

THE UK'S BEST SELLING MAGAZINE FOR AMATEUR RADIO ENTHUSIASTS

DECEMBER 1993 £1.90

# practical **Wireless**

## INSIDE FREE PULL-OUT SCANNING MAGAZINE



*Inside This Month*

## WORKSHOP SPECIAL

**Setting Up Your Workshop**  
By Rev. George Dobbs G3RJV

*Build*

**A Desk Microphone**  
**A NiCad Cell Holder**

*Reviewed*

**The Kenwood CO-1305 Oscilloscope**

*Plus*

**Novice Natter**  
For The Newcomer To Amateur Radio  
**Bits & Bytes**  
The Computer In Your Shack



**Win An SG-2000 HF Mobile Transceiver - Final Questions & Entry Form**  
**Plus All Your Favourite Regular Features**

ISSN 0141-0857



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# HATS OFF!

## TH-22E/42E FM HANDHELD TRANSCEIVERS



The news is out. And it's too exciting to keep under your hat.

Kenwood's new TH-22E (144MHz) and TH-42E (430 MHz) redefine handheld communications, with a palm-size format and impressive performance.

They're small and light enough to carry anywhere, but offer over 5 watts

output (with a 9.6V battery) and long hours between charges. The secret's in the FET power module, a world first in this class for sophisticated power management.

Other features? From the user friendly menu system to the 40 EEPROM memory channels, Kenwood's new

handheld FM transceivers offer numerous category-leading features and first-class performance. So it's hats off to Kenwood – the transceivers that cap the rest.

**KENWOOD**

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Book your seat now .... we don't want you to be disappointed!

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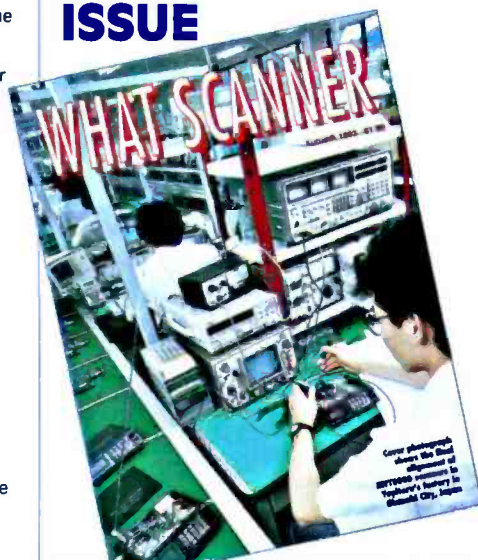
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## FRONT COVER ACKNOWLEDGEMENT

The front cover photograph shows our guest lead feature writer, the Rev. George Dobbs G3RJV working at his bench in St. Aldan's Vicarage, Rochdale, Lancashire. Kenwood CO-1305 Oscilloscope courtesy of Saje Electronics. Photograph by Derrick Bennett L.M.P.A, 5a Hornby Street, Heywood, Lancashire OL10 1AA.

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Published on the second Thursday of each month by PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel: (0202) 659910. Printed in England by Southernprint (Web Offset) Ltd. Distributed by Seymour, Windsor House, 1270 London Road, Norbury, London SW16 4DH. Tel: 081-679 1899. Fax: 081-679 8907. Telex: 8812945. Sole Agents for Australia and New Zealand - Gordon and Gotch (Asia) Ltd., South Africa - Central News Agency, Subscriptions INLAND £21, EUROPE £23, OVERSEAS (by ASP) £25, payable to PRACTICAL WIRELESS, Subscription Department, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel: (0202) 659930. PRACTICAL WIRELESS is sold subject to the following conditions, namely that it shall not, without written consent of the publishers first having been given, be lent, re-sold, hired out or otherwise disposed of by way of trade at more than the recommended selling price shown on the cover, and that it shall not be lent, re-sold, hired out or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of Trade, or affixed to or as part of any publication or advertising, literary or pictorial matter whatsoever. *Practical Wireless* is Published monthly for \$45 per year by PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW, UK Second Class postage paid at Middlesex, N.J. Postmaster: Send USA address changes to *Practical Wireless*, c/o Permit to post at Hackensack pending. The USPS (United States Postal Service) number for *Practical Wireless* is: 007075.

## COMING NEXT MONTH

*Practical Wireless* delves into the world of Kit Building and Home-Brewing - Just right for those dark cold winter evenings!

## DON'T MISS IT!



# C.M.HOWES COMMUNICATIONS

Mail Order to: **Eydon, Daventry, Northants NN11 6PT**  
Tel: 0327 60178



## NEW! Higher Power ATU Kit

The new **HOWES CTU150** has been introduced to meet the demand for a higher powered version of our much liked CTU30 30W ATU (kit: £39.90). The CTU150 is designed for use with the popular 100W HF transceivers and covers 1.8 to 30MHz. The "T match" configuration (using 2 high voltage tuning capacitors and 12 switched inductance settings) gives a wide matching range and useful extra RF filtering. It suits coax fed and long-wire antennas. The optional hardware pack is styled to match our other equipment and enables you to achieve a smart finish for your project.



Antenna Tuner

**CTU150 Kit (£49.90) + HA150R hardware (£16.90) = £66.80**



DFD4 + CA4M

## ADD DIGITAL READ-OUT!

Add digital accuracy to your analogue radio! The **HOWES DFD4** is an excellent way to bring older equipment up to date. Suits FRG7, FT101, TS520 etc. etc.

**DFD4 kit: £49.90. CA4M hardware pack: £24.90. Optional PMB4 allows extra 5 IF offsets. PMB4 kit: £9.90**

Other kits are also available to give digital read-out with our communications receivers, transmitters and transceivers.

## EASY TO BUILD RECEIVER KITS

**TRF3** Shortwave Broadcast TRF receiver. Great fun to build and use, educational tool! As featured on BBC World Service "Waveguide" programme. AM/SSB/CW reception. Makes a great present for the junior op.

Complete electronics kit plus hardware pack: **£41.40**

**DXR10** Three band (10, 12 & 15M) Amateur radio SSB & CW receiver. Matching transmitter kits available to enable expansion into transceiver. Complete receiver kit with HA10R hardware pack and DCS2 "S Meter": **£64.30**



TRF3 + HA33R Hardware pack



DXR10 + DCS2 Kits + HA10R Hardware

## TRANSMITTERS

		Kit	Assembled PCB
<b>AT160</b>	80 & 160M Bands AM/DSB/CW 10W PEP adjustable	£39.90	£62.90
<b>CTX</b>	QRP CW Transmitter, 40M or 80M versions	£15.50	£22.90
<b>MTX20</b>	20M 10W (adjustable) CW Transmitter	£29.90	£39.90
<b>HTX10</b>	10 & 15M SSB/CW Exciter (inc crystal filter)	£49.90	£79.90
<b>HPA10</b>	3/10W PEP Linear Power Amplifier to suit HTX10	£39.90	£58.90

Matching VFO kits are available for all the above

## ACTIVE ANTENNAS AND PRE-AMPS

<b>AA2</b>	150kHz to 30MHz Active Antenna Amplifier	£8.90	£13.90
<b>AA4</b>	25 to 1300MHz Active Antenna	£19.90	£27.90
<b>AB118</b>	118 to 137MHz Optimised VHF Air-band Antenna	£18.80	£25.90
<b>SPA4</b>	4 to 1300MHz Receiver Pre-amplifier	£15.90	£22.90



**CLEAN UP YOUR RECEPTION!**

## DUAL BANDWIDTH AF FILTER: £29.80

- Reduce noise and interference! • Sharp SSB/Speech filter with faster roll-off than IF crystal filters! • 300Hz bandwidth CW filter • Printed and punched front panel • All aluminium case
- Simply connects between radio and external 'speaker' or 'phones' • Suits all general coverage receivers and transceivers • Excellent receiver upgrade!

**ASL5 Filter Kit (£15.90) + HA50R Hardware (£13.90) = £29.80**

**PLEASE ADD £1.50 P&P for kits or £4.00 P&P if ordering 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.**

# AKD

Unit 5  
Parsons Green Estate  
Boulton Road  
Stevenage  
Herts SG1 4QG



**THE FILTER SPECIALISTS**



## MAIL ORDER DEPT.

Stock Items Normally  
Dispatched within 48 hours,  
21 days latest.



**TEL. 0438 351710**

## TV INTERFERENCE PROBLEMS??!

Are you having trouble receiving a watchable picture on your T.V.? If so, the cause may be airborne interference. For many years AKD has manufactured a low cost range of in-line interference suppression filters that are easily inserted into the aerial system to help reduce the effects of interference from local taxi radio, CB, amateur radio, airport radar, etc. Each filter is terminated in standard aerial co-ax plug and socket and requires no external power. Fitting could not be more simple. No technical knowledge is needed. There are 13 standard stocked filters in our range, but individual filters can be tuned to reject interference at specific frequencies if required. If you are not sure which filter type to order or have any questions regarding interference phone our helpline on 0438 351710 and ask for John who will be pleased to assist you in making the best choice of filter.

### THE FILTER RANGE IS AS FOLLOWS:

#### FILTER TYPE RBF1

A range of filters designed to eliminate Radar Blip, especially noticeable on video recorders. Stocked on channel 36 and 846MHz (RAF Boulmer interference) can be tuned at our factory from 420MHz to 890MHz. **£7.65**

#### FILTER TYPE TNF2 (Suitable for UHF TV only)

A range of Tuned Notch filters stocked on generally useful frequencies used by Amateur Radio operators, CB users, Private Taxi companies. Can also be factory tuned to reject any spot frequency up to 300MHz. Now stocked at 50 & 70 MHz. **£8.75**

#### FILTER TYPE HPF1

Used in weaker reception areas for general interference problems. Use with UHF TV, Video & Pre-Amps. **£7.65**

#### FILTER TYPE HPFS

Used in strong signal area for severe interference on UHF only. **£8.25**

#### FILTER TYPE BB1

A general purpose filter that can be used on its own or together with other filters in our range for severe interference problems. Ideal at the input of VCR and Pre-Amps. **£7.65**

#### WA1 WAVEMETER

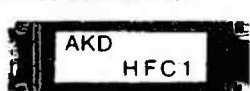
£29.96 + £1 p+p



Our Wave Absorption meter for 2 Mtre transmitters meets licensing requirements range 120MHz to 450MHz, very sensitive, can also be used as field strength meter within its range. Requires PP3 type battery (not supplied).

#### HFC1 CONVERTER

£49.95 + 75p p+p



For the FRG 9600/965 our new HF Converter, connects to the aerial socket, and powered direct from the 8 Volt o/p of the FRG 9600. Tune from 100, 1MHz to 160MHz, gives tuning range of 100kHz to 60MHz, uses double balanced mixer, with low pass filter on input.   
★ Can be supplied with BNC termination for other scanners ★

#### WA2 WAVEMETER

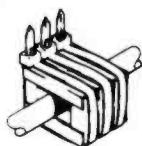
£29.96 + £1 p+p



Our Wave absorption meter for the 50 & 70MHz Bands. Meets licensing requirements. Can also be used as field strength meter within its range. Requires PP3 battery (not supplied).

## Unifilter 'CLAMP-ON' RADIO-FREQUENCY CHOKE

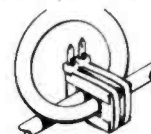
PHONE OR SAE FOR PRODUCT SPECIFICATION & APPLICATION NOTES



Allows leads to be torroidally protected without the need to cut or remove plugs or connectors. Ideally suited for moulded plugs, leads, ribbon and large diameter cables. Can easily be fitted and stacked in multiples to increase rejection. 'UNIFILTER' works by suppressing the interference currents that flow along the outside of cables without affecting the signals or power flowing inside. This means that you don't need to worry about upsetting normal operation or invalidating guarantees. Suitable for both reducing the emission of, or rejecting the effect of, 'common mode' interference as experienced on computer, hi-fi & speaker leads, as well as the normal mains & aerial cables.

**UF 4 KIT (SUITABLE FOR SMALLER INSTALLATIONS) £12.20 + 50p p+p**

**UF 8 KIT (FOR MULTI INSTALLATIONS) £24.25 + 75p p+p**



ALL PRODUCTS ARE AVAILABLE FROM US DIRECT  
MAIL ORDER OR WHY NOT MAKE USE OF OUR ACCESS  
& VISA FACILITIES TO ENSURE MINIMUM DELAY

ALL AKD PRODUCTS CARRY THE USUAL AKD 2  
YEAR GUARANTEE. PRICES QUOTED ARE  
CORRECT AT TIME OF GOING TO PRESS AND  
INCLUDE VAT, POSTAGE & PACKING

**TRADE ENQUIRIES WELCOME**  
**TRADE ORDERS CAN NOW BE PLACED BY**  
**FAX ON 0438 357591**

Props: RT & VEL Wagstaffe. Technical Adviser: John Armstrong



# NEW IMAGE SMC

We aim to give the best prices and will endeavour to match any competitors genuine offer. We stock the largest range of antennas and accessories in the UK.

*These prices remain only whilst stocks last.*



**FT1000** Carr. E  
**TOP HF IN EUROPE**

List price **£4295**  
SMC price **£3149**

**SAVE £1146**



**FT990. DC model** £1829  
Carr. D **BEST VALUE HF**

List price **£2699**  
SMC price **£2039**

**SAVE £660**



**FT890 c/w Auto ATU** List price £1750  
Carr. D **SMC price £1339**

List price **£1499**  
SMC price **£1169**  
**TOP BUDGET VALUE**

**SAVE £330**

Options Carr. D  
ATU2 Auto ATU £259  
FP800 AC PSU £325

Carr. B  
D

**SAVE £476**



**FT736R** Carr. D

Options  
736/50 6m module £299  
736/1.2 23cm module £595

List price **£1975**  
SMC price **£1499**  
**NOW INCREDIBLE VALUE**

Carriage  
B  
B

## Dual Band mobiles



**FT5100**  
List price £765  
SMC price **£499**

**SAVE £260**

**FT5200**  
List price £925  
SMC price **£599**

**SAVE £326**

VHF/UHF Multimode  
Mobiles / Portables  
Carr. C



**FT690R2** List price £609  
6M MOBILE SMC price **£459**

**SAVE £150**

**FT290R2** List price £639  
2M MOBILE SMC price **£469**

**SAVE £170**

**FT790R2** List price £739  
70CMS MOBILE SMC price **£549**

**SAVE £190**

## Handhelds



Carr. B  
**FT530 2m/70cm**  
complete with 5W nicad +  
charger

List price **£599**  
SMC price **£399**

**SAVE £200**

**33% OFF**

**FT415** List price £395 – SMC price **£275**  
2m **SAVE £120**

**FT411** List price £345 – SMC price **£265**  
2m **SAVE £80**

**FT815** List price £425 – SMC price **£295**  
70cm **SAVE £130**

**FT26** List price £000 – SMC price **£000**  
**SAVE £000**

**FT76** List price £335 – SMC price **£265**  
70cm **SAVE £70**

**FT811** List price £379 – SMC price **£279**  
7cm **SAVE £100**

All handhelds supplied with 7.2V 600ma Nicad and charger as standard

## THIS MONTH'S SPECIAL

**12%**  
**OFF LIST PRICES**  
OF ALL  
**ICOM AND KENWOOD**  
**TRANSCEIVERS**

Special Offers subject to availability Carriage B=£5.00 C=£7.50 D=£12.50 E=£16.50

South Midlands Communications Ltd, S.M. House, School Close, Chandlers Ford Ind. Est., Eastleigh, Hants SO5 3BY

Showroom hotline 0703 251549 HQ showroom hours 9.30-5 weekdays 9-1pm Saturday

Service Department Direct Line Monday - Friday 9am - 5pm (0703) 254247

2 year warranty on Yaesu, Icom & Kenwood transceivers

HQ & Mail Order Southampton (0703) 255111 Leeds (0532) 350606

Birmingham 021-327 1497 Axminster (0297) 34918 Chesterfield (0246) 453340

# WATERS & STANTON

## UK'S LARGEST SELECTION OF

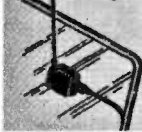
**NEW**

### On Glass Antennas

**Models for:**  
**2 metres**  
**Dual Band**  
**Scanners 30-1300MHz**

Here's just what you want for the modern car. These antennas mount firmly on the glass surface and come with internal matching box and 17ft of coax cable. You get low VSWR and no scratches on the car. Want to remove it? Just purchase the optional kit that enables the aerial to be safely removed and re-mounted with new disposable parts.

**GM-144 2m.....£29.95**  
**PAG144-440 2m/70cm .£39.95**  
**TGSP Scanner.....£32.95**  
 Order before 1st December and we'll send post free. Quote RSGB Advert.



## HAM RADIO CATALOGUE

From the Super Store with all the stock, good prices and friendly staff.

### Mail Order Code

Immediate despatch  
 24 hour delivery on request  
 Full Value carriage insurance  
 10 days option to return if not satisfied  
 12 months parts and labour warranty  
 No grey imports - just honest prices  
 Free after sales help  
 3 full time engineers



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### Mark's Message.

By the time you read this Leicester will be over but I will still be here waiting for your calls for even more orders. You know how I like to sell so give me a call and let me do you a deal on any make of equipment you see advertised in this magazine. Latest news is our gift tokens. Ideal for presents etc. We can supply them for virtually any amounts and they can be exchanged by post, in our shops or at rallies. We have some particularly nice deals going on hf gear so let me know your needs and of course we are happy to offer part exchange. Take a look at the new Ten-Tec Scout, it really is great value. The MFJ loop looks equally exciting. A complete hf antenna system in a loft which really works. We hope to have the new ALINCO DJ-GI Boy, what a performer! Come and see it working. In fact why not come and pay us a visit. Free coffee and a decent aerial system to try your rigs out on. You'll be made very welcome.

GOGBY



### 2m 30W Mobile for £59!

#### P335

This amplifier converts your 2m FM handheld into a 30W output mobile or base system.

- ★ RF sensing
- ★ 1.6W Input
- ★ Ideal for FM
- ★ 12dB power gain
- ★ SO-239/BNC plug
- ★ 12-14V DC
- ★ 74 x 50 x 24mm



This is a well made unit which we have purchased at a silly price. We have limited stocks at this price and you have a full 12 months UK warranty. Ask us nicely and we'll send it post free!

### MFJ-1786 Hi-Q Loop



- ★ 6 Bands 10MHz-30MHz
  - ★ 36" Diameter
  - ★ 150 Watts
  - ★ Remote control
  - ★ Fits in loft easily
- £299.95**

It works because we've been testing it ourselves! It fits easily through the average loft trap door. It's also weatherproof for outside and comes with mounting hardware for mast plus control box and AC adaptor. Simply plug adaptor into 240V socket, connect it to control box and run a remote cable between control box and loop. No other connection is necessary. The control box gives you slow and fast tuning plus built in VSWR and Power metre. A complete serial system in one package.

Gives good low angle radiation for DX and some high angle for local work. Mount it vertically for DX and horizontal for local work. Performance is very similar to a dipole erected at a similar height. However, unlike a dipole, it still works well at low heights of only a few feet. Ideal for portable work. For the full information send today for the specification sheet.

## ALINCO - factory fresh from the importers!



**NEW**

### DJ-G1E

2m Tx Dual-Band Rx  
 With Spectrum Display



80 memories, 2 Watts on nicads, 5 Watts on 12V. But the unique feature is the Spectrum Display. The bargraph shows the strength of the signal you are receiving plus the strength of signals on the 3 channels either side. Watch a Spectrum Display of the activity as you tune the band. It's the most amazing handheld we have seen!



### DJ-180EB

2m Budget Class Rig  
 10 memories (Expandable)  
 Auto Power Off  
 Scanning & wide-band Rx  
 Rotary Control  
 Ni-cads & Charger

You won't purchase a better quality rig at this price. Derived from their commercial design, this rig is tough and reliable. Ideal as a second rig or/and appealing to those who don't want all the frills (and the expense). Get the adaptor and you can make it into a 5 Watt mobile! And if 2 metres gets boring or goes quiet, you can always listen between 130MHz and 174MHz to pass the time. Get the full details now.



### DJ-580E

2M/70cms

Full CTCSS  
 Wide-Band Rx  
 42 Memories  
 Full Duplex

The DJ-580SP is the latest feature-packed handheld from ALINCO. You get ALINCO tough engineering and excellent reliability. You even get AM airband receive. No comers have been cut with the DJ-580SP and to add to its pedigree, it has been selected by many groups for RAYNET operation. No doubt because of its auto repeater mode. Get the facts today and find out more about this lovely rig.

### DR-130E 2m Mobile



50 Watts Output  
 20 Memories  
 CTCSS Encoder

Time Out Feature  
 Channel or Freq. Display  
 Compact size

This is the newest mobile rig to come from ALINCO and with 50 Watts output it really does pack a punch. Its simple front panel belies its many features yet making operation safer. You can switch between frequency display or channel numbers; nice for "on the move" operation. Frequency control is by rotary control or up/down buttons on the mic. Repeater access is taken care of by the 1750Hz tone with reverse repeater in an instant. And if you get tired of 2 metres you can always listen to the segment 130MHz-174MHz. Everything you need to mount and operate the rig is supplied. Just connect 13.8V.



# ELECTRONICS

## HAM RADIO PRODUCTS

0702 206835  
or 204965

### Ten-Tec Scout £589



#### SSB/CW 1.8MHz-30MHz Capability!

- ★ 5-50Watts Output SSB/CW
- ★ Plug-in Band Modules (40m included.)
- ★ Variable Xtal Filter 500Hz-2.4kHz
- ★ VSWR, Power & S-meter
- ★ Full Break-in Built-in Speaker
- ★ 100Hz resolution 12 Volt operation

Just arrived from USA. It's the cheapest HF rig with the famous Ten-Tec Pedigree. Just pay for the bands you want. Extra band modules £39.95. Measuring 2.5" x 7.25" x 9.75" it is ideal for mobile, base or portable. Only available direct from us. Plus a full 12 month UK backed warranty.

### HF Rig Discounts!

... on most models.



### Kenwood Icom Yaesu

We can give you a good deal. One that is fair to you, competitive, yet allows us to give you an honest warranty backed up by our own service department. We could have another 5% off the price, send your rig back to the suppliers when it goes wrong and make all kinds of excuses why it is taking so long. That's not our way. We are here to serve you before, during and after your purchase. Call us old fashioned if you like. Better still call us on 0702 206835!

### Price Crusher!

- ★ 20 Memories
- ★ 2 Watts Output
- ★ Wide-band Rx
- ★ Key-pad entry
- ★ Full scanning

### ADI - 2m & 70cms Hand-helds

£199 (2m Version)

We've cut the price to the bone on these rigs. You get great value, guaranteed reliability and superb performance. Fully featured, these rigs are well recommended for the beginner or experienced user. You get two dry packs, one taking 4 AA cells, the other 6 x AA cells. The 70cms model is ideal for the NOVICE operator. By direct selling these we have been able to offer you the very best value. Includes aerial and belt clip. Ni-cads and chargers extra.

AD-145  
2m model £199

AD-450  
70cms model £219

### EAR-TALKER £29.95

Factory Direct Price

#### Combined ear-piece and microphone

Comes with PTT control box and clip. Models for most modern hand-helds. Quote model when ordering.



#### Mobile?

We used one with a handheld and the quality was superb. Hands-free and low car noise. The performance will amaze you.

### WANTED

We want good clean modern used equipment and will pay cash or offer a part-exchange deal. Just telephone us for a quote.

### DIAMOND VSWR Meters

The Best!

from



£89.95

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## WARNING! Your scanner is only as good as your antenna

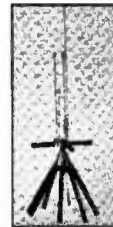
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200  
Channel  
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Channels



**PRO-44**  
50 Channel  
Scanner  
66-88, 108-  
136-975(AM)  
137-174, 380-  
512MHz



**PRO-46**  
100 Channel  
Scanner  
66-88, 108-  
136.975(AM)



### MVT 7100

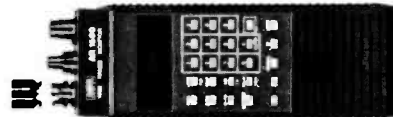
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# MARTIN LYNCH

G4HKS

THE AMATEUR RADIO EXCHANGE CENTRE

## NEW PRODUCTS NEW DISPLAYS NEW SHOWROOM!!

Firstly, A BIG THANK YOU to everybody who came along to the opening day of the new showroom - the response was overwhelming! I thought North London Radio Clubs could pack the food & drink away, but visitors from all over the country? Sainsbury's turnover went up 50% that week-end!

### ANOTHER DATE FOR YOUR DIARY.

Saturday 11th and Sunday 12th December.  
(10 - 6 Sat, 10 - 4 Sun)

My WEEK-END TWO DAY SALE. There's no Verulum rally this year, so come along to our mini rally!

Throughout NOVEMBER I'm extending the welcome to those of you that can't make the opening party. By visiting the biggest showroom in the U.K., you'll see all the latest equipment on show from the major manufacturers and special money saving ideas on purchasing your new toy! If you can't make the journey, phone us today for Lynch's special savings on all NEW & USED equipment.

#### Kenwood TH22/42

The latest from Kenwood, both 2m or 70cm handies are loaded with features and not loaded on price! Throw £30 at me and pay the balance in SIX MONTHS!!



#### Yaesu FT-840

The new price conscious HF transceiver from YAESU. Buy one now for only £95 and pay the rest in MAY 1994!! Are we mad, NO! are TRICITY FINANCE? Maybe.....



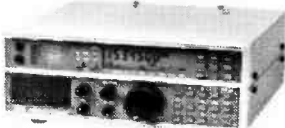
#### Alinco DJ-G1

The only Handie available with "Spectrum Display", this 2M transceiver is waiting for your order! Special November price.



#### AOR AR3030

Built to commercial specifications, the NEW AR3030 will set new standards in Shortwave Receivers. Telephone for info sheet, or buy on our Twelve Months FREE FINANCE OFFER!



#### ICOM IC707

The first delivery were sold to an overseas customer - he completely cleared us out!! This no frills HF Transceiver is a weal winner, wing us & find out why. (It gets weally worse).



#### ICOM IC-W21E/ET

With or without keyboard, we've got a few left at the "Leicester Massacre" price. You weren't there? You didn't see the blood? Both under £400! Pay £40, with the balance in SIX months. Phone now before we come to our senses. (or run out, whichever soonest!)

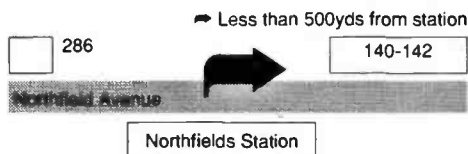


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Company are supplying U.K. dealers direct from their U.K. operation at Heathrow, prices have never been so competitive.

If you're considering a new Yaesu rig or accessory, give our sales team a ring. The goods will be guaranteed fresh from YAESU themselves and the massive savings will make you grin. Lots. Lots and lots in fact.

### DON'T FORGET WE'VE MOVED!!



By Tube, still the same Piccadilly line and get off at Northfields, but turn RIGHT, (instead of left for the old shop), walk less than five hundred yards and the showroom is on your left hand side. For those of you who know RUPERT'S Vintage Wireless shop, we're opposite! By car, much the same as before, i.e. the same road, still between the M4 & the M40 motorways. Phone for precise details.

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#### ICOM IC-737



#### YAESU FT-736R



#### ICOM IC-275H



#### YAESU FT-890



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# EDITOR'S *keylines*

The week ending Friday and Saturday 15 and 16th of October 1993 was a busy time for Tex Swann G1TEX and myself. Firstly, we drove from Dorset to Humberside (It's still really Yorkshire to me!) to visit the North Ferriby Club, and then on to Rochdale in Lancashire for the Mini-QRP Convention.

Tex and I were made very welcome by the North Ferriby Club, and we were joined by other guests from other clubs in the area. Between us, we gave a talk on the approach *PW* has to the hobby, and on how we tackle the production of the magazine in general.

As is usual during my club visits, I rounded the talk off as soon as possible and turned the evening into a question-and-answer session on *PW*. The topics were varied and interesting, and we ended up with some clearly stated preferences being voiced by our audience.

The following day, I 'chaired' the now annual *Practical Wireless* 'Question & Answer' session at the

Rochdale QRP Convention. It proved to be a very informative meeting, with readers coming out with exactly the same comments as we'd heard at the North Ferriby Club the previous evening regarding reviews in the magazine!

The single most important request from readers during our busy weekend related to equipment specifications. In short, it appears that many readers find the different manufacturer's specifications to be confusing. And in many cases, the readers said that they don't understand them at all!

In fact, at both meetings I asked for a show of hands, to get a good idea of how many readers found equipment specifications confusing. The result was quite amazing,

almost every hand was raised at both the Friday and Saturday meeting after I had posed the question!

So, bearing in mind that on both occasions when technical specifications were mentioned there was a high level of technical expertise, it was obvious that something has to be done. I'm pleased to report that something has been done to help our readers, and it will appear very soon.

Ian Poole G3YWX is a very well known author, both in *PW* and through the books he's written. Because of his expertise and approach, Ian is the ideal person to dispel the mysteries and confusion where specifications are concerned.

The first of Ian Poole's articles will appear very soon in *PW*, so

watch this space! And, remembering that the magazine responds to what you the reader requires, please help us to help you by filling in the Questionnaire which can be found in the centre of the November issue of the magazine.

To round off this last 'Keylines' of 1993, I am pleased to announce that this column will have two 'guest' authors from the editorial team in the January and February issues. The first guest author will be Donna 'Toad' Vincent, our News and Production Editor.

Donna is taking her RAE next year, and I understand that she's intending to explain one or two 'Editorial' (?) mysteries to you in her 'Keylines'! However, (worryingly perhaps) I've had to promise that there'll be no Editorial interference.

In the meantime, I'll wish you all good fortune with a final reminder. Please don't forget to fill in your Questionnaires!

*Rob Mannion G3XFD*

## SPECIAL PRIZE COMPETITION CORNER part 3

### First Prize

**SG-2000 HF Mobile Transceiver Worth Over £1800** Kindly donated by SGC, Inc.

**Second Prize** Jones Morse Key worth £65 Kindly donated by Peter Jones Engineering.

**Third Prize** Two Year Subscription To Practical Wireless



You could win the dedicated SG-2000 h.f. mobile transceiver by answering the six questions (final two questions published this month) taken directly from the review by G3XFD of the SG-2000 published in the October *Practical Wireless*. Enter your answers to the six questions on to the competition form on this page, complete the tie-breaker sentence, staple your corner flash coupons to the entry form and send it to: **Practical Wireless, Special Prize Competition Corner, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW, England, to reach us by 13 January 1994.**

**Entries with all six answers must be written on the final entry form, (photocopies accepted only if accompanied by the three original corner flashes) with all three corner flashes attached and tie-breaker sentence completed. Any entry not conforming to the rules will be disqualified. All winners will be notified by post. The Editor's decision will be final and no correspondence will be entered into.**

The December Questions (Enter Your Answers On The Special Coupon On This Page).

Question 1: When operating the SG-2000 which tuning method did G3XFD prefer to use?

Question 2: How many remote control heads (controllers) can be operated with the SG-2000?

Name .....

Address .....

.....

.....

Answer Question 1 October .....

Answer Question 2 October .....

Answer Question 1 November .....

Answer Question 2 November .....

Answer Question 1 December .....

Answer Question 2 December .....

Complete this tie-breaker sentence (making a total of no more than 20 words): "I would like to win the SG-2000 because....."

.....

.....

.....

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.....

.....

.....

.....

# RECEIVING *you*

## STAR LETTER

**Dear Sir**  
I was most interested to read the article about Pat Hawker G3VA in the September 1993 issue of *PW*.

You mentioned on Page 21 that he listened in 1936 to Schenectady and Sydney VK2ME with its Kookaburra signal. Well, so did I as a schoolboy s.w.l. So, I thought you might like to see the enclosed photocopies of QSLs from these stations together with other interesting ones from the same pre-war period. They were great days in wireless construction and my knowledge of early radio stood me in good stead when I joined the RAF as a wireless operator in 1940.

My late mother saved all my pre-war QSL cards and gave them to me many years later. Note also, the *PW* All Continents Received Certificate, dated May 1940. I wonder how many of those are still around?

You and I had the pleasure of a chat a few years ago at the Rally at HMS *Mercury* and I also met Ron Ham at Amberley around the same time.

**Colin Dawson  
G4UZS  
Portsmouth**

**Editor's reply:** Our article on Pat Hawker G3VA seems to have stirred many memories and interest Colin! I've no doubt that many readers will be interested to see the pictures of your certificates, which we're pleased to publish in 'Receiving You'.



## EF50 Receiver

**Dear Sir**

I have recently become an avid reader of *Practical Wireless* and in the October 1993 issue, on page 33, some very interesting details are given regarding Jack Hum G5UM and his three valve EF50 t.r.f. receiver, first published in 1946.

I would very much like if it were at all possible to obtain further details for the component values and coil details of that receiver and the r.f.c.s, etc.

Can you help me in any way at all?

**A. J. Hamshere  
Norfolk**

**Editor's reply:** You should have your photocopy of the article from *Short Wave Magazine* by the time the magazine is in print Mr Hamshere. However, we found that it appeared in the August 1946 issue of *SWM*, and not as published.

Photocopies (at a special price of £1) of the article and follow up notes are available from the *PW* office on request and NOT from Jack G5UM whose photocopier can't cope with the demand!

## Examination Blackspot

**Dear Sir**

I picked up my first copy of *Practical Wireless* ever last weekend and I was amazed to read that Taunton is an examination 'blackspot' for courses leading to the RAE. In fact, I drive to Taunton, some 23 miles away to attend a course run at the Somerset College of Arts and Technology. The course

leads to the City and Guilds examination next May. Perhaps you could put the record straight.

As someone who is totally new to the hobby I found that there were very few colleges offering courses. I was also staggered by the bureaucracy involved in getting a licence. Surely it would be reasonably easy for schools, local

colleges or even Radio Clubs to offer the test on a regular basis with proper supervision from an examining board.

With the current trend of colleges offering courses that lead to vocational qualifications, an exam for hobbyists such as the RAE is bound to be lowest in their list of priorities. Unless easier access to

the hobby becomes the norm, then existing hobbyists are going to have fewer people to talk to.

I hope to join you next May on the air. Unfortunately if I fail a paper then it will be six months before I can try again!

**Steve Townsley  
Devon**

## British Library

**Dear Sir**

I do not know whether any of your readers have noticed that if a book requested through a local library has to be obtained from the British Library, then there is a reservation charge of £4.11 in addition to the local library's charge.

Specialist physics books (the one I wished to refer to on this occasion was *Antennas* by Kraus) American publications and old radio/television books, usually seem to come via this route.

You cannot always be certain that a requested book will turn out to contain exactly the material you wish to study. Yet on other occasions you may be efficiently impressed by a book to purchase your own copy. The new charge is a lot of money (two issues of *PW*!) to pay out each time on a gamble.

I thought that we had a free public library service. Students, or those employed by large research/development organisations probably

have a free access to these books in the university/company library. But for those of us not so privileged - the self taught, it looks as though we must pay unreasonably for our desire to extend our knowledge.

**Brian Pethers  
Kent**

**Editor's comment:** It does seem unfortunate Brian, but it seems as if the libraries are only passing on the charges set by the British Library. I use the Dorset libraries a lot, and although you have to pay for book reservations, I find their charges reasonable. I have a Polish 'Linguaphone' course on loan at the moment, it's costing £5 for three months, which is much cheaper than buying a course. I'd be interested to hear other reader's comments on the Public Library service.



## Rally At Stalybridge

### Dear Sir

May I, on behalf of the society that I represent and through the pages of *Practical Wireless*, pass a few comments and facts, about the rally held at Stalybridge on the 29th of August.

Like a lot of other amateurs who were present at the rally, I was disappointed that no dealers in radio equipment were present at the rally and only one or two had components. Maybe this was due to the fact that a radio rally took place at Bolton the week before.

A few amateurs had chosen to aim their comments and in one case his nasty remarks, at Tameside ARS. Let me point out to these people, that Tameside ARS was in no way responsible for organising this rally, or had any say in the running of it. If these people had taken notice of the large poster outside the hall or the notice board where they paid their entrance fee, or even the logo on the sweat-shirts of the staff and security people, then they would have seen the name of the people responsible for the rally.

Tameside ARS members were at the rally, because as a local society we were invited by the organisers to run the Bring & Buy, which we did. So why the few amateurs who were dissatisfied with the rally should aim their complaints and in one case nasty remarks over the air, at Tameside ARS is beyond me. Especially when we were only there by invitation of the organisers, the same as everybody else.

One member of the Tameside ARS did put out a bulletin on packet about the rally taking place, but even he put it out that it was a 'Computer & Radio Rally'. I believe he did his usual practice at the end of his bulletin, he added his name, call-sign and that he was a member of the Tameside ARS. This does not give dissatisfied amateurs the right to blacken the name of Tameside ARS for something over which they had no control.

The Rally was advertised quite clearly in *Practical Wireless* as 'Computer, Electronics and Radio' rally and if people who were travelling any distance, had taken the advice printed in the 'Radio Diary' section of *Practical Wireless* and telephoned the number given, then not only would they have found out the exact nature of the rally, but also who was organising it.

Maybe these amateurs who were so quick to condemn Tameside ARS can now be just as quick to send us their apologies, I doubt if this will happen.

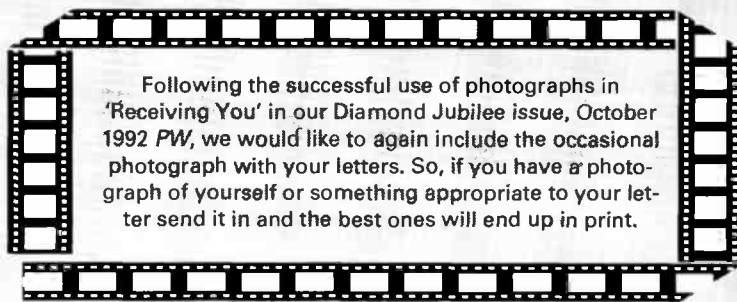
Our committee had looked at the hall in Stalybridge, as a possible venue for a 'Radio Rally' to be held at some future date. My recommendation to them however, is to abandon any thoughts in that direction and channel all our energies into our own society's activities and those of our local community.

It's just not worth the hassle trying to help some people.

**A. N. Laughlan  
(Secretary)  
Tameside A.R.S.**

Send your letters to the editorial offices in Broadstone. They must be original, and not duplicated in any other magazine. We reserve the right to edit or shorten any

letter. The views expressed in letters are not necessarily those of *Practical Wireless*. The Star Letter will receive a voucher worth £10 to spend on items from our Book or other services offered by *Practical Wireless*. All other letters will receive a £5 voucher.



## Radio Amateurs Examination

### Dear Sir

Re: Your editorial 'Keylines' column, October 1993 issue of *PW* reference the RAE Examination by City & Guilds.

As a tutor of the RAE syllabus for some three decades I am deeply concerned at what I consider to be the excessively high technical standard and deliberately misleading nature of some questions in their Operating Procedures, Practices and Theory papers.

For example:

**1:** A question which asks the candidate to decide when a semiconductor diode is forward-biased, shows a rectangular block PN junction with terminals A and B, rather than the more realistic internationally accepted diode symbol with cathode (k) and anode (a) legends.

**2:** A question which asks for the magnification factor of a tuned circuit includes as one possible answer "the ratio between inductive and capacitance."

**3:** A question which gives a totally unrealistic figure of 0.08 for the velocity factor of a transmission line.

**4:** A question which states that a millimetre reads 10% high at 100mA and asks what is the actual

current, does not include the correct current of 90.9mA in the multiple-choice answers.

**5:** Radio circuits given with questions use the Earth symbol rather than the more realistic Frame or Chassis symbol.

Whilst I agree in principle with the concept of the overall responsibility for organisation and administration of the Amateur Radio examinations being vested in the RSGB, I have reservations about their ability to provide and manage geographically localised venues on a stable long term basis.

In my considered opinion, the following administration changes relating to the Amateur Radio examination should be introduced as soon as practicable.

**A:** Responsibility for compilation of examination papers leading to the Amateur Radio Licence should be transferred to the Radio Society of Great Britain.

**B:** Examination results should be available within six weeks of the examination date.

**C:** Examination marks assessed should be issued to the candidate as a matter of right.

**D:** The option to resit within four months one failed part of the two paper examination.

**Ed Chicken G3BIK  
Northumberland**



Send in your news,  
photographs and product  
information to Donna Vincent  
at the editorial offices in  
Broadstone.

# NEWS

## 1993

### Jim MX-14S Transceiver

Following the review in the July 1993 issue of *Practical Wireless* by Clive Hardy G4SLU and the comments he made regarding the price of the Jim MX-14S, UK agents Waters & Stanton have negotiated a price reduction.

Waters & Stanton have recently notified *PW* that the manufacturer has decided not to trade to other dealers, making them the sole importers. As a result of this Waters & Stanton are now able to offer the Jim MX-14S at £239 inc. VAT instead of the original price of £289.



### Henry's Catalogue

Henry's Audio Electronics of 404 Edgware Road, London W2 1ED now have copies available of their new 1994 colour catalogue. The 300 page catalogue comes complete with a retail/mail order price list and four £5 vouchers.

To obtain your copy call in at Henry's with £2.00 or post a £4.00

cheque with your name and address and they will send you a copy.

Don't forget that Henry's are the main distributors for a wide range of electronics and can quote for UK and export. For more information contact **Henry's Sales Office on 071-258 1831.**

### Classic From AOR

The AOR Company have introduced the new AR3030 general coverage receiver to their range of products. The AR3030 has a classical appearance on the outside and comprises of a direct digital synthesiser design on the inside. The result is the New Classic.

The frequency coverage of the AR3030 is from 30kHz to 30MHz and features a.m., s.a.m. (synchronous a.m.), n.f.m., u.s.b., l.s.b., c.w. and FAX as standard. To help provide the ultimate in a.m. selectivity a Collins 8 6kHz mechanical filter is also fitted as standard. In addition to the Collins filter the 3030 is fitted with two other filters, a 2.4kHz for s.s.b., FAX, c.w., a.m., s.a.m., and a 15kHz for n.b.f.m.

Other features include 100 memory channels allowing data to be transferred in and out of the memory giving greater flexibility, 1.8W audio output, and standard headphone socket with 3.5mm jack socket for use with an external speaker. Antenna input is via a 50Ω BNC connector.

Other new models will also be available soon. These include a high performance all-mode wide coverage hand-held transceiver and a new base station all-mode wide coverage receiver.



**The price for the AR3030 has yet to be confirmed but further details are available direct from AOR (UK) Ltd., Adam Bede Tech Centre, Derby Road, Wirksworth, Derby DE4 4BG. Tel: (0629) 825926.**



**Young Amateur Of The Year Tim Munn 2E1AMX/G7OTO receiving one of his prizes from RSGB President Peter Chadwick G3RZP.**

### Young Amateur Of The Year - Tim Munn 2E1AMX/G7OTO

The 1993 Young Amateur of the Year award has been awarded to 15 year old Tim Munn 2E1AMX/G7OTO from Ventnor, Isle of Wight.

The award was presented to Tim along with the first prize of £250 by Roger Louth, the Radio-communication Agency's Director of Mobile Services. The presentation took place at the Radio Society of Great Britain's HF Convention in Windsor on October 10.

In addition to the first prize, Tim, supported by his family, also received numerous other prizes including an invitation to visit Baldock, the Agency's Radio Monitoring Centre, Hertfordshire, a one week training course on professional mobile communications at Wray Castle College in the Lake District and gifts from Icom (UK) and Siskin Electronics. Tim will also receive a certificate signed by the President of the Board Of Trade, Michael Heseltine

Tim has been interested in amateur radio since he was 10 years old and is an active Packet user as well as being involved with his local RAYNET group. Not only has he achieved the title of Young Amateur of The Year but is also the youngest Novice Instructor in Great Britain and has recently heard that his first three

pupils have all passed their Novice Radio Amateur Examinations (NRAE). His great enthusiasm for radio is also shown by the many items of equipment he has constructed. These include an 3.5MHz receiver and a 50MHz transmitter/receiver.

The close runner-up in the 1993 Young Amateur Of The Year award, was Simon Kahn G0STU/2E1AAB aged 14 from Salford, Lancashire. Simon was also present at the ceremony together with his parents and brother who is also a Novice. He is an active member of the Bury Radio Society and is Editor of the club's magazine, *Feedback*.

Simon was also invited to visit the Radiocommunication Agency's monitoring station at Baldock.



**Simon Kahn G0STU/2E1AAB close runner-up of the Young Amateur Of The Year Award receiving a prize from the Chairman of Icom (UK) Paul Nicholson G3VJF.**

## Hi-Band Loop

Waters & Stanton Electronics of Hockley in Essex have recently introduced the MFJ-1786 Hi-Q 6 Band Loop to their range of products. The 914mm diameter loop has a power handling capacity of 150W, a frequency

nection between the loop and the control box.

The loop is constructed from a 25mm diameter welded aluminium tube and tuning is carried out by a special butterfly capacitor which has no rotating contacts.

This helps to keep r.f. current losses to a minimum.

The American manufacturer MFJ claim that field tests have shown that the MFJ-1786 is the

equivalent of a dipole erected at similar height. The antenna is aimed at those who find outside antennas a problem to install.

**Waters & Stanton are selling the MFJ-1786 for £299 inc. VAT and can be contacted at 22 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835.**

range of 10 - 30MHz. and covers the 10, 14, 18, 21, 24 and 28MHz bands.

The MFJ-1786 is supplied with a control box and an a.c. adaptor. The control box allows the loop to be remotely tuned without the need for a control cable. The d.c. controls are fed via a 50Ω coaxial cable con-



## Try Before You Buy

The Middlesex based company Livingston Hire and Tektronix have recently drawn up an agreement to allow potential buyers of Tektronix products to evaluate equipment before buying it - at no cost. The scheme known as the Tektronix Freeway Evaluation scheme means that the potential buyer can rent equipment from Livingston Hire at a preferential rate.

The scheme works by the rental cost of up to a maximum of 10% of the purchase price of the equipment being reimbursed by Tektronix in the form of vouchers. These vouchers can be redeemed against the purchase price of the equipment.

Livingstone Hire is unique in providing this 'try before you buy' scheme. The aim is to give customers the opportunity to evaluate any new Tektronix equipment before deciding whether or not to buy.

**For more information on the 'try before you buy' agreement contact Graham Harris, Livingston Hire Limited, Livingston House, Queens Road, Teddington, Middlesex TW11 0LR. Tel: 081-943 5151.**

## Packet Survival

Roger Cooke G3LDI author of the *PW* 'Packet Panorama', column has recently produced a self published booklet entitled *Packet BBS Survival For The Beginner*. It's produced in loose leaf spiral bound A4 format and contains 73 pages on how to survive on packet as beginner.

*Packet BBS Survival For The Beginner* takes the user from the first connect to the BBS through to using the full set of servers. It is laid out clearly and concisely and gives the user plenty of examples to work to. There is also a United Kingdom Mailboxes and a DX Clusters list at the back of the booklet.

**Anyone interested in obtaining a copy of Packet BBS Survival For The Beginner can get one by sending £4.50 inc. P&P to Roger Cooke G3LDI, QTHR or by packet address to G3LDI @ GB7LDI.#35.GBR.EU.** For each booklet purchased Roger will donate £1 to the AMSAT Phase 3D Satellite Fund.

## Speak To Me

The National Museum of Science & Industry, London are currently running an exhibition entitled 'Speak To Me' on communication and disability. 'Speak To Me' is the seventh and final exhibition in the Science Box Series on contemporary science sponsored by Nuclear Electric Plc. and is running until the 30 January 1994.

The exhibition, designed to help those who have difficulty in communication, was opened on 4 October 1993 by Professor Stephen Hawking, author of *A Brief History of Time*. Professor Hawking, a sufferer from motor neurone disease uses a speech synthesiser which he operates using two fingers of his left hand.

Visitors to the exhibition will have the chance to try out various methods of communication. These include the Liberator speech synthesiser, like the one used by Professor Hawking.

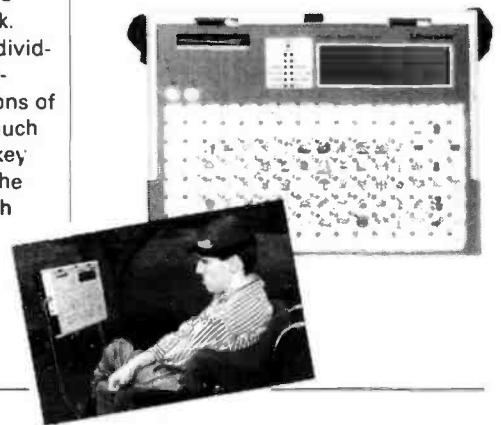
The Liberator works by using a software package called Minspeak. This allows the user to choose individual words on a symbol based keyboard. Using different combinations of pictures, it builds up sentences much faster than using a conventional keyboard. The computer then turns the sentences into synthesised speech giving the user a voice which sounds almost human.

Also on display is the Speaking Hand developed by Robert Klein, a student at

University College London. The Speaking Hand is an experimental device that recognises the Deafblind Alphabet and then turns it into artificial speech or text. The device works on the Deafblind Alphabet principal of spelling out one letter at a time by touching the palm and fingers of the left hand. This has enabled Robert to develop a glove containing tiny sensors which detect pressure on each touch point. A control unit then turns the electrical output from the sensors into a signal that can be processed by a BBC microcomputer.

Visitors will also have the chance to use an electronic newspaper designed for the blind and visually impaired as well as the chance to take part in an opinion poll on communication and disability.

**'Speak To Me' can be seen at the Science Museum, Exhibition Road, London SW7 2DD. Tel: 071-938 8080/8008.**



## Old Radio Sets

*Old Radio Sets* by Jonathan Hill has recently been published by Shire Publications. The A5 sized book describes the development of radio (wireless) from the late Victorian era until the late 1960s. It shows many rare and unusual sets that were once familiar to listeners as well as containing a 'Further Reading' and 'Places To Visit' section.

The author, Jonathan Hill, is a freelance writer and photographer who has been interested in radio since the early 1970s. He was also a founder member of the Vintage Wireless Society and runs his own communications museum next to his home in Bampton, Devon.

***Old Radio Sets* is available from booksellers or from Shire Publications Ltd., Cromwell House, Church Street, Princes Risborough, Buckinghamshire HP27 9AJ for £2.25.**





# NEWS

## '93

### South Hampshire Repeater Group

The South Hampshire Repeater Group based in Southampton have informed PW that plans for a 70cm/430MHz repeater are well advanced. The licence application has been submitted and the proposed channel is RB8, callsign GB3EA. The location of the proposed repeater will give coverage to Southampton, Eastleigh and all surrounding areas.

**For more details contact the South Hampshire Repeater Group, PO Box 73, Eastleigh, Hants SO5 5WG.**



### Palm Sized Communications

The TH-22E and TH-42E are the latest f.m. hand-helds to be launched by Kenwood.

The TH-22E is designed for 144MHz and the TH-42E

for 430MHz. Both of these hand-helds are small, palm sized, light and offer over 5W from a 9.6V battery.

Other features include 40 EEPROM memory channels, easy to use menu system and numerous category leading features.

Kenwood announce that both the TH-22E and 42E will be competitively priced. **For more details contact Trio-Kenwood (UK) Ltd., Kenwood House, Dwight Road, Watford, Herts WD1 8EB. Tel: (0923) 816444.**



### New Warranty

Icom (UK) Ltd. have just announced a new warranty scheme. The new two year warranty came into operation on November 1. This will be available on receivers, transceivers, hand-helds and mobile rigs as well as selected other products purchased after November 1 1993.

**For more details contact Icom (UK) Ltd., Sea Street, Herne Bay, Kent CT6 8LD. Tel: (0227) 741741.**

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# NOVICE *matter*

Videos on the radio hobby must be few and far between. So when Nevada Communications sent a package of four videos to look at, it came as quite a surprise.

The videos are produced by the American *CQ Magazine* - but don't let that put you off. The subjects they cover are *Getting started in Ham Radio*, *Getting Started in Packet Radio*, *Getting Started in Amateur Satellites*, and *Getting Started in DXing*.

I can't tell you about all of them in detail in one issue, because there's too much to say. But, at £19.95 each, I think they could be really good additions to the 'Please can I have for Christmas' list.

I started by looking at the video about Packet Radio - an aspect of amateur radio I've never bothered with before. The video contains lots of American enthusiasm, but as the equipment is the same both sides of the Atlantic, the information is valid.

The explanations of packet radio are about the simplest and best I've ever heard/seen, I could almost be converted. Don't worry though, it shows you how to use packet and not the theory on why packet works.

Any orders for these videos should be sent to **Nevada Communications, 189 London road, North End, Portsmouth, Hants PO2 9AE**. If you want your videos for Christmas, don't wait too long before sending off your order, you know how congested the Post Office gets the closer we get to Christmas, and you wouldn't want to be disappointed, would you?

## Helping Others

Helping others is something the RAIBC do a lot of. The letters in RAIBC stand for **Radio Amateur Invalid & Blind Club**. The Branch in Northern Ireland have sent some details on how we can help them to help disabled radio amateurs and short wave listeners.

When you visit many petrol stations these days, you often receive vouchers to collect for various gifts. If you're anything like me it takes forever to collect enough. Well, there is another use for these vouchers - the RAIBC in Northern Ireland want them!

As the RAIBC are a registered charity, the petrol companies

**Elaine Richards G4LFM, PO Box 1863, Ringwood, Hants BH24 3XD.**

*Elaine Richards G4LFM brings you some interesting news on videos, helping others and free gifts.*

have been very helpful by processing orders quickly - sometimes they even give discounts. The vouchers are mainly used to get the prizes for raffles or tombolas, sometimes the prizes are sold at rallies or shows.

The funds generated are used to buy radio equipment and audio cassette courses for home study for blind and disabled people in Northern Ireland. This enables the disabled community to take part in a hobby that's very therapeutic.

In a lot of cases it enables the individual to develop their communications skills, without being embarrassed about their disability. Think about it, once you're behind the microphone, Morse key or computer keyboard, how can people tell you're disabled unless you tell them?

The RAIBC project for 1993/94 is to encourage deaf people to take part in the hobby with the use of a computer, linked to their radio with a modem - packet radio. This in itself opens up a new world of communications for the deaf.

If you think this is a worthwhile project to support, then send your vouchers free of charge to **MLO, Radio Amateur Invalid & Blind Club (NI Area), FREEPOST, BE 1769, Belfast BT15 3BR.**

## RAE Courses

I have some young friends who are attending an RAE course. One topic they asked to be clarified was resistors and what happens when you put them in series and parallel.

Before I cover that, let's just look at the reason for resistors and what they do. Their prime role in life is to pass current, but in a very controlled way.

One way to think of a resistor is to imagine you're trying to water your beloved greenhouse plants with a powerful hose. If you take the hose to your pre-

cious seedlings it's power will probably blast them clean out of the pot!

What you

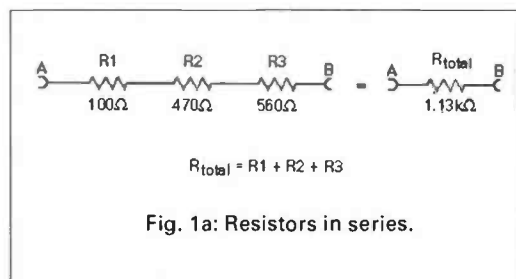


Fig. 1a: Resistors in series.

need is some way of restricting the flow. You could do this by putting your finger over the end or perhaps by squashing the hose pipe.

The restriction or resistance is precisely what a resistor is required to do in an electrical circuit. In this analogy, the water pressure can be equated to voltage and the water flow to current. You will find this similarity between the flow of water and electrical current holds true for many types of electrical circuit.

Resistors in series are easy to deal with. You just have to be able to add their values together and if you can't do that in your head you can always resort to a calculator. For example, a 100Ω resistor in series with a 470Ω resistor in series with a 560Ω resistor is equivalent to:

$100 + 470 + 560 = 1130\Omega$  (or 1.13kΩ).

When thinking of resistors in parallel, imagine our hose pipe again. This time imagine it's a hose pipe that splits into three smaller pipes and then joins back into one large pipe. What

do you think happens to the flow of water?

If the three pipes are the same size or resistance, each will pass the same amount of water so the total flow will be three times the flow in each individual pipe. Exactly the same principle applies to electrical circuits with identical resistors in parallel, you just need to divide that value by the total number of resistors.

But, what if the pipes or resistors are different sizes? In this case, the current is shared between the resistors. The lowest value of resistor passes the

most current and the highest value of resistor passes the least current. If you need to work out the total resistance of a group of parallel resistors, there's a simple formula you need to learn.

$1/R = 1/R1 + 1/R2 + 1/R3$ , etc.

This is where R is the answer you want to end up with and R1, R2, R3 etc., are however

many resistors that are sat in your parallel circuit. If you look at **Figs. 1a & 1b**, you can see what both series and parallel resistors look like in a circuit.

## Free Gifts

As we're approaching the festive season, the Editor's 'getting into' the festive spirit early. I've got 20 Maplin catalogues and a couple of free subscriptions to give away.

So, what do you have to do? To get the subscriptions, I need to see a photo and a few details of you and your Novice station. For the catalogues, I want to know what is the total value of resistance when you have a 2.7kΩ, 270Ω and 470Ω resistor in parallel - easy or what..... See you next month with the answers and winners.

# CLUB news

## Antrim

**Carrickfergus AG.** Tuesdays, 7pm. Downshire Community School, Downshire Road, Carrickfergus. November 20 - Rally/Bring & Buy/Talk-in on S22, 12pm start, December 7 - Packet by Hugh Irvine G13TLT. **Gavin G10GMG** on (0232) 835650.

## Avon

**Thornbury & DARC.** Wednesdays, 8pm. United Reform Church, Chapel Street, Thornbury, September 22 - Rig Night. **A. Hellen G0RYV** on (0454) 415215.

## Bedfordshire

**Shefford & DARS.** Thursdays, 8pm. Church Hall, Amptill Road, Shefford, Bedfordshire. November 11 - A Talk by Nic G4TXG, 18th - Members Activity Night, 25th - Quiz Night, December 2 - Members Activity Night, 9th - The GAMEO Challenge. **Paul G1GSN** on (0462) 700618.

## Berkshire

**Reading & DARC.** 2nd & 4th Thursdays, 8pm. The Woodley Pavilion, Woodford Park, Haddon Drive, Woodley, Reading. November 25 - Construction Contest & Alignment Evening by Jim Carter G0LHZ & Paul Read G8XBE. **Nick Challacombe G0LGG** on (0734) 722489.

## Cheshire

**Stockport RS.** 2nd & 4th Wednesdays, 7.45pm. Room 14, Dialstone Centre, Lisburne Lane, Offerton, Stockport, Cheshire. November 24 - Ladies Night - Around The World In 80 Minutes, December 8 - AGM. **Jim France G3KAF** on 061-439 4952.

## Cornwall

**Cornish RAC.** Village Hall, Perranwell Station, Perranwell, Nr. Truro, 7.30pm. **Miss T. Warrillow G00OP** on (0872) 222605.

## Cumbria

**Eden Valley RS.** Odd months, 7.30pm. BBC Club, Penrith. November 25 - Informal Evening at the Tufton Arms. **John Pape G0NYQ, 2 Mill Hill, Appleby-in-Westmoreland** on (07683) 52106/52148.

## Derbyshire

**Buxton Radio Amateurs.** Lee Wood Hotel, Buxton, 8pm. November 23 - Discussion/Demonstration Of ATV. **Derek Carson G4IHO** on (0298) 25506.

**Derby & DARS.** Wednesdays, 7.30pm. 119 Green Lane, Derby. November 24 - Orkney & Shetland G4ZAP Expedition by Martin G6ABU, December 1 - Surplus Sale, 8th - Constructors Contest. **Hayley Winfield G7PXA** on (0773) 856904.

## Devon

**Appledore & DARC (Devon).** 3rd Mondays, 7.30pm. Appledore Football

Clubroom. November 15 - Club Radio Quiz details from G4ETJ. **Reg Lyddon G4ETJ, QTHR** on (0237) 477301.

**Torbay ARS.** Fridays, 7.30pm. ECC Social Club, Highweek, Newton Abbot. November 19 - TARS Nostalgia Slide Show by Derrick G3LHJ. **W. Hipwell G3HTX** on (0803) 526762.

## Dorset

**Dorset Police ARS.** The Dorset Police ARS will now be holding regular monthly meetings, at Force HQ on the first Thursday of every month, at 7.30pm. Membership is open to Police Officers, serving and retired, civilian employees, Special Constables and their immediate family. The club welcomes contact from other local clubs. November 16 - On The Air Night, December 2 - Committee Meeting/On The Air Night. Further info from **PC 915 Richard Newton at Ferndown Police Station** on (0202) 229351 or (0202) 229342.

**South Dorset RS.** 1st Tuesdays, 7.30pm. Wessex Lounge of Weymouth Football Club. November 12 - Quiz with Bournemouth RC at Kinson Community Centre, Bournemouth, 21st - SDRS Hamfayre '93 Event at Portland Heights Hotel, December 7 - Something Different by Andy G3VMZ. **Mike Lenzi G7HNY** on (0305) 773860.

## Down

**Bangor & DARS.** 1st Fridays, 8pm. Bangor Technical College, Room A13. December 3 - Christmas Surprise Talk, 4th - Xmas Dinner in the Winston Hotel, £10 per person. **Keith G10SSA** on (0247) 883315.

## East Sussex

**Crowborough & DARS.** Thursdays, 8pm. Plough & Horses, Crowborough. November 23 - Quiz Night. **Michael Smith G6UUO** on (0892) 661807. **East Yorkshire**

**North Ferriby United ARS.** Fridays, 8pm. North Ferriby Ltd., FC Social Club, Church Road, North Ferriby, East Yorkshire. November 12 - Equipment Sale, 19th - Night On The Air, 25th - The Notice Licence by Duncan G3TLI, December 3 - Night On The Air. **Frank Lee G3YCC** on (0482) 650410.

## Essex

**Bishops Stortford ARS.** 3rd Mondays, 8pm. British Legion Club, Windhill, Bishops Stortford. November 15 - Annual Junk Sale. **John Dudeney** on (0799) 550313.

**Braintree & DARS.** 1st & 3rd Mondays, 8pm. The Clubhouse, Braintree Hockey Club, Church Street, Bocking. November 15 - Wavemeter - Design & Construction

Pt 1, December 6 - Quiz - Visit to Dengie 100 Club. **J. F. Burton G1WQQ** c/o G4JXG, 88 Coldnailhurst Avenue, Braintree, Essex CM7 5PY or **Publicity Secretary** on (0376) 327431.

**Vange ARS.** Thursdays, 8pm. Barnstaple Community Centre, Long Riding, Basildon, Essex. November 11 - Home-Brew Comms Receiver by Ray G3IOI, 18th - Talk by Roy G3ASH, December 2 - Junk Sale, 9th - Television. **Doris** on (0268) 552606.

## Greater London

**Cray Valley RS.** 1st & 3rd Thursdays, 8pm. Progress Hall, Admiral Seymour Road, Eltham SE9. November 18 - Another View Of Sri Lanka by G3VLX, December 2 - Meet The Members. **Bob Treacher** on 081-850 1386.

**Crystal Palace & DRC.** 3rd Saturdays, 7.30pm. All Saints Parish Rooms, Beulah Hill, London SE19 (opposite junc. Grange Road). November 20 - Surplus Equipment Sale **Will Taylor G3DSC** on 081-699 5732 or **Bob Burns G300U** on (0737) 552170.

**Edgware & DRS.** Watling Community Centre, 145 Orange Hill Road, Burnt Oak, 8pm. November 11 - Maritime WX & FAX by Tom Morgan G0CAJ, 25th - Morse Training Evening, December 9 - Junk Sale. **Rod Bishop G0SQL** on 081- 204 1868.

**Loughton & DARS.** Room 12 of Loughton Hall, 7.45pm. November 12 - National Trust by J. Archer. **Ray Pedley G0LWF** on 081-500 2811.

**Silverthorn RC.** Fridays, 7.30pm. The Chingford Community & Adult Education Centre, Friday Hill House, Simmons Lane, Chingford, London E4 6JH. November 12 - Construction Contest, 19th - Night On The Air/Social, 26th - Junk Sale, December 3 - Night On The Air/Social. **Andrew Mowbray G0LWS** on 081-529 4489 **between 5.30 & 6.30pm weekdays only.**

**Southgate ARC.** 2nd & 4th Thursdays, 8pm. Winchmore Hill Cricket Club Pavilion, Firs Lane, Winchmore Hill, London N21. November 11 - Construction Judging For G6QM Trophy, 25th - Demo Of G6QM Entrants, December 9 - AGM. **Brian Shelton G0MEE** on 081-360 2453.

## Greater Manchester

**Rochdale & DARS.** Mondays, 8pm. The Cemetery Hotel, 470 Bury Road, Rochdale, Lancs. November 15 - Guest Speaker. **Brian** on 061-653 8316 or **Dave** (0706) 32502.

**Tameside ARS.** 1st & 3rd Tuesdays, 7.30pm. ATC Camp, Moorcroft Street, Droylsden, Tameside. **A. N. Laughlan G1YCM, 8 Kempton Close, Droylsden, Tameside, Manchester M35 7LJ.**

## Gwynedd

**Dragon ARC.** 1st & 3rd Mondays, 7.30pm. Four Crosses Hotel, Menai Bridge. November 15 - Amateur Radio Videos. **Tony Rees GW0FMQ** on (0248) 600963.

## Hampshire

**Basingstoke ARC.** 1st Mondays, 7.30pm. Forest Ring Community Centre, Sycamore Way, Winklebury, Basingstoke. November 28 - 144MHz Direction Finding Competition - Fox, December 6 - Xmas Social. (0256) 25517.

**Itchen Valley RC.** 2nd & 4th Fridays, 7.30pm. Scout Hut, Brickfield Lane, Chandlers Ford. November 12 - Food Hygiene by John G7DYV, 26th - Home Construction From Kits by Keith G3XUO. **Les Kennard G3ABA** on (0703) 732997.

**Winchester ARC.** 3rd Fridays, 7.30pm. Red Cross Centre, Durrngate House. November 19 - Construction Project by Gerry Sanderson G2DBT. **Peter Simpkins G3MCL** on (0962) 865814.

## Hereford & Worcester

**Bromsgrove ARS.** 2nd & 4th Tuesdays, 8pm. Lickey End Social Club, Alcester Road, Burcot, Bromsgrove. November 23 - Technical Topics. **Mr B. Taylor G0TPG** on (0527) 542266.

## Hertfordshire

**Dacorum AR & TS.** 1st (informal) & 3rd (formal) Tuesdays, 8pm. The Heath Park, Cotterells, Hemel Hempstead. November 16 - ATV by G4NJU. **Nicholas Camp, 48 Northfield Road, Harpenden, Herts AL5 5HZ.**

**Hoddesdon RC.** Alternate Thursdays, 8pm. Conservative Club, Rye Road, Hoddesdon, Herts. November 11 - Good House Keeping by Robin Page-Jones, 25th - Morse Code by Tony Smith G4FAI, December 9 - AGM. **Roy G4UNL** on 081-804 5643.

**Stevenage & DARS.** Tuesdays, 7.30pm. Stevenage Day Centre, Chells Way, Stevenage. November 16 - Club Video Project - How's It Progressing by Ian Wade G3NRW, 23rd - Nos View by Ian Wade G3NRW, 30th - CW Instruction/On Air, December 7 - Running A Packet BBS by Andy G4SPV. **Neil Ravilious 2E1ASZ** on (0438) 350882.

## Humberside

**Goole R & ES.** Fridays, 7.30pm. West Park Pavilion, West Park, Goole, last Fridays at the 'Black Swan Inn', Asselby. November 12 - Mobile Operating, 19th - Christmas Dinner, 26th - Social Evening, December 3 - Night On The Air. **Steve Price G8VHL** on (0405) 769130.

## Kent

**Bromley & DARS.** 3rd Tuesdays, 7.30pm. The Victory Social Club, Kechill Gardens, Hayes, Kent. November 16 - RAYNET In Romania slides by Les Wilbraham G0LW. **Alan G7GBH** on 081-777 0420



**Medway AR & TS.** Fridays. Tunbury Hall, Catkin Close, Tunbury Avenue, Walderslade, Chatham, Kent. Visitors & new members welcome. November 12 - Fish & Chips Supper, 19th - Kent Repeater Group Current & Future Developments. **Mrs Gloria Ackerley G70VI, 40 Linwood Avenue, Strood, Rochester, Kent ME2 3TR. Tel: (0634) 710023.**

**Sevenoaks & DARS.** November 15 - Homeopathy by Jean Cole, December 6 - AGM/Social. **The Secretary, c/o Sevenoaks District Council, Council Offices, Argyle Road, Sevenoaks, Kent TN13 1HG.**

**South East Kent ARC.** Wednesdays. Duke Of Yorks School, Guston, Nr. Dover. November 17 - Operating Evening, 24th - Icom (UK) Presentation OT Video, December 1 - Novice Evening, 8th - Surprise Talk. **Paul Turvey G1PJJ on (0304) 214030.**

## Lancashire

**Bury RS.** Tuesdays, 8pm. The Mosses Community Centre, Cecil Street, Bury, Lancashire. November 15 - Quiz with Rochdale ARS, 16th - Quiz - The Next Day, 23rd - Ragchew & Operating, 30th - Video Evening, December 7 - Committee Meeting. **Steve Gilbert G3OAG on 061-881 1850 or Colin Fox G3HII on (0204) 883212.**

**Hesketh ARC.** Every other Tuesday. Birkdale, Southport. October 26 - Logic Gates, November 11 - Rubber Products., 23rd - Mystery Topic. **Bernie G7DEM on (0704) 63344.**

**Oldham ARC.** Thursdays, 8pm. The Moorside Conservative Club, Ripponden Road, Moorside, Oldham, Lancashire. **Kathy G4ZEP on 061-652 8617 evenings or 061- 633 0550.**

## Leicestershire

**Charnwood AR Contest C.** 1st & 3rd Sundays. The Albion, Loughborough. November 13 - Club Calls Contest, 21st - Social Night, December 5 - Review Of The Years Contests. **Phil on (0509) 232927.**

## Lincolnshire

**Grantham RC.** 1st & 3rd Tuesdays, 8pm. Kontak Sports & Social Club, Barrowby Road, Grantham. November 16 - AGM, December 7 - Xmas Dinner. **John Kirton G8WWJ on (0476) 65743.**

**Spalding & DARS.** Fridays, 7.30pm. Old Fire Station, Albion Street, Spalding. November 12 - Constructional Contest For G2BQC Memorial Trophy. **G400, QTHR on (0775) 750382.**

## Merseyside

**Liverpool & DARS.** Tuesdays, 8pm. Churchill Club, Church Road, Wavertree, Liverpool. November 16 - Open Night, 23rd - Open Night, 30th - Surplus Sale. **Ian Mant G4WWX on 051-722 1178.**

**Wirral & DARC.** Irby Cricket Club, Mill Hill Road, Irby, Wirral, 8pm. November 17 - D&W at The Saughall Massie Hotel, 24th - Home Construction Competition, December 1 - D&W at the Basset Hound, Thingwall. **Paul Robinson G0JZP on 051-648 5892.**

## Norfolk

**Dereham ARC.** 2nd Thursdays, 8pm. St. Johns Ambulance Hall, Yaxham Road, Dereham. November 11 - What Routes To Take. **Mark Taylor G0LGJ on (0362) 691099.**

**King's Lynn ARC.** 7.30pm. The King's Lynn Scout HQ, Chequers Lane, North Runcion, Nr. King's Lynn. November 11 - Packet Radio & Basic TCPIP by Paul Overton G0MHD, 25th - Club Junk & Surplus Sale. **Derek Franklin G0MQL on (0553) 841189.**

**Norfolk ARC.** Wednesdays, 7.30pm. University Arms, South Park Avenue, Norwich. November 14 - Surplus Equipment Sale, 17th - On Air & Workshop, 24th - Archeology And The Metal Detector by Dr. John Davies. December 1 - Committee Meeting/On The Air Night, 8th - Voice Pitch Control by Ted G3CWC. **Dale Simkin on (0603) 37393.**

## Northants

**Kettering ARS.** Tuesdays, 7.30pm. Electricity Sports & Social Club, Eksdale Street, Kettering. November 23 - Communications In The Fire Service & Advice On Fire Precautions by D Johnson. **Len G0RDV (but QTHR as G7EHM) on (0536) 514544.**

## Nottinghamshire

**South Notts ARC.** Highbank Community Centre, Farnborough Road, Clifton Estate, Nottingham, or Fairham Community College, Farnborough Road, Clifton Estate. November 12 - VHF Linears And Power Supplies by Martin Dale G6ABU, 19th - Open Forum, 26th - HF & VHF On Air/Construction. **Julie Brown G0SOC, PO Box 4, Nottingham NG11 9DE.**

## Scotland

**Banff & DARC.** 1st & 3rd Fridays. Banff Castle, Castle Street, Banff, Aberdeenshire AB45 1DL. November 19 - Free Evening, December 3 - Club Construction Evening. **Martin Andrew GM6VXB on (03465) 82061.**

**Dundee ARC.** Tuesdays, 7pm. College of Further Education, Graham Street, Dundee. November 16 - The UK Independent Broadcasting Scene by Ian Stuart GM4AUp, 23rd - Construction Night, 30th - Members Question & Answer Night, December 7 - Construction Night. **George Millar GM4FSB, 30 Albert Crescent, Newport-on-Tay, Fife DD6 8DT.**

**Lothians RS.** 2nd & 4th Wednesdays, 7.30pm. Orwell Lodge Hotel, 29 Polwarth Terrace, Edinburgh EH11 1NH. November 24 - Air Traffic Control At Edinburgh Airport by Phil Jackson and Kel Kirkland. **Colin Wright GM4HWO.**

**Paisley ARC.** Alternate Wednesdays, 7.30pm. YMCA, 5 New Street, Paisley. November 24 - The Work Of The Ordnance Survey. **Stuart GM70IG on (0509) 335195.**

## Somerset

**Wincanton ARC.** 1st & 3rd Mondays (except Bank Holidays - 2nd & 4th), 7.30pm. The Community Lounge, King Arthur's Community School, Wincanton, Somerset. November 15 - Open Evening, December 6 - Slow Scan TV by Mr C.

Tabor G3UGR. **Dave G3ZXX on (0963) 34360 or Andy G1FPW on (0747) 51381.**

**Yeovil ARC.** Thursdays. Red Cross HQ, Grove Avenue, Yeovil, Somerset. November 11 - Home Brew Yeovil Rigs, On Air G3PCJ, 18th - PMR Conversions by G7LNLJ, 25th - Club Stations On The Air/Committee Meeting. **Cedric White G4JBL on (0258) 73845.**

## South Yorkshire

**Barnsley & DARC.** Mondays 7.30pm. Three Horseshoes, Barnsley Road, Brierley, Nr. Barnsley, South Yorkshire S729JT. J. P. Caledon-Scott G4LRS on (0226) 203448.

**Sheffield ARC.** Mondays 7.30pm. Firth Park Pavilion, Firth Park Road, Sheffield. November 15 - The SARC Quiz, 22nd - Test Equipment On A Shoe String by Tom G4KMA, 23rd - Swimming at Forge Ponds Complex, 29th - Provisional Talk by Tony G1TKX, December 6 - All I Want For Christmas by David G0JJR, 7th - The Club's Ten Pin Bowling Competition. **(0742) 446282.**

## Suffolk

**Felixstowe & DARS.** November 22 - HF Antennas by Richard Hayward G0DZG, December 5 - December Fixed & AFS Contest. **Paul Whiting G4YQC on (0394) 273507.**

## Surrey

**Dorking & DRS.** The Friends Meeting House, South Street, Dorking, 7.45pm. November 23 - Wartime Britain With Exhibits by David Ford of the DGF Museum. **John Greenwell G3AEZ on (0306) 77236.**

**Horsham ARC.** Guide Hall, Denne Road, Horsham, West Sussex, 8pm. December 2 - AGM. **Peter Stevens G8SUI on 0737) 842150.**

**Surrey RCC.** 'Terra Nova' The Waldrons, Waddon, Croyden, Surrey. November 15 - Natter Night, December 6 - PCBs Made Easy by Peter Burton G3ZPB and Bernard Wynn G8TB. **Berni G8TB on 081-660 7517.**

**Sutton & Cheam RS.** 3rd Thursdays, 7.30pm. Sutton United Football Club, The Borough Sports Ground, Gander Green Lane, Sutton, Surrey. Natter Nights - 1st Thursdays. November 18 - Nuclear Power by Dr. Daniel Ward of Nuclear Electric, December 5 - 144MHz AFS/Fixed Contest. **John Puttock G0BWW, 53 Alexandra Avenue, Sutton SM1 2PA.**

**The Kingston & DARS.** 3rd Wednesdays, 8pm. Alfriston, 3 Berrylands Road, Surrey KT5 8RB. November 17 - AGM/Constructional Projects. **Ray Fuller on 081-398 1128.**

**Wimbledon & DARS.** 2nd & last Fridays. St. Andrews Church Hall, Herbert Road, Wimbledon SW19. November 12 - Meet The Committee, 26th - Club Quiz. **Chris Frost G0KEB on 081-397 0427.**

## Warwickshire

**Stratford-Upon-Avon & DRS.** 2nd & 4th Mondays, 7.30pm. Home Guard Club, Main Road, Tiddington, Stratford-Upon-Avon, Warwickshire. November 11 - Talk by John Badger of Badger Boards, 25th - Amateur Television by Mike Wooding G6IQM, November 8 - British Red Cross Society by Ray Beardsmore. **Alan**

**Beasley G0CXJ on (0608) 82495.**

**Solihull ARS.** 3rd Thursdays. The Shirley Centre, 274 Stratford Road, Shirley, Solihull, West Midlands. November 18 - Annual Surplus Sale. **(0827) 53344 day-time.**

## West Sussex

**Mid-Sussex ARS.** Thursdays, 7.45pm. Marle Place Further Education Centre, Leylands Road, Burgess Hill, West Sussex. November 19 - Chemical Rectifiers by G5RV, December 3 - More On Russia by Colin G3ZAF. **Chris Coward G3YTU on (0444) 458992.**

## West Yorkshire

**Halifax & DARS.** 1st & 3rd Tuesdays, 7.30pm. November 16 - 144MHz by Ron Binns G30TE. **David Moss G0DLM on (0422) 202306.**

**Keighley ARS.** The Ingrow Cricket Club, Ingrow, Keighley, 8pm. November 11 - RAYNET by G3RXX, 18th - Natter Night, 25th - Vintage Radios by Bob Rawlings, December 2 - On The Air Night, 9th - Natter Night. **Kathy Conlon G0RLO on (0274) 496222.**

**Spenn Valley ARS.** Thursdays, 8pm. Old Bank Working Men's Club, Mirfield. Alternate Thursdays - 'Noggin & Natter nights'. November 18 - Switch Mode PSUs by Mike Cox G8HUA, December 2 - An Evening With Gerald G3SDY. **Tony Galvin G0IKD on (0532) 534437.**

## Wiltshire

**Chippenham & DARC.** Thursdays, 7.30pm. Sea Cadets HQ, Long Close, Chippenham. November 30 - North America by G7ILF. **Barry Winslow G0LJA on (0225) 706265.**

**Trowbridge & DARC.** 1st & 3rd Wednesdays, 8pm. Southwick Village Hall, 8pm. November 17 - Natter Night, December 1 - Christmas Party & Skittles. **Ian G0GRI on (0225) 864698.**

*News Editor Donna Vincent says that with 1994 just around the corner, get your reports in early for any special events that your Club is arranging.*



# NEVA DA

EVER

## KENWOOD RADIO

Kenwood TS50



Just arrived. This new "micro" 100 watt HF mobile rig is in short supply because of its popularity. We have purchased large quantities - call for info or part exchange price on your old HF rig. **£999**

### Kenwood Radio

R5000 S/VWave Rec	
150kHz - 30MHz	£939.00
TS-950SDX HF Trans	
auto ATU & DSP	£3475.00
TS-850SAT HF with auto ATU	£1695.00
TS-450SAT Mobile HF with	
auto ATU	£1400.00
TS-690S Mobile HF & 6m	£1400.00
TS-140S Budget HF Transceiver	£845.00
TM-732E 2m/70cm Twin Mobile	£629.00
TR-751E THE BEST 2m M/Mode	£705.00
TH-78E Twin Band Handheld	£440.00
TS-790E Tri-Band Base	
2/70/Op. 23am	£1690.00

### Kenwood Accessories

PS-52/53 Mains PSU Full Duty	£269.00
TL-922 HF 2kW amp	£1645.00
MA-5 5-Band Mobile HF Ant	£119.00
AT-50 Matching Auto ATU for TS50s	£279.00
SM-230 Station Spectrum Display	£795.00
HS-5 Deluxe Comms H/Phones	£45.00

### Kenwood Microphones

MC-50 Desk Mic	£84.95
MC-60A Desk Mic (Pre-Amp'd)	£99.95
MC-80 Electret Desk Mic	£59.95
MC-85 Deluxe Desk Mic	£119.95
MC-43S Dynamic H/Mic	£22.95
MC-44E H/Mic Prag. Func	£29.95
MC-45E H/Mic Multi Functions	£29.95
MC-44DME H/Mic DTMF	£45.95
MC-45DME H/Mic DTMF	£49.95

## DRAKE



**Drake R8E** - To own one of these receivers is a dream in itself - everything you could ever want in facilities and performance is in the R8E. Drake are no newcomers to radio - they have been No.1 in the USA since 1943! Unlike other expensive receivers the Drake has all its filters fitted as standard, therefore, there are no hidden extra costs. Its performance is truly staggering! With an excellent dynamic range coupled with superb filtering it takes a lot of beating! Multiple scan facilities, easy use 100ch. memory, all mode coverage and synchronous detector for improved AM reception are just a few of its extensive range of facilities.

**£995**

H Twin VFO's H Selectable AGC  
H Passband Tuning  
H Timer Function H RS232  
Interface H Built-in pre-Amp H Dual Noise  
Blanker H Non-Volatile Memory H 100kHz -  
30MHz Wide Coverage

### Options

Matching Speaker	£49.95
P.C Drive Software	£59.95
Full VV/Stop Manual	£29.95
VHF Converter (Internal)	£225.00

## ICOM RADIO

Icom IC-737



A new full coverage HF transceiver with Auto ATU, Electronic Keyer, good receiver and a host of extras

IC-735 HF all band mobile	£1135.00
IC-728 HF 100w Mobile	£945.00
IC-729 HF Plus 6m Mobile	£1230.00
IC-229E 2m FM Mobile	£369.00
IC-P2ET 2m FM Handie	£303.00
IC-P4ET 70cm FM Handie	£360.00
IC-W21E 2m/70cm Handie	£425.00
R-100 Mobile Receiver	£595.00
R-7100 Wide Band Base RX	£1375.00
R-72E HF S/VWave Receiver	£815.00

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#### THE NEW IC707 HF TRANSCEIVER

★ 100 watts RF output  
★ All ham bands plus 500kHz to 30MHz RX

Price only **£895** or pay by three past dated cheques of £298.33 each.  
See right hand page for details.

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Standard 7 Amp UK Spec	£29.95
Standard 10 Amp UK Spec	£59.95
HP12S 12 Amp Twin Meters	£79.95
HP1230S 30 Amp Twin Meters	£139.00
HP1250S 50 Amp Twin Meters	£220.00

### ANTENNAS

#### SAGANT Antennas

Using Vinyl coated annealed copper wire - supplied with matching unit for coax feed - high quality Japanese made.

3.5 MHz (39 mtrs long)	£79.95
7.0 MHz (20 mtrs long)	£79.95
14.0 MHz (9.9 mtrs long)	£79.95
Trap Dipole 40/80	£89.95
Pair 40 mtr Traps	£19.95
2kW Balun 1:1	£29.95

#### HARI HIGH QUALITY WIRE ANTENNAS

Constructed using heavy duty multi stranded clear plastic coated wire to professional standards. These Antennas are built to last.

G5 RV (80-10mtrs) 1kW full size	£39.95
G5 RV (40-10mtrs) 1kW 1/2 size	£34.95
W3 DZZ (80-40mtrs) 200W Dipole	£79.95
W3 DZZ (80-40mtrs) 1kW Dipole	£99.95
WARC Trap Dipole (200W)	£79.95
Broadcast RX Antenna (1-30MHz)	£59.95
Windom (80-10mtrs) Full size 1kW	£79.95
Windom (80-10mtrs) Full size 200W	£59.95
Windom (40-10mtrs) 1/2 size 1kW	£69.95
Windom (40-10mtrs) 1/2 size 200W	£49.95
Balun 1:1 1kW	£29.95
Balun 1:1 200W	£24.95

#### TONNA VHF BEAMS

2m 9 Ele. Portable Beam (13.1dBi)	£49.95
2m 9 Ele. Crossed Beam (13.1dBi)	£86.95
2m 11 Ele. Beam (14.1dBi)	£77.95
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70cms 19 Ele. X Beam (16.2dBi)	£61.95
2m/70cms Oscar Special (9/19 Ele)	£85.95

#### DIAMOND BASE

X50 2m/70cm base vert	£79.95
X300 2m/70cm higher gain vert	£129.95

#### OUTBACKER MOBILE ANTENNAS

##### FROM AUSTRALIA

Outbacker 300W, 80 thru' 10m	£189.95
Outbacker (T) Inc. top band	£219.00
Outbacker Junior 100W, 80 thru' 10m	£179.95
Perth 300W, 80 thru' 10m	£199.95
Perth (T) inc. top band	£235.00
Heavy duty bass spring	£59.95

## SCANNING RECEIVERS

We are probably the UK's largest distributor and stockist of scanning receivers - we have listed here a few of the popular models but for full information why not send in £2 for our full colour catalogue.

### Yupiter

MVT-7100 hand-held	£399.00
MVT-8000 mobile	£389.00
MVT-7000 hand-held	£369.00
MVT-3100 <b>NEW MODEL</b>	£199.00
VF-150 marine	£189.00
VF-125 airband	£189.00
VF-225 civil/military airband	£269.00

### AOR

AR3000A base/mobile	£899.00
AR1500 hand-held	£339.00
AR2500 base	£399.00

### Commet

COM 102 marine/PMR	£99.95
COM 203 hand-held	£213.00
COM 204 hand-held	£249.95
COM 205 base	£344.00

### Fairmate

HP2000 hand-held	£299.00
MS1000 base	£299.00

### Icom

R1 hand-held	£395.00
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### Black Jaguar

BJ200 MKIV	£239.00
BJ1300 <b>NEW</b>	POA

### Bearcat

BC2500XLT <b>NEW</b> hand-held	£365.00
BC890XLT <b>NEW</b> base	£299.00
BC200XLT	£249.95

### Accessories

JIM M75 pre-amp	£79.95
JIM M100 pre-amp	£89.95
Scanmaster GW2 pre-amp	£59.95
Scanmaster base stand	£19.95
Scanmaster mobile holder	£14.95

### Scanmaster Antennas

Base 500kHz - 1500MHz	£39.95
Discone 25 - 1300MHz	£49.95
Double discone 100 - 1300MHz	£59.95
Mobile 25 - 1000MHz	£29.95



## EXTENDAMAST 10 METRE RETRACTABLE MAST

Suitable for: Dipoles, Long Wires, VHF/UHF Beams, G5RV and many other antennas.

A new and inexpensive aluminium 10 metre retractable mast that may be used at home or for portable use. Easy to erect in minutes - your antennas can now be independent of trees, buildings and other make shift fixing points! The steel guying rings are corrosion protected to provide years of useful life. Because individual requirements vary guy wires are not included. A base fixing plate is available as an extra.

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**SAVE £30**

### Vectronics VC300DLP

Canadian-built ATU with a host of features:

- 1.8 - 30MHz
- 150W (300W PEP)
- 4:1 Balun
- 300W dummy load
- Peak/average power
- Dual reading SWR/power meter
- 3-way antenna selection
- Illuminated meter



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A new range of advanced inexpensive, portable counters from the U.S.A. All come complete with telescopic antenna and UK power supply.

### New ATH™ Series - features include:-

**HANDS FREE** operation to automatically read and hold a signal within 80m/seconds. The counter is super fast because it does not require the additional time for multiple readings like digital filtering techniques.

**ONE SHOT** feature enables signals to be captured, locked and displayed as a single reading. This facility can be set to trigger and display a frequency even when the counter is left unattended.

A full range of accessories is available - send for our leaflet.

**Model ATH-50**  
 • 5Hz - 2800MHz  
 • High speed  
 • Bar graph reads to 4GHz  
 • One Shot instant hold and display reading

**£289**

**Model ATH-30**  
 • 1 - 2800MHz  
 • High speed  
 • Bar graph reads to 4GHz  
 • Extra bright LED display  
 • One Shot feature

**£269**

**Model ATH-15**  
 • 1 - 1500MHz  
 • High speed - 6 fast gate times  
 • Bar graph reads to 4GHz signal strength  
 • Extra bright LEDs  
 • Automatic clean dipout

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**Model 1350**  
 • Covers 1 - 1300MHz  
 • 3 gate times. An entry level counter that offers excellent value for money

**£129**

## THE NEW SCOUT 555

### Simplicity at its best!

**£585**

Direct from the Ten-Tec factory in America comes this new concept in mobile HF communications. An SSB/CW transceiver that utilises easy plug-in band modules. It's small enough to fit in a briefcase yet packs an impressive 50 Watts punch. For those keen CW operators, there's even a built-in Iambic Keyer and unique and revolutionary patented "Jones" filter with variable bandwidth control from 500Hz to 2.5kHz.



- ★ Complete with 40m band module
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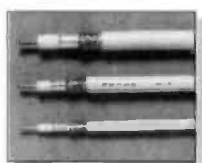
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The hardest part is deciding what to buy!

### LOW LOSS CABLE

Superb Japanese low loss cable with aluminium foil and braid double earth screening, tough weather resistant yet flexible. Fantastic low loss - suitable for high power and frequencies up to 3GHz.



50-FB (8.1mm - 0.055dB/m).....£0.75/mtr  
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 Losses quoted at 100MHz

### EARTALKER



A completely new concept in microphone technology. The EarTalker is a combination of earphone and microphone which is worn within the ear. It provides outstanding transmitted audio quality and is suitable for all leading brands of hand-held (Call for details on your particular model), Separate volume, PTT switch and control box.....**£29.95**

### TRADING POST

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#### Scanning receivers

Airco DX11 hand-held, vgr.....	£215
AOR 2100 base scanner 20 channels.....	£199
AOR AR1000 hand-held, 1000 channels.....	£185
Beocat 50XL 10 channels, hand-held.....	£75
Beocat 200XLT hand-held, c/w 900MHz.....	£165
Fairmate HP100 scanner.....	£175
FDK TM568 2m. Xtl receiver.....	£65
Icom R100 mobile scanning RX.....	£425
Kenwood R21 mobile scanner.....	£315
Yaesu FRG9600 scanning RX.....	£365
Yupitau MVT-7100 almost new.....	£315

#### Shortwave receivers

Drake RBE "as new" condition.....	£750
Icom IC71E shortwave receiver.....	£675
Icom R7000 wideband RX, inc. HF.....	£795
Kenwood R2000 RX+VHF conv.....	£525
Kenwood R5000 S/W receiver.....	£695
Kenwood R820 base S/W receiver.....	£325
Sony SW55 portable RX.....	£219
Trio IR500/S basic S/W RX.....	£95
Trio R1000 general coverage receiver.....	£295
Yaesu FRG7 RX, old but faithful.....	£195
Yaesu FRG7000 good starter.....	£245
Yaesu FRG7700 digital S/W RX.....	£425
Yaesu FRG7700 shortwave RX.....	£395
Yaesu FRG8800 c/w ATU and Ant.....	£600

#### HF Transceivers

Drake TR7+PS7 PSU/MS7 Spkr.....	£1125
Icom 7011 HF and matching PSU.....	£545
Icom IC725 mobile HF.....	£625
Icom IC730 mobile HF TX.....	£495
Icom IC737 ex-demo, as new.....	£1325
JST 135 HF TX/RX 150W PEP.....	£775
Kenwood TS430/S HF TX.....	£675
Kenwood TS530/S HF TX.....	£549
Kenwood TS830S HF TX.....	£585
Kenwood TS940S AM, Hierns (ATU).....	£1495
Saramcamp FT101ZD.....	£495
Takyo HT115 15m monobander.....	£195
Yaesu FT One HF base TX.....	£1050
Yaesu FT707 HF mobile TX.....	£475
Yaesu FT726 with 2m/70cms mods.....	£895
Yaesu FT9020M HF base TX.....	£625

#### Hand-helds

Airco D1560 dual band handle.....	£340
Airco D1580 dual band hand-held.....	£385
CTE Sender 145 2m hand-held and nicod.....	£155
Kenpro KT22 2m hand-held, vgr.....	£115
Kenwood H215 2m hand-held.....	£135
Kenwood TH26 2m hand-held, boxed, vgr.....	£155

#### Mobile Transceivers

Kenwood TM221E 2m 25W mobile.....	£215
Standard CS800 2m mobile RX/TX.....	£195
Standard C7800 70cm mobile, 25W.....	£185
Yaesu FT227 memoriser 2m mobile.....	£185
Yaesu FT230R 2m mobile, boxed.....	£175
Yaesu FT290 2m port-a-pack.....	£325
Yaesu FT290 2m c/w Mutek front end.....	£350
Yaesu FT290 Mutek, Amp, Mnt. Bkkt.....	£445
Yaesu FT480R 2m multimode.....	£325

#### Station Accessories/Microphones/Amps/Speakers

Adonis AM508 desk mic, boxed.....	£75
Kenwood SP100 speaker.....	£45
Microwave modules 144/1005.....	£95
Microwave modules 2m transvert.....	£85
Microwave modules 70cms transvert.....	£95
Nevada TM1000 high power ATU.....	£75
Takyo 2m 100W amp, boxed.....	£165
Takyo HL1K/6 6m high power amp.....	£695
Vectorics VC300 ATU+prtr mtr.....	£85
Yaesu FC700 ATU boxed.....	£95
Yaesu FC902 ATU.....	£145
Yaesu FC980 101 matching ATU.....	£195
Yaesu FL2000HF HF amplifier.....	£350
Yaesu FL21002 HF amp (1kW PEP).....	£525
Yaesu SP102 speaker.....	£45

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# The Kenwood CO-1305 5MHz Oscilloscope

*To accompany our workshop themed special issue, Richard Ayley G6AKG takes a look at a budget priced oscilloscope from Kenwood.*

Looking at the prices charged for surplus test equipment these days, has left me wondering who can possibly afford to buy an oscilloscope. New or used they don't come cheap.

However, if you're thinking of buying new, the Kenwood CO-1305 scope from Saje Electronics is cheap at £185 plus VAT when compared to most other budget instruments currently available.

Looking at its specification and price the CO-1305 is obviously aimed at the educational and Novice end of the market. And from what I hear, it is selling very well.

### Light and Neat

The Kenwood CO-1305 is a light and neat instrument with quite a quality look about it. Closer inspection with the covers off, shows a well built design with the cathode ray tube (c.r.t.) running the full depth of the instrument and two p.c.b.s.

The tube used in the CO-1305 gives a bright well defined trace, which seems to hold up well even when the instrument is working at the limits of its specification.

The power consumption of the entire instrument is just 12W, which would indicate that the tube is also nice and efficient.

The first p.c.b. nearest the small mains

transformer obviously provides the many power supply rails used to feed a c.r.t.

The second p.c.b. forms a sub-chassis to which all the front panel controls are mounted. The control panel p.c.b. also contains the trace amplifier and sweep circuitry.

### The Inputs

Three 4mm sockets are used for inputs, the first two are used as the Y-amplifier input. The third socket along with the second, which is a common grounding point, is used to provide either external synchronisation of the sweep oscillator or by flicking a switch, an input to the X-amplifier.

The X-amplifier in this instrument is d.c. coupled. This allows the application of very slow external sweep waveforms.

For those unsure of what the X and Y amplifier actually do in circuit I'll provide a reminder! Basically speaking, the Y-amplifier output is used to drive the display trace up and down. On the other hand, the X-amplifier is generally fed with a sawtooth waveform (sweep oscillator) which moves the trace across the screen from left to right.

On the back of the instrument are two terminals for Z-modulations, which enable the brightness of the trace to be varied by an external voltage source.

The use of 4mm sockets was obviously chosen to suit the schools environment which does not allow the direct use of the more useful capacitive type 'scope probe.

However, the spacing of the input sockets enables the use of a 4mm to BNC type adaptor and the specification input impedance of the instrument is well suited to high resistance capacitive type probes.

Kenwood provide a coaxial input lead fitted with 4mm plugs and insulated crocodile clips. This is acceptable for basic testing at audio frequencies.

### Uncluttered Appearance

The instrument front panel is uncluttered in appearance with the intensity and focus controls designed as presets, adjusted with a trimming tool or small screw driver through a recessed hole in the panel.

I didn't have a problem with this arrangement as these controls are rarely used in most circumstances. The other preset control is the d.c. balance of the Y-amplifier.

### Input sensitivity

The input sensitivity of the scope is 10mV/division which can be adjusted with the Y-gain control. Once the Y-gain is altered with this control the scope loses its calibrated figure of 10V/m and then reverts to being a comparative instrument.

However, in order to extend the calibrated range of the instrument a switched attenuator is provided which can be set to either divide by 10 or 100.

To use the scope in this calibrated mode the Y-gain control needs to be set fully clockwise. This point isn't made that clear in the operating notes and I felt that a calibration mark on the front panel along with a pointer type knob would have helped operation.

In order to check the amplitude and duration of a waveform against the graticule screen in front of the c.r.t., X and Y position controls are also provided.

The compact size of the CO-1305 reviewed by G6AKG can be judged by comparison with photographer's (G1TEX) hand.





## Sweep Oscillator

The sweep oscillator of the 'scope is similar to the Y-amplifier, in that it is fully adjustable between the switch ranges. But unless the frequency control of the oscillator is set fully clockwise the timebase calibration of the scope is meaningless.

My earlier comments on control markings still hold! This means the instrument is somewhat limited in its ability to give useful duration measurement.

There are four sweep ranges provided 10 to 100Hz, 100Hz to 1kHz, 1 to 10kHz and 10kHz to 100kHz. The highest frequency which could be measured is limited by your ability to count the number of wave peaks and divide them into the switched sweep rate selected.

The trace synchronisation of the CO-1305 is very good considering its simplicity. The engineer I spoke to at Saje Electronics said that one of his customers had commented at the trace stability, even when being used with complex video waveforms.

I must admit, the oscilloscope handled everything I tried on the review model. It even coped with low amplitude signals.

I found one small point unfathomable in Kenwood's design philosophy. And this is although they have provided a Z-mod. input on the oscilloscope, a function I have yet to utilise in my experience, they did not blank the flyback part of the trace!

My reference to the Z-modulation input was because this function could be used with some additional circuitry to enable flyback blanking. A lack of flyback suppression shows a totally spurious, and annoying, section of the trace as it returns to the left hand side of the tube for its next sweep.

To be honest, when I first saw this design flaw I thought it to be a fault condition. However, when I was told it was quite normal my overall feeling towards the instrument changed to disappointment. Still, all things are built to a price these days!

Anyone viewing a sinewave for the first time might be forgiven to think that all such waveforms have this rather odd line drawn through their negative wave peak! Educationally it's a bit misleading and it is one small problem I think Kenwood could do something about.

## Operating Instructions

The operating instructions, along with the specification of the instrument are given on a fold-

out A3 sheet. This I found to be reasonably written.

There are a few oddities in the instructions. Personally I'm sure these were introduced in translation and the shorthand style adopted through lack of space.

The instruction sheet also tells you how to measure Lissajous Figures. These are used for comparing the frequency of a known signal source with that of an unknown waveform being monitored with the 'scope.

## Summing Up

In summing up my opinions, I think that the bottom line must be that the Kenwood CO-1305 oscilloscope represents good value for money in its class. This is an important factor if you consider that the next step up to a semi-professional oscilloscope could add another £200 to the price tag.

Most people are on a tight budget these days. This particularly applies to schools and colleges and this 'scope will seem very attractive to this sector of the market.

However, if I were buying a scope for my own personal use and I had £200 to spare, I think I would do some shopping around to find a reasonable second-user semi-professional instrument.

The few switch ranges provided by the CO-1305 and the lack of flyback suppression must be taken into account. I think these factors would quickly frustrate most experienced home constructors, myself included.

Thanks to Saje Electronics Ltd. for their helpful and cheerful assistance when technically

quizzed on the 'phone. They have a growing list of comparatively priced lines of test equipment. They're so helpful, I suggest you ring them for details of their full range of test equipment.

My thanks go to Saje Electronics Ltd. at 117 Lovell Road, Cambridge CB4 2QW, Tel. (0223) 425440, FAX (0223) 424711, for the loan of the CO-1305 which they can supply for £185 plus £5 carriage. PW

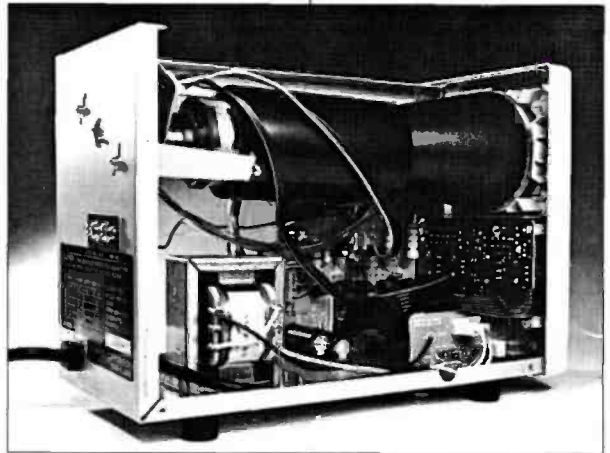


Fig. 1: The neat and uncluttered interior of the CO-1305 oscilloscope.

## Manufacturer's Specifications

Vertical deflection sensitivity	Approx. 10mV/div
Frequency response d.c.	To 5MHz or more (-3dB)
Frequency response a.c.	2Hz to 5MHz or more (-3dB)
Input resistance	1MΩ ±2%
Input capacitance	50pF or less
Attenuator	1, 1/10, 1/100 and ground. (Step by step error 5% or less)
Gain control	Step-less control over 22dB range
Max. input	600V peak-to-peak
Horizontal deflection sensitivity	300mV/div or more
Freq. Response	d.c. to 250kHz (with ext. gain at max)
	d.c. to approx. 30kHz (with ext. gain set at halfway point)
Input resistance	1MΩ(±20%)
Input capacitance	40pF or less (provided SYNC control is set to INT)
Attenuator	Step-less attenuation to 0 (ext. GAIN)
Max. input voltage	100V peak-to-peak

# Setting U



*As we have a workshop theme to this month's magazine, who else could we ask to write a special article than PW's old friend the Rev. George Dobbs G3RJV? George is probably the UK's most well known 'home-brewer' and he's offering some sound advice on setting up your workshop, starting off with a quote as usual!*

**The Rev. George Dobbs G3RJV busy in his workshop.**

*"An art can only be learned in the workshop..."*  
**Samuel Butler 1835-1902**

**W**e radio amateurs are a perverse lot! What can be more odd than wanting to run a radio station from a private house?

The situation is usually never ideal. There's never enough time, money or space and the garden is always too small!

Amateur radio is not a pursuit for the faint-hearted. The happiest radio amateurs are those who achieve results, however meagre, in spite of the situation.

Our hobby is a real 'in spite of' pastime. The true amateur revels in adversity. The achievement is enhanced by the challenge.

The implied challenge is equally true in the amateur radio workshop. Few of us have dedicated workshops and we can manage without one.

Most enthusiasts cannot afford a vast array of tools. But only a few simple tools are required.

Few people are trained in workshop techniques. However, we learn as we go on. Not many enthusiasts have an extensive collection of test equipment, but very simple equipment can be used.

The workshop is where the radio amateur learns his art. I have never received any formal training in radio or electronics in my life. Instead, I've learned my craft while working with a soldering iron and a few pieces of test equipment.

But setting up a workshop can be a very modest enterprise. Some of my most enjoyable radio construction was done when I was a student, living in a cell-like room with a bed, one chair, a small wardrobe and a desk.

So if you really want to be in the 'front line' of the hobby, set up a workshop. Don't be wary. You have nothing to fear, but fear itself....and the odd solder lash on the carpet!

## Finding The Space

For the radio amateur, the ideal situation is the dedicated workbench in a room set aside for the purpose. Unfortunately, few of us can enjoy that luxury. A small workshop bench about 600mm by 1.2m or so offers plenty of space for all the jobs a radio amateur is likely to undertake.

In fact, the amount of space I've suggested would be a luxury for me. My equipment (and junk!) has encircled my working area. Nowadays I do all my construction and testing in a space of approximately 600mm by 1m.

I feel fortunate to have dedicated space in St. Aidan's vicarage. Small house or flat dwellers rarely have space for a workshop, but any available table space can be

commandeered, temporarily (with appropriate protection against sharp tools and hot soldering irons).

## Modest Workbench

My modest 'workbench' during my student days was a large old wooden tea tray. I bought this at a jumble sale and stored it under the bed when not in use.

The radio components were stored in manila envelopes 'filed' in shoe boxes. My tools were all housed in a plastics cutlery tray bought at the same jumble sale.

If a domestic table, or portion of a table, is being used as the work surface, it can be a good idea to make a purpose built worktop. A suitable design was described by Vic Flowers G8QM in his 'A Table Top Project Bench' article in the December 1992 *PW*.

I made my original from piece or hardboard or plywood. And suitable size makes a good base, but this will be counter-productive if the 'table protector' scratches the table! So, add some felt or rubber feet to the underside of the piece of wood.

Edging the base board, to form a tray, is important. Without a retaining edge, small components always fall off and disappear into the carpet or under the table.

The ingenious constructor will perhaps add some compartments to keep tools or other small parts in place. A good sturdy soldering iron stand is also essential and it's not a bad idea to fasten it to the base in a corner away from the 'person side' of the surface.

Soldering is generally a safe process, but it can certainly incur the risk of your spouse or the home owner's wrath. I also suggest the use of a piece of plastics carpet protector underneath the working area of a soldering iron.

The simple, and transportable 'workshops' I've mentioned are suited for construction and testing, but are often not suitable for metal fabrication. With my existing set up, I do all the metal working in a corner of my cellar.

It's very common to do the heavy and dirty work in a garage or garden shed. Sawing, drilling, filing and certainly etching printed circuit boards are best done away from the main living quarters of a house. It may be inconvenient - but safeguarding domestic harmony often is!

## Words Of Warning

A few words of warning about restricted space workshops and soldering. The soldering process forms an important part of any radio amateur workshop practice, unfortunately modern solder generates fumes which can be an irritant.



# Up Your Workshop

The fumes produced during soldering may be produced by the flux in some rosin cored solders, and some enamels on insulated wires. So, it's best to work in a well ventilated space or add ventilation.

In an enclosed space, an extractor fan can be useful. I have an old axial fan used for cooling equipment, which I bought cheaply at a radio rally. This is tucked away on the corner of my bench and gently draws air across the working area.

Another safety consideration is that of eye protection. Splashes of solder in the eye can be painful as I know from experience!

Certain metal working procedures, especially when using a soft metal like aluminium, can also endanger the eyes. I've already got eye protection, because the ravages of old age force me to wear reading spectacles to perform any close-up work.

But, if you're one of those lucky people who retain the eagle eyes of your youth, I advise to consider buying a pair of safety glasses. These inexpensive plain plastics lens safety spectacles are available from many hardware and DIY shops.

## Small Components

Another problem for constructors is that many modern projects use small components with diminutive markings. Even those with keen eyesight have difficulties in reading, or even seeing the diminutive components.

Fortunately, a wide range of magnification aids are sold for inspection of small components or circuit boards. Some of these use large lenses often mounted on stands or part of 'helping hands' clamps, or in the form of visors worn over the head.

The only common factor with magnification aids seems to be that they get in the way! My answer, even before I had to resort to spectacles as a matter of course, was to buy a pair of the inexpensive 'off the shelf' half-lens reading spectacles.

When you're buying your half-lens spectacles, it's best to take a few hard-to-read parts or circuit boards into the shop to help choose a suitable magnification. You only have to add a string to the side-arms (to wear them around the neck) so they can be used when required.

## Specialist Tools

Thankfully, very few specialist tools are required for the amateur radio workbench. Many may already be a part of the domestic tool collection, and most of the required tools are readily available in DIY chain stores.

I'm also going to add the usual sensible advice about tool buying! I urge you to get the best quality tools that can be afforded. Good quality tools, when well cared for, should outlive the user.

The minimum tool requirements are very modest. To compile a list of the basic tools required, I took a look at my workbench to see which of my tools were on the bench and which were in the tool tray under the bench.

In theory, all my tools should have been packed neatly in the tool tray. But my personal working habits are another matter!

The items I appear to use frequently, are a small pair of pointed pliers and a small pair of wire cutters. I also use a few small screwdrivers, a small adjustable spanner and a pocket knife.

Also in my collection there's my soldering, and desoldering equipment. This is hardly surprising, for most of the work on the amateur radio bench involves the

cutting, manipulating and soldering of wire.

Just under my bench I keep several small reels of various colours of pvc covered wire. Personally I always use multi-strand, flexible wire.

In the past, I've found that the single strand variety of wire has broken too often on my projects. The wire I use is pvc covered (7/0.2) 'hook-up' wire as sold by most of the electronics mail order houses.

I keep a small reel of each, in red and black, of (16/0.2) hook-up wire for power connections. There's also a reel of 22s.w.g. tinned copper wire and a motley collection of screened cable, coaxial cable and mains cable.

Amongst my component and parts storage there are several reels of the more common gauges of enamelled copper wire. I use them for winding inductors.

## Pliers And Cutters

When working with wire, most of my work is done with only the pointed pliers and wire cutters (side cutters). And, I must say that a really good pair of pointed pliers is a joy to find.

The pliers I use are sometimes called 'snipe-nosed pliers' or even 'radio pliers'. They only need to be some 110 to 140mm long. But, please inspect them carefully before parting with any money.

The plier's action should be smooth, ideally with a lap joint, and the jaws should meet correctly at the tip. Remember these tools are for bending and holding the wire and not for tightening up nuts!

Several types of tool are available for wire cutting. My favourites are miniature side cutters. Again look for a tool with a smooth closing action and teeth that align accurately.

There are specialised tools which are designed for wire stripping. I've several examples, but in practice I rarely use them.

When stripping wire, my favoured option is the 'nick and pull' method of removing the insulation from the end of wires using side cutters. My method requires a little care and practice, but it's more convenient than most of the sophisticated wire stripping tools.

## Impressive Screwdrivers

Most radio amateurs seem to have an impressive array of screwdrivers, and they really do seem to build up as the years progress. Although, in practice only a few are needed.

The starting point for the tool box would be medium and small flat bladed screwdrivers and medium and small cross headed screwdrivers. Look for screwdrivers with sharp blades, and only buy good quality cross-headed screwdrivers. Bad cross-headed types can chew away at the smallest of screws or bolts.

I also keep one or two trimming tools for inductor cores, and I prefer the sort with the plastics handle and thin phosphor bronze blades. Normal screwdrivers often crack inductor cores, so trimmer tools are not a luxury. I buy them in pairs because they are very easy to mislay!

The workshop will also require the use of spanners. These days you're likely to run into metric and BA sizes in radio equipment and occasionally nuts from the Far East, which appear to be neither.

In my tool collection I have a selection of BA and metric, box and open-ended spanners. But my most commonly used tools for nuts is a 150mm miniature adjustable spanner.

The adjustable spanner has jaws which can open to

*"Thankfully, very few specialist tools are required for the amateur radio workbench"*

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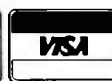
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about 19mm. It can cope with most sizes and is ideal for potentiometer and other control panel fixing nuts. I also have an even smaller adjustable spanner, but these are not so easy to obtain.

Another item which always lives on my bench is a small pocket knife. I use this to scrape wires and terminals, cut around wire sleeving and clean out my pipe! (*I hope he runs the ventilation when he's smoking it!* Editor)

## Your Soldering Iron

A parting greeting that I once used to exchange with an old radio amateur friend was "Keep your soldering iron warm"! Soldering is the most common operation in the amateur workshop.

For any kind of success in amateur radio construction or servicing, the ability to make a good solder joint is essential. Unfortunately, space does not allow me to go fully into the techniques of soldering.

If you are doubtful about your ability when soldering, then read one of the many texts of instruction on making a good solder connection, and practice. Remember that even very modest electronic construction projects may require more than a hundred solder connections, and one bad joint can ruin the whole thing!

Soldering like most other practical pursuits, requires good equipment for successful results. Buy a decent soldering iron and this means one with a known (branded) name.

The most popular amateur radio soldering irons appear to be made by Antex. The range includes their C240 (15W), CS240 (17W) or XS240 (25W) irons.

All the Antex irons are suitable for general workshop use. The CS range is designed with almost zero leakage for soldering static sensitive devices.

My firm favourites are the Weller range of TCP Soldering Irons. These are 45W, 24V temperature controlled irons which require a PS Power Unit. The temperature is controlled by the type of tip used.

I normally use the Weller PA-AA7 tip for all general electronic work. They are expensive systems, but the owner can expect years of use from the power unit and the iron.

The Weller soldering iron tips, which are made from pure copper coated with iron, also have a long life. They're especially useful for people like me who leave soldering irons switched on for long periods. I think they're the 'Rolls Royce' of soldering irons!

A good soldering iron also requires a decent soldering iron stand. This is particularly important for workshop safety.

The coil spring stands with a heavy base are the best. If the base is lightweight, fasten it down to the working surface.



Most soldering iron stands also include a sponge holder for cleaning the tip. This is an important part of soldering. I frequently wipe solder across the hot tip (tinning the tip) and wipe off the excess solder on the sponge.

The cleaning sponge must be kept wet. In my workshop, I keep a small squeeze bottle of water to keep the soldering sponge damp.

To ensure good results, always use a good quality solder. I usually buy a large reel of Multicore Ersin 22s.w.g. 60/40 tin/lead solder with a core of resin flux. The large reels are expensive but they last a long time, even in my workshop!

There are other makes of suitable solder but avoid cheap products. Some have a high acid content and help neither the iron tips or the long term life of the solder joints.

Desoldering connections to remove parts from a circuit board is a common workshop process. This is usually done by melting the solder on the joint with a soldering iron and removing the melted solder with a spring loaded solder sucker.

Again, it's worth spending a little more on a reliable solder sucker. This is because it can often be difficult to get replacement tips for the unknown makes.

I also have a rubber bulb type solder sucker for the more delicate desoldering operations. Other constructors like to use absorbent solder wick material. These are in the form of a copper braid strip that acts like blotting paper, but I rarely seem to succeed with this material

## Chassis Bashing

In the 'old days', we used to call metal working 'chassis bashing' and my version of it still is! Because I am not a skilled nor elegant sheet metal worker, like many other I tend to use ready built cases and boxes and only add holes and cut-outs appropriate to my needs.

I will not deal with materials and tools for making cases, anyone who feels capable of doing this probably has all the equipment now. However, anyone interested in making their own equipment housing will find the two-part article 'Boxing It Up' by Stephen Harding G4JGS (December 1992, January 1993 PW) very helpful.

For the type of metal working that most radio amateurs carry out, only a few basic tools are required. These may be the sort of tools that most car owners would have on their garage workbench.

Quite a lot of my metal working is carried out on a Black and Decker Workmate, and the 400 and 600 models are both suitable. The Workmate is a combined clamp and bench which also works very well for holding and bending thin aluminium sheets.

When you're drilling metal, it's much easier with a pillar drill or bench press drill, but I've only had one for a relatively short time. Before that I used a normal domestic electric hand drill.

Working with a soft metal like aluminium (the common material for amateur radio boxes and cases) it's important to punch the hole first with a centre punch to locate the drill bit correctly.

Two more important tools I use a lot when metal working are a reamer and a 'nibbler'. Soft metals rarely seem to drill into a nice circular hole. I always drill an undersized hole and then ream it up to full size.

For odd shaped cut-outs or large holes a nibbler is useful. These are tools which fit into a drilled hole and, by squeezing a handle, bite or nibble out pieces of metal.

With a little patience, a steady hand and a tidy up with a file, quite complex cut-out shapes can be made in sheet metal. If larger circular holes are needed, these can be cut with a chassis punch set.

Chassis punch sets are relatively expensive. But if you're making round holes in sheet metal, chassis punches are an easy way to make a neat job.

The other metal working tools I use are very common



**Fig. 1: A temperature controlled soldering station, although initially relatively expensive is recommended by G3RJV.**

**Fig. 2: George Dobbs G3RJV suggests that when buying a test meter, that an analogue moving coil multimeter be your first purchase (see text).**



**Fig. 3: Digital display multimeters come into their own for very precise measurement and G3RJV says there is room on your bench for both analogue and digital types of instrument.**

items. A standard hacksaw, with a good supply of spare blades, is used for cutting metal, printed circuit board material and shortening shafts on controls. I also use a 'Junior' hacksaw.

A collection of files is also useful but I suspect I could get away with only two. These include a medium cut flat and medium cut round. I also have a wallet of inexpensive needle files.

The rest of my tool collection includes spanners, sockets, Allen keys, hammers, etc. These are all part of the domestic tool kit.

### Test Equipment

We all like to impress our friends and neighbours with the technical nature of the hobby! But an amateur radio workshop can achieve quite a lot with a minimum of test equipment.

I must admit that my array of test equipment may look quite impressive. But very few of the items were bought as new.

Fortunately, amateur radio rallies are wonderful sources of bargain test equipment. Forget about looking around the shelves for bargains in transceivers and station equipment. Start looking for items of useful test equipment instead!

Don't worry too much when looking for test equipment, if you're not sure what to buy, or which items represent good value. Take someone with you who does know about test equipment, that's what friends are for!

In the past, I've seen some real bargains in test equipment hanging around on the shelves of rally Bring & Buy stalls until the end. Meanwhile, other people have been fighting to buy over-priced second-hand 144 and 430MHz hand-held transceivers in the first half hour!

The definitive item of test equipment is the multimeter (a volts/ohms/milliampere instrument). The basic test bench multimeter should be an analogue instrument, that is one with a needle pointer scale (not a digital display instrument).

I recommend the analogue type of multimeter because in our sort of work we rarely need to take finite and accurate measurements. We usually want to know if the voltage, current or resistance is about right.

We often want to measure changes, dips and rises. And an analogue meter is the way to do this. But be aware that the internal resistance of cheaper multimeters can interfere with the accuracy of the readings.

Choose a meter with a reasonably high 'Ohms Per Volt' rating. This should be 20k $\Omega$  or better and there are many such instruments for sale at reasonable prices.

A digital multimeter looks more exciting, but this should only be bought after an analogue instrument has been obtained. It's also a good idea to look for extra features in a digital meter.

Many digital display multimeters have built in transistor testers. Some even have inductance and capacitance ranges, making them good general purpose instruments.

### Essential Item

An essential item of test equipment on my bench is a diode probe to use with the multimeter. This is so simple that mine are all home-made from a couple of diodes and a couple of capacitors.

My earlier series in *PW*, 'Getting Started the Practical Way' (page 32, 33 August 1991 and pages 60, 61 of November 1991 *PW* describe a further development of the idea), describes how to build a simple peak reading diode probe. It's a useful device, and I use mine for checking r.f. levels around circuit boards.

A similar circuit attached to a load resistor and a calibrated meter makes a useful r.f. wattmeter. A multimeter and diode probe can do most of the jobs for the average amateur radio constructor.

One not-to-be-forgotten item of test equipment probably already exists in your amateur radio station. It's actually in a receiver, especially a general coverage receiver.

Your receiver can be used for locating and checking oscillators, transmitters and other signals. I have even tapped off the signal from a receiver's local oscillator to use it as a signal source. If you try this do not forget to add or subtract the receivers i.f. frequency.

However, a more commonly used signal source would be a signal generator. These are often available as cheap rally buys.

Some constructors buy a dip meter first. They use them not only for their intended job of checking the frequency of tuned circuits, but also as a signal source. I described a home-built dip meter in the 'Getting Started the Practical Way' series (pages 33 to 37, April 1992 *PW*).

### Frequency Counter

Perhaps the next expensive item I would buy would be a digital frequency counter. This can also double up to read the frequency of a simple home-made dip meter, in which case it need not have a calibrated scale.

An oscilloscope always looks good on the test bench. Despite this, a lot of the 'scopes I see around in amateur radio shacks are audio oscilloscopes which have very limited value in our type of work.

A 'scope should be capable of 'seeing' several tens of MHz for amateur radio work. This sort of range is useful if you can afford one or find a good bargain.

The list of test equipment can go on, and depends upon your need and pocket. Very useful work can be done with the absolute minimum. Begin with the essentials, learn how to use the simple instruments well and then progress as skill and finances allow.

### Components And Parts

Any good amateur radio workshop ought to keep a stock of basic components and parts. These would include all the common values of resistors and capacitors.

The starter packs sold by a number of mail order houses are ideal for this purpose. The component packs sold by Marco Trading are a useful source for anyone starting a workshop stock.

I also keep a stock of the more common transistors and integrated circuits plus some hardware. What your basic stock should be, is quickly learned by experience.

Whenever I see component bargains I buy them and add them to my stock. This is because when I do need them, they're bound to be expensive!

### Storage Problem

Storage can be a problem for anyone with limited space. Although I have some of the small plastics storage drawers, most of my storage is in crude (but cheap) containers.

My resistors and capacitors are sorted according to value into Woolworths small manila envelopes. These are then filed into shoe boxes.

The values are written on each envelope. The larger items are stored in square 1 litre ice cream tubs or margarine tubs.

It's best to choose square containers, if possible of the same sort or size, as these stack better to save space. I can do most of my construction or servicing out of two shoes boxes and about half a dozen ice-cream tubs of parts.

The tubs in turn fit into a larger plastics box of the stackable tidy box type. Although I don't have to (I ought to) put them away each time, it would be simple to pack them out of the way if I was working on a kitchen or domestic table.

In summing up, my message is: don't be daunted. I would be very surprised and disappointed if anyone reading this could not set up some kind of amateur radio workshop capable of producing reasonable results. Begin planning now - it's really the only way to learn the art!

PW

*"Keep your soldering iron warm."*

G3RJV



**Fig. 4: A dip meter, whether valved or transistorised, can be useful in many ways in an amateur radio workshop. Many operators even use them as simple signal generators.**



# The £5 Desk Microphone

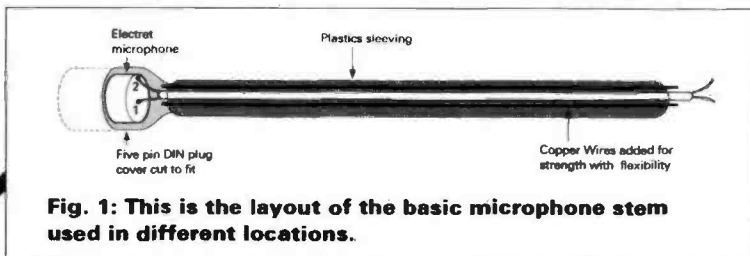
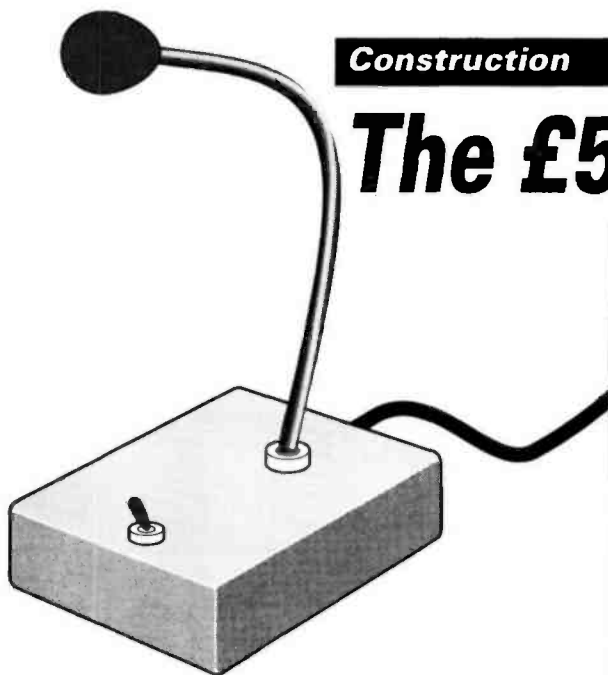


Fig. 1: This is the layout of the basic microphone stem used in different locations.

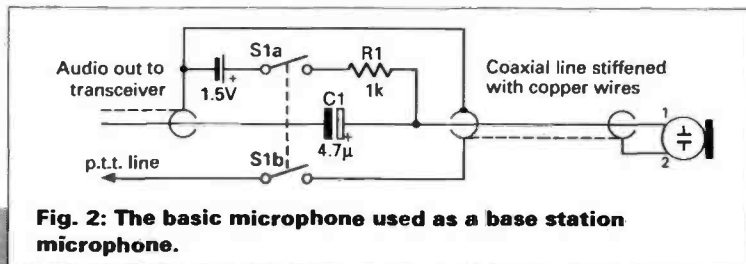


Fig. 2: The basic microphone used as a base station microphone.

*A desk or mobile microphone for under a fiver may seem impossible, but Ken Fisher GOLKX shows you how.*

Making a desk, or mobile, microphone for less than £5 can be done, even buying all the bits. Many of you will already have some, or even all, of the bits in the junk box.

So let's begin. Cut the plastics shroud of a DIN plug as shown at Fig. 1. Dip one end of the 6mm plastics sleeving in hot water for a few minutes to soften it.

The sleeving can be pushed over the cable entry of the plug body. You can use about 250mm of sleeving for the desk microphone version, or about 350-400mm for the mobile version.

Stiff copper wire, put onto the sleeving along with the microphone coaxial cable, supplies the necessary stiffness. I used some single strand copper wire, stripped from flat wiring cable, for this purpose. I found that four or five strands held the boom nicely in shape.

For the base microphone version, I used a tobacco tin for the base. Taking the wires through a hole drilled in the lid, I spread the copper wires out, and soldered them in place. If you use a plastics box for the base, then an epoxy glue works just as well.

When soldering the microphone insert to the cable, check that polarity is correct and don't hang about with the iron, they don't like being cooked.

Make up the board as in Fig. 2, and assemble in the box of your choice. Try to avoid buying boxes if possible as they push up the cost of simple projects such as this and tobacco tins are free.

## Mobile Version

For the mobile version, use enough coaxial cable to run neatly from the mounted microphone to the gear stick. Then fix the control box in position on the gear lever with two small clips. I clamped the copper wires under one of the sun visor fixing screws and led the boom over the visor then down to a comfortable position.

As these microphone inserts are quite sensitive, there's need to 'eat the microphone', so the positioning of the microphone is not that important. All that then remains to do is to ascertain the connections to your set, put on a plug and that's it.

So there's no excuse for using a fist microphone now! **PW**

### Shopping List

- Resistor 5% 0.4W
- 1k $\Omega$  1 R1
- Capacitor electrolytic 10V working
- 4.7 $\mu$ F 1 C1

### Miscellaneous

Electret microphone insert (Maplin FS43W), an AA battery holder a length of 6mm plastics sleeving, audio coaxial cable, one d.p.d.t. switch, the body moulding from a DIN plug, a small piece of perfboard or Veroboard, and a plug to suit your transceiver.

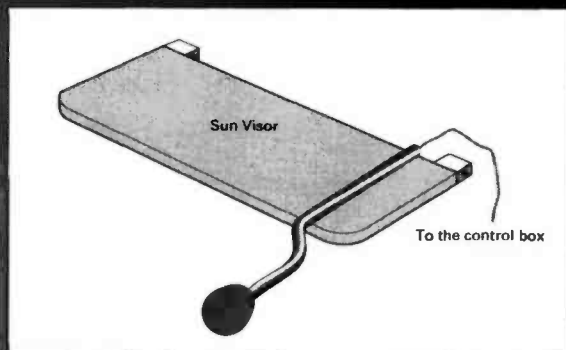


Fig. 3: Here it is used as a visor-mounted microphone. The control box is shown in Fig. 4.

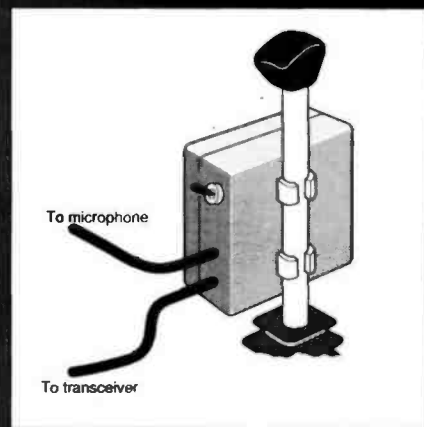


Fig. 4: One suitable mounting position for the control box is on the gear lever stem.

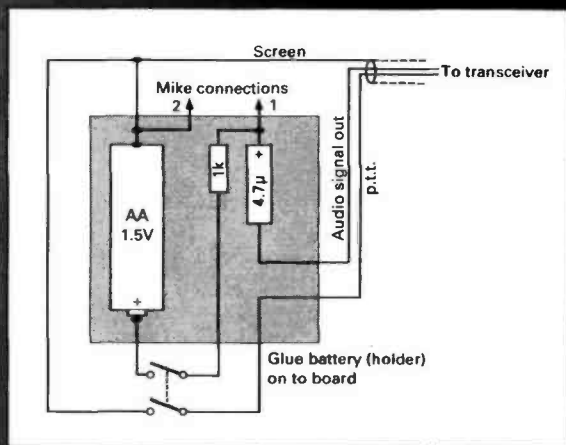


Fig. 5: The circuit diagram and one possible layout for the control box.

*Finding a way of holding NiCad cells for charging didn't worry Edgar Powell GWITDW. He just got to work with his handsaw and made a battery box.*

Like many people I've purchased some individual NiCad cells, mainly for toys and hand torches, to reduce the overall cost of battery powering items. Having constructed a constant current charger for the 'C' and 'D' type NiCad cells, I reached the stage of wondering how and what to house the cells to charge them.

I wonder how many constructors have come up against the battery housing problem. I suppose most people just connect the cells individually with crocodile clips and bits of wire, or go to the added expense of buying a combined charging unit and cell holder. These methods are a lot more expensive than making a battery holder. There are also many plastics cell holders available, but they are normally suitable for no more than four cells.

With minimum expense in mind, I came up with the idea presented here. I don't think you need to be a carpenter to knock these up. Just some straight (?) gentle work with a saw (almost any fine cut saw will do the job). The only other items you will need, are a keen eye, steady hand (personal attributes), a few panel pins, a small hammer, a rule and a pencil and pieces of sheet metal to make the spring contacts.

Whichever cell unit you have decided to build, the method of construction is to start by cutting the two side members first. Make them somewhat longer than the dimensions given in the drawings to allow for discrepancies in spacer thickness (and the end pieces).

Cut one end piece (spacer), pin and glue this to

both side pieces on one end, now cut the required number of spacers and start to space and pin each one from each other as to the dimensions on the drawings, or to suit your NiCad cell diameters and lengths.

Cut the hardboard base to size, and drill the ejector holes then pin this to the bottom of the unit. Finish off the woodwork by cutting off the protruding surplus wood from the end pieces and sand paper if necessary.

From the metal sheet, make and pin the tin contacts to the appropriate positions. The metal should ideally be of a springy nature, to make better contact with the bases of the batteries.

The bolts, or screws, making up the positive contacts, may be of almost any size or type. They need only be long enough to pass through the wooden sides and leave sufficient length to take a nut and solder washer.

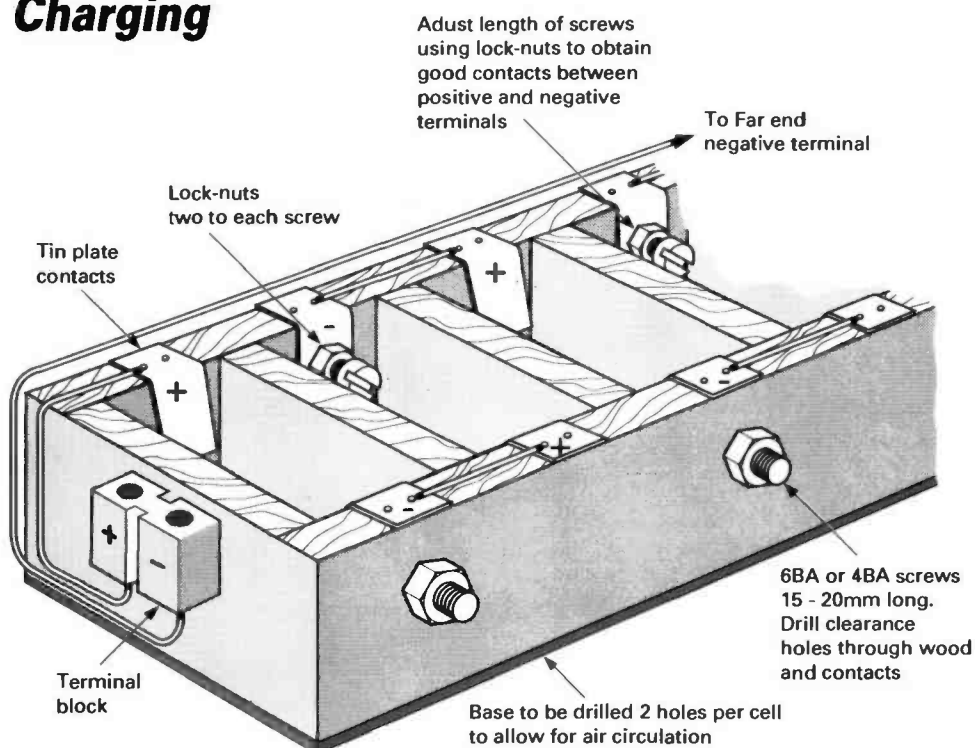
Finally, fit on to one end of the end spacers an electrical connecting block and wire it up as to the drawing, run a pair of red and black flexible wires from this to the charger. Place the appropriate cells, all of the same capacity, into the unit (the correct polarity around), and you are now ready to begin charging.

(The wood for the units can be obtained from DIY shops, etc., and is normally called door-stop about two metre lengths).

PW

# NiCad Battery Box

## Hold Those Batteries In Place When Charging



### Further Reading

'NiCad Recycler' May/June 1990 PW.

Peter Lovelock shows you how to build a NiCad cell recharger that can regenerate your rechargeable batteries, by repetitively deep discharging them before a complete recharge.

'Regulated Discharge, the key to improved health' February 1991 PW.

Niel Starkie describes an add-on constant current discharge unit for the PW NiCad Recycler unit.

'Low Cost NiCad Tester' February 1991 PW.

Alistair Downes gives you a circuit for a NiCad cell capacity tester. Now you can find out just how much power is available from NiCads.

**Fig. 1: A little work with simple hand tools is all that is needed to produce the NiCad cell holder.**



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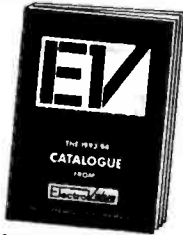
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# New Transformers From Old

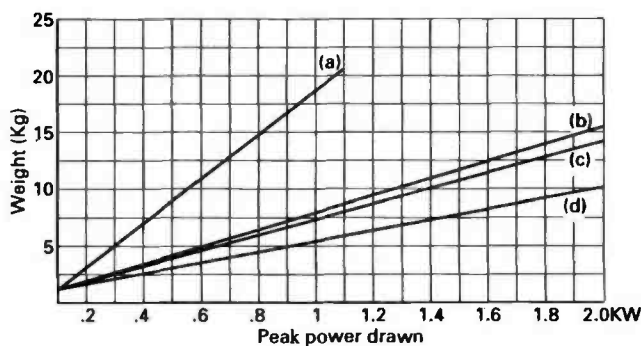
*Paul Essery GW3KFE discusses some ideas and suggestions on how you can rewind transformers for your own purposes.*

My aim in this article is to discuss, in as simple terms as possible, the rewinding of transformers. They can be from the junk-box or ones that have 'cooked', in order to make something different. But, please note that I'm not covering the design of the switched-mode type of power supply.

Obviously, I will be to some extent improvising. But this does not imply that I'll be suggesting you make a transformer to such close limits of size that a slight change in input frequency will be enough to wreck it.

What I mean to do is to create a situation where you can pick up a transformer and visualise whether it can be turned into what you want or not. Assuming you have access to a supply of the chosen wire to rewind it.

For a start, it's necessary to realise that for a given external circuit, a fair estimate of what the transformer can do is given by its weight. Also it's possible to imagine four different basic possibilities for the load.



**Fig. 1:** This curve relates the weight of a bare transformer (i.e. weight of core iron plus bobbin plus wire) to the power available from it. Curve A is for continuous service, curve B covers use on c.w. Curve C is a fairly conservative rating for s.s.b. use, and D covers the extreme case of s.s.b. with longer pauses for reception. If the transformer carries continuous loads in addition, some interpolation from curves B, C, or D may be needed. If there is any doubt, GW3KFE says that it is better to use curve A.

## Toughest Load

The toughest case for a transformer is where the load must be assumed to be continuous. Secondly, it's possible to imagine the transformer in the p.s.u. of a c.w. transmitter, where it can, as it were, rest during key-up and listening times.

Obviously, in the case of the c.w. transmitter, the transformer can be persuaded to give more power during key-down periods. This can be more than would be acceptable for a continuous service rated unit.

Thirdly, it's possible to imagine the transformer in use for a s.s.b. transmitter, where again the transformer is rested. In this case, there's a little more power out of the transformer.

And finally, there's the third case again. But in this application the transformer is pushed to the absolute limit for safety.

Other modes of interest will tend to fall between the areas I've mentioned. Below a weight of about 5 or 6lbs (2.7kg approx), this concept fails, because other problems, such as the d.c. resistance of the wire used, begin to enter the argument.

## Transformer Power

A transformer weighing around 5lb should manage about 100W of power output. For a rough example, that would be 12V at 8A continuous.

At the top end it's possible to go to an extreme. You

can envisage a transformer weighing 45lb (20.4kg) providing 1kW of output working in continuous service.

For c.w. service it's possible to 'ask' a 30lb (13.6kg) transformer to provide 1.5kW. In the case of an s.s.b. transmitter you could aim for 1.9kW from the 30lb unit.

By pushing the s.s.b. 'luck' to the limit it might even be possible to get 2kW from 25lb (9kg) transformer. However, below a 5lb weight, the continuous ratings must be adhered to. This situation is summed up graphically in Fig. 1.

When assessing the weight, I'm talking about the transformer proper. If the transformer is in a metal case and has mounting fixtures, deduct an allowance for the weight.

## Consideration To Design

Now it's time to give some consideration to the design of the 'new' transformer. There are two possible approaches.

The first approach involves noting how many turns there are on a winding of given voltage. From this, you can derive a figure for the number of turns per volt.

If the transformer has a heater winding, clearly this is the way to go. For example, eight turns per volt and a 5V winding mean forty turns, so you aren't too likely to lose count as you unwind.

Anyway, if you do lose count of the turns don't despair. You can measure the end to end length of the wire taken off. Then measure the length of one turn with a bit of string, and get back to the figure even if you are a bit absent-minded!

The alternative way is to tackle a full-blown design, but making some assumptions since you don't have all the information needed. But, more of this approach later.

## Simple Matter

It used to be a simple matter of getting a set of standard wire gauge wire tables. Unfortunately, they changed the design units from CGS to MKS to metric, and then metricate the wire sizes.

You may only have a set of standard wire gauge tables (s.w.g.) tables from some aged reference book...so what are you to do? Firstly, keep your cool and look in a set of metric and s.w.g. drill size charts for some comparisons of dimensional size. You can even go to the trouble of turning s.w.g. sizes into metric dimensions.

At the same time, check what wire sizes you can lay hands upon in enamelled copper winding wire. For your purposes it doesn't matter if your transformer's windings are a combination of mixed metric and s.w.g. wire, particularly if by this means the wire has come cheaper!

If planning your design around what you've got means you spend an extra evening on the design, but doing so saves you buying any wire at all, you can be even happier! This is the key to the approach.

## The Efficiency

Let's now consider the efficiency of the transformer. For example a 100W output transformer will probably be 90% efficient, a 50W only 75%. But once above 500W the efficiency may be expected to rise to 95%.

Now, you can turn your thoughts to the ways and means. The normally accepted figure of current, of 1000



'circular' millimetres per ampere for continuous service can be taken as high as 1500 circular millimetres for intermittent service. (Yes, I know they're really 'square' millimetres, but in this context it's best to think of them as circular).

The wire tables suggest how many turns you can get into unit winding space. However, on the other hand, professional designers have the advantage of coil-winding lathes to pack the maximum number of turns into the available space. Additionally, there's also the need to have a thin layer of paper insulation between each layer.

If you assume the need for 50% more winding area, that will cater fairly well for an acceptable degree of hand-winding clumsiness plus the interleaving. But do not go for thicker interleaving, because the thicker paper merely keeps heat in better!

Do not think about using masking tape for interleaving, either, as it seems to harden under heat. Watch out too for Sellotape. This is because the normal household grade, when used in transformers seems to deteriorate with time and to attack wire enamel.

## Stripped Transformer

Assuming you have already stripped your transformer, and established the turns per volt, you can lay the wire aside. Coil it up carefully on a drum to avoid chipping the enamel.

Next, lay the E and I shaped laminations carefully to one side. Notice as you do so, that one side of each lamination is coated and one is not. This is to insulate each lamination from its neighbour, to reduce eddy currents and the resulting losses.

Investigate the former on which the wire was wound. Is it fit for re-use?

Repairing the former is practical if you remember what it does. It holds the wire in place, so if the sides of the former bulge while winding, you'll not be able to get the transformer back together. It's also long odds that somewhere the end turn in a layer has slipped sideways and dropped one or more layers down.

A turn that has moved or dropped means either the wire vibrating and breaking. It could also short to another turn when the vibration rubs the insulation away.

A shorted turn means a rapid build-up of heat due to the current circulating in the shorted turn, even if the transformer is off load. The moral is: have a decent bobbin whether by repair, manufacture or purchase!

Actually, before now I've used new cheek pieces of s.r.b.f. or s.r.b.p. These were stuck into place with Araldite epoxy resin adhesive to make completely new cheeks or even a complete bobbin given some care in operation

However, you have to compromise when working on the former. Beef up the bobbin too much, and you'll lose valuable space in the winding area.

When professional transformer rewinding companies do the job, they may elect to have no sides at all to the bobbin. If so, they would measure the winding area defined by the space available when the laminations are correctly assembled.

Of course, the mandrel used for the winding would be provided with sides so it would not slip during the actual winding process. If the bobbin your winding has sides, the winding area will be enclosed by the bobbin. Either way, you must measure and record.

## Turns Per Volt

Now it's maths time. Given the turns per volt it's possible to define the number of turns for each secondary winding.

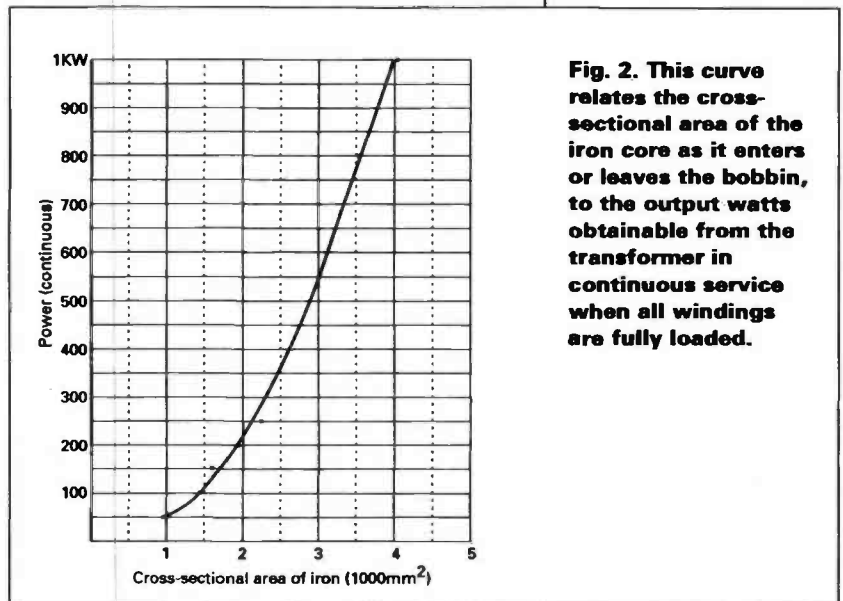
If the current drawn by the winding is known, it's possible to define, using the wire tables, the desired wire gauge to carry that current, using the figure of 1000 'circular' millimetres per ampere or 1500 circular millimetres/ampere as appropriate.

**Warning!** Do not use the current figures used by Practical Wireless, December 1993

electricians. This is because they are based on some assumptions about cooling which don't apply in the applications I'm covering.

Don't forget also, that if there are long wiring runs and/or heavy current, you may need a suitably higher voltage at the transformer terminals. Now your calculator comes into play.

If you know how many turns of wire of a certain size



**Fig. 2. This curve relates the cross-sectional area of the iron core as it enters or leaves the bobbin, to the output watts obtainable from the transformer in continuous service when all windings are fully loaded.**

you require, you know how much area your winding takes. Repeat this process for each other secondary, and then for the primary. Don't forget to allow some extra turns for tapping, say 220, 230, 240 and 250V.

When you've finished, add up the various areas so found. Make the allowance for hand winding and paper interleaving mentioned above, and you have the winding area you require. Then compare it with the winding area you have already measured.

As always, Sod's Law can now step in. If you are lucky, the winding will fit. If on the other hand the calculator says you can't quite get your windings into the space you have available, there are numerous possible ways of tackling the problem.

**1:** Have you made too much allowance for hand winding and interleaving paper - after all you might be a dab hand at it!

**2:** Can you compromise a bit on wire gauges? Maybe a particular winding is only drawn upon intermittently?

**3:** Could you win a bit of extra space by scrapping the side cheeks or thinning them down?

**4:** Finally, the worst case, it won't fit, and you need a bigger winding area.

Think carefully on everything I've mentioned. There are all sorts of possibilities. For example, if you have one continuously loaded winding could you move that to a separate transformer. Perhaps you could then reduce wire sizes for the other windings which are intermittently used?

Normally it's possible to assume the primary is running continuously. But what happens if the transformer secondaries all tend to draw at different moments of time, perhaps the primary wire gauge could be reduced?

Nine times out of ten or even more, there are ways and means of solving the problem. So sit down and have another think!

## Transformer Design Formula

Back in the days of CGS units, the transformer design for a continuous rating started from a formula:

$$E = (4 \times F \times f \times T \times Z) / 1000000,$$

This is where F is the form factor (1.11 for sine-wave), f is the frequency in Hz, T is the number of turns in the winding being considered, and Z is the total magnetic flux

***“It’s when you start to aim at minimum size transformers that skill in juggling is needed”***

through the core.

All you modern technicians won’t have too much difficulty in relating this to current ISO units. (good mental exercise!). Incidentally, Z is used instead of the Greek letter because it doesn’t appear on my wordprocessor!

Still considering continuously rated transformers, as I go into things a bit more, it’s possible to simplify matters. This is because the cross-sectional area of the core (where it goes through the centre of the bobbin) in square inches, times the turns-per-volt equals eight. This figure applies to every winding on the transformer.

You can also observe how the cross sectional area of the core required varies as the watts input to the transformer, as in Fig. 2. This figure shows some scattering of data, which arises because I tried some existing transformers, to generate the data for the graph.

## Summing Up

Now I can begin summing up. Let’s start by picking up an old transformer, and guess from its weight how many watts it’s possible to pull out of it by reference to Fig. 1.

From further inspection/measurement of the sample transformer and comparison with Fig. 2, you’ll be able to see the cross-sectional area. This should give a broadly similar answer to your guess of the weight if you compare the continuous service figure in both cases.

Further still, by noting whether you can get the cross-section area of the turns turns required on every winding, by allowing 50% for hand-winding and interleaving as already mentioned.

If the transformer weighs more than 5lb, you can then turn back to Fig. 1. You’ll then see whether or not you can pull more out of it in c.w. or s.s.b. service.

Another problem can occur with a case where the laminations to hand are from a transformer that is too big. This is where you end up with a lot of unused space in the window after all windings are complete. So, what do you do?

Provided you did the maths correctly, for the core cross-section as you measured it, and used the wire sizes appropriate to the task in hand, there’s no problem. Except that you have made a transformer which wastes space.

However, it’s when you start to aim at minimum size transformers that skill in juggling is needed! So, let’s take a practical case.

Firstly, let’s consider a transformer providing 12V r.m.s. out at 10A. At 90% efficiency, the transformer will have about 135W in and 120W out

Let’s now assume there’s an existing transformer you can strip down. The cross-sectional area of core is about 2.5 square inches. Using Fig. 2, you’ll find you need 3.5 turns per volt.

So, you need  $240 \times 3.5 = 840$  turns on the primary winding, and  $12 \times 3.5 = 42$  turns on the secondary. Now it’s time to consider the wire gauge for the primary.

With the transformer under consideration, at 135W into the 240V winding, you’ll have an r.m.s. current of, say 600mA flowing in the primary. Turning now to your s.w.g. wire tables you may have some 22s.w.g. enamelled copper wire for the primary to hand.

Using the other tables you’ll find that a metric wire close enough would be 0.75mm diameter. For the secondary, a wire that can carry 10A is required.

You’ll need a wire of 12s.w.g., the equivalent metric size is around 2.7 mm. Therefore, you’ll need a primary of 840 turns of 22s.w.g., and a secondary of 42 turns of 2.7mm copper wire, enamelled in each case.

The wire table tells you that it’s possible to get 1089 turns into a square inch. So your 840 turns will take up 0.771 square inch, and allowing for the 50% for handwinding and interleaving, that’s about 1.2 square inches for the primary.

Taking the 12s.w.g. figures from the table, this tells you it’s 56 turns per square inch. So you need, allowing the 50% factor again, about 1.3 square inches.

Looking at the bobbin and laminations, you’ll find

there’s a ‘window’ space of 3 square inches, into which the windings will slip quite comfortably. You now have a viable design for continuous service!

Now consider the same transformer, but in a different service. This time it’s going to be used to supply power through a bridge rectifier to feed a transistor a p.a. stage for c.w. operation, refer to Fig. 1.

With the operation I’m suggesting, it should be possible to get away with as much as 150W output, key-down. But since the transformer is actually operating down near the bottom left-hand corner of the graph, you’ll have to be careful!

## Practical Construction

Now it’s time to look at practical construction. And firstly, you’ll have to strip the transformer.

I’m going to be honest from the start. I don’t bother with trying to totally strip one which has been ‘potted’ (encapsulated in a resin or other suitable compound).

When you’ve got a transformer that’s fairly obviously heavily impregnated with varnish, you may well be able to recover the laminations. In this case there’s also a chance that the ‘impregnation’ is all on the surface, so at least try to remove the windings.

The reason I recommend removing the windings is basic. In order to persuade the impregnant to enter the windings fully, the manufacturer needs to ‘pull a vacuum’ on the transformer.

The ‘pulling’ is done by putting the transformer in the impregnant bucket, then putting the bucket and its contents into an autoclave. As the air bubbles come out, so the impregnant goes in.

However, pulling process is often reduced to a mere dip by ‘the shop’, who seem to think that the impregnant itself drives the air out. So do have a try.

If the transformer is of the more or less standard undosed variety, take it apart. Take note and record with a sketch, how the laminations fit together and strip off the windings, checking the number of turns per volt.

If you’re dealing with a burned-up transformer, observe as the windings come off, where the burned-up winding is, and hence the state of the other windings. If the shorted turn is near the surface, you might find the primary is undamaged. Your nose and eyes will indicate clearly between them.

## Word Of Caution

A word of caution about transformers which were interleaved with material that looks like drawing-office masking tape. With time and heat, this sets hard. The result is that instead of a winding, you have a lump having the strength and consistency of reinforced concrete.

Almost invariably, an attempt at breaking-in to a transformer with the masking tape ‘look alike’ is started with a craft knife. The next thing you know is that the blade has broken and flown across the room - so do be careful.

When working on a transformer insulated with the tape, I suggest you remove the laminations and set them aside. Then be prepared to write off the bobbin if you can’t get the windings off.

Once you have the transformer apart, inspect the bits. Check the laminations and lay them out so that as you re-assemble them, each bit will be the same way up. This maintains insulation between laminations.

Insulation, by whatever means, is only on one side of each lamination. Check again that you have a note of how the laminations fit together and interleave.

Check the state of the bobbin, repair as necessary. If you must, make a new one from materials at hand. Bits of scrap p.c.b. (less the copper, obviously) can be pressed into service along with an epoxy resin adhesive, such as Araldite.

I’ve even made a bobbin from sheets of writing-paper. It was formed round a greased wooden mandrel of



appropriate size and each 'buttered' on one side with Araldite. It was then wound tightly round the mandrel, adhesive-side out.

Arrange things so your starts and finishes are staggered. Then remove all surplus adhesive while it's still plastic, and then you can then put the papered mandrel to one side to set while you make the sides.

Leave the assembly to set thoroughly (several days). Then bring the side pieces and the 'centre' together. Then fix with Araldite, and again leave to set. If you forgot to grease the mandrel, hard luck!

## The Winding

Now to the business of winding. If you have used a lathe, you won't need me to tell you how to adapt it to coil winding duty.

All you need to add to a lathe is a 'turns counter'. This is easily done by modifying a cheap calculator. You arrange it so that one revolution of the lathe completes +1 on the calculator.

If you don't have a lathe, you can use a hand-drill to grip the mandrel on which the bobbin is to rotate. Grip the end of the drill (a 'Workmate' bench is ideal) in a bench vice, and allow the wire to feed from the reel.

Since one turn of the handle will be several turns of the mandrel, find out how many, and remember the relationship. You then only have to remember how many turns of the handle you need to have made.

Tension is applied to the wire by the your thumb (watch out for splinters) or a simple brake. At the bottom limit, wind on purely by hand.

You'll need an interleaving sheet and a tiny section of masking tape. And, since you know how wide the bobbin is, you can cut the paper to width precisely.

You can pre-cut the length to be one complete turn plus a bit, measured round the outside of the bobbin. Don't forget to lay out enough pre-cut pieces nice and handy.

When your first layer is complete, put on a turn of interleaving paper. Then trim the surplus length so there's minimal overlap between start and finish of the sheet, and stick down with the narrowest piece of tape possible.

Wind another layer over the interleaving, then add a sheet of paper as before and so on to the end of the winding. Keep the wire tension as even as possible while winding.

Enough tension on the wire holds the inner layers nice and fast. Too much tension can snap the wire, and not enough lets the wire flap about in service.

When a winding is complete, use two sheets of interleaving, then start the next winding. This process is continued to the end.

## Finishing Off

Finishing off is completed with an outer layer of paper. If you can give each winding a coloured sleeve, you can make a note, so you don't have to mess about identifying them later!

Now it's time for the laminations. Most transformers of interest to radio amateurs have cores made up of lots of E, or E and I-shaped metal stampings.

Take care and be quite sure how the laminations go together before you start the assembly. With E and I shaped laminations for example, you start with an E and close the E with an I-shaped stamping.

Next, you should lay an E over the I, and close the E lamination's gap with another I and so on. They should fit snugly, with no air gaps. And, don't be afraid if towards the end you have to tap the transformer on the bench to make the laminations all snug and tight.

Finally, fit a clamp round the outside of the laminations to pull them up really close. This precaution will prevent that annoying buzzing.

## Time To Test

Now it's time to test your transformer. Before you begin, take note of your test meter's accuracy at full scale.

Note also that it is less accurate at less than full scale deflection (f.s.d.). So for testing, you should choose a range which will provide as near full-scale as possible.

If you are going to re-use an existing primary winding, you should have checked it with full mains voltage before you think of winding over it, just in case of a shorted turn.

For an all-new transformer apply the correct voltage to the primary. Then measure the voltages at the secondaries. Play safe.

Always switch off the primary volts while changing test leads, etc., around. Now try running the transformer with primary volts but no secondary loads for an hour or more. It should remain cool.

Finally, load up the secondaries to the working conditions and give it an hour on test. At the end of the test the transformer should not be over-hot. (This may be defined as, in normal room temperatures, hot to the touch but not hot enough to burn a bare hand).

If you have built a transformer for c.w. or s.s.b. service, refer back to Fig. 1. You can extract the relevant continuous service ratings when applying the loads for this test, or simulate the working loads some other way.

## Essence Of Radio

In my opinion, to turn a junk-box transformer into a purpose-built 'special' is the essence of amateur radio. Furthermore, it is cheaper!

Because you don't know precisely what you've got in the way of iron, the relationships given are pretty conservative. So core saturation shouldn't occur.

Some of the transformers I've rehashed have lasted for two decades of satisfactory service or more. Some have been transformed from burnt-out wrecks into useful transformers.

At least two transformers I've made are keeping alive test gear which otherwise would have been thrown away. And the one I couldn't dismantle has been an excellent door-stop!

*"To turn a junk-box transformer into a purpose built 'special' is the essence of amateur radio. Furthermore - it's cheaper!"*

**GW3KFE**

# Radio Diary

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

**November 13:** AMS 7 The All Micro Show, Electronics Fair & Radio Rally will be held at Bingley Hall, Stafford (Signposted from Junction 14 of M6). Large Trade presence. Bar, refreshments & free parking. **Sharvard Services on (0473) 272002.**

**\*November 14:** The Bridgend & District ARC are holding their annual rally at the Bridgend Recreation Centre. Doors open at 11am, 10.30 for wheelchair operators.

Bring & Buy, canteen and large bar/rest room. The swimming pool and the rest of the recreation centre will be available. **Mike Smith on (0656) 721199.**

**\*November 21:** South Dorset Radio Society present the Hamfayre '93 Event at Portland Heights Hotel (on A354, Portland Dorset). Doors open at 10am - 4.30pm, admission Adults 50p, Children under 15, RAIBC, OAPs and UB40 25p, children under 12 Free. Many stalls including *PW* & *SWM*, s.w.l., Scouts, RAIBC, RAYNET and RSGB. Local traders, large free car park, refreshments and much more. **Mike G7HNY on (0305) 773860.**

**December 5:** Leeds & District Amateur Radio Society will be holding its rally at Allerton High School, King Lane, Leeds. Four large main halls, talk-in on S22, catering facilities. **Richard Tillston G7HUE on (0532) 552344 or FAX (0532) 393856.**

**\*December 12:** Centre of England Christmas Radio, Satellite, Computer & Electronics Rally is being held at the Sports Connexion Centre, Leamington Road, Ryton on Dunsmore, Coventry A45/A423. Doors open at 11am, 10.30am for disabled visitors, admission £1. Over 80 traders, Bring & Buy, talk-in on S22. Bar

and hot food all day, ample free parking. Christmas special 'Spot The Cracker' on many of the trade stands to win a prize. **Frank Martin on (0952) 598173.**

## 1994

**January 23:** Oldham ARC are holding their annual radio rally at the Queen Elizabeth Hall, Civic Centre, West Street, Oldham, Lancashire. Large trade presence, free parking, doors open at 11am, 10.30am for disabled visitors. Morse test and talk-in on S22. **Dave Gray on (0532) 827883.**

**\*PW & SWM in attendance.**

# Tex's Tips...Tex'

*Tex Swann G1TEX, takes time off from his busy schedule as the PW Technical Projects sub-editor to pass on some practical tips and advice on where and how to find all those necessary bits and pieces for your workshop.*

The idea behind my article is not to tell you how to set up your workshop. George Dobbs G3RJV has already told you that in his 'Setting Up Your Workshop' article.

I'm actually aiming to provide you with an idea of who can supply what in the way of bits and pieces. My ideas and tips are aimed at everyone.

However, if you're taking your first steps into the fascinating world of radio construction I have an excellent piece of advice for you. I think that to make best use of my notes, you should read George's article first!

No article of this type can possibly guarantee to be fully comprehensive. There are just too many suppliers for that to be the case.

Whatever group of constructor you fall into, whether it be beginner, intermediate or advanced, this section should prove to be helpful. I've put all the addresses together at the end and it will be obvious which supplier I'm referring to when I mention names. So, without any more ado, let's make a start.



**Fig. 1: Tex Swann G1TEX recommends shopping around for good quality hand tools, by doing so, you will get the best prices on the better tools.**

**Fig. 2: There are a great number of power tools available for the workshop, this miniature 12V d.c. drill and bench stand is one example, available from Cirkit Distribution Ltd. This model is particularly useful for p.c.b. preparation work (see text).**

## Space To Spare

How much space you have to spare when you're preparing your work area will tend to decide how many and what type of tools you might need. For example, it's unlikely you'll have space to set up a mains powered pillar drill if you're working with the 'Table Top Bench' described by Vic Flowers G8QM in

the January 1993 issue of *PW*.

If your working area is limited, then most likely the projects you tackle, will be of a lightweight nature. They may be biased more towards kit building rather than 'chassis bashing'.

I don't think that much metal working seems to go on these days. It's much more convenient to solder p.c.b. material into a chassis shape than work on metal chassis.

When it comes to tools, I think they can be broken down into two main types: hand tools and powered types. Powered tools may also be broken down into battery and mains powered types.

The choice is very wide. Hand, mains or battery powered drills, saws, screwdrivers, the list becomes longer every day.

At one time only two names were found on power tools bought in the UK. Now there are many to be found. The most prominent include Black and Decker, Bosch, Wolfcraft and Makita.

The choice of power tools is so wide, it's best made at a specialist tools supplier such as the many DIY superstores. The larger DIY chainstores are difficult to beat for price, so I won't dwell on this point.

## Small Powered Drills

There are several small 12 volt powered drills around. One example, is available with a suitable stand is sold by Cirkit Distribution Ltd.

The 'Expo' Mini Drill was reviewed by Rob Mannion G3XFD, the Editor of *PW* in the Dec 1992 issue. The various bits, attachments and the stand make this drill very versatile in use.

In the way of handtools, all the suppliers mentioned, can supply a great variety, in both price and quality. However, in my mind there's no way out of the truism that 'you don't get owt for nowt'!

In general the more you spend on each item in your tool kit, the better quality it will be. This statement doesn't always hold true, but it's a pretty fair bet that the 50p set of side cutters will not remain sharp for long!

It also pays to remember that side cutters can't handle aluminium sheet. So, when working with aluminium sheet, use a saw, tin snips or a nibbling tool. The once popular nibbling tool is not often seen these days, but they can cut shaped holes easier than by using a file and hacksaw.

I cannot stress enough that it is worth getting catalogues from the various suppliers, and spending some time looking them over before buying any tools. Time spent doing this will, without doubt, save both frustration and expense later.

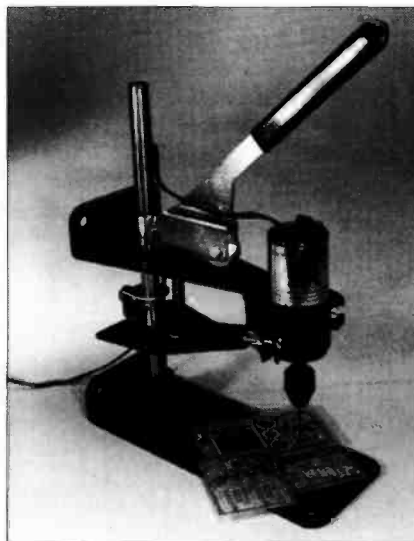
Remember, before you order, that most of the suppliers have a minimum charge. And, don't forget also to add in the post and packing charges before you make a decision.

Some items may be cheaper from other suppliers. However, overall you may save by purchasing from one firm rather, sending off to the cheapest for each item.

## Test Equipment

Having set out your work area and tools, the next area of the workshop to look into, has to be test equipment. This section of the working environment will also depend on the space available for the items.

I've no doubt that most of us would all like to own a workshop full of expensive test equipment, to do every conceivable job we might like to tackle. Unfortunately, most of us have to make do with a rather smaller area than this.



# Tex's Tips...Tex'



# s Tips...Tex's Tips...

My last military posting was in an electronics inspection laboratory. I must have had almost a £million worth of equipment under my control at that time.

I was like a child let loose in a toy shop for over two years! Nowadays though, my home workshops is not only very much smaller, but also a lot less exotic, not to mention cheaper!

If you are buying second-hand then remember 'Caveat Emptor', let the buyer beware. Try to take someone else with you, ask to see the piece of equipment working. Does it look as though it is reversed? Or was it just thrown in the bottom of a pile of junk?

If you decide to buy new, buy only what you think you need, try and borrow items you won't use very often, to start with at least. Again most if not all the suppliers have various items of test equipment at a variety of prices.

To help choose a suitable supplier when looking for test equipment, it's a good idea to look in the 'Test Equipment' special issues of *PW*. The most recent was in the September 1993 issue of the magazine.

## Build Your Own

Perhaps you intend to build your own items of test equipment. Many radio enthusiasts do make their own equipment, and operate very well with these items.

We have had many test equipment projects in past issues of *PW*. These included items such as power meters, gate (or grid) dip meters, r.f. voltmeters, s.w.r. meters, signal tracers, signal generators, digital counters and pre-scalers.

The number of projects published in *PW* is too long to list them all. However, a s.a.e. to the editorial offices will get you a complete list of projects. But please make sure your envelope is large enough to take several A4 sheets of paper, and mark it **Test Equipment Projects**.

## Ready To Start

Now that you're ready to start making things, is there anything else to consider? How about electrical safety?

What about electrostatic precautions for handling sensitive modern components? Again, I'm pleased to say we've had previous articles on both these important issues.

Personal electrical safety was covered in the August, September and November 1986 issues of *PW*. An article covering the safety of static sensitive devices appeared in the January 1991 issue of the magazine.



Finally, after building your superb item of radio or test equipment, what do you put it in? This problem can be solved by looking in the catalogues from the suppliers I've already mentioned. Most, if not all, have an extensive range of boxes and enclosures to proudly grace your workshop.

## Something Unusual

But how about something unusual? Yes you've guessed it, we've even had two articles published on how to make boxes!

Unfortunately (the similarity in names could cause confusion) both articles were called 'Boxing It Up'. The earlier was published in

October 1986, with the other article appearing in December 1992/January 1993.

If after setting up your own workshops you don't know what to build, look out for our kit building special in a future issue of *PW*. We'll have some more ideas to help the long dark evenings pass by. Until then, good reading....and keep busy!

PW

**Fig. 3: An Antex soldering iron, complete with stand. Soldering irons such as this model are available through many outlets and Tex Swann G1TEX says it is really worthwhile comparing prices from retailers before buying.**

**Cirkit Distribution Ltd.**  
Park Lane  
Broxbourne  
Herts EN10 7NQ  
Tel: (0992) 444111

**ElectroMail**  
PO Box 33  
Corby  
Northants NN17 9EL  
Tel: ((0536) 204555

**Farnell Electronic Components Ltd**  
Canal Road  
Leeds  
W. Yorkshire LS12 2TU  
Tel: (0532) 636311

**Greenwood Electronic Components Ltd.**  
Kyppings House  
Ravensworth Road  
Mortimer  
Reading  
Berks RG7 3UD  
Tel: (0734) 333788

**Henry's Audio Electronics**  
404 Edgware Road  
London W2 1ED  
Tel: 071-258 1831

**Mainline Electronics**  
PO Box 235  
Leicester LE2 9SH  
Tel: (0533) 777648

**Maplin Electronics**  
PO Box 3  
Rayleigh  
Essex SS6 8LR  
Tel: (0702) 554161

**Marco Trading**  
The Maltings  
High Street  
Wem  
Shropshire SY4 5EN  
Tel: (0939) 232763

**Nevada Communications**  
189 London Road  
North End  
Portsmouth PO2 9AE  
Tel: (0705) 662145

**Pasternack Enterprises**  
Post Office Box 1679  
Invine  
CA 92713-6759  
USA  
Tel: (0101) 714 261 7451

**Piper Communications**  
4 Severn Road  
Chiltern  
Didcot  
Oxon. OX11 0PW

Suppliers List

# s Tips...Tex's Tips...

# QSOs in Spanish

Gareth Roberts GW4JXN and Idefonso Sevilla EA7BWX bring you the third and final part of Basic QSOs in Spanish.

English	Spanish	Pronunciation
<p><b>Social</b>            From the shack I can see mountains/sea/moors.            I have a friend/wife/children in the shack with me.            He is a visitor/a shortwave listener.            She is a visitor.            He intends to sit his radio exam.            I am at home/at work/at a friend's house.            This is a demonstration/special station.            I have visited your country.            I hope to visit your country.            We had a nice time.            Excuse my Spanish.            I wish I could speak your language as well as you speak mine.            Can we continue in English?            May I say it in English?            May I explain it in English?</p>	<p>Desde mi cuarto de radio puedo ver montañas/el mar/páramos. mar/paramos.            Tengo un amigo/mia esposa/mis hijos en el cuarto de radio conmigo.            Es un visitante/un radio escucha.            Ella es una visita.            El va a examinarse de radioaficionado.            Estoy en casa/trabajando/en casa de amigo.            Es una demostración/estación especial.            He visitado su país.            Espero visitar su país.            Lo pasamos muy bien.            Perdone, no hablo bien Español.            Desearía hablar su idioma tan bien como usted habla el mio.            ¿Podemos continuar en Ingles?            ¿Puedo decirlo en Ingles?            ¿Puedo explicarselo en Ingles?</p>	<p>Desdee me kwarto day radio pooay ver montanas/el            Tengo oon ameego/meea esposa/mees eechos en el kwarto day radio connego.            Es oona bisitantay/oon radio eskootsha.            Elia es oona biseeta.            El va a eximinarsay day rahdioafithionahdo.            Estoy en casa/travachando/en casa day ameego.            Es oona demonstrathion/estathion espethial.            Ay visitahdo soo pays.            Espayro visitar soo pays.            Lo passmos moeee be-en.            Payrdonay, no ablo be-en espanol.            Desayareea ablar soo eedioma tan be-en como oostedh abla el meeo.            Podhaymos continuoar en inglays?            Pooayhdo daythirlo en inglays?            Pooayhdo explicarsaylo en inglays?</p>
<p><b>QSL</b>            Could you please send me your QSL card.            I would be very pleased to get a QSL card from you.            I shall send you my QSL card via the bureau/direct.            My name is in the American/British Call Book.            Is your name and address in the Call Book?            Can you give me your address and telephone number over the air?            What is your postal code/telephone code?            This is my address and my telephone number.</p>	<p>Por favor podria mandarme su QSL.            Me gustaria mucho recibir su tarjeta de QSL.            La enviare mi QSL via buro/directa.            Mi nombre esta en el Call Book Americano/Ingles.            Esta su nombre y direccion en el Call Book?            ¿Deme su direccion y telefono ahora?            ¿Cual es su codigo postal/prefijo telefonico?            Esta es mi direccion y mi numero de telefono.</p>	<p>Por favor podhreea mandarme soo kooehse ehle.            May gwstareeia mootsho raytheebeer soo tarchayta day kooehse ehle.            Lay enviaray me kooehsa ehle via bwro/directo.            Me nombre esta en el Call Book Amayrican/Inglays.            Esta soo nombre ee deerection en el Call Book.            Daymay soo directhion ee telayfono aora?            Kwál es soo codheego postal/prayficho telefoniko?            Esta es me directhiom ee me noomayro day telefono.</p>
<p><b>Concluding Remarks</b>            May I thank you once more for this and I wish you a very good morning/afternoon/evening/good weekend.            Merry Christmas and a Happy New Year.            I send you my best regards.            All the best to you and yours.            I look forward to working you again.            May I wish you 73, 55, 88 and make this my final.            Back to ... from ... who is waiting for any concluding remarks from you.            So best wishes and good DX.            Goodbye until next time/until the pleasure of seeing you            This is ... signing off and clear with ... and now standing by for a call on this frequency.            ... now monitoring this frequency and waiting for any call.            ... now changing frequency to.            ... now returning to the calling channel.            ... now going QRT.  <b>CONTINUED ON PAGE 38</b></p>	<p>Una vez mas gracias por la llamada, y le deseo buen dia/ buenas tardes/buenas noches/buen fin de semana.            ¡Felices Pascuas y próspero año nuevo!            Le envio mis mejores recuerdos.            Todo lo mejor para usted y su familia.            Espero que podamos copiarnos otra vez.            Muchos 73, 55, 88 y me despido.            El vez para ... de ... que espera cualquier otra cosa.            Mis mejores deseos y muchos DX.            Adios hasta la proxima vez que nos encontremos.            Aquí ... terminando con ... y quedando atento a la frecuencia para cualquier llamada.            ... ahora espero cualquier llamada en esta frecuencia.            ... ahora voy a cambiar a ...            ... ahora vuelvo al canal de llamada.            ... ahora quedo QRT.</p>	<p>Oona veth mas grathias por la liamadha, ee le daysayo booendeeaa/booenas tardhes/booenas notshes/booen fin day semana.            Faylithes Paskwas ee prospayro ano nooayvo.            Lay envio mees mechore rekooerdhos.            Todho lo maychor para oostaydh ee soo fameelia.            Ayspayro kay podhamos kopeeamos otra veth.            Muchos sehtentaeterehs, seenkooenthetheencoh, ohshentaheehshoh ee may despido.            El veth para ... day ... kay ... espayra kwalkwear otra.            Mees maychores deayos ee mootshos Day Eks            Adhios hasta la proxima veth kay nos enkentraymos.            Akee ... terminando con ... ee kooedando atento a la frookooenthia para kwalkwee-er liamadha.            ... aora espero kwalkwee liamadha en esta frekooenthia.            ... aora voy a kambiar a ...            ... aora vwaylvo al canal day liamadha.            ... aora kwaydo en cuertay.</p>

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Power:- 400 watts  
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Gain:- 7dbi.

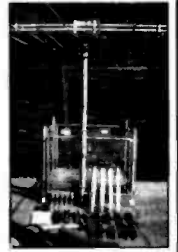
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# QSOs In Spanish

CONTINUED FROM PAGE 36

## Numbers together with their pronunciation

1	uno	oonoh
2	dos	dohs
3	tres	trehs
4	cuatro	kooahtroh
5	cinco	theencoh
6	seis	says
7	siete	see eh teh
8	ocho	ohshoh
9	nueve	noehveh
10	diez	dee ehz
11	once	onsay
12	doce	dohsay
13	trece	trehsay
14	catorce	katorsay
15	quince	keensay
16	diez y seis	dee eh zi says
17	diez y siete	dee eh ze sea eh teh
18	diez y ocho	dee eh zi oshoh
19	diez y nueve	dee eh zi noehveh
20	veinte	veh in teh
21	veinte y uno	veh in teh oonah
22	veinte y dos	veh in teh dohs
30	treinta	treh in tah
31	treinta y uno	treh in tah oonoh
40	cuarenta	koo ah rentah
41	cuarenta y uno	koo ah rentah oonoh
50	cinuenta	seenkoo entah
60	sesenta	sehshenta
70	setenta	sehtentah
80	ochenta	ohshentah
90	noventa	nohvehntah
100	cien	see-ehn
200	dosciento	dohsseehntoh
1000	mil	mill
2000	dos mil	dohs mill

## Days Of The Week

Sunday	Domingo	Domeangoh
Monday	Lunes	Looness
Tuesday	Martes	Martess
Wednesday	Miércoles	Mee ehr coless
Thursday	Jueves	Who eh vess
Friday	Viernes	Ve ehr ness
Saturday	Sábado	Sahbahdoh

## The Spanish Alphabet - this is used to give the Q code and also for callsigns (distintivo de llamada).

A	a	ah
B	be	bay
C	ce	say
D	de	deh (like the e in let)
E	e	eh
F	efe	ehfeh
G	ge	gheh (strong H like in hell)
H	ache	asheh
I	i	ee
J	jota	hohtah (like the o in home)
K	ka	kah
L	ele	ehleh (like the e in set)
M	eme	ehmeh (like the e in set)
N	ene	ehneh (like the e in set)
O	o	oh (like the o in not)
P	pe	peh
Q	co	koo
R	ere	ehreh (like the e in set)
S	ese	ehseh (like the e in set)
T	te	teh (like the e in set)
U	u	oo (like the u in put)
V	uve	ooveh
W	uve doble	ooveh dohbleh
X	ehkiss (equis)	ehkiss
Y	ee gree ehgah	ee gree ehgah
Z	zeta	thehtah

## Common Spanish Christian Names - it is easier to recognise them in the QRM if you have seen them before.

Angel	Diego	Guillermo	Manolo
Alfonso	Damian	Gerardo	Miguel
Antonio	Dionisio	Gonzalo	Pedro
Alfredo	Eduardo	Ignacio	Pablo
Andes	Eulogio	Isidoro	Pepe
Alberto	Enrique	José	Ramon
Bernardo	Emilio	Juan	Ramiro
Benito	Ernesto	Joaquin	Rafael
Carlos	Francisco	Luis	Salvador
Carmelo	Federico	Leon	Santiago
Cristobal	Felix	Manuel	Tomas

## For those who have some knowledge of Spanish there follows a list of the most common technical words and phrases. The pronunciation is not given.

absorption wavemeter	ondámetro de adsorbción
ammeter	amperimetró
amplifier	amplificador
amplitude modulation	modulacion de amplitud
antenna	antena
antenna matching	sintonización de antena
antenna tuning unit	adaptor de antenas
aurora	aurora
auroral	auroral
balun	balun
band pass filter	filtro pasabanda
calibrator	calibrador
carrier frequency	frecuencia portadora
coaxial cable	cable coaxial
coil	bobina
condenser (capacitor)	condensador (capacitor)
continuous wave	onda continua
cross modulation	modulación cruzada
deviation	desviación
dial	cuadrante
a digital frequency meter	frecuencímetro digital
directional antenna	antena direccional
disturbance	perturbación
dummy load	carga artificial
earth	tierra
to earth	conectar a tierra
fading	desvanecimiento
feeder	línea de alimentación
final stage	etapa final

## Time

1 o'clock	son la una
2 o'clock	son las dos
2.05	son las dos y cinco
2.10	son las dos y diez
2.15	son las dos y cuarto
2.20	son las dos y veinte
2.25	son las dos y veinticinco
2.30	son las dos y media
2.35	son las tres menos veinticinco
2.40	son las tres menos veinte
2.45	son las tres menos cuarto
2.50	son las tres menos diez
2.55	son las tres menos cinco

fixed	fijo
frequency modulation	modulación de frecuencia
ground wave	onda terrestre
indoor antenna	antena interior
insulator	aislador
ionosphere	ionosfera
jack	enchufe
lightning protection	protección pararrayos
line of sight	al alcance de la vista
log book	libro registro
lower sideband	banda lateral inferior
metal case	caja metálica
meter	contador
modulated wave	onda modulada
omnidirectional antenna	antena omnidireccional
operator	operador
oscillation	oscilación
parasitic oscillation	oscilación parasítica
plug	clavija
power supply	fuelle de alimentación
preset	preestablecido
preset potentiometer	potenciómetro preestablecido
pulse modulation	modulación de impulsos
to radiate	radiar
the range	alcance
readability	inteligibilidad
receiver	receptor
repeater	repetidor

r.f. amplifier	amplificador alta frecuencia
rig	transceptor
rotating antenna	antena giratoria
rotato	rotor
satellite	satélite
selectivity	selectividad
sensitivity	sensibilidad
shielded braiding	blindaje
sideband	banda lateral
single sideband	banda lateral única
skip zone	zona muerta
sky wave	onda espacial
sound frequency	frecuencia (audiofrecuencia)
speech processor	compresor de voz
standing wave	ondas estacionarias
switch	conmutador
transceiver	transceptor
transistor	transistor
transmitter	emisor
troposphere	troposfera
tuned circuit	circuito sintonizado
to tune up	sintonizar
upper sideband	banda lateral superior
valve	válvula
variable	variable
vertical antenna	antena vertical
vertical rod	varilla vertical
voltmeter	voltímetro

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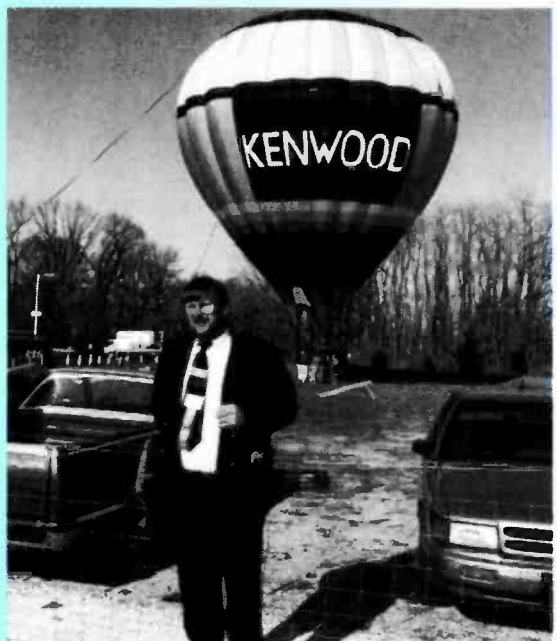
**With so many radio enthusiasts attending the event - around 40 000 visited the 1993 HamVention - There will probably be enough hot air to send the Kenwood balloon soaring in 1994! So, come and join in the fun, meet and make new friends and see the biggest and best amateur radio show in the world!**

Join the *PW* party, led by the Editor Rob Mannion G3XFD, when we fly out on a scheduled Delta Airlines flight from Gatwick on Monday April 25 1994. We'll be flying direct to Cincinnati and our private coach will take us to the Holiday Inn in Dayton for our seven night stay. There'll be several day trips in our private coach and we'll spend a day at the world famous United States Air Force Museum. There's plenty of shopping and many other attractions for the family too!

You can book your seat on the *PW* 1994 HamVention Holiday for only £630 per person, sharing a twin-bedded room. Single rooms are available for an extra £205. The price includes the return flight and meals on the aircraft, coach transfers, seven nights' accommodation, two day excursions by coach and admission ticket to the HamVention. We return home on Monday May 2, arriving at Gatwick on Tuesday morning.

Although Rob Mannion G3XFD is leading the *PW* party, the entire holiday is being organised by the Bristol based professional group tour operator RCT International. Annette Oxley at RCT is awaiting for your enquiry and she'll be delighted to send you a full itinerary and booking form. Don't delay, send away **today** and fly with *PW* to the great amateur radio adventure of 1994!

**We don't want you to miss the flight!  
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**To Annette Oxley  
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How many seats required \_\_\_\_\_

# Clubbing Amateur

*Steve Ortmayer G4RAW regards the local radio club as being the life and blood of amateur radio. Here Steve tells you how to get the best from your local radio club as he has from his, The Halifax & District Amateur Radio Society.*



**His worship the Mayor of Calderdale Bill G4KQJ operating GX2UG closely watched by Ben, a student Novice and Roy G3NBI. (photograph courtesy of the Halifax Evening Courier)**

**T**he welcome a newcomer receives at a club is very important. The first time visitor must be made to feel that they can become more deeply involved and eventually get on the air themselves. Established radio club members can too easily slip into jargon which will often be incomprehensible to the newcomer.

Clubs do not exist just to attract new people to the hobby, important though it is to do so. The club should be able to offer a wide range of activities which can be undertaken as a group, but would be difficult for an individual on their own.

Later on I will go on to describe a whole range of activities that can be undertaken by the club. But first a little about my own club, The Halifax and District Amateur Radio Society.

## Great Radio Pioneer

The Halifax and District Amateur Radio Society club was formed in 1922 and is one of the oldest in the land. Halifax was fortunate in having one of the great early radio pioneers, Percy Dennison.

Percy had experimented with radio for some years before helping to form a club called The Scientific Wireless Society. What a grand name, I think we should have stuck with it!

The club's first meeting place was Clare Hall which has long been demolished and an inaugural message was sent from the Marconi works in Chelmsford. The club also contacted the Eiffel Tower and a 'peace message' was exchanged, the club still has the original letter from the Director at the Tower confirming the contact. Is this perhaps the first QSL card?

Halifax & DARS has met on and off since this date and was re-formed in 1982 after a short lapse.

The club presently meets at the 'Running Man' public house, Pellon Lane, Halifax.

One meeting place in the 1950s was a pub on the moors above Halifax. Ron G3OTE was a member then, has told me the following amusing story.

One of the members gave a talk on simple repairs to radios. Because the moorland pub had no mains electricity, only oil lamps, he powered his radio from a car battery with an inverter for the h.t. "You will all know the simple wet finger on the grid test for the a.f. amplifier" he said. But when he put his finger on the first a.f. valve grid, nothing happened! There were no mains for miles and the 50Hz hum which normally surrounds our bodies was not present!

## Wealth Of Advice

The discussions that take place at clubs can provide a wealth of advice to old and new radio amateurs alike. Perhaps one of the most talked about subject is antennas.

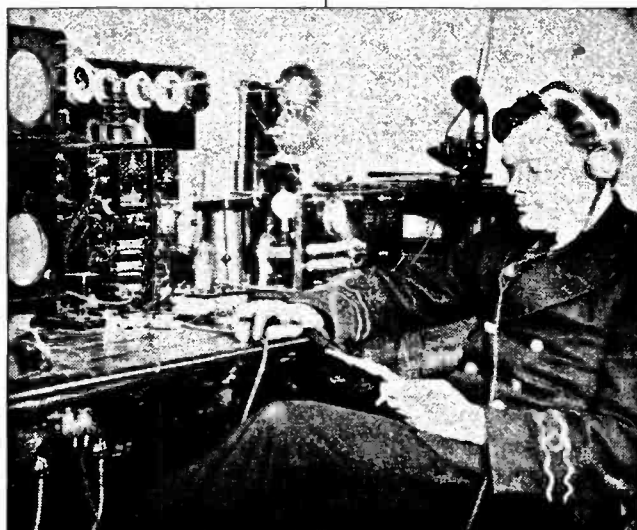
I can remember going to a club for the first time and asking "What is a G5RV antenna"? this brought wry smiles from the members.

Nowadays, antennas are still of interest. I have recently been to the G-QRP club mini convention at Rochdale and heard a talk by Peter Dodd G3LDO. I also bought his book on antennas and I am looking forward to

passing on some of the new ideas I have learned at a future club meeting.

## Club Shack

The club in Halifax is lucky to have its own shack in a Community Centre. However, you do not need



**Fig. 1: Percy Dennison founder of the Halifax and District Amateur Radio Society pictured in his Marconi marine uniform. (photograph courtesy Alan D. Benn G8AFV)**



# Together For Radio

anything very grand, just a small secure room where gear can be set up and permission to erect antennas.

The local council youth and community service will be keen to help with this kind of venture. They'll be particularly keen if you can demonstrate a youth interest, such as tuition for the Novice Licence.

The Halifax club call is G2UG and this can be modified to GX2UG to allow non licensed people to pass messages. How this is done is covered by DTI regulations and clubs who wish to use this facility should carefully study them.

The Halifax club's use of GX2UG is a wonderful step forward in bringing new, particularly young persons into the hobby. Instead of having just to watch, knowing that it can be many months before a newcomer gains his licence, they can now join in and practice on the air procedure.

## Special Events

Many clubs take part in Special Event demonstrations. This is where the club is on show to the public and a good image of amateur radio can be promoted. The event needs careful planning with members agreeing a roster for manning the station and providing and erecting the equipment.

The Halifax Club has put on a number of special event stations using a special call or G2UG or more recently GX2UG. The venue for such events is important, as there is often too much already for the public to see at say a Gala and not much interest is shown to the radio amateurs.

As well as the operator, it's a good idea to have an experienced member standing by to welcome visitors. They can explain what is going on with possibly a map to show where the contact is being made.

Our club callsign GX2UG still causes some interest on the air. Amateurs not familiar with it think they have worked some rare DX or a rare offshore island!

Perhaps the most successful demonstration station held by the Halifax Club was at Wainhouse Tower which is a famous local landmark and Victorian folly. The tower was used by Percy Dennison in the early days of radio and the club has a plan of his shack located near the base of the tower which is almost 300 feet high (90m).

I was persuaded to climb up the steps inside the tower carrying the antenna wire. Chairman Jim G4MH said my upwards progress was marked by the pigeons escaping from the tower!

There were not too many distractions for the visitors at Wainhouse Tower. Once they had climbed the tower so many showed an interest in the station and several had a 'go' with GX2UG.

When running a special event such as our Wainhouse Tower, to obviate the need to sign /P a temporary change of location of the station can be advised to the DTI. Perhaps the most memorable

thing heard on the air from Wainhouse Tower was from a 'W' in Ohio who said "Gee, your own 300ft stone antenna support" much more impressive than a simple lattice tower!

We also had support from the Town Hall. For the event the council provided nice coloured postcards of the tower which we used as QSL cards.

## Construction Projects

Many local radio clubs can embark on a wide range of construction projects. This is when the more experienced can help the less able member.

The White Rose Club in Leeds has constructed a fantastic project. This was originally a receiver for all bands from 1.8 - 144MHz which the club then developed into a transceiver.

I am very keen on home-brew and made my first QSO with a simple crystal transmitter and direct conversion receiver. Both designs were by my hero the Rev. George Dobbs G3RJV.

Both G3RJV projects seemed too simple to work. But when they were completed I called CQ on 3.5MHz and back came GM3MXN, Tom in Glasgow with a 559 report for my first QSO!

## Club Opportunities

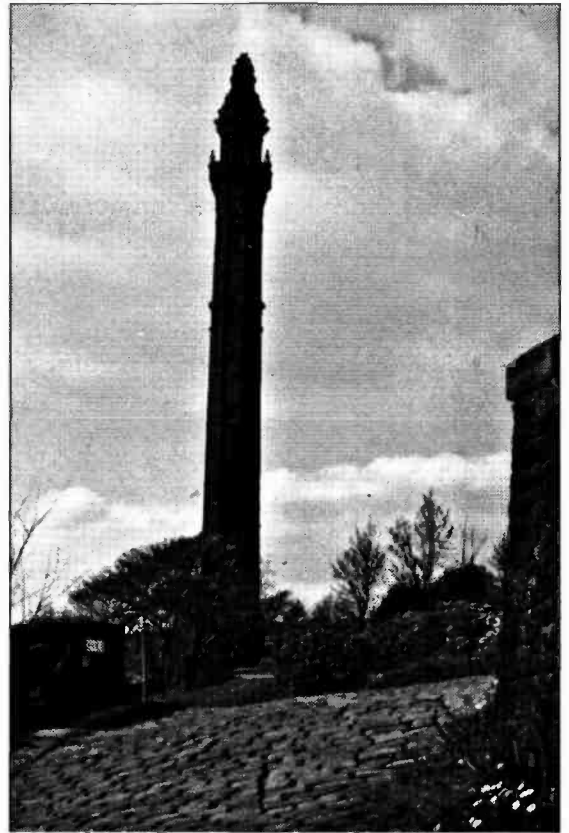
Clubs also have opportunities to enter all the major contests as a group. There are plenty of hills around Halifax and my club used one for v.h.f. contests.

The larger clubs can organise rallies which can be very hard work to put on. However, they can be a good source of income for club funds and can also help to bring new members to the club.

Talks on radio subjects are the mainstay of the club activity. The Halifax & DARS has had some very interesting and informative talks on a wide range of subjects. These talks are arranged almost a year in advance by the club secretary David G0DLM.

"You only get out what you put in" this is often said about many forms of human endeavour and it is true of radio clubs. So, get down to your local club with a bright new idea. I am sure that the response will be "Good idea, why don't you organise it"!

PW



**Fig. 2: The Wainhouse Tower perched above Halifax.**

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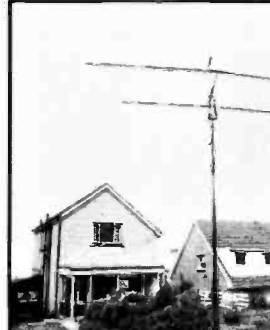
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EL180	25.00	PL509	8.00	6AU5GT	5.00	6Q7	4.00	7581A	12.00
EL81	5.00	PL519	8.00	6AU6	2.50	6RH8B/6K8B	12.00	7586	15.00
EL84	2.25	PL802	6.00	6AW8A	4.00	6SA7	3.00	7587	23.00
EL84 Mull	6.00	PY81	1.50	6B7	4.00	6SC7	3.00	7868	12.00
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*This month Peter Hunter GOGSZ has news of a fantastic program from Canada called Electronics Workbench.*

*The Computer in Your Shack*

# BYTES & BITS

Electronics Workbench (v3) is produced by Interactive Image Technologies Ltd., of Toronto, Canada. And it's aptly described as 'The electronic lab in a computer'.

The Electronics Workbench program is the most complete, versatile, complex, easy to use, electronics design software package I have ever seen. To call the program a p.c.b. design program would be an understatement.

Look at the picture in Fig. 1 (a 'grabbed' screen display), and I'll explain what I mean. This is an MS-DOS program but the built in GUI (Graphics User Interface) gives the feeling that you're in Windows. Although this DOS version will run from within Microsoft Windows, a full blown Windows version is available, as is a version for the Apple Macintosh.

### Main Workbench

The main part of the screen is your workbench, along the right hand side you have a Parts Bin (with an 'unlimited supply' of components), along the top are all your test instruments.

The instruments can be moved onto the workbench and connected to the circuit. At the top right hand corner of the picture is an ON/OFF switch, flick this to ON to supply power and the circuit is tested.

At any time you can change the value of any component, you can also add, delete, move and rotate these components as you please. The circuit can also be retested as often as you wish.

You can 'blow' components without any damage to your pocket or stock. When all the faults have been corrected, and your design functions satisfactorily, you can go ahead and build the project, on the kitchen table, knowing that it'll work.

With Electronics Workbench you get two 'MODULES'. One is for Analogue, the other for

Digital (see Figs 2 and 3). The use, feel and function of each module is identical, and each has its own array of test instruments and unlimited supply of components.

### Easy To Read

The manual is well laid out, informative, and easy to read. Its 300 plus pages contain thorough, easy to follow tutorials for both analog and digital. The disk contains a full DEMO for each module.

Appendix D in the manual, has listings of Abbreviations, SI Prefixes, Units of Measurement, and Equations (Ohm's law etc.). This makes it ideal for the RAE candidate. You can learn by doing, without burning yourself.

### Build And Test

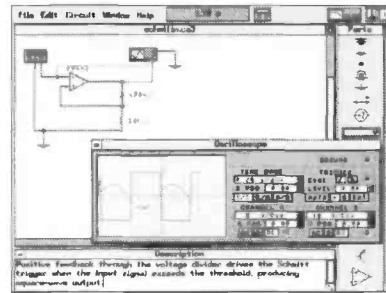
With Electronics Workbench you can build and test your circuit in modular form. Each individual circuit can, when tested and proven, be saved. All 'modules' can then be connected together and tested (and improved if necessary) as a complete project.

Each individual circuit can be used over and over again as often as you wish. This makes Electronic Workbench an ideal package for both hobby and professional experimenters alike.

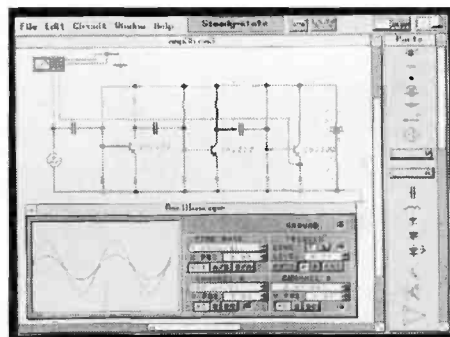
Unfortunately I haven't had the program long enough to give it a thorough testing, nor sufficient space to do it justice, in fact I haven't even scratched the surface. I therefore hope to give a 'long term' user, report at a later date.

The minimum hardware needed to run the DOS version of the program is an IBM AT (or 100% compatible) with an 80286 or higher CPU. It needs 640Kb RAM with at least 550Kb free, MS-DOS 3.1 or higher, one floppy drive and a hard disk with at least 2 megabytes available space.

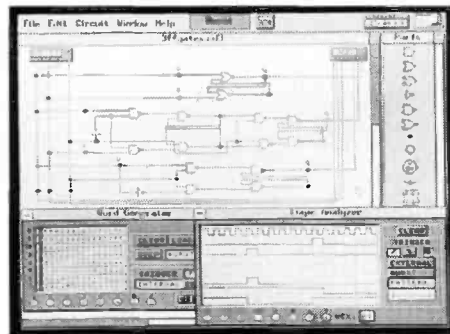
A Microsoft compatible



**Fig. 1: A 'grabbed' screen display' from Electronics Workbench.**



**Fig. 2: An example of the Analog module.**



**Fig. 3: An example of the Digital module.**

mouse and VGA colour monitor are preferable, though not essential. For really 'serious' work I would suggest somewhat higher specifications than this.

With an asking price of £233.83 inc VAT plus £4.99 P&P this is certainly value for money.

My thanks (and congratulations) go to Interactive Image Technologies Ltd who sent me this review copy. For more information, or to place an order, contact: Robinson Marshall (Europe), 17 Middle Entry, Tamworth,

Staffordshire B79 7NJ. Tel: (0827) 66212.

That's it for this month, don't forget I'm always looking for news of non-PC items. I look forward to hearing from you. Write to: Peter Hunter, GOGSZ, 2 Mayes Close, Bowthorpe, Norwich NR5 9AR. Tel/Fax: (0603) 748338. GOGSZ @ GB7LDI.#35.GBR.EU.

**E N D**



# Antenna Workshop

Peter Dodd G3LDO, continues his look at the use of a noise bridge

In the last Antenna Workshop I looked at the advantages of measuring impedance and briefly discussed the noise bridge. For antenna measurements, the noise bridge is one of the most useful pieces of test equipment available to radio amateurs. In addition to measuring antenna impedance the noise bridge can be used to measure coaxial cable losses and characteristic impedances.

In this Antenna Workshop I will give a few additional details of the bridge. How to calibrate it and a method for using it for measuring antenna impedance.

My thanks go to Jandek, for permission to publish the noise bridge circuit shown in Fig. 1. The instrument comprises an r.f. bridge energised by a wide band source of amplified noise.

I will refer to the components as they appear in Fig. 1. Most noise bridges have the similar components so the following description can apply to all noise bridges.

Two arms of the bridge are energised equally via a broadband ferrite transformer. The third (reference) leg of the bridge contains the calibrated resistive and reactive components.

Completing the bridge, in the fourth leg, is the circuit whose characteristics are to be found. This is referred to as the 'Unknown impedance'.

The unknown impedance (in most cases an antenna) is

measured by connecting it to the unknown impedance socket. A null detector (receiver) is connected to the detector socket, and is used to detect the bridge balance.

The receiver used for null detection, should be switched to a.m. if that mode is available. Otherwise use the s.s.b. mode. Do not use f.m. or a narrow band mode such as c.w.

Look now at the redrawn bridge Fig. 2. The bridge is balanced when the impedance of the bridge's reference arm (R1 and CV1) equals that in the unknown arm. (C5 and unknown impedance).

Bridge balance is achieved by adjusting the variable resistor RV1 and capacitor CV1. This is done until a null in the noise level is detected in the receiver.

A reactance offset capacitor, C5, is connected in series with the unknown impedance side of the bridge. This offset capacitor enables the variable capacitor, CV1, to be used to measure inductive (positive) or capacitive (negative) impedances.

The units of impedance are measured in ohms. The reference variable resistance RV1 can be calibrated directly, but the capacitor measurement units are, of course, picofarads. These capacitance values must be converted to impedances by calculation.

Before the bridge can be calibrated, its performance

should be checked to ensure that the bridge's measurements do not vary with frequency. This can happen because of capacitive coupling between the bridge and the noise amplifier through the toroidal transformer T1

To check possible frequency dependence, connect a 50Ω resistor (the nearest preferred value is 51Ω) to the unknown socket. The resistor can be soldered directly across the socket inside the instrument or soldered into a coax plug and connected to the socket.

Connect a receiver to the detector socket. Set the receiver to 2MHz. Switch on the receiver and the noise bridge and adjust the resistance and reactance controls for the deepest null in noise output from the receiver.

If the bridge has been calibrated, the resistance scale should read 50Ω and the reactance scale should read zero. Now retune the receiver to 21 or 28MHz.

Repeat the measurement. If both the resistance and reactance readings remain the same then the design of the bridge is good.

The Jandek noise bridge provides a method of bridge balance frequency compensation and uses a small capacitance connected between points A and B and earth. This is shown in Fig. 3. The capacitance comprises a pair of wires twisted together near to the

'Unknown Impedance' socket. The frequency balance compensation details are described in the instructions that come with the kit.

## Resistance Calibration

Calibration of the resistance scale is straightforward. Begin by tuning the receiver to around 3.5MHz. Now connect a 50Ω resistor to the unknown port. Then vary RV1 and CV1 to null the bridge, adjusting both controls until a null occurs in the noise output from the receiver.

This calibration point (50Ω) can be then marked on the front panel scale for RV1. The calibration scale for CV1 should also be marked and labelled '0'.

Using fixed resistors, the rest of the resistance range is calibrated in a similar manner. For greatest accuracy the resistors should be individually calibrated using an accurate ohm-meter. The calibration resistors can be wired into a coaxial plug, or soldered directly across the socket inside the instrument. Which ever method is used, keep the leads as short as possible.

## Reactance Calibration

When the resistance scale was calibrated, the zero point on the reactance scale was also fixed. If you are only going to use your

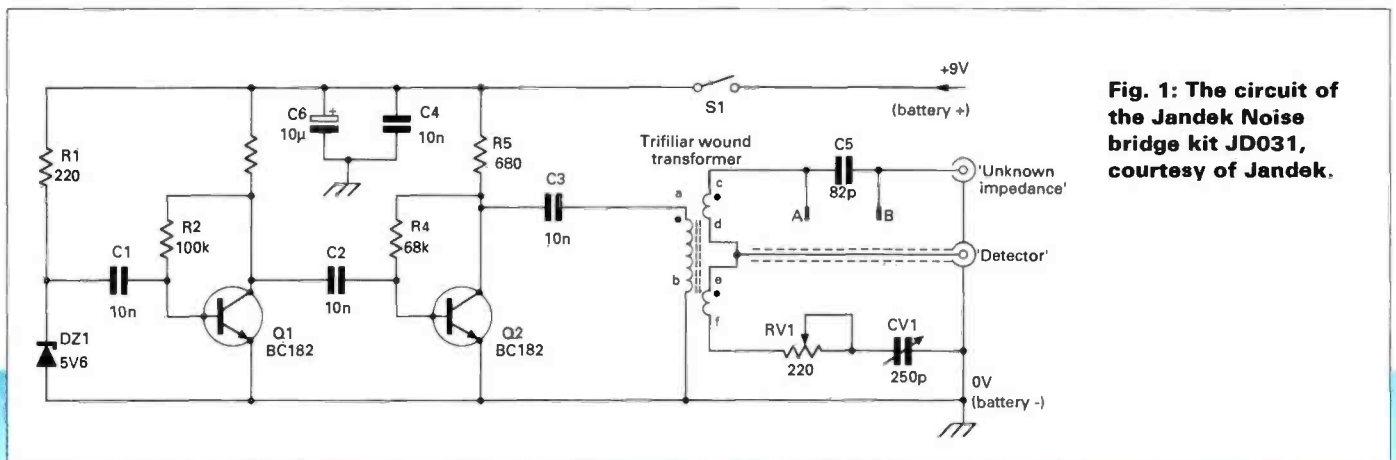
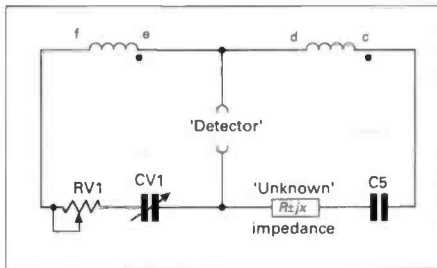


Fig. 1: The circuit of the Jandek Noise bridge kit JD031, courtesy of Jandek.



**Fig. 2: The bridge components re-arranged a little. Winding labels are as in Fig. 1.**

noise bridge for setting up (matching) antennas, where you are aiming for 50Ω (0Ω reactance) then there's no real need to calibrate the reactance scale. However, if you wish to make impedance measurements then the reactance scale must be calibrated.

The reactance scale should read ohms; positive for inductive reactance and negative for capacitive reactance. This range would enable you to plot impedance values and enter it in the impedance chart described in 'Antenna Workshop' in the November 1993 issue of *PW*.

The offset capacitor's value determines the zero reactance point on the dial. In the Jandek noise bridge this capacitor, C5, and 250pF is used for CV1.

However, before the impedance can be quoted in ohms, you must read the equivalent capacitance value in picofarads. This is because the circuit uses a capacitor as the reactance variable.

The capacitor scale is calibrated in two parts, the positive scale (inductance) and the negative scale (capacitance) sides. To calibrate the positive reactance (inductive) side of the scale, connect a 50Ω resistor across the unknown socket.

Connect a 10 pF capacitor across C5 and adjust the bridge

for a null. Mark this new position on the reactance dial 10pF. Repeat the sequence using different values of capacitors, i.e. 20, 30, 40pF, etc. to calibrate the positive scale.

To calibrate the negative reactance (capacitive) side of the reactance scale, you should repeat the procedure described above, with the calibration capacitors connected in turn across CV1.

To find the reactive impedance, the calibration values (pF) must be converted to reactance. This need only be done at one frequency such as 3.5MHz. You can use the formula:

$$x = \frac{10^6}{2\pi f} * \frac{S}{C5*(S+C5)}$$

If you have a computer, you might like to use the small program (Listing 1), from Jandek. This program ran on every flavour of BASIC I could find, and it produces a table of reactance values for given capacitance calibration marks for any one frequency.

### Using The Bridge

I only have enough space this time to cover one aspect of using the noise bridge; adjusting antenna matching devices such as the Gamma Match.

When you are making

impedance measurements at the antenna, the audio output of the receiver has to be close at hand so that you can hear the noise levels. This may be a trifle inconvenient if you are up a mast or on the roof of a house.

The inconvenience of having to listen to the receiver, may be overcome by using an extension speaker. But you'll need a rather long extension lead to reach to the antenna location. You could use a couple of wires from the antenna rotator if you have one. The other alternative is to use the arrangement shown in Fig. 4.

The method shown in Fig. 4 allows the station receiver to be used as the noise detector when adjusting an antenna matching using a noise bridge, but with a



**Fig. 3: Inside The Jandek noise bridge. The pair of twisted wires near the left hand coaxial socket are the compensating components.**

loudspeaker at the antenna site. I find that using headphones gives a much better ability to sense the null point.

In the next 'Antenna Workshop' I'll be describing a new low band antenna - watch this space.

I'll also describe how to use an impedance measuring instrument, to measure coaxial cable losses and characteristic impedance. I will also describe a more accurate method of calibrating the reactance scale.

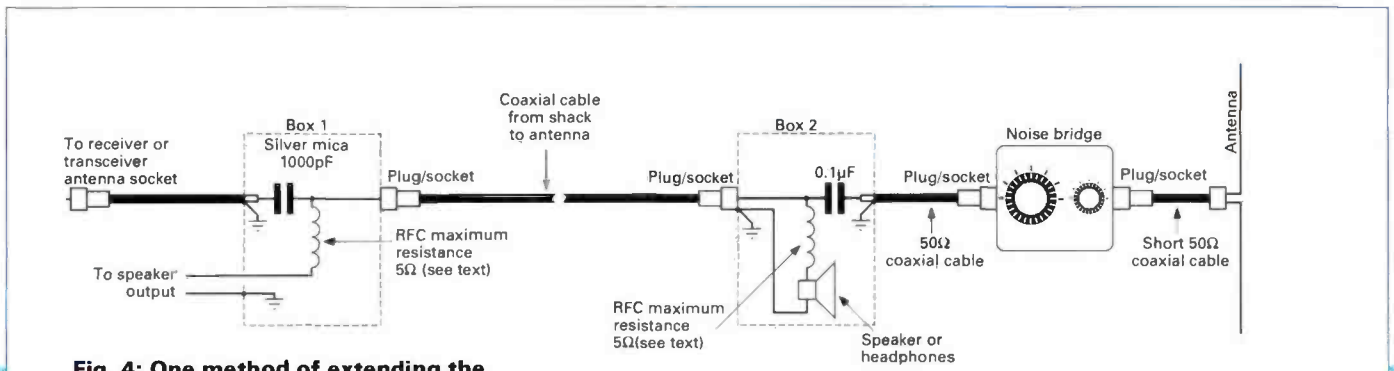
**PW**

### Listing 1

```

10 REM HF Noise Bridge Program
20 REM to convert capacitor scale reading to reactance
40 REM
50 REM Capacitance in pF, Frequency in MHz
60 REM X is Reactance in Ohms
70 REM S = Scale reading(in pF difference from zero)
80 REM C5 is fixed capacitance in unknown arm
100 CLS
110 INPUT "C5 in pF."; C5
120 INPUT "frequency in MHz."; f
130 PRINT "S", "X"
140 FOR S = -180 TO 180 STEP 20
150 IF S < -C5 + 20 THEN 180: REM to prevent division by zero
160 X = 159155 * (S / (C5 * (S + C5))) / f
170 PRINT STR$(INT(S)), STR$(INT(X))
180 NEXT
190 END

```



**Fig. 4: One method of extending the receiver's audio up to the antenna location without extra wires.**

Further details on Jandek kits are available from:  
**6 Fellows Avenue, Kingswinford, West Midlands  
 DY6 9ET. Tel: (0384) 288900.**

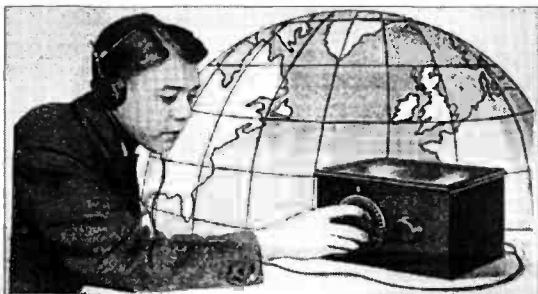
# Valve &

Ron Ham is ready for 'business' once again in the PW vintage wireless 'shop'. You're welcome to enter and savour the softly illuminated dials and warm cabinets.

Wireless developed through the years from the bread-board receivers built on the kitchen table, in the 1920s and early 1930s. We've passed through the era of the factory made sets of 1930s, 40s, 50s and 60s with their sophisticated style and polished cabinets, to the smaller, mainly portable, domestic sets in use today.

Throughout the past 70 years, there have been many advances in technology. But nothing, in my view, can equal the complete change in wireless design and techniques as that which came when the thermionic valve was replaced by the semiconductor.

When transistors arrived, out went the metal chassis, valve holders, large components with high working voltages, hefty mains and speaker transformers. Also redundant were big smoothing capacitors and chokes and, most important, all that unwanted heat generated inside the cabinets.



## Get America on this One-Valver

Short wave reception is the latest thing in radio! Here is a simple set which will give you the thrill of exploring the world through the ether!

**Fig. 1: The boy radio enthusiast pictured on the cover of Every Boy's Hobby Manual (published 1937) brought back memories for both Ron Ham and Dave Riddick.**

## Read And Wallow

At least for the time it takes you to read 'Valve & Vintage', you can forget about transistors and microchips and wallow in nostalgia. You can join the wireless-collectors and restorers, in the age that was dominated by the thermionic valve.

However, first readers, I suggest

that you take a good look at Fig. 1. You'll see the character and enthusiasm in that boy's face in the illustration. Does it remind you of yourself? It certainly did with me!

My thanks for the illustration in Fig. 1., and the memories that came with it are due to **Dave Riddick** (St. Albans, Hertfordshire). Dave sent me a copy of *Every Boy's Hobby Annual* of 1937 which contained a four-page constructional article entitled, 'Get America on this One-Valver'.

The article had a sub-heading: "Short wave reception is the latest thing in radio! Here is a simple set which will give you the thrill of exploring the world through the ether!"

## Circuit In Psalter

A circuit, similar to the one in the *Every Boy's Hobby Annual* article was drawn in the back of my choir boy's Psalter! How could an 11

year-old boy concentrate on his singing, etc., when at home he had a one valved bread-board receiver with a 2V glass accumulator, 120V

'Winner' h.t. battery and a pair of S.G. Brown headphones?

I was given the bits to make my set at the age of ten and it

became my life. I'm now 62 Dave and can honestly say, that this little receiver gave me more pleasure and a greater thrill than any of the hundreds of complex sets that I have owned and serviced since!

I remember winding another coil and hearing some different stations! I often think of the excitement produced by a few more or less turns of wire on that coil former.

when I casually flip through a wave-change switch or 'punch' in a frequency on a modern receiver today.

## World At War

Soon after the 1937 hobby annual was published the world was at war. Untold numbers of transmitters and receivers of numerous shapes, sizes and designs were built for the armed forces of all countries.

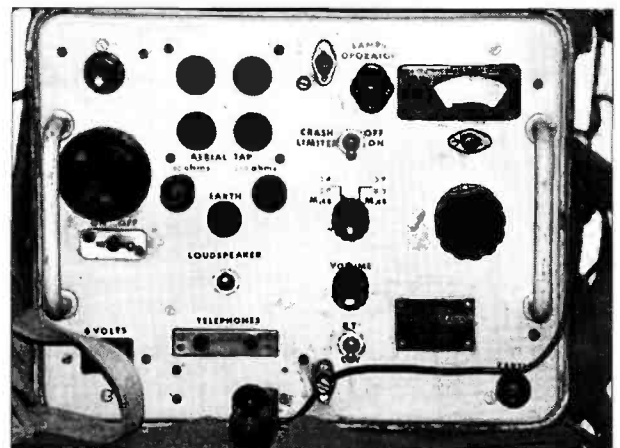
When the Second World War ended in 1945 a large amount of military equipment was sold as government surplus. Much of it was

came from a 75Ah accumulator and the high-tension was provided by either two 60V dry batteries, wired in series, or one single battery of 120V.

## Service Valve Numbering.

In the past, we've often talked about service valve numbering. And, recently I have been reminded by **Keith Seddon** (Stockport, Cheshire) about the confusion that can be caused by the prefix 'VT' on a valve's identification.

The VT marking represents



**Fig. 2: A lesser known British Army receiver, the R109, from the Second World War (see text).**

new and unused in the original packing cases.

'Valve & Vintage' usually has something about Second World War equipment. And this time it's the green wooden-cased WS-17.

My thanks go to **Victor Walkley** for telling me that the WS-17 set is a simple battery operated v.h.f. transmitter and receiver. The equipment was used to communicate between the searchlight units which helped to defend the UK against air attack by night. During the hours of darkness each set on the network was switched to 'receive', to await instructions from the control station.

The 17 set operated between 44 and 61MHz, had a range of of 5 to 8km and used AR6 and ARP18 valves. The 2V filament supply

Valve Transmitting to the RAF, but in the USA in means vacuum tube. To the dear old GPO (General Post Office) Keith thinks it represents 'Valve Thermionic'. He points to three type VT104s, 1, (RAF) = CV1104 = PT15; 2, VT104 (USA) = CV546 = 12SQ7 and 3, VT104 (GPO) = CV1040 = PX25.

## British Army Receiver

One of the lesser known British army receivers is the R109, in Fig. 2. The receiver illustrated, is currently on display in the Vintage Wireless Building at the Amberley Chalk Pits Museum.

The battery operated R109 receiver, uses mainly ARP12 valves and covers 1.8 to 8.5MHz in two



# Vintage

By Ron Ham

ranges. It's fed from a 6V accumulator, via a socket on the bottom left of the grey front panel (behind the webbing).

The h.t. for the valves is produced by an internal 6V vibrator operated power-pack. Because of this, a gentle buzzing is heard while the set is running. The vibrator itself, like the valves, is a plug-in replaceable component.

The R109 is simple to operate. The on/off switch is under the 'pocket' watch holder which has the red (power-on) warning light above it.

The front half of the holder unscrews and a standard pocket-watch is laid inside. This becomes the station clock when the front is screwed back on. Watch-holders were first fitted to military wireless sets during The First World War.

Three on/off toggle switches are used to bring in the b.f.o. for c.w. reception. The 'crash' limiter (noise filter) and, if required, the loudspeaker seen at the top above the three (large) antenna and earth terminals.

The wave-change switch (upper) and volume (lower) controls are situated vertically between two of the toggles to the left of the main tuning control-knob. The dial (top right) has a small round knob on the left of the escutcheon to lock the scale.

Next to this is a low voltage power-point for an operator's desk light. Two headphone jack-sockets are fitted below the speaker toggle.

The metal grid which originally protected the front panel is missing from the set in Fig. 2. And, although interesting in its own right, the tiny Morse key, (displayed lower centre) is not part of the R109 equipment.

## Books For Collectors

One of the books that I would thoroughly recommend for military wireless collectors is *Echoes From Arnhem* (ISBN 0-7183-05213). It's by Lewis Golden, who took part in operation 'Market Garden'.

The book is fascinating and has informative text about the development of airborne signals and

the parachute landings at Arnhem. Additionally there are photographs of the communications equipment used during the battle.

Large pictures are devoted to the 68P set. This is almost identical to WS-18 and the '22' set (similar to the WS-19) packed in its parachute dropping container.

There's another photograph of a WS-22 mounted in an airborne Jeep. Also shown is a '76' set transmitter with an R109 receiver and the short-range American, SCR-536 ('handy-talky').

The 'handy-talky' looks like a large telephone handset with a hefty send-receive switch on one side. In the book, Chapter 8, 'Signals at Arnhem' provides the reader an account of how all these sets were used in action.

More nostalgia now as H. E. Chamberlain (Newark-On-Trent, Nottinghamshire) tells me about a small booklet entitled *When The Ovaltine's Sang*, by Ron Montague. The booklet gives details of such 1930s radio-stations as Radios Normandy and Luxembourg who broadcast sponsored programmes. It costs £1.20 (post free) and is available direct from the author at **39 Orchill Drive, Benfleet, Essex SS7 2LS**

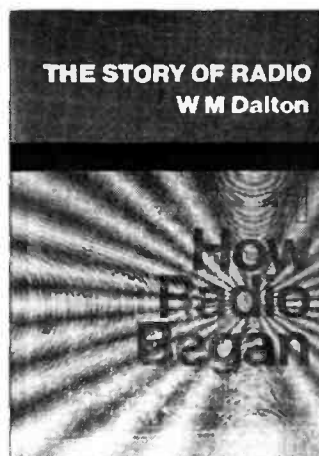
Now to another book. New collectors and vintage wireless enthusiasts should find *The Story Of Radio*, by W. M. Dalton, good reading.

I have three of *The Story Of Radio* series on my book shelf. They are: Part 1 *How Radio Began* (ISBN 0 85274 241 X), Fig. 3. Part 2 *Everyone an Amateur* (ISBN 0 85274 307 6) and Part 3 *The World Starts to Listen* (ISBN 0 85274 308 4).

Each book has about 150 pages. They are well illustrated with circuits, drawings and photographs of valves and equipment up to the time of the Baird mechanical television at the end of Part 3.

## Installed New Radio

In the early 1960s, I installed a new GEC BC5645 v.h.f. radio for an elderly couple. It replaced their



**Fig. 3: The Story Of Radio, by W. M. Dalton, one of an interesting series of books for radio collectors (see text).**

existing pre-1939 set.

The couple, both with failing sight, had their arm-chairs one each side of the fireplace. The receiver was on a shelf on 'her' side because the power point was there and she could easily switch it on and off from her chair.

The v.h.f. signal was strong, so a short piece of wire was sufficient for the antenna. I left the set tuned to the BBC Home Service (now Radio 4) and, apart from seeing her in the village, I heard no more about it for some 15 years.

Meanwhile the husband had died and the lady continued listening to her favourite programmes in the same way. By now she was almost blind.

One day, I received a message via a neighbour, that her beloved wireless was making a 'funny noise'. This turned out to be the receiver's background hiss because the dial cord had rotted and the springs had pulled the capacitor off tune.

It was obvious that the tuning had not been touched since the set was first installed! However, I removed the accumulated dust from the chassis, valve pins and speaker, reset the tuning gang to Radio 4 and earned a large kiss for my work from a very grateful lady!

## Can You Help?

Rob Filby requires a manual for a 'Samwell and Hutton', type 78m wobulator. If you can help, drop him a line, at **11 West Street, Timberland, Lincolnshire LN4 3RX.**

"I started reading *Practical Wireless* in 1934", so writes **P. G. Ascough**, who is currently overhauling a Philips 206A which was made in 1940. He recently obtained a signal generator, type SGM1, serial number 658 made by Weymouth Radio Manufacturing Ltd., of Weymouth in Dorset.

If anyone can help with a manual and/or instruction book, please contact Mr Ascough at: **22 Misty's Field, Walton-on-Thames, Surrey KT12 2BG.**

From Malta GC, **C. A. Fenech** is looking for a 1L5 valve, for a set that he's restoring. Offers please to: **35 Main Street, Attard, Malta GC Europe.**

**Well, that's it for another month. It's time to close the vintage wireless shop, but don't forget I'm 'open' at any time for your letters. Write to me at 'Faraday', Greyfriars, Storrington, West Sussex RH20 2HE. Cheerio for now.**

*Paul Essery GW3KFE takes his monthly look at the h.f. bands and at the successful use of loop antennas.*

Report

BANDS  
HF

It's time to see what's been happening on the h.f. bands once again. And, as any successful manager will tell you, to succeed in an activity, you must set targets.

In DX operating the same holds good save that the targets are for you to achieve. Be realistic though, if you have only one hour a week for operating don't set your target as all current DXCC countries in a twelve-month, or you'll be a bit frustrated!

For the average 100W station on an average antenna, and average operating time, to raise the first 100 countries in a year is practical. That's if you don't waste time and spectrum space on CQs.

Setting a target will also make you look critically at your station layout and antenna for possible improvements. By and large, DX operators spend more time listening, and more time thinking about the station and how to improve it.

If for instance you are stuck with an end fed wire, what can you do about improving the earth? Can the antenna span be raised a bit higher?

If you move the rig an inch further to the left will it make operating any easier? Does the shack need better ventilation?

In other words, to set yourself a serious operating target will almost certainly start you questioning everything in your station and your operating. Once that happens, you're in the DX business!

**Looking At Conditions**

Looking back at conditions, I see it hasn't been a good month. On at least three days the sunspot count was down to zero.

Conditions have varied between abominable up to a 'peak' of around normal at best. Last time we were in this state was 1987!

Oddly enough, the seasonal change in conditions to be expected at the time of writing seems not to have happened either. Again, this is rather odd!

As the minimum of the solar cycle approaches, the spots tend to the solar equator, and the first hint of a new cycle is observance of a sunspot much nearer a solar pole.

**Angie's Pirate**

Angie G0HGA, in Stevenage seems to have a pirate! The unwelcome station was noted on 3.5, 7 and 14MHz. Anyone who can take a line of direction and pass it on to Angie please do so.

Still with G0HGA, Angie has some antenna changes in mind but meantime found TF3GC on 3.5MHz. Believe it or not, some joker called her on 7MHz at 1300Z signing 'W2AR'. On 14MHz, there were lots of East Coast Ws plus W5 and W6.

On 18MHz I noted W1HMD, but better antennas are needed. As for 21, 24 and 28MHz - Zilch!

On the QRP front, Eric Masters G0KRT in Worcester Park says the 'Boss' made him have a tidy-up. The result being much improved operating conditions and the retrieval of some items thought lost for ever. All this and UA9CM on 7MHz with the Lake DTR7 into the upper half of a W3EDP antenna and a quarter-wave counterpoise!

Talking still of low power, Leighton Smart in Trelewis has wielded GW0LBI to the tune of 100+ DXCC countries in all continents. A recent foray on 7MHz surprised him somewhat.

On 7MHz Leighton worked five continents in a few minutes around supper-time on what he had always thought of as a chat band! On 14MHz c.w. HZ1AB and N6AR on 300mw seemed the pick of the crop.

Using s.s.b. on 21MHz yielded a few Europeans. And on 28MHz there was one c.w. plus one s.s.b. contact.

Leighton has a modified Yaesu FT-747 at 5W out. His antennas include a ¼ wavelength end-fed for 1.8MHz, a trap dipole, dipoles for 14 and 21MHz, plus an indoor top-loaded vertical for 28MHz.

Incidentally, Leighton sent in a copy of the (USA-

based) QRP ARCI club details. For those interested, the UK contact is: Dick Pascoe G0BPS, Seaview House, Crete Road East, Folkestone, Kent CT18 7EG.

Enforced low power operation has been the fate of John G3BDQ in Hastings, awaiting new 'bottles' for the linear. Despite this, John has booked a few in, of which 21MHz seems to have been favourite, with ZS8MI as top, a country last raised in the 1950s!

The 14MHz band wasn't so popular with John, though DU1COO TG9GI and ET3YU were all good. His operation on 18MHz resulted in V85XF, and on 7MHz UA9XK and CY9R. Sideband on 3.5MHz gave VK3AJJ and various Europeans were raised on 1.8MHz.

The loop antenna used on 1.8MHz by Ted G2HKU in the Isle of Sheppey is a great help in keeping the skeds with ON7BW and GW4RPU despite heavy QRN. John G3BDQ also uses a loop, and reckons that using it he gets perfect copy of North Americans who are only R3 on the transmit antenna.

To return to G2HKU, QRP with the IC-721S and G5RV on 10MHz gave IS/10ER and small fry. And a blast with the Omni found ZA1E, and IB0/W7SW in the Ligurian Islands.

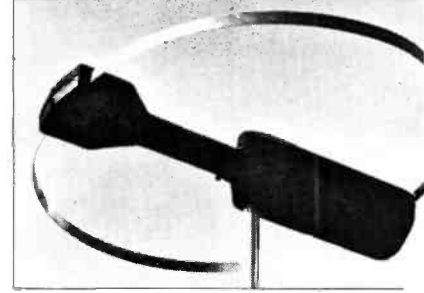
Turning to 14MHz, Ted's IC-721S found another ZA, and SV5TH in Rhodes; US0RR was a joint effort in the CIS. On 18MHz using the HF6 antenna, he worked 4L9A and 9X5DF, and on 28MHz a solitary IK0TXF.

**Contest Dates**

The 1993 CQ WW DX Contest dates are October 30-31 for 'phone, and November 27-28 for the c.w. leg. It's interesting to note that the 'disqualification' clause now includes disqualification from eligibility for an award for a year, referring either to the station or the operator.

The disqualification clause adds: "the use of non-amateur means such as telephones, telegrams, to elicit contacts or multipliers is unsportsmanlike and the entry

**Fig. 1: Loop antennas, such as the IsoLoop 10-30HF (from ICS Electronics) are finding favour with many operators. Loop antennas are used by G2HKU and G3BDQ who both report they have good results (see text).**



is subject to disqualification". All that's needed now is for some brave soul to actually disqualify someone!

**Personalities And Notes**

On to personalities and notes now. To start off, I've heard that Martti Lain OH2BH will be working in the Far East for several years and that he now holds VR2BH.

The 3V8W exercise was not a 'Slim,' despite the packet radio network. Isn't it about time that licences covering packet radio, anywhere in the world, have a clause added covering deliberate misinformation?

Karl made some 6500 contacts, mostly on the key. However, it's true that a '3V8WK' and '3V8WX' were cluttering the bands up at the same time and they were not genuine.

The proposed BV, Pratas, exercise is gradually coming together and OH2BH is among the chosen operators, so says DXNS. However, the date has been slipping fairly consistently, and all I can advise on this is to keep an ear to the ground for BV0ARL/BV9.

**Thanks To Contributors**

Thanks go as always to our various contributors, *The DX Bulletin*, *The DX Magazine*, *The Canadian Amateur*, *DX News Sheet*, and all your letters. Keep it all coming!

Finally, a reminder on deadlines. Your input please, by the middle of each month, addressed as always to me at: 287 Heol-y-Coleg, Vaynor, Newtown, Powys SY16 1RA. Cheerio for now and good DX!

E N D



Scene

SATELLITES

Welcome to the world of amateur radio in orbit! It may surprise you, but the OSCAR-11 satellite was launched almost ten years ago and it's still going strong.

Thanks to phased efforts by the University of Surrey Command team and AMSAT-UK's Richard Limebear G3RWL, the OSCAR-11 is now carrying the ASCII bulletin once more. Richard will upload the news every Thursday, which may be copied on 145.825MHz every pass.

Launched in June 1983, OSCAR-10 is still giving good service. However, due to radiation it has lost its on-board computer, telemetry and the ability to change antennas or bands.

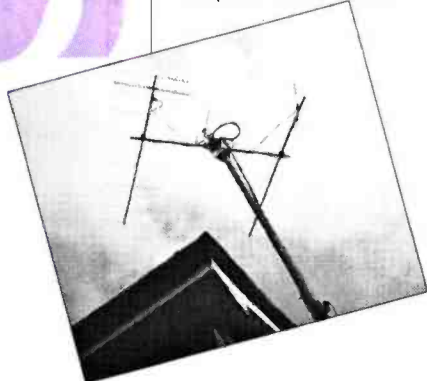
Fortunately, OSCAR-10's mode 'B' capability on its monopole antenna system still permits regular DX activity. But you won't hear very strong signals from this satellite with a simple antenna.

Ideally, operation via OSCAR-10 needs a long cross-polarised Yagi and a quiet front-end to produce good signals. Compared to OSCAR-13 it has very few users.

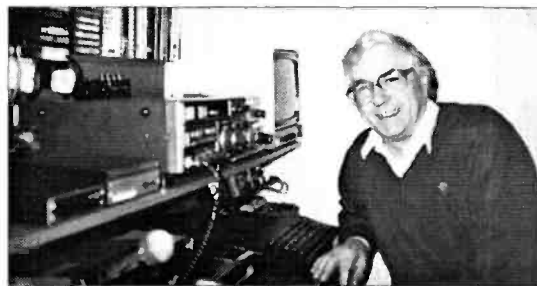
**Lunar Eclipses**

Lunar eclipses of OSCAR-10 are of up to 137 minutes duration continue to effect it until December. These dictate gentle use of the satellite to help keep the battery power up.

As a result of the need for gentle use, the provisional schedule has been changed again for the period from 9th to 25th October. The 'B' mode transponder will be on from



*This month Pat Gowen G3IOR provides an update on three of the currently operational amateur satellites and has further information on Satellite Awards*



**Fig. 1: Ron Wheeler G1LJT of Corsham Wiltshire, is a keen OSCAR-13 user and his equipment includes an FT-736R.**

MA 0 to MA 60, changing to Mode 'BS' from MA 60 to MA 120.

The spacecraft will then be on Mode 'S' from MA 120 to MA 145. At this time the 'S' transponder will be on, and the 'B' transponder switched off.

From MA 145 to MA 150 it's back to 'S' mode again, but now with the 'S' beacon on only. Mode 'BS' returns from MA 150 to MA 210, Mode 'B' again from MA 210 to MA 256. The omni-directional antennas will be used between MA 230 and MA 40. The Alon/Alat attitude will be 180/0

The satellite will be moved to attitude 210/0 on October 25. From then until November 15th the intended schedule will be Mode 'B' from MA 0 to MA 130, Mode 'BS' from MA 130 to MA 180.

It will then be on Mode 'S' with 'S' transponder on but 'B' off from MA 180 to MA 205. Followed by Mode 'S' with 'S' beacon only from MA 205 to MA 210.

Mode 'BS' returns from MA 210 to MA 226. The omni-directional antennas will be in use from MA 240 to MA 80, and an attitude change to 240/0 will be set for November 15. Users are requested not to attempt to uplink on 'B' mode between MA 180 and 205, as this interferes with mode 'S'.

**Lots Of DX**

There's lots of DX on OSCAR-13. This fact is shown by log listings from Bernhard DJ5MN and Mike DK5MV. This is also supported by reports from DG1MHC, DG2SBW, DG3LAV and DL5MHC.

There's activity from Africa. And this is represented by C91AJ, FR3EK, 5Z4JD, ZS6NH, CN8GI, EA9MH. Active

from Asia are 4X1DM, 4X1MK, A41KB, VU2CVP, 4X4JW, HL5QO, TA5C, VS6YHT, UL7CY, UL7PL, UA9XEA, UA0SV and many Japanese operators.

From North and South America come PY1DGV, XE1KK, XE1EMN, OX3DB, KP4SQ, LU4EBC, ZP6XD, KL7IFP, WL7KY, WL7LA, PT9FH, and VP9MU. Active from Oceania are YB1CS, 3D2GG, T24JJ, VK4EU, AH6LR, KH6JJI and lots of all area Ws.

From Europe the reported loggings show CTs 1ANC, 1AVR and 1COU, LZs 1DP, 1JH and 1KWT, OK1s 1AQH/P, 1AUC/P, 1FWG/P, 1UFZ, 1UOZ/P, 2AQK, 2VMU, T72EB, GU3UOQ, LA3FY, OM3AU, SV3BEF, YO3AC, UB5EIE, EJ5LID, S57TTI, Z37CEF and LY93BDX.

Stations from DL, EA, F, G, GW, HB9, I, JA, K, OE, OH, ON, OZ, PA, SM, SP and VE are not given. This is because of the high level of activity from these countries.

**Further Awards**

In September's 'Satellite Scene' I promised to tell you of further awards available for satellite operators. So, to keep my promise here are some more than you may wish to seek.

**Canadian Award:** The North Alberta UHF Society of Canada sponsors the VE Satellite Award. To win this very handsome certificate, you'll need to submit QSL cards confirming satellite contacts with eight different Canadian call areas.

The call areas for the Canadian award are: VE1, 2, 3, 4, 5, 6, 7 and 8, plus VO1 and VY1. That's if you are in North America. If you are in any other continent, then you need

only four of the call areas listed.

Send your QSLs plus 8 IRCs or \$2US (plus enough to return your QSLs via registered mail if you wish) to: Ray Nadeau VE6SF, PO Box 52, Barrhead, Alberta T0G 0E0, Canada.

**Magazine Awards**

The American *CQ Magazine* sponsors the CQ DX award OSCAR endorsed for 100 confirmed countries. These can be QSOs specifically via c.w. or with s.s.b. by satellite, but not mixed mode.

The magazine also provides endorsements for each additional 50 countries confirmed. For the required forms and the fee schedule write to *CQ Magazine*, 76 North Broadway, Hicksville, NY 11801, USA.

Another American publication, *73 Magazine*, offers the DX Dynasty Award. This is for 100 countries worked by satellite after 0001 on January 1st 1987.

The steps for the DX Dynasty Award then go by 50 up to 350, then to 375, then 400. You don't need to send your QSL cards, but you do need to apply by the official DXDA form and the country list is available from *73 Magazine*.

For the DXDA form and country list just send your request, a SAE plus \$1 or 2 IRCs to: DXDA, WGE Center, Peterborough, NH 03458, USA.

Once you've got it, you have to fill in the list with callsigns in order with date, time, frequency bands used, mode and power. Then send it off with US\$6 plus \$4 for each endorsement and you will receive your certificate.

These awards I've detailed complete all the shack wall adornments that I know of. But if you have news on any others available to the satellite users, please let me know for future columns.

**Fig. 2: The antennas in use at Ron Wheeler G1LJT's station are a Tonna 19-element crossed for 435MHz and 9-elements for 145MHz. He says he has made many good friends around the world using the satellite mode.**

E N D



*Roger Cooke G3LDI remembers the day he played at being a 'paparazzi' photographer, and says 'caught at last!' to Ian Wade, and brings you news 'from down-under'.*

*Damonama*

**PACKET**

Despite his extreme efforts to avoid my camera, I have at last obtained a photograph of Ian Wade, G3NRW, the author of *NOSINTRO*, and the editor of the TCP/IP section of *Datacom* magazine.

Obviously I shall refrain from revealing the source of the photograph, but suffice it to say that I did have help!

Ian is pictured in Fig. 1 trying to hide behind a copy of his book, which I understand is rapidly becoming a best-seller. Ian is on the BARTG committee and works hard to promote TCP/IP. His book is still available from the *PW Book Service* or from *Dowermain Ltd., 7 Daubeney Close, Harlington, Beds LU5 6NF.*

By the time you read this column, the 1993 AGM of BARTG, should have been held on November 13, will probably be history. However, I shall report any major changes the group makes as soon as I have any information.

**Information From Australia**

Ian VK6CR has kindly sent me the following information from Australia. I was particularly keen to obtain the correct Hierarchical addressing for VK, so Ian made some enquiries for me.

Following this overview by Ian, I shall give some addressing information. This may well take us into next month's column.

"For those unaware of Australian geography, I'll start with a few facts and figures. The continent has an area of almost 7.7 million square kilometres. To put this in perspective, it's approximately the area of mainland USA. Australia has a total population of about 15 million people.

Western Australia has around a third of the total land area, but little more than a tenth of the population. The incredible scale of the State can be astonishing. In UK terms, Western Australia is almost ten times the total size of the

British Isles!

What bearing have these Australian facts and figures on amateur radio you may ask. The answer is that the huge distances make linking packet networks a major hurdle.

The low population density means a similarly sparse amateur population and resource base. In spite of these hurdles, an efficient BBS and forwarding system has developed.

Perth and its suburbs contain most of Western Australia's amateur population. Others spread out over six towns and the regional rural districts.

The metropolitan area is served by three full function BBSs. These are supported by file server systems on three v.h.f. channels, although u.h.f. activity has limited support.

Four other BBS systems are located around the State near the main regional centres. The majority of BBS or forwarding systems are now running on FBB software. I gather that the compressed forwarding function proved most attractive. With the adoption of FBB the complimentary TPK software is receiving attention.

Until such time as more complex networks develop, I believe that some of the more feature packed systems available these

days will find limited support. The TCP/IP has made some advances, but there is a sparsity of interest, due mainly to the greater complication of the package. However, after an extended 'honeymoon', I am definitely taken by this versatile system.

Interstate and international forwarding traffic relies heavily on h.f. In the past, there was the benefit of a free ride on a commercial link to New South Wales, now sadly defunct. This gave a gateway to Trans-Pacific forwarding, courtesy of the Internet system.

The wisdom of reliance on non amateur-controlled system links must be considered as short term only. Present links employ 14 and 21MHz.

Within the state, digipeaters carry forwarding to the south-west (with 7MHz back-up). Forwarding to the north of the state is carried out on h.f.

The northern link also provides forwarding, to and from the international network via Indonesia and Taiwan. Some use has been made of the Fidonet system to reach areas where path or lack of facilities prohibit normal amateur channels.

Should anyone be in need of information on this 'sun-blessed' State, I will be happy to oblige, but please

note that my knowledge of the States 'over-East' (thousands of kilometres away!) is almost non-existent".

VK6CR @  
VK6KS.#PER.#WA.AUS.OZ

**Packet Survival**

In order to help users to obtain the most from the packet BBS system, I've produced a book *Packet BBS Survival For The Beginner*. This book takes the beginner from absolute basics, to explanations of the complete command set. These commands include those from: FBB-DOS, the Library, and most of the commonly installed servers.

The book is written to enable the newcomer to packet, to use the system with complete confidence. At present it has 70 A4 format, spiral bound pages, quite handy for the desk.

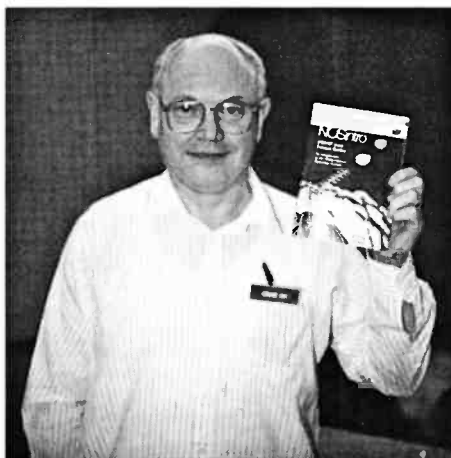
The price of £4.50 is inclusive of post and packing. This is basically non-profit making, for every one sold I shall be donating £1 to the Amsat Phase 3D fund.

I shall have more from 'down under' in next month's column. Readers in VK, or any other land, please don't be shy, send me some news of what is happening in your part of the world. Perhaps with a few pictures to show everyone else

However, space has just run out again, so that's it for this month. Even though you may be reading this in November, I'd like to wish you all a very Happy Christmas and a peaceful 1994. Remember, there are lots of good things in small packets!

As usual, news to G3LDI @ GB7LDI, QTHR or Tel: (0508) 70278.

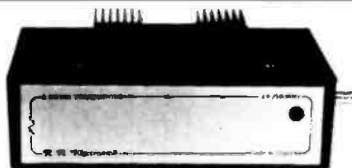
73 and happy packeting de Roger, G3LDI.



**Fig. 1: Ian Wade G3NRW, caught with a copy of his book *Nosintro*.**

**E N D**

## BRITISH TRANSVERTERS



RN6/2/25 2-6 metre 25W output £229      RN4/2/10 2-4 metre 10W output £229  
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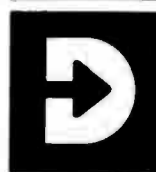
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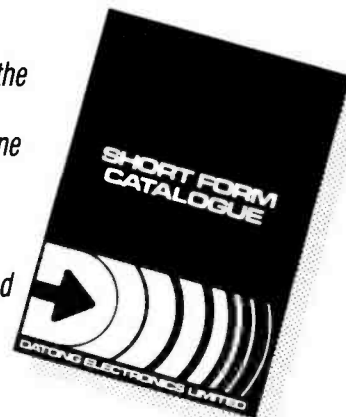
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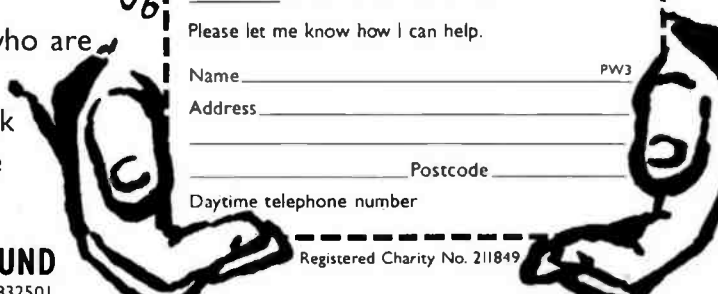
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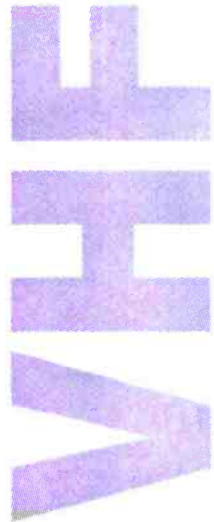
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Report



*This month David Butler G4ASR has updates on auroral activity, openings on the 50MHz band and meteor shower information. David also provides details about v.h.f. transverters and the latest news from the IARU Conference in Belgium.*

Recent months have seen a marginal improvement in auroral activity on the v.h.f. bands. Levels in June and July, as expected, were very low with only four openings being recorded during the period.

In the following month, three events were observed on August 4, 16 and 27. The opening on August 16 which commenced around 1500UTC was probably the best of these.

Contacts on the 50MHz band were generally between G and GM. The stations of GM3XOQ (IO99) and GM6ABU/P (IP90) both located on the Shetland Islands were much in demand.

It was a similar situation on the 144MHz band. But **Andy Cook G4PIQ** (JO02) did find SM5EFP (JO79) at 2204UTC operating in the c.w. end of the band.

**Jim Williamson GMOFET** (IO87) literally saw the aurora! Jim observed it at 2200UTC, before going into the shack and firing up the 144MHz gear. On that band he runs a Yaesu FT-221 with muTek front-end board, a single 4CX-250B amplifier and 17-element F9FT Yagi at 20m above ground.

Andy worked a total of seven countries including OH2BNH and OH2TI (both in KP20) and OY9JD (IP62). Most stations were worked on a beam-heading of 30°.

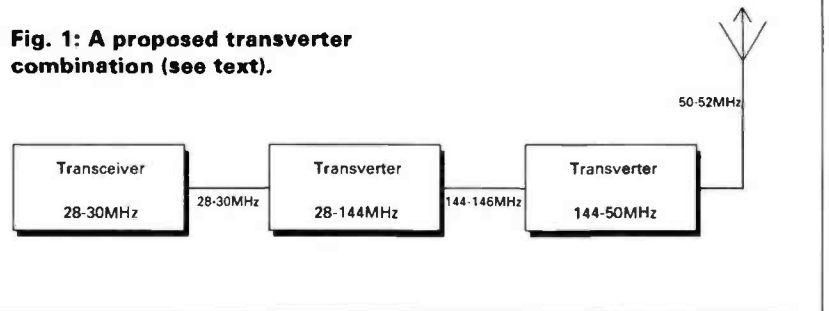
But at 0000UTC the aurora had moved to the west. Then Andy found that the Swedish beacon SK4MPI (JP70) on 144.960MHz was strongest at 335°.

During September a total of five events were recorded in central England. The dates for your auroral calendar being September 3, 12, 13, 20 and 29.

Activity on the 50MHz band was very low, which is a real shame. It's almost like operators on this band don't recognise DX unless it's S9!

At least on the 144MHz band some people are prepared to dig down into the noise to find the DX. The use of the auroral calendar

**Fig. 1: A proposed transverter combination (see text).**



(which I described in the February issue) also comes in very handy.

For example using the auroral calendar, one solar rotation (28 days) after the event on August 16 the recurrent solar coronal hole was facing the earth again. It therefore came as no surprise that an aurora might happen on September 13.

Other indicators were also present to give forewarning of the event. On September 12 the h.f. bands were very disturbed as a minor Dellinger fade-out had occurred earlier in the day.

The aurora on September 13 started around 1500UTC. Although not very intense it waxed and waned through to 2200UTC.

During the September 13 event, contacts could be made on the 144MHz band with a number of stations in northern Europe. The pick of the bunch was UZ2FWA (K004FT) who was putting in a really strong c.w. signal around 1630UTC.

It's just a pity that more people don't read Morse. I can't emphasise enough that the real DX is always on c.w!

### Meteor Showers

Unlike sporadic meteors, the orbits of established meteor showers have paths which can be accurately calculated. The following information concerns the Leonid and Geminid showers which the earth will encounter in the next few weeks. It determines the best direction to beam at specific times and when the shower is below the horizon.

The Leonids meteor

shower will be encountered between November 15-19 peaking on Wednesday November 17 theoretically at 1030UTC. It rises in the sky at 2230UTC and sets at 1430UTC. Between 0100 to 0300UTC beam north or south, 0300 to 0400UTC beam north-east or south-west, 0400 to 0800UTC beam east or west, 0800 to 1100UTC beam south-east or north-west.

The Geminids shower lasts from December 6-15 with the predicted maximum activity occurring at 1955UTC on Monday December 13. It rises at 1630UTC and sets at 1145UTC. Between 2000 to 2200UTC beam north or south, 2200 to 0100UTC beam north-east or south-west, 0100 to 0300UTC beam east or west, 0300 to 0500UTC beam south-east or north-west.

The Bavarian Contest Club (BCC) have organised a contest to be held during the Geminids meteor shower. It commences at 0000UTC on December 10 and continues through to 2400UTC on December 14.

The Bavarian contest is a c.w. only event, with the aim of generating more activity on the random working frequencies. Full contest details may be obtained from me via packet radio @ GB7MAD or even via the postal system!

### The 50MHz Band

After a very quiet start in early August, the 50MHz band produced some excellent Sp-E propagation. The band was particularly

good during the period August 20-30 with many lengthy openings to most parts of Europe.

On August 24, around 1800UTC, the Sp-E propagation linked into a t.e.p. path and contacts could be made with 7Q7LA and 7Q7RM in Malawi.

On September 29 and 30 the band opened up to Greece. There were contacts with SV5TS (Rhodes) and SV9ANJ (Crete) giving many UK operators new DXCC countries.

Conditions during September were grim. It was almost as if the band knew it was September and switched itself off. Apart from the auroral activity already mentioned virtually no other activity was recorded.

**Luit Popken PA0LPN** (JO22) has sent me the logs of his activity during the summer. He has built the G4WIM transceiver and runs 10W into an HB9CV beam at 12m above ground.

With his relatively simple set-up PA0LPN has worked 28 countries. They range from the Faroe Islands (DY) in the north to the Canary Islands (EH8) in the south. Contacts as far east as Russia (RU1A) and Belarus Republic (EV5M) were also made.

**Leslie Kennedy G4TEP** (IO91) reports that he was very surprised to work OK2BGW (JN89) during a Sp-E opening on August 14. Nothing remarkable in that except that G4TEP (nice call sign!) was only running 20mW from a PW Meon transverter. The antenna



was a small 2-element HB9CV beam.

The station of **M Richardson G1IYN** (J001) runs a Yaesu FT-736R into a 2-element Yagi. He has also been successful in recent months making many s.s.b. contacts throughout Europe including HB9CKZ, IS0AGY, OY3JE and T70A.

**Dave Akriil G0DJA** (I093) was pleased to come back from his summer holiday to find the 50MHz band still in good shape. He can run up to 10W output, but prefers to run at a QRP level of 3W or so.

Some of the DX worked included G0JLF/TF/P and G40DA/TF/P, both in locator IP34, ES6PZ (K038) and RU1A (K048). On August 24 at 1757UTC Dave worked 7Q7RM (KH74) on c.w. of course!

These reports typify the attraction of the 50MHz band. When conditions are right you can work some very good DX. On the other hand this is normally restricted to Sp-E propagation during the summer months so you have to be dedicated to catch openings at other times.

## Good Feedback

I've had some good feedback regarding the 'Assembling An Effective VHF Station' article I wrote in the October *PW*. A number of readers have written to me making enquiries about transverters.

One reader wanted to buy a v.h.f. multi-mode transceiver and then add a transverter. However he was undecided about which band the transceiver should operate on.

All commercial transverters I've seen advertised only have options for two different i.f. drive frequencies. Transverters are available from the 28MHz band to the 50, 70 144 and 430MHz bands.

Transverters for the microwave bands are also available and these nearly always use an i.f. from the 144MHz band. You'll also find transverters from the 144 band to the 50 and 70MHz bands.

What you won't find (unless you prove me wrong!) is a transverter from 50 to the 144MHz band. Therefore to answer the first question the only option is to buy a 144MHz multi-mode transceiver and then add to it a 144/50MHz transverter.

Another reader owns an h.f. transceiver and 144MHz transverter. He asked if it was permissible to connect

the 144MHz output to yet another transverter to give access to the 50MHz band.

The answer to the reader's question is yes, but in practice there is a better way of doing it. If you look at the diagram, **Fig. 1**, you can see the system suggested by the reader. Theoretically this will work, but the big problem is one of gain distribution ahead of the main transceiver.

Modern transverters are quite sensitive, but in most cases they also have an excess of i.f. output level. Because of this, it's therefore not simply a case of bolting all the units together.

You must ensure that all inter-unit levels are set up correctly. And this applies not only in the receive direction, but also on transmission. Unfortunately most appliance operators don't know one end of an attenuator from the other!

So unless you're prepared to do some basic system gain setting, it's best to have separate transverters. This is probably easier, as you can leave the transverters connected to the appropriate antenna and just switch the 28MHz i.f. as necessary.

However, you still need to correctly match the levels between transceiver and transverter. One of my original set-ups for the 50MHz band consisted of an FT-221 transceiver (at 144MHz) and a muTek transverter.

The FT-221 was very sensitive being fitted with an muTek replacement front-end board. However, because of the excess gain available it was necessary to fit 18dB of attenuation between the units to stop overloading the receiver.

It may seem strange to fit an attenuator after a transverter, or a low noise amplifier for that matter. But it really is necessary in most cases.

## September Conference

During September I was one of the RSGB delegation that attended the IARU Region 1 Conference in De Haan, Belgium. Many items were discussed concerning the protection of the amateur radio and amateur satellite service. In addition papers were put forward by national societies making various proposals regarding the usage of the amateur bands.

I'll now deal with these changes in band order. It was agreed that in the usage

part of the 50MHz band plan 50.550MHz shall be designated as the facsimile working frequency. This complements a decision at the Vienna meeting 1992 to designate 50.510MHz for Slow Scan TV (SSTV) usage.

The Nordic countries were particularly keen to establish f.m. voice repeaters on the 50MHz band. Although the RSGB have no plans to pursue this at the present time, it was thought helpful to plan for their eventual introduction.

For use within Europe, eight repeater channels were allocated. The input channels will be at 20kHz spacing from 51.210 to 51.350MHz and the outputs will be 600kHz higher from 51.81 to 51.950MHz.

The channels will be designated by the input/output frequency. They would be (for example) 21/81 for the lowest channel and 35/95 for the highest channel.

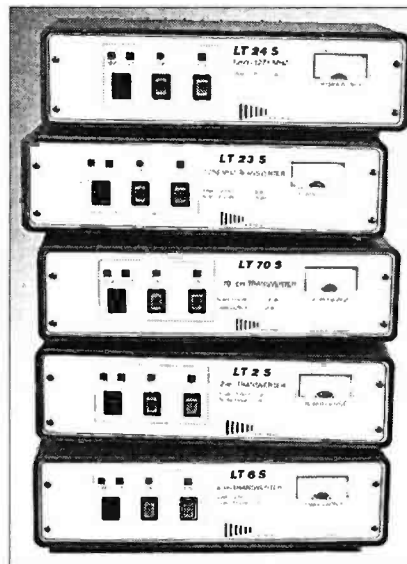
Apparently, Finland is building a repeater to work on channel 35/95 and Norway already has a unit working on 20/80. This repeater will presumably move up a channel or so to fit in with the IARU Region 1 recommendations.

## Minimal Changes

Only minimal changes were made to the usage part of the 144MHz band plan. A recommendation made in 1992 regarding an additional e.m.e. sub-band at 144.140-144.160MHz has proved unpopular.

The conference agreed to an RSGB paper that the 144MHz sub-band should be discontinued and the area 144.000-144.035MHz be adopted. This is in fact a 10kHz increase to the existing usage part of the band plan.

Another proposal that has not gained in popularity is the use of the 'letter' system for random s.s.b. meteor scatter operation. It was agreed that this procedure will be abandoned, but it will be retained for random c.w.



**Fig. 2: There's a transverter for every v.h.f./u.h.f. amateur band (see text).**

operation.

As many operators still use the old m.s. calling frequency, therefore two segments for s.s.b. random m.s. operation have been introduced. They are 144.195-144.205MHz and 144.395-144.405MHz.

A request from the RSGB Repeater Management Group (RMG) regarding low power repeaters on the 430MHz band was agreed. A footnote will be added to the band plan acknowledging the use of channels R61 to R67 at a power of 10W e.r.p. on a non-interference basis.

Modifications were also made to the IARU Region 1 band plans regarding the 1.3, 2.3, 3.4, 5.6 and 10GHz bands. These and the changes just described can be found in the 1994 edition of the RSGB *Amateur Radio Call Book*.

**That's the lot for this time. Keep writing to me, not forgetting the deadlines! Please send your letters to reach me by the end of the month at the very latest. Don't forget that I can also receive messages via packet radio @ GB7MAD or at my DX cluster GB7DXC.**

**Photographs of your shack, antennas or any v.h.f. activity are especially welcome. Other pictorial items such as QSL cards, awards, certificates etc. are also useful.**

**E N D**

*Round-up*

# BROADCAST

*Peter Shore brings you some new winter broadcasting schedules as well as details of a new short wave receiver from Sangean.*

Short wave radio did not have quite the same impact in the political upheaval in Russia a few weeks ago as it did during the coup attempt in the summer of 1991.

In 1991 President Gorbachev listened to the Voice of America and BBC World Service on short wave in the Crimea to try to establish what was going on back in Moscow.

However, in 1993 President Yeltsin was the one in control in Moscow and it was the dissolved Parliament that was isolated in the White House. The Deputies did, however, try to put over their point of view to the outside world using a very low powered amateur radio transmitter.

It seems that few heard the signals. And since most of the people on the streets seemed to have little interest in the whole affair, it was not terribly successful.

On Sunday 3 October, when fighting broke out between the Army units loyal to Yeltsin and the armed supporters of self-proclaimed President Khasbulatov, Radio Moscow World Service broadcast its normal range of programmes and the news contained only brief reports about the trouble flaring in Moscow city centre. How times have changed!

## Boston Site To Close

The World Service of the Christian Science Monitor in Boston's transmitting site in Scotts Corner, Maine, the site used to launch the international station, is to be closed down.

An additional transmitter and antenna have been ordered for the transmitting complex at Cypress Creek, South Carolina. This will enable European and African audiences to continue to be reached from mainland US sites. The Scotts Corner facility will be put up for sale, I wonder who will buy it?

The beginning of October marked the end of

an era when the Voice of Peace beaming programmes into the Middle East, closed. Run by Israeli Abie Nathan, the Voice of Peace has been on the air for more than a quarter of a century.

Many DJs on board were recruited in Britain. But now with a peace accord signed between the Israeli government and the Palestinian Liberation Organisation (PLO), and increasing costs in maintaining a ship that is over 50 years old, Nathan has decided to call it a day.

The fate of the ship is uncertain. It may be sunk in the Mediterranean, or perhaps turned into a peace monument somewhere in the region.

## Winter Schedules And Reports

The Voice of Israel's winter schedule arrived with me at the time of the signing ceremony in Washington.

English to Europe can be heard on 0500-0515 on 17.545, 9.435, 7.465MHz; 1100-1130 on 17.575, 15.65, 15.64MHz; 1400-1430 on 15.65, 15.64MHz (Sun-Thur); 1800-1815 on 11.675, 11.587, 7.465MHz; 2000-2030 on 17.575, 11.675, 11.603, 11.585, 9.435, 7.465MHz; 2230-2300 on 17.575, 11.675, 11.603, 11.585, 9.435, 7.465MHz

The broadcasts at 0500, 1100 and 1800 are relays of the domestic Network A.

There have been reports in the press recently of increasing unrest in Cuba as the population finds it more difficult to make ends meet, with severe rationing of basic foodstuffs.

The Caribbean island state no longer has help from the former Communist countries of eastern Europe, and is struggling by itself, with sanctions in place in the United States preventing trade between the countries.

Cuba seems a perfect place for an uprising by the people and for that reason it could be worthwhile keeping an ear on Radio Havana Cuba. The station has English on the air at; 0000-0200 on 6.01 and 9.815



**Fig. 1: Peter Shore has news of the new Sangean ATS606.**

u.s.b.; 0200-0500 on 6.06, 6.18 and 13.66MHz; 0500-0700 on 9.51MHz; 2100-2200 on 17.76MHz; 2200-2300 on 6.18MHz.

Spanish can be heard at 2000 to Europe for two hours on 13.715 u.s.b., 17.705 and 17.835MHz.

Regular readers will recall that BBC World Service rents time on an Albanian medium wave transmitter to reach the Balkans. Now the Voice of America is doing the same.

Serbian programmes are transmitted at 1600 for half-an-hour on 1395kHz. In addition, a Romanian medium wave transmitter on 756kHz is used to reach the former Yugoslavia, according to *Media Network* on Radio Netherlands.

Croatian Radio is now heard on the new short wave channel of 13.64MHz. This is in addition to the existing frequencies of 5.92, 9.83 and 13.83MHz, all of which are 24 hour-a-day services.

The Lithuanian station, Radiocentras, is now on the air using 9.40MHz lower sideband, with a 5kW transmitter. The owners are offering to hire time on the transmitter to everyone from broadcasters to churches to DX clubs. To contact the station, you can write to **PO Box 1792, Vilnius, Lithuania, or fax the station on +370 2 612800**. Perhaps we should have *PW* on short wave from Lithuania?

If you tune your satellite receiver to transponder 22 on Astra 1-B (that is one of the MTV channels) and the audio subcarrier at 7.74MHz you can listen to National Public Radio's current affairs output, together with Radios Netherlands, Australia, Finland, France International, Korea, Moscow and Canada.

World Radio Network is now on the air, relaying all radio stations from Astra 1-B, and one or two others, twenty-four hours a day. All programmes are in English,

but the station has plans to introduce other language streams in the future. It means that you might never have to switch on a short wave receiver at home again!

## New Sangean Receiver

Finally this month, I have details of a new short wave receiver from the Taiwanese Sangean company, badged for the German manufacturer, Siemens.

The Sangean ATS606 (Siemens call it the RK 759), has comprehensive short wave coverage as the a.m. band runs from 150kHz to 30MHz.

The ATS606 has been designed as a compact travel portable. It measures a little under 150mm wide by 90mm high and 30mm deep and weighs around 330g.

Frequencies can be keyed in directly on the numeric keypad and manual tuning is provided by UP and DOWN buttons. Additionally there are 18 frequencies of nine European broadcasters have been programmed into the total of 45 memories.

A novel device on the ATS606 is the Automatic Tuning System. This works on f.m. to store the strongest signals in a separate memory table, so that if you take the radio to a new area, you do not have to search labouriously for the local stations (which does take the fun out of it if you like DXing the f.m. band on your travels!).

Overall, the ATS606 is a well-built receiver, and seems to work well on short wave and it costs around £90 in Germany.

**That's all for this month, don't forget to send your news and reports to me via the *PW* office.**

**E N D**



The World of ATV

FOCAL POINT

Andy Emmerson G8PTH brings you his bi-monthly report on the ATV scene with a look into his mailbag.

I start this month with a welcome letter from Mike Edwards G8CPF. He signs himself Technical Dogsboddy for GB3UT.

Mike says "In response to your plea for updated info on the 'secret' repeaters, I am pleased to inform you that GB3UT (Bath) is also alive and well(ish!), having undergone major surgery and much tender loving care for many months, nay years!

"It seems we are not quite alone in having to wrestle with the problems of an a.m. allocation (RMT1 1276.5MHz in, 1311.5MHz out) with its ridiculous 35MHz split (lovely for an i.f., isn't it?) and all the attendant problems of keeping TX out of RX. Please extend our sympathies to Keith G8HGM and company (GB3VI).

"We too are running about 6W, into a phased co-linear array from our 700ft a.s.l. site at Bath University (co-sited with GB3UB and GB3UX), most contributors using GB3UB for talkback so as to avoid cluttering 144.750 (in view of our proximity to 'ZZ' country). GB3UT has two receivers, one for a.m. and one for f.m. - the a.m. one has gone a bit blind lately. Hoping that will be fixed soon.

Mike continues "The transmitter uses a Mitsubishi M57762 brick, amplitude modulated on its bias pin, with envelope negative feedback to improve linearity. In beacon mode it emits a sequence of eight test patterns from an EPROM-type test card generator.

"Current work in hand is to implement multi-source switching, using a MAX456 eight-by-eight crosspoint switch (courtesy of Maxim Integrated Products), a frame store and to improve the intercarrier sound.

"Don't forget if you are looking for either 'UT or 'VI we are amplitude modulated, which means your normal satellite receiver will probably clip the syncs unless you can nuzzle the limiter. All you really need is a downconverter into the back of your domestic a.m. television, plus a good



Here's an off-screen shot of PE1LRS working through GB3LO, the amateur television repeater in Lowestoft. It looks as if he is using a light pen for the main caption or more likely he wrote it on card with a felt pen and used his camcorder's framestore to key the saved image into the main picture. Photograph by Paul Godfrey G8JBD in Lowestoft.

antenna. 73 from GB3UT". Good stuff, nice to hear from you, Mike!

News

Now for some news. I received a telephone call from William G8CMK, who has been working on the Mk III version of GB3VI, the Hastings repeater. William says it is an a.m. transmitter producing 10W peak sync power into a G3JVL Alford Slot antenna.

This signal reaches Eastbourne very satisfactorily in colour. Apparently many users transmit into the repeater using f.m. for convenience, the repeater having twin a.m. and f.m. receivers. William's current tour-de-force is a filter having just 1.6dB insertion loss and 20MHz passband. The stopband is 80 or 90dB at 35MHz off and the filter is made of 15mm diameter copper pipe enclosed in printed circuit board material. The whole affair is two feet long.

Paul Godfrey G8JBD in Lowestoft, Suffolk, has also written to me to say "Just a few lines to update you and your readers with the progress of GB3LO, the Lowestoft 24cm ATV repeater.

Paul writes "Our repeater builder Ray G4RKP has been busy improving the box in stages, it now runs the full output power of 25W ERP (courtesy of a Mitsubishi brick p.a. ) from an Alford Slot. This has greatly improved the coverage in the North and South directions over the original set-up of bow tie aerials that only

favoured the westward direction.

"Lowestoft is the most easterly town in the UK and therefore to see the repeater's potential to the east needed a lift in conditions to get signals across the North Sea.

"On the 30th June 1993 a local QSO between Dick G4RRX in Norwich, Mike G4PFG in Harleston and Tony G4AXN near Norwich had a breaker on frequency, Walt ON5NY in Passendale who was P5 into the box. Between breaks in transmission the PE1LRS call sign appeared and Walt tried to call him via via LO but did not make contact.

"After working our local trio Walt then worked via LO Tony G4UAM at Lingwood near Norwich. Later that evening Ray G4RKP in Lowestoft did work PE1LRS who reported that he could see Ray's signals via the box and direct. Paul says "I have taken some photos of a video tape made by G4RKP of some of the events of that evening with the hope that these may be of interest. Thanks for all your columns that appear in the various mags, I feel this really helps to keep interest in ATV alive." Thanks for that Paul and for your comments on my columns.

More Thanks

Thanks also to the Severnside, Kent and Birmingham ATV Repeater Groups for their newsletters. We'll probably dip into these next time if there's room. Also by then I hope to hear that

the Birmingham group have been successful in their search for an antenna site.

Well Developed Repeaters

Britain is not the only country with a well-developed TV repeater system. Jonathan Gudgeon G4MDU was a keen ATVer until he left these shores to work in Vienna.

John kindly sent me a map and frequency allocation sheet of repeaters in Austria, which shows no less than nine ATV repeaters there. Kris Partridge G8AUU (he used to publish the European VHF/UHF Repeater Guide with Julian Baldwin) has extracted nine pages showing frequencies and locations of ATV repeaters in Denmark, France, Germany, Luxembourg, the Netherlands and Switzerland. If anyone wants photocopies, I'll be happy to oblige (11 pages at 10p = £1.10 plus 24p postage).

Again space as caught up with me so until next time cheerio and keep sending your news and views to 71 Falcutt Way, Northampton NN2 8PH.

E N D



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Yaesu FT-5100 Dual-Band Mobile Transceiver by Richard Newton G0RSN	20	May
Yaesu FT-530 Dual-Band Hand-Held by Richard Newton G0RSN	24	Apr

## Obituary

Peter Rouse GU1DKD	13	Sept
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### Computing In Radio Presented Free with Practical Wireless May 1993

A Packet Experience by John Denton G4USF	16	May
Build Your Own Computer by Peter Hunter G0GSZ	4	May
Computer Book Reviews	9	May
Computer Control Of The FRG-8800 by Norman Dille G8YBT	3	May
Computers And The London Amateur Radio Show by Mike Richards G4WNC	8	May
Educational Software On The IBM PC - Special Offer by John Beaumont	20	May
Equipment Showcase by Peter Hunter G0GSZ	11	May
How To Design Inductors by R. E. Barber	22	May
Lucid Morse - Tutorial Program Review by Peter G. Rayer	17	May
Yagi Design On A Computer by Norman Fitch G3FPK	18	May

### What Scanner 1993 Presented Free with Practical Wireless December 1993

VHF Utility Listening by Tim Anderson	1	Dec
Netset Pro-46 Review by Mike Richards	7	Dec
AOR 1500EX Review by Donna Vincent	8	Dec
Visiting Yupiteru On Their Own Ground by Mike Devereaux	12	Dec
Have Scanner, Will Travel by Andrew Linney	13	Dec
What Scanner compiled by Elaine Richards	15	Dec

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Nevada Communications 72-page Catalogue	June
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18 Jan, 19 Feb, 19 Mar, 16 Apr, 16 May, 16 June, 16 July, 16 Aug, 16 Sept, 16 Oct, 16 Nov, 16 Dec

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	Part 3 9 Dec

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62 Jan

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### VHF Report by David Butler G4ASR

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**Don't forget we still have available PW back issues for 1993. These are available from our Post Sales Department for £2.00 inc. P&P.**



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# Practical Wireless Tool Club

To accompany our 'Workshop Special' issue we've come up with some interesting and very useful tools for your workbench. All items have been selected and tried by Rob Mannion G3XFD, Editor of PW.

The SL-1000 Portable Gas Powered Soldering Iron. To start with, have you every been stuck when needing to solder away from a mains electricity or 12V battery source? I have, and I have found the portable Pencil Gas Soldering Iron ideal for those emergency jobs, or even when you're near a mains supply but don't have the larger iron.

This neat little soldering iron only measures 20 x 145mm with its soldering tip in place, and a little less with the supplied blow-torch head.

Working as a soldering iron, once it's lit, the catalytic burner takes over and the flame disappears. You can then adjust the iron up to a maximum equivalent heat rating of approximately 60W. It's ideal for outdoor antenna jobs, and you can see just how much gas is left. Refilling, from an easily obtained lighter fuel dispenser takes only a few seconds. I was most impressed, and needless to say, there's one in my toolbox now!

**Tool Club price £14.45 inc. P&P and VAT.**



The Helping Hand. Everyone can do with an extra 'helping hand' in the workshop. The type we've come up with has a built-in magnifying glass. It can save you many wasted minutes trying to solder and hold awkward small components and will be useful on any workbench.

**Tool Club price £10.75 inc. P&P and VAT.**

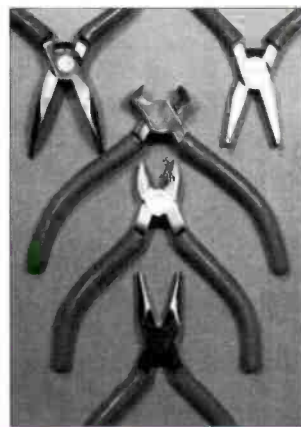
**Adjustable Automatic Centre Punch.** The automatic one-hand operated 'centre popper' can save you much frustration and time. By placing, and then gently pushing the barrel you can use this handy 120mm long punch to make a good centre point for drilling metal and I also use mine when I'm marking out metalwork and p.c.b. material.

**Tool Club price £7.45 inc. P&P and VAT.**



**Five Piece Mini Plier And Cutter Set.** This neat set of 105mm long tools is of good quality, well finished steel with the essential (for small hand tools) sprung-loaded action. All items are extremely useful, but I found the angled pliers and end cutters particularly good. The set is well made and fitted with a comfortable, good quality handle insulation made from resilient plastics.

**Tool Club price £10 inc. P&P and VAT.**



## Practical Wireless Tool Club December 1993

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**Send your order to Practical Wireless Toolclub Offer (December), Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Offer closes 9 December 1993 (UK), 13 January 1994 (overseas). Orders from abroad are welcome, but please enquire via the PW office regarding the extra postage.**

# A R C A D E

## The PW Shopping Arcade

Welcome to the *Practical Wireless* 'Arcade'. In this section of the magazine, you'll be able to find all those important services 'under one roof' - just like the shopping arcades you see in the High Street.

Let your eyes 'stroll through' the Arcade every month and you'll find all departments open for business including: The Book Service, PCB Service, Binders and details of other *PW* Services. Make a regular habit of 'visiting' the Arcade, because in future, you'll have the chance of seeing special book offers and other bargains. And don't forget, this Arcade is open wherever you're reading *PW*!

## Services

### Queries:

Practical Wireless,  
PW Publishing Ltd., Arrowsmith Court,  
Station Approach,  
Broadstone, Dorset BH18 8PW.

We will always try to help readers having difficulties with *Practical Wireless* projects, but please note the following simple rules:

- 1: We **cannot** deal with technical queries over the telephone.
- 2: We **cannot** give advice on modifications either to our designs, to commercial radio, TV or electronic equipment.
- 3: All letters asking for advice **must** be accompanied by a stamped self-addressed envelope (or envelope plus IRCs for overseas readers).
- 4: Make sure you describe the problem adequately, with as much detail as you can possibly supply.
- 5: Only one problem per letter please.

## Back Numbers

Limited stocks of many issues of *PW* for past years are available at £2.00 each including post and packing. If the issue you want is not available, we can photocopy a specific article at a cost of 85p per article or part of article. Over the years, *PW* has reviewed many items of radio related equipment. A list of all the available reviews and their cost can be obtained from the Editorial Offices at Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW for a stamped self-addressed envelope.

## Binders

*PW* can provide a choice of binders for readers' use. Plain blue binders are available, each holding 12 issues of any A4 format magazine. Alternatively, blue binders embossed with the *PW* logo in silver can be supplied. The price for either type of binder is £5.50 each (£1 P&P for one, £2 for two or more).

Send all orders to PW Publishing Ltd., FREEPOST, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW.

## Constructional Projects

Components for *PW* projects are usually readily available from component suppliers. For unusual or specialised components, a source or sources will be quoted.

Each constructional project is given a rating to guide readers as to the complexity.

**Beginner:** A project that can be tackled by a beginner who is able to identify components and handle a soldering iron.

**Intermediate:** A fair degree of experience of building radio or electronic projects is assumed, but only basic test equipment will be needed to complete any tests and adjustments.

**Advanced:** A project likely to appeal to the experienced constructor. Access to workshop facilities and test equipment will often be required. Definitely not for the beginner to attempt without assistance.

## Mail Order

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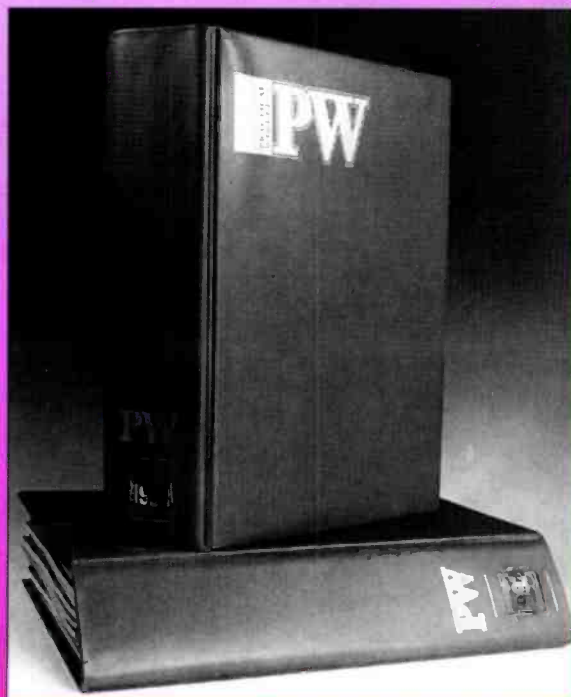
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George Wilcox

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### FLIGHT ROUTINGS 1993

Compiled by T.T. & S.J. Williams  
This guide was produced with the sole aim of assisting airband listeners to quickly find details of a flight, once they have identified an aircraft's callsign. Identifies the flights of airlines, schedule, charter, cargo and mail, to and from the UK and Eire and overflights between Europe and America. 122 pages. £5.95

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(RSGB)

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# REVIEWS

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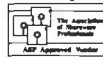
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# HANDHELD HEAVEN

## IC-P2E/P2ET

The picture below shows the IC-P2E 144MHz FM transceiver, typical of ICOM's new wave of handhelds, the IC-P2ET has extended functions and is keypad operated. Both of these compact radios have AI



(Artificial Intelligence) a unique feature that allows instant access to previous functions. The IC-P2E and P2ET will evaluate your operating capability and memorize the order of functions used. Other features include; 100 memory channels, programmable call channel, ergonomic design, system clock with timer and lots more.

## IC-P4E/P4ET

The IC-P4E and P4ET (pictured) are 430MHz FM transceivers visually similar to the IC-P2E range.

Features include: compact and ergonomic design, 100 memory channels, 5 watt power output with 13.8VDC. cartridge-type battery pack, full programmed and memory scan



features, a variety of tuning steps, simple 1750Hz tone call, auto power-save and frequency lock function. The durable splash-resistant body measures 49W x 105H x 38D mm, and weighs a mere 280g. We think you will agree that these compact handhelds will prove to be winners.

## IC-2iE/4iE

These two new, ultra-slim and rugged handhelds have got to be the smallest transceivers around. Even including battery pack these radios will fit snugly into your shirt/jeans pocket or handbag. The IC-2iE operates on 144 - 146MHz FM and the IC-4iE on 430 - 440MHz UHF FM bands. Both of these



radios feature: maximum 5 watt output (with 13.8VDC battery), output miser to conserve battery power, 10 memory channels, scanning, power-save function and dual tuning steps. A full range of practical accessories are also available to make these pocket pals even more fun to operate.

## IC-W21E

The IC-W21E offers dual-band 144/430MHz simple operation using few switches and independent volume / squelch for each band.

The ergonomic and splash-resistant design makes the IC-W21E a snug fit in the palm of your hand. Features include; cellphone-style



'whisper' function. This allows cross-band full duplex use via the mic-equipped battery pack, and easier repeater operation with repeater memory. Every time you access a repeater all settings are automatically memorized in a repeater memory.

## IC-W21ET

The W21ET has the same dual-band performance characteristics as the IC-W21E but sports a command keypad and relocated back-lit display (manual operation is also available).

Features are as the IC-W21E and include: battery capacity indicator, remote control via an optional HM-75 speaker mic, 70 channels, dial select steps, monitor function, high-speed scan functions, frequency-lock function, external DC power jack for mobile use, auto power-down to allow last minute operation before battery fades, giving you the most from your IC-W21ET.



## IC-2SRE/4SRE

The distinctive appearance of these two handhelds is bound to start the tongues wagging. You can enjoy the advantages of a handheld transceiver



with a wideband receiver allowing true reception of FM Broadcast, Air and Marine bands. Until now this was only achieved by purchasing separate equipment. The IC-2SRE is a 2m FM transceiver with wideband receive and the IC-4SRE is its 70cm companion. Other great features include; selective calling, 30 ham memory and 60 wide-band receive memory channels plus loads more.

N.B. Photographs not to scale.

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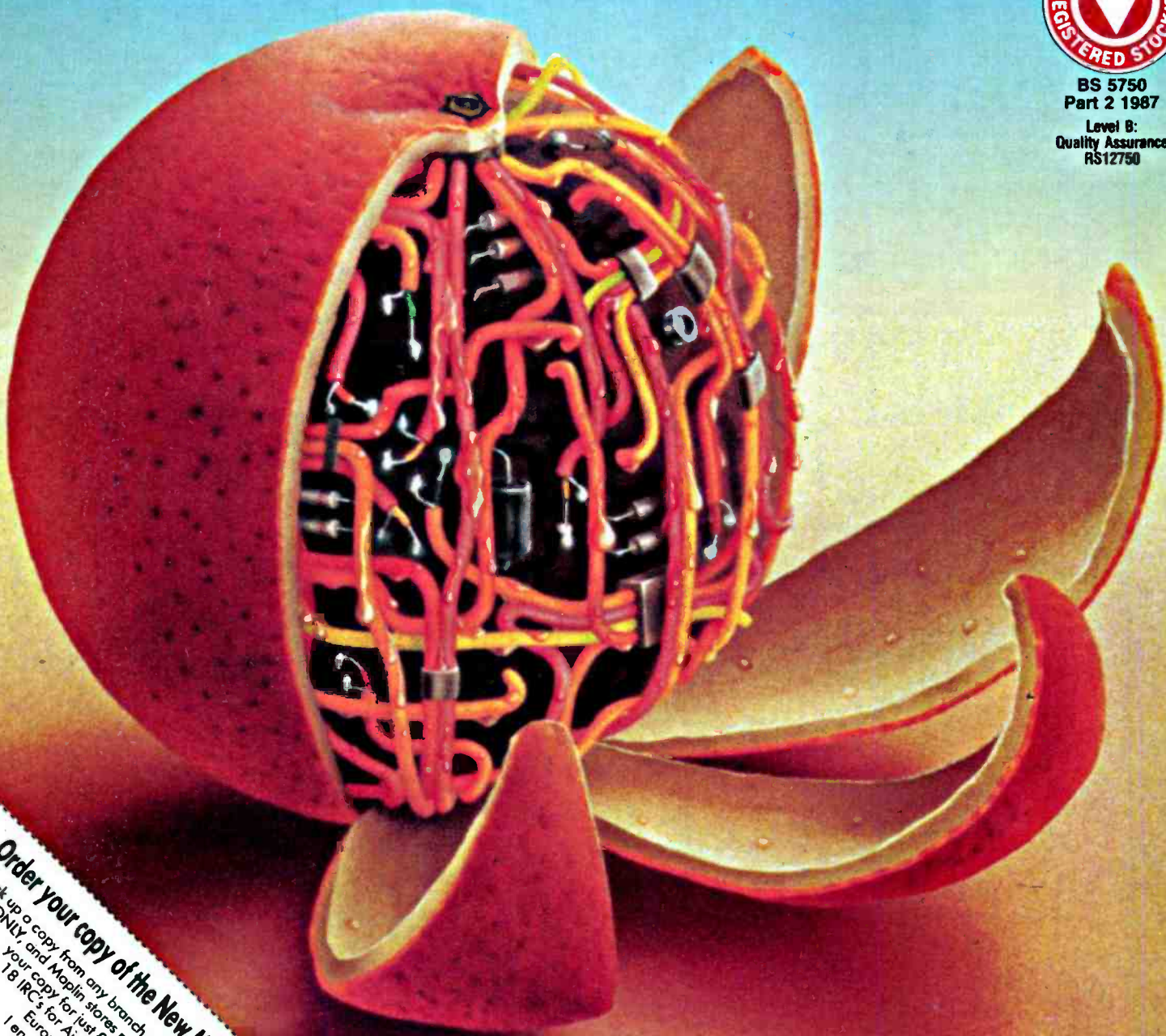
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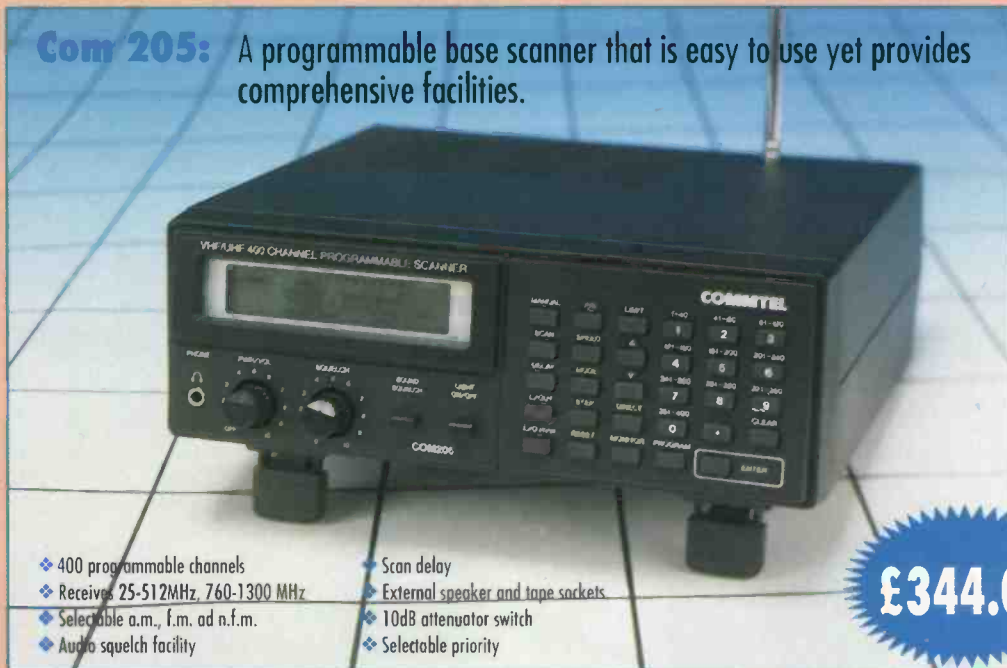
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## WELCOME

Once again it's the time of year for another issue of *What Scanner*. This issue is being given away, free, with both *Short Wave Magazine* and *Practical Wireless*, so reaching an even wider audience than in previous years.

Scanning has grown in popularity over the last year or so, probably as a result of the 'scandals' that have been widely covered by the press - tabloid or otherwise. However, the widely predicted clampdown by the authorities has not happened - in fact it now seems to have receded somewhat.

I hope that you enjoy reading this issue of *What Scanner*. If you received your copy with *Short Wave Magazine* you do not need me to tell you that *SWM* is essential reading for scanning enthusiasts. If, however, you are a *Practical Wireless* reader and this is your introduction to the world of listening, may I be so bold as to suggest that you might find *Short Wave Magazine* worth looking at.

Dick Ganderton

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## WHAT SCANNER

# VHF UTILITY LISTENING

Perhaps the most succinct definition of utility listening would be to say that it is listening to signals other than broadcast and amateur stations. Often listeners will specialise in a particular mode or type of station for their utility listening, some will use only RTTY and decode News Agency broadcasts, others prefer FAX and receiving weather data, some will just listen to the various military/aviation bands spread across h.f. following movements of planes right across the Atlantic. In short, there are hundreds of different types of signals out there to be copied.

Most utility listeners, except perhaps for aviation enthusiasts and satellite fans, would be using frequencies between 30kHz and 30MHz for their signal chasing, but as I have found, utility listening need not stop there.

*'Utility' listening has become one of the most popular facets of the short wave listening hobby in recent years. You only have to look at columns like 'Decode' and 'SSB Utility Listening' in Short Wave Magazine and the proliferation of adverts for data decoders for many different modes: c.w., RTTY & FAX, to mention just a few, to see how popular this type of listening has become. To ask, "What is utility listening?" is a bit like asking, "How long is a piece of string?" Tim Anderson explains more.*

Throughout much of the world, low v.h.f. (30-50MHz approximately) is used for many interesting services such as power utilities, military, telephones, fire services, police, forestry services, railways and many others. Given that v.h.f. propagation is generally line of sight, you may be forgiven for thinking that there is not much chance of receiving any of these services from overseas and whilst it is true that you won't hear things everyday in this part of the spectrum, there are many days when European and even world-wide reception is possible. Equipment to receive all of these signals is not hard to find, any scanner that covers low v.h.f. will do.

### IT ALL STARTED WITH 50MHz

I have owned a scanner of one sort or another for nine years now and I used

them mostly for TVDX as an 'early warning' monitor to keep track of how many TV channels were active during openings. I didn't really become aware of all the world-wide DX that could be heard on v.h.f. until I became interested in the 50MHz amateur band.

Many amateurs who use the 50MHz band monitor the 'World-wide 6m Information and Talk Back Net' on 28.885MHz to keep abreast of the openings and the DX. I heard several amateurs on this net swapping frequencies of STLs (Studio to Transmitter Links) in various exotic locations. These STLs are used in the same way as the amateur beacons to indicate the direction of any possible openings and also to monitor the rise of the m.u.f. (maximum usable frequency). Many amateurs also had lists of the exact offsets of many world-wide E2 and R1 TV transmitters,



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48.25 & 49.75MHz nominal vision frequencies, for the same reason.

I took note of a few of the frequencies that were mentioned and entered them into the scanner memories. The first STL I heard was in Columbia, South America. Very pleased with this DX, I started to scan between 30 and 50MHz and was surprised how many signals I could hear from the USA and Central America.

How could I hear all this DX at these frequencies? Quite simply because of the sun spot cycle being near its peak. There have been many other articles in many radio magazines explaining the vagaries of our sun and its eleven-year sun spot cycle, so I don't intend to go into a full explanation here. Suffice it is to say that for two to three years either side of the sun spot cycle peak the F2 layer of the ionosphere becomes more highly ionised and generally speaking the higher the ionisation, the higher the Maximum Useable Frequency or m.u.f.

Over the past four winters, m.u.f.s have climbed to 51MHz or more, often for a week or more at a time, allowing reception of many world-wide utility signals on v.h.f. Depending on how quickly this cycle declines we may still have one or two winters of F2 propagation on v.h.f. Of course, all the other more familiar v.h.f. propagation modes will produce DX reception of some sort on the low v.h.f. bands.

Summertime Sporadic E, or Es, often brings in signal from much of Europe and occasionally North Africa and the Middle East. Tropospheric reception does occur on low v.h.f. but generally it is not as intense as high v.h.f., 144MHz for example, although I

have received trop signals from France and Germany on low v.h.f.

## MYSTERY SIGNALS

Some of the signal received are a real mystery due to the language problem, but with a little patience and detective work you can often locate the source of the signals. Radio procedure seems to be much the same the world over, listening to a radio net one morning in a

totally incomprehensible (at least to me) language, I noted that all the stations were called by a name, rather than a number. Some of these names seemed vaguely familiar and given the time of day, the signals were more than likely coming from the Near of Middle East, so I made some notes, phonetically, of all the names and looked them up in the atlas. Many of these names correspond to town names like Turkey. For most listeners in the UK, signals from the USA and Canada will be the most interesting as they use English, or at least a form of it!

Many police services in the USA have channels on low v.h.f. and plenty of these channels are simplex. Once the m.u.f. is high enough and the propagation in the right direction, sections of the low v.h.f. spectrum can be crammed with police communications. Not just the base stations either, I have often heard the mobiles and on one occasion a policeman in New York involved in a chase could be heard, panting, into his hand-held! Knowing the locations of these police signals makes listening even more exciting. It takes a little bit of patience as obviously no one is going to announce their location on every communication, but the controllers often direct cars to addresses that include the area of a city, like the Bronx, in New York. As controllers or dispatchers as they are known over the water, often direct cars in 'hot pursuit' by road or highway numbers, it is useful to have an American atlas handy. Mine is the *Bartholomew Road Atlas America*, which includes Canada, the USA and Mexico along with major city maps

that I bought from WH Smith. Using this I have twice followed car chases in New York state and Washington DC on the map.

Other signals from the Americans, heard by me or other UK scanning enthusiasts, include power utility controllers sending linemen, 'To an overhead cable break that had been made by squirrels chewing through the cable, again!', port workers involved in docking ships, ambulance dispatchers, railway track repairmen and outside broadcast links for TV news. Yet more signals from around the world include a police net in Pakistan, American workers in the Gulf who sounded as though they were involved in the operations to cap all the burning oil wells in Kuwait, military communications from the USSR (as it were then), STLs from many countries and once, US forces somewhere in the Pacific.

## DIFFERENT SIGNALS

Another type of signal often heard on low v.h.f. when conditions are right is harmonics from h.f. broadcast and utility. Many h.f. broadcasters use very high power transmitters, often hundreds or even thousand kilowatts, and while most h.f. broadcasters take great care to keep harmonic radiation from their transmitters to a minimum, some power is still radiated as harmonics. These harmonics could be in their tens or hundreds of watts range and easily propagated around the world when conditions are right.

Tracing the source of these signals is easy with a short wave receiver and a book such as the *World Radio TV Handbook*. Take note of the frequency of the monitored harmonic and start dividing - divide by two and check the resulting possible, fundamental frequency on the h.f. receiver, no luck? Divide by three and check again and so on until you find the real fundamental, check what service it is and refer to your *WRTH* and you will have the source of your signal. Many of the harmonics heard will be of broadcast stations but some will be from utility stations such as the Egyptian SUK16 c.w. station I heard on 34.38MHz, see **Table 1**. It would be an interesting exercise to see who could hear the highest multiple, 5th, 6th, 7th?

Equipment and antennas for this sort of reception need not be sophisticated. My present scanner is the Realistic PRO-2005. Multi-element beams for low v.h.f. are nice if you have the room for them and a deep pocket! All reception on the scanner,



# WHAT SCANNER

including Australian TV video carriers, has been with loft mounted dipoles cut for 40 and 50MHz. To help you on your way I have included: **Table 1** - a selection of frequencies from my own database and **Table 2** - band plan for low v.h.f. in the USA.

## USEFUL PUBLICATIONS

*Monitoring Times* (ISSN 0889 5341) published in the USA by Grove Enterprises, PO Box 98, 140 Dog Branch Road, Brasstown, NC 28902-0098, USA. Subscription rate \$28.50 US Funds outside the USA. Covers everything from v.l.f. to Satellite TV including a comprehensive scanning column.

92676, USA. Subscriptions for Europe are \$28 surface mail and \$54 airmail. Another excellent magazine with many columns including one on v.h.f. DXing.

*Betty Bearcat Frequency Directory*. This was published in two volumes covering the Western & Eastern half of the USA. The series has now been expanded to cover the USA in 12-16 volumes. These directories list thousands of USA frequencies in geographical and frequency order and cost \$14.95 each in the USA. The only address I have is Uniden Parts Dept., 9340 Castlegate Drive, Indianapolis, IN 46256, USA (although it might be worth trying Uniden UK as a source).

Of course, don't forget our own *Short Wave Magazine!*

**Table 1**

Freq (MHz)	Mode	Service	Location
30.000	FM	US Military Link	Europe
30.040	FM	Trawlers	Canada
30.055	FM	Radiophones	Barbados
30.125	FM	Military	USSR/CIS
30.160	FM	Mobile phone	Quebec, Canada
30.475	FM	Security Service	El Salvador
30.700	FM	Ocean drilling	Gulf of Mexico
31.060	FM	Jamaica bus depot	New York, USA
31.350	FM	Radio pager CHV	Uruguay
31.400	FM	?	Scandinavia
31.900	FM	OB link	Ontario, USA
32.200	?	Military	Italy
32.200	FM	Repeater	Iraq
32.870	FM	VIP Taxi service, call WAR315	Washington DC, USA
33.160	?	Guam cable TV Repeater	Agana, Guam
33.350	FM	Collective farms	Cuba
33.400	?	UN Forces	Cyprus
33.560	FM	Trumble Fire dept.	New England, USA
33.570	SSB	Scrambled	?
34.380	CW	Harmonic of SUK16 on 17.189MHz	Egypt
34.760	FM	Autobahn assistance	Germany
34.790	FM	Statue of Liberty, call KID703	New York, USA
35.220	FM	Radio Llamada paging, call AZ1229	Argentina
35.340	FM	US Forces	Middle East?
35.680	FM	Radio paging, call WNO364	USA
37.180	FM	Secret Service	USA
37.695	?	CB	Asia
37.800	FM	Police	South Africa
38.640	AM	BBC World Service harmonic	Cyprus
38.650	FM	Pakistan Police	Pakistan
39.250	FM	Power plant	NSW, Australia
39.460	FM	Highway Patrol	Kansas, USA
39.650	?	Pager	Amsterdam
40.469	?	Auroral research radar	Alaska
40.680	?	Industrial, Scientific & Medical (ISM)	World-wide
40.870	FM	NASA	Hilversum
41.150	WBFM	STL for Radio Netherlands	Hawaii
41.150	FM	USMC Air Station	New York, USA
41.275	FM	WNBC TV OB Link	S. Carolina, USA
42.080	FM	Highway Patrol	S. Carolina, USA
42.480	FM	State Police	Michigan, USA
43.065	FM	STL for Radio Yerevan	USSR/CIS
43.650	FM	Fire dept.	Colon, Panama
43.290	?	Meteor scatter system for Transtrack	Marion, USA
44.040	FM	Telephones	Italy
45.300	FM	Telephone link	Japan
45.700	WBFM	STL for RCN	Columbia
45.785	FM	Telephone link	Asia
46.100	FM	Repeaters	Thailand
46.610	FM	Cordless phones	USA
46.750	FM	Presidential helicopter	USA
48.250	FM	RT link	Asia
48.500	WBFM	STL	Italy
48.600	FM	PMR	Australia
48.875	WBFM	STL	Italy
48.960	FM	Repeater	Cuba
49.200	FM	Telephones	Italy
49.410	FM	Hydro operations	Niagara Falls, USA
49.595	?	Digital MS System	Kentucky, USA
49.760	?	MARS US Army	Baltimore, USA
49.800	FM	National Guard	Rhode IS., USA
50.750	WBFM	STL	Italy
52.850	WBFM	STL	Italy
55.070	WBFM	STL	Japan
58.200	WBFM	STL	Italy

*RCMA Journal*, the magazine of the Radio Communications Monitoring Association. Address RCMA Inc., PO Box 542, Silverado, CA

**Table 2**

Freq To Freq (MHz)	Services
30.580-30.640	Industrial
30.680-30.640	Forestry & business
30.700-33.380	Petroleum utilities
31.260-31.980	Industrial & forestry conservation
33.440-33.980	Fire departments
35.040-35.980	Industrial, business & telephone maintenance
37.040-37.400	Local police
37.100	Fire departments
37.100-37.260	Local government & police
37.460-37.860	Power utilities
37.920-37.960	Highway maintenance
39.020-39.960	Local police
39.100-39.980	Local government & police
42.020-42.940	State police
42.280	Fire departments
42.960-43.180	Industrial & business
43.700-44.600	Trucking
44.620-45.060	State police & forestry conservation
44.640-45.040	Forestry conservation
45.080-45.580	Local government
45.100-45.660	Local police
45.680-45.840	Highway maintenance
45.700-46.020	Local police, highway maint & special emergency
45.880-46.500	Fire departments
46.520-46.580	Local government
46.600-47.000	Government
47.020-47.400	Highway maintenance
47.440-47.680	Industrial
47.700-48.540	Power utilities
49.520-49.580	Industrial

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# Radio Communication Products from AOR



**AR1500EX** - The very compact AR1500EX hand-held wide range receiver offers all mode reception including SSB as standard. Newly designed printed circuit boards have been incorporated to ensure this new version offers the very best performance. Frequency range is 500 kHz ~ 1300 MHz without gaps (reduced sensitivity below approx 2MHz - all modes), all mode reception AM, FM(N), FM(W) & SSB (USB, LSB & CW - with BFO). The AR1500EX offers full coverage of the VHF, UHF and Shortwave Airbands plus Broadcast, Amateur band, Utility services etc. Many accessories included: NiCad pack, Charger, Dry battery case, DC lead, Soft case, Belt hook, DA900 VHF-UHF aerial, SW-wire aerial, Earphone, Comprehensive Operating manual... **Suggested Retail Price of £349.00 inc VAT. (UK Carriage free)**

**AR2000** - this popular receiver continues and remains a firm favourite with listeners and enthusiasts. There has to be a compromise in hand-held design when compared to base units such as the AR3000A receiver. However when compared to other wide range hand-



held monitors on the market, the AR2000 provides the very best balance between sensitivity and strong signal handling. The AR2000 has a very wide frequency coverage from 500 kHz to 1300 MHz (1.3 GHz) with no gaps (reduced sensitivity below approx 2MHz - all modes). The modes available are AM (Amplitude Modulation), FM (Narrow Band Frequency Modulation - N.B.F.M.) and WFM (Wide Band Frequency Modulation). Any available mode may be selected at any frequency within the receiver's coverage. For your convenience the search banks have been preprogrammed at the factory to largely suit the UK band plan, this allows you to switch on the AR2000 and immediately enjoy hours of no fuss listening. Of course the AR2000 is supplied with an operating manual showing examples of programming etc. There are 1000 memories arranged in 10 banks of 100 channels, there are also 10 additional programmable search banks. Supplied with: High Capacity NiCad batteries, AC charger, DC lead, DA900 VHF-UHF aerial, soft case with carry strap, belt hook, earphone and operating manual. **Suggested Retail Price £309.00 inc VAT. (UK Carriage free)**



With the **AR3000A** (base-mobile receiver) your listening horizons are truly extended providing receive coverage from 100 kHz all the way up to 2036 MHz without any gaps in the range. The AR3000A offers the widest coverage on the market today with a high level of performance and versatility from long wave through shortwave, VHF and onward to the upper limits of UHF and SHF. Not only will the AR3000A cover this extremely wide range it will allow listening on any mode: NFM, WFM, AM, USB, LSB and CW. The AR3000A also features an RS232C port for computer control. **Suggested Retail Price £949.00 including VAT. (UK Carriage free)**

**AORSC** is a powerful program for the IBM PC (and 100% compatible) computer, which allows you to control an AOR scanning receiver using a serial port (RS-232 interface) of the computer. Many facilities are offered to provide you with a high performance radio monitoring system. The software is priced at **£75.00 plus £2.00 P&P**. AORSC is supplied on both 3.5 & 5.25 inch media for installation onto a hard drive. A **DEMO** disk (without RS232 support) is available on a 3.5 inch disk for installation onto a hard drive, **Price is £3.00 \*\*\* Windows software soon to be released \*\*\***

**ACEPAC3A** For those with a larger budget, ACEPAC3A is also available for the AR3000A & AR3000 receivers. Installation is recommended on a hard drive but can be run from 3.5 or 5.25 inch floppies depending on machine compatibility. Features are similar to AORSC but ACEPAC3A has a more versatile spectrum graph type display. A descriptive leaflet is available to request. **Suggested Retail Price £139.00 plus £2.00 P&P**



**ABF-125 VHF Air Band Filter for better strong signal performance...** The ABF125 is a receive bandpass filter especially designed to improve the strong signal handling characteristics of receivers for VHF commercial Airband listening. The ABF125 is suitable for connection to most airband and wide range receivers on the market, it is not designed just for AOR branded products. The addition of this filter to the aerial signal path will provide additional selectivity which will enable the receiver's circuitry to cope much more easily with strong interfering signals such as Band-2 Stereo or Shortwave broadcast transmissions which can be manifest in many ways such as 'hissing', mixing of many signals together, music breakthrough and desensitisation of the receiver. The ABF125 is not an amplifier so will not 'boost' signals, however the additional selectivity offered can significantly improve reception in many situations by removing unwanted strong signals which may overload the receiver and reduce its effectiveness. Note: Remember to remove the ABF125 from the aerial when monitoring signals other than VHF Airband or signal strength will be dramatically reduced. **Suggested Retail Price £24.50 inc VAT. (UK Carriage £1.50)**

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AR2000	Hand-held receiver 500 kHz - 1300 MHz without gaps. AM/NFM/WFM.	309.00	270.00	39.00
AR2800	Competitively priced full featured base-mobile scanning receiver. All mode operation AM/NFM/WFM & SSB using a BFO. Coverage is 500 kHz - 600 MHz & 800 - 1300 MHz. Includes internal NiCad battery.	449.00	375.00	74.00

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Many other receivers and products are available from the AOR range. Please phone or send a large S.A.E. (34p) for full details. Dealers throughout Europe... fast mail order available for direct orders.



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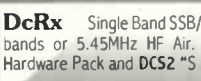


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		Kit	Assembled PCB
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<b>DFD4</b>	Add-on Digital Read-out for superhet radios	£49.90	£69.90
<b>CTU30</b>	ATU covers all HF bands + 6M for receiving or 30W TX	£39.90	£46.90
<b>CV100</b>	Adds Medium & Shortwave to VHF scanners	£27.50	£39.90
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The HOWES AA2 is the active antenna for general coverage HF reception. Broad-band performance that does not tail off at the higher frequencies. The neat compact answer for those with limited space, holiday use, mobile operation etc. Two selectable gain settings, local or coax powering (12 to 14V). Good strong signal performance, IP3 +38dBm. Easy to build, and much liked by customers!

AA2 Kit: **£8.90** Assembled PCB Module: **£13.90**

### AA4 ACTIVE ANTENNA FOR SCANNERS

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AA4 Kit: **£19.90** Assembled PCB Modules: **£27.90**

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AB118 Kit: **£18.80** Assembled PCB modules: **£25.90**



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73 from Dave G4KQH, Technical Manager.



# NETSET PRO-46

*Hand-held scanners are always fun, but are they good performers? Here Mike Richards gives the low down on the PRO-46 from Netset.*

The PRO-46 is a very smart, wide range, portable a.m./f.m. scanner that's ideally suited to a host of different monitoring requirements. From basic airband through to 'DianaGate' fans, the PRO-46's coverage is well planned. Powered by internal batteries and supplied with a neat 'rubber duck' antenna, it easily slips into a coat pocket. In addition to selective coverage from 66MHz through to 956MHz, the PRO-46 features automatic a.m. and f.m. switching. All this combined with the one hundred memory channels makes the PRO-46 an attractive receiver.

## STARTING OUT

To help the operator get the best from the receiver it was supplied with a 27 page operating manual. This was well laid-out with good use of calculator style charts to lead the operator through the various key sequences. There was the usual trouble shooting section for when the thing just lies there beeping at you! The manual also listed the known 'birdies' or spurious signals. Knowing these can save a lot of frustration trying to identify bogus signals. It was interesting to note that there were just seven such 'birdies' quoted for the PRO-46.

General handling of the PRO-46 was very straightforward and required minimal use of the manual. The liquid crystal display featured all the important information and could be back-lit at the press of a button. This backlight remained on for around fifteen seconds before automatically turning off, which saves unnecessary battery drain. For those that want to use the PRO-46 as a base station, or maybe even mobile, there was provision to use an external power supply. The requirements were a very modest 9V d.c. at around 200mA, which could be supplied from a mains unit or a car battery adaptor. The only odd point about this was that it used a smaller than normal coaxial power socket.

The antenna connection was also well thought out with a good quality BNC socket on the top panel. This could be used either for the supplied 'rubber duck' or for an external antenna. If you use a good external antenna, it's as well to have some form of attenuation available. This is because the wide open front end of the PRO-46 can be prone to overload from strong local signals. However, in my experience, a little attenuation goes a long way to minimising the problem.

## SCANNING AROUND

The main operating mode for this receiver is scanning, where it sequentially checks each memory channel for activity. The check, in this case, being for any signal that exceeds the manually set squelch threshold. The scanning rate appeared to be very rapid and was quoted at fourteen channels per second. Although the PRO-46 has a hundred memories, these were conveniently divided into ten banks of ten memories. This makes recall of the memory channels somewhat easier for the operator. You can use this system to group the memories according to the type of signal. As an example, an airband enthusiast could put all the local airport frequencies into one bank, whilst company frequencies may be kept in another.

Selection of the appropriate banks to be included in the scan is done during scanning. Each of the numbered keys on the keypad has a memory range printed above it. All you do is press the appropriate memory band key to toggle it in or out of the scan, as appropriate. There's no limit to the number of banks that can be excluded or included. For further refinement of the scan, you could also lock-out individual memories.

When the PRO-46 detects a signal, the scan will pause for as long as the signal exceeds the squelch threshold. When the signal ends, the scan immediately restarts. In order to cope with the gap between 'overs' in a simplex radio link, you can add a two second delay to any memory. This, fairly obviously, causes the scan to pause for two seconds after the signals disappears and is adequate to cope with most radio links. If you want to hold a memory for longer you just have to press MANUAL or turn the squelch control to minimum.

If you have a particularly important frequency you want to keep an eye on, you can use the PRIORITY feature. This provides automatic monitoring of memory one every two seconds. This happens regardless of the main mode selected. Needless to say, programming the PRO-46's memories was very simple.

## COMPREHENSIVE SEARCH

Of course, having lots of scanner memories is all very well if you know all the local interesting frequencies. For us lesser mortals, the 'hot' frequencies first have to be found.

Although you can use a scanning guide



or Alan Gardener's 'Scanning' column to get started, you will need to do some of your own searching. The PRO-46 is well set-up in this area and has a couple of interesting features to help find those elusive frequencies. The first is the **LIMIT** search mode. This enables the operator to start an intensive search between any two frequencies. The receiver automatically selects the appropriate mode and frequency steps. Once started, the PRO-46 continually sweeps between the upper and lower limits of the search, stopping only on signals that exceed the squelch threshold. The search speed of this mode was very fast with a claimed speed of nineteen steps per second.

As with the scanning mode, you can introduce a two second delay once a signal has been detected. To save you having to write down each useful frequency, the PRO-46 features a set of ten **MONITOR** memories. When the search stops on a signal, the number of the next available **MONITOR** memory will flash in the display. A single press of the **MONITOR** button then transfers the current frequency into that **MONITOR** memory. Once then search has finished, you can then review the **MONITOR** memories and transfer any interesting frequencies into the main memory system.

In addition to this **LIMIT** search, you could start a search from any of the main memory channels. This is done by pressing the **UP** or **DOWN** buttons whilst the required memory is selected. As this

CONTINUED ON PAGE 9



# AOR 1500EX

## COMPACT ALL-MODE HAND PORTABLE RECEIVER

*As a relative newcomer to the world of short wave listening and scanning and someone who has just started, Radio Amateurs Course, Donna Vincent was a little apprehensive when asked to review the AOR-1500EX. But here's how she got on.*

The AOR-1500EX is a hand-held, wide-range, monitor, featuring s.s.b. as standard, together with a.m., n.f.m. and w.f.m. modes. The 1500EX has a total of 1000 memories arranged in ten banks of 100 memories as well as an automatic memory feature to enable automatic storage of busy channels.

It comes complete with a single wide-band whip antenna, for v.h.f./u.h.f., an a.c. charger, internal NiCad rechargeable battery pack, dry battery case, 12V d.c. lead and a short wave wire antenna for use when receiving short wave broadcasts. There's also a soft carry case, belt hook, earphone and operating manual. You do have to supply your own plug for the charger.

### FIRST IMPRESSIONS

My first impression of the AOR-1500EX (incidentally the EX stands for enhanced

model for the UK market), was its solid, robust but reasonably compact size.

The controls and functions are divided between the top and front panels. The top panel houses the **VOL & PWR** (volume and power) combined switch, **SQL & BFO** (squelch and b.f.o.), **DIAL** rotary tuning control, **LOCAL/DX** attenuator switch, **KEY LOCK** and **BFO** switches, together with the **EAR** (earphone) and **ANT** (antenna input socket).

The b.f.o. only functions when the receiver is in a.m. mode when the **BFO** switch is depressed and is used in conjunction with s.s.b. transmissions.

The front panel consists of a grid of 0-9 push-buttons as well as an **ENTER** and a dual purpose **°** and **CLEAR** button. The other thirteen buttons are used for things such as changing modes, locking out certain frequencies, determining **STEP** size in multiples of 5kHz and programming. Also on the front panel are the **SEARCH** and **SCAN** buttons along with a rather useful **LIGHT** button which, when pressed, activates a light behind the l.c.d. I found this function especially useful when operating in bad light conditions.

### SEARCHING

The 1500EX has nine pre-programmed search banks covering all modes, upper and lower frequency limits. These are factory defaults, although it is possible to re-program these banks anywhere within

the coverage range of 500kHz - 1300MHz.

Using the searching facility I found that, as a newcomer, the ability of being able to search through each of the banks very useful, although it does take rather a long time! When the receiver reaches a frequency that is active it automatically stops there until the channel becomes clear, unless the **HOLD** key has been activated.

It is also possible to manually tune the received frequency up and down using the rotary **DIAL** control by whatever tuning step has been previously programmed in.

If you only want to search specific banks this can be done by carrying out the following: **SEARCH**, **BANK**, **PROG** (No.), **LIMIT** (No.), **ENTER** (this is explained in the manual). This facility is particularly useful if you only want to listen to certain frequencies such as airband or marine.

You can store any interesting frequencies into the memory as you come across them when using the receiver in search mode.

### SCANNING & MANUAL TUNING

If you want to use the receiver to listen to short bursts of communication, the 1500EX when in **SCAN** mode is capable of scanning a maximum of 20 channels per second. You can scan all 1000 memory channels apart from those that you have

### MANUFACTURER'S SPECIFICATION

Receiver Coverage:	500kHz - 1300MHz
Receiving Modes:	a.m., f.m. (narrow) and s.s.b. with the b.f.o. switched on (u.s.b., l.s.b. & c.w.)
Number of memory channels:	900 plus 100 reserved for 'auto-memory' in bank 9 1000 total x (10 x 100)
Scan rate:	20 channels per second (approx)
Number of scan banks:	10 total. Bank 9 reserved for 'auto memory'
Scan delay time:	2 seconds (approx)
Search banks:	9 standard search banks plus one search bank for the automatic search pair of bank 9
Search rate:	Programmable in 5 & 12.5kHz steps to a maximum of 995kHz Search step size: (i.e. 5, 10, 12.5, 15, 20, 25, 50, etc.)
Priority channel (AUX):	Any one of the 1000 memories may be used as priority. Sampling is every 2 seconds (approx)
Receiver sensitivity:	f.m. (narrow) 0.5µV or better for 12dB across most of the range a.m. 3.0µV or better for 10dB S/N across most of the range s.s.b. 1.5µV or better across most of the range Note: reduced sensitivity below approx 2MHz on all modes
BFO range:	Continuous -4 +6kHz (approx)
Antenna connection:	One 50Ω BNC socket on top case
Audio output:	>100mW @ 10% distortion
Power requirement:	6V from built-in NiCad battery pack or 11 - 18V d.c. from CHG jack or 4 x AAA dry cells (dry case provided)
Power consumption:	100mA approx
Size:	55(w) x 152(h) x 400mm(d) approx excluding projections
Weight:	360g approx including NiCad pack
Display:	Liquid Crystal (l.c.d.) with switchable light for areas of low level lighting



## WHAT SCANNER

locked-out. Specific banks can also be scanned using the program facility.

One thing that I found very helpful as newcomer was the fact that the 1500EX comes ready programmed. This meant that I was able to get stuck into listening straight away without having to program in any frequencies. This meant that I could discover if there were any frequencies that were of more interest to me than others.

Even though the 1500EX is supplied ready programmed you can manually tune the receiver via the keypad.

Using this feature you can enter any frequency, in any mode and alter the step tuning size as required.

### OPERATING

Once I had finally got to grips with the operating procedure of the 1500EX I felt confident enough to put it to the test.

With the receiver in a.m. mode and by using the b.f.o. control I managed to listen to quite a few short wave stations including broadcasts from RFI and VOA Europe. These signals were vastly

improved when I attached the short wave wire antenna instead of the standard whip antenna.

I also managed to receive signals closer to home. For example, I heard a couple of radio amateurs in Yeovil when I was using the receiver in n.f.m. mode. I was fascinated by the number of frequencies it was possible to receive and found listening to the airband and marine frequencies particularly interesting.

### CRITICISMS

The only criticisms I have of the AOR-1500EX are of the instruction manual and the **SEARCH** and **SCAN** buttons.

Even though the manual works through the operating procedures in stages I found it a little difficult to understand. This meant that I had to read through the manual twice very carefully before I felt ready to begin using the receiver. However, I do not necessarily think that this a fault in the way the manual is written, it might just have been because I was a newcomer.

The **SEARCH** and **SCAN** buttons are printed in blue against the grey plastics casing which makes them difficult to see clearly especially in artificial light.

### SUMMING-UP

I think the AOR-1500EX is an excellent little receiver and I thoroughly enjoyed being given the chance to use it. In fact I'm trying to persuade the Editor of *SWM* to let me hang onto it a bit longer!

With a retail price of £349 it may be a little too expensive for the enthusiast who's just starting out. However, with the wide range of facilities it offers, together with the sensitivity and versatility I think it's well worth every penny.

My thanks go to the Editor of *SWM* for introducing me to the fascinating world of scanning and short wave listening. Thanks also to **AOR (UK) Ltd., Adam Bede High Tech Centre, Derby Road, Wirksworth, Derbyshire DE4 4BG. Tel: (0629) 825926** for the loan of the AOR-1500EX.

## WHAT SCANNER

# NETSET PRO-46

CONTINUED FROM PAGE 7

search has no predefined limits, it continues up or down until the frequency limit of the receiver is reached. At this point, it cycles to the top or bottom limit of the frequency range and continues. The search direction can be reversed at any time by pressing the **UP** or **DOWN** buttons.

Whilst experimenting, I found an extra mode that was not referred to in the manual - direct frequency entry. This is particularly useful when you want to quickly try a specific frequency. Without the direct entry mode, you first have to program the frequency into a memory. The method I discovered was to fully open-up the squelch and key in the frequency followed by the **UP** or **DOWN** keys. This puts you into a direct search from the entered frequency. However, as the squelch is wide open, the receiver will remain on the entered frequency.

### EXTENDED FEATURES

The power connections of the PRO-46 were very versatile and gave the operator a number of options. As mentioned earlier you could use internal batteries or an external d.c source. A particularly good point was its ability to handle both NiCads and dry cells. When NiCads are being used, you can plug an external power source into the charge socket and so trickle charge the NiCads. All too often, you find that battery powered receivers

don't really like the lower voltage provided by NiCads - the PRO-46 breaks that trend.

The PRO-46 also featured a recessed **KEYLOCK** button. As its name suggests, pressing this disabled the keypad and was a boon for true portable operation. There was also the commonly found **WX** key which initiated a search of the American weather report channels. The frequency range covered was 162.4 to 162.55MHz in 25kHz steps. Needless to say, this is of little value outside the USA.

### PERFORMANCE

Throughout the review the PRO-46 showed itself to be a good performer. The audio quality was always very clean, especially on a.m. I was pleased to hear this, as many scanners seem to have particularly poor a.m. detectors. Whilst on review, I took the opportunity to make a few measurements. The low distortion was confirmed with measured results of 1.5% max. on f.m. and a very good 1% for a.m. The sensitivity was also well up to standard giving the following results for 12dB SINAD.

70MHz	0.18µV
127MHz	0.6µV
450MHz	0.5µV

As mentioned earlier, if these high sensitivities are combined with a good external antenna you may hit overload problems. The solution

is normally achieved with the introduction of some attenuation in the antenna lead.

### SUMMARY

The PRO-46 showed itself to be one of the better performers in the competitive portable scanner market. Its facilities were well organised and you don't have to keep referring to the manual to use it to the full. Overall then, a good receiver that is likely to appeal to a wide range of listeners. The current price is £199.99 from all Tandy outlets. My thanks to **Link Electronics, 216 Lincoln Road, Peterborough PE1 2NE. Tel: (0733) 345731** for the loan of the review model.

### SPECIFICATION

Frequency Range:	66-88MHz 108-174MHz 406-512MHz 806-823.9375MHz 851-868.9375MHz 896.1125-956MHz
Sensitivity:	66-88MHz 0.5µV 108-136.975MHz 1.6µV 137-174MHz 0.7µV 406-512MHz 0.7µV 806-956MHz 0.8µV
Search Speed:	19 steps/channel
Scan Speed:	14 channels/second
Priority Sampling:	2 seconds
Delay Time:	2 seconds
IF Frequencies:	10.8MHz and 450kHz
Audio Power:	220mW max.
Built-in Speaker:	36mm 8Ω
Power Requirements:	4 AA batteries or -ve ground 9V d.c. adaptor
Dimensions:	151(H) x 66(W) x 37mm(D)
Weight:	220g









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# VISITING YUPITERU ON THEIR OWN GROUND

*Yupiteru are best known in the UK for high quality scanning receivers. However, on a recent visit to their headquarters in Tokyo, Mike Devereaux, MD of Nevada Communications, learnt that beside scanners, they manufacture telephones, radar detectors and audio visual equipment, all of which provided them with a staggering £146 million turnover in 1992/3.*



**The Yupiteru plant and engineering centre.**

Yupiteru employ more than 500 people and recently completed the expansion of their plant and engineering centre in Okazaki City where the scanners are manufactured in almost laboratory conditions. The Production Plant resembles an operating theatre - they even wear white gloves! The company operates two other plants, one in Shenzhen, China with 1300 workers making telephones, the other in Penang, Malaysia where 350 workers make telephones and TVs, mainly for the Japanese and US markets.

Yupiteru sell their products in Japan and throughout the world, but it was interesting to note that the UK is their largest market in Europe for scanning receivers.

They first started producing scanners in 1984, shortly after Mr Kitamura, the current President, was appointed. He explained, "We put great emphasis on research and development to provide innovative products that we hope will shape the communications of tomorrow." He went on to add, "Technology is advancing so rapidly and being upgraded faster than ever, but we at Yupiteru never forget that however sophisticated we make our products they must be reliable and easy to use".

Certainly, it has been the reliability and ease of use that has made Yupiteru products so popular here in the UK.



**Final quality checks on an MVT-8000.**



**Mike Devereaux (centre) at the Yupiteru Head Office, Tokyo, with Managing Director Mr Ara (left) and Export Manager Mr Aoyagi (right).**

## LONG DAYS

On my two day visit, I was impressed with how hard the Japanese work. They are often still in the office at 8 or 9 o'clock in the evening.

From an early age, Japanese children are encouraged to study hard and most are expected to attend university. I was in Tokyo during the summer holidays, when many children would usually be at play. Not for the Japanese, however - this is an ideal time to send the children to summer school where they will cram for their school exams later in the year. The staff at Yupiteru headquarters were no exception - most of them had been to university prior to joining the company.

## RUMOURS

Just before I concluded my visit, I asked Mr Aoyagi, Export Manager of the International Division, if the rumours of an MVT-8100 base version of the popular MVT-7100 scanner were true. He replied quite firmly, "We have no plans for any further scanner products at the moment", but then added, with a glint in his eye, "However, as a manufacturer of radio and telecommunications equipment, we have plans for new products in the near future".

Yupiteru are continually looking to the future and are certainly well informed of events in the UK market - as I left the headquarters I noticed several copies of *Short Wave Magazine* in the Export Office!



# HAVE SCANNER, WILL TRAVEL

*In a recent edition of Short Wave Magazine, the Editor asked for people with experience of taking scanners abroad and for any hints, tips or problems that they'd experienced. Andrew Linney relates some of his experiences.*

I've been heavily into scanners for several years and travel a fair bit whenever I get the opportunity. I've taken a Fairmate HP-200E hand-held scanner on several excursions by various methods, i.e., plane and ferry. Up to now, I haven't had any trouble at all in getting the radio through customs in any of the places I've visited. Mainly I think, because to most people it looks like a mobile phone or posh radio. In fact, a trick that I generally employ is to set the scanner to Radio One or some other radio station in the normal v.h.f. broadcast band and lock the radio so that it can't be altered accidentally. Then, I turn the volume down as I get to the check-in gate. I usually trigger the metal detectors as I always carry a Swiss Army Knife in a pouch on my belt.

As a result of the Lockerbie Bombing, airport security now want to see radios working, so they must have batteries fitted - otherwise they can get really interested. If you put Radio One in or whatever, and as I say, lock it and turn the volume down, when you go through the gate, present them with the scanner and turn it up. Once they hear Steve Wright or whatever, they pop it through the X-ray machine and that's it - you're through.

I went to the USA in January 1991 and the Gulf war had just started going flat out, so security at Heathrow was stricter than usual, with the Army tanks patrolling the surrounding approach roads and troops running around in the terminals as well as the normal Hunter/Delta armed patrols. I was sat for a good couple of hours listening merrily to various suspect packages and general activity until we checked in.

They paid particular interest to us as well, seeing as we had Arabic stamps on the passport from a Tunisian holiday a few years before, but the scanner went through, no problem.

If you take a scanner to the States then call into a Radio Shack (Tandy) over there and ask for a local listing. We were there on a fly-drive holiday in Florida and called in several as we toured and asked them for any information. They gave us a photocopy of the local action from the Highway patrols to Coast Guard, Fire Department to the Secret Service! Also a good book to obtain from this shop is called *Police Call*. This covers the state you're in and neighbouring states and gives you the spot frequencies for every service you'll ever want to know. It also comes in useful in high sun spot activity when you're back home, as I've heard Police and Fire Departments from the States on 33 to 40MHz during these times. If the 28MHz band (10m) is open with American stations, then it's worth listening a bit higher up.

I've also taken the rig with me to Amsterdam on a couple of occasions, once by boat and once by plane. In fact, in Schiphol airport in the arrival lounge they sell them and sweepers for bug detection. The only thing to listen to once you're in a non-English speaking country is the air band (unless you speak the local lingo of course).

The most unerving experience I've come across was at Tegel Airport in Berlin on the way out. On the way in was no problem, but coming out I was beginning to think it was a bad idea. When I was there it was just a year to the day, near enough after the wall had come down, so things were a bit more relaxed than in previous years, I think. The guard was showing more than a passing interest in it, but again, I'd got it tuned to the local radio station of the v.h.f. American Forces Radio Berlin, or something along those lines, and so got away with it. AFN Berlin was about the only thing worth listening to as such. I do speak a little German but unless your fluent in the host language than, it's really a waste of time as they

don't use tourist lingo in their normal comms. As in, they don't need a double room with a shower or a steak well done so to speak. Only the air bands use English in general.

In Berlin, I was there wandering around the old Russian section of the city with a high tech radio receiver capable of monitoring their traffic. Had it have been a couple of years earlier, I'd have left it at home. Otherwise, I'd probably be somewhere in Moscow or thereabouts as a special guest of the KGB. But that's the closest I've come to regretting taking it. So, basically, if your scanner has got w.b.f.m., tune it into a domestic station and lock it until you've got through customs. Just use your common sense and don't have their armed security or whatever blasting out of the radio as you go through.

I've taken mine through East Midlands, Manchester, Heathrow, John F. Kennedy, Orlando International, Schiphol Amsterdam, Tegel Berlin airports and Dover, Calais, Hollyhead and Dun Loaghaire Ferry Ports.

Use your common sense in the use of the rig and you should have no trouble. Go up to the nearest Cop and tell him to turn his radio up as their comms are shouting at him and you'll get what you deserve!

Happy travels.





# JAVIATION

## The Airband Specialists

### ENGLISH INSTRUCTIONS!!

If you are finding the instructions supplied with your scanner a little difficult to make head or tail of then you might like to try one of our own, re-written Instruction Books. They are available for all the Yupiteru & AOR/Fairmate handheld range.

### Secondhand Equipment

As part exchanges are welcome we usually have a wide selection of good condition secondhand or ex-demo equipment available and all sets come with a 6 month warranty.

### Part Exchanges

If you have been thinking about a new scanner but find it is a little out of range of your pocket why not consider a p/x. Just give us a call and we will gladly give you a price over the phone.

### Leather Carry Cases

For the MVT-7100 are now available together with cases for the MVT5000, VT225, AR1000/HP100 family. All £14.99 each (and smelly!)

As specialists in airband listening we are better placed than most in trying to guide you through the vast range of equipment available suitable for this fascinating hobby. We have always tried to give friendly, un-biased advice on all the models we stock and together with a receivers "good points" are as keen to point out the disadvantages of certain models not always brought to your attention. Please feel free to call and have a chat - it would be nice to speak with you. If you would like a catalogue please send a large (A5+) SAE - Thanks.

### FREQUENCY LISTS

*Our New VHF/UHF guide is dated the 17th September and has been updated over the July edition with new squawk codes and callsigns. If you are not familiar with our guides we are sure you will find them both informative and interesting. We include a considerable amount of information not found in any other publication, complete listing of all civil and military airfields together with stud/channel numbers, en-route ATCC frequencies, transmitter sites, range frequencies and much, much more.*

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# WHAT SCANNER

Compiled by Elaine Richards

*Scanners are available from a wide range of sources, many advertisers in Short Wave Magazine will be able to give you advice as well as technical help whilst you choose which radio is the one for you. I've drawn up a list of all the dealers who stock scanners that I could find, my apologies if I've left anyone out. It's often worth talking to your local radio dealer to see if he can supply the scanner you've been looking for, most are always pleased to help a customer.*

*The following pages contain many of the most popular scanners, some now are only available on the second-hand market, but that doesn't mean that they are second best. I've tried to include as many scanners as possible, but as new models and makes seem to appear on the market monthly, there are bound to be some that have slipped the net. If you know of a good scanner that hasn't been included, please drop me a line so that it can be included in any future scanner studies.*

*Prices were correct when the article was written, although those scanners only available on the second-hand have the 'when new' price shown.*

## DEALERS

### Avon

**AMDAT**, 4 Northville Road, Northville, Bristol BS7 0RG. Tel: (0272) 699352.  
**QSL Communications**, Unit 6, Worle Industrial Centre, Coker Road, Worle, Weston-super-Mare BS22 0BX. Tel: (0934) 512757.

### Bedfordshire

**Welland Communications**, 33 High Street, Bedford MK40 1RY. Tel: (0234) 364004.

### Buckinghamshire

**Communications Centre** (Photo Acoustics Ltd.), 58 High Street, Newport Pagnell, Bucks MK16 8AQ. Tel: (0908) 610625.

### Cambridgeshire

**Link Electronics**, 216 Lincoln Road, Peterborough PE1 2NE. Tel: (0733) 345731.

### Cheshire

**CB37**, 15 Middlewich Street, Crewe CW1 4BS. Tel: (0270) 588440.

**Flightdeck**, 192 Wilmslow Road, Heald Green, Cheadle, Cheshire SK8 3BH. Tel: 061-499 9350.

### Cornwall

**Skywave**, Slades Road, St. Austell, Cornwall PL25 4HG. Tel: (0726) 70220.

### Derbyshire

**AOR (UK) Ltd.**, Adam Bede High Tech Centre, Derby Road, Wirksworth, Derbyshire DE4 4BG. Tel: (0629) 825926.

**Low Electronics Ltd.**, Chesterfield Road, Matlock, Derbyshire DE4 5LE. Tel: (0629) 580800.

**Riley's TV Services Ltd.**, 125 Langwith Road, Hillstown, Chesterfield S44 6LX. Tel: (0246) 826578.

### Devon

**Reg Ward & Co Ltd.**, 1 Western Parade, West Street, Axminster, Devon EX13 5NY. Tel: (0297) 34918.

### Essex

**Waters & Stanton Electronics**, 22 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835.

### Fife

**Jaycee Electronics Ltd.**, 20 Woodside Way, Glenrothes, Fife, Scotland KY7 5DF. Tel: (0592) 756962.

### Hampshire

**Nevada Communications**, 189 London Road, North End, Portsmouth, Hants PO2 9AE. Tel: (0705) 662145.

**South Midlands Communications Ltd.**, SM House, School Close, Chandlers Ford Ind Est., Eastleigh, Hants SO5 3BY. Tel: (0703) 251549.

### Hereford & Worcester

**SRP Trading**, Unit 20, Nash Works, Forge Lane, Nr Stourbridge, Worcs. Tel: (0562) 730672.

### Ireland

**Radcom Electronics**, Midleton Enterprise Park, Midleton, County Cork. Tel: 021/632725.

### Kent

**Icom (UK) Ltd.**, Unit 8, Herne Bay West Industrial Estate, Sea Street, Herne Bay, Kent CT6 8LD. Tel: (0227) 741555.

**The Flying Shop**, Biggin Hill Airport, Westerham, Kent TN16 3BN. Tel: (0959) 576370.

### Lancashire

**Microgate Services Ltd.**, Metcom House, Bradley Lane, Standish, Wigan WN6 0XQ. Tel: (0257) 472866.

### London

**ARE Communications '92**, 6 Royal Parade, Hanger Lane, Ealing, London W5A 1ET. Tel: 081-997 4476.

**ASK Electronics Ltd.**, 248 Tottenham Court Road, London W1P 9AD. Tel: 071-637 0353.

**Haydon Communications**, 132 High Street, Edgware, London HA8 7EL. Tel: 081-951 5782.

**Lee Electronics**, 400 Edgware Road, London W2. Tel: 071-723 5521.

**Martin Lynch**, 286 Northfield Avenue, Ealing, London W5 4UB. Tel: 081-566 1120.

**South Essex Communications Ltd.**, 191 Francis Road, Leyton, London E10 6NQ. Tel: 081-558 0854.

### Norfolk

**The Short Wave Centre Norwich**, 95 Colindeep Lane, Sprowston, Norwich, Norfolk NR7 8EQ. Tel: (0603) 788281.

### Nottinghamshire

**Radio Amateur Supplies**, 3 Farndon Green, Wollaton Park, Nottingham NG8 1DU. Tel: (0602) 280267.

### Staffordshire

**J.W. Staton & Sons Ltd.**, 15 Brunswick Street, Newcastle, Staffs. Tel: (0782) 616702.

### Tyne & Wear

**Supertech**, 32 Russell Way, Gateshead Metro Centre NE11 9YZ. Tel: 091-493 2316.

### West Midlands

**Amateur Radio Communications**, 38 Bridge Street, Earlstown, Newton-le-Willows, Merseyside WA12 9BA. Tel: (0925) 229881.

**Aviation Hobby Centre**, 1st Floor, Main Terminal Building, Birmingham International Airport, Birmingham B26 3QJ. Tel: 021-782 2112.

**Castle Electronics**, Unit 3, Baird House, Dudley Innovation Centre, Pensnett Trading Estate, Kingswinford, West Midlands DY6 8XZ. Tel: (0384) 298616.

**Quantek Electronics**, 3 Houldey Road, Birmingham B31 3HL. Tel: 021-411 1821.

**SRP Radio Centre**, 1686 Bristol Road South, Rednal, Birmingham B45 9TZ. Tel: 021-460 1581.

### Yorkshire

**Air Supply**, 83B High Street, Yeadon, Leeds LS19 7TA. Tel: (0532) 509581.

**Alan Hooker**, 42 Nether Hall Road, Doncaster, South Yorkshire DN1 2PZ. Tel: (0302) 325690.

**Javiation**, Carlton Works, Carlton Street, Bradford, West Yorkshire BD7 1DA. Tel: (0274) 732146.



## HAND-HELD SCANNERS UP TO £50

### STEEPLETONE SAB-11 PORTABLE RADIO

**Frequency Range:** 108-135MHz  
**Modes:** a.m., f.m.  
**Memories:** n/a  
**Scan Speed:** n/a  
**Search Speed:** n/a  
**Features:** Budget priced airband radio, receiver airband frequencies and normal f.m. and m.w. radio programmes, rotary controls, no l.c.d. readout.  
**Reviewed**  
**Price:** £14.95



### STEEPLETONE SAB 9 MK II PORTABLE RADIO

**Frequency Range:** 108-175MHz  
**Modes:** a.m., f.m.  
**Memories:** n/a  
**Scan Speed:** n/a  
**Search Speed:** n/a  
**Features:** Also receives national f.m., m.w. and l.w. stations, rotary control for normal tuning plus fine tune control.  
**Reviewed:**  
**Price:** £24.95



## HAND-HELD SCANNERS UP TO £100

### COMMTEL COM 102

**Frequency Range:** 66-88, 138-174, 380-450, 470-512MHz  
**Modes:** f.m. **Memories:** 10  
**Scan Speed:** 8 channels per second  
**Search Speed:**  
**Features:** Compact hand-held, liquid crystal display indicates channel, frequency and all other key modes  
**Reviewed:**  
**Price:** £99.95

### REALISTIC PRO-38

**Frequency Range:** 68-88, 136-174, 406-512MHz  
**Modes:** f.m.  
**Memories:** 10  
**Scan Speed:** 10 channels per second  
**Search Speed:**  
**Comments:** Reviewer said, "is a simple 10-channel device that has been optimised for simplicity of operation and portability."  
**Reviewed:** *Short Wave Magazine* October 1988\*\*  
**Price:** £99.95

### REALISTIC PRO-41

**Frequency Range:** 68-88, 137-174, 406-512MHz  
**Modes:** f.m.  
**Memories:** 10  
**Features:** Direct keyboard access to frequencies, keyboard lock and audible low battery indicator.  
**Reviewed:**  
**Price:** £99.95

# WHAT SCANNER

## HAND-HELD SCANNERS UP TO £150

### NETSET PRO-44

**Frequency Range:** 68-88, 108-136.975, 137-174, 380-512MHz  
**Modes:** f.m.  
**Memories:** 50  
**Features:** Keyboard access to frequencies, keyboard lockout and low battery indicator.  
**Price:** £149.99



### BEARCAT UBC-50XLT

**Frequency Range:** 66-88, 136-174, 406-512MHz  
**Modes:** f.m. **Memories:** 10  
**Scan Speed:** 10 channels per second  
**Features:** A simple two-digit display provides both memory channel indication and frequency allocation by pressing a review button on the front panel, direct frequency entry.  
**Price:** £109.95

## HAND-HELD SCANNERS UP TO £200

### NETSET PRO-46

**Frequency Range:** 68-88, 108-174, 406-512, 806-960MHz  
**Modes:** f.m.  
**Memories:** 100  
**Features:** Keyboard access to frequencies, has monitor memories and frequency search.  
**Reviewed:**  
**Price:** £199.99

### YUPITERU VT-125UK

**Frequency Range:** 108-142MHz  
**Modes:** a.m.  
**Memories:** 30  
**Scan Speed:** 20 channels per second  
**Comments:** Reviewer said, "A very attractive and capable air band receiver. Its small size is bound to make it very attractive to operators who like to listen on location".  
**Reviewed:** *Short Wave Magazine* August 1991\*  
**Price:** £169.00



### RCV WIN-108

**Frequency Range:** 108-142.975MHz  
**Modes:**  
**Memories:** 20 (two banks of 10 channels)  
**Comments:** Reviewer said, "Fiddly buttons for those with larger hands. the set shows the selectivity to have a pleasing value".  
**Reviewed:** *Short Wave Magazine* December 1988\*\*  
**Price:** £175.00

### YUPITERU VT-150

**Frequency Range:** 142-170MHz  
**Modes:** f.m.  
**Memories:** 30  
**Scan Speed:** 20 channels per second  
**Search Speed:** 20 steps per second  
**Comments:** Reviewer said, "For the enthusiast who combines an interest in aviation with both amateur and marine band listening...is an ideal compliment to the other receivers in this range. In styling, sensitivity and audio quality this receiver is well worth every penny".  
**Reviewed:** *Short Wave Magazine* March 1993\*  
**Price:** £189.00



### UNIDEN BEARCAT UBC-100XLT

**Frequency Range:** 66-88, 118-174, 406-512MHz  
**Modes:** f.m.  
**Memories:** 100 (5 banks of 20 channels)  
**Scan Speed:** 15 channels per second  
**Search Speed:** 25 steps per second  
**Features:** 30 minute memory back-up retaining all stored frequencies in the event of battery exhaustion, automatic selection of both step size and mode is accomplished by the microprocessor.  
**Price:** £199.95

### YUPITERU MVT-3100

**Frequency Range:** 143-162.025, 347.7125-452, 830-960MHz  
**Modes:** f.m.  
**Memories:** 100  
**Scan Speed:** 30 channels per second  
**Search Speed:** 40 steps per second  
**Features:** Comes complete with a full range of accessories, including an UK charger  
**Price:** £199.00



## HAND-HELD SCANNERS UP TO £250

### REALISTIC PRO-43

**Frequency Range:** 68-88, 118-174, 220-512, 806-999, 9875MHz  
**Modes:** a.m., f.m.  
**Memories:** 200  
**Scan Speed:** up to 25 channels per second  
**Search Speed:** up to 50 steps per second  
**Features:** Direct keyboard access to frequencies, triple conversion receiver, memory back-up.  
**Price:** £249.99



### REALISTIC PRO-39

**Frequency Range:** 68-88, 108-174, 380-512, 806-960MHz  
**Modes:** f.m. **Memories:** 200  
**Features:** Keyboard access to frequencies, memory back-up circuit, hyperscan search and scan.  
**Price:** £219.99



## WHAT SCANNER

### BLACK JAGUAR BJ200

**Frequency Range:** 26-29.995, 50-88, 115-178, 200-280, 360-520MHz  
**Modes:** a.m., f.m. selectable  
**Memories:** 16  
**Comments:** Reviewer said, "The receiver is so easy to use that my initial reservations about its few facilities, e.g. only 16 memories and an inability to store band limits (unlike my base receiver) melted away when I realised just how easy it is to operate. It takes me longer to remember which number band I want to search on my base receiver than it does to program the Black Jaguar fresh each time!".  
**Reviewed:** *Short Wave Magazine* November 1993\*  
**Price:** £239.00

### COMMTEL COM203

**Frequency Range:** 68-88, 118-174, 380-450, 470-512, 806-960MHz  
**Modes:** f.m.  
**Memories:** 200  
**Scan Speed:** 25 channels per second  
**Search Speed:** up to 50 steps per second  
**Features:** Built-in power save circuit, key lock switch to avoid accidental operation, easy-to-read l.c.d. with back lighting, direct frequency entry.  
**Reviewed:**  
**Price:** £213.00

### COMMTEL COM204

**Frequency Range:** 68-88, 118-174, 220-512, 806-999.9875MHz  
**Modes:** a.m., f.m.  
**Memories:** 200  
**Scan Speed:** 25 channels per second  
**Search Speed:** 50 steps per second  
**Comments:** Built-in power save circuit, band selection for a.m./f.m., back-lit l.c.d., triple conversion receiver.  
**Reviewed:**  
**Price:** £249.00

### REALISTIC PRO-32A

**Frequency Range:** 68-88, 108-174, 380-512MHz  
**Modes:** a.m., f.m.  
**Memories:** 200 (10 banks or 20 channels)  
**Scan Speed:** up to 8 channels per second  
**Search Speed:** up to 8 steps per second  
**Comments:** Reviewer said, "is a very compact portable scanner...and sophisticated scanning modes. Its neat lines conceal a lot of features".  
**Reviewed:** *Short Wave Magazine* November '87\*\*  
**Price:** £249.95



### UNIDEN BEARCAT UBC-200XLT

**Frequency Range:** 66-88, 136-144, 148-174, 420-450, 470-512MHz  
**Modes:** f.m.  
**Memories:** 200 (10 banks of 20 channels)  
**Scan Speed:** 15 channels per second  
**Search Speed:** 25 steps per second  
**Comments:** Reviewer said, "Is a very good radio for somebody who is new to scanning. Although it does not cover as much of the frequency spectrum as other scanners, it is very easy to use program, and offers an almost ideal breakdown of memory channels, it is also very competitively priced".  
**Reviewed:** *Short Wave Magazine* August 1993\*  
**Price:** £249.95

## HAND-HELD SCANNERS UP TO £300

### UNIDEN BEARCAT 100FB

**Frequency Range:** 66-88, 138-174, 406-512MHz  
**Modes:** f.m.  
**Memories:** 16  
**Scan Speed:** 15 channels per second  
**Search Speed:** 15 steps per second  
**Comments:** Reviewer said, "for monitoring local activity it was ideal and also proved very useful during mobile microphone setting-up tests. Its scanning rate, being much faster than my amateur rig, became very useful whilst looking for contacts on either 144 or 432MHz bands."  
**Reviewed:** *Practical Wireless* September 1989\*  
**Price:** £253

### SONY AIR-7

**Frequency Range:** 150kHz-2.19MHz, 76-136, 144-174MHz  
**Modes:** a.m., w.b.f.m., n.b.f.m.  
**Memories:** 10  
**Comments:** Reviewer said, "is very easy to use. The memory functions are not quite self-evident, but are readily understood from the operating instructions leaflet... has good sensitivity and adequate selectivity on all bands".  
**Reviewed:** *Practical Wireless* November 1986\*\*  
**Price:** £299

### FAIRMATE HP-100E MKII

**Frequency Range:** 25-550MHz, 830MHz-1.3GHz  
**Modes:** a.m., n.b.f.m., w.b.f.m.  
**Memories:** 1000 (10 banks of 100 channels)  
**Scan Speed:** 20 channels per second  
**Comments:** Reviewer said, "proved itself to be a very competent and easy-to-use little scanner. It's technical performance was well up to the standard one would expect from this type of receiver but the layout and features put it one step ahead of a lot of the competition...highlight the provision of the rotary tuning control".  
**Reviewed:** *Short Wave Magazine* February 1990\*  
**Price:** Approx £299



### YUPITERU VT-225

**Frequency Range:** 108-142, 149.5-160, 222-391MHz  
**Modes:** a.m., n.b.f.m.  
**Memories:** 100 (10 banks of 10 channels)  
**Scan Speed:** 20 channels per second  
**Search Speed:** 20 steps per second  
**Comments:** Reviewer said, "One final and pleasing aspect is the quality of sound reproduction. That, together with a well thought out list of features comparable with top flight equipment makes the scanner a pleasure to use".  
**Reviewed:** *Short Wave Magazine* April 1992\*  
**Price:** £269.00

## HAND-HELD SCANNERS OVER £300

### SONY ICF-PR80

**Frequency Range:** 150kHz-108MHz, 115.15-223MHz (with converter)  
**Modes:** a.m., l.s.b., u.s.b., n.b.f.m., w.b.f.m.  
**Memories:** 40  
**Comments:** Reviewer said, "is a novel set, limited by its design and perhaps only moderate overall performance. It is aimed, perhaps, at the listener who wants more than either just short wave or v.h.f. scanning, but a combination of the two".  
**Reviewed:** *Short Wave Magazine* March 1988\*\*  
**Price:** £350

### YUPITERU MVT-7100

**Frequency Range:** 530kHz-1.65GHz  
**Modes:** a.m., l.s.b., u.s.b., n.b.f.m., w.b.f.m.  
**Memories:** 1000 (in 10 banks of 100)  
**Scan Speed:** 30 channels per second  
**Search Speed:** 30 steps per second  
**Comments:** Reviewer said, "a superb receiver. It's very sensitive, has extremely wide-band coverage and is just the right size for a hand-held receiver."  
**Reviewed:** *Short Wave Magazine* April 1993\*  
**Price:** £399.95

### ALINCO DJ-X1D

**Frequency Range:** 100kHz-1.3GHz  
**Modes:** a.m., n.b.f.m., w.b.f.m.  
**Memories:** 100 (2 x banks of 40 plus 20 holding)  
**Comments:** Reviewer said, "is packed with useful features designed to make like easy for the listener. Although its high sensitivity can be a boon when operating, you could have problems with external antennas if you don't use an attenuator".  
**Reviewed:** *Short Wave Magazine* October 1992\*  
**Price:** £329

### AOR AR-1500EX

**Frequency Range:** 500kHz-1.3GHz  
**Modes:** a.m., l.s.b., u.s.b., n.b.f.m., w.b.f.m., c.w.  
**Memories:** 900 + 100 reserved for auto memory  
**Scan Speed:** 20 channels per second  
**Search Speed:** 20 steps per second  
**Comments:** Reviewer said, "One thing that I found very helpful as newcomer was the fact that the 1500EX comes ready programmed. This meant that I was able to get stuck into listening straight away without having to program in any frequencies. This meant that I could discover if there were any frequencies that were of more interest to me than others".  
**Reviewed:** *Short Wave Magazine* November '93\*  
**Price:** £349

### YUPITERU MVT-7000

**Frequency Range:** 8MHz-1.3GHz  
**Modes:** a.m., n.b.f.m., w.b.f.m.  
**Memories:** 200  
**Scan Speed:** 16 channels per second  
**Search Speed:** 20 steps per second  
**Comments:** Reviewer said, "is a very attractive portable scanner with a fine overall performance. The attenuator was very effective, reducing spurious to a minimum. The audio quality was well adjusted for speech communications and there was plenty of output power for portable use".  
**Reviewed:** *Short Wave Magazine* August 1991\*\*  
**Price:** £369.00

## WHAT SCANNER

### AOR AR-2000

**Frequency Range:** 500kHz-1.3MHz  
**Modes:** a.m., n.b.f.m., w.b.f.m.  
**Memories:** 1000 (in 10 banks of 100 channels)  
**Scan Speed:** up to 20 channels per second  
**Search Speed:** up to 40 steps per second  
**Features:** Easy to operate, with factory pre-programmed search banks suitable for UK users. Has improved frequency stability and less unwanted harmonics, especially in the v.h.f. marine band.  
**Price:** Approx £309

### ICOM IC-R1

**Frequency Range:** 100kHz-1.3GHz  
**Modes:** a.m., n.b.f.m., w.b.f.m.  
**Memories:** 100  
**Scan Speed:** up to 20 channels per second  
**Search Speed:** not stated  
**Comments:** Reviewer said, "The buttons are very small and the rotary tuning knob is, of course, minute. The l.c.d. is small but is relatively easy to read and is very comprehensive".  
**Reviewed:** *Practical Wireless* July 1990\*  
**Price:** £395

### FAIRMATE HP-200

**Frequency Range:** 500kHz-1.3GHz  
**Modes:** a.m., f.m., w.b.f.m.  
**Memories:** 1000 (10 banks of 100 channels)  
**Scan Speed:** 20 channels per second  
**Search Speed:** less than 40 steps per second  
**Features:** selectable 100dB attenuator, keypad or rotary tune controls  
**Price:** £309.00

### MOBILE/BASE SCANNERS UP TO £150

#### UNIDEN BEARCAT UBC-142XL

**Frequency Range:** 66-88, 136-174, 406-512MHz  
**Modes:** f.m.  
**Memories:** 16  
**Scan Speed:** 15 channels per second  
**Search Speed:** not stated  
**Comments:** Reviewer said, "Is very easy to set up and use, though caution may be needed in computer environments. It is almost certainly aimed at the marine monitoring enthusiast, and its lightweight and low power consumption seem to make it ideally suited for a life on the waves".  
**Reviewed:** *Short Wave Magazine* May 1993\*  
**Price:** £117.00



### MOBILE/BASE SCANNERS UP TO £200

#### REVCO RS-3000

**Frequency Range:** 26-30, 68-88, 118-176, 380-512MHz  
**Modes:** a.m., f.m.  
**Memories:** 50  
**Comments:** Reviewer said, "sensitivity of the test sample tallied pretty much with the quoted figures and these are roughly what I would expect on a middle-of-the-road scanner. The strong point is the programmable mode. It has plenty of memory channels and some features that are only found on more expensive machines."  
**Reviewed:** *Short Wave Magazine* June 1988\*\*  
**Price:** £199

#### COBRA SR-925

**Frequency Range:** 29-54, 118-174, 406-512MHz  
**Modes:** f.m.  
**Memories:** 16  
**Comments:** Reviewer said, "I found the scanner very easy to use... it doesn't have some of the more complex options available, but that didn't make it any less of a useful piece of equipment".  
**Reviewed:** *Short Wave Magazine* April 1990\*  
**Price:** Approx £160

#### UNIDEN BEARCAT UBC-760XLT

**Frequency Range:** 66-88, 118-136, 138-174, 406-512, 806-952MHz  
**Modes:** a.m., n.b.f.m..  
**Memories:** 100 (5 banks of 20 channels)  
**Scan Speed:** 15 channels per second  
**Search Speed:** 15 steps per second  
**Features:** Keyboard has been divided into two parts, PROGRAMME that allows you to command any frequency within its range on all 100 memory channels and OPERATION that controls scan, lockout, priority, delay, hold, the service searches as well as the programmable search functions.  
**Reviewed:** not stated  
**Price:** £199.00

#### UNIDEN BEARCAT UBC-175XL

**Frequency Range:** 66-88, 118-174, 406-512MHz  
**Modes:** a.m., f.m.  
**Memories:** 16  
**Scan Speed:** up to 15 channels per second  
**Search Speed:** up to 15 steps per second  
**Comments:** Reviewer said, "attractive scanner that achieves welcome simplicity of operation without compromising the technical performance."  
**Reviewed:** *Short Wave Magazine* December '87\*\*  
**Price:** £180

#### UNIDEN BEARCAT UBC855XLT

**Frequency Range:** 66-88, 108-174, 406-512, 806-956MHz  
**Modes:** a.m., l.s.b., u.s.b., n.b.f.m., w.b.f.m.  
**Memories:** 50  
**Features:** Programming in either scan or search modes is made very easy with a simple-to-use keypad and large l.c.d.  
**Reviewed:** not stated  
**Price:** £195.00

### MOBILE/BASE SCANNERS UP TO £300

#### REALISTIC PRO-2021

**Frequency Range:** 68-88, 108-174, 380-512MHz  
**Modes:** a.m., f.m.  
**Memories:** 200  
**Scan Speed:** up to 8 channels per second  
**Search Speed:** not stated  
**Comments:** Reviewer said, "is a very capable scanner equipped with a good range of facilities, its strong points being the well organised 200 memories and the good audio quality".  
**Reviewed:** *Short Wave Magazine* August 1988\*  
**Price:** £219.95

#### NETSET PRO-2032

**Frequency Range:** 66-88, 108-174, 380-512, 806-960MHz  
**Modes:** f.m.  
**Memories:** 200 (10 banks of 20 channels)  
**Features:** Direct keyboard access to frequencies, easy-to-read l.c.d., memory back-up  
**Price:** £219.99

#### REALISTIC PRO-2006

**Frequency Range:** 25-520MHz, 760MHz-1.3GHz  
**Modes:** a.m., n.b.f.m., w.b.f.m.  
**Memories:** 400 (in 10 banks of 40 channels)  
**Scan Speed:** up to 26 channels per second  
**Comments:** Reviewer said, "was a very smart and capable modern scanner. The facilities covered all the basic requirements with one or two useful extras. These facilities were also easy-to-use, makes it particularly attractive to the newcomer".  
**Reviewed:** *Short Wave Magazine* February 1991\*  
**Price:** £299.95

#### NEVADA MS-1000

**Frequency Range:** 500kHz-600MHz, 800MHz-1.3GHz  
**Modes:** a.m., n.b.f.m., w.b.f.m.  
**Memories:** 1000 (in 10 banks of 100 channels)  
**Scan Speed:** 20 channels per second  
**Search Speed:** 20 steps per second  
**Comments:** Reviewer said, "a very compact easy-to-use scanner with a very respectable performance. It's equally at home both in the shack and in the car. The comprehensive range of memory storage options are worthy of note and should prove more than adequate for most operators".  
**Reviewed:** *Short Wave Magazine* May 1991\*\*  
**Price:** £279.00

#### SIGNAL R-535

**Frequency Range:** 108-142.995 & 220-399.975MHz  
**Modes:** a.m., f.m.  
**Memories:** 60  
**Features:** An airband set that covers both v.h.f. and u.h.f. signals that can be computer controlled. Frequencies are selected by using four front panel buttons and then stored in the memories. Frequency as well as channel and operating mode information easily read on a green back-lit liquid crystal dot matrix display.  
**Price:** £265.00

#### UNIDEN BEARCAT 800XL

**Frequency Range:** 29-54, 118-174, 406-512, 806-912MHz  
**Modes:** f.m.  
**Memories:** 40  
**Scan Speed:** up to 15 channels per second  
**Search Speed:** up to 15 channels per second  
**Comments:** Reviewer said, "although featuring fairly basic scanner facilities, was actually a pleasure to use as everything worked so well. The very wide frequency coverage was also very welcome, but I will remember it for its excellent audio quality particularly on the air band."  
**Reviewed:** *Short Wave Magazine* March 1989\*\*  
**Price:** £229

#### UNIDEN BEARCAT BC-950XLT

**Frequency Range:** 29-956MHz not continuous  
**Modes:** a.m., f.m.  
**Memories:** 100 (5 banks of 20 channels)  
**Comments:** Reviewer said, "scanning facilities were well organised and if the service search was to be adapted for the UK it would be very popular indeed".  
**Reviewed:** *Short Wave Magazine* July 1988\*\*  
**Price:** £229





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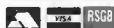
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## MOBILE/BASE SCANNERS UP TO £500

### REALISTIC PRO-2004



**Frequency Range:** 25-520MHz, 760MHz-1.3GHz  
**Modes:** a.m., n.b.f.m., w.b.f.m.  
**Memories:** 300 (10 banks of 30 channels)  
**Scan Speed:** up to 16 channels per second  
**Search Speed:** up to 16 steps per second  
**Comments:** Reviewer said, "Neatly designed and built in a matt black plastics case, the sloping front panel carries the controls and display panel. The l.c.d. is clear and easily read and shows which channel and frequencies are being scanned, monitored or programmed, as well as the status of the channel and the operational mode of the receiver".  
**Reviewed:** *Short Wave Magazine* April 1987\*\*  
**Price:** £330

### AOR AR-2001

**Frequency Range:** 25-550MHz  
**Modes:** a.m., n.b.f.m., w.b.f.m. **Memories:** 20  
**Scan Speed:** 5 channels per second  
**Search Speed:** 1MHz in 6 seconds  
**Comments:** Reviewer said, "receiver sensitivity is good and even with its own telescopic antenna it compared well with dedicated portable rigs on the 144MHz band".  
**Reviewed:** *Practical Wireless* May 1984\*\*  
**Price:** £325

### JIL SX-200N

**Frequency Range:** 26-88, 108-180, 380-514MHz  
**Modes:** a.m., f.m. **Memories:** 16  
**Scan Speed:** up to 8 channels per second  
**Search Speed:** up to 10 channels per second  
**Reviewed:** *Practical Wireless* October 1981\*\*  
**Price:** £325

### REALISTIC PRO-2005

**Frequency Range:** 25-520MHz, 760MHz-1.3GHz  
**Modes:** n.b.f.m., w.b.f.m. **Memories:** 400  
**Scan Speed:** up to 16 channels per second  
**Comments:** Reviewer said, "represents an improvement over the previous model and its overall performance was very good for a scanner of this type....the sound squelch was particularly useful".  
**Reviewed:** *Short Wave Magazine* September '89\*\*  
**Price:** £339.95

### AOR AR-2800

**Frequency Range:** 500kHz-600MHz, 800MHz-1.3GHz  
**Modes:** am., l.s.b., u.s.b., n.b.f.m., w.b.f.m., c.w.  
**Memories:** 100 (10 banks of 100 channels)  
**Scan Speed:** up to 20 channels per second  
**Search Speed:** up to 20 steps per second  
**Features:** Keypad or rotary frequency control, internal battery for portable use. **Price:** £429.00

### KENWOOD RZ-1

**Frequency Range:** 500kHz-905MHz  
**Modes:** a.m., n.b.f.m., w.b.f.m. **Memories:** 100  
**Comments:** Reviewer said, "is a very well thought out wideband scanning receiver. The memories can store not only the frequency and mode but also a seven character message".  
**Reviewed:** *Short Wave Magazine* April 1988\*\*  
**Price:** Approx £459

# WHAT SCANNER

### YUPITERU MVT-8000

**Frequency Range:** 100kHz-1.3GHz  
**Modes:** a.m., n.b.f.m., w.b.f.m.  
**Memories:** 200  
**Scan Speed:**  
**Search Speed:** up to 20 steps per second  
**Features:** Frequency entry via a simple front panel keypad, metal case and liquid crystal display with backlight, keypad illumination for easy use.  
**Reviewed:**  
**Price:** £389.00

### AOR AR-2002



**Frequency Range:** 25-550MHz, 800MHz-1.3GHz  
**Modes:** am., n.b.f.m., w.b.f.m.  
**Memories:** 20  
**Scan Speed:** 5 channels per second  
**Search Speed:** 1MHz in 6 seconds  
**Comments:** No new scanners of this type are being made, so keep an eye open for some good bargains, Reviewer said, "There is a useful l.e.d. S-meter and a tuning knob for those who prefer this to UP and DOWN buttons."  
**Reviewed:** *Practical Wireless* December 1985\*  
**Price:** £499.00

### COMMTEL COM205

**Frequency Range:** 25-50MHz, 760MHz-1.3GHz  
**Modes:** a.m., n.b.f.m., w.b.f.m.  
**Memories:** 400 (10 banks of 40 memories)  
**Features:** Direct frequency entry, easy-to-read front panel display with electroluminescent backlighting with dimmer switch, 10dB attenuator switch.  
**Reviewed:** **Price:** £344.00

## MOBILE/BASE SCANNERS OVER £500

### MOBILE/BASE SCANNERS OVER £500

**ICOM IC-R7000HF**  
**Frequency Range:** 25-999.999MHz, 1.025-1.99999GHz  
**Modes:** a.m., l.s.b., u.s.b., n.b.f.m., w.b.f.m.  
**Scan Speed:** up to 7 channels per second  
**Comments:** Reviewer said, "is clearly a very competent v.h.f./u.h.f. scanning receiver with the performance and handling to put it in a class of its own".  
**Reviewed:** *Short Wave Magazine* December 1989\*\*  
**Price:** Approx £989

### YAESU FRG-9600

**Frequency Range:** 60-905MHz (up to 460MHz for s.s.b.)  
**Modes:** a.m.(wide), a.m. (narrow), l.s.b., u.s.b., n.b.f.m., w.b.f.m. **Memories:** 100  
**Features:** An all-mode scanning receiver with computer control capabilities allowing operators to add virtually unlimited customised control functions in software. It has seven tuning/scanning rates.  
**Price:** £625

### ICOM IC-R9000

**Frequency Range:** 100kHz-2GHz  
**Modes:** a.m., l.s.b., u.s.b., n.b.f.m., w.b.f.m., c.w., f.s.k.  
**Memories:** 1000  
**Comments:** Reviewer said, "The large 5in c.r.t. display shows, apart from the frequency readout, memory lists, a dual clock, weekly and daily timers and an external video input. It can also be used as a spectrum scope, displaying signals up to 100kHz from the receive frequency, with a sensitivity of approximately 1µV and a dynamic range of 60dB, or as a terminal monitor".  
**Reviewed:** *Short Wave Magazine* April 1989\*\*  
**Price:** £4950.00

### ICOM IC-R100

**Frequency Range:** 500kHz-1.8GHz  
**Modes:** a.m., n.b.f.m., w.b.f.m.  
**Memories:** 100  
**Features:** 15dB pre-amp enhances weak signals in the 50-905MHz range, 20dB r.f. attenuator reduces excessively strong signals  
**Price:** £629.00

### ICOM IC-R7100



**Frequency Range:** 25MHz-2GHz  
**Modes:** a.m., l.s.b., u.s.b., n.b.f.m., w.b.f.m.  
**Memories:** 900 (9 banks of 100 channels)  
**Features:** rotary and direct keyboard entry are available for fine tuning, built-in clock, multiple scan functions, high sensitivity and reliable frequency stability. **Price:** £1395.00

### YAESU FRG-100



**Frequency Range:** 50kHz-30MHz  
**Modes:** a.m., l.s.b., u.s.b., c.w., f.m. (optional)  
**Memories:** 50 (tuneable)  
**Comments:** Reviewer said, "Can be very deceptive in that its wealth of unusual features are not obvious from a simple scan of the front panel...the more I used the receiver the more I grew to like it. I was particularly impressed with the main l.c.d., which proved extremely clear in all lighting conditions."  
**Reviewed:** *Short Wave Magazine* April 1993\*

### AOR AR03000A



**Frequency Range:** 100kHz-2.036GHz  
**Modes:** a.m., l.s.b., u.s.b., n.b.f.m., w.b.f.m., c.w.  
**Memories:** 400 (4 banks of 100 channels)  
**Scan Speed:** 50 channels per second  
**Search Speed:** 50 steps per second  
**Comments:** Reviewer said, "It's incredible how AOR have managed to fit so much into such a small case. A quick check in the lab showed the sensitivity of the set to be very good up to 1GHz".  
**Reviewed:** *Short Wave Magazine* January 1990\*  
**Price:** Approx £949

\* back issues available £1.90

\*\* photocopies available £1.00



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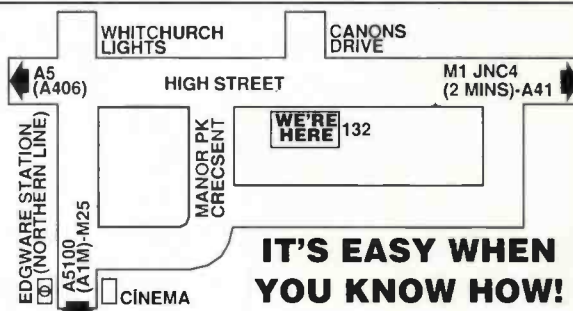
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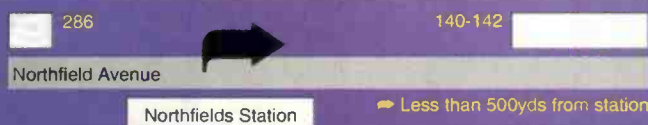
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