaptive L-Network™ provides automatic impedance matching for lowest SWR on these bands.

Tuning to your favorite part of these bands is simple and is done at the bottom of the antenna.

MFJ Elevated Top Feed™
The feedpoint is elevated all the way to the top of the antenna.

MFJ's Elevated Top Feed™ places the maximum current point high up in the clear where maximum radiation takes place -- a big plus, especially, if your antenna is mounted low to the ground.

MFJ-1768 elements give wide bandwidth.

This National Bureau of Standards design is optimized for maximum gain, high front-to-back ratio and clean symmetrical pattern.

Mounts vertically for FM/Packet or horizontally for SSB with single included U-bolt on 1 to 1 1/2 inch mast or tower leg.

High strength 6061-T6 aluminum 5 foot, 1 1/4 inch diameter boom. 2 pounds. Elements are electrically isolated from boom. Made in USA.

High strength 6061-T6 aluminum tubing is used for the compact 5 foot long, 1 1/4 inch diameter boom -- it won't come down in windy areas and during ice storms.

You can mount it vertically for FM or horizontally for SSB with a single included U-bolt on any 1 to 1 1/2 inch mast or tower leg.

It weighs just 2 pounds and is made in USA.

It goes together easily. You'll have it up and on-the-air working DX in less time than it takes to go to the store and bring home a six-pack.

Get extra "oomph" and get through. Order yours today. Get two Yagis for the price of one and enjoy the convenience of two Yagis-in-one and single coax feed!
MFJ 5/8 Wave Ground Plane

You get a 300 watt 5/8 wave ground plane 2 Meter home station antenna. Other 5/8 wave ground planes can't work any better -- no matter how much they cost...

Look at all you get for an incredibly low price!
You get a 300 watt 5/8 wave ground plane base antenna for 2 Meters that gives you the maximum possible calculated gain of any single element antenna.

Other 5/8 wave ground planes can't work any better -- no matter how much they cost.
You get a shunt fed matching network for the lowest possible SWR over the entire 2 Meter band. Plus, it bleeds off unwanted static.
You get MFJ's Rapid Tune-Radiator™ for quick accurate tuning.
You get a ceramic antenna insulator for low RF loss. The result? Maximum radiated power.
You get super easy installation to any 1" to 1½" inch mast with single U-bolt (included). Made in USA. Mast not supplied.

You get strong lightweight aluminum construction that's protected by MFJ's Permanent Molecular Bonding Technology™. This super durable finish actually bonds itself to aluminum molecules -- it won't come off unless metal comes off!
You get MFJ's famous No Matter What™ one year unconditional guarantee. That means we will repair or replace your MFJ-1750 (at our option) no matter what happens for a year.

Get you the most incredible value in a 5/8 wave base station ground plane.
Remember, other competitive 5/8 wave ground planes can't work any better.
Also available for 220 MHz, MFJ-1752.

Improved 1/4 wave ground plane

You get an improved 300 watt 1/4 wave ground plane for 2 Meters that'll bring up repeaters as well as or better than any 1/4 wave ground plane -- even if it cost twice as much.

The improved MFJ 1/4 wave ground plane minimizes feedline radiation for more useful radiated power, reduced TVI and noise pickup by the coax shield.

Here's how:
The radial angle is raised from the conventional 45 degrees to 28 degrees to reduce inductive coupling. Then, the radiator is shortened and the radials are lengthened to move the feedpoint from the voltage node so capacitive coupling cancels the remaining inductive coupling. This minimizes feedline radiation.

You'll get years of dependable QSOs because its strong lightweight aluminum parts are protected from corrosion by MFJ's Permanent Molecular Bonding Technology™ -- this protective coating is so durable it may outlast you!
You get MFJ's Fast-Tune-Radiator™ that makes tuning to your favorite part of the band a snap. You get MFJ's low loss ceramic antenna insulator for maximum radiated power. You get single U-bolt mounting that makes it 1000 easy to install on any 1" to 1½" mast. Made in USA.
You get MFJ's No Matter What™ one year unconditional guarantee.
The improved MFJ 1/4 wave ground plane is your very best buy. It's the most inexpensive way to put out a potent FM signal on 2 Meters. Can be cut for 220 or 440 MHz. Cutting Chart included. Get yours today.

Stacked 5/8 Wave for 2 Meters
gives twice the omni-directional gain of a single 5/8 wave antenna MFJ's stacked 5/8 wave radiators give you more than twice the omni-directional gain of a single 5/8 wave radiator!
Wide 10 MHz 2:1 SWR bandwidth... excellent ferrite choke balun feedline decoupling... shunt choke for bleeding off unwanted static... strong lightweight aluminum.
Fully assembled -- simply attach radiators -- no tuning required. Mounts vertically for FM/Packet or horizontally for SSB. Installs with single U-Bolt on 1 to 1½ inch mast or tower leg. 1½ lbs., two 47 inch radiators, 23 inch boom. Made in USA. Also works as excellent 6 Meter full halfwave centered antenna.
MFJ-1766 gives you four times the gain of a single 5/8 wave. Includes 2 MFJ-1764, phasing cables. Doubles gain on 6 Meters MFJ-1765 phasing cables for 2 MFJ-1764s, other 2M ant.

Portable 3 element beam for 2 Meters

Check out MFJ's new portable 3 element beam for 2 Meters. Its unique design lets you set it up or take it down in seconds!
Elements simply screw into theboom. It's easy to store and sturdy enough to use as your base station antenna.

The extra gain and directivity from this 3 element beam could get you through when a vertical can't. It'll make the difference between "you're breaking up... can't copy you" and "OK, go ahead with your traffic. Solid copy."
You can center mount it and use it vertically on FM or horizontally for SSB. By rotating it you can minimize QRM. Unique design also lets you end mount it vertically or horizontally on the leg of a tower... great for packet and PacketCluster™!

It's compact 2½ foot boom gives you a calculated gain within 1 dB of a four element Yagi with a boom nearly twice as long.
Extra thick elements maintain high gain and directivity over virtually the whole 2 Meter band. A ferrite choke balun gives you excellent feedline decoupling. Coax coupling is further reduced by mounting the SO-239 connector behind the reflector.
Elements and boom are made from strong lightweight aluminum. They're protected by MFJ's Permanent Molecular Bonding Technology™ -- MFJ's exclusive new coating that's so tough it won't come off unless metal comes off.

Weighs just 2 pounds. Boom is 30½" x 1½" x 1½". Mounts easily to mast or leg of a tower with single included U-bolt. Mast not included. Made in USA.
You can take the MFJ-1763 2 Meter portable Yagi with you wherever you go and have the "oomph" and directivity of a beam.

Dual Band 144/440 Ground Plane

MFJ's dual band 144/440 ground plane antenna is small, lightweight and super easy to mount to any 1 to 1½ inch mast with a single included U-bolt -- you'll have it up and operating anywhere in just minutes. You can even mount it inside to get on the air quickly.
You get extra long range on 440 MHz with a high gain halfwave over quarter wave antenna and solid quarter wave performance on 2 Meters.
The ground plane is sloped to give you low SWR across both bands and to minimize feedline radiation. This gives you more useful radiated power, reduced TVI and noise pickup by the coax shield.
The MFJ-1754 is made of strong lightweight aluminum parts protected from corrosion by MFJ's exclusive Permanent Molecular Bonding Technology™. Its stainless steel Easy-Tune™ radiator is 19 inches long and has a built-in integral phasing coil for 440 MHz.
**MFJ-1278B with DSP**

multi-mode data controller

*Only MFJ gives you DSP and 10 digital modes -- Packet, PACTOR, AMTOR, RTTY, Color SSTV, 16 Gray Level FAX/Weather FAX, ASCII, Navtex, CW, and Memory Keyer...*

**Now with DSP!**

**GPS Compatible**

MFJ-1278B/DSP with DSP

MIJ-1278B/T Turbo with fast 2400 baud modem

PACTOR and AMTOR and enjoy receiving packet mail in your mailbox. Wanna copy some CW? Just relax and read your screen.

**MFJ-1278B, no DSP.**

**MFJ-1278BT, built-in 2400 baud modem, no DSP.**

**Exclusive MFJ gives you all these features...**

**New Features**

- PACTOR mode with mailbox
- 32K Packet mailbox expandable to 512K -- allows separate callsign, auto mail forwarding and reverse mail forwarding.
- Remote Sysop access, Sysop paging, chat mode, mailbox C-text
- Mail-Waiting™ LED indicator
- 4K battery backed up RAM
- 1 Megabit system EPROM
- External accessible reset
- Up to 19.2K baud terminal operation
- Color SSTV with VIS tones for picture autostart
- Selectable European RTTY tones
- Optional plug-in crosspattern scope tuning adapter

**Standard MFJ Features**

- Built-in 300 and 1200 baud packet modem
- Two software selectable radio ports
- Auto terminal baud rate: 300, 1200, 2400, 9.6K, 19.2K
- Anti-Collision™ gets packets through faster
- True DCI™ for excellent HF operation
- Noise threshold control improves HF operation
- Two software selectable radio ports
- Built-in 300 and 1200 baud packet modem

**Exclusive Optional Items**

- Real-time clock, MFJ-43
- Plug-in Scope tuning adapter, MFJ-44
- 2400 baud internal modem, MFJ-2400
- 9600 baud internal modem, MFJ-9600B

**Optional Pre-wired Radio Cables**

Solves your wiring headache with the MFJ pre-wired MFJ-1278B-to-radio cables. See page 36 for details. TNC/Mic switch allows you to switch between Microphone and MFJ-1278B or without disconnecting cables. MFJ-1272B.

**MFJ-1278 and Multicom Upgrade**

Upgrade your MFJ-1278 to include PACTOR and the enhance mailbox --MFJ-56A (32K) -- MFJ-56B (128K); MFJ-56C (512K).

**New MultiCom™ upgrade release 3.2.**

New features: Hi-Color SSTV/Simultaneous dual multi-mode or TNC operation for DOS. New FAX module with auto receive, color FAX, BMP format compatible. YAPP binary file compatible. Order MFJ-49B for MultiCom™ 3.2 upgrade. *Upgrade available for current MFJ-1278 and Multicom user with proof of purchase.

**Combining "brick wall" DSP filters with the world class MFJ-1278B gives you ham radio's most powerful multi-mode data controller -- the new MFJ-1278B/DSP -- for an incredibly low price.**

You won't believe your eyes when you see solid copy from signals completely buried in QRM!

This MFJ-1278B/DSP, your transceiver and computer are all you need for exciting digital QSOs!

You'll discover a whole new world of ham radio. You'll communicate in ways you never knew existed.

The MFJ-1278B/DSP and MFJ-1289 MultiCom™ software are packed with features available only from MFJ.

You get 10 digital modes... Packet, PACTOR, AMTOR, RTTY, color SSTV, 16 Gray Level FAX/Weather FAX, CW, ASCII, Navtex and Memory Keyer... plus an enhanced 32K mailbox that's expandable to 512K.

You'll have fun joining worldwide packet networks and exchanging color SSTV pictures with your buddies.

You'll marvel at full color FAX news photos as they come to life on your screen, and you'll see weather changes on highly detailed weather maps in all 16 gray levels.

You'll eavesdrop on late breaking news as it happens on RTTY.

You'll enjoy error-free HF QSOs on
MFJ Packet Only™ Transceiver

Enjoy high performance packet from 1200 to 9600 baud on 2 Meters, 24 hours/day, for an incredibly low price . . .

MFJ-8621

Runs all data rates from 1200 to 9600 baud.

Why tie up your expensive 2 Meter rig on a single packet channel?

For an incredibly low price, you can dedicate MFJ's Packet Only™ transceiver to your favorite packet channel for continuous 24 hour/day duty.

MFJ's new Packet Only™ radio is a 2 Meter FM data transceiver built exclusively for high performance packet.

You can run all data rates from 1200 to 9600 baud right out of the box!

MFJ-8621 is compatible with all TNCs having hardware DCDs. Also compatible with most TNCs having software DCDs.

Getting started couldn't be easier -- just plug in an appropriate TNC cable (also available), your antenna, 12 VDC and you're ready to enjoy error-free packet.

Get up to 5 watts output -- ideal for packet. It's plenty to cover your operating area without disrupting distant nodes.

It's ready to operate on 145.01 MHz with pre-installed crystals. For other packet channels, order plug-in crystals from MFJ -- for each packet frequency.

MFJ's exclusive packet only design gives you outstanding performance!

Here's why . . .

- Direct modulation lets you use all data rates from 1200 to 9600 baud without modification.
- Ultra-fast PIN diode switching gives you near instantaneous changeover between transmit and receive.
- Dual conversion receiver, 0.25 uV low noise preamp, double-tuned front end -- gives you excellent weak signal reception and freedom from interference.
- Narrow 10.7 MHz IF filter and special full data-bandwidth 455 KHz IF filter -- gives you optimum passband and steep skirts for error-free data reception.
- Unsqueaked audio feeds directly to your TNC for lightning-fast DCD response.
- The receiver local oscillator is crystal-controlled. It runs full-time -- no start-up drift or synthesizer lock-up delay.
- Once you're set-up, there's nothing to adjust. Just turn it on and off.
- You'll get dependable performance 24 hours /day. The MFJ-8621 never gets tired!

You'll get dependable performance 24 hours /day. The MFJ-8621 never gets tired!

It's great for portable packet. It's a tiny 5x5x1 1/2 inches, draws just 15 ma on receive and less than 1 amp on transmit on 12 VDC.

Don't waste hundreds of dollars on an expensive 2 Meter radio just to get on packet. Order MFJ-8621 for your dedicated packet station.

Accessories

Pre-wired cables for MFJ-8621 to TNC. Order MFJ-5100 for all MFJ TNCs/PK12/PK96/PK900/PacComm/other TAPR.


MFJ-4110. 110 VAC Power Supply for MFJ-8621.

Read both UTC and local time at a glance with the MFJ-108B dual clock that displays 24 and 12 hour time at any QTH throughout the world -- it also gives you an attractive world map.

A, This new MFJ-112 DXers' World Map Clock not only shows you the time at any QTH throughout the world -- it also gives you an attractive world map so you can see the place where your contact is! Also shows day of week, month, date and year. Time displays hour/minute/second. User selectable for 12 or 24 hour display format.

B, The MFJ-105B is a true 24 hour quartz wall clock. The huge 10 inch diameter face gives excellent visibility across a computer or radio room.

A single "AA" battery (not included) provides over one year operation.

MFJ-105B

Big 5/s inch LED digits can be seen across the room and even in the dark, and can show either 12 or 24 hour time.

Battery Backup -- You won't lose a second, even if you lose power.

MFJ World MapClock  MFJ 24 Hour Wall Clock

12/24 Hour Clock has giant 2.3 inch red LED digits!

You can see this clock across the street!

Giant 2.3 inch red LED digits -- nearly the width of a 2 Meter handheld -- are the largest and brightest we've seen anywhere.

Select 12 hour or 24 hour UTC time. An adjustable base lets you customize your viewing angle.

Built-in mounting holes let you hang your clock on any wall in your room.

Separate hour set and minute set buttons make setting time quick and easy.

A. MFJ-112

B. MFJ-105B

12/24 Hour Clock has 10 minute ID Timer!

You can get an ID buzz every 10 minutes. It keeps you legal, and you won't miss that extra-important QSO you need to make.

Big 1/2 inch LED digits can be seen across the room and even in the dark, and can show either 12 or 24-hour time.

Two Alarm Settings -- volume can be either high or low. The high volume setting is extremely loud!

Battery Backup -- You won't lose a second, even if you lose power.

Compact Size -- case is only 4/5 x 2 x 4 inches.

12/24 Hour Clock has 10 minute ID Timer!

MFJ-107B

MFJ-108B

MFJ-105B

MFJ World MapClock  MFJ 24 Hour Wall Clock

12/24 Hour Clock has 10 minute ID Timer!

You can get an ID buzz every 10 minutes. It keeps you legal, and you won't miss that extra-important QSO you need to make.

Big 1/2 inch LED digits can be seen across the room and even in the dark, and can show either 12 or 24-hour time.

Two Alarm Settings -- volume can be either high or low. The high volume setting is extremely loud!

Battery Backup -- You won't lose a second, even if you lose power.

Compact Size -- case is only 4/5 x 2 x 4 inches.

12/24 Hour Clock has 10 minute ID Timer!

MFJ-107B

MFJ-108B

MFJ World MapClock  MFJ 24 Hour Wall Clock

12/24 Hour Clock has 10 minute ID Timer!

You can get an ID buzz every 10 minutes. It keeps you legal, and you won't miss that extra-important QSO you need to make.

Big 1/2 inch LED digits can be seen across the room and even in the dark, and can show either 12 or 24-hour time.

Two Alarm Settings -- volume can be either high or low. The high volume setting is extremely loud!

Battery Backup -- You won't lose a second, even if you lose power.

Compact Size -- case is only 4/5 x 2 x 4 inches.

MFJ World MapClock  MFJ 24 Hour Wall Clock

12/24 Hour Clock has 10 minute ID Timer!

You can get an ID buzz every 10 minutes. It keeps you legal, and you won't miss that extra-important QSO you need to make.

Big 1/2 inch LED digits can be seen across the room and even in the dark, and can show either 12 or 24-hour time.

Two Alarm Settings -- volume can be either high or low. The high volume setting is extremely loud!

Battery Backup -- You won't lose a second, even if you lose power.

Compact Size -- case is only 4/5 x 2 x 4 inches.
**MFJ's new TNC/Mic Switch**

Switch between your TNC or Mic by pushing a button!

Just plug these pre-wired cables into your rig's microphone connector and into your TNC and you're ready to go -- no more hunting for hard-to-find connectors and wiring up complicated cables. Works with HP, VHF and UHF radios with 8 pin mic connectors -- including Kenwood, ICOM, Yaesu, Alinco, Radio Shack and others. For radios with 8-pin RJ-45 modular telephone jack, select the new "M" models. Plug-in jumpers let you quickly set-up for virtually any radio. Factory set for Kenwood and Alinco. Includes easy-to-follow instructions. Has audio-in and speaker outputs. 3/4" x 1/4" x 4" inches.

Select your switch from the chart below:

![Switch Chart](image)

**Pre-wired Radio-to-TNC Cables**

These new MFJ cables are pre-wired for most 8 pin rigs and HTs. You won't have to wait to get your cable wired because MFJ solves that little problem...

**Open End Cables with Radio Connectors**

<table>
<thead>
<tr>
<th>MFJ-5082</th>
<th>open end cable with 8-pin mic connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFJ-5224</td>
<td>open end cable for Icom / Yaesu / Alinco / Radio Shack handsets</td>
</tr>
<tr>
<td>MFJ-5226</td>
<td>open end cable for Kenwood handsets</td>
</tr>
<tr>
<td>MFJ-5268</td>
<td>open end cable with 8-pin modular mic plug for Yaesu, Kenwood, Icom, and Radio Shack</td>
</tr>
<tr>
<td>MFJ-5222</td>
<td>open end cable with split connectors for Alinco and other handsets</td>
</tr>
<tr>
<td>MFJ-5205</td>
<td>general purpose open end with 5-pin DIN connector</td>
</tr>
</tbody>
</table>

---

1. does not include IC-W2A
2. does not include IC-W2B
3. YV for KAM VHF port. TH for KAM HP. PK96/12000 baud models.
4. Includes MO-100, 1270, 207, 500.

---

**MFJ's High Speed Packet Modems**

MFJ-2400 or MFJ-9600B High Speed modem is designed to plug inside all MFJ TNCs or multi-modes. Easy to install. NO modification is needed to your controller.

Just plug these pre-wired cables into your rig's microphone connector and into your TNC and you're ready to go -- no more hunting for hard-to-find connectors and wiring up complicated cables. Works with HP, VHF and UHF radios with 8 pin mic connectors -- including Kenwood, ICOM, Yaesu, Alinco, Radio Shack and others. For radios with 8-pin RJ-45 modular telephone jack, select the new "M" models. Plug-in jumpers let you quickly set-up for virtually any radio. Factory set for Kenwood and Alinco. Includes easy-to-follow instructions. Has audio-in and speaker outputs. 3/4" x 1/4" x 4" inches.

Select your switch from the chart below:

![Switch Chart](image)

**Open End Cables with Radio Connectors**

<table>
<thead>
<tr>
<th>MFJ-5082</th>
<th>open end cable with 8-pin mic connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFJ-5224</td>
<td>open end cable for Icom / Yaesu / Alinco / Radio Shack handsets</td>
</tr>
<tr>
<td>MFJ-5226</td>
<td>open end cable for Kenwood handsets</td>
</tr>
<tr>
<td>MFJ-5268</td>
<td>open end cable with 8-pin modular mic plug for Yaesu, Kenwood, Icom, and Radio Shack</td>
</tr>
<tr>
<td>MFJ-5222</td>
<td>open end cable with split connectors for Alinco and other handsets</td>
</tr>
<tr>
<td>MFJ-5205</td>
<td>general purpose open end with 5-pin DIN connector</td>
</tr>
</tbody>
</table>

---

1. does not include IC-W2A
2. does not include IC-W2B
3. YV for KAM VHF port. TH for KAM HP. PK96/12000 baud models.
4. Includes MO-100, 1270, 207, 500.

---

**MFJ Computer Interface lets you use JVFAX or HamComm software**

This MFJ-1213 computer interface lets you use JVFAX or HamComm software to receive and decode all kinds of digital data communications with your transceiver. Excellent JVFAX software lets you see fabulous full-color FAX and SSTV pictures on your PC. View, edit, store FAX/SSTV images. Includes "on-the-fly" skew correction, Auto-Receive, Auto-Save, JVFAX or HamComm software available from shareware/freeware/public domain suppliers.
Now GPS Compatible

- ROM expands to 512K
- External accessible reset
- Built-in monitor amplifier
- Front panel ON/OFF switch
- Enhanced DCD circuit for HF
- Supports 1800 baud terminals
- 64K RAM expands to 128K or 512K

The MFJ-1270C super TAPR TNC clone has a world-wide reputation as the most reliable packet TNC in the world! Thousands used as digipeaters, nodes, BBS and used in all kinds of commercial applications working 24 hours a day - many work for years without a single failure...

**The Most for Your Money**

The most reliable TNC in the world gives you the most for your money. See for yourself...

**Fully TAPR TNC-2 Compatible**

You get full TAPR TNC-2 compatibility—all software and hardware designed for the TAPR TNC-2 standard works without modification. You get X1J, NETROM, theNET and Rose Switch compatibility that turns your MFJ-1270C into a Layer Three and Four networking node.

**VHF and HF operation.**

You get high performance VHF and HF modems as standard equipment — for double fun. You get a true DCD circuit that dramatically reduces sensitivity to noise and dramatically increases Q50s.

**FREE AC Power Supply**

You get a free 110 VAC power supply at no extra cost. With other brands, the AC power supply could cost you extra.

**New enhanced Personal Mailbox**

The enhanced Easy Mail™ personal mailbox lets you use a dedicated call-sign for your mailbox. Your mailbox can stay on while you operate packet. It will also auto forward or reverse forward mail to and from other BBs. A check mail LED blinks when you have mail. More features: remote synch access, synch paging, mailbox C-text, chat mode and many other features not available in other TNCs. The mailbox memory is expandable to 128K or 512K.

**MFJ-1270C**

WeFAX gives you Weather Maps

You get a WeFAX mode that lets you print full fledged weather maps from your HF radio to screen or printer or save to disk using an MFJ Starter Pack.

**Plug-in Modem**

- 2400 or 9600 Baud

You can add MFJ's optional internal 2400 baud or 9600 baud modem just by plugging it in and making a few simple connections.

**KISS interface and MFJ Host Mode**

You get a KISS interface that lets you run TCP/IP and MYSYS and MFJ's Host Mode that makes it easy to write packet application programs.

**MFJ Anti-Collision™ Technology**

You get MFJ's Anti-Collision™ technology that prevents packet collisions and improves performance on busy channels.

**Plus more...**

- You also get 32K RAM. IC sockets for easy service. 256K ROM, speaker jack, lithium battery backup, RS-232 and TTL serial ports, radio cable (you have to add a connector for your radio), Fast Start™ Manual plus much more. Use 12 VDC or 110 VAC. 9 x 11 1/2 in.

**One Year Unconditional Guarantee**

You get MFJ’s famous No Matter What™ one year unconditional guarantee.

**Enjoy Packet for a long, long time**

If you want a TNC that’ll work 24 hours a day — many work for years without a single failure — get the ultra reliable MFJ-1270C today and enjoy packet for a long, long time.

**2400 Baud Turbo**

MFJ-1270CT has all the features of the MFJ-1270C plus built-in fast 2400 baud modem. Operate 300, 1200 and 2400 baud packet with the MFJ-1270CT. Radio modification is not necessary when operating 2400 baud packet.

**MFJ 9600 Baud TurboPlus™ TNC**

MFJ-1270CQ

Has all the features of the MFJ-1270C, the most reliable TNC in the world, plus built-in 9600 baud G3RJH compatible modem. Operate 300, 1200 and 9600 baud.

**TNC ACCESSORIES**

**MFJ Starter Packs**

An MFJ Starter Pack, gets you on the air instantly. You get interface cable, software on disk and instructions — just plug it all in and start enjoying packet. Order MFJ-1284 for IBM or compatibles, MFJ-1282 for Commodore 64/128, MFJ-1287 for Macintosh or MFJ-1290 for Amiga.

**Mailbox Memory**


**Real Time Clock**

MFJ-43, ends re-setting TNC clock everytime you turn it on. Maintains correct time even when TNC is off. Plugs into RAM socket. Works with MFJ TNCs and TAPR TNC clones. MFJ-52B, plug this board into your TNC configured as TheNet X-J Node and users can check their transceiver packet FM deviation. Checks temperature and voltage. Requires X-1J or later nodeware. See CQ Magazine, Nov. 1993.

**Firmware Upgrade**

For older MFJ TNCs. MFJ-40C, $19.95, gives you enhanced mailbox and supports mailbox up to 512K.

**Mailbox Memory Expansion Board**

For older MFJ TNCs. MFJ-47A, 32K RAM; MFJ-47B, 128K RAM; MFJ-47C, 512K RAM. Complete with firmware.

PACKET plus PACTOR TNC

**all the features of the MFJ-1270C HF/VHF TNC plus ... PACTOR ... precision tuning indicator...**

MFJ-1276

Now you can have all the features of the MFJ-1270C, the most reliable packet TNC in the world, plus PACTOR, precision tuning indicator for HF.

PACTOR is an exciting new HF mode. PACTOR combines the best of Packet and Angle Mode tracking. It's impressive under weak signals. You get error correction, faster baud rate, data compression and full 8-bit word transmissions. The results? Faster throughput than either Packet or AMTOR and excellent weak signal operation.

A high resolution 20 LED bargraph tuning indicator lets you tune in HF signals fast. Just tune your radio to center a single LED and you're precisely tuned in to within 10 Hz — and it show you which way to tune!

You also get an extra 32K of memory for your enhanced Easy Mail™ personal packet mailbox. Your buddies can leave you more and longer messages — you'll never have to worry about running out of memory.

MFJ-1276T, same as MFJ-1276 but has built-in fast 2400 baud modem. Lets you operate 300, 1200, and 2400 baud packet.
Operating menu -- each mode gives you easy and simple menu operation of all 10 digital modes:

- Packet
- Pactor
- AMTOR
- ASCII
- CW
- Navtex
- Factor
- Amtor
- 16 gray levels FAX
- Hi-resolution SSTV

You can monitor VHF packet on the top screen and operate any other text modes on the bottom screen.

**MFJ Call-Alert**: Sends an alarm when characters you specify are received

Only MultiCom gives you the new MFJ Call-Alert that sounds an alarm through your computer speaker if a character sequence you specify is received by your MFJ-1278B.

Now you can monitor any channel for DX calls and receive 16-gray level TNCs and two comm ports.

**MultiCom** lets you carry on two digital QSOs simultaneously using two multi-mode TNCs and two comm ports.

Hi-resolution Color SSTV pictures received

You can use Auto-Set to set up a second MFJ TNC for a function like Easy-Mail. MFJ Auto-Router lets you store digipeater node routes for instant digipeating.

MFJ's exclusive Packet Multi-Plex lets you send and receive packet messages during binary file transfer.

Now you can exchange programs by packet without having your QSO cut off completely. YAPP protocol is supported with MultiCom's binary file transfer.

**MFJ** MultiCom's built-in Multi-Word word processor is the only word processor specifically designed for multi-mode communications.

**Plus more**...

You also get disk utilities for graphics, screen capture and conversion to packet picture format, sample pictures, effective packet through-put readout, screen colors set, sound on/off switch, DOS gateway, RS-232 cable, complete instructions and much more.

**MFJ-1289 MultiCom** requires an MFJ-1278B or other MFJ TNC (features limited by TNC) and an IBM or compatible computer with 512K RAM. Color SSTV and multi-gray level FAX require VGA graphic system. Hi-resolution SSTV requires Hi-color card.

Order MFJ-1289 for 5/4" HD disk or MFJ-1289M for 3 1/2" HD disk.

**MacMultiCom**, MultiCom64 and MultiComAm ... new MultiCom packages give most of the capabilities of the IBM compatible MultiCom for your Macintosh, C64/128 or Amiga computer.

They come complete with interface cable and friendly instructions -- everything you need. Here are the models available:

- MacMultiCom
- MultiCom64
- MultiComAm

**MultiCom 3.2 Upgrade**

MFJ-49B, available to current users with proof of purchase.
MFJ 6 Meter SSB Adventure Radio™

... MFJ breaks the six-meter SSB price barrier with the MFJ-9406 Adventure Radio. Compare with transceivers costing far more, and you’ll quickly discover the MFJ-9406 is all business!

MFJ-9406
Turn it on. Distant stations roll in loud and clear, thanks to the MFJ-9406’s quiet crystal-mixed single-conversion receiver.
Pick up the mic and transmit. MFJ’s Constant Current™ speech processing raises 10 Watts PEP to new heights — delivering the punch of a much more powerful radio.
Explore exotic 50 MHz band openings — Tropo, Sporadic E, F2, TE, Aurora, Meteor Scattering, and more.
Ragchew with the locals, or hunt down new grid squares from far-away places. From home, car, or, mountain top, the MFJ-9406 is built to perform! Best of all, it won’t cost you an arm and a leg to get started!

Here’s what you get

Full CW/SSB coverage: VFO tunes 50.0 - 50.3 MHz, covers CW, propagation beacons, SSB.
Powerful signal: 10 Watts PEP output. MFJ’s exclusive Constant-Current™ syllabic speech processing gives you up to 6 dB more punch to SSB.
50.3 MHz, covers CW, propagation beacons.

Get yours today: 6 Meter SSB is growing in popularity like never before. Join the fun. Order your MFJ-9406 or MFJ-9406X today!

Free MFJ 6 Meter Adventure Radio™ manual Take a closer look before you buy! Manual includes hook-up and operating instructions, antenna tips, troubleshooting guide, circuit description, schematic, alignment information. For a free copy, just write or call MFJ.

ACCESSORIES

2. Handheld dynamic SSB microphone: MFJ-290, (3Vb) is especially matched to compliment the Constant Current™ speech processor used in the MFJ-9406.
3. AC portable power supply: MFJ-4110, is a rugged wall adapter transformer and voltage regulator module that delivers 13.8 volts to power the MFJ-9406. Powerful, yet small. Fits in your coat pocket!
4. MFJ portable power pack: Built for the MFJ Adventure Radio™, the MFJ-4114, provides AC power from 10 NiCd D-cells and NiCd re-charging. Fastens to MFJ-9406 cabinet. Batteries not included.

MFJ 6 Meter Antennas:

MFJ-1776, lightweight folded dipole.
MFJ-1728B, mobile magnet mount, full 1/4 wave on 6 Meters, also 5/8 wave on 2M.

MFJ 6 Meter Antenna Tuner:

MFJ-906, Lighted 2 Range Cross-Needle SWR/Wattmeter bypass switch, 100 Watts FM, 200 Watts SSB, 8 x 2 1/2 x 3 inches.
MFJ-903, Same as MFJ-906 less SWR/Wattmeter bypass switch. Measures 5 x 2 1/2 x 3 inches. See page 4 for more details.

Above accessories are shipping code A.

Quick Index

<table>
<thead>
<tr>
<th>Amplifiers</th>
<th>1, 25-29</th>
<th>Computer Interfaces</th>
<th>21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antennas</td>
<td>1, 20, 30-33</td>
<td>Dummy Loads</td>
<td>10</td>
</tr>
<tr>
<td>Antenna Accessories</td>
<td>6, 8-10</td>
<td>Filters</td>
<td>17-18</td>
</tr>
<tr>
<td>Antenna Tuners</td>
<td>2-6</td>
<td>HT/LF Accessories</td>
<td>25, 34</td>
</tr>
<tr>
<td>Books</td>
<td>24</td>
<td>Keys/Keyboards/Keys</td>
<td>13-15</td>
</tr>
<tr>
<td>Cables</td>
<td>23, 36</td>
<td>Licensing Products</td>
<td>16, 22</td>
</tr>
<tr>
<td>Clocks</td>
<td>35</td>
<td>Packet Radio</td>
<td>35, 39</td>
</tr>
<tr>
<td>Code Practice Products</td>
<td>13-16, 22</td>
<td>Reelerver Kits</td>
<td>20</td>
</tr>
<tr>
<td>SWL Products</td>
<td>18-21</td>
<td>SWR/WattMeters</td>
<td>7, 9</td>
</tr>
<tr>
<td>Switches</td>
<td>10, 29, 36</td>
<td>Software</td>
<td>22-23</td>
</tr>
<tr>
<td>Transceivers/Receivers</td>
<td>11-12, 40</td>
<td>Miscellaneous</td>
<td>4, 8, 11, 16, 29, 34</td>
</tr>
<tr>
<td>Ordering Information</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## MAIL ORDER FORM

<table>
<thead>
<tr>
<th>TITLE: MR/MRS/MISS/MS/OTHER:</th>
<th>INITIALS:</th>
<th>SURNAME:</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADDRESS:</td>
<td></td>
<td>POSTCODE:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>QUANTITY:</th>
<th>MODEL No.:</th>
<th>DESCRIPTION:</th>
<th>PRICE:</th>
<th>POSTAGE:</th>
<th>TOTAL:</th>
<th>£</th>
<th>FREE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>£</th>
<th>PHONE No.:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>£</th>
<th>SIGNATURE:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PLEASE FIND ENCLOSED CHEQUE/POSTAL ORDER - NUMBER:

PLEASE DEBIT MY CREDIT/DEBIT/CHARGECARD: CARD TYPE eg VISA: CARD No.: ISSUE No.: 
VALID FROM: / EXPIRES: / BANK OF ISSUE eg BARCLAYS: 

PLEASE TICK BOX(ES) AS REQUIRED: SECONDHAND LIST: PRICELIST: CREDIT FORMS: 
SEND TO: WATERS & STANTON, SPA HOUSE, 22 MAIN ROAD, HOCKLEY, ESSEX, SS5 4QS, UK.