

# practical Wireless

SEPTEMBER 1993 £1.90

**Tex Swann G1TEX Reviews The Thurlby Thandar TSA250 Spectrum Analyser Adaptor**

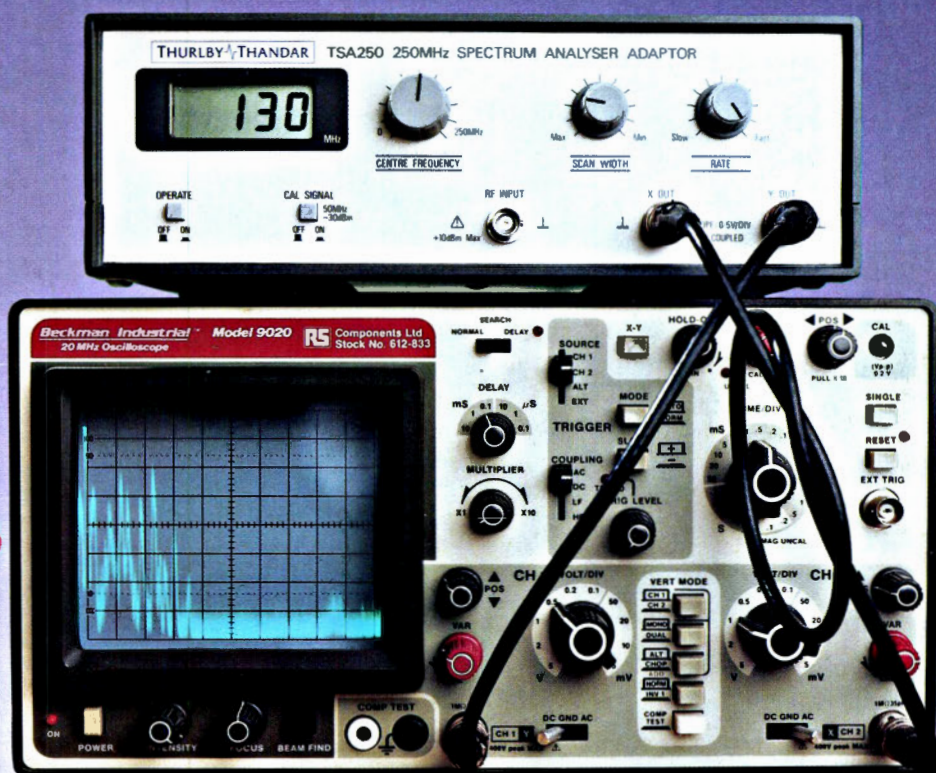
**Plus**

**Build A Tri-State Cable Tester**

**And**

**Multiplexing The Robin Frequency Counter -  
Updating A Very Popular Project**

**Off The Shelf  
The PW Team's Guide To  
What's Available And  
Where To Find Test  
Equipment**



## TEST EQUIPMENT SPECIAL



**ALSO**  
**Radio Personality**  
**Pat Hawker G3VA - The Man**  
**Behind The Prolific Pen**

**Bits & Bytes - The Computer In**  
**Your Shack, Valve & Vintage**  
**And Lots More!**



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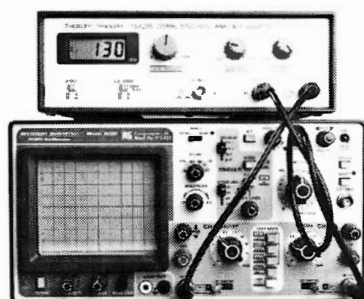
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### FRONT COVER ACKNOWLEDGEMENT

This month's main front cover photograph was taken by Rob Mannion G3XFD at the 1993 Dayton Hamvention. Rob spotted this enormous selection of (bargain price) test equipment in the flea market and it was only one stand from among 2000!

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**COMING  
NEXT MONTH**

Our VHF Special - PW explores the radio world above 30MHz. Join us as we look at the many activities on v.h.f., u.h.f. and microwaves.

**DON'T MISS IT!**





# TWELVE MONTHS TO PAY AT ZERO INTEREST



**The new TS-505 from Kenwood**  
**DEPOSIT £199.95 & 12 payments of £66.67**

NEW Icom IC-737 Superb HF all band transceiver, general coverage receiver, built in Auto ATU. 12V

**Deposit £475.00 & 12 payments of £85.00**

Icom IC-728 HF all band transceiver, general coverage receiver. 12V

**Deposit £195.00 & 12 payments of £66.66**

Kenwood TS-850S HF all band trans. General coverage receiver. 12V.

**Without Auto ATU, Deposit £510.00 & 12 payments of £95.00**

**With Auto ATU, Deposit £540.00 & 12 payments of £105.00**

Kenwood TS-450S HF all band trans. General coverage receiver. 12V.

**Without Auto ATU, Deposit £449.00 & 12 payments of £75.00**

**With Auto ATU, Deposit £480.00 & 12 payments of £85.00**

Yaesu FT-890 HF all mode trans. General coverage receiver. 12V

**Without Auto ATU, Deposit £375.00 & 12 payments of £85.00**

**With Auto ATU, Deposit £495.00 & 12 payments of £90.00**

NEW Alinco DJ-580SP Dual-band handheld, extended receive and including CTCSS. Supplied with nicad pack, aerial and charger.

**Deposit £50.00 & 6 payments of £66.66**

Kenwood TH-78E Dual-band handheld with extended receive. Supplied with charger, nicad pack and aerial.

**Deposit £69.95 & 6 payments of £66.66**

Icom IC-W21E Dual-band handheld supplied with charger, nicad pack and aerial.

**Deposit £50.00 & 6 payments of £66.66**

Kenwood TM-732E Dual-band mobile transceiver with remote head facility.

**Deposit £69.95 & 12 payments of £50.00**

Kenwood TM-241E 2m 50w mobile transceiver.

**Deposit £50.00 & 6 payments of £53.33**

Yaesu FT-690R 2.5w 6m multimode transceiver.

**Deposit £108.00 & 6 payments of £72.00**

Yaesu FT-290 2.5w 2m multimode

**Deposit £110.00 & 6 payments of £73.00**

Yupiteru MVT-7100 handheld all mode all band scanner. Supplied with aerial, charger & nicads

**Deposit £49.00 & 6 payments of £66.67**

*The items listed above are examples but we can offer interest free credit on most of our product lines, please ring for prices.*

## SECONDHAND EQUIPMENT

	P&P
Alinco DJ-180E 2m hand-held (DEMO MODEL) .....	£189.00 (£5.00)
Trio TH-21E 2m hand-held .....	£139.00 (£5.00)
PRO-39 VHF/UHF hand-held scanner (Excellent Condition) .....	£189.00 (£5.00)
Yaesu FTV-901R Transverter c/w 2m module .....	£199.00 (£5.00)
HF-225 Superb HF receiver with keypad .....	£435.00 (£10.00)
Realistic PRO-2004 Base scanner 25-1300MHz .....	£159.99 (£5.00)
Icom IC-725 HF transceiver with FM (DEMO MODEL) .....	£779.00 (£10.00)
Icom IC-735 HF transceiver c/w PS-15 power supply .....	£895.00 (£10.00)
Trio TS-680S HF transceiver with 6M. Excellent Condition. ....	£865.00 (£10.00)
Sony ICF-7600D Portable shortwave receiver .....	£149.00 (£5.00)
HF-125 Shortwave receiver 30KHz-30MHz. VGC. ....	£225.00 (£10.00)
AOR-2800 HF/VHF/UHF scanning receiver all mode, As NEW. ....	£325.00 (£10.00)
Trio TS-530S HF amateur band transceiver VGC. ....	£470.00 (£15.00)
Trio TS-680S HF transceiver gen. cov. rec. + 6 meters .....	£850.00 (£o.c.)
Yaesu FT-690RII 6m multimode transceiver ...	£349.00 (£10.00)
Yaesu FT-290RII 2m multimode transceiver ...	£345.00 (£10.00)
AOR-1000 VHF/UHF handheld scanner .....	£195.00 (5.00)

## SPECIAL BARGAINS

**SGC-230 Auto Antenna Tuners** works with any type of HF transceiver, will tune long wire or whip antenna, weatherproof ..... **£399.00 (10.00)**

**Alinco DJ-X1D** handheld scanner. This unit has a slight scratch on the display ..... **£269.95 (5.00)**

\* \* \* \* \*

The latest from **SONY**, the **MZ-1** portable recordable mini CD. You can record up to 74 minutes on one disc!

**NORMALLY £499.00**, we have one available with a marked case at **ONLY £399.00!!!**

**AUTHORISED AGENTS FOR KENWOOD, ICOM, YAESU & ALINCO. FULL SERVICE FACILITIES AVAILABLE**

**SPEND UP TO £1,200 INSTANTLY WITH A PHOTO ACOUSTICS LTD. CREDIT CHARGE CARD**

**PART EXCHANGE WELCOME, ASK FOR KERRY G6IZF OR ANDY G4YOW**

**RETAIL SHOWROOM OPEN MONDAY - FRIDAY 9.30 - 5.30, Saturday 9.30 - 4.30**

**Goods normally despatched within 24 hours. Please allow 7 banking days for cheque clearance. Prices correct at time of going to press - E&OE**





DON'T BE SEDUCED BY  
ITS GOOD LOOKS.

BE SEDUCED BY ITS  
PERFORMANCE.



If someone can make a dual-band transceiver as small and feature-packed as this, who cares about its looks?

Especially if it's also so sturdy that it shrugs off the knocks and shocks of a lifetime's use.

And especially if it has a host of product features, from built-in DTSS and paging functions to alphanumeric

memory, simultaneous dual-frequency receive and message paging.

We'll tell you who cares  
Kenwood cares.

Which is why the TH78E isn't just the neatest dual-band transceiver you can buy, it's also the best designed. Right down to thoughtful touches like the sliding keypad cover.

So visit your nearest Kenwood

approved dealer, pick up the TH78E and admire its ergonomic curves at close quarters. Or simply take in the wonders of its specification.

Either way, it's love at first sight.

*Kenwood TH78E is part of a range of hand portables from £240 to £430.*

**KENWOOD**

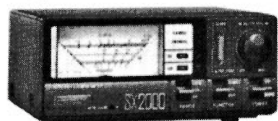


# WATERS & STANTON ELECTRONICS

ALINCO KENWOOD YAESU ICOM DIAMOND MFJ MICROSET TONNA REVEX

## Diamond Power Meters

Very Accurate & Reliable



### Specifications:

- SX-200** 1.8 – 200MHz 5W-20W-200W  
Connectors SO-239 RMS or PEP  
£89.95 + \$6 p&p
- SX-400** 140 – 525MHz 5W-20W-200W  
Connectors SO-239 RMS or PEP  
£104.95 + \$6 p&p
- SX-600** 1.8 – 525MHz 5W-20W-200W  
Connectors SO-239 RMS or PEP  
£164.95 + \$6 p&p

## QRP CORNER



**MFJ 40m or 20m CW Transceivers.**  
Both models now available with full vfo control and semi-break in. 5 Watts.....£209

**Jim 80m, 40m or 20m SSB/CW Transceivers.**  
Complete in every respect inc. CW button and internal mic. 2 Watts output.....£249

**Ramsey 80m, 40m, or 20m Tx. kits.**  
A complete kit with board, components, controls and xtal. 1 Watt output.....£31.95

**Ramsey DC 80m, 40m, or 20m receiver kits.**  
All you need to build a simple hf receiver that will copy CW, SSB and AM.....£31.95

Ask for QRP leaflet

## MFJ Data Controllers



The most reliable and best value on the market. There's one for most pockets.

**MFJ-1214 – Data**  
Gives you FAX, WeFAX, RTTY, ASCII and CW. Includes IBM software and connecting cable.....£169.95

**MFJ-1270B – Packet**  
A complete packet controller with enhanced mail-box features for VHF and UHF. Includes 12V psu.....£149.95

**MFJ-1274**  
Same as "1270B" but with HF tuning bar indicator.....£179.95

**MFJ-1278**  
A complete data controller for Factor, SSTV, FAX, Packet, AMTOR, RTTY, ASCII, Navtex, CW, plus enhanced 32k Mail Box. This is the number one seller in the USA and UK.....£369.95

**MFJ-1289**  
The multicom software for use with the above data controller to give you all modes. 5.25" discs.....£69.95

**MFJ-1289M**  
As above but on 3.5" disc.....£69.95

## Global AT-1000

£89.95 P&P £4.00

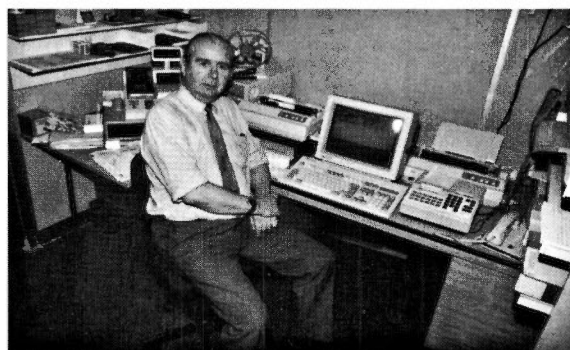


The best receiver ATU around. Thousands in use. Improves signals, front-end selectivity and reduces background noise.

## Great news FREE HAM RADIO CATALOGUE

The best ever produced!

For the first time ever you can obtain a copy of this catalogue packed with Ham Radio equipment and accessories, some never before advertised. You get the full specification with pictures and accompanying price list. Forty four pages of absorbing reading and it's all FREE! Just call in and collect one from our Hockley or Hornchurch stores. Alternatively send two first class stamps to cover postage.



Frank in control of mail order despatch

## HB-400 Amazing! £13.95!

P&P £2.00

### Hand-held mount

The easy way to mount your hand-held or scanner in the car. Fits any hand-held using the belt clip. Gives firm mounting for safe driving.



## Kenwood HF

NEW! TS-50 £Phone

The amazing 100W mobile rig. No bigger than many 2m FM boxes it gives you all hf bands. 1.8-30MHz plus 500kHz-30MHz receive! SSB/CW/FM/AM. Memories, Dual VFO, Scan, Noise Blanker etc.



TS-450S

£Phone

1.8MHz-30MHz 100W transmit plus receive 500kHz-30MHz. Optional ATU, triple conversion, IF shift, notch filter, dual mode noise blanker, reverse CW, CW pitch control, 100 memories. Send for details.

TS-850S

£Phone

The most popular 100W transceiver in 1992 SSB/CW/AM/FM super dynamic rx range. IF slope tuning, IF notch filter, tx monitor, true rf speech processor, full break-in CW, 100 memories and more!



## Ameritron Linears

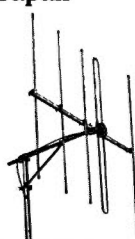


We can supply most models from stock 1.8-30MHz with built-in power supplies. Ameritron linears are rugged and well built. It's the sure way of working the DX. We also supply free connecting leads to match your transceiver on request. We can supply the AL-811 rated at 600 Watts pep for £839 and the beefy AL-808X with an output of 1kW for £1499. We also have a very nice second-hand AL-80 which has been completely checked over and is "as new"; the price of this is £999!

## MASPRO!

from Japan

A new range of aeralis from Japan that feature superb engineering and amazing prices. Probably the best new range of aeralis we have seen for a long time. They are particularly attractive to FM users as the optional stand-off kit allows you to mount the aerial vertically and away from the mast for perfect radiation pattern.



- 144-WH5 2m 5 el. 0.93m 6.6dBd .....£29.95
- 144-WH8 2m 8 el. 1.79m 8.6dBd .....£39.95
- 435-WH8 70cms 8 el. 0.8m 10.4dBd .....£29.95
- 435-WH15 70cms 15 el. 2.19m 14.2dB .....£44.95
- KSB-50 Offset Boom bracket .....£7.95

## ALINCO

DR-130  
2m  
50W



The new DR-130 has arrived! 20 memories and 50 Watts output. The really nice touch is the ability for channels to be displayed instead of frequency. Good for quick glance mobile or those with impaired sight. You also get CTCSS encode included free of charge. Now available from stock.....£349.95

## HF MOBILE WHIPS

A completely new range at a sensible price. Single band makes sense. You buy what you need and no more. Fibreglass helical construction with tunable whip and total length of approx. 2.25m makes these really efficient 3/8" studs. (PL-259 adaptor £3.95).

- PHF-160 160m 15kHz bw .....£54.95
- PHF-75 80m 35kHz bw .....£24.95
- PHF-40 40m 60kHz bw .....£22.95
- PHF-20 20m 150kHz bw .....£19.95
- PHF-15 15m 200kHz bw .....£19.95
- PHF-10 10m 500kHz bw .....£19.95

## 2M ON-GLASS!

- GM-144 2m on-glass halfwave. 50W with 14' of cable + PL-259 .....£29.95
- Re-mounting kits .....£9.95

## Free Credit! On HF Transceivers

Model	Deposit	Monthly
IC-765	£595	£200
IC-737	£295	£100
IC-279	£257	£86.50
IC-R7100	£279	£93
TS-950 SDX	£741	£246.50
TS-790E	£359	£120
R-5000	£198	£66.75
FT-990	£479	£160
FT-990DC	£430	£143.25
FT-890	£277	£91.50
FT-890TU	£315	£105
FT-747FX	£176	£58.25
FRG-100	£116	£40.25
AL-20BX	£299	£100

Payments based on 12 monthly instalments

## Special



DR-112E 2M FM 45W

14 memories  
6 frequency steps  
Full scanning  
Expanded receive  
1750Hz tone  
Mic and hardware

£329

Your chance to purchase a top performer at a discount price!

Hurry

## ADI in stock!

2m or  
70 cms

Now back in stock, these transceivers offer a real bargain to the UK customer. Keypad entry 20 memories, 2 Watts output and all the normal scanning and search facilities. 1750Hz tone is included and the 70cms version is ideal for the Novice.



- ADI-145 2m 2W.....£199.95
- ADI-450 70cm 2W.....£219.95

Head office: Retail and Mail Order: 22 Main Road, Hockley, Essex SS5 4QS.

Tel: (0702) 206835/204965. Fax: 205843

Retail only: 12 North Street, Hornchurch, Essex. Tel: (0708) 444765



# WORLD CHAMPIONS!



## DJ-180EB

Frequency	
(Transmit):	144-146MHz FM
(Receive):	130-174MHz FM
Power Out:	5W (12V) 2W, 300mW
Steps:	5, 10, 12.5, 15, 20, 25kHz
Memories:	10 (Expandable to 50 or 200)
Sensitivity:	12dB SINAD -16dBu.
Tone:	1750Hz
DTMF & CTCSS:	Optional
IF Frequencies:	21.4MHz & 455kHz
Offset:	Programmable 0-16MHz
Size:	132 x 58 x 33mm
Weight:	390g.

**£209.95**

## DJ-580SP

Frequency	
(Transmit):	144-146MHz & 430-440MHz FM
(Receive):	108-143MHz AM 130-174MHz FM 400-470 & 825-950MHz FM
Power Out:	5W (12V) 2.5W, 1W, 300mW
Steps:	5, 10, 12.5, 25kHz
Memories:	42 Channels
Sensitivity:	12dB SINAD -15dBu.
Tone:	1750Hz
DTMF:	Built in
CTCSS:	Built in
Size:	132 x 58 x 33mm
Weight:	410g.

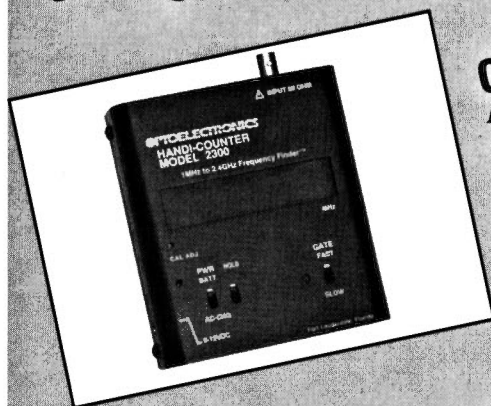
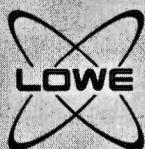
**£449.95**





# PUT LOWE TO THE TEST

No matter how much or how little you spend on radio equipment, sooner or later you're going to need some test gear. You can get by with just the bare minimum needed under the licence terms (the good old wavemeter!) but most people will want to go that little bit further - that's where we come in.



**OPTOELECTRONICS**  
As the appointed distributor in the UK for Optoelectronics, we can offer a full range of high-quality, low-cost digital frequency meters. Small enough to be carried in a tool box but accurate enough to be in use with many of our professional customers for frequency measuring and security applications

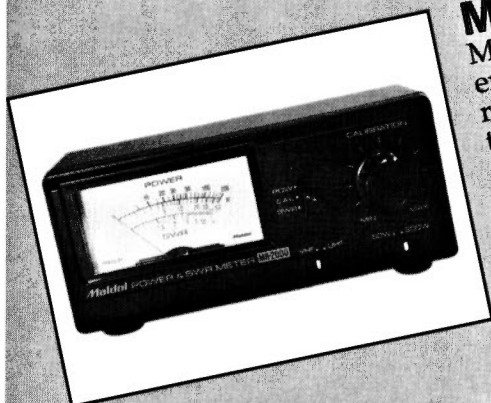
*Have you seen our new price list yet? Four first class stamps and your name and address are all we need to send one out to you with a bumper info pack on all that's good in amateur radio*



## DIAMOND

The most popular range in the world, Diamond can offer an excellent range of accurate and reliable SWR/PWR meter. Several models ensure that you get the right one for your frequency range and power handling requirements. Ask us now for full details of this exciting range. The first time you blow one of the PA slabs on your new dual-band mobile, you'll realise that a good meter would have paid for itself!

*Need our second-hand list? Why not try our new Fax-on-Demand service. Simply dial 0629 580008 from your fax machine and listen for the voice instructions. Service available 24HRS.*



## MALDOL

Maldol offer just two SWR meters, which will probably be more than enough for most people. The MR1000 covers 3.5 to 150 MHz with power ranges of 50 and 200 watts, whilst it's twin brother the MR2000 covers 140 to 525 MHz at the same power levels. Why not buy a matching pair?

*The best "antenna" you can buy for your rig is a dummy load. There's little point performing any SWR bandwidth tests on an antenna, unless you can be sure that your transmitter output is consistent over the range you are testing. You can only find that out if your load is consistent. So, don't be a dummy! You don't need to be loaded to buy our DL60*



## KENWOOD

We've got a super deal on a few remaining Kenwood SW2100 meters. With power handling up to 2kW, this is the ideal meter for those who like the cosy glow of a pair of good bottles on HF. At over £375.00 for a matched pair of 3-500Z's, can you afford not to have a quality meter?

## BRANCHES AT

BOURNEMOUTH - 0202 577760  
BRISTOL - 0272 315263  
CAMBRIDGE - 0223 311230

CUMBERNAULD - 0236 721004  
LONDON - HEATHROW - 0753 545255  
LEEDS - 0532 452657  
MAIDSTONE - 0622 692773  
NEWCASTLE - 0661 860418  
NEW BRANCH - PLYMOUTH - 0752 607284





# LOWE ELECTRONICS

## When the music stops.....

We've been doing a little musical chairs recently to bring you better service both up here in the Dales and out in the sticks around our branches. Lots of our people have been moving around and we have a few new faces to introduce. Steve Jelly, G6URJ, who has run our Kent branch for the last few months is our new showroom manager here at Matlock. Steve's causing quite a commotion at the moment, planning to move the showroom around a bit and upgrading our datacomms section - hopefully getting it ready for our open day, which this year is on 25th September.

The empty slot at Maidstone has been filled by Brian Underdown, G1LIJ. Brian is a very experienced VHF/UHF DXer, well known on the bands and very knowledgeable on VHF and UHF antenna arrays. I'm sure regular customers there already know Brian but if you don't, pop in and say hello.

For some time now we've had our very own "New Age Traveller". For the last two years, Dave McEchran, GW6CWA, has travelled the length and breadth of the UK as our relief manager and knows many of our customers from Cumbernauld to Bournemouth. Dave is now hanging up his caravan and settling in to our Bristol branch, ably assisting Tony, G4CYE who will be able to concentrate a little bit more on the service side.

Also moving around is Fred, G4RJS. Fred used to run our Eastcote branch and can now be found at our Heathrow branch together with Steve. Steve's not long passed his Morse and now sports the newish callsign of G0TKD. Catch him on the air on HF most mornings, chatting to Dave Brown G4KFN/M on his TS50S as he makes his way from Carlisle to open up our Newcastle branch.

Not content with that little lot, our Cambridge branch is on the move! Not far though, just a few doors up from the old place so you can still park in the same place. Tony, G4NBS is looking forward to welcoming old and new customers to his new larger premises. There might even be space for you to sit down now! Ask him now for your invite to the "official opening"!

**KENWOOD TS450S**  
Super rig, super deal  
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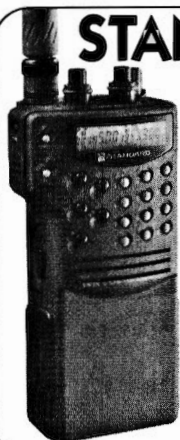
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STANDARD YAESU ALINCO AEA MFJ KENWOOD DRAKE WELTZ ANTENNAS ACCESSORIES



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SK1000 1.8-1300MHz 5/90/900 Watts PL+"N".....	£289.95
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### PL+"N"

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### THE NEW STANDARD C408

The latest in the "standard" range is probably the smallest set yet produced.

It has 230 mW R.F. output from 2 x AA cells – ideal for local Q.S.O's and repeater working. An idea that comes to mind for those of you with dual banders that will act as a repeater, is that you will have a portable microphone anywhere around the house!

We are waiting for full specs and leaflets.

The projected price is just under  
**£200.**



**DUE TO THE FLUCTUATING EXCHANGE RATE, PRICES MAY VARY  
– PLEASE PHONE BEFORE ORDERING –**

# Lee Electronics



I met many readers and other friends at this year's Longleat Rally. It was a very hot day, and while I was enjoying the shelter of a tree with a group, one of my companions brought up the subject of mobile equipment insurance.

We were chatting generally about insuring our amateur radio mobile gear, and everyone in the group said they actually kept their transceivers in the car. Our discussion led me to do some research, and I have some news that will come as a shock to many mobile amateur radio operators.

I spoke to several major insurance organisations. But I'll try to keep a long and complicated story as simple as possible.

Basically speaking, insurance problems may arise if you install your mobile equipment permanently in your car. If the equipment is in view and in a position where the driver can operate it safely - it seems that the insurance position could be compromised.

None of the insurance organisations I spoke to, would specifically state that they would refuse to cover the full cost of replacing stolen amateur radio equipment, permanently mounted in a car. However, they all clearly stated their requirements, and unfortunately these seem to conflict with the permanent (and safe) mounting of amateur radio equipment in cars.

The insurance companies advise (although I interpret this as a requirement) that **ALL** amateur radio equipment be removed when the vehicle is left unattended. Any equipment left in the vehicle should be out of view of potential thieves, and they apparently regard the common practice covering of dashboards (to obscure mounted equipment) as being an enticement to steal rather than a deterrent.

So, you'll probably realise that anyone with equipment fitted permanently in the car could have a problem. My own insurance company (I've been with them for almost 30 years!) weren't particularly helpful when I asked for advice on keeping

# Keylines



equipment in the car permanently.

When asked about insuring ever more expensive amateur radio equipment in cars, my insurance company's spokesman said "Why pay all that money and keep the equipment in the car anyway"! When told that installing equipment of this nature, which is mostly designed for permanent installation in any case, the spokesman repeated the advice given by other insurance companies. "Remove the equipment when you leave the vehicle unattended".

There does not seem to be a way round the mobile equipment insurance problem. When told of my (it's a daydream really!) intention of getting a Kenwood TS-50 h.f. dedicated mobile transceiver, my insurers weren't impressed and suggested that something so valuable would be better off in the main shack rather than used mobile!

Obviously, we must work together with the insurance companies and police on the matter of equipment security. To this end, I would like to hear from readers on the subject of insurance.

Have you had equipment stolen from your car? If so, what was the reaction from the insurance company? I feel sure that many readers will be able to help via 'Receiving You'. I think that we'll be able to learn from previous thefts from readers' cars, details on resultant insurance pay-outs, any subsequent insurance 'loading', and conditions of future insurance.

So, get writing! Your misfortune may stop others falling into the same trap, and together we'll try and make it even more difficult for the thief.

Finally, I must thank everyone who came to my rescue at the Longleat rally when I lost the back door key for my car, especially the group from Wales. The key turned up later in the week, jammed in the rubber seal of the rear estate door! I much appreciated everyone's help. Thank you.

*Rob Mannion G3XFD*



## COMPETITION CORNER

### Spot the Difference

Mark the 12 changes made to the right hand version of the cartoon. Details of entry are below.

#### First Prize

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

#### Second Prize

Six month subscription or £10 book voucher.

☐ Subscription ☐ Voucher

Name .....

Address .....

Send your entry (photocopies acceptable with corner coupon) to: Competition Corner, Spot The Difference Competition, September '93, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Editor's decision on the winner is final and no correspondence will be entered into. Entries to reach us by Friday 24 September 1993.

Competition Corner  
September '93



# Receiving You

## Wireless Chase

★★ STAR LETTER ★★

**Dear Sir**

I recently returned to the hobby after a lapse of some years and currently operate on 144MHz f.m. mobile. As my knowledge needed updating, I asked my wife to get me a copy of *PW*. Because of the word 'Wireless' in the title, she was convinced that she was on a wild goose chase, particularly as our own children didn't understand what 'Wireless' is! After a half-hearted attempt, she gave up.

Fortunately, I was able to go out and buy a copy and prove her wrong. I think that the format of your magazine is excellent as you cover a wide range of topics without becoming too technical, which makes for easy and interesting reading. I am now a regular reader.

On another point it seems to me that certainly locally, there is a lot less activity on 144MHz f.m. than I remember, say seven years ago. I wonder why this is so?

**J. Sones G8JBK  
Essex**

**Editor's reply:** The term 'Wireless' may seem outdated, but many readers have said they prefer the original title for the magazine. We reverted from the acronym *PW*, to the full title for our Jubilee year in 1992, as many of you had asked us to do. As regards 144MHz f.m., it always seems fairly busy here in Dorset!

## Unprotected Radio Spectrum

**Dear Sir**

Following Donald Elkington's lucid letter on legitimate spectrum allocations and usage, spare a thought for those who try to use 'unprotected' parts of the radio spectrum.

Some time ago I set up a v.l.f. system on a long wire antenna to record the signal strength of the MSF Rugby standard frequency station on 60kHz. This was to detect solar flares and other ionospheric disturbances.

This went well for about six months, until one day the signal was swamped by switching 'dirt' of some high power 50Hz system which ran continuously. I contacted Midlands Electricity, who were very helpful and installed a computer logger on my supply for a week. This confirmed that there was 1.5V of r.f. at 60kHz riding on the neutral!

The computer drew a spectrum of the noise from 10kHz to 150kHz. This showed the interference to be within EMC limits on the long wave broadcast band, so there was nothing they could do but sympathise!

I tried to get round the problem by building a v.l.f. frame aerial (200 turns tapped every 50 turns on 4ft diagonals). This tunes down to audio, and by turning it I can null the interference out and get a d.f. fix as well.

Unfortunately the source (a pumping station) is in the same direction as MSF Rugby. So I'm no better off, although the v.l.f. signals from static and geomagnetic effects are fascinating, provided I don't turn the frame off the null and get the 'radio pumping station' full blast!

The 'legal' pollution of the spectrum outside broadcast bands is more difficult to tackle than the light pollution problem facing astronomers. It's nobody's responsibility, so nobody in authority will do anything about it because power line filters cost money. Unlike light pollution, there's no visible energy waste for a public focus. Have *PW* readers any ideas how (or whether) the æther outside broadcast bands should be protected from silicon controlled rectifier 'transmitters'?

**Tony Hopwood  
Worcester**

## Brass Stock For DIY Morse Key

**Dear Sir**

Rather than me wittering on about this supplier, I would like to suggest you write for a copy of their catalogue to: **J. A. Crew & Co., Watery Gate Farm, Dovers Hill, Chipping Campden, Gloucestershire GL55 6QU.**

For the price of a £1 stamp (no cheques please) you will have something to keep you busy. The catalogue is full of items (including electronic surplus and other fascinating bits) handy for home-brew enthusiasts, including brass stock for the recently-published Jim Lycett G0MSZ design.

I have been intending

to write with my views on computing in radio. But, I started an engineering (electronics) degree course last September and I have been exceedingly busy ever since.

As an impoverished student who is lucky enough to live in an area with a high water table, I would really like to see a detailed DIY article on multiband h.f. vertical. (Just thought I would mention that).

I hope you had a good trip to Friedrichshafen this year. I will be sweltering through exams while you are enjoying yourself.

**Ian Wye G0OKY  
Nr Scunthorpe**

**Editor's reply:** Thanks for the information Ian. I sweltered in the (incredibly) hot sun at the Longleat rally this year, instead of Friedrichshafen. I like your distinctive callsign by the way!

## Illegal Network on 6MHz

**Dear Sir**

I refer to the letter from Roy Nicholls G7NUW July 1993 *PW*, concerning transmissions in the 6MHz band, and your reply to the effect that these are an illegal network of long standing.

I have listened to this activity on a number of occasions, and refer to them as 'The alternative 40 metre net'. Also they operate below 3.5MHz. In the main they appear to be UK based using Yaesu or Icom equipment and a mixture of amateur and CB type jargon.

Why are they allowed to continue this activity? They are operating within the confines of the aircraft frequencies with the possibility of harmful interference to that essential service.

I wrote to the RSGB several years ago concerning these pirates. But I received only a negative reply to the effect that as they are not operating within the standard amateur bands, there was little that could be done.

Why? Surely someone is capable of locating these pirates in this day of modern d.f. equipment and then bringing them to court. Or does it need an aircraft transmission to be blocked and danger caused first?

They have been there many years. It is time that they were stopped.

**John Randall G3OAZ, Hampshire**



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.



## Amateur Radio Visitor Licences

Dear Sir

I am writing to draw your attention to the subject of the Amateur Radio Visitor's Licence facility. I had applied to Subscription Services Ltd., in Bristol for a temporary licence for my friend N8KXY, who was visiting the UK for the first time, and had completed the application form I sent him.

I sent the £15 fee off with the application, although I queried why someone only staying in the UK need pay so much. The visitor's licence costs the same amount whether the person stays for one day or one year, presumably because it's too difficult to arrange an ascending scale of charges which could be implemented economically.

Upon receipt of the licence through the post, I noted the following:

- 1: The paper on which the licence is printed bears no watermark.
- 2: The document layout comprised of a much amended standard UK Amateur Radio Licence, but with all references to CEPT removed.
- 3: No serial issue number appears at the top of the form, giving the impression at least, that no record is held of the issue of this official document, which would most certainly be required by law in possible court cases. Personally, I would seriously challenge any person in possession of this licence, as to its authenticity.
- 4: The licence was handwritten, not typed, giving the impression that it was falsely or improperly issued. Any person could take a colour photocopy from the original, and with the aid of typewriter correction fluid simply overwrite the required details.

Upon contacting the SSL offices direct and complaining about the poor appearance of the licence, the issuing officer stated that it was impossible to produce a computer typed version, as they did not have typewriters in the office! I wrote to the Radiocommunications Agency, stating my concern. Mrs Karen Scott replied, and I was told SSL will shortly be laser printing all temporary validation documents. In addition, a suitable numerical issue system is currently under review, so that the documents are easier to trace.

Mrs Scott also explained that the £15 required for the visitor licence is because of the work involved in vetting the applications, even though they may only be required from a short period. The RA also needs to recover all the costs when setting the licence fee. She suggested to me that it would perhaps be easier if a visiting amateur operated under the supervision of a UK licensee, using the UK operators call sign, if the visit is only for a few weeks or less.

I was thanked for bringing the matter to the attention of the RA and I was assured that they would be keeping a close eye on the situation. I was pleased with the response, and it's nice to know that my efforts were not in vain. The problem is that N8KXY never did get his laser printed licence to frame!

**Paul Fry G0FUS**  
**Winchester**

## July QRP Special Issue

Dear Sir

Very many thanks for the July 'QRP Special' issue received today via W. H. Smith's. Well done *PW* team, you certainly did us proud!

Perhaps I should introduce myself. I'm Dave G0NEZ, The QRP Novice Manager of the G-QRP Club. I studied my RAE/Morse under Angus Taylor G8PG, Communications Manager of the Club, through the Rapid Results College, correspondence course, and passed first time with Credits.

I am responsible in helping the Novices (2E0 and 2E1) plus many 'first time QRPers' who are unsure. Gus G8PG receives about 300 letters every year, and I about 150.

I found the general 'QRP Special' very interesting. Our QSL Bureau Manager - Bob - does a great job and the general camaraderie amongst QRPers is well known. After passing the RAE, and putting in some three years QRP c.w., G8PG and I have become firm friends, as have many others in the club.

I spent three years on a straight key. I experiment with antennas, and my latest end loaded Doublet design may be reported in *Sprat* soon.

Once again I congratulate *PW* on the QRP Special Issue.

**David Gosling G0NEZ**  
**Hertfordshire**

**Editor's reply: The *PW* team are pleased you enjoyed the QRP Special issue David, and we hope you like and will eventually build the projects and enjoy using them.**

## Radiocommunications Agency Reply To G4GLM

Dear Sir

In your August issue, Dr G. Manning G4GLM questions the powers of the Radiocommunications Agency to act against the sale of non-licensable radio equipment and states that sale cannot be stopped apart from some very specific exceptional cases.

Such equipment can cause serious radio interference, including to safety-of-life services. It is all well, therefore, that your correspondent's statement is a considerable over-simplification. I would not wish anyone to be misled into committing a criminal offence so though it would be helpful to clarify the position.

The sale of some categories of radio equipment is a specific offence under the Wireless Telegraphy Act 1967. Apart from a.m. CB radios, this applies also to unapproved cordless telephones because of their interference potential. In addition, suppliers of any other type of unproved radio transmitter or transceiver which cannot legally be used may be guilty of

the common law offence of incitement. A disclaimer that the device cannot be used in the UK is not a sure defence as a number of suppliers have found to their cost. The Agency has successfully prosecuted several suppliers for inciting customers to contravene the Wireless Telegraphy Act 1949 and sizeable penalties have been imposed by the courts.

As for the power the Agency can seize equipment at the point of sale, authorised officers of the Agency can seize equipment as evidence under powers in the Telecommunications Act 1984. There are also powers in that Act and the 1949 Act to apply for forfeiture.

The Agency's powers and the offences in the legislation go wider than Dr Manning implies. There is not room in this short letter to go into all the legal details. If any of your readers are in any doubt, they should check very carefully before they act. Further information is available from the Agency at Waterloo Bridge House (public enquiry point 071-215 2150).

**L. B. Green**  
**Radiocommunications Agency**

Following the successful use of photographs in 'Receiving You' in our Diamond Jubilee issue, October 1992 *PW*, we would like to again include the occasional photograph with your letters. So, if you have a photograph of yourself or something appropriate to your letter send it in and the best ones will end up in print.



## Tri-band Hand-Held

Icom (UK) Ltd. have recently introduced a new model to their hand-held range of transceivers. The IC-Δ1E (Delta 1) tri-band f.m. hand-held transceiver is the first of its kind ever produced for general sale.

The IC-Δ1E covers 144/430MHz plus all of the 1296MHz band and is said to have many advantages over the common dual-band transceivers. These include simultaneous three band monitoring and reception, incremental tuning on 1296MHz and 78 memory channels.

Other features of the IC-Δ1E are, a built-in DTMF encoder/decoder, four DTMF memories, four l.c.d. contrast levels with backlighting, as well as optional tone squelch and pocket beep functions that can be set independently on each band.

The IC-Δ1E is available from **Icom (UK) Ltd., Sea Street, Herne Bay, Kent CT6 8LD. Tel: (0227) 741741, for £759 inc VAT.**

## Bank Holiday Sale

Garex Electronics in South Devon, following the success of previous sales are holding a Bank Holiday Monday Sale on August 30 1993 between 10am and 1pm.

On offer you'll find, new and second-hand scanners, antennas, components, audio and miscellaneous electronics, as well as junk and stores clearance items at 'Must Go' prices.

Garex are easy to

find and have ample free parking. To find them just head for South Brent, which lies just off the A38 between Exeter and Plymouth and then follow the signs for the town centre. Turn right into Station Road, immediately left before the railway bridge and into Station Yard. Garex are on the right at the end of the yard.

For more details contact **Garex Electronics, Station Yard, South Brent, South Devon TQ10 9AL. Tel: (0364) 72770.**

## RAE Courses

**Brighton College of Technology** are to begin running RAE courses from 13 September. The courses will run on two evenings. Mondays from 6 - 8.30pm covering theory and Wednesdays for Morse and Practical Project Building.

Details of enrolment, fees, etc., are available from **T. F. Strickland G4EOA on (0273) 667788 ext. 433 or 730.**

**Chesham: The Whitehill Centre.** Morse classes commence on Monday 13 September and RAE classes on Tuesday 14 September. The tutors will be Shirley G4HES and Ron G3NCL. For more details **Tel: (0494) 776420.**

**The City of Westminster College, Science & Technology Department, 25 Paddington Green, London. Tel: 071-723 8826,** will be running an RAE course, commencing in September and running until the May 1994 examinations. Class A and B licences will be catered for and it is hoped that an Advanced Morse course will also be run, taking in candidates up to 22 - 25w.p.m. with an insight into professional and marine procedures.

For enrolment details contact **Ann James** at the above address.

**Doncaster College, Division of Engineering, School of Electrical & Electronic Engineering, Waterdale, Doncaster DN1 3EX. Tel: (0302) 322122 Ext. 287.** Commencing September on Tuesday evenings, 6pm and running until the May 1994 RAE. The course will be in two parts, nought to five words for the Morse test in the subsequent ten weeks.

At the end of the course, arrangements will be made for RSGB examiners to test in the college. All enquiries to be made to Doncaster College.

**East Kent Hilderstone Radio Society.** Commencing late September in the Canterbury area. This course is designed for those wishing to sit the RAE in 1994. The tutor for this course will be G3JIX. For more details contact the **Secretary on (0843) 869812.**

**Kingston College, Kingston Hall Road, Kingston-upon-Thames, Surrey KT1 2AQ. Tel: 081-546 2151 ext. 2066,** will be running the following amateur radio courses in the forthcoming year: City & Guilds 7650 - Radio Amateurs, City & Guilds 8280 - Radio Servicing Theory (includes construction & fault finding), City & Guilds 7730 - Novice Licence Training, Practical Introduction to Digital Communications. Enrolment is on Monday September 6 in the Engineering Department. For further information contact the college direct.

**Merton College, Morden Park, London Road, Merton, Surrey SM4 5QX. Tel: 081-640 3001,** will again be running an RAE course this year. Commencing September and running until early May on Wednesday evenings at 7pm. The tutor for this course will be David Bowman G0MRF and enrolment is the 1st & 2nd week in September. Anyone interested should contact the college direct.

**The North Cheshire Radio Club, Morley Green Club, Morley Green, Nr Wilmslow, Cheshire** will be running an RAE course on

Sunday evenings. Enrolment will be on Sunday September 19 at 8pm, each Sunday thereafter the course will start at 7pm.

For further details contact **Jill on 061-485 5036.**

**North Trafford College, Talbot Road, Stretford, Manchester M32 0XH. Tel: 061-872 3731** are offering another RAE course this year, starting in September. The course tutor will be J. T. Beaumont G3NGD. Theory will be on Monday evenings or Wednesday mornings, Morse on Tuesday evenings or Wednesday afternoons, Amateur Television on Wednesday mornings and an Advanced Radio Course Tuesday afternoons.

The all day course (Wednesdays) should appeal to retired or unemployed people, as a successful student could apply for an A licence at the end of the first year.

Enrolment dates are September 1, 2nd & 3rd. For further details on the course contact the college at the above address.

**Reddish Vale Evening Centre, Reddish Vale Road, Reddish, Stockport SK5 7HD.** A full RAE course of 25 sessions, commencing Monday September 27. The classes will run on Mondays, 7 to 9pm. Facilities will be available for students who register for the course to sit the examination in December 1993, either for those wishing to obtain the licence quickly, or for students needing to resit one or more components. These examinations are held in the centre.

They will also be running a Morse course of 25 sessions, up to 20w.p.m. The sessions will run on Thursdays, 7 - 9pm, commencing

Thursday September 30. Enrolment for both courses will be on September 13, 14th & 16th between 7 & 8pm.

Further details from course tutor **Dave Wood on 061-430 6246.**

**Sony Broadcast Amateur Radio Training Group, Jays Close, Basingstoke, Hants RG22 4SB.** Commencing on Monday September 13 from 6.30 - 8.30pm. Entries will be made for both the December 1993 and May 1994 examinations.

There is also a distance learning package nearing completion for those who are unable to attend the evening classes.

Further details are available from **Stephen Harding** at the above address.

**Southdown ARS** will again be running weekly evening classes to introduce newcomers to amateur radio and to assist in the preparation for the RAE. The classes will start on Friday 1 October 1993, 7.45pm and run until May 1994, at the **Lagoon Leisure Centre, Vicarage Lane, Hailsham.**

The first part of the course, leading up to Christmas will feature various aspects of amateur radio as well as an introduction to basic electronics and radio theory. As from 7 January 1994 the classes will follow a 17 week course to prepare for the May examinations.

For more details contact **John Vaughan G3DQY. Tel: (0323) 485704 or Vic Robins G0THX. Tel: (0323) 846774.**

## New Opening Hours

**Harry Lemming G3LLL** of Holdings Amateur Electronics, Blackburn, has advised *Practical Wireless* of new opening hours.

Due to escalating prices caused by the £'s 25% fall against the Yen, Harry has experienced an increased demand for repairs on second-hand equipment. In order to meet this demand, Holdings Amateur Electronics, as from August will close for one extra day a week. The new opening hours will be: Tuesday, Wednesday, Friday and Saturday 9.30am - 12pm & 1.30 - 5pm.

For more details on the repair services offered contact **Holdings Amateur Electronics, 45 Johnston Street, Blackburn BB2 1EF. Tel: (0254) 59595.**

## Extreme Miniaturisation Exhibition

The National Museum of Science & Industry, London are currently holding an exhibition on the beginnings of nanotechnology and the benefits of extreme miniaturisation.

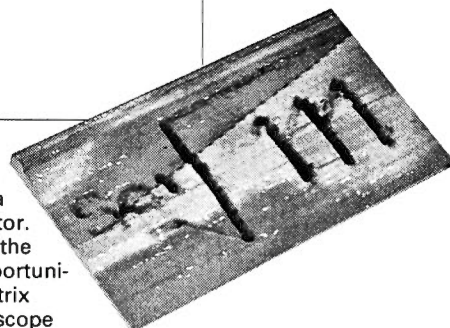
The exhibition, 'How Small Can We Go?', which is running until 26 September 1993 is the sixth in the Science Box series sponsored by Nuclear Electric Plc. and explores nanotechnology or the technology of atom sized dimensions.

Visitors to the exhibition can see US Engineer William McLellan's rotating electric motor measuring 0.4mm, as assembled in 1959. Also on display is a model of a Toyota car measuring

4.8mm long, complete with hub caps, number plates and a working electric motor.

The highlight of the exhibition is the opportunity to see the TopMetrix Atomic Force Microscope (AFM) in action. This microscope can produce a three dimensional picture of a surface.

For further details of 'How Small Can We Go?' contact the **Science Museum, Exhibition Road, London SW7 2DD. Tel: 071-938 8080/8008.**







## - Obituary -

# Peter Rouse

## GU1DKD

“

I am glad, that at long last fashion designers have come to realise that Radio Amateurs are not a load of old fuddy duddies who do

nothing but wear sensible pullovers and sandals. I was therefore delighted to receive an invitation to the first of Pierre Cardigan's (YF-RONT) fashion shows for those of our persuasion. The highlight was the 'Hamorak' in either Pye blue or real-ale brown. This stylish jacket was mottled with simulated silicone grease stains and soldering iron burns (beautifully styled holes that were delightfully crispy and brown around their edges). This must be ideal wear for a visit to the club or rally. Several sweatshirts were also on offer (this year's colours are 'Box Black' and 'Import Grey') and carried such logos as 'Hams don't do it but they talk about it'.

I was also impressed with his beard-boom-mic (it just clips on); the ideal accessory for those amateurs who work 144MHz at rallies and do not like things strapped round their head or attached to their glasses.

Pierre of course, also provides a matching range of cosmetics. His E-layer friendly aerosols will come as a delight to amateurs young and old. There's the 'Speco-mist'; just a squirt (Roland Acne) makes the average lens look as if it has not been cleaned for weeks and as if it is covered in several greasy fingerprints (he's even working on pre-grimed sticking plaster for on-the-spot repairs that don't look as if they've just been done). However, the real show-stopper was the 'bargain counter clearer'. Now, how often have you been to a rally and had to fight your way to the counter with the best bargains? It need be no more. Pierre's scientists have developed a special chemical spray based on a scent secreted by female pigs when they do **not** want to breed. (It is actually a synthetic substitute based on raw Garlic). A quick squirt on your 'Hamorak' is guaranteed to clear all space for a radius of twenty feet. Finally, Pierre has perfected spray-on Dandruff which, I swear, looks just like the real thing and is guaranteed to stick to clothing for at least a fortnight.

Finally, like most Fashion designers, Pierre also includes accessories. I was particularly taken with his home-brew selection which included a set of six unmatched control knobs and a kit of blown fuses, which come complete with ready cut strips of cigarette packet foil (Galois appear to be just as good as the more familiar British brands).

”

The extract on the right was part of a series of 'occasional barefaced lies about products and developments' that came from the prolific pen - or rather the wordprocessor - of a very special person. It was published in *Practical Wireless* in April 1990 and was written by Peter Rouse GU1DKD. Peter was a dedicated radio amateur with a fantastic sense of humour. He had the rare ability to explain in simple, readable terms the technicalities of radio, or, as in this instance to make his readers laugh while getting to the point. This gift he put to good use, writing several books and many technical features on one of his favourite subjects - radio.

Readers of our sister title *Short Wave Magazine* will remember Peter best for his very popular monthly column 'SSB Utility Listening'. This was Peter's own idea stemming from his interest in this particular facet of the hobby. The way in which the column developed was almost entirely due to his enthusiasm and boundless energy. Even during his recent illness he could still dream up fresh ideas for future use in the magazine.

Peter was well-known in the Channel Islands as a television presenter for Channel Television. In fact he was so well known on Guernsey that when I asked in St Peter Port which bus would get me to St Andrews Parish Church for two o'clock, the bus inspector knew that I was attending Peter's funeral. The funeral itself, although tinged with sorrow, was not a sombre affair - just as Peter himself would have wished. He leaves behind Val and children James, Abbi and Arron.

*Practical Wireless* will miss the humour and wisdom of Peter's writing.

Dick Ganderton G8VFH



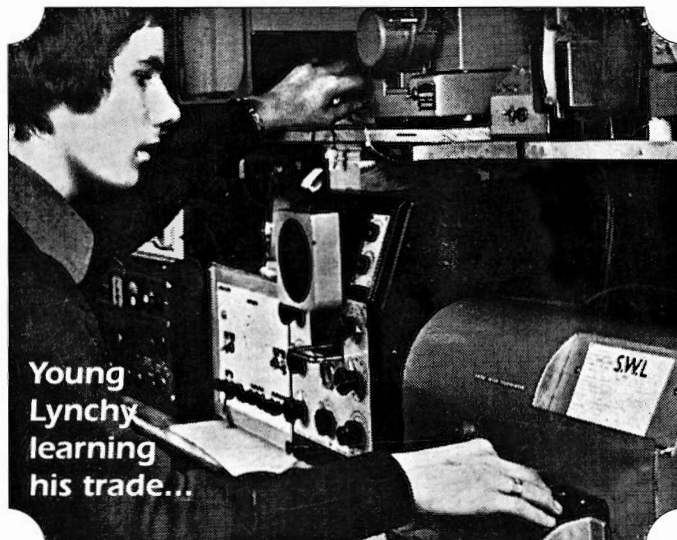
Stop Press...See the 'Lynch Mob' at these great summer events...  
**Bristol - 5th Sept...Telford - 5th Sept (yes, we're at both events)...**

# Lynch's Third Year At

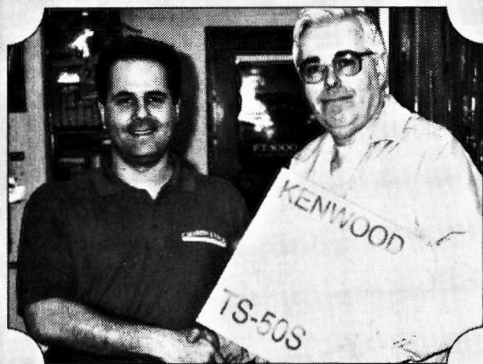
To celebrate the third year at our Northfields showroom, we're having the biggest sale ever offered by a Radio Retailer. Very **LOW DEPOSITS ON INTEREST FREE**, (isn't it funny how everyone seems to have caught on to this one!), or **CASH** purchase, (**TRADE-IN's** still welcome), the savings on all **NEW & USED AMATEUR RADIO EQUIPMENT** will be offered during **SEPTEMBER ONLY** and will not be available at these prices again.

Thanks to all my loyal U.K. and Overseas customers, **MARTIN LYNCH** has had another successful year. Over **TEN THOUSAND** customers have poured through the front door or telephoned to place an order. Even more important is that you keep coming back to support your "Independent Retailer", realising that we really can offer objective and unbiased advice, giving you the very best in customer care.

More recently, you may have had a call from Brian, G3THQ. He's the latest member to join my sales team, his role being somewhat unusual. His job isn't to make sales, (albeit I'm the last to stop him!), it's actually to liaise with you **AFTER** the sale is made. Without landing you in it with the other half, Brian's role is to make sure you're satisfied with the purchase and ensures that nothing is left out of the transaction. In other words, if you're delighted with the service you've received from **MARTIN LYNCH**, then he is satisfied. So am I. How many other retailers contacted you - after the sale?



Young Lynchy learning his trade...



## Massive Cele

...and now, with John Tett G0OID. The first U.K. TS-50S owner.

**The NEW KENWOOD TS-50S Mini HF Transceiver.**

**Deposit only £99.95 & Twelve payments of £75 Interest Free**

John Tett, G0OID near Dorking in Surrey has been a long standing customer of **MARTIN LYNCH**. When he phoned me and said he wanted the new TS-50S from Kenwood the day of issue, he wasn't kidding! When we said how about being the **VERY FIRST** owner of one in the U.K., he said great!

Just how long will Kenwood have to wait until the other manufacturers catch up. Word is, a very long time. The ultimate Mobile h.f. OR THE IDEAL BUDGET base rig, the TS50s really fit the bill. Look at the **LOW LOW** deposit this month...

AMATEUR RADIO STATION LOG										Report		Remarks
Date	Time (GMT)	Station Worked	Freq	Mode	Power	Dist	Report	Rcvd	Sent	58	59	
16-3-93	1500	1507	G3 X KA	3.7	30	20	58	59	59	58	59	Long Woking Surrey
16-3-93	1509	1520	G3 E M N	3.7	30	20	58	59	59	58	59	Long Woking Surrey
16-3-93	1658	1710	G3 D H L	3.7	30	20	58	59	59	58	59	Long Woking Surrey
16-3-93	1947	1901	K2 J H	18	30	20	58	59	59	58	59	Long Woking Surrey
17-3-93	0710	0725	Z6 G D J	18	30	20	58	59	59	58	59	Long Woking Surrey
17-3-93	0730	0745	UK 7 G K	18	30	20	58	59	59	58	59	Long Woking Surrey
18-3-93	0824	0707	G3 G C M	3.7	30	20	58	59	59	58	59	Long Woking Surrey
18-3-93	1530	1547	W3 Y D	18	30	20	58	59	59	58	59	Long Woking Surrey
18-3-93	1549	1600	W3 Y D	18	30	20	58	59	59	58	59	Long Woking Surrey
30-3-93	1645	0829	9 H I K K	18	30	20	58	59	59	58	59	Long Woking Surrey
21-3-93	1610	1617	I 8 R R R	18	30	20	58	59	59	58	59	Long Woking Surrey
23-3-93	0803	0825	UK 2 H H L	14	30	20	58	59	59	58	59	Long Woking Surrey
27-3-93	1947	1947	G3 X KA	3.7	30	20	58	59	59	58	59	Long Woking Surrey

John's impressive first log using the TS-50S.

### The NEW ICOM DELTA ONE

World First Triple Band Handie  
 It had to come, all three bands in one neat & robust unit. Full coverage of 2, 70 23cm, three separate displays, three volume & squelch controls, this is 3 radios in one small box.

**Deposit only £159. Twelve payments of £50 INTEREST FREE.**



### The NEW ALINCO DJ-Z40

Not another handheld I hear you cry! Yep. But one with a difference. The guys at Alinco have given you a **PANORAMIC DISPLAY** showing you three channels either side of your operating frequency! Remote Digital Microphone, (wonder where they got that idea from?), throw in receive on 2 metres plus all the usual features of scanner-wide frequency coverage, Nicads, charger and the rest, and you'll see why **ALINCO** is good value for money.

**Price ? Haven't a clue - PHONE FOR UPDATE!**

**286 NORTHFIELD AVENUE, EALING, LONDON W5 4UB**



...for amazing rally bargains...  
**.BARTG at Sandown, Esher - 12 Sept**

**MARTIN LYNCH**  
 G4HKS  
**THE AMATEUR RADIO EXCHANGE CENTRE**

**Dial 081 566 1120 NOW**

## The Universal Range of Decoders Direct From The USA

### M-400

As featured in August Short Wave Magazine, the NEW UNIVERSAL M-400 decoder is a must for those who want a serious RTTY, SITOR, FEC, WEATHER FAX plus much more CODE CONVERTOR at a sensible price. Available from stock.

**£379.95 incl. VAT**  
**PSU extra at £19.95.**



### M-1000



Got a PC and want a powerful decoder using your own computer as part of the system? The UNIVERSAL M-1000 is a complete CODE CONVERTOR on a single card, ready to slot into an IBM compatible PC. Full colour on screen graphics are at your disposal. This one IS fully recommended - our Chief Engineer uses one!

**£379.95 incl. VAT**

### M-900



Similar in features to the M-400, the M-900 has a powerful FAX-to-SCREEN processor built in, enabling weather and other 'picture' transmissions to be viewed by a simple video monitor, before dumping to printer.

**£499.95 incl. VAT**

### M-8000

The ultimate in all mode code converters. Mainly used by commercial organisations throughout the world, UNIVERSAL have managed to engineer the package at a price within reach of the true hobbyist. A true colour VGA output is given to enhance the incredible definition obtainable in all modes by this advanced piece of hardware. It's easier to use than you think - a few hours will soon bring decoded data to your own screen from around the world. Open your eyes to a new world just waiting for you to explore. Put your NRDS35 or RS000 or Drake R8E to real use today!

**&1199.95 incl. VAT. A 10" VGA HIGH RES**  
**COLOUR Monitor is available for only £179.95**



# bratation Sale!!

**The Yaesu FT736RDX -**  
 the best selling VHF/UHF Base Station



Since the introduction of the muTek RDX Front-End boards replacing the originals, sales of the transceiver have gone through the roof! Hundreds of engineering hours by both Mike Dorset, (if muTek who designed the boards) & Graham my Chief Engineer, who carefully fits each one individually, have helped make the YAESU FT736RDX the best performance, most economically priced Base Station available today.

**To celebrate the MARTIN LYNCH**  
**THREE YEAR CELEBRATION, I will**  
**actually PAY YOU £100 towards your**  
**deposit, on Interest Free, over a**  
**whole twelve months!**

**PHONE TODAY FOR A TAILOR MADE**  
**QUOTATION**

**The NEW ICOM IC737**  
**H.F. Base Station Transceiver**

Reviewed in September Radcom, Icom have

given you a top flight H.F. Rig, with all the frills at a sensible price, (They obviously shot the chap who usually prices ICOM kit!). Mr HENRY LEWIS G3GIQ, or "MR FAMOUS" for short, reviewed this in the LYNCHY Spring newsletter and comparing it with his TS950SD, reckoned it stacked up very well. Not bad seeing the Kenwood is more than DOUBLE the price! The auto at is simply staggering, so is the display, electronic keyer, receive performance and Icom quality "feel". Come on lads, get those eight year old IC735s in on Part-Exchange. I'll give you a silly trade-in offer you can't refuse!



**Deposit £295.00 & Twelve payments**  
**of £100 INTEREST FREE**

**The NEW YAESU FT530R**  
**Dual Band Handie**

It's the most expensive, but it is, in our opinion, probably the best. Capable of dual receive on ONE BAND, full duplex on 2/70, digital remote speaker microphone, yes it actually has a display BUILT IN, plus

payment over a whole  
 year, interest free gratis?

**Deposit only £53.00**  
**& twelve payments**  
**of £39.75 Interest**  
**Free. Or with Digital**  
**Mic. Deposit £61.00**  
**& twelve payments**  
**of £45.75**



**The NEW KENWOOD TH-78E**

I remember when these were as rare as price reductions in Ham Gear, they were just unobtainable! Now KENWOOD U.K. are here doing the biz on distribution, I've got a wall of them! Dave, or "RAVE" Wilkins at Kenwood thinks that life wouldn't be worth living without caressing his little '78 each morning. I wouldn't know, but it is the most popular Dual Band Handie next to the Alinco DJ-580. I've knocked the deposit to a minimum and thrown in FREE CARRIAGE to anywhere in the U.K. next day, GUARANTEED!!

**Deposit only £46.95 & twelve**  
**payments of £35.25 INTEREST FREE**

## That TWO YEAR WARRANTY...

Several telephone enquiries have bought about the topic of 2 year warranties being offered at present. This was an old selling tactic introduced years ago and every now and again, it re-appears. Quite frankly, we can all start offering 2 years, indeed why stop there, why not 3 or 4 or even 10? Without wishing to preach to the converted, you know as well as I do, most faulty electronic equipment goes wrong within seconds of pulling it out of the box. This is usually due to insufficient test before dispatch. Alternatively, a malfunction can happen a few hours or even weeks after use. Generally, today's manufacturing methods & design have pushed the MTBF (mean time between failures), so far down the road, that offering a Two Year warranty is relatively meaningless.

**What's far more important is how**  
**your retailer responds to a**  
**problem with your faulty**  
**purchase. For example, will he:**

**a.** Collect your faulty transceiver, (within the U.K.), the same day, (if phoned through before 12:00), for rectification - at HIS EXPENSE?

**b.** Offer a replacement if the equipment is in as new condition and only recently purchased?

**c.** If a repair is required, get it fixed within 10 working days (subject to spares), & return it to you at HIS EXPENSE? Most companies lead times to their workshop is 4-6 WEEKS - then it gets repaired!

**d.** Keep you informed of the progress with your warranty claim?

**e.** Out of warranty claims charged at a minimum - our servicing charges are one of the lowest in the country.

Who else offers a "MENU" fixed price repair service for most equipment?

**If the answer is YES to all of the**  
**above, then you're probably using**  
**me already! If not, there's always**  
**that 10 year warranty available.....**

**The complete range of AMATEUR**  
**RADIO PRODUCTS held by the**  
**showroom is on special offer and**  
**O.T.T. trade-in prices will be offered**  
**for clean equipment. Anything over**  
**£200 can be bought on INTEREST**  
**FREE, no catches, just free interest**  
**loans. If you want a particular**  
**product that's not listed then get**  
**dialling, or call in.**  
**MAXIMUM DISCOUNTS AVAILABLE**  
**TO EXISTING CUSTOMERS OR**  
**CALLERS TO THE SHOP.**  
**SEPTEMBER ONLY!**

**Tel: 081 566 1120 FAX: 081 566 1207**

**SWITCH**





# Club News

Please send in all of your 'Club News' items to Donna Vincent at the new editorial offices in Broadstone.

## Berkshire

**Newbury & DARS.** 4th Wednesdays, 7.30pm. Bucklebury Memorial Hall. August 25 - The dBW Explained by John McGinty. **Norman** on (0635) 863310.

**Reading & DARC.** 2nd & 4th Thursdays, 8pm. The Woodley Pavilion, Woodford Park, Haddon Drive, Woodley, Reading. August 12 - HF SSB Contest & Club Members Discussion, September 4 - SSB Field Day. **Nick Challacombe** G0LGG on (0734) 722489.

## Buckinghamshire

**Milton Keynes & DARS.** 2nd Mondays. North Bucks Youth Sports Hall, Haversham Road, Wolverton, Milton Keynes. September 5 - Car Boot Sale, Cranfield Airfield. **Julian Winson** G3FGB on (0908) 611005.

## Cheshire

**Mid-Cheshire ARS.** Cotebrook Village Hall, Cotebrook, nr. Northwich, Cheshire. August 25 - On The Air Night. **Mike Baguley** G7LQD on (0606) 331210.

**Stockport RS.** 2nd & 4th Wednesdays, 7.45pm. Room 14, Dialstone Centre, Lisburne Lane, Offerton, Stockport, Cheshire. August 25 - Non Packet Data Systems by Bill Green, September 8 - Pulsars-Time Keepers Of The Universe by Ian Morrison G0DMU. **Jim France** G3KAF on 061-439 4952.

**Widnes & Runcorn ARC.** Every other Tuesday, 8pm. Scout Hut, Castle Road, Walton Castle, Runcorn, Cheshire. Aug 27 - RAE Classes start. **Dave Wilson** G70BW on (0270) 761608.

## Clwyd

**Wrexham ARS.** Maesgwyn Community Centre, Maesgwyn Road, Wrexham. August 17 - Field Evening. **Ian Wright** GW1MVL on (0978) 845858.

## Derbyshire

**Buxton Radio Amateurs.** Lee Wood Hotel, Buxton, 8pm. August 24 - Video Night. **Derek Carson** G4IHO on (0298) 25506.

**Derby & DARS.** Wednesdays, 7.30pm. 119 Green Lane, Derby. August 18 - Visit to Carsington Reservoir, September 1 - Junk Sale. **Hayley Winfield** 2E1AJI on (0773) 856904.

## 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. August 17 - Committee meeting/Night On The Air, September 2 - BBQ/Night On The Air. Further info from **PC 915 Richard Newton** at Ferndown Police Station on (0202) 229351.

## East Sussex

**Southdown ARS.** 1st Mondays, 7.30pm. Main Hall of the Chaseley Home for Disabled Ex-Servicemen, South Cliff, Eastbourne. Wednesdays (Morse) & Fridays (Novice & RAE), 7.30pm at the clubrooms, Hailsham Leisure Centre, Vicarage Road, Hailsham. September 4 & 5 - Exchange Weekend with Radio Club de Normandy, 6th - AMTOR & RTTY. **John Vaughan** G3DQY on (0323) 485704.

## Essex

**Bishops Stortford ARS.** 3rd Mondays, 8pm. British Legion Club, Windhill, Bishops Stortford. August 16 - Natter Night. **John Dudeney** on (0799) 550313.

**Braintree & DARS.** 1st & 3rd Mondays, 8pm. Community Centre, Victoria Street, Braintree. August 16 - Hobbies Evening. **J. F. Button** G1WQQ c/o G4JXG, 88 Coldnailhurst Avenue, Braintree, Essex CM7 5PY.

**Chelmsford ARS.** 1st Tuesdays, 7.30pm. Marconi College, Arbour Lane, Chelmsford, Essex. August 15 - Southend & DARS Rally, September 7 - Satellites by Pat Gowen G3IOR. **Roy & Ela Martyr** G3PMX & G6HKM on (0245) 360545.

**Vange ARS.** Thursdays, 8pm. Barnstable Community Centre, Long Riding, Basildon, Essex. August 12 - Round Table Discussion on CW, 19th - Loading & Setting Up The FT101 by Roy G3ASH, 26th - Rally Update, September 9 - Junk Sale, 9th - Rally Review. **Doris** on (0268) 552606.

## Greater London

**Acton, Brentford & Chiswick ARC.** 3rd Tuesdays, 7.30pm. Chiswick Town Hall, Heathfield Terrace, London W4. August 17 - Communications Receivers Discussion. **Colm Mulvany** G0JRY on 081-749 9972.

**Cray Valley RS.** 1st & 3rd Thursdays, 8pm. Progress Hall, Admiral Seymour Road, Eltham SE9. August 19 - Natter Night, September 2 - Military Radio by G7KQO. **Bob Treacher** on 081-850 1386.

**Crystal Palace & DRC.** 3rd Saturdays, 8pm. All Saints Parish Rooms, Beulah Hill, London SE19 (opposite junc. Grange Road). August 21 - Informal Natter Night & active h.f./v.h.f. station. **Wilf 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. August 26 - SSB Field Day Briefing, September 4 & 5 - SSB Field Day. **Howard Drury** G4HMD on (0923) 822776.

**Loughton & DARS.** Room 12 of Loughton Hall, 7.45pm. September 3 - CW Operation From Lancaster Bombers In WWII by Tom Langley. **Ray Pedley** G0LWF on 081-500 2811.

## Greater Manchester

**Rochdale & DARS.** Mondays, 8pm. The Cemetery Hotel, 470 Bury Road, Rochdale, Lancs. August 16 - Five Million Volts - Aftermath by G0GNR. **Brian** on 061-653 8316 or **Dave** (0706) 32502.

## Gwynedd

**Dragon ARC.** 1st & 3rd Mondays, 7.30pm. Four Crosses Hotel, Menai Bridge. August 16 - EGM, September 6 - Talk by Jeff GW7OIX. **Tony Rees** GW0FMQ on (0248) 600963.

## Hampshire

**Horndean & DARC.** 1st Thursdays, 7.30pm. Horndean Community School, Barton Cross (off Catherington Lane), Horndean, Hants. September 2 - RAYNET by Dick Grindley G0MNL. **Stuart Swain** G0FYX on (0705) 472846.

**The Three Counties ARC.** Every other Wednesday, 8pm. Railway Hotel, Liphook Hampshire. August 18 - Video Night, September 1 - Club Junk Sale. **Kevin Roche** G8GOS on (0420) 83091.

**Winchester ARC.** 3rd Fridays, 7.30pm. Red Cross Centre, Durngate House. August 20 - Social Evening With A Focus. **Peter Simpkins** G3MCL on (0962) 865814.

## Hereford & Worcester

**Bromsgrove ARS.** 2nd & 4th Tuesdays, 8pm. Lickey End Social Club, Alcester Road, Burcot, Bromsgrove. August 24 - On The Air Night. **Mr D. Edwards** G4ZWR on (0527) 546075.

## Hertfordshire

**Dacorum AR & TS.** 1st (informal) & 3rd (formal) Tuesdays, 8pm. The Heath Park, Cotterells, Hemel Hempstead. August 17 - WAB by Robert G40BE. **Dennis Boast** G1AKX, **8 Juniper Green, Warners End, Hemel Hempstead** HP1 2NQ.

**Hoddesdon RC.** Alternate Thursdays, 8pm. Conservative Club, Rye Road, Hoddesdon, Herts. September 2 - Pre Field Day Briefing. **Roy** G4UNL on 081-804 5643.

**Stevenage & DARS.** Tuesdays, 7.30pm. Stevenage Day Centre, Chells Way, Stevenage. August 12 - Committee Meeting at G7HCLs, 17th - Discussion, Promotional/Teaching Video, 24th - Preparation for DF Hunt, 31st - HF & VHF On The Air, September 7 - DF Hunt. **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. August 13 - Junk Sale, 20th - PSUs by Andy G8ZCS, 27th - Social Evening, September 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. August 17 - BBQ/Calibration & Operating Evening. **Alan G7GBH** on 081-777 0420

**Medway AR & TS.** Fridays. Tunbury Hall, Catkin Close, Tunbury Avenue, Walderslade, Chatham, Kent. Visitors & new members welcome. **Mrs Gloria Ackerley G70VI**, 40 Linwood Avenue, Strood, Rochester, Kent ME2 3TR. Tel: (0634) 710023.

**South East Kent ARC.** Wednesdays. Dover YMCA, Leyburne Road, Dover. September 1 - Novice Evening, 8th - Television Questions & Answers by G7NOR. **Mick Bowers G7NOR** on (0304) 825030.

## Leicestershire

**Charnwood AR Contest C.** 1st & 3rd Sundays. The Albion, Loughborough. August 15 - HF Night On The Air & Antenna Discussion, 22nd - HF Contest Planning, 29th - Club Field Day, September 4 & 5th - NFD. **Phil** on (0509) 232927.

## Merseyside

**Liverpool & DARS.** Tuesdays, 8pm. Churchill Club, Church Road, Wavertree, Liverpool. August 17 - Quiz, 24th - Medical Electronics, 31st - Surplus Sale, September 7 - Pitcairn DX Video. **Ian Mant G4WWX** on 051-722 1178.

**Sankey Penketh & Newton ARC.** Wednesdays, 8pm. St. Davids Parochial Centre, Wargrave Road, Newton-Le-Willows, Merseyside. **G. H. Brookes**, 38 Mersey Street, St. Helens, Merseyside WA9 2JX.

**Wirral & DARC.** Irby Cricket Club, Mill Hill Road, Irby, Wirral, 8pm. August 18 - D&W, The Anchor, Irby, 25th - Annual BBQ. **Paul Robinson G0JZP** on 051-648 5892.

## Norfolk

**Dereham ARC.** 2nd Thursdays, 8pm. St. Johns Ambulance Hall, Yaxham Road, Dereham. August 12 - BBQ & Informal, September 9 - Equipment Review. **Mark Taylor GOLGJ** on (0362) 691099.

## Nottinghamshire

**Nottingham ARC.** Thursdays, 7.30pm. Sherwood Community Centre, Mansfield Road, Nottingham. August 12 - Visit from Castle Electronics, 19th - Foxhunt No 5/Activity, 26th - Construction/Activity, September 2 - Forum, 9th - 50MHz ATU Construction by G1WSD & The Current Repeater Situation by G2SP. **Simon G0IEG** on (0602) 501733.

**South Notts ARC.** Highbank Community Centre, Farnborough Road, Clifton Estate, Nottingham, or Fairham Community College, Farnborough Road, Clifton Estate. August 13 - Talk-in on S22/Open Forum & BBQ Site Servicing, 14th & 15th Club Field Days 1 & 2, 20th - Visit to Nottinghamshire's Traffic Flow Management Centre, 22nd - Fifth Fox Hunt, 27th - Talk-in on S22/Junk Sale, September 3 - Talk-in on S22/Open Forum, 4th & 5th - SSB Field Days 1 & 2. **Julie Brown G0SOC**, PO Box 4, Nottingham NG11 9DE.

## Oxfordshire

**Oxford & DARS.** 2nd & 4th Wednesdays, 7.45pm. Littlemore Hospital Social Club. **Terry Hastings G0CFN** on (0865) 863526.

## Scotland

**Banff & DARC.** 1st & 3rd Fridays. Banff Castle, Castle Street, Banff, Aberdeenshire AB45 1DL. August 13 - Modifying PMR Equipment For Amateur Band Use by GM6VXB, 27th - Pre HF Field Day Preparations. **Martin Andrew GM6VXB** on (03465) 82061.

**Dundee ARC.** Tuesdays, 7pm. College of Further Education, Graham Street, Dundee. September 7 - Enrolment Evening. **George Millar GM4FSB**, 30 Albert Crescent, Newport-on-Tay, Fife DD6 8DT.

## Somerset

**Yeovil ARC.** Thursdays. Red Cross HQ, Grove Avenue, Yeovil,

Somerset. August 12 - Activities for Amateur Radio Clubs by G3MYM, 19th - Airing Your Problems by G3ICO, 26th - Natter Night & Committee Meeting, September 2 - Getting On Air For Peanuts by G3ICO, 9th - 144MHz DF Event. **Cedric White G4JBL** on (0258) 73845.

## South Yorkshire

**Barnsley & DARC.** Mondays 7.30pm. Radio club room & shack, at the rear of the Darton Hotel, Station Road, Darton, Barnsley. August 16 - Ex Military Equipment by Eric Rogers G3MWN, 23rd - On The Air Night, 30th - Real Home-brewed Gear by Roy G4YDI. **J. P. Caledon-Scott G4LRS** on (0226) 203448.

## Suffolk

**Felixstowe & DARS.** August 15 - DF Hunt & BBQ, 31st - Quiz with Leiston RC. **Paul Whiting G4YQC** on (0394) 273507.

**Leiston ARC.** 1st Tuesdays, 8pm. Sizewell Visitors Centre, Sizewell Power Station. August 31 - Quiz with Felixstowe, September 7 - Talk by Andy Nunn G8AXO. **Bob Simmons G0HSI** on (0986) 874800.

## Surrey

**Horsham ARC.** Guide Hall, Denne Road, Horsham, West Sussex, 8pm. September 2 - The Night Sky by Ron G3PYC. **Peter Stevens G8SUI** on (0737) 842150.

**Surrey RCC.** 'Terra Nova' The Waldrons, Waddon, Croyden, Surrey. August 16 - Natter Night, September 6 - Fiber Optics. **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. August 19 - Video Evening, September 4 & 5 - SSB Field Day. **John Puttock G0BWV**, 53 Alexandra Avenue, Sutton SM1 2PA.

**The Kingston & DARS.** 3rd Wednesdays, 8pm. Alfriston, 3 Berrylands Road, Surrey KT5 8RB. August 18 - Technical Discussion. **Ray Fuller** on 081-398 1128.

## Warwickshire

**Coventry ARS.** Fridays, 8pm. Baden Powell House, 121 St.

Nicholas Street, Radford, Coventry. August 13 - On The Air Night & Morse Tuition, 20th - Portable On The Air Night, 27th - On The Air Night, September 3 - Indoor DF Contest Final. **David G1ORG** on (0203) 311468.

**Mid-Warwickshire ARS.** 2nd & 4th Tuesdays. August 24 - Fox Hunt. **Don Darkes G8HRI** on (0926) 424465.

## West Sussex

**Mid-Sussex ARS.** Thursdays, 7.45pm. Marle Place Further Education Centre, Leylands Road, Burgess Hill, West Sussex. September 3 - Antenna Impedance, Resonance & Field Strength Measurements by Peter Dodd G3LDO. **Chris Coward G3YTU** on (0444) 458992.

## West Yorkshire

**Denby Dale & DARS.** Pie Hall, Denby Dale, nr. Huddersfield, 8pm. August 12-16 - Youth In Action Weekend, 18th - Committee Bash, September 1 - Silent Key Sale, 8th - Fox Hunt. **Ivan Lee, Clayton Lodge, Sunnyside, Edgerton, Huddersfield HD3 3AD.**

**Halifax & DARS.** 1st & 3rd Tuesdays, 7.30pm. August 17 - Old & New Equipment by Jim G4MH. **David Moss G0DLM** on (0422) 202306.

**Keighley ARS.** The Ingrow Cricket Club, Ingrow, Keighley, 8pm. August 12 - Naylor Bros Car Restoration Visit, 19th - Ideas For 1994 Club Events, 26th - Treasure Hunt, September 2 - Packet On The Air by GX0KRS & GX7KRC. **Kathy Conlon G0RLO** on (0274) 496222.

## Wiltshire

**Trowbridge & DARC.** 1st & 3rd Wednesdays, 8pm. Southwick Village Hall, 8pm. August 18 - Natter Night, September 1 - RAYNET by G4TIX. **Ian G0GRI** on (0225) 864698.





# NEVA DA

# EVER

## SCANNING RECEIVERS



**NEW - MVT-7100,**  
Set to be THE handheld of 1993. This radio must be heard to be believed. It provides effortless reception of SSB and CW signals using TRUE carrier injection with 50Hz resolution. It can even (with accessories) be hooked up for FAX and DATA reception.

- 100kHz-1650MHz
- 1000 memory channels
- All mode reception (incl. SSB & CW)

Each set is supplied with all accessories including: UK Charger, NiCad Batteries, Earphone, Telescopic Antenna, Original Yupiteru English Manual. **PRICE £449**



### YUPITERU MVT 7000 HANDHELD

- Receives 8 to 1300 MHz 100kHz-1300MHz (at reduced sensitivity)
- 200 Memory channels
- Rotary or keypad freq. control
- AM/FM/NFM
- Large display with strength meter

Each set is supplied complete with:- Full set of high power NiCads, AC charger, DC power lead and carry strap. **£369**

### HP2000 HANDHELD

Still our most popular handheld scanner.

- 500kHz-1300MHz
- 1000 Memory channels
- AM/FM/WFM Modes
- Sensitive Receiver
- Supplied with all accessories & UK charger



**£299**

### MS1000 Base/mobile

A mobile version of the HP2000 handheld but with added features.

- ★ Tape recorder voice activated switching
- ★ Audio squelch
- ★ 500kHz-600MHz, 805-1300MHz
- ★ Supplied with mains adaptor



**£279**

### MVT-8000

Mobile version of the 7000 c/w mains adaptor. Especially sensitive @ UHF. Recommended. **£389.00**

### AR3000A

Our most popular base scanner. Latest updated version. (100kHz-2036MHz) **£899**



### SCS computer software

New software for IBM/clones. Gives logging, monitoring and control of AR3000. **£59.95**

### ACE PAC-3 software

Full feature software for AR3000. **£119**

### AR1500 HANDHELD

Covers 500kHz-1300MHz receiving NFM/WFM/AM and SSB. Supplied with a large selection of accessories including:-

- Charger
- Dry Cell Battery Case
- Long Wire Antenna
- Ear Piece
- Soft Case



**£339**

## YAESU RADIO

### Yaesu FRG100 HF receiver

A superb new radio covering 50kHz to 30MHz - our top selling general coverage receiver. **£559**



#### Yaesu Radio

FT247GX Economy HF Transceiver	£822.00
FT890 100w Gen. Coverage HF	£1295
FT530 Latest Twin Band Handheld	£495.00
FT1000 200w Tap/Line in HF	£3475.00
FT990 All Mode Gen. Coverage HF	£2250.00
FT57GX2 Good reliable HF	£1089.00
FT67GX HF + VHF/UHF modules	£1660.00
FT650 Tri-Bander HF 6/10/12m	£1200.00
FRG8800 Digital S/Wave Receiver	£610.00
FRG9600m 60-950MHz Scan rec.	£585.00
FT290R2 2m M/Mode Portable	£516.00
FT690R2 6m M/Mode Portable	£505.00
FT790R2 70cm M/Mode Portable	£610.00
FT5200 2m/70cm dual band mobile	£657.00
FT26 2m FM Handheld	£272.00
FT76 70cm FM Handheld	£295.00

#### Yaesu Accessories

G-400 Bell type Rotator	£187.00
G-600RC Extra H/Duty Rotator	£309.00
GS-050 L/weight Bearing for above	£26.95
8-Core Rotator Control Cable (per m)	£0.96
FP-757HD H/Duty PSU for Yaesu HF	£310.00
FRV-8800 VHF Converter 118-175MHz	£112.00
FRF-7700 ATU for S/Wave Receivers	£74.95
YH-55 Padded Comm. H/Phones	£25.95

## 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.

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

#### Options

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

**£995**

## 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 port exchange price on your old HF rig. **£999**

#### Kenwood Radio

R5000 S/Wave 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. 23cm	£690.00

#### Kenwood Accessories

PS-52/53 Mains PSU Full Duty	£269.00
TL-922 HF 2kW amp	£1645.00
MA-5 S-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-Amped)	£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 Prog. 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

## ADONIS MICROPHONES

### Adonis 508G

Built-in Compressor **£99.95**

### Adonis 308G Built-in Mic

Ant. **£84.95**



## EXTENDAMAST 10 METRE RETRACTABLE MAST

Suitable for: Dipoles, Long Wires, VHF/UHF Beams, GSRV 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.

**Introductory Price £69 Plus £8 Carriage**

## THIS MONTH'S BEST BUY

### NRD-525 HF GENERAL COVERAGE RECEIVER

Considered to be one of the finest receivers ever made! We've managed to locate a limited quantity at a very special price. Now's your chance to own one of the thoroughbreds amongst receivers.

- ★ Receives 90kHz to 34 MHz
- ★ 200 channels of memory
- ★ RTTY, CW, SSB, AM, FM, FAX
- ★ Pass band tuning
- ★ Wide dynamic range
- ★ Built in Clock/Timer circuits

- ★ Fully solid state modular design
- ★ Programmable memory scan
- ★ Microprocessor controlled, electronic tuning

**LIMITED QUANTITY AT £795**



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# EVERYTHING FOR THE RADIO ENTHUSIAST

## HUGE STOCKS - FAST DELIVERY - PERSONAL SERVICE

NEVADA COMMUNICATIONS, 189 LONDON ROAD, PORTSMOUTH PO2 9AE  
TELEPHONE HOTLINE: (0705) 662145 FAX: (0705) 690626

### ICOM RADIO

**icom IC-737** - A new full coverage HF transceiver with Auto ATU, Electronic Keyer, good receiver and a host of extras. **£1425.00**

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-VW21E 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  
IC-R1 Handheld Receiver...£395.00

### ICOM ACCESSORIES

IC-AT1 50 Auto ATU...£403.00  
IC-PS55 Deluxe 20A PSU...£232.00  
SP-21 Base Station Speaker...£132.00

### POWER SUPPLIES

Standard 3 Amp UK Spec...£17.95  
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

### PAY BY POST DATED CHEQUES - INTEREST FREE

Simply divide the price into 3 equal payments. Write 3 cheques dated in consecutive months starting with todays date and post them to us enclosing your name, address, telephone number and cheque card number. We will (subject to status) send your goods immediately we receive the cheques! *The hardest part is deciding what to buy!*

### ANTENNAS

#### SAGANT End Fed ZEPP 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  
Trop Dipole 40/80...£89.95  
Pair 40 mtr Trop...£19.95  
2kW Balun 1:1...£29.95

#### 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  
70cms 9 Ele. Beam (13dBi)...£43.95  
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

### SCANNING ANTENNAS

#### SCANMASTER 1300 DISCONE

Stainless steel top of the range "N" connector. Receives (25-1300MHz), transmits 6m, 2m 70cm, 32cm and 23cm bands...£49.95

#### SCANMASTER BASE

New high quality wideband 500kHz-1500MHz receiving antenna fibreglass/stainless steel "N" type connector...£39.95

#### SCANMASTER MOBILE

High quality magnetic mount covers 25-1000MHz supplied c/w low loss coax and fitted BNC connector...£29.95

#### SKYBAND

Econ VU/band discone 25-1300MHz...£27.95



### EARTALKER

**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 handheld (Call for details on your particular model). Separate volume, PTT switch and control box...£29.95

### MICRO-READER



**ERA Microreader** - Data Communications decoder - decodes RTTY, CW, AMTOR (A) & SITOR (B). 16 character LCD display needing only connection to receiver extension speaker socket. Shortly to become available will be the large 4-line LCD display with built-in parallel printer driver port. Variable in-built morse tutor. (Call and reserve your optional display now)...£169.00

### ALINCO & STANDARD

**Alinco DJ-580** - Fast becoming the top selling Twin Band handheld here in the U.K. Complete with all "mod-cons" including AM Airband RX. Comes ready to go just plug-in and charge - the perfect way to operate 2M & 70 Cms...£449

**Alinco DJ-F1E** - Don't take my word for it but my customers agree that this is the perfect companion when considering a 2M handheld. Full coverage and again offered with Airband receive...£265

**Alinco DR-599E** - Replacing the 590E - This little unit has an impressive 50W on each band, automatic remote repeater function (ideal raynet exercises) and a host of extra facilities including ext.RX. Full colour brochure available - call us now! **£690.00 incl. free duplexer**

**Standard C528** - This Twinband handheld is the model the others were based on! Still a popular choice with many features including remote cloning and repeater talk-thru...£420

**Alinco DJ-F4E** - A popular novice band radio on 70cms. Simple to operate handheld with 40 memories and 5 Watts output...£280

### 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.



5D-FB (8.1mm - 0.055dB/mtr)...£0.75/mtr

8D-FB (11.1mm - 0.039dB/mtr)...£1.79/mtr

10D-FB (13.1mm - 0.031dB/mtr)...£2.75/mtr

losses quoted at 100MHz

### CONNECTORS (for above)

"N" Types...£3.56

BNC...£3.75

PL259...£1.50



### KENPRO RADIO

**KT-44** - 70 cms handheld. Thumb wheel frequency control. Full 10MHz! Ideal novice or repeater user. c/w NiCad, beltclip & charger...£159.00

**KT-22** - Popular 2M version of the KT-44 with simple NO FUSS operation. Ideal standby handheld or for use on Packet...£149.00

### NEW HAND-HELDS

**ALAN CT-145** - Fully featured 2M handheld with options for DTMF & CTCSS Paging. 5 watts output is available when powered from external 1.2V DC supply. Now with extended receive - 130-169MHz. Excellent reliability & performance...£199.00

**ALAN CT-450** - Fully featured 70cms H/held with facilities and options similar to the CT145...£225.00

### VECTRONICS

Canadian made high quality ATU's

#### HFT1500

1.8 - 30MHz 1500 watt cw, 3000 watt pep. Easily matches all types of antenna's coax, long wire and balanced inputs (with a 4:1 balun included)

- ★ Peak and average power reading meters
- ★ 3 way antenna switching
- ★ Heavy duty roller coaster for continuous coverage
- ★ Slow motion variable capacitor control...£399

### OUTBACKER

Outstanding new mobile antennas from Australia. A commercial design proven in the Outback for 22 years. If you are going mobile, this new antenna is all you need. The Outbacker covers from 160 thru' to 10m including all VVARC bands, without the need for an ATU. Lookout for the reviews which will be coming shortly. We have been running around with these antennas and the new Kenwood TS50 for the last few weeks, working everything in sight. The antenna is constructed of fibreglass with copper helical windings covered with a coating of urethane for strength, durability and protection. Tap points for each amateur band are clearly engraved on the antenna.

#### OUTBACKER

1.7m long, 300w, 80 thru' 10m...£189.95

#### OUTBACKER (T)

As above but including top band...£219.00

#### OUTBACKER JUNIOR

1.2m long, 100w, 80 thru' 10m...£179.95

#### PERTH

2.1m long, 300w, 80 thru' 10m...£199.95

#### Perth (T)

As above but including top band, 100w...£235.00

Heavy duty bass spring...£59.95

### VECTRONICS

#### VC300 DLP

150 watt (300W pep) 1.8-30MHz This small ATU has a host of features  
★ Cross pointer SWR/power meter  
★ 300w built in dummy load ★ Built in 4:1 balun ★ Peak/average power readings  
★ 3 way antenna selection ★ Illuminated meter  
Due to bulk purchase we can offer a special price...£129.95



### TRADING POST

We buy as well as sell new and used radio equipment, please feel free to call Paul or John on our Hotline for an instant quote on either P/X or Buy-Ins.

icom IC-R7000 Quality RX	£795
Yaesu FT707 100w HF	£475
Kenwood R2000 + VHF Conv	£495
Yaesu FT790 70cms M/Mode	£325
Kenwood TM241 HiPower 2m FM	£275
icom IC-728 HF Transceiver	£995
icom IC-726 HF + 6m	£725
icom IC-701 HF + PSU . . . nicel	£545
Kenwood TS430S 100w HF	£675
Tokyo HL-1K/6 Amp	£450
Standard C520 Twin Bander Handie	£325
Yaesu FT470 Twin Handie	£335
Yaesu FT480R 2m M/Mode	£345
Yaesu FT-690 6m Porta-pack	£345
Yaesu FRG-9600 25-950MHz RX	£365
Yaesu FT290R 2m Porta-pack	£325
Trio R1000 Short wave digital RX	£325
Yaesu FT-902DM HF TX, v.g.c.	£625
Adonis 308 Desk mic (boxed)	£65
icom R100 Mobile scanning RX	£425
CT1600 2m H/H c/w BS25+H/Set	£165
Alinco DJ-560 Twin band h/held	£345
Kenwood TS-530/5 HF TX, v.g.c.	£549
Adonis 508 Desk Mic (compressor)	£75
icom IC-R71E S/W/ Receiver, v.g.c.	£675
Yaesu FL2000B HF 1Kw PEP Amp	£495
Yaesu FT102 HF Transceiver	£625
Sommerkamp FT1012D HF TX/RX	£495
Yaesu Memoriser 2m FM mobile	£185
Trio 130V c/w VFO120 (all filtered)	£450
Yaesu FT57 GX Auto ATU & H/D PSU	£1045
Tokyo HL110V 2m 100w Amp	£165

Call us now - even if we haven't listed your radio, for what we know to be unbeatable P/X deals.

## STARTEK

### FREQUENCY COUNTERS



#### Model 1350

- ★ Covers 1-1300 MHz
- ★ 3 Gate times. An entry level counter that offers excellent value for money...£129

"Hands Free" operation to automatically Read & Hold a signal as quick as 80ms or 8% of a second the ATH™ Circuitry is super fast because it does not require the time for multiple readings like digital filtering techniques.

SAY GOODBYE TO RANDOM COUNTING AND FALSE READINGS WITH THE ATH™ SERIES

## NEW ATH™ SERIES FEATURES INCLUDE

#### ATH 15

- ★ 1-1500MHz
- ★ High speed - 6 fast gate times
- ★ Bar graph reads to 4GHz signal strength
- ★ Extra bright Leds
- ★ Automatic clean dropout

£199

#### ATH 30

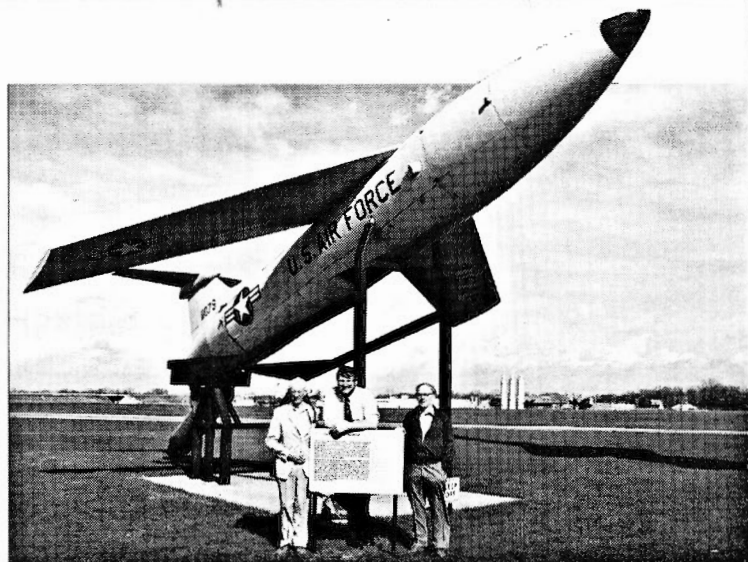
- ★ 1-2800MHz. Same features as ATH 15 but with one shot feature on top of the unit - this allows the counter to hold the first reading until manually reset.
- ★ Extra bright Leds
- ★ 4GHz bar graph for signal strength
- ★ High speed - 6 fast gate times

£269



# Come Fly With Us - To The 1994 Dayton HamVention

Join Rob Mannion G3XFD and friends on the Practical Wireless 1994 HamVention trip - we promise that the aircraft is bigger than this vintage model at the US Air Force Museum near Dayton - and you'll have an unforgettable holiday!



The Annual Practical Wireless holiday trip to the Dayton HamVention has established itself as something very special. Readers enjoyed the 1993 week's trip so much, that we've planned an extra special trip for the 1994 Dayton HamVention, which is being held between April 29 and May 1.

The 1994 Practical Wireless HamVention holiday will again be a week long trip. Following the success and greater convenience of flying to Cincinnati in 1993, we're doing the same in 1994 and I'm delighted that once again, I shall be leading the party during the week in the USA.

We've also up-graded our Hotel accommodation, and the Practical Wireless party will be staying at the Holiday Inn at Englewood, Dayton. The Hotel is comfortable, has private facilities in every room, including TV and direct dial telephone. There's also a restaurant, swimming pool and sauna.

## Holiday Costs

The 1994 Practical Wireless HamVention holiday will cost £630 per person sharing a twin bedded room. Single rooms are available, at a further cost of £205.

There's optional travel insurance for £40 and the holiday costs include the following: Scheduled return flights to Cincinnati with meals on board and return coach transfers Cincinnati to Dayton. It also includes seven nights' accommodation in the Holiday Inn at Dayton, two day excursions by coach and admission ticket to the HamVention.

## Gatwick To Cincinnati

The 1994 Practical Wireless Dayton HamVention holiday starts on Monday April 25. Departure is at lunchtime, and we fly from Gatwick direct to Cincinnati on a scheduled flight. We'll be returning on Tuesday, May 3.

The PW party arrives in Cincinnati in the late

afternoon. We'll be transferred by coach direct to the Holiday Inn Hotel in Dayton.

On the Tuesday morning, our private coach will take us to the United States Air Force Museum, on the outskirts of Dayton. It's an appropriate place to site the museum - it's one of the largest in the world - because Dayton was the home of the pioneer aviators Wilbur and Orville Wright.

Having experienced the Air Force Museum myself, I know it needs at least a day's visit. There's a good, reasonably priced restaurant in the Museum and there'll be an opportunity to visit the world famous IMAX three dimensional cinema.

On the Wednesday, we'll have a free day to explore Dayton and surrounding area. For those who want to shop, there are various shopping 'Malls' and they are easy to get to by express bus or taxi.

Keen radio types will no doubt head for Mendelson's Electronic Surplus at 340 East First Street in Dayton. Mendelson's describe themselves as, "The world's largest surplus store". Having visited it, I can tell you it's HUGE!, and a ride in the massive passenger lift provides an inkling of what's in store!

On the Thursday, we'll again have the use of our private bus. We're planning a day excursion and there are several possibilities, including two radio orientated special visits. However, this part of the trip we'll finalise later on, but you can guarantee that it will be a good day out.

Friday sees the opening of the HamVention at mid-day. However, the gigantic flea market is open for business from around 6am! Courtesy bus services are usually available from our Hotel, but if you're really keen to get the bargains no doubt you'll take an early morning taxi.

Incidentally, if you buy anything during the show, Delta Airlines (they're based in Cincinnati) have a very efficient, reasonably priced 'Pack & Despatch' service working throughout the weekend.

On the Sunday evening, we're planning a final evening meal and get together. Everyone thoroughly enjoyed the 1993 impromptu celebration so much, that we're planning ahead this time. We'll be eating out at a good restaurant.

After a very busy and enjoyable week, Monday May 2 sees the start of our trip home. We'll depart in the afternoon from Dayton and travel by coach to Cincinnati. As our flight is an evening take-off and overnight flight, you may wish to enjoy the attractive Cincinnati City with its majestic buildings, fascinating shops and elevated walkways. There's even a British style fish and chip shop to try before we fly home, arriving home on the morning of Tuesday May 3.

## Professional Tour Operator

Although I'm leading the Practical Wireless party on the holiday itself, the holiday has been planned and organised in conjunction with the Bristol-based professional group and conference travel specialists RCT International.

As organisers and operators of specialised tours and holidays all over the world, RCT International are providing us with a first class service. Annette Oxley is handling the PW holiday arrangements, and she will be delighted to send you full details and an itinerary of the tour. So, don't delay - send off your coupon today for the full travel details of the Practical Wireless 1994 Dayton HamVention Holiday.

**Rob Mannion G3XFD**

To Annette Oxley  
Practical Wireless 1994 HamVention Holiday  
RCT International  
44 College Green  
Bristol BS1 5SH  
Tel. (0272) 230933, FAX (0272) 226912

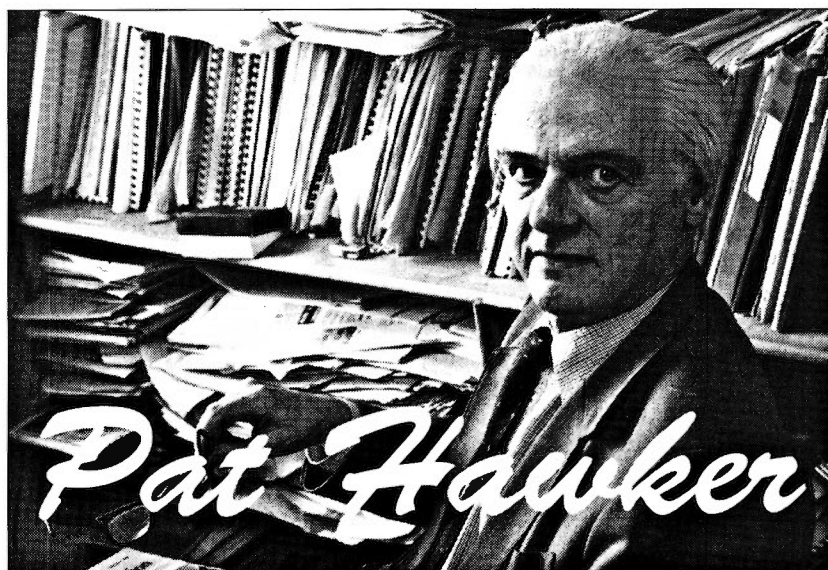
I am interested in joining the Practical Wireless 1994 Dayton HamVention Holiday, please send me further details.

Name: \_\_\_\_\_

Address: \_\_\_\_\_

How many seats required: \_\_\_\_\_





*As we have a test equipment themed issue this month, it seems entirely appropriate to feature Pat Hawker G3VA, as this month's Radio Personality. Pat is, of course, the well-known personality behind the long-running and popular 'Technical Topics' in the RSGB's Radio Communications magazine where so many excellent ideas have been covered over the years.*

By anybody's reckoning, 60 years - 57 of them as a licensed radio amateur - is a long time to have been involved with short wave radio. Pat Hawker G3VA's stint started in 1933-34. This was when as an 11 year-old schoolboy he began to build a series of crystal sets on which to receive programmes from the then recently opened BBC transmitters at Washford Cross, six miles from his parents' home in Minehead, Somerset.

By 1935 Pat's sights were firmly fixed on the fascinating spectrum below 200 metres. He then built a two-valve 'blooper' (regenerative detector plus one stage of audio amplification) receiver. At first only the strong broadcast stations were found.

But, Pat's discovery of the 7 and 14MHz amateur bands led to form-filling to get a licence. Then there was a search for character references, birth certificates, including those for his father, to whom nominally the 2BUH 'Artificial Aerial' licence was issued.

Bureaucracy but no examinations marked the path in those days to obtaining the 'AA' non-radiating permits. These allowed the holder to build and install transmitters that could be operated only into dummy loads.

Pat's first time in print, was in his school magazine in 1936. This is where he described short wave listening to such stations as Pittsburgh W8XK, Schenectady W2XAD. There was also Sydney VK2ME, with its laughing kookaburra interval signal.

His early writings led to a 1938 report on early 405-line television at the 1937 Television Exhibition at the London Science Museum. Then in the 1939 edition there was an article with the teaser title 'G3VA'.

The pattern was then setting into what would become his profession in the post-war period: technical journalism. This included book editing, specialising in radio communications, radio and television broadcasting.

### Short Wave Listening

In the 1930s, radiating licences were issued only to persons over 16 years old. This gave Pat two years of short wave listening and time to learn Morse code to the standard, then as now, of 12 words per minute.

Pat admits he found learning Morse irksome and difficult and gave up more than once. But he says he's never regretted the time spent, and believes that a Morse requirement is a unique way of encouraging a lasting commitment to the hobby.

Pat's now famous callsign, G3VA, was issued in October 1938. Since then, h.f. operating using c.w. has been his main interest ever since a brief initial fling on 1.8 and 7MHz phone in 1938-39.

### Second World War

By the time the Second World War came in September 1939, Pat was beginning to feel reasonably confident in copying Morse at up to about 25w.p.m. (later at 35w.p.m.). This was just as well since, in early 1940, along with many pre-war British amateurs, he was recruited by Lord Sandhurst as a 'Voluntary Interceptor' for the Radio Security Service (then an agency of MI-5).

**Although Pat Hawker's wartime exploits provide fascinating reading, he has made it clear in his various articles that others often paid the Supreme Sacrifice. This photograph taken in the Second World War, shows a group of young Belgians who provided daily weather reports for the RAF by clandestine radio. Organised by Albert Touissant ('Beagle') - on the left of the picture - the group operated for several years until Belgium was liberated. Not all the group survived.**

# G3VA





This led to a special duties enlistment in November 1941 in Special Communication Unit (SCU) No. 3 at the Hanslope Park special intercept station. Pat monitored German Military Intelligence (Abwehr) traffic until Spring 1943.

Then, with some others, he swapped interception for two-way working with the secret intelligence and Resistance radio agents in German occupied Europe. Most of these were equipped with simple low power transmitter-receivers such as the 'Paraset' (Mk VII/2 - two-valved receiver, 6V6 crystal controlled power oscillator) built by SCU1 at Whaddon, near Bletchley.

There was the thrill of getting the cipher messages. But there was also the trauma of knowing, when a station suddenly went off the air, that the operator may have fallen into the hands of the German direction finding teams, or was engaged in a shoot out in a desperate attempt to escape.

### Special Joint Operation

For the 1944 Normandy invasion, there was a special Allied joint Intelligence operation.



**Pat Hawker G3VA, operating a 1971 special event station which marked the 60th anniversary of Wireless World.**

Christened operation 'Sussex', it involved parachuting into France some 50 two man teams of French agents.

The agents were equipped with very low power battery h.f. transmitter-receivers and 35MHz 'Ascension' f.m. equipment for talking to aircraft that carried wire-recorders. To provide liaison between this secret intelligence operation and 21st Army Group, a No 2 Intelligence (Underground) Section was set up with an SCU9 signals section attached.

The result was that Pat landed on the Mulberry Harbour at Arromanches in July 1944. He was in Paris by August 27, a day after its official 'liberation', but he says it was "still a memorable experience".

It seemed the war in Europe was virtually over - but the Arnhem disaster in September proved this was far from the case. Pat found himself in Nijmegen where IS9 (WEA) under Major Airey Neave (later killed by a car bomb planted by Irish terrorists in the Houses of Parliament car park) was attempting to bring back the hundreds of evaders hidden by the Dutch Resistance.

Then from 1 January, 1945 Pat was loaned to the Netherlands Intelligence Department (Bureau Inlichtingen). He worked as chief operator at the Abbe Museum, Eindhoven where there was a control station for a Dutch clandestine radio network operating in the occupied north of the country.

The group of stations, set up by 'Lange Jan' (Jan Thijssen) of the Council of Resistance (RvV) and the Orde Dienst (OD), included a number of Dutch pre-war amateurs as well as some professional radio operators.

### Tremendous Respect

Pat still recalls with tremendous respect the work of Jack Verhagen, a former marine radio officer Jack who sent him a stream of cipher telegrams at average speeds of over 25 five-letter groups per minute from a secret station set up by Jan Zandbergen PA0ZY, in the nurses bathroom of the St Elisabeth hospital in Alkmaar.

The Alkmaar station carrying traffic from the Amsterdam headquarters of the Dutch Resistance Forces was one of the very few that survived. Most of the other operators and associates, including Jan Thijssen, were arrested and executed by the Germans.

Some six-months as radio-operator at Secret Intelligence stations in the Rhineland, gave Pat further insight into the complexities (and absurdities) of most secret intelligence operations. He returned to Bletchley in February 1946 as a 'main-line' operator for what was, in 1947, to become the Diplomatic Wireless Service.

Pat had already decided not to stay with the organisation. However, he retained a profound and lasting respect for those who had been prepared to operate radio transmitters in occupied territory.

Pat was duly discharged as 'services no longer required' in the Autumn of 1946. But after six years of Signals Intelligence and then Secret Intelligence, he found it difficult to resume uneventful civilian life as an articulated clerk to a Minehead firm of Chartered Accountants.

To compensate, Pat became very active on the h.f. bands using a home-brew communications receiver based on the pre-war Tobe tuner. But in September 1947, he departed for London as an assistant to John Clarricoats G6CL, the General Secretary and Editor for the Radio Society of Great Britain, for three years making Amateur Radio a profession as well as a hobby.

### Technical Books

In early 1951 Pat Hawker joined the Technical Books Department of George Newnes Ltd. He worked in the adjacent suite of offices to those of the 'Practical' magazines group headed then by F. J. Camm. Despite this, there was little contact between Camm and the Technical Books Department headed, by Edward Molloy who had originally recruited Camm for Newnes.

Molloy, like Camm, believed in keeping his staff hard at work. Pat was soon editing and/or compiling the many volumes of *Radio & Television Servicing*, the bulky *Radio & TV Engineers' Reference Book* and many other titles.

From 1953-58, following his marriage at



Christmas 1952, Pat operated all home-brew equipment. The rig was normally concealed in a built-in cupboard in a first-floor flat in a Bloomsbury garden square.

Despite all the difficulties of putting up an effective antenna without access to the roof - and the growing problem of TVI - G3VA once again made DXCC on 14 and 21MHz c.w.

In 1958 Pat launched his column 'Technical Topics' for the *RSGB Bulletin* (now *Radio Communication*). It has so far run without a break for over 35 years. That year he also took over the editorship of *A Guide to Amateur Radio* (editions 6 to 19, but currently out of print).

## Leafy Suburb

Wire antennas have proved less of a problem in the leafy south London suburb of Dulwich, to where Pat, his wife Gwen and their two children, Philip and Victoria moved in October 1958. Here the equipment again remained all home-brew until the 1970s.

It was in the 1970s when some second-hand items were acquired by G3VA. These included a 1940s Hammarlund HQ129x general coverage receiver, a Labgear LG300 table-top transmitter with 813 p.a. and a KW2000a s.s.b./c.w. transceiver.

Pat still (very occasionally) makes an appearance on 'phone using the KW2000a, although 99.9% of his contacts are made with manual Morse. Keeping old equipment in working order has become a way of life for G3VA!

## Communications Editor

For five years, between 1963-68, Pat was Communications Editor of *Electronics Weekly*. This was a job G3VA admits to having thoroughly enjoyed. His news reports and features now appeared within just a few days, rather than weeks or months later.

Magazine work was so different from the slow grind of book publishing. There was also travel to Europe, the USA and even Ascension Island as an added bonus!

Then in October 1968 Pat made his final career move to the Independent Television Authority's Engineering Information Service in Knightsbridge. Here he remained until his 'retirement' in 1987.

The ITA became the IBA (Independent Broadcasting Authority) in 1972. This was when it became responsible also for commercial radio broadcasting in the UK.

Today, as a result of the 1990 Broadcasting Act, the old IBA has been broken up. The radio side has been hived off to form the Radio Authority.

The former IBA Engineering Division has now been privatised into the National Telecommunications Ltd (NTL). On the administration side, the regulatory aspects of television (including satellite and cable-TV) merged

into the Independent Television Commission which has now moved from Knightsbridge to Foley Street.

Pat wonders whether these are changes for the better, or, as he believes, for the worse only time will tell. However, Pat is pleased to recall that during most of his time at the IBA, there was an ethic of public service broadcasting, funded commercially rather than market driven.

## Pat's Paradox

In his amateur radio activities, Pat freely admits to being in something of a paradox. This happens because of his work as a technical columnist, he's doing his best to keep abreast of the fast moving solid-state technology, although his station remains based on the classic valved approach!

Pat confesses that even electronic keying is rejected in favour of his straight Morse keys that date back to 1914. He suggests that this alter ego also reflects a keen interest in the history of radio and television.

He wryly admits that his personal approach to the hobby may be a sign of technical immaturity. Perhaps it's a hankering after what may or may not

have been 'the golden age' of radio, an era when the ability to pluck signals out of the ether with simple, home-built equipment germinated a sense of wonder that has never left him.

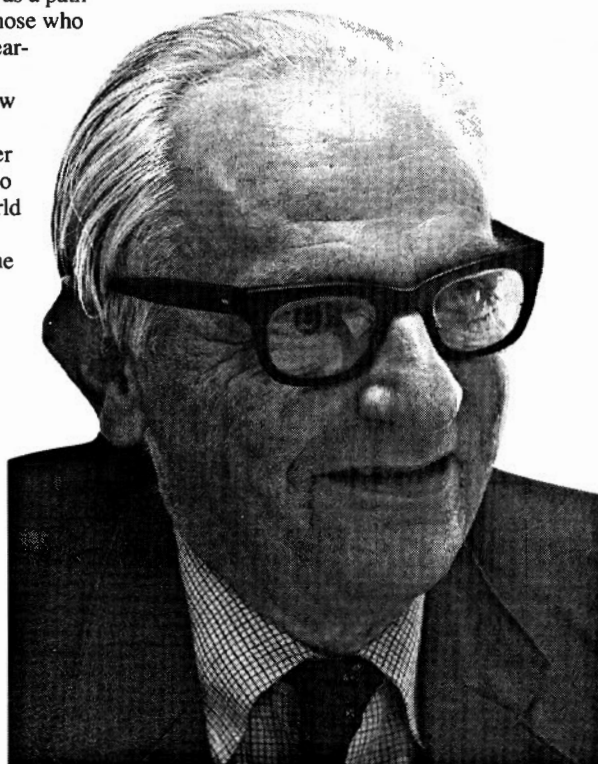
# G3VA

## Pat's Progress

Like many others, Pat remembers his progression from crystal set to battery valve sets, and the commitment involved in learning the Morse code. Then this was followed by mains operated and superhet receivers. It was a path followed by many of those who were attracted to the near-magic of wireless as schoolboys in those now distant days.

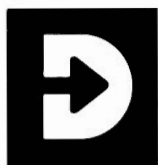
Pat wonders whether today's youngsters, who are fed on a diet of world wide TV relays and instant dialled telephone conversations across global distances will ever come to share his profound sense of wonder. It was that profound sense that sparked off a lifelong commitment to a hobby which, in Pat's case, turned out to be much more than a hobby.

PW



The Man behind the pen.





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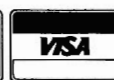
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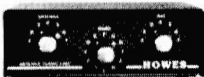
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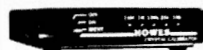
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**DXR10** Three Amateur Bands, 10, 12 & 15M SSB & CW receiver with excellent sensitivity and dynamic range Kit: **£27.50** Assembled PCB: **£42.50**

Optional hardware packs are available to go with the above receiver electronics kits. The amateur band receivers can all be expanded into transceivers by adding on the relevant transmitting kits.

## TRANSMITTERS

		Kit	Assembled PCB
<b>AT160</b>	80 & 160M Bands AM/DSB/CW 10W PEP adjustable	<b>£39.90</b>	<b>£62.90</b>
<b>CTX</b>	QRP CW Transmitter, 40M or 80M versions	<b>£15.50</b>	<b>£22.90</b>
<b>MTX20</b>	20M 10W (adjustable) CW Transmitter	<b>£29.90</b>	<b>£39.90</b>

All the above transmitters are crystal controlled. Matching VFO kits are available and these enable transceive operation with the relevant receiver kits. There are also kits to build a 10 & 15M SSB transmitter (super Novice rig).

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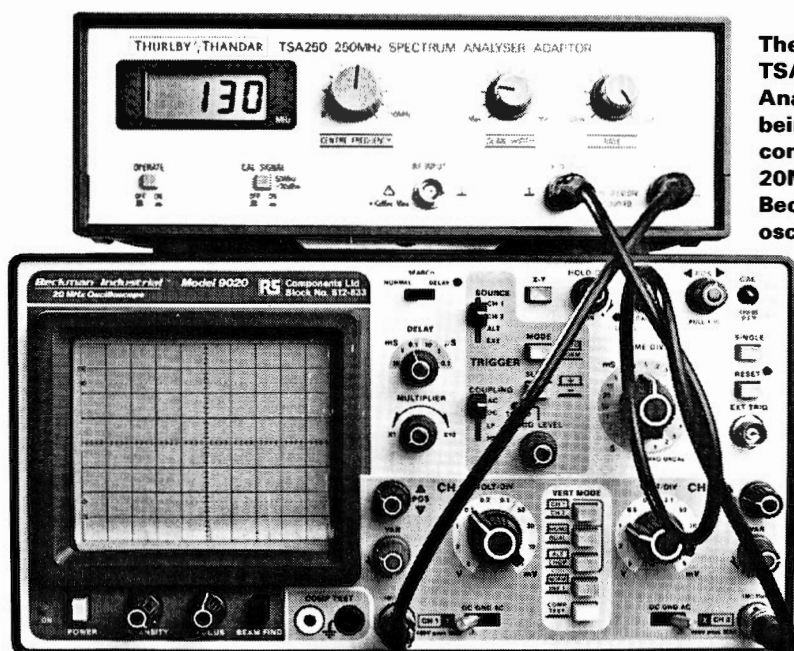
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**73 from Dave G4KQH, Technical Manager.**





The Thurlby Thandar TSA250 Spectrum Analyser Adaptor, being used in conjunction with a 20MHz bandwidth Beckman 9020 oscilloscope.

*Tex Swann G1TEX, the PW Technical Projects Sub-editor is happiest when he can get his hands on computers or test equipment. This month, he's had a chance to try out a useful spectrum analyser adaptor, and here's what he thinks....*

# The Thurlby Thandar TSA250 Spectrum Analyser Adaptor

One of the most effective pieces of test equipment available to any r.f. engineer (or anyone interested in that field) is the spectrum analyser. Unfortunately, these are usually the most expensive items of test equipment.

However, the spectrum analyser is really useful. This oscilloscope-like device can show, in real time, the emissions from a particular piece of radio related equipment.

The spectrum analyser can also detect the spurious signals causing reception problems, or help you see if that 'super-duper' low-pass filter you've just bought is really working. But, it really comes into its own when you're testing and tuning up a transmitter.

Among the pieces of test equipment I have at my disposal at the *PW* office, are many items each costing several thousands of pounds. As most radio enthusiasts (including me!) don't have the ability to spend this much, I'm going to look at a piece of test gear that costs much less, providing a much cheaper alternative to a self-contained spectrum analyser.

## Add On Analyser

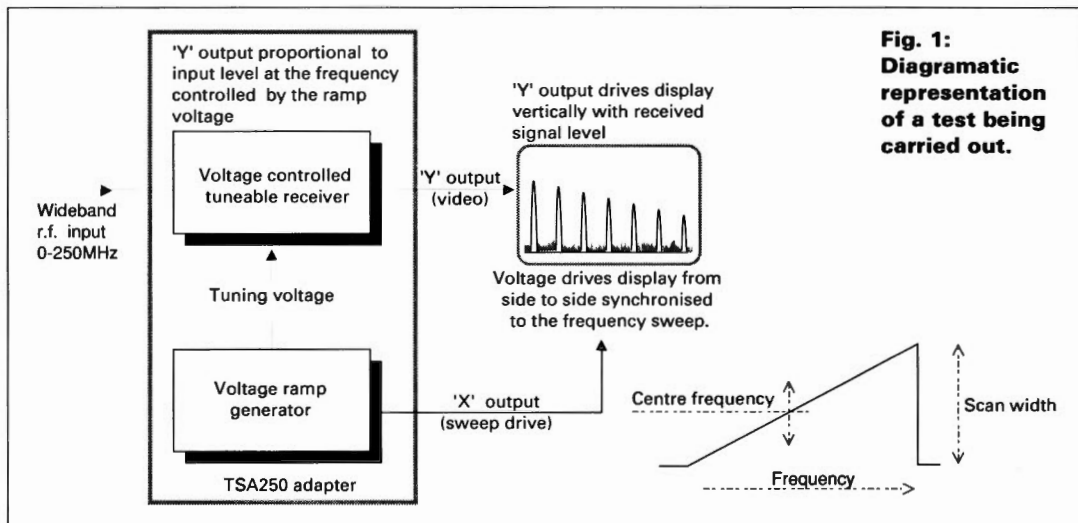
The instrument I had the chance to try, is an add-on spectrum analyser unit from Thurlby Thandar. It's available at a price level that is much easier on the pocket than a self-contained analyser.

But how good is this adaptor in reality? To answer that question, I took a close look.

I should say at this point, that anyone wanting to do measurements to a very fine degree, with precise measurement of frequency and power levels can stop reading now. I'm writing for the benefit of the 99% of radio amateurs who would like a greater insight into the workings of a particular circuit.

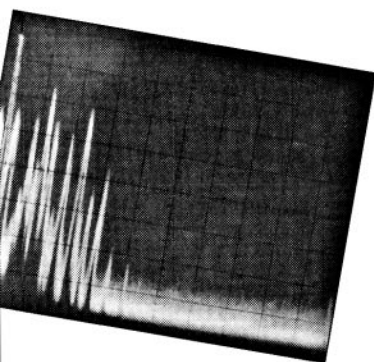
To make use of this add-on unit, you'll need a reasonable oscilloscope with the capability of driving the X and Y plates by external signals. The bandwidth of the 'scope is largely immaterial.

Any 'scope with a bandwidth over 1MHz should be adequate in conjunction with the add-on unit. And, don't forget that the size and type of 'scope screen affects only the quality and definition of the display, not the measurements.

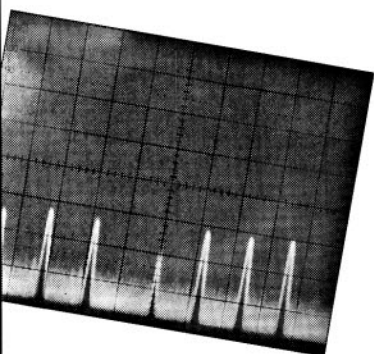


**Fig. 1:** Diagrammatic representation of a test being carried out.

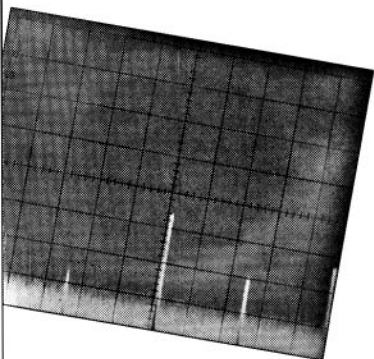




**Fig. 2:** The display obtained from the TSA250, when receiving 0-50MHz signals from an 18m long wire antenna (1mW power level).



**Fig. 3:** Photograph of screen display showing Band II v.h.f. f.m. signals (see text).



**Fig. 4:** Photograph showing screen display of 50MHz marker signals on the TSA250 (see text).

My thanks for the loan of the review unit go to Cirket Distribution Ltd., of Park Lane, Broxbourne, Herts EN10 7NQ. Tel: (0992) 444111. They can supply the Thurlby Thandar TSA250 Spectrum Analyser Adaptor for £399.90 inc. VAT.

## One Input

The Thurlby Thandar TSA250 has only one input (signal), two outputs (X sweep and Y sweep) and three controls - Centre Frequency, Scan Width and Scan Rate). So operation couldn't be simpler (I've discounted On/Off and calibration markers).

To use the unit, two connections have to be made to the 'scope, and one to the circuit under test as shown in Fig. 1. The slim multi-lingual instruction book adequately explains how to do the initial setting-up.

It was at this point that I found my practical experience, disagreeing with the manual. It suggested that the 'scope should have d.c. coupling on the X plate drive. Actually, I found that setting up was so much easier when a.c. coupling was used.

## Screen Pictures

I've included several display screen pictures to illustrate the usefulness of this adaptor. The 0-50MHz sweep, Fig. 2, actually shows all the signals arriving down an 18m antenna wire. The 200mV plus signal levels show that, on h.f. at least, vast quantities of r.f. gain are not necessary.

On the 0-100MHz sweep I measured, there were some strange signals around the 47-75MHz range. These were easily explained, as I live in an area where there are many Taxi firms, all using radio control.

The Band II radio station sweep, Fig. 3, is interesting. It shows that all the v.h.f. f.m. broadcasting stations are available at a signal strength that's more adequate for stereo reception using cheap equipment.

## Radio Amateur Use

From my description, it may seem to be a nice piece of gear. But, in the 'real' r.f. world of the radio amateur, you may ask how useful is it, and why should you use it? To answer the obvious questions, let's take a look at a common enough procedure - setting up a p.a. strip.

When most of us set up a p.a. strip, we merely put a power meter on the output and tune for 'maximum smoke'. Of course, we can only assume that all the energy being thrown out is at the desired frequency!

With a spectrum analyser on the output as well (with a suitable attenuator) you can now see that about 10% (-10dB) is actually harmonic rubbish. By turning back the gain - while watching the spectrum analyser display - you'll see that a much cleaner signal is available.

On the display, you'll be able to see that the 'jump' in power level is in reality an oscillation in the p.a. stage. Furthermore, this oscillation is nowhere in the band you were hoping to produce power!

Using the analyser, you can actually set-up a low-pass filter. This can be done by feeding 'white' r.f. noise into the input and then displaying the output of the filter relative to frequency.

You can take this idea a little further. For example, you can adjust band-pass filters for minimum ripple within the band, or check that the second (third or otherwise) harmonic trap really works.

## Marker Signals

After trying out the adaptor unit, my first criticism concerns the marker signals, Fig. 4. There is provision for a marker signal at 50MHz only, and the output level is only strong on odd harmonics.

In fact, I would like to see even more harmonic production for the markers on this unit. Additionally, I would also have liked, at the very minimum, to have seen a 10MHz marker available.

It's not so easy to zoom in to an area of the spectrum, and know (with any certainty!) where you are. A minus point there I feel.

The second criticism, is that I consider the internal receiver's bandwidth is rather too wide. This doesn't help

when you're carrying out intermodulation measurements using the two-tone method of checking linear amplifiers. These have to be guessed from looking at the overall spectrum output.

Even though the method is not easy, it does make setting up linear amplifier very much easier than waiting for the complaints to come in!

## Summing Up

In summing up, I feel that the manufacturers have conceived a very nice oscilloscope add-on. That's not to say the TSA250 unit is perfect, nothing can meet that requirement (not at a really sensible price!).

For example, exceeding the maximum input of 10mW causes internal non-linearity, giving rise to spurious harmonic readings. The nominal input is 1mW, and keeping below this gives good readings.

There must be many clubs whose members could all benefit from the availability of such an exceptional item of r.f. test equipment. The unit would be good value at twice the price, but at this price it is excellent value for money.

PW

## Manufacturer's Specification

The following specifications are with an oscilloscope with a 10-division horizontal and vertical scales and set to 0.5V per division in both X and Y axis.

Frequency range	400kHz to 250MHz (min.)
Centre frequency	
Range	0-250MHz
Accuracy	2% (typical)
Calibration markers	50MHz (and harmonics at 100, 150, 200 and 250MHz)
Receiver bandwidth	250kHz @ -6dB
Gain flatness	±1.5dB (1-250MHz typical)
Frequency scan	10 - 250MHz total (variable) 1-25MHz per division
Maximum input	+10dBm 50V d.c., 35V a.c. < 400Hz
Scan speed	0.5 - 5ms per division
Screen amplitude	represents -70 to 0dBm (nominal)
linearity	10dB ±1.5dB (typical) per division
Marker calibration	-30dBm (±1dB) at 50MHz harmonics uncalibrated
Input impedance	50Ω
Oscilloscope	access to X and Y amplifier at 0.5V per division
Bandwidth	not critical
Power requirements	operable over the a.c. input voltages of 99-132V or 198-264V set internally
Power consumption	10VA maximum
Size	260 x 88 x 235mm excluding handle and feet
Weight	1.4kg

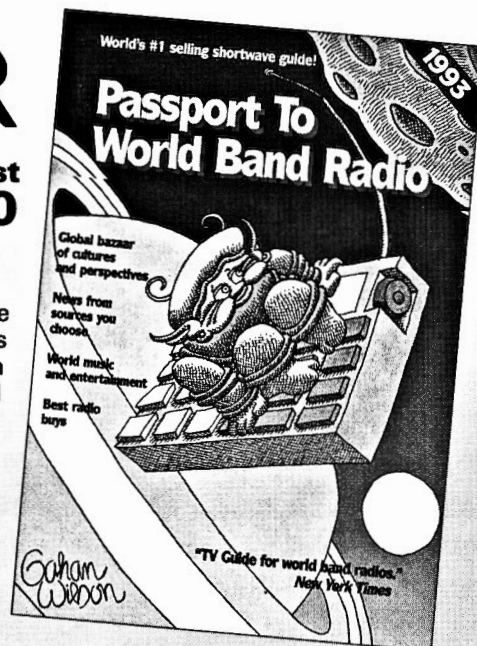


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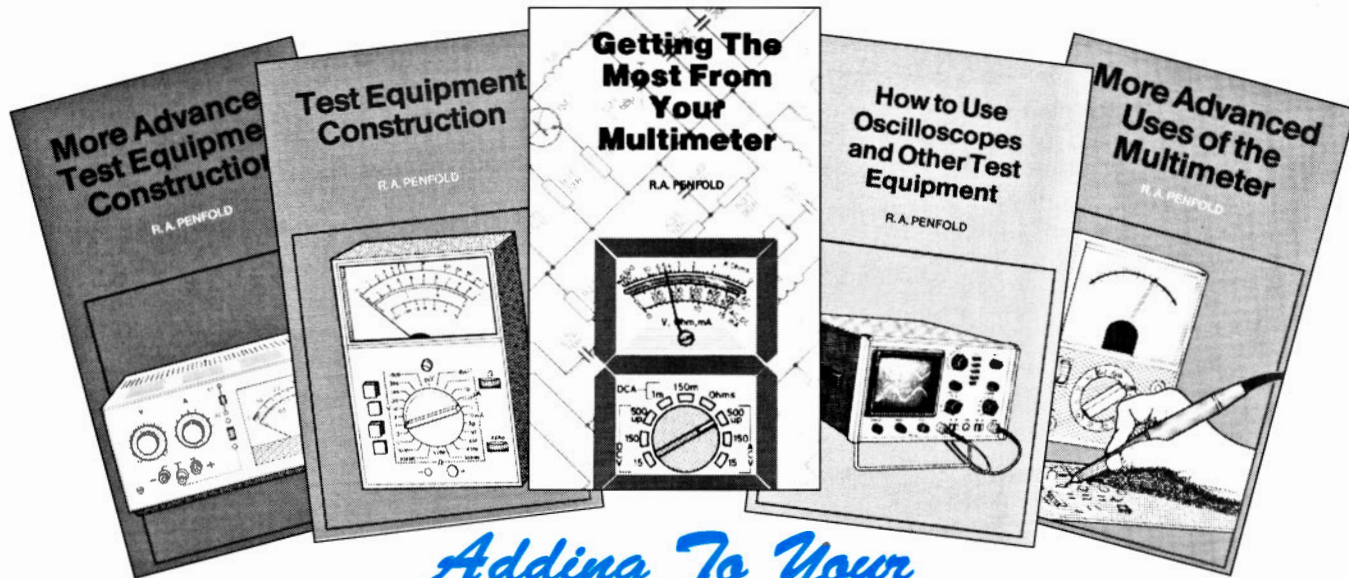
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PW Sept 1993





## Adding To Your Bookshelf

Technical writing, by its very nature, tends to attract specialists. Some names become established in their own particular fields, and that of R. A. Penfold is one example. This prolific author is well-known for his readable approach to what could be daunting subjects for the non-professional radio or electronic enthusiast.

To help you get the best from the hobby, and as we have a test equipment theme in this issue of *PW*, it's a good time to look at what's available from the PW Book Service for your library dealing with this wide subject area. Fortunately, the well-known publishers Bernard Babani Ltd., have a range of books to suit the needs and pocket of the enthusiast in the workshop.

Everyone should have a multimeter to hand in the workshop. It's the basic tool for trouble-shooting and testing. Many enthusiasts, even those with a lot of experience, could find *Getting The Most From Your Multimeter* a useful book. Covering the choosing of a multimeter, whether analogue or digital, components and testing, along with a host of other useful topics, this book will help you use your meter to the full.

### Getting The Most From Your Multimeter BP239

R. A. Penfold

102 pages, £2.95 from PW Book Service.

Once you've got your multimeter and have gained more experience, there's another title to help you, entitled *More Advanced Uses Of The Multimeter*. Including topics such as testing unijunction transistors, integrated circuits, t.t.l. outputs, static dynamic testing and component analysis, this book is complimentary to the first title.

### More Advanced Uses Of The Multimeter BP265

R. A. Penfold

96 pages, £2.95 from PW Book Service.

Many enthusiasts like to make their own radio gear, and *Test Equipment Construction* starts off by introducing the reader to audio test gear. You can make your own Wien Bridge, a test bench amplifier, and among other projects, a

useful audio millivoltmeter.

In his second chapter, R. A. Penfold explains how to make a high resistance voltmeter, a transistor tester and a useful capacitance meter. He also describes an audio frequency meter before dealing with test probes. The book concludes with a look at analogue, c.m.o.s. and t.t.l. probes.

### Test Equipment Construction BP248

R. A. Penfold

104 pages, £2.95 from PW Book Service.

Taking his approach further, *More Advanced Test Equipment Construction*, the author leads the keen builder into the techniques behind digital measuring equipment, attenuator circuits, a current tracer and a heatsink thermometer amongst many other projects and ideas. The second part of the book deals with a crystal calibrator, a bench power supply, logic pulser and a dynamic transistor tester.

### More Advanced Test Equipment Construction BP249

R. A. Penfold

102 pages, £3.50 from PW Book Service.

Finally, as many radio enthusiasts aim to eventually have their own workshop oscilloscope, R. A. Penfold has prepared the way by writing *How To Use Oscilloscopes And Other Test Equipment*. He starts off by introducing you to oscilloscope basics, and explains their use, with the aid of diagrams representing typical screen displays. Other equipment is also covered, including the versatile dip-meter.

### How To Use Oscilloscopes And Other Test Equipment BP267

R. A. Penfold

104 pages, £3.50 from PW Book Service.

**Post and packing, add £1 (UK), £1.75 (overseas) for one book, £2 (UK), £3.50 (overseas) for two or more books.**



## Special Offer

**Wherever in the world is it? You certainly won't have to ask that question if you have a copy of our special offer map.**

Editorial Assistant Zoë Shortland and Production/News Editor Donna Vincent are pictured next to the map, so you can see that it's an ideal size for your shack wall. The map is clearly printed in a variety of colours, complete with zone numbers and prefix letters for each country. Improve your knowledge of our fascinating world, and quickly locate where that rare prefix is by getting your copy of the **7th Edition Of The Radio Amateurs Prefix Map Of The World** for only £2 (original price £3.50 plus £1 P&P), plus 50p P&P UK 75p overseas (surface mail).

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RADIO

# HAMSTORES

## SPECIAL EVENT DAY AT 'BIRMINGHAMSTORE'



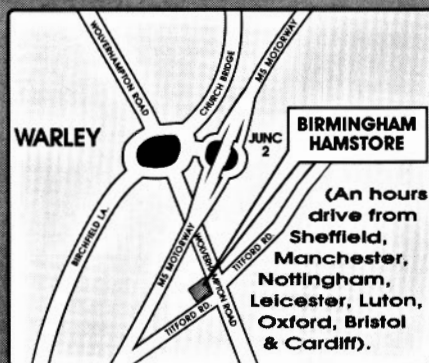
Last year we claimed to have one of the best Ham Radio Showrooms in the country... this year we know we have. Come and see for yourself between 10am & 4pm on

### Saturday 18th September

Come and see how we have developed and help us celebrate our second year in Birmingham with a glass of Buck's Fizz and some nibbles, you might even get

**your teeth into a NEW RADIO! There will be some EXTRA SPECIAL DISCOUNTS ON OFFER PLUS...**

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- Shortwave listening & weather chart reception
- Operating desks c/w rigs by all the major manufacturers
- Extensive stocks of new gear
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- Mobile radio aerials and accessories
- Portable radios of all kinds
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- Data sheets to mull over, in fact everything for Radio Hobbyists, be they listeners or transmitters
- ICOM Marine, Avionic and PMR radios will also be on display
- HAMSTORES stock AEA, AKD, Alinco, AOR, Barenco, Comet, Cushcraft, Davis, Dee Comm, Diamond, Icom, JRC, Kenwood, Lowe, Microset, MFJ, RSGB books, Toyo, Yaesu and Yupiteru gear
- Low deposit, interest-free credit is available on most radio purchases
- Gordon, John and Ray are all looking forward to greeting you on the 18th!



(An hours drive from Sheffield, Manchester, Nottingham, Leicester, Luton, Oxford, Bristol & Cardiff).



### BIRMINGHAM: (STORE IS JUST OFF M5 MOTORWAY AT JUNCTION 2)

International House, 963 Wolverhampton Rd. Oldbury, West Midlands B69 4RJ.  
Tel: 021 552 0073 Fax: 021 552 0051. Also at...

### LONDON:

11 Watford Way, Hendon, London NW4 3JL. Tel: 081 202 0073 Fax: 081 202 8873

### HERNE BAY:

Unit 8, Herne Bay West Industrial Estate, Sea Street, Herne Bay, Kent CT6 8LD.  
Tel: 0227 741555 Fax: 0227 741742. N.B. Herne Bay closed for lunch 1300-1400.

**OPENING TIMES:** Mondays to Fridays: 09:00-17:00 & Saturdays: 09:00-16:00.



# PW Robin - Lowering The Display Power Requirements



*Mike Hughes has modified the PW Robin Frequency Counter. His modification reduces the overall current consumption. Now it can be powered from batteries for use in the field.*

The design for the PW Robin Frequency Counter by Mike Rowe G8JVE is first rate. It's a small low-cost unit capable of operating up to at least 450MHz.

However, having produced a similar design, using the 'all displays on all the time' method, I had discovered one major disadvantage of the design. The overall power consumption can be quite high, all the l.e.d. segments require power whenever they are on.

To calculate the typical maximum current consumption for one display, take the current of one segment and multiply it by seven. For simplicity's sake, let me assume that the l.e.d. voltage is 2V. The voltage

across any of the limiting resistors is then 3V. Each limiting resistor is  $270\Omega$ , so the current flowing is 11mA.

Each display has seven segments and there are eight displays. The worst case condition is when all segments of all displays are lit (displaying 88888888 even though this would be very unusual). This condition gives a current consumption in excess of 0.5A for the display alone. So I looked for a method of reducing this power drain.

The method I chose to reduce the power consumption is multiplexing the display digits. In display multiplexing, each display digit is turned on for a short time, then off again for a longer period. In this long off period the other displays, in turn, are switched on and then off again in a similar sequence. No two displays are on at the same time, so the overall consumption should be reduced by a factor of eight. The number of times each display is turned on (and off) per second is called the switching rate.

If the switching rate is fast enough, the eye and brain are

unaware of the flickering on and off. Persistence in the retina of the eye, keeps the image for a short time and fools the brain into believing that the segments are on all the time. After all not many of us see the flying spot on the screen of the television. An absolute minimum switching rate for this project is around 20 times per second, whereas the TV uses 25 complete (50 half picture) pictures per second.

## Circuit Operation

The part circuit (of the PW Robin) Fig. 1, shows a section of the decode/display in the original circuit. The dual 4-bit data outputs of the counter i.c.s (74HC390) are decoded in the seven segment drivers (each a 4511 type).

The outputs of the i.c.s feed the current limiting resistors for each of the displays. The displays are of the common cathode type and Pins 13 and 14 of each dual display have to be connected to the 0V line to turn both digits on. If this connection is not made then the display is off and has minimal power consumption.

My modification multiplexes the displays to reduce the power consumption. By looking now at the drawing of my circuit, Fig. 2, you will see that only a few additional components are necessary. The multiplexing circuit is controlled by the outputs of the new counter i.c. (IC1a) which is a decade divider with each of ten output pins going high (then low again) in sequence. Of the ten decoded outputs, only one will be on (high) at any time.

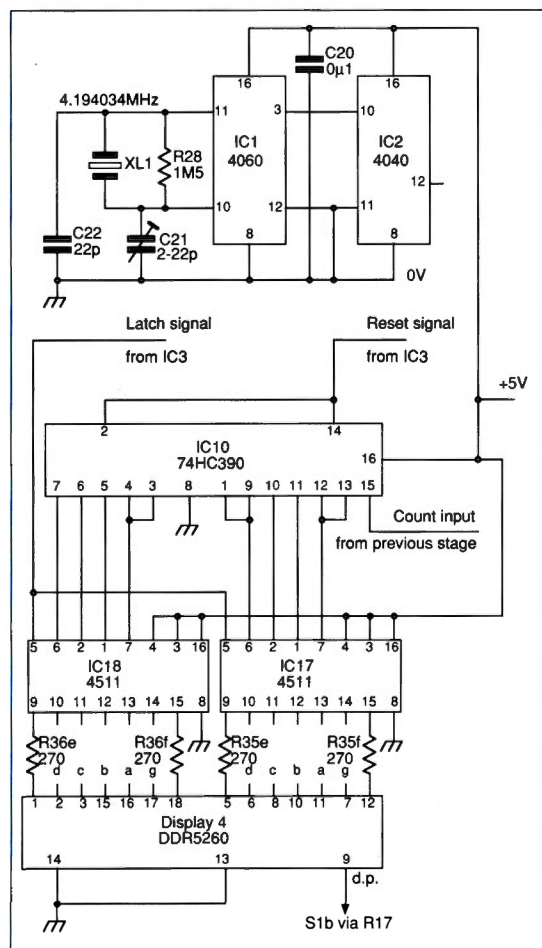
With each falling edge ('1' to '0' signal change) of the clock input, the active output line goes low and the next line goes high. The '9' output line going high is used to provide a reset pulse to the master reset of the i.c. The first output then becomes active (high) again, so the i.c. is now effectively a one-of-eight decoder.

The eight outputs, via transistors Tr1a - Tr8a, each control one display digit. It is possible to have a separate clock generator to drive the decade divider i.c. but in the PW Robin design the final output stage of the 4060 divider should provide a suitable clock rate of 256Hz. This signal is available on Pin 3 of IC1 (Pin 10 of IC2).

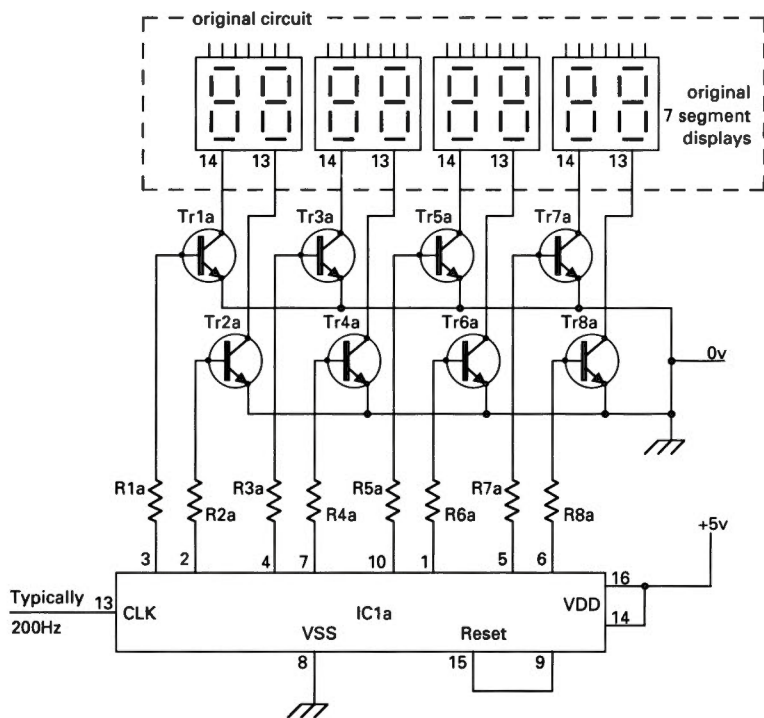
In theory it is possible to achieve a reduction in current consumption of 87.5%, although in practice the display will appear dim. To counteract dimming of the displays, the current limiting resistors (to the displays) can be reduced in value to make the displays brighter.

A value of about  $100\Omega$  for these resistors (R29a-f to R36a-f in the original circuit) will produce a much

**Fig. 1: Part of the original PW Robin decode and display section.**







**Fig. 2: This is the simple circuit of the additional parts to multiplex the original display.**

brighter display but the circuit is still able to provide substantial current savings. When you fit this modification to the PW Robin design, you can easily implement it into the original design by cutting the tracks to Pins 13 and 14 of each display and having the circuit

on a small piece of Veroboard or p.c.b.

This modification can reduce the current drain to such a point that it will be possible to use the PW Robin Frequency Counter on batteries during tests outdoors.

PW

#### How Difficult How Much

Intermediate  
£5

#### Shopping list

##### Resistors

Carbon Film 0.25W 5%  
100Ω

56

(optional to replace original current limiting resistors)  
R1a - R8a

2.2kΩ

8

##### Semiconductors

##### Transistors

BC182

8

Tr1a - Tr8a (almost any small signal n.p.n. transistor will do)

##### Integrated circuits

4017

1

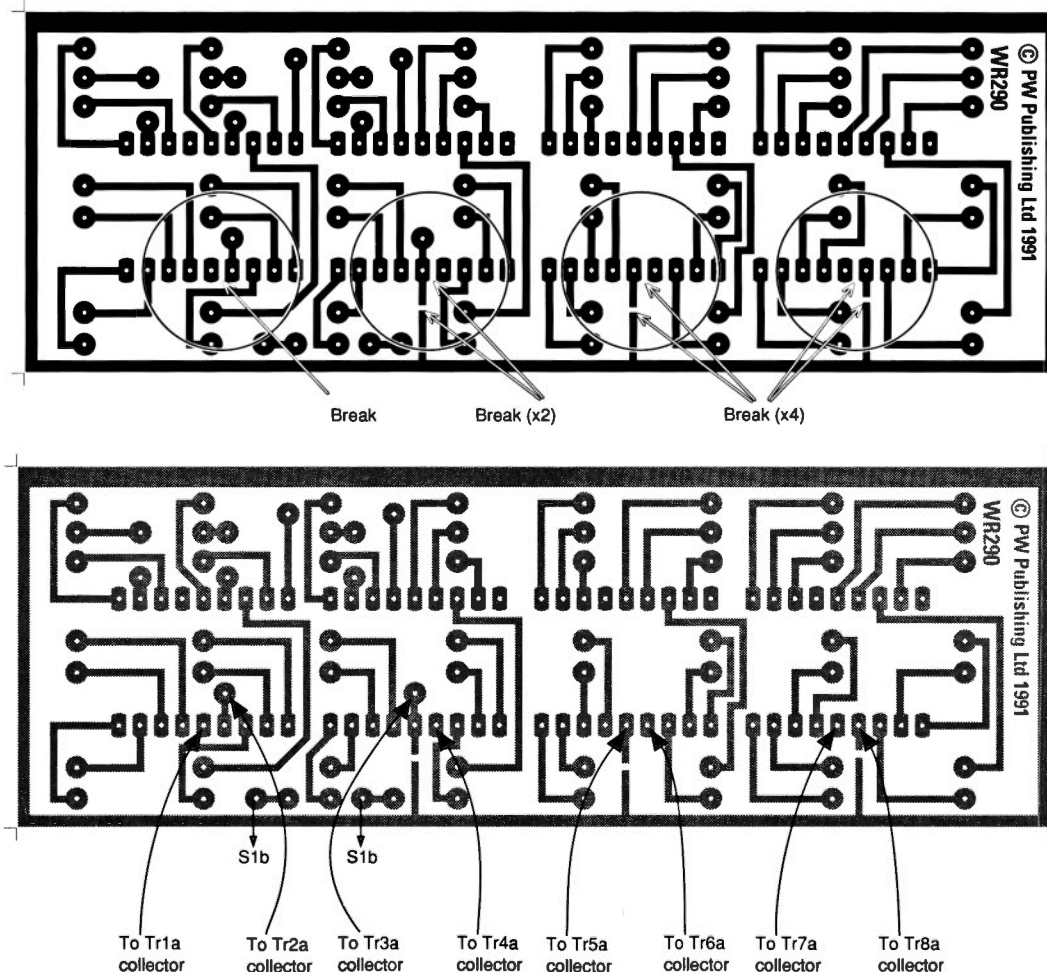
IC1

##### Miscellaneous

A small piece of Veroboard or perfboard about 50mm square, some thin insulated hook-up wire to connect the new circuit and the original PW Robin.

**A suitable 256Hz clock signal can be picked up from Pin 3 of IC1 or Pin 10 of IC2 on the PW Robin mainboard.**

**Fig. 3: The original display p.c.b. from the PW Robin showing suitable 'break-in' points for the connection to the collectors of Tr1a - Tr8a.**



#### Additional Reading

'PW Robin frequency counter' by Mike Rowe G8JVE, PW July and August 1991.





**Fig. 1: The prototype bi-polar transistor tester as built by Martin Michaelis DK1MM.**

# A Simple Tester For Bipolar Transistors

*Martin Michaelis DK1MM describes a useful little project that will test transistors and diodes using its built-in r.f. oscillator. It's ideal for testing all those 'bargain' transistors and diodes you've got lying around in the junk box.*

Most transistor testers are only able to test the d.c. parameters. With the tester described in this article you can test the function, the doping (*npn* or *pnp*) and approximately the maximum frequency range of oscillation ( $f_{max}$ ). Equally we can test diodes with this tester.

The circuit is shown in Fig. 2. The heart of the tester is a Colpitts oscillator formed by L1, Ca & b and the transistor to be tested. Under test, a good transistor will oscillate and the diode D1 rectifies the resultant r.f. The meter M1 indicates the relative strength of the oscillations.

## Frequency Change

The two-pole six-way switch, S1a & b, selects the frequency range. The toggle switch S4a & b changes the polarity for the doping test.

Using the potentiometer R1, the full-scale reading of the meter M1 may be adjusted for the gain of the transistor under test. The two-pole changeover switch, S2a & b acts as the 'test' control, S2a discharging the 10nF capacitor C6.

The combination of the Zener diodes D2 & 3, with the associated resistor R3, forms a limiting voltage divider connected by the toggle switch S4a & b and the resistor R3 to the circuit.

The diode, D1, is normally in circuit. However, it's disconnected by the switch S3, when a diode is under test, and the Diode Test switch, S3 is operated.

I chose to use a separate power supply, which should be regulated, and in the range of 8 to 12V d.c. Alternatively, an external battery supply can be used.

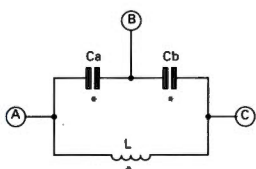
The test oscillator frequency range depends on the values of Ca, Cb and L. The details for the value of Ca & b, together with the inductors for the frequency ranges are shown in Table 1.

## Easy and Cheap

Building the tester is easy and cheap. This is because all the parts may well be found in your junk box, or can be bought surplus or from the flea market at rallies.

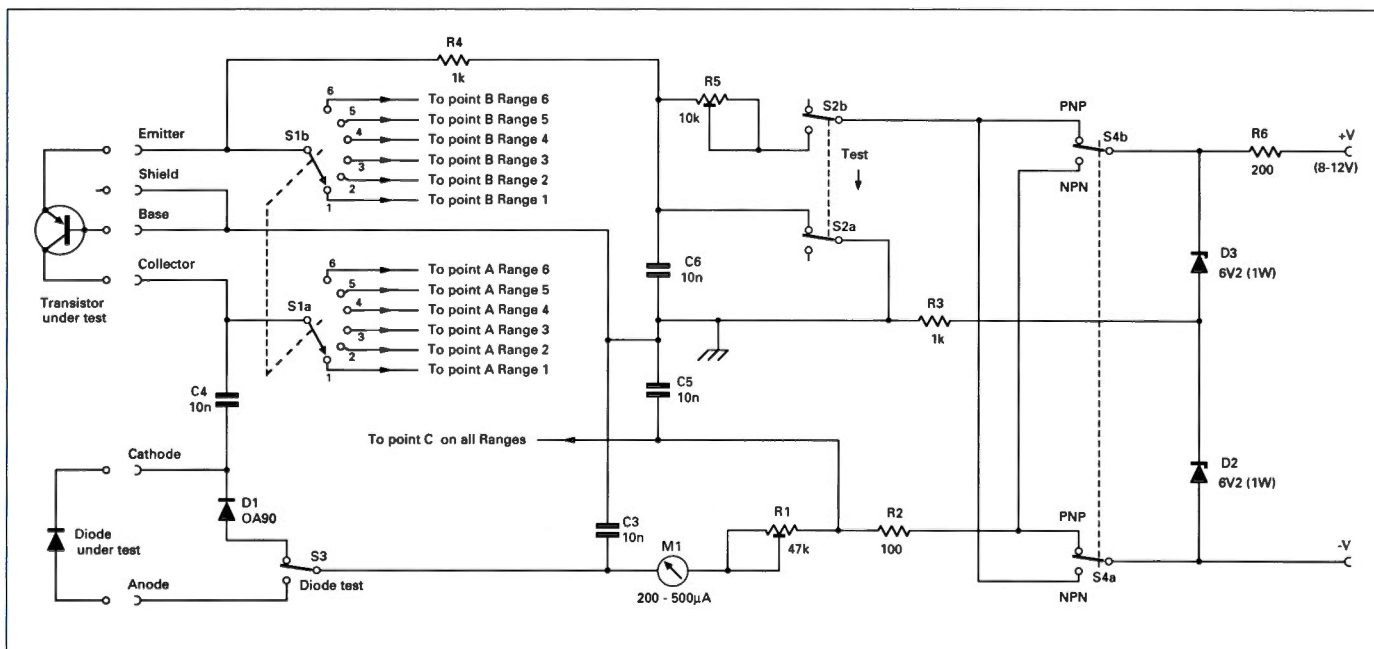
The oscillator itself is a simple arrangement. Another useful factor is that the oscillator's frequency stability is not critical in this application. The switch S1a, shown in Fig. 1, is one half of a two-pole six-way type, selects the coils and capacitors for each frequency range. The coils and capacitors are mounted between the front section and the rear section of S1a & b.

I chose to mount most of the components on the underside of the front panel. Only the power socket and the Zener diodes D2 & 3 with resistor R5 are mounted on

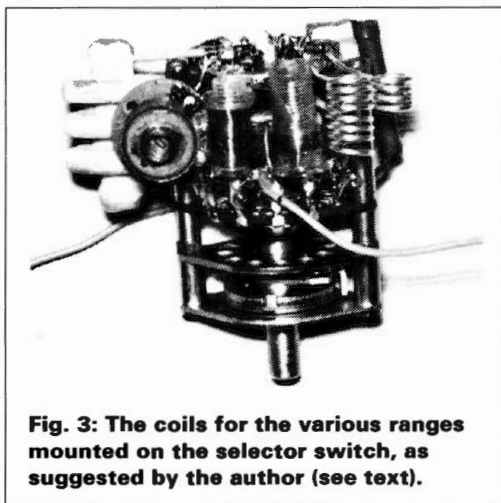


See Table 1 for the combinations of inductance and capacitance values for each range.

**Fig. 2: Circuit of the transistor tester (see text).**







**Fig. 3: The coils for the various ranges mounted on the selector switch, as suggested by the author (see text).**

the rear panel of the cabinet on my prototype.

Be careful if you use a meter with a full scale deflection (f.s.d.) other than the one I suggest. If you do, make sure that the correct value of resistance is used for R1. When using a different f.s.d. meter, for correct adjustment - full scale at half power voltage - you should substitute another value for potentiometer R1. I suggest you use a 100k $\Omega$  linear type.

The connections between S1a & b to the **Transistor Under Test** socket, must be as short as possible. In practice, I soon found that it's better to use four short leads, made up from insulated braided wire (for base, emitter, collector and common connection) with alligator clips.

## Using The Tester

Using the tester is quite straightforward. For example, to test bipolar transistors you should first connect the transistor leads to the correct alligator clips on the tester. Then, select the lowest frequency range on S1.

To begin the actual test, put the switch S2 to the **Test Position**. If the meter deflection is lower than half scale, switch S1 to the next frequency range, and then check again by operating S2. You may find that a transistor will oscillate (for example) at 50MHz and not 50kHz.

If the meter does not show any deflection at all, turn S4 to the other position and start the tests again. This will tell you if the transistor under test is a *pn*p or an *np*n type.

When you're testing a transistor with unknown pin connections, you'll have to try different connection combinations. At two thirds clockwise rotation of R5, a good transistor will give a meter deflection of 80-100% f.s.d.

## Testing Diodes

When testing diodes, because of the way it works, a working transistor is needed as well! The diode under test

**How Difficult?**  
**How Much?**

**Intermediate**  
**Around £10** (Cheaper if you have a suitable meter)

## Shopping List

### Resistors

*Metal film 0.4W 5%*

100 $\Omega$

1

R2

200 $\Omega$

1

R6

1k $\Omega$

2

R3, 4

*Miniature variable 20% linear*

10k $\Omega$

1

R5

47k $\Omega$

1

R1 (see text)

### Capacitors

*Miniature polyester*

10nF

4

C3, 4, 5, 6

(See text for Ca, b)

### Semiconductors

*Diodes*

OA90

1

D1

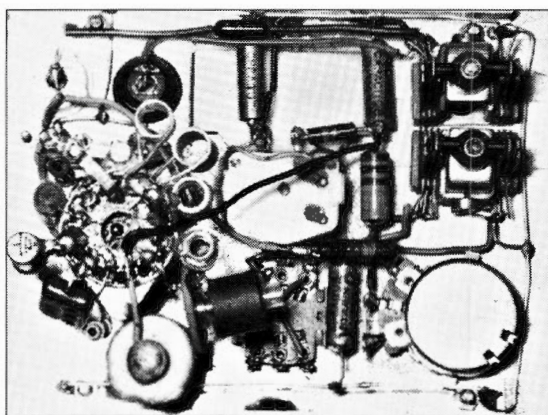
BZX61C6V2

2

D2, 3

### Miscellaneous

Suitable box (aluminium chassis box or die-cast type), meter movement (400 $\mu$ A f.s.d. used in author's prototype), sockets and leads or crocodile clips, see note in text regarding test connections. Two-pole, two-way switch (can be either toggle or push-to-change type to suit) S2. Two-pole two-way changeover switch, S4. Single-pole changeover switch, S3. Two-pole, six-way switch, S1. Suitable knobs and battery/power supply connectors.



**Fig. 4: The main components for the tester, mounted behind the front panel.**

actually replaces D1 in the test circuit.

So, to start the diode test you must connect a good transistor to the alligator clips on the test leads. The next stage is completed by connecting the diode under test to the diode-test clips.

Make sure you connect the diode the right way round, ensuring that the polarity is correct. Then, switch S2 and S3 to their test positions. The diode's maximum working frequency may be found by switching S1, step by step from Range 1 to Range 6.

Although it's a simple design, this transistor tester provides a very useful range of practical tests. By using it, you'll be able to find out much more than whether or not all those 'bargain' transistor or diodes in your junk box work or not.

PW

**Table 1**

Range	Frequency	Turns	Inductor (L) Wire	Former	Ca	Cb	Notes
1	50kHz				5nF	10nF	2.5mH r.f. choke
2	500kHz				400pF	5nF	300 $\mu$ H long wave coil from an old transistor radio
3	5MHz	46	31s.w.g. e.c.w.	6mm dia iron dust core	200pF	2nF	5-7 $\mu$ H
4	15MHz	15	31s.w.g. e.c.w.	6mm dia iron dust core	100pF	1nF	2-2.5 $\mu$ H
5	50MHz	8	19s.w.g. bare wire	6mm dia air core	50pF	80pF	0.3 $\mu$ H
6	100MHz	4	19s.w.g. bare wire	6mm dia air core	1pF	3.9pF	0.15 $\mu$ H



*The PW team have been busy finding out what test equipment is available and who can supply it. So carry on browsing around the shelves, you never know what you may find.*

# Off The Shelf

To help you we have arranged the test equipment into various sections to make it easier to search for the special item you need. Where a supplier appears in more than one section, their address will appear in full only the first time they are mentioned.

## Power Supplies

Power supplies (p.s.u.s) cover all sorts of voltages and current ranges. Many amateurs look to buy a 13.8V p.s.u., at current levels up to 50A, to supply the home station. But other output types are available from the suppliers.

Alpha Electronics can supply a variety of power supplies from the Thurlby Thandar range. From highly accurate (to within 0.1%) 0-30V 1A supplies, to low-cost units suitable for powering novice projects. For more information contact them at Units 5 & 6, Linstock Trading Estate, Wigan Road, Atherton, Greater Manchester M29 0QA. Tel: (0942) 873434 or FAX: (0942) 873558.

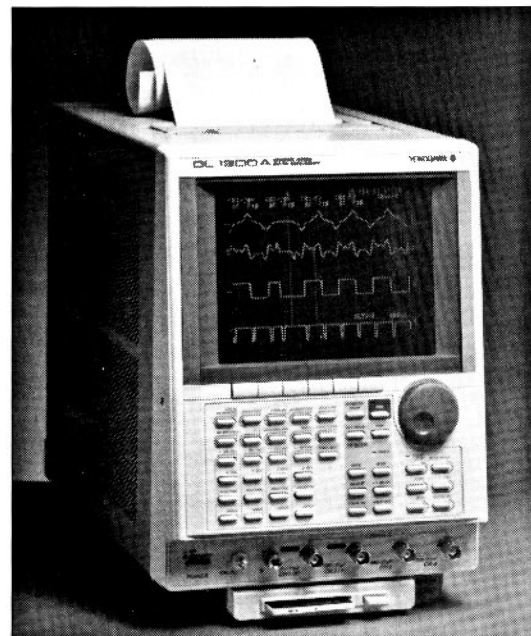
Cirkit Distribution have a selection of laboratory grade p.s.u.s available. Their catalogue, costing £1.90, is available through the larger high street newsagents. In cases of difficulty contact Cirkit direct at Park Lane, Broxbourne, Herts EN10 7NQ. Tel (0992) 444111 or FAX: (0992) 464457.

Electromail have an 18 page section, in their massive three part catalogue, dealing with p.s.u.s of all types, sizes and power levels. Copies of the

current 1800+ page catalogue are available, costing £6.50, from Electromail at PO Box 33, Corby, Northants NN17 9EL. Tel: (0536) 204555 or FAX: (0536) 405555.

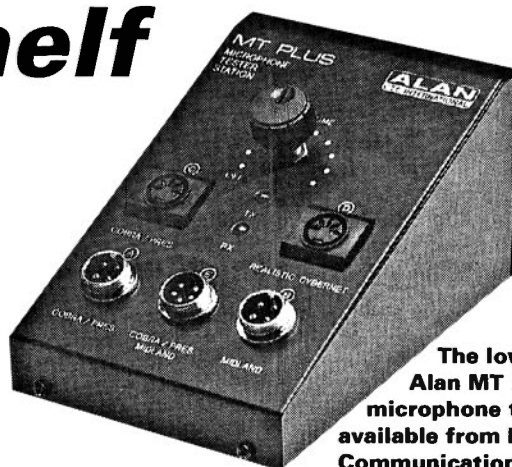
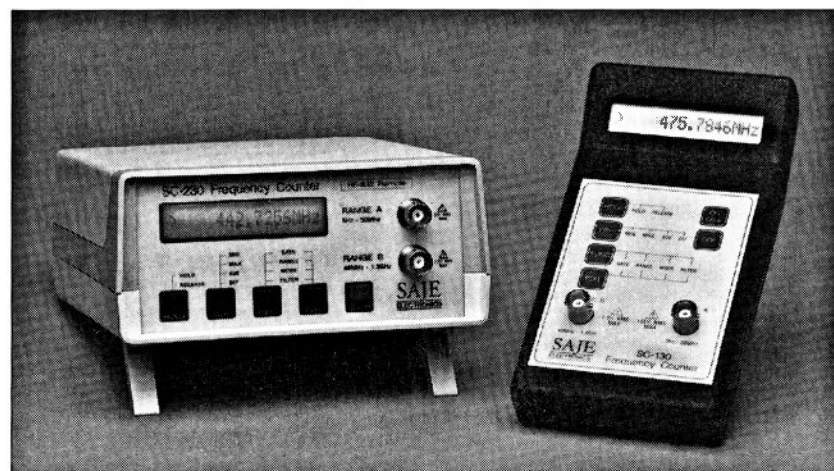
Greenweld have a catalogue that is rich in all sorts of things. Amongst these items is a section dealing with power supplies all at very reasonable prices. They have multi-output mains driven switch-mode p.s.u.s for computer projects, plug style low power p.s.u.s or the parts to make your own. Their catalogue is available from 27 Park Road, Southampton SO1 3TB. Tel: (0703) 236363 or FAX: (0703) 236307

Henrys Audio and Electronics catalogue contains a section on p.s.u.s to suit many low to medium powered items. Items such as 13.8V 5A supplies are available. For a copy of their catalogue, price £4, contact Henrys at 404



**Not a new-look computer, but a digital storage oscilloscope available from Martron Instruments.**

**Count up to 1.3GHz with either of these digital counters from SAJE Electronics.**



**The low cost, Alan MT Plus microphone tester available from Nevada Communications.**

Edgware Road, London W2 1ED. Tel: 071-258 1831 or FAX: 071-724 0322.

Jaytee Electronic Services are suppliers of the toroidal transformer for the PW Marchwood high power 13.8V p.s.u. They can supply the whole range of ILP toroidal transformers, which includes low profile encapsulated transformers for direct p.c.b. mounting. Contact Lee Adams at 143 Reculver Road, Beltinge, Herne Bay, Kent CT6 6PL. Tel: (0227) 375254 or FAX: (0227) 365104.

Lowe Electronics have p.s.u.s to suit most needs. For details of your closest Lowes shop, see their advertisement in this issue.

Maplin Electronics have a catalogue featuring a variety of single and dual rail power supplies, with up to 60V or 10A output type, to suit most situations. The 700+ page catalogue, costing £2.95, is available through the larger newsagents, or direct from Maplin at: PO Box 3, Rayleigh, Essex SS6 2BR. Tel: (0702) 554161 or FAX: (0702) 553395.

Martin Lynch has a constantly changing stock of new and second-hand equipment. contact him to see what is in stock at: 286 Northfield Avenue, Ealing, London W5 4UB. Tel: 081-566 1120 or FAX: 081-566 1207

Nevada Communications can supply a variety of p.s.u.s from small battery charger types to items capable of sourcing 50A at 13.8V. They also have variable and twin output p.s.u.s. Their catalogue was free with the June 93 issue of PW or costs £2 from Nevada Communications at 189 London Road, North End, Portsmouth, Hampshire PO2 9AE. Tel: (0705) 662145 or FAX: (0705) 690626.

SAJE Electronics can supply the Maxcom MX-9000 four-in-one test unit. Reviewed in the March '93 issue of PW it features a triple output p.s.u. with a d.v.m., counter timer and signal generator thrown in for £399. Contact SAJE at 117 Lovell Road, Cambridge, Cambs CB4 2QW. Tel: (0233) 425440 or FAX: (0233) 424711.

South Midland Communications can supply power units suitable for the wide range of transceivers they stock. Contact SMC at: S.M. House, School Close, Chandlers Ford Ind. Estate, Eastleigh, Hants SO5 3BY. Tel: (0703) 255111.

Waters & Stanton stock the Microset range of power supplies. The range covers from 5-30A supplies at 13.8V. These p.s.u.s are good value for money and are available with built-in meters to monitor the load. Contact them at 22 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835/204965 or FAX: (0702) 205843.

## Meters & Oscilloscopes

This section deals with equipment to measure and displaying signals. Most suppliers will have a variety of test meters to measure Volts, Amperes and Ohms, and some meters can check transistors or measure capacitance. But space doesn't allow us to mention every product



offered by every supplier. The following is only a small selection of what's available.

**C. M. Howes** are manufacturers of many items of test equipment to meet the needs of an amateur radio station. Their DFD5 digital frequency meter is available as a kit of quality parts to make your own 35MHz counter. All Howes projects are well designed, and have a harmonised look to them. For more information contact Dave Howes at Eydon, Daventry, Northants NN11 6PT. Tel: (0327) 60178

**Cambridge Kits** say they make "electronics YOU can make". In their growing list of kits is a sound level meter. Useful for checking sound pressure levels in noisy environments. For more details of this and their other kits contact them at 45 Old School Lane, Milton, Cambridge CB4 4BS. Tel: (0223) 860150.

**Cirkit Distribution Ltd.** source a range of multimeters of digital or analogue varieties to suit all pockets. The world renowned AVO Model 8 is not cheap, but is a superb analogue multimeter. See p.s.u. section.

**Cricklewood Electronics Ltd.** are updating and reprinting their catalogue (due out late October), this is to include a test equipment section. For more details about their range, contact them at: 40 Cricklewood Broadway, London NW2 3ET. Tel: 081-452 0161 or FAX: 081-208 1441.

**Eastern Communications** stock the Sigma SC40SP digital power/s.w.r. meter. This unit, with a remote sensing head, is available from them at Cavendish House, Happisburgh, Norfolk NR12 0RU. Tel: (0692) 650077.

**Electromail** have many pages in their catalogue devoted to measurements of all electrical, and mechanical, values. If you fancy measuring a.c. currents up to 1000A then they can help. See p.s.u. section.

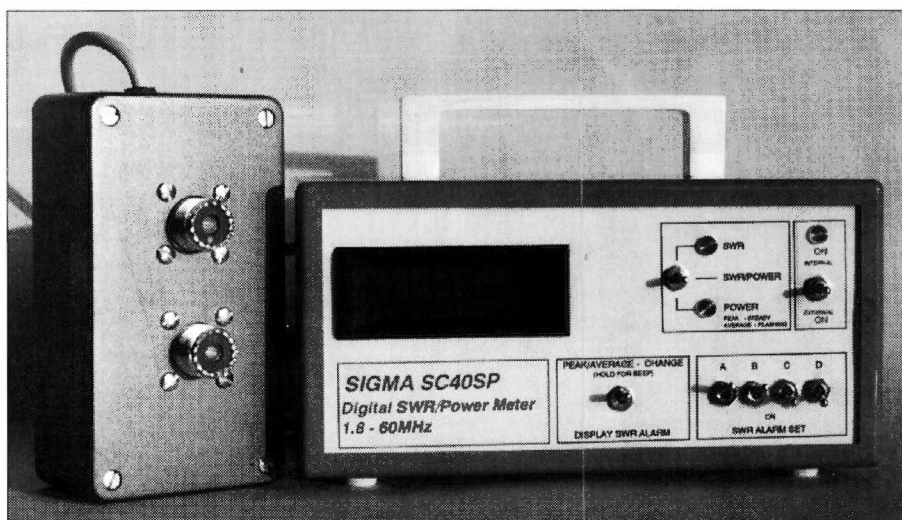
**Exsell Technical Communications Ltd.** are suppliers of Wavetek's Griffin range of multimeters. The top of the range DM15XL model, measures ttl logic pulses up to 20MHz, as well as the more mundane Volts and Amps. They may be contacted at Dock Office, Trafford Road, Manchester M5 2XB. Tel: 061-872 6310 or FAX: 061-872 4504.

**Gould Electronics** have an ingenious signal measuring and monitoring system. Based on a high-tech storage oscilloscope, this data acquisition system can capture, store and display signal waveforms up to 150MHz. For more information about this and their other oscilloscopes, contact Gould at: Roebuck Road, Hainault, Ilford, Essex IG6 3UE.

**Grosvenor Software** can supply the BMKMULTY computer program to display the incoming audio spectrum of RTTY and Amtor signals. See at a glance, the state of the signal. A small simple interface unit is needed between the radio and computer. For more information write to 2 Beacon Close, Seaford, E. Sussex BN25 2JZ. Tel: (0323) 893378.

**Hesing Technology** import the laboratory quality, Krenz Electronic measuring equipment. The range includes data and signal monitoring displays that may be interfaced with a PC for control and storage. These items are capable of so many functions it is difficult to put them into any one category. For more information about the range, Hesing may be contacted at: Cromwell Chambers, 8 St. John Street, Huntingdon, Cambs PE18 6DD. Tel: (0480) 433156 or FAX: (0480) 413357.

**ITT Instruments** supply the MX50 series of digital multimeters that feature the ASYC® safety designs. They have min/max, true r.m.s. decibel and frequency measurements available in the range, which includes a model for potentially explosive environments. For



more information contact them at: 346 Edinburgh Avenue, Slough, Berkshire SL1 4TU. Tel: (0753) 511799 or FAX: (0753) 694983.

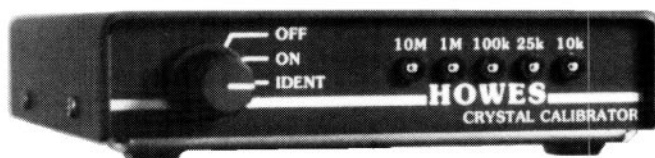
**Kanga Products** is an enthusiastic supporter of QRP working, and their product lines reflects this. Listed in their A5 sized catalogue are dummy loads, power meters (v.s.w.r. measurements) and other test equipment for amateur radio use. Their catalogue is available from them at: Seaview House, Crete Road East, Folkstone CT18 7EG. Tel/FAX: (0303) 891106.

**Lake Electronics** manufacture a range of r.f. power and s.w.r. measuring kits that are also available ready-built. Both the PM20, a terminated 1/20W power meter, and the TUA1 s.w.r. meter (reviewed PW Nov. '92) are suitable for novice construction and use. For more details about these or other products, see Alan Lake at a rally, or at: 7 Middleton Close, Nuthall, Nottingham NG16 1BX. Tel: (0602) 382509.

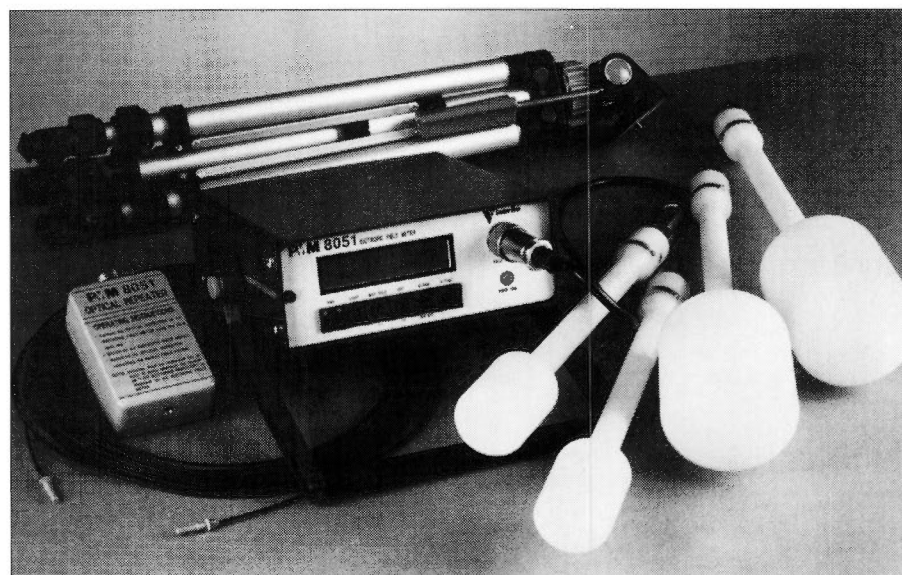
**Maplin Electronics** can supply test equipment to measure both d.c. and r.f. For instance they have almost 20 pages devoted to their range of analogue and digital meters. There are other sections covering oscilloscopes, and audio

**The Sigma SWR/Power meter with remote head, available from Eastern Communications.**

**Left: A Crystal calibrator from C.M. Howes, could help you check your receiver's tuning accuracy.**



**Below: EMC/RFI problems? Hire or buy this portable field strength unit from Martron Instruments.**

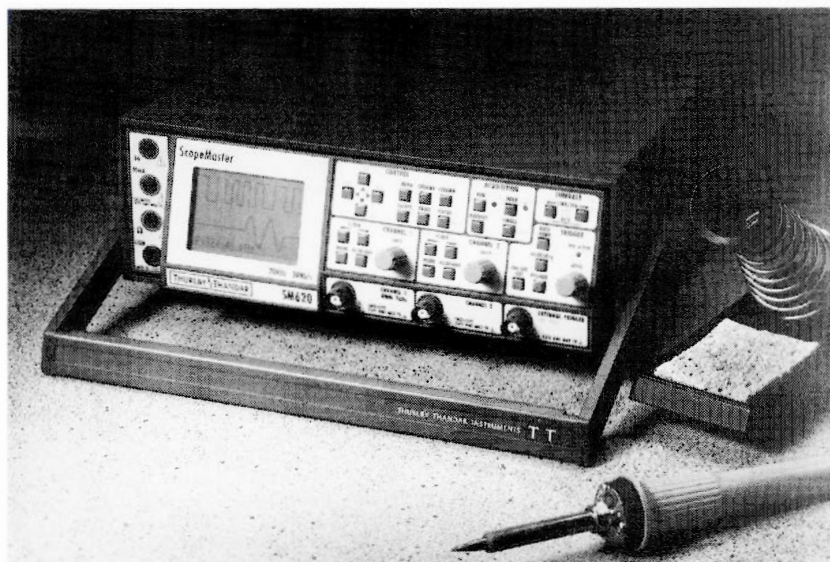






**Digital multimeters for use in explosive environments are available from ITT Instruments.**

**A multi-purpose item from Thurlby Thandar, combines d.v.m., data analyser and counter timer into a digital storage oscilloscope.**



test equipment. For their address details see the p.s.u. section.

**Martron Instruments** produce a portable field strength meter suitable for EMC/RFI testing. The PMM-8051 meter unit measures radiation of 20Hz to 18GHz at field strengths between 0.05-1000V/m. Able to display the values in a variety of forms, the units are available for short term hire on a weekly basis. For more information write to them at: Wellington Road, Cresssex Ind. Estate, High Wycombe, Bucks HP12 3PR. Tel: Martin Ball on (0494) 459200.

**Nevada Communications** catalogue contains many items of test equipment and a recent addition is the ALAN MT PLUS microphone tester unit. Priced at £19.95 this unit will check the major manufacturer's microphones for all facilities. Contact address is in the p.s.u. section.

**SAJE Electronics** Have a range of test equipment that covers almost every field of measurement. Their hand-held frequency counters are particularly cost effective, with a

maximum count of 1.3GHz. More details in the p.s.u. section.

**Thurlby Thandar** have an unusual multimeter, the SM620 ScopeMaster model, that combines a d.v.m. with a digital storage oscilloscope, a counter-timer and data analyser unit. For more information about the SM620, or their other products contact Thurlby Thandar's John Cornwell at: 2 Glebe Road, Huntingdon, Cambs PE18 7DX. Tel: (0480) 412451 or FAX: (0480) 450409.

**Waters & Stanton** import s.w.r. and power meters in the Diamond and Revex ranges. They can also supply the MFJ-249 HF/VFHF SWR analyser (Antenna Workshop *PW* August '93). See the p.s.u. section for address details.

## Signal Generation

One of the most useful items available to a radio amateur or electronics enthusiast is a signal generator. In this section we offer a selection of suppliers for many types of signal generators. These will include audio, r.f. and pulse generators. Most firms can supply the range of items so it would be useful to check them all out for your exact requirements.

**Alpha Electronics** Carry the range of Thurlby Thandar signal generators. See the p.s.u. section for details.

**Badger Boards** not only supply the p.c.b.s for *PW* projects, but they supply a variety of electronic kits for signal generators of audio r.f. or digital types. For more details contact John Badger at 87 Blackberry Lane, Four Oaks, Sutton Coldfield B74 4JF. Tel: 021-353 9326.

**C. M. Howes** have a crystal calibrator kit available, providing signals from v.l.f. up into the u.h.f. band.

**Cirkit Distribution** have many pages of signal generators in their catalogue.

**Electromail** carry an extensive range of audio, r.f. and pulse generators.

**Henry's** audio and electronics catalogue contains a few items of mainly audio related generators.

**Kanga Products** offer several test oscillators for radio related use in their catalogue.

**Levell Electronics Ltd.** can supply a fine range of pulse and digital test oscillators. Their 233 and 240 models cover from 0.5Hz to 50MHz. The 233 model being doubly useful as it is two independent oscillators in one box. For more information about these, and their other items of test equipment, write to Technology House, Mead Lane, Hertford, Hertfordshire SG13 7AW. Tel: (0992) 501231 or FAX: (0992) 500028.

**Maplin Electronics** have a catalogue section devoted to their various types of signal generator.

**Martin Lynch** has been known to take all sorts of items in part exchange. Phone him and find out.

**SAJE Electronics** supply a variety of signal generators, some of which are integrated into other items of test equipment.

**Thurlby Thandar** manufacture many types of test oscillators, most are available from themselves or other distributors mentioned on these pages. **PW**

## Special Offer From PDSL

It isn't necessary to have test equipment to evaluate electronic circuits. Manufacturers now create working models using computers at every stage of design and manufacture. **Public Domain Shareware Library (PDSL)** have a special offer for readers of *PW*.

The CDROM, 'Libris Britannica', costs only £45 +VAT and contains more than 1300 megabytes of PC/AT programs. Design, and predict electronic circuits, and then to design a p.c.b. layout to suit. For more details contact PDSL Winscombe House, Beacon Road, Crowborough, Sussex TN6 1UL.



# SUMMER 1993 CATALOGUE



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### MVT 7100



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### 100 Channel Scanner

**£199.99**

Netset PRO-46. Covers 66-88, 108-136.975 (AM), 137-174, 406-512 and 806-956 MHz. LCD display with backlight, search, priority, lockout, scan-delay, memory backup circuit. Belt clip. Requires 4 "AA" batteries or Adaptor.

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**NEW**

**Pro 2006 £299  
BACK IN STOCK**

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### PRO 43

HAND-HELD SCANNER

### Frequency coverage:

- 68-88MHz (in 5kHz steps)
- 118-136.975MHz (in 25kHz steps)
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- 400.0125-512MHz (in 12.5kHz steps)
- 806-999.9875MHz (in 12.5kHz steps)

Channels of operation: Any 200 channels in any band combinations (20 channels, 10 banks) and 10 monitor channels.

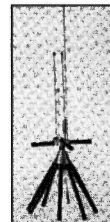
### SPECIAL OFFER PRICE

**£229.95 + £5P&P LIMITED STOCK**

### SKY SCAN

### Desk Top Antenna Model Desk 1300

Built and designed for use with scanners. Coverage: 25 to 1300MHz. Total height – 36ins – 9ins at widest point. Comes complete with 4 metres of RG58 coax cable and BNC connector fitted.. Ideal indoor – high performance antenna and can also be used as a car antenna when your car is static. REMEMBER YOUR SCANNER IS ONLY AS GOOD AS YOUR ANTENNA SYSTEM! **£49.00 + £3.00 p&p**



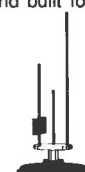
### SKY SCAN V1300 Antenna

Most discons only have horizontal elements and this is the reason that they are not ideal for use with a scanner. Most of the transmissions that you are likely to receive on your scanner are transmitted from vertically mounted antennas. The Sky Scan V1300 discone has both vertical and horizontal elements for maximum reception. The V1300 is constructed from best quality stainless steel and aluminium and comes complete with mounting pole. Designed and built for use with scanners.

**£49.95 + £3.00 p&p**

### SKY SCAN Magmount MKII

For improved performance, wide band reception, 25 to 1300MHz. Comes complete with protective rubber base, 4m RG.58 coax cable and BNC connector. Built and designed for use with scanners. **£24.95 + £3.00 p&p**



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Unit 20  
Nash Works  
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S.R.P. Radio Centre  
1686 Bristol Rd South  
Rednall  
Birmingham  
B45 9TZ  
Tel: 021 460 1581



# Cable Health Tester

*David Turtle  
GIOLZ has come up  
with a simple but  
effective cable tester  
- that tells you the  
state of the cable  
under test.*

Like many radio amateurs I've had instances where I've been unable to decide if the cause of a high v.s.w.r. was due to a badly set up antenna, or a problem with the coaxial feed. There are two problems that can occur with coaxial cables, and this unit will display the results of tests to determine whether either of these conditions exists.

The two possibilities of a poor cable are: an open circuit in either the inner or outer of the cable, or a short between inner and outer of the cable. Two simple tests are all that are needed to determine the overall state of a coaxial cable.

Although initially aimed to check coaxial cables, this handy little unit can also be adapted to checking any cable with any number of connections. All that is needed is access to both ends of the unconnected cable. This design I'm describing, provides a simple descriptive indication of the state of the cable by means of a seven segment display. The display will

should cater for a reasonable tolerance plus circuit resistance.

It is possible to modify the unit for use with other values of terminating resistance by substituting a value of twice the test resistance in place of the 100Ω (R1) resistor. There is no need for the purposes of this d.c. test to match the terminating resistor to the characteristic impedance of the coaxial cable under test. That need only be done if the cable is being tested at r.f. frequencies.

Connectors on coaxial cables are particularly difficult to inspect, as few can be easily disassembled for a visual inspection. A short circuit can be identified from one end only, but continuity or open circuit can only previously be tested either by use of an additional cable or removal of the cable for testing.

The cable under test is connected to the TEST terminals of the unit and a terminating resistance is connected at the far end. Assuming the cable and connections are in good condition, the TEST terminals are then presented with this resistance (plus a little for the cable itself). There will be a voltage of three volts (or one third of the battery voltage) at the TEST terminals.

Resistor R2 (1kΩ) and two diodes (D1 and D2) give some degree of protection against moderate user abuse. This terminal voltage (3V) will be present at terminals 5 and 6 of IC1, the quad comparator.

The terminal voltage is compared with a reference voltage from a divider chain, consisting of R3 (6.8kΩ), R4 (1kΩ) and R5 (3.3kΩ). This chain of resistors provides two reference values of 2.7V at terminal Pin 7 of IC1, and 3.5V at Pin 4 of the comparator i.e.

If the TEST terminal voltage lies between these two values (2.7 and 3.5V) the outputs (open collector) pins 1 and 2, will both go low driving the segments required to produce the letter H. If the test circuit is low or a short exists, the test voltage will drop below this window area. Pin 2 will drop turning on segment G and Pin 1 will now rise shutting off segments B and E. At the same time Pin 13 output will drop so turning on segments D and A. The letter S results. In the case of open circuit Pin 1 and 14 are low and the letter O results. The latter two comparators are wired to act as a NOR gate.

## Circuit Layout

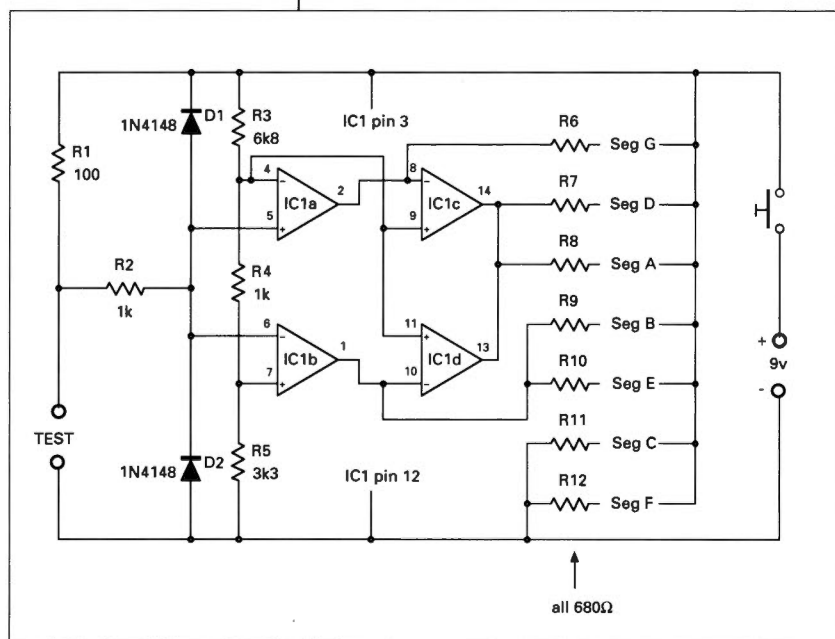
The circuit layout is non-critical and can be made on a piece of Veroboard or a small section of perfboard. Power is supplied from a small 9V battery (PP3) with a small push-to-make switch turning the unit on when a cable is under test.

The unit can perhaps best be built in a small hand-held case that holds a PP3 battery. These are listed in both Maplin and Electromail component catalogues.

I fitted my prototype unit with two SO239 connectors. One of these connectors was labelled 'TEST', and the other connector was wired with a 47Ω resistor (or a pair of 100Ω in parallel).

You could use almost any combination of coaxial connectors on the casing of the test unit. Belling Lee, DIN, BNC, TNC, Jack or Cannon connectors could easily be wired up in parallel for either the TEST terminal or the termination terminal.

If this were the case you could then test cables with different connectors on either end. Another



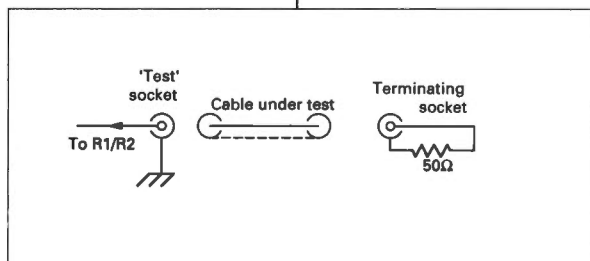
**Fig. 1: This is the circuit diagram of the cable health tester.**

show the letters O, H or S for open circuit, healthy or short circuit.

Those checking coaxial cables are specifically catered for as most will have access to a 50Ω dummy load. If this is fitted to the far end of the feeder and the near end is connected to the test terminal, the unit will instantly display the state of the circuit.

The particular virtue of this unit is that you do not need to have both ends of the cable within reach of the test position.

**Fig. 2: This is the 'standard' layout.**



## Bridge And Windows

The operation of the unit is based on a bridge and window comparator. This, with the marked components, allows a tolerance of around ±20% in the value a 50Ω test resistor. These values



advantage of putting connectors on the test unit case is, that you will now be able to do the tug-and-twist test on the connections. This check is used to see that the cable is not subject to movement faults. This test is almost impossible to carry out when using measuring the cables using probes on a multimeter.

The ultimate setting up is now over to you. Add your adaptation-specific needs to this basic unit.

Any cable connector with an even number of cores can be easily tested. In this case the test load resistor would be better suited to being made up of smaller value resistors. A four cored cable could be tested using two 18Ω resistor at the 'far' end the 'near' ends being joined by a 15Ω ( $18+18+15 = 51$ )

If you try this method out, don't forget to include any shielding wire in the overall conductor count.

PW

**How Difficult?**  
**How Much?**

**Intermediate**  
**£5**

### Shopping List

#### Resistors

Carbon film 0.4W 5%

100Ω	1	R1
680Ω	7	R6 - 12
1kΩ	2	R2, 4
3.3kΩ	1	R5
6.8kΩ	1	R3

#### Semiconductors

##### Diodes

1N4148	2	D1, 2
--------	---	-------

##### Integrated circuits

LM339	1	IC1
-------	---	-----

#### Miscellaneous

A common-anode seven segment display, a suitable box to house the unit, a push-to-make switch, plugs and sockets to suit the intended use, number and type as needed.

#### Useful Addresses

Maplin Electronics Have a useful catalogue available in larger high street newsagents, or from Maplin themselves at:

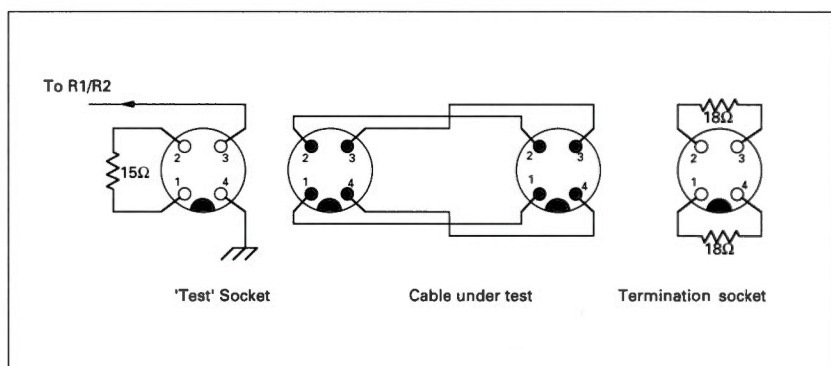
Box 3,  
Rayleigh,  
Essex SS6 8LR.  
Tel: (0702) 554161

Another supplier with a catalogue available through high street newsagents is Cirkit. Or they may be contacted at:

Cirkit Distribution Ltd.  
Park Lane,  
Broxbourne,  
Herts EN10 7QN.  
Tel: (0992) 444111

Electromail have a three part catalogue available. They may be contacted at:

Electromail  
PO Box 33,  
Corby,  
Northants NN17 9EL.  
Tel: (0536) 204555



**Fig. 3: This is just an idea for testing multi-way cables (with even numbers of cores), such as this four-way cable example.**

## Radio Diary

\*Practical Wireless and Short Wave Magazine in attendance.

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

**August 29:** Castle Hall Computer, Electronics & Radio Rally will be held at Castle Hall Exhibition Centre, Stalybridge, Cheshire. Doors open at 11am to 4pm (10.30 for disabled visitors). Over 200 stalls, Bring & Buy, refreshments available. Talk-in on S22. **Enquiries to 061-681 0569.**

**August 29:** 2nd Gloucester Radio Rally & Car Boot Sale is being held at Naas Lane, Quedgley, Gloucester. Sign-posted from Junctions 11 & 12 on M5. Talk-in on S22 & Bring & Buy stall run by Stroud Radio Club. **Mike on (0452) 503786.**

**August 30:** Coleraine & District ARG Radio Rally & Bring & Buy will be held in The Golf Links Hotel, Portrush, Northern Ireland. From 12 noon to 5.50pm. Traders welcome free of charge, food & refreshments available. Admission £1. Talk-in S22. **Raymond G14MFM on (0266) 558230.**

**August 30:** Huntingdonshire Amateur Radio Society will be holding their Annual Bank Holiday Monday Rally at St Germain Street, Huntingdon (easy to find, drive around the ring road until you find us!). Doors open at 10am, admission £1, free car parking. Talk-in on S22. **David Leech G7DIU on (0480) 431333.**

**September 5:** Milton Keynes & DARS will be holding their 7th Annual Radio Boot Sale at Cranfield Airfield, Cranfield, Beds. **Ray G1LRU on (0908) 660798.**

**September 5:** Vange Amateur Radio Society Annual Rally will be held at the Laindon Community Centre, Laindon High Road/Aston Road, Laindon, Basildon, Essex. Doors open from 10.30am. Admission 75p. Trade stands, Bring & Buy, raffle, refreshments, car parking. Talk-in on S22. Sign-posted approach roads. **Mike Musgrave G4NVT on (0268) 543025.**

**\*September 11:** The Scottish Amateur Radio Convention will be held in Cardonald College, 690 Mossspark Drive, Glasgow G52. Full trade show, lecture theatres, Bring & Buy, Morse tests, bar & restaurant. Free parking. Talk-in on S22. **Tom Hughes GM3EDZ on 041-882 5753.**

**\*September 12:** Lincoln SWC Hamfest will be held at Lincolnshire Showground & Exhibition Centre, four miles north of Lincoln on A15 Lincoln/Scunthorpe Road. Doors open 10.30am. Usual trade stands, Bring & Buy, refreshments, licensed bar. Lots of attractions for whole family. Admission £1 by lucky programme, free parking, caravans welcome by arrangement. Talk-in on S22. **Denis G1XZG on (0522) 684214.**

**\*September 12:** The BARTG Rally will be held at Sandown Exhibition Centre, Esher, Surrey. Bring & Buy, refreshments, many exhibitor & special interest groups. Doors open 10.30am to 5pm. Admission, adults £1.50 & OAPs £1, under 14s free if accompanied by an adult. Well sign-posted. **Peter Nicol on 021-453 2676.**

**September 18:** The Annual Isle of Wight Wireless Rally will be held at the National CEM Wireless Museum, Arreton Manor, Nr. Newport, Isle of Wight. Doors open at 11am. Bring & Buy, refreshments, covered accommodation if wet. Free admission for all, including traders, free parking. Talk-in on S20 by G3IOW. **Douglas G3KPO on (0983) 567665.**

**September 19:** The Peterborough Radio & Electronics Society will be holding the East of England Rally at The East of England Show Ground, Oundle Road, Peterborough. Doors open at 10.30am, admission £1. Traders, Bring & Buy, Car Boot, flea market. Free parking, full catering & bar facilities. **Mike G0CVZ on (0733) 222588.**

**September 26:** The Harlow & District Amateur Radio Society will be holding its 35th Annual Amateur Radio Rally & Computer Show at Harlow Town Sports Centre, off Fifth Avenue Harlow (easy access off M11 Junction 7, A414 follow the signposted route). Doors open at 10.30am. Admission £1, OAPs & children 50p. Varied selection of traders, Bring & Buy, free parking at & near to the site. Disabled parking & lifts available. **Mike G7BNF on (0850 487863 or Ken G0HRR on (0279) 426647.**

**October 10:** The Computercations 1993 Amateur Radio & Computer Rally will be held at Hillhead Campsite, Kingswear Road, Brixham, Devon. Trade stands for computer & radio, Bring & Buy, raffle, refreshments. Unlimited free parking with overnight camping available. Talk-in on S22. **Bill Trezise G6ZRM on (0803) 522216.**



# Basic QSOs In Spanish - Part 2

English

Spanish

Gareth Roberts GW4JXN and Ildefonso Sevilla EA7BWX continue the 'Basic QSOs in Spanish' series with Part 2.

Pronunciation

## Net Working

<p>I think it is (XYZs) turn. I've forgotten whose turn it is. Over to .... with the group. Break. Over.</p>	<p>Creo que la vez es para (XYZ). He olvidado para quien la vez Vez para .... con el grupo. Break. Cambiar.</p>	<p>Crayo jay la veth es para (XYZ). Ay olivindado para cwee-en la veth. Veth para .... con el grupo. Break. Cambiar.</p>
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## Rig and Antenna

<p>The rig here is .... I'm using a .... transceiver. I have here a .... receiver and .... transmitter/with a linear amplifier. I am putting out 10, 20, 50, 100, 150 watts.  The rig is home brew with modifications. My antenna is a dipole/is a trap dipole. A beam with three elements. With horizontal/vertical/circular polarisation. With a gain of .... A quad/a long wire/an end fed Zeppelin.  A centre fed Zeppelin. The antenna is about .... metres above ground level. The QTH is .... metres above sea level/at sea level/below sea level. The antenna has a rotator. I'll turn the antenna on you during the next over.  I rotate the antenna by hand. The antenna is in the garden/attic on a .... metre high mast.</p>	<p>Mi equipo es .... Estoy usando un .... transceptor. Tengo aqui un .... receptor y .... transmisor/con amplificador lineal. Estoy poniendo en antena diez, veinte, cincuenta, cien, ciento cincuenta vatios. Equipo casero con modificaciones. Antena dipolo/dipolo con trampa. Antena de haz con tres elementos. Con polarización horizontal/vertical/circular. Con una ganancia de .... Una cuadracubica/hilo largo/una Zepp alimentada en extremo. Una Zepp alimentada en centro. La antena tiene .... metros de la tierra. Mi QTH está a .... metros sobre nivel del mar/al mismo nivel del mar/bajo nivel de mar. La antena es giratoria. Voy a girar la antena hacia su dirección durante el próximo cambio. Giro la antena a mano. La antena esta en el jardín/atico/en un mástil de .... metros.  Estoy probando el equipo. Estoy contento de su reportaje. Me gusta mi .... Quiero cambiar mi .... Le gusta su ....</p>	<p>Mee equeepo es .... Estoy wsando oon .... trantheptor. Tengo aki oon .... retheptor ee .... transmissior/con ampliefeeacahdor lineal. Estoy ponvendo en antena dee-eth, vayintay, seenkoentah, see-ehhseenkoentah vatios. Ayqueepo kasayro con modifikathiones. Antena deepolo/deepolo con trampa. Antena day ath con trehs elementos. Con polarithathion orizontal/vertical/sircoolal. Con oona gananthia day .... Oona kwadracobika/eelo largo/oono Zepp alimentahda en extremo. Oona Zep alimentahda en thentro. La antena tee-enay .... metros day la tee-erra. Me ccotay-ah esta a .... metros souvre neeval del mar/al mesmo neeval del mar/bacho neevel del mar. La antena es hiratoreea. Voy a hira la antena athia soo direkthion doorante el proximo cambio. Hiro la antena a mano. La antena esta en el chardin/atiko/en oon mastil de .... metros. Estoy provando el aykweepo. Estoy contento day soo reportache. May gwsta me .... Key-ero kambiar me .... Le goosta soo ....</p>
--	--	---

## Weather and Radio Conditions

<p>The temperature is .... Today the weather is fine/sunny/(very) cold/hot/misty/windy. It is raining.</p>	<p>La temperatura es .... Hoy el tiempo es bueno/soleado/(muy)/frio/caluroso/niebla/viento. Está lloviendo.</p>	<p>La temperatura es .... Oy el tee-empo es booenno/solayahdo/(moosee)/freeso kaluroso/nee-evil/vee-ento. Esta liovee-endo.</p>
--	---	---



<p>It is snowing. The snow is 30cm thick. The weather has been fine. Today/yesterday/during the weekend it has been raining. It has been snowing. Winter/spring/summer/autumn has come. The wind has been strong. There has been thunder and lightning. Working conditions are poor/bad/moderate/good/very good/excellent. All the bands are open. The 10, 15, 20, 40, 80 metre band is closed/open to North/Central/South America. Eastern/Northern/Southern/Western Europe, Asia, Africa, the far East, Japan.</p> <p>I have just heard a .... I can hear but cannot work a .... There is an opening on 2 metres. This lift is getting better/getting worse. Let's hope it lasts.</p> <p>Nice to speak to you under lift conditions. It is .... o'clock approximately here local time/GMT. What time is it in ....?</p>	<p>Está nevando. Hay treinta centímetros de nieve. El tiempo ha sido bueno. Hoy/ayer/durante el fin de semana es lluviosa. Ha nevado. Invierno/Primavera/Verano/Otoño ha llegado. El viento ha sido fuerte. Hubo truenos y relámpago. Mis condiciones de trabajo son malas/moderadas/buenas/muy buenas/excelentes. Todas las bandas están abiertas. La 10, 15, 20, 40, 80 metros esta cerrada/abierta para el Norte/Centro/Sur America. Para Europa del Este/Norte/Sur/Oeste, Asia, Australasia, Africa, Extremo Oriente, Japon.</p> <p>Acabo de escuchar a .... Puedo escuchar pero no puedo trabajar un .... Hay apertura en dos metros. Esta exaltación esta mejorando/empeorando. Esperemos que dure. Que bien poder hablar en condiciones elevadas. Son alrededor los .... hora local/GMT ¿Que hora es en ....?</p>	<p>Esta nevando. Ay trehinta thentimetros day nee-eve. El tee-empo a seehdi boeno. Oy/ayer/doorante el fin day semana es lliuviosa. A nevahado. Invee-erno/preemavera/verano/otonio a liegahdo. El vee-ento a seehdo foerte. Oobo truweenos ee relampado. Mees conditiones day trabacho son malas/mohderahdas/booenas/moeee booenas/ekthelente. Tohdas las bandas estan aviertas. La 10, 15, 20, 40, 80 metros esta therrahda/avee-erta para el nortay/thentro/sur america. Para oyropa del estay/nortay/sur/oyestay, asia awstralasia, afrika, estremo orientay, chapon. Akavo day eskootshar a .... Pooyhdo eskootschar pero no pooyhdo trabachar oon .... Ay apertura en dos metros. Esta eksaltathion esta mechorando/empeorando. Esperemas kau dooray. Kay bien pohder avlar en kondithiones aylevahdas. Son alrethethor los .... ora local/GMT. Kay ora es en ....?</p>
<h3>Arranging a Sked</h3>		
<p>May I speak to you again? Are you free tomorrow/this time next week at .... hours? GMT? How about this frequency or alternatively let's try the 10, 15, 20, 40, 80 metre band? No I'm sorry, I am not free at that time. I am usually on 20 metres at .... GMT on (days of week) except .... I have to go to bed/work now.</p> <p>I have a new rig/linear/antenna which I am testing. Is my modulation OK? Your modulation is good/bad/</p> <p>What is my exact frequency. I'm using a speech compressor. Does this make any difference? Thank you for the test.</p>	<p>¿Puedo hablarle de nuevo? ¿Esta libre mañana/a la misma hora la proxima semana a las .... horas GMT? ¿Esta bien esta frecuencia o podemos probar la banda de 10, 15, 20, 40, 80 metros? No lo siento, no estoy libre a esa hora. Estoy en 20 metros sobre las .... GMT los (days of the week) excepto .... Tengo que irme a la cama/a trabajar ahora.</p> <p><b>Technical</b></p> <p>Tengo nuevo equipo/linear/antena que pruebo. Esta mi modulación bien? Su modulación es buena/mala.</p> <p>¿Cual es mi frecuencia exacta? Uso el procesador ahora. ¿Se nota la diferencia? Muchas gracias por las pruebas.</p>	<p>Pooyhdo ablarlay day nooyvo? Esta liebre nanianan/a la mizma ora la proxima semana a las .... oras GMT? Esta bee-en esat frekooenthis o pohdaymos provar la banda day 10, 15, 20, 40 80 metros? No lo see-ento, no estoy libre a esa ora. Estoy en vehinte metros sobre las .... GMT los (days of week) exepto .... Tengo kay eerme a la kama/a travachar aora.</p> <p>Tengo nuayvo ekuueepo/linear/antena kay prooevo. Estamee moodoolathion bee-en? Soo moodoolathion es booenas/mala. Kwal es mee fraykooenthia escata? Oosa el prothesahdor aora. Say nota la diferenthia? Muchas grathias por las prooyvas.</p>
<h2>Next time we will complete the phrases and their pronunciation and have a glossary of useful technical terms.</h2>		



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OPC288 DC lead .....

LC71/72/73 W2/SRE Carry Cases .....

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(TH28 70cm)

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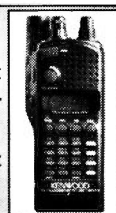
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# ALL THROUGH THE NIGHT

One of the hazards of using a bedside receiver in the case of a shared room or bed, usually means that you can't do anything but use the type of earphone that actually fits in the ear canal if you do not wish to disturb anyone. I have yet to find a satisfactory earpiece and conclude that most manufacturers have given up trying to make one. The new type that fits in the outer ear (about the size of a 2p) gives quite good quality but is easily dislodged.

The so called 'pillow' speaker which is quite a thin unit to be placed under the pillow is not satisfactory on two accounts. Firstly, it is uncomfortable unless you turn up the gain and place it almost out of pillow 'cover' and secondly when you turn over it becomes inaudible.

So you are forced to use the midget earpieces, which are quite cheap but require a modification. This is because in their leads are much too fragile to withstand the flexing of more than a few restless nights. Therefore you have to fit them with heavier flex and then you can get up to six months service.

## Chosen Carefully

Receivers for bedtime listening need to be chosen carefully. The modern keyboard operated (and usually very expensive) models are not really very good because it is very awkward to manipulate push buttons when lying on your side. The illuminated frequency read-out is also too bright for either your own sleep or anybody else's.

The best type to go for are those with the 'old fashioned' tuning knob such as the Trio R1000 and the Yaesu FRG-7 etc. Personally, I still prefer the old valve receivers in spite of their drifting propensities but I have to admit that a battered R1155 in the boudoir begets bags of ear bashing. (The hum from the mains supply in older receivers is also excessive).

The thing to do is to acquire something that is completely user-friendly, as when you are lying on your side enveloped in bed clothes you do not have more than a

very short range of digital and hand movement. There's nothing worse than having to get both arms out from under the blankets on a cold night to change bands!

Antennas are a relatively simple problem to solve if you have one of the receivers mentioned above, as they will operate very well indeed on a humble end-fed piece of wire. This can be unobtrusively led to the nearest window when the world is your oyster. There should be absolutely no need for a.t.u.s or baluns as you shouldn't have to be bothered with such labour in this environment.

## Positioning Important

The positioning of the receiver is important, as you must be able to re-tune without having to strain your sleepy muscles. I use an old dinner trolley as I find the upper shelf is just the right height.

The bottom shelf is also very handy for cups of tea and copies of *Practical Wireless*. It is just no good putting up with the receiver on the floor or above the bed's headboard. Although in the past I have found such places and have even had the receiver half under my pillow, but in that case it was a tiny single band commercial rig, popular as a mobile receiver.

## Best Time

When I said bedtime was the best time for listening, I really meant that it is a good time for propagation on many bands and in no way is it my intention to promote insomnia. Many keen listeners like myself are used to nights which are best described as fitful and there is nothing more boring than lying awake and thinking about your mortgage or whatever.

However, if you can switch on an easily tuned receiver it can actually promote sleep paradoxically speaking. In my own case I often find that concentrating on a c.w. QSO or broadcast gets me back to the Land Of Nod in no time!

PW

*John Worthington GW3COI, PW's cartoonist gives you some hints on bedtime listening. John says there can be little doubt that in any period of 24 hours, the best time for listening is arguably when most folk sleep and he explains how to achieve the best results here.*



*...Awkward to manipulate...*



# Antenna Workshop

*In this session Peter Dodd G3LDO looks at antenna and transmission line impedance.*

An antenna element is a tuned circuit. At resonance the capacitive and inductive reactances are equal and opposite, making the feed point impedance purely resistive. At frequencies above and below resonance the feed point has inductive or capacitive reactance elements.

Impedance has two parts; a resistive part (R), and a reactive part (X), usually shown R + (or -) jX. By convention, inductive reactance is positive and capacitive reactance is negative. The j character indicates the values must be treated separately because as they represent phase difference. The phase relationship of current and voltage in an antenna element (or tuned circuit) can be any value between 0 and  $\pm 90^\circ$ .

The method of showing impedance, expressed in two parts, might present a problem. But consider the map of the world shown in Fig. 1. A position on a map, such as  $60^\circ$  North,  $25^\circ$  West can be understood by everyone. Impedance can also be represented using a chart

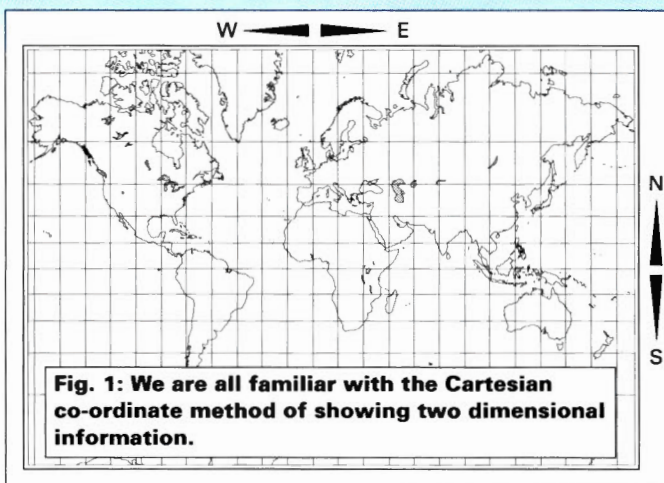
with similar Cartesian co-ordinates.

Look now at Fig. 2 that shows an impedance chart using Cartesian co-ordinates, with straight lines of equal resistance and reactance. The dotted circles represent s.w.r.s of 1.5:1 and 2:1 for 50 $\Omega$  coaxial cable. An impedance of  $80R + 40jX$  is plotted at point X.

If we use this as an analogy for an impedance chart, Latitude (vertical) represents resistance (R) and longitude (horizontal) reactance (Z). We can now give an impedance 'location'. Resonance (inductive and capacitive reactances equal and opposite) exists only on the 0 reactance (vertical centre) line.

## Distance And Angle

A geographic location may also be expressed giving the distance and angle from a reference point. The polar map, Fig. 3, illustrates the method. This projection shows the North Pole in the centre, with the South Pole all around the outside. A map analogy for this method, is a



**Fig. 1: We are all familiar with the Cartesian co-ordinate method of showing two dimensional information.**

great circle projection map for your location.

Before proceeding any further, perhaps it might be useful to say why we bother with measuring impedance at all. After all, measurements taken when matching an antenna to a transmission line are almost exclusively by measuring the voltage standing wave ratio (v.s.w.r.).

Almost every shack I've visited has an (v.)s.w.r. meter amongst the equipment. It's well known that the s.w.r. will be 1:1 if a transmitter is connected to an antenna whose impedance is 50 $\Omega$  when using 50 $\Omega$  transmission line. Most operators also know that if the antenna impedance is 100 $\Omega$  or 25 $\Omega$  then the s.w.r. will be 2:1.

But is the s.w.r. value the whole story? As mentioned earlier, impedance is a combination of two parts, resistance and reactance.

If we were to plot, on our impedance chart, all the impedance points that could result in an s.w.r. of 2:1, the result would be a circle as shown in Fig. 2.

Note that the 1.5:1 s.w.r. circle is a smaller diameter than the 2:1 circle. The lower the s.w.r. the smaller the diameter of the s.w.r. circle. An s.w.r. of 1:1 would be a single point at  $50R + 0jX$ .

Because the circle only gives a contour (I'm using the map analogy

again) of constant s.w.r. the antenna impedance cannot be determined. However, this doesn't prevent the s.w.r. being used to adjust an antenna.

## Optimum Matching

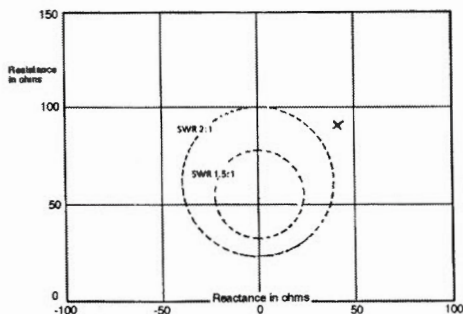
We use an s.w.r. meter to adjust the length of a simple antenna (a dipole or a single band vertical) for optimum matching. This method is usually done by altering the antenna length, or the frequency we are taking the s.w.r. measurement at, and noting if the s.w.r. value increases or decreases.

Sometimes it is not possible to get a low value s.w.r. In this case the s.w.r. meter cannot tell you why this should be.

An example is shown in Fig. 4. This shows the s.w.r. curve of a short 3.5MHz mobile antenna. The lowest s.w.r. is just less than 2:1, and no amount of adjustment of the antenna length will bring the s.w.r. down below this point.

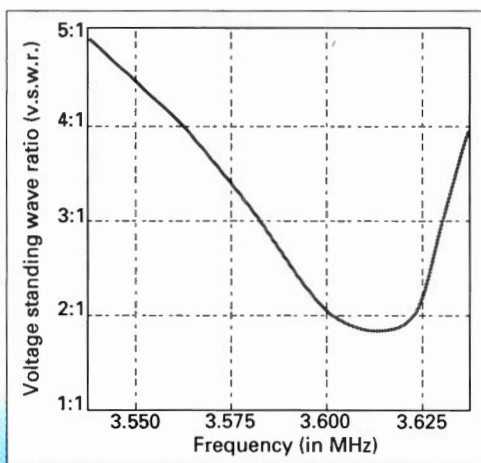
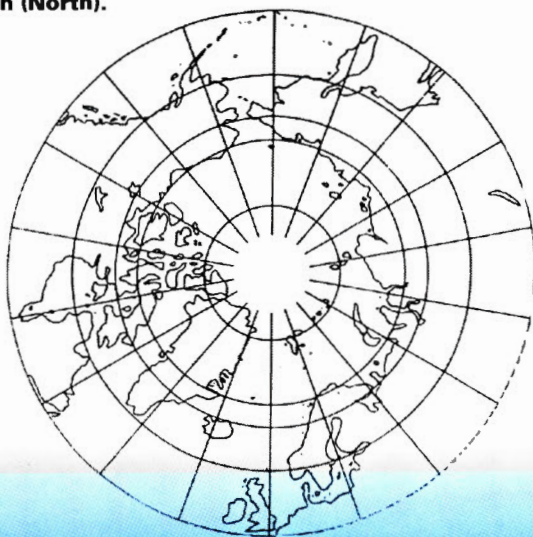
However, if we plot the impedance of the antenna at a number of spot frequencies, Fig. 5, then the reason we are unable to obtain a low s.w.r. becomes apparent. The resistance at resonance is far too low. Some form of matching arrangement is required. The ability to measure impedance allows us to decide what sort of matching section is required.

The chart can be redrawn with the



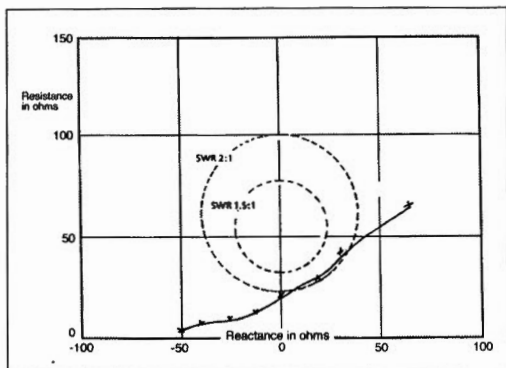
**Fig. 2: An impedance chart using the Cartesian co-ordinate method.**

**Fig. 3: Circles of constant distance (resistance) radiate from a single point. Direction offset (reactance) is measured by angular measurement from a reference direction (North).**

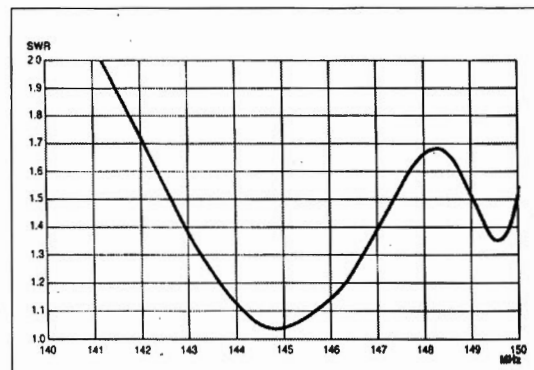


**Fig. 4: The v.s.w.r. curve for a typical 3.5MHz whip antenna.**



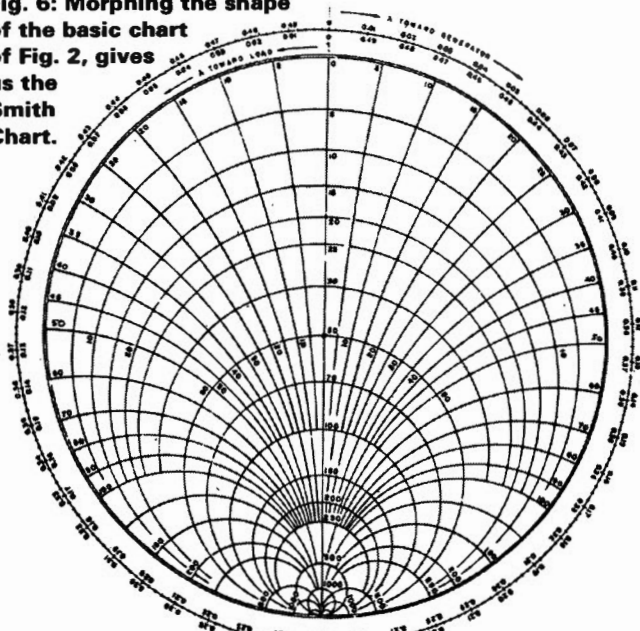


**Fig. 5: Measured impedance characteristics for a typical 3.5MHz whip antenna**

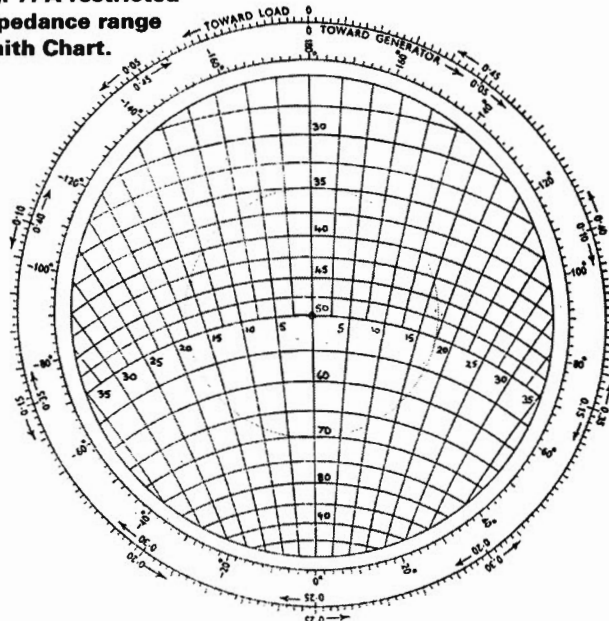


**Fig. 8: The manufacturer's s.w.r. curve for a Tonna F9FT 14-ele 144MHz Yagi antenna.**

**Fig. 6: Morphing the shape of the basic chart of Fig. 2, gives us the Smith Chart.**



**Fig. 7: A restricted impedance range Smith Chart.**



lines of constant resistance (horizontal) and impedance (vertical) lines bent into circles rather than straight lines. If the distance, between the lines of constant resistance and

reactance, are also made logarithmic instead of linear the whole universe of impedances can be contained within the chart.

This new chart is the familiar

Smith Chart. It appears in every antenna book of note.

In addition to being an alternative graphic method of displaying impedance the Smith Chart has various other applications. These include determining the input impedance of a transmission line (provided the length and terminating impedance is known) the design of matching networks and converting impedance to admittance (the inverse of impedance).

In spite of the apparent usefulness of the ingenious Smith Chart I have never met anyone who has used it to solve an amateur radio antenna problem. Why should this be? I can think of two possible reasons.

I think the first of these reasons is, because the Smith Chart has a rather intimidating appearance.

The second reason is more practical.

Before the Smith Chart can be used to do some conversion or transformation it is necessary to arrive at a starting point. This transformation can only be achieved with impedance measurements.

There are very few designs for simple (but accurate) impedance measuring equipment to be found in amateur radio literature. I hope to remedy this failing in a later 'Antenna Workshop'.

But to return to the Smith Chart.

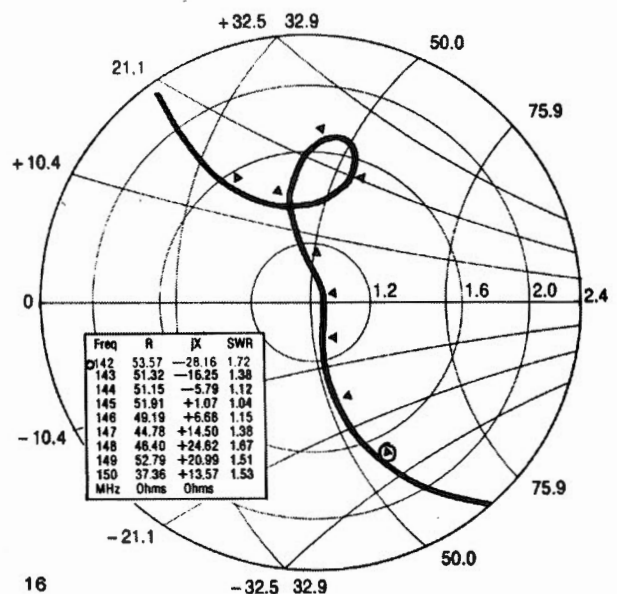
The chart can be simplified considerably by making it so that it doesn't cover all impedances from zero to infinity.

Most amateurs measure impedances indirectly with an s.w.r. meter, as described above. They can cover a range from 10 to 400Ω or so. A Smith chart with a restricted impedance range is shown in Fig. 7. It isn't very much different from the chart of Fig. 2. Note that the resistance scale is inverted, with diminishing resistance towards the top. One distinct advantage of Smith Chart is that the circles of s.w.r. are concentric, unlike the chart shown in Fig. 2.

### Antenna Brochure

The Tonna antenna brochure is the only one that I know of, that includes an impedance plot with all the other antenna data. The plot of Fig. 8 shows the s.w.r. curve for a 14-ele 144MHz Yagi antenna. There is a double dip in the s.w.r. curve. The impedance plot of Fig. 9 shows the reason for the double dip in the curve. The table shows the frequencies where the impedance measurements were taken.

That's all I have space for this month, but I will be returning to this subject in future sessions of 'Antenna Workshop'. PW



**Fig. 9: The Smith Chart impedance plot for a Tonna 14-ele 144MHz Yagi antenna. Note this is shown rotated to the left compared to Fig. 7.**



The Computer  
in Your Shack

Peter Hunter opens his postbag once again and discusses some interesting programs.

This month I've got some news of some interesting programs. But first the post. **Roger Rowthorn G7CSE** wrote in with information for BBC computer users.

Roger has found a postal computer club that produces a bi-monthly disk-based magazine. For more information write (enclosing an s.a.e.) to the following address: **Ron Marshall - Solinet, 41 Westbrook Drive, Rainworth, Mansfield, Nottinghamshire NG21 0FB.**

Incidentally, Roger would like to hear from other readers using any model BBC with radio. His QTH is: **19 Woodlee Gardens, West End, Southampton SO3 3GA.** Or, via packet, **G7CSE @ GB7XJZ.**

### World Wide Club

**Simon Adlem 2E1AGM** has started a world-wide packet radio 'club' for the Novice Licensees. Simon uses a Commodore C64, J & P Electronics TNC and Digicom 64 version 4.0.

Using the Commodore set-up, Simon sends out a monthly newsletter, via packet. Look out for a bulletin addressed to "NOVICE @ WW".

If this is of interest to you, then contact Simon, either by packet, **2E1AGM @ GB7VRB.#38.GBR.EU.** Alternatively you send him a FAX on (0903) 502094.

### Database

**Tim Anderson G0GTF** sent me a couple of disks. On the disks is **AMISCAN**, a very powerful, and comprehensive database program for all wide band receiver users.

To use the system, you just select the band you want to look at for a detailed list of who is using what frequency. The second disk has two programs. These are **TXWATCH** and **IDWATCH**.

The **TXWATCH** program is a very detailed database of worldwide Band I TV transmitter frequency offsets. This facility is

invaluable for identifying F2 and Sporadic E signals. **IDWATCH** is a useful database of station IDs etc. There's also a great deal of specialised and comprehensive amateur radio data, including beacons and repeaters.

Both disks are available for the IBM PC and AMIGA (A500, A600, A1200 etc.).

### Something Different

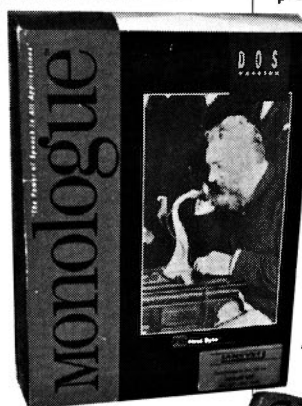
And now for something completely different! It's called **Monologue**, **Fig. 1**, and it's a product of the USA based company **First Byte**.

**Monologue** is a program that gives all your text based applications (word processor, spreadsheet,

electronic mail, etc.) the power of speech. **Monologue** is a memory resident program, activated by a simple key press.

To use it, you just highlight the text you want to 'Hear' then sit back and listen. It's ideal for having an 'on-disk manual' read out whilst you're working. Or proof reading your letter to 'Receiving You'!

**Monologue** can be run from floppy or hard



**Fig. 1: The Monologue package, reviewed by Peter Hunter G0GSZ this month.**

**Amiscan** costs £7.50 and **TXWATCH/IDWATCH** costs £8. These prices include VAT and P&P. Contact **Tim** at: **2 Burry Rd, St. Leonards, East Sussex TN37 6QX.**

### Coil Program

A long-time friend and supporter of **PW**, **Martin Michaelis DK1MM**, has sent me a air-coil program that may be of interest to the experimenter. It's a short program, written in **GWBASIC**, that **Martin** wrote for his own use.

The program, called **AIR-COIL.BAS** helps you calculate all the appropriate measurements, (capacitance, inductance, diameters, etc.), accurately, and speedily. **Martin** has very kindly made this program available free to **PW** readers. If you want a copy send me a formatted disk and return postage.

disk. A simple to use installation program is included on the supplied disk.

Once installed on disk, you load the program into your computer's memory by typing 'mono' and pressing the <Enter> key. From then on you activate **Monologue** by holding down the <Alt> key and pressing T (though this is user configurable, it can be changed to suit you).

There's another file on the disk, titled 'Sayfile'. Once **Monologue** is loaded in the RAM you can have a file, or group of files, read straight from the hard (or floppy) disk, by just typing 'Sayfile' followed by the filename.

I'll quote an example. I use Lan-link on packet radio, and when I receive messages Lan-link saves them in a file that has today's date as its name, and .RUN

as the extension.

To listen to my messages, while I get on with other things, I can just type the command **sayfile \*.run** and my messages are **spoken** to me. This is just one use for this program, and I'm sure you can think of others.

**Monologue** will run on any IBM PC, XT, AT, PS/2 or compatible, with at least 384Kb memory (though 640Kb is recommended). It also needs MS-DOS or PC-DOS version 3.0 or higher.

The handbook states that **Monologue** will work from the PC's built-in speaker, although I couldn't get it to work on mine. However, I've been using it successfully with a Covox 'Speech Thing' (an amplified speaker). While this is acceptable, a full blown sound card would give best results.

I've been using the DOS version of **Monologue**. A Windows version is also available, but I haven't any details about it.

At the time of writing this, the asking price for **Monologue** for DOS is £89 which includes postage, but not VAT. For further, up-to-date information, please contact the UK Distributors: **IANSYST Ltd. United House, North Road, London N7 9DP. Tel: 071-607 5844.** My thanks to **Iansyst Ltd** for the loan of the review copy.

And that's it for this month. I look forward to hearing from you, so please keep in touch. 73 de Peter, **G0GSZ @ GB7LDI.#35.GBR.EU: 2 Mayes Close, Bowthorpe, Norwich NR5 9AR. Tel/FAX: (0603) 748338.**

E N D



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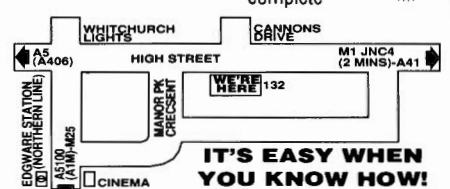
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Ron Ham welcomes you once again into the PW vintage 'wireless shop'. This month he talks about reconstructing and renovating bread-board receivers, and your memories.

I'd like start our chat this time by talking about the reconstruction and renovation of the 'bread-board' receivers. A good example is the Scott Taggart 300, shown in Fig. 1, including the cabinet and loudspeaker that has been rebuilt by John Tye (Dereham) and it's shown being tried out by his wife Joan.

Although John runs the set from a 'modern' power supply, he made up a dummy high-tension battery and an accumulator to look like the real thing. John says that, of the seven controls on the front panel, five are employed for tuning and two for wave-change and on/off.

## Collecting Old Receivers

A good number of vintage wireless buffs specialise in collecting old home-made receivers. And there are many newcomers who would like to add one to their collections, but are unsure of where to start.

To begin with, early wireless books are a valuable source of information. This is because, in addition to the contemporary text, a lot can be learned from illustrations such as that showing the use of an intervalve transformer, Fig. 2.

A basic intervalve transformer



Fig. 1: Joan Tye, trying out the Scott-Taggart 300 rebuilt by her husband John.

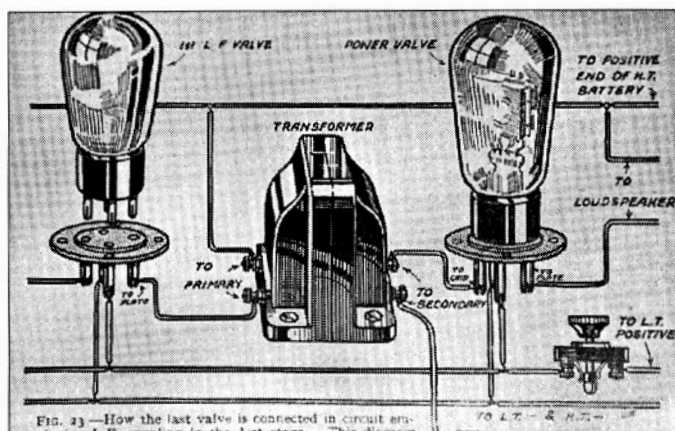


Fig. 2: A lot can be learned from illustrations such as this drawing demonstrating the use of an intervalve transformer.

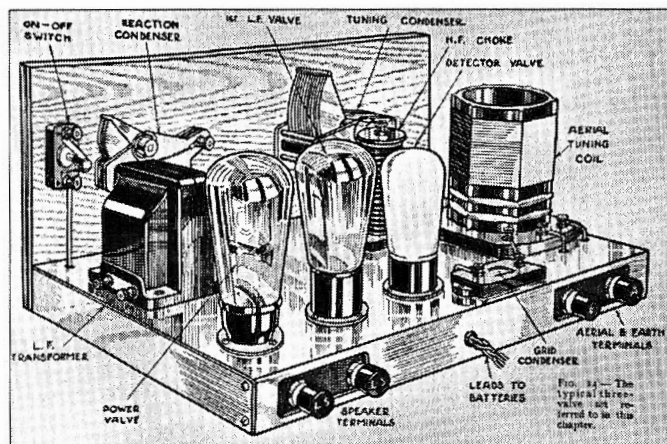


Fig. 3: A vintage receiver design, used as an example (see text).

has two windings, primary (input) and secondary (output). The energy developed in the first winding is induced into the second without a direct electrical connection. This is known as inductive coupling.

The high-tension voltage for the anode (signal output) of the first valve is fed through the primary winding of the transformer. The control grid (signal input) to the second valve is connected via the secondary winding. This circuit also shows the valve filaments wired in parallel and the (push-pull) on/off switch in the positive feed.

## Front Panel

A push-pull on/off switch is shown on the left of the front panel in Fig. 3, in front of the intervalve transformer. The valve holders themselves are recessed into the chassis so that most of the wiring is underneath.

It was common practice to drill a small hole close to the terminal on a component above the chassis. This was to let the connecting wire through. No doubt the centre and right hand terminals on the aerial coil (right) go to the corresponding terminals on the far right of the chassis.

The left terminal on the coil is directly connected to one leg of the grid 'condenser' while the other goes through the chassis to the (input) grid-pin of the detector valve. In many cases the aerial coil would have a metal cover to prevent signals being collected there instead of via the aerial input.

Don't forget, however simple or complicated a piece of wireless apparatus may be, the design of the chassis, with the cabinet in mind and the layout and position of components is very important for the efficient working of the set.

## One Valve Receiver

The short-wave enthusiasts among you who are keen to build a vintage-type one valve receiver should look for a copy of *Newnes Short-Wave Manual*, shown in Fig. 4. It was edited by that very practical man, F. J. Camm, who was of course the founding Editor of *PW*.

Another good one by Camm is *Everyman's Wireless Book*. These sometimes appear in second-hand books shop or possibly your public library. Don't be afraid to ask the librarian in the reference section if they have any early wireless books in their stores, because they cannot display all that they have.

The copies of the books I've got on my shelf were published in 1941 and 1945 respectively. And, believe me, their pages are packed with information for the bread-board constructor.

There is some form of circuit, with practical and theoretical explanations on most pages. Because of this I think the books will be a great help to all who plan to collect such sets.

Looking back (and from memory) the receiver description 'O-V-O', means one valve only. The term 'O-V-I' means there's an audio amplifier after the valve and 'I-V-I'



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A black and white photograph showing four vacuum tube sockets arranged horizontally. Each socket has a glass envelope and a metal base with pins. The internal components, including the filament and various electrodes, are visible through the glass. The sockets vary slightly in design, with some having more complex internal structures than others.



*Paul Essery GW3KFE takes his regular look at what's happening on the h.f. bands, and starts off with some advice.*

# Report

# S B A N D S H F

I'm often asked by newcomers about equipment and antennas. The factors that matter are simple: operating skill and the antenna.

It really doesn't matter whether you have the latest super-brew transceiver or an old station having separate transmitter and receivers so long as they work to specification. A skilled QRP operator with a monoband beam and a key, will work far more than 100W of s.s.b. into a low-mounted G5RV over a wet window-box, even if the rig is a 'Sooper-Dooper Special'.

**Antennas are important.** They should be erected as high as possible. Going from say ten, up to 15 metres in height will make an enormous difference.

Time spent 'tweaking up' for the best s.w.r. in the middle of the band isn't wasted. If you are stuck with a Marconi type of antenna, needing an earth or counterpoise, then work on that too. A metre of copper pipe driven into the ground looks good but doesn't work too well!

The key to it all, though, is operating know-how. When you can't hear the good operator, he's listening. So you should do the same.

Compare the skilled operator's methods with the

ways of the clots. Learn what and what **NOT** to do to achieve success. Only then do you think to switch the rig on.

Now, if your antenna isn't very competitive, plug in your key. The 'twits' who write to complain in the letters columns about c.w. being 'obsolete' refuse to accept a cold hard fact: that for equal operating skill, antenna and power c.w. is more useful by a couple of S-points.

Another way of getting some more countries booked in, is to operate in one of the world-wide contests. I suggest the ARRL, CQ WW, and WAE as examples.

Often, a keen contesteer will appear from some rare spot in hopes that their callsign will provide a winning score. However, this only applies to the major world-wide contests.

## Band Conditions

It's time to look at band conditions now. Unfortunately, National Field Day this year, coincided with some pretty awful radio conditions, even if the sun did burn the skin off various noses and arms.

Sunspot counts on some days this last month have been well down. I recall GB2RS quoting only 11 on one day! And right to the time of writing, it has continued below normal, at least when I've been on.

## Events

It's expedition and event time now. Rumours of an Andamans Islands expedition, near the top of the 'most wanted' list, have come to nought.

About the only chance for the Andaman expedition in the foreseeable future, might be an expedition set up by the VU gang. On the other hand, Wake Island (IOTA OC-053) seems set to start on September 1. The Brazilian Natal DX Group are set for a St Peter & St Paul Rocks jaunt, early in 1994.

The Spratly, 9MOS

exercise actually came off, to the tune of 37 000 contacts, protected by the Malaysian Navy base at the other end of the reef. Some 10 000 of the contacts were on the WARC bands. And, thank Heaven, nobody died this time.

Reports around June 15 indicated 5A0RR was on from Libya, it sounded like Romeo. However, nothing more has been noted to the time of writing.

The recent VR6BX/P operation was the first ever from Ducie Island. It's a 283 nautical-mile trip from Pitcairn Island.

## More Beacons

I've heard of a couple more beacons which could be of some use. They both run 1kW into a non-directional antenna, and the frequencies are: 5.470, 7.870, 10.407, 14.405, 10.945MHz for VK4IPS in Brisbane Australia. The other beacon, LN2A in Norway, uses 14.405, 20.945, 5.470, 7.870 and 10.407MHz.

Each station is on one frequency for four minutes at a time. They start at the first mentioned frequency on the hour, so they cycle through each frequency three times every hour throughout the 24 hours.

## The Postbag

It's time to look at the postbag now. The Scottish Expedition Group, by way of GM2TW, wrote to mention they are putting on GB2SEG, 6/7/8 August from Balmacara Wester Ross, and October 1/2/3 from Dunnet Head - the most northerly point of mainland Scotland.

The SEG intend to make five or six expeditions like the 1993 annually. They're also planning to have a Lighthouse Award for working them. Further details are available from GM2TW who is QTHR.

A cynical GMOIRZ in Dundee suggests there should be a priority facility such as is given to the letters QRP in a pile-up. He

suggests the use of QWS for 'I am operating on a wet string'.

Somehow, I'm not sure DXpeditions will respond to GMOIRZ's suggestion. Alternatively, he could try living in the west, where the string never manages to dry out!

Let's look at your reports, and I'll start off with a QRP operator. Grandfather's old roll-top desk is the operating position for **Eric Masters GOKRT** (Worcester Park).

Eric, Fig. 1, runs 1W from a Lake DTR7 into the top of a W3EDP against a quarter-wave counterpoise. This time he reports that UA6LAM with OZ3AAA for the best contact with low-power both ways.

Output from the receiver goes through the contents of an old margarine box - an audio filter and clipper - and then to speaker or headphones. The former is a miniature hi-fi unit bought for under £2 on a market stall. Hi-fi or not, Eric in common with most c.w. operators, prefers using headphones.

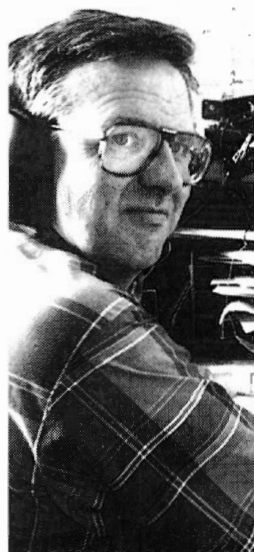
Looking out to the Far East over the sea helps **John Heys G3BDQ** (Hastings) by a couple of S-points. On 14MHz VK and ZL, but on 21MHz XX9AS, ET3SID, XU3ENF (PA3ENF in Kampuchea) came in plus S92YL for Sao Thome and an all-time new one.

John G3BDQ of course, is well known for his books on antennas. His strong signal backs theory with practice.

Among the listeners, **Luciano Marcqardt** (Hereford) also found a new one, by way of F05IW. Luciano has also received cards from S79FLB (Seychelles), S92YL, and CU2BD.

**Well, that's your lot for this month. Keep writing - and don't forget those photographs of you and your station. Send them to me at: 287 Heol-y-Coleg, Vaynor, Newtown, Powys, Wales SY16 1RA.**

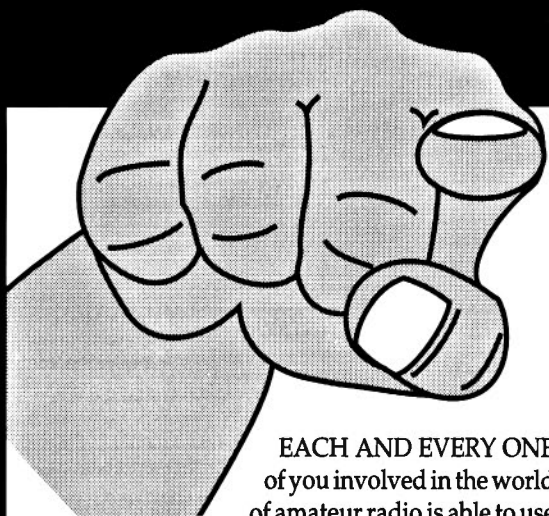
E N D



**Fig. 1: Keen QRP operator Eric Masters GOKRT.**



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Ultimately it comes down to you, the individual, but please think ahead; not this year, maybe not next year, but sometime, the commercially interested parties may force their way into the spectrum which we currently enjoy. Support the RSGB now and the battles ahead can be won.

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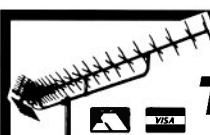
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Scene

WIRELESS

Welcome to the world of amateur radio in orbit. This month, I'm going to look at 'award chasing' for satellite users.

Just as with h.f. and v.h.f. terrestrial communications, certificates, diplomas and awards as well as a few 'specials' are available to those able to demonstrate their operating skills and achievements by satellite. The easiest and simplest satellite award is the Satellite Communicators Club Certificate, the SCCC.

The SCCC is available for making just one QSO via satellite! No forms or QSLs are required. Just send your two-way satellite QSO information details with an addressed envelope and \$2 to **AMSAT SCCC Manager, PO Box 27, Washington DC 20044, USA** and the award will be sent to you.

### American Award

The 'Ten American Districts Award' (TAD) with satellite endorsement is sponsored by the **Lockheed ERC Amateur Radio Club, QTH W6LS, 2814 Empire Ave., Burbank, CA 91504, USA.**

To qualify for the TAD, you must produce evidence of satellite contacts with all ten USA call areas W1 to 0. (Don't just rely on the prefix - be sure that they are in the call area districts, as I often work W6s in Florida, W0s in Texas and the like).

Make a list of your ten contacts. Show all details and pertinent information, particularly that they were obtained through satellite QSOs. Get your list validated and signed by two other amateurs or your local radio club secretary, and send with \$2 to the address above.

### Popular Awards

The popular WAC, WAS and DXCC awards from the ARRL are all available for through-satellite QSOs. For WAC (Worked All Continents) you should submit proof of your contact with a station in each of the world's six regions, i.e. Europe, North

*This month Pat Gowen G3IOR covers the topic of awards given for satellite operating in full, and explains how you may obtain some of the many diplomas, certificates and awards available.*

America, South America, Asia, Africa and Oceania.

You should ensure that each QSL submitted has indication of an actual QSO for a satellite. For example: mark it as 'via OSCAR-13 Mode B', or frequency 145/435MHz, 29/145MHz, etc., and then send it to the ARRL, address supplied below.

For WAS (Worked All States) you should provide evidence of QSLs of satellite contacts with a station in each of the 50 USA states, including KL7 and KH6. The complete rules and the application form are available for a self addressed envelope plus two IRCs sent to **The American Radio Relay League, 225 Main Street, Newington, CT 06111, USA.**

To get DXCC Satellite, you need evidence of satellite QSOs with 100 different established countries. Whilst this award was extremely difficult via the earlier satellites, it's now very easy by using OSCAR-13.

The first step is to send an addressed envelope and two IRCs or \$1 to the ARRL (QTH above). You should ask for forms CD-164 and CD-253 on which you must establish and list the different country contacts.

The Satellite DX Achievement Award DX-1000 also comes from the ARRL. For this you need to accumulate 1000 points.

Each different continent gives 250 points, and each country 50 and each new station ten. Thus, your very first contact, coming into each category, starts you off with 310 points!

No fees are required from ARRL members, but costs must be covered for others. Sending an addressed envelope plus two IRCs to ARRL QTH will provide the form and full details.

### Awards from AMSAT

The AMSAT organisation sponsor several awards. These include the AMSAT OSCAR Award, the AMSAT Sexagesimal Award and the



**Fig. 1: A collage made up from some of the handsome certificates and awards available to satellite operators, prepared by Pat Gowen G3IOR.**

OSCAR Century Award, presented for 20, 60 and 100 satellite QSOs respectively.

A qualifying card is one showing a satellite QSO with a different country, a different US state or Canadian call area in any combination. You can get endorsements for additional steps of ten in all levels.

You must send to AMSAT (QTH as above), your QSL cards plus return postage costs with \$3.50 if you're an AMSAT member. But it's \$5.00 if you're a non-member.

The AMSAT organisation also provides the ZRO memorial award. This award is in honour of Kaz Dexter K2ZRO, who was AMSAT's treasurer.

The ZRO award is really a test of your receiver and antenna engineering skills and your discrimination ability. Periodically, at times and frequencies given out on the numerous AMSAT Nets, (or you can send an addressed envelope with two IRCs to **AMSAT ZRO Test, PO Box 177, Warwick, NY 10990, USA** for details) a station is set up to transmit code groups through OSCAR-13, with a series of ever-decreasing power levels.

The ZRO test station runs from level 1, full nominal power though -3dB steps to level 9, which is very tiny. You can easily get a certificate for level 1, but for level 9 you need a very good

station set up and keen ears to boot!

The **AMSAT South Africa Organisation, Box 13273, Northmead 1511, Republic of South Africa**, produce the Satellite Communication Achievement Award. It's awarded for 25 two-way contacts through the Phase II satellites (Any RS satellite, the Fujis, or OSCARs 6, 7, and 8, but not OSCAR-10 or 13, as they are Phase III satellites). For this award you must send your fee in South African Rands.

Our own AMSAT-UK organisation provide an award for working UK Counties. The form needed and the details are available from the General Secretary, **Ron Broadbent G3AAJ, AMSAT-UK, London E12 5EQ.**

### Any Other Awards?

The awards I've mentioned, are all the shack wall adornments that I know of. But if you have news on any others, please let me know for future columns.

That's the lot for this month's look at amateur radio in orbit. See you next month, and don't forget that you can write to me at 17 Heath Crescent, Hellesdon, Norwich, Norfolk NR6 6XD.

END



*This month David Butler G4ASR has news of DX openings on both the 50 and 144MHz bands. David also reports that conditions were very good during June, and that stations were worked via a number of propagation modes.*

# Report

The main DX propagation mode during the summer months is Sporadic-E (Sp-E). During June it occurred on the 50MHz band every single day.

Sporadic-E also occurred on the 144MHz band (in the UK) on June 8, 10, 11, 12, 13 and 20. However, I'll concentrate on the 144MHz band now, and cover the 50MHz openings later.

Last month, I described the Sp-E opening to Greece on May 12. Reports indicate that there were actually two active areas, one over north-eastern Italy, and one about 400km south-east of that.

## Northern Area

The more northern area of Sp-E was supporting a path from the UK to southern Italy. The southern area was supporting a path from Switzerland to Greece.

It's quite probable that the station of SV3KH and other SV operators were worked via a little 'chordal-hop' between the two areas which were ideally placed. Incidentally both areas displayed some westwards drift, in excess of 100kph, the northern area drifting more rapidly than the southern path.

The first Sp-E opening of the month, on June 8, was not widely reported. **Jim Smith G00FE** (I090) worked three OK stations and one OM station between 0907-0922UTC.

At 1057UTC Jim was also fortunate to work SV2JL (KN10). At exactly the same times **Silvio Rua IW1AZJ** (JN35) was also enjoying the propagation. He worked into LA and OZ between 0910-0920UTC during the first opening and later into HA, YO and YU between 1020-1050UTC.

Two days later, on June 10, an excellent opening occurred during the evening between 1515-1915UTC. It enabled contacts to be made from the UK with large parts of Europe from Poland through Italy, Malta and around to Spain.

## Sporadic-E Reports

For your Sporadic-E reports, I'll start with details from Scotland and the first comes from **Paul Bradbeer GM7GUC** (I086). Paul missed the beginning of the opening, but was aware that something was brewing when Italian v.h.f. Band II broadcast stations could be heard on his car radio.

Arriving at his home QTH, a quick check by Paul revealed that the 144MHz band was wide open to the south-east. After working one station (his first via Sp-E) he decided to go out portable from a local hilltop with an Icom IC275-H and a 13-element Yagi.

Fortunately the band was still open, and stations were contacted in DL, HA, I, OE, OM, YU and 9A. The best DX worked was YU1EV and YU1LA, both in locator KN04.

**Ray James GM4CXM** (I075), found the band open when he arrived home. Between 1550-1912UTC he worked stations in 41 locator squares.

Ray made a total of 110 contacts, with stations situated in EA, EA6, F, HA, I, OE, OM, S5, YO, YU, 4N, 9A and 9H. The Maltese station 9H1AP (JM75) was at a distance in excess of 2600km! Ray wonders if anyone in GM has worked 9H before?

Propagation extended into Northern Ireland. **Noel Moore G17CMC** (I074) reports that in addition to himself, G11CET, G11JLA, G11JUS, G14EIZ, G14KSO and G14OWA were also getting in the action. Noel uses 50W and a 7-element Cushcraft Yagi, and managed to make 55 s.s.b. contacts in 10 countries.

Although I didn't receive any reports from the Republic of Ireland I did get packet radio messages from IW1AZJ and S59AX. Between them, they mentioned working EI3GE, EI4AEB, EI4CI, EI4HG, EI5FK, EI7BFB, EI7HP, EI8GQ and EI9HW.

## Moore DX

**Rob Moore GW0MOH** (I083) has only been active on the 144MHz band for a few months. And the first DX he worked was a YU station in the Sp-E opening on June 8.

On 144MHz Rob runs an FT-290, a 30W amplifier and a 5-element Jaybeam Yagi at 8m above ground. In the opening on June 10, he made 18 contacts in 9 countries.

Having whetted his appetite for DX, Rob is planning to replace the antenna with a 13-element Tonna Yagi and change the UR76 feeder. He's also going to complete the 300W 4CX250B amplifier.

In my propagation log for June 9 I wrote "It's going to be good tomorrow"! This was based on my perceptions that the 50MHz band had been particularly good that evening.

Sure enough, when I checked the 50MHz band at 0600UTC on June 10 it was 'bubbling'. This is an indicator to me that indeed it was to be a good day.

The opening on the 144MHz band started at my QTH (I081) at 1520UTC, and finished abruptly at 1915UTC. Unfortunately a thunder storm and intense rain static made me close down for nearly two hours.

In the remaining time I made 54 s.s.b. QSOs with stations in DL, EA, HA, I, LZ, OE, OK, OM, S5, SP, UB, YO, YU and 9A. The best DX contacts were with LZ2WY (KN23) 2284km, RB5GU (KN69) 2529km, UB5BDC (KN29) 1982km and YO3JWV (KN34) at 2358km.

Down on the south coast of England **Jim Smith G00FE** (I090), runs a Kenwood TR-751E, a 170W amplifier and a 12-element Yagi. Jim made contact with stations in 8 countries, the most notable being UB5BAE (KN29).

Also on the south coast, **Steve Damon G8PYP** (I090), managed to catch a few minutes of the opening. He worked HG8QG, S510T,

LZ3UF, 9A1CCY and 9A1EZA.

Finally it's over to the east coast to the QTH of **John Regnault G4SWX** (J002). He made a total of 42 s.s.b. QSOs between 1614-1916UTC with stations in eight countries.

Most of John's QSOs on June 10 were with stations in Italy. But contacts were also made with LZ2WY, LZ3UF, UB5BDC and YO3LEA.

## Another Opening

Another opening on the 144MHz band occurred on June 11 between 0630-0900UTC. It was a little patchy, but operators on the western side of England reported contacts with stations in I, S5, T9, YU and 9A.

It was a similar situation on the following day, June 12. Between 0900-0945UTC contacts were made by stations in southern England with I and IT9.

There was also a good opening on June 13 between 0946-1040UTC. I detected it simply by having my receiver tuned to 144.300MHz and having the antenna pointing towards the south-east.

At 0946UTC up popped HA9RC (KN08). A quick contact was made and then I went on to make 33 contacts with stations in HA, OK, OM and YO.

The station of **John G4SWX**, had pretty much the same results. John made 25 s.s.b. contacts with stations in HA, I, OE, OM and YO.

Later in the morning, around 1114UTC, there was a brief opening to northern Italy. Unfortunately, very little seems to have been worked.

The last 144MHz Sp-E opening in June, was recorded on the 20th. It was an early morning event, from 0715-0815UTC. At the beginning of the opening the path extended into Greece.

A number of operators in J001 and J002 worked SV1BRL/A and SV8JE (KM08). However after a few minutes the propagation path had shortened, and



contacts were made with the more usual area around Italy and Yugoslavia.

## Tropospheric Openings

Now we'll take a look at tropospheric openings. During some of the Sp-E events, and at other times throughout the month of June, the v.h.f. bands were in excellent shape via tropospheric enhancement.

The tropo openings in June caused some confusion. For example, some stations reported working German stations, during Sp-E openings.

To sum up, during June the v.h.f. and u.h.f. bands were open to Denmark, Norway, Sweden, Germany, Switzerland, southern France and Spain. The locator map, Fig. 1, shows the DX worked from the QTH of G4SWX via Sp-E and tropo during June. It certainly was a good month!

## The 50MHz Band

As I've already mentioned, Sp-E propagation was prevalent every day on the 50MHz band during the month of June. I haven't space to give details of the multitude of contacts made, you'll just have to assume that every country in Europe with a 50MHz allocation was worked many times from the UK!

While on the subject of countries, it reminded me about some letters I've received asking for details of all those new prefixes. So, to help, I've made up a chart, Fig. 2, which should explain what you've been working recently on the 50MHz band and perhaps on the 144MHz band too.

During June, some of the rarer European stations worked from the UK included C31HK (JN02). He's always to be found on 50.203MHz. There was also CU1EZ (HM76) and an appearance of HV4NAC (Vatican City) within the Italian allocation.

The station of JX3EX (IQ50) on Jan Mayen was reported by G7LNO on June 15 at 1737UTC. Also, OY9JD (IP62) was worked on a number of occasions.

Activity from Greece has now increased with many stations being reported from SV1. There was SV5TS (KM46), SV7CO (KN20) and SV8JE (KM08).

Activity from eastern Europe was also high. Many operators reported working EV5M (K042) the expedition by DL5BAC and EV8A/EV9A operating from various

locators including K032, K042, K043 and K044.

The stations of UC2AA (K033) and RU1A (KP40) were in much demand. Some were even luckier and managed to find RA3YO (K078) and UB5BW.

A little further afield is the continent of Asia. From there, the stations of 4X11F and 4Z4TT (KM72) provided the DX. The beacons OD5SIX (KM74) on 50.079MHz and 5B4CY (KM64) on 50.499MHz were also copied.

## African Continent

It was also possible to work the African continent in June. The easiest way of accomplishing this was to work the various CN8 or EH9 stations on the band.

Other African stations of note included CT3FT (IM13), EH8ACW and EA8/DJ3OS. However, you should note that the latter expedition may well turn out to be an invalid operation.

The beacons EA8SIX (50.075MHz) and ZD8VHF (on 50.032MHz) were heard on a few occasions. But, the only 'real' African stations to be found on the 50MHz band were from Malawi.

Ken G4IGO (IO80), worked 7Q7JL on June 13 around 1900UTC. At my station in Herefordshire, I found 7Q7LA (KH75) and 7Q7RM (KH74) both on c.w. in an opening between 1650-1745UTC on June 26.

## North America

And if all the activity I've mentioned on 50MHz wasn't enough, there were the multi-hop Sp-E openings to North America! Although they weren't spectacular there were a number of them.

The first North American QSO to be reported was on June 5. This was when Ted Collins G4UPS (IO80) heard VE1XDX and VE1ZZ at 2142UTC.

The band had been open from Portugal to the USA 25 minutes earlier. The next opening occurred on June 11 between 1830-2015UTC and seemed to favour stations located in northern England.

Stations reported being worked on June 11 included K1DAT, K1TOL, KM1H, WA1OUB, W1DU and W1JR. Dave Ackrill G0DJA (IO93) was very pleased to contact VE1MQ as he was only running 5W into a 5-element Yagi.

Later in the evening of June 11, at 2110UTC, the VO1ZA beacon (50.040MHz)

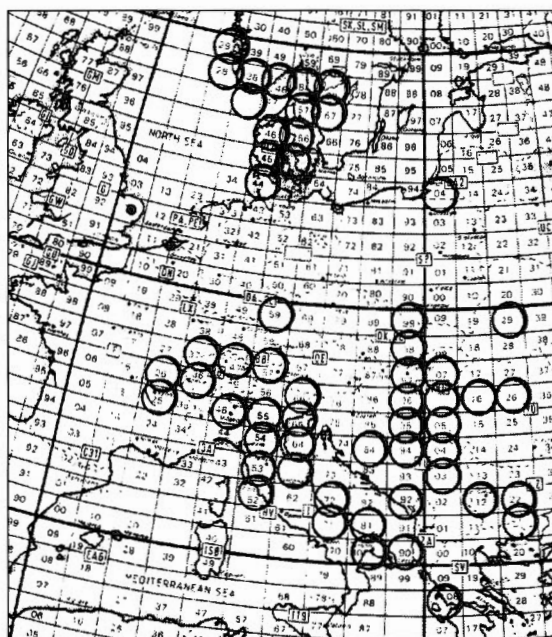


Fig. 1: Map showing contacts made by G4SWX during June (see text).

was heard by Neil Carr G0JHC (IO83) and at 0012UTC on June 12 he heard S59AM working K8WHZ.

## Statistical Data

The statistical data on 50MHz, will show that the transatlantic path will normally open (provided the right conditions are present!) between 1900-0000UTC. There's a minor peak between 1400-1700UTC.

Despite this, events on June 12 were such that it should teach you a lesson not to put all your faith into statistics! The first report

These included AB4J (EM64), KA2DRH (EM64), KB4UG (EM86), KC4IS (EM76), KC4YO (EM75), W4CMA (EM74) and WA4CQG (EM72). The opening closed around 2100UTC. A remarkable day!

The VO1ZA beacon in locator GN37 was heard on June 14 at 1955UTC. However, it was a brief opening and nothing seemed to have come of it.

Another event took place between 1900-2100UTC on June 25, although it was rather a patchy affair. At my QTH (IO81) contacts were made with K1TOL (FN53), KM1E (FN54), W1AIM (FN34), WA1OUB (FN43), VE1MQ

Fig. 2: New call signs for old after the changes in eastern Europe

New	Country	Old
ES	Estonia	UR
EV	Bylarus Rep	UC
LY	Lithuania	UP
RU	Russia	UA
YL	Latvia	UQ
OK	Czech Rep.	OK
OM	Slovakia	OK
9A	Croatia	YU2
S5	Slovenia	YU3
T9	Bosnia	YU4
Z3	Macedonia	YU5
YU	Yugoslavia	YU

that something unusual was happening came at 0500UTC when NI2C (FN31) heard the GB3SIX beacon on 50.020MHz.

At 0945UTC Colin Morris G0CUZ (IO82), using only a dipole, heard K1TOL. A number of stations in the English Midlands then made contacts with stations situated in the W1 call area.

Later in the day at 1915UTC, the 50MHz band opened up again to allow contacts to be made with stations in the W4 call area.

(FN66) and VE1ZZ (FN74) between 1915-2105UTC. All of the signals were weak and exhibited much fading.

That's about it for this month. Please send your reports to me at Yew Tree Cottage, Lower Maescoed, Herefordshire, HR2 0HP or via packet radio @ GB7MAD or the DX Cluster system.

E N D



Roger Cooke G3LDI, brings you the latest news of Russian packet radio.

# Panorama

# PACKET

There is a lot of enthusiasm in Russia for packet radio, despite the difficulties in obtaining suitable equipment. Although it's really quite surprising to learn just how some of the modern rigs, such as the Icom 751 etc., are obtained over there.

There are several forwarding stations operating at present and traffic flows quite reliably on both 21 and 14MHz. My main forwarding partner in Moscow is **Leo Labutin UA3CR**.

Leo visited me in 1986 and took lots of information and some equipment back to Moscow. His was the first h.f. packet BBS and we've been forwarding traffic now for several years.

Unfortunately, Leo Labutin has been in poor health just lately and has been in hospital. Not to be separated from packet operation, he took a complete packet station with him and operated his h.f. station at home, via an v.h.f. link from his hospital bed. Such is his enthusiasm!

Several other stations have become active in Russia and I now forward (mostly on 21.105MHz) with **Misha (Michael) UA6LU**. Leo is normally active on another frequency but 'auto-QSY's to my nominal frequency, if he has traffic. For this he uses the Adventure Club call of **RK3KP**. The photograph, **Fig 1**, shows Leo at that station in Moscow, with h.f., v.h.f. and satellite links.

The station **RK3KP** forwards to **DK0MWX** and

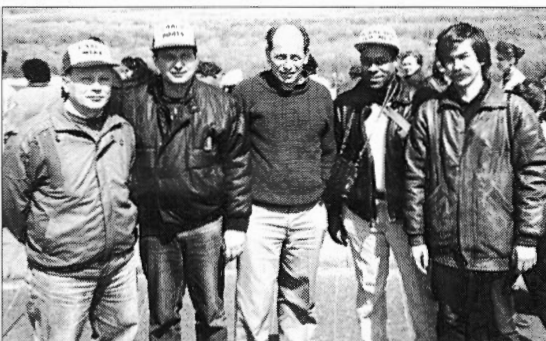
**SM5BKI** on a regular basis. The BBS call, **RK3KP-9**, is also available for **GB7LDI**, **SV1IW**, **IK1JNS**, **EA4BS**, **HB9JAM**, **4X1RU** and several USSR calls.

Also available for users on v.h.f. are the calls **RK3KP**, **RK3KP-1**, **RK3KP-2**. Channels 5-18 are used for forwarding

practically impossible to work with **MIR** over Moscow due to strong QRM from Europe, but over Africa Alain **TR8CA** can transfer more than 10K per pass.

## A Holiday

Shown in the photo, **Fig 2**, is



**Fig. 2: Left to right, Misha UA6LU, Boris UA6LQ, Ken G0NKZ, Bob KC3VO and Igor UT4UX.**

to **RS3A** and **UA3CR**.

In future the plans are to scan the 3.5 and 10MHz bands for USSR users in the European part of the country. Leo's call, **UA3CR**, will still be available, and he has many interesting plans to use satellites and h.f. for forwarding.

Using h.f. p.s.k.

**Misha UA6LU**. On the far left, **Boris UA6LQ**, **Kenn G0NKZ**, **Bob KC3VO** and **Igor UT4UX**. Kenn and Bob took a holiday in Rostov-on-Don.

Kenn enjoyed the holiday so much, that he plans to return, together with his wife **G0SZO**, in 1994. Kenn runs an h.f./v.h.f. gateway on a daily basis for the locals at the

is between **RZ6LZB** in Taganrog on the coast of the Azov Sea and Rostov, a distance of 75km.

The Taganrog station uses modified p.m.r. type equipment on 144MHz with 9-ele Yagi antenna. Control is from a PC AT/286 with a home-made Baycom modem.

The modem is based on 4046 i.c.s with Baycom v1.4. software. When they have built other equipment, a full BBS will be set-up.

Obviously, with the availability of suitable radio equipment, a v.h.f. network is the next step and could be very useful. However, some of the distances involved could be prohibitive and may have to be done on the h.f. bands.

This month the featured packet BBS is Misha's: **SYSOP: UA6LU**, Michael Bondarev, P.O. Box 416 QTH: Rostov-on-Don, 344007, Russia

Computer: PC clone, 640 KB RAM, 21Mb hard disk, 2 ports and 9 channels (see **Table 1** for more details). Software: FBB Release 5.14d.

Well, that's it for this month, next session, I shall be giving some more details from Rostov-on-Don, together with some more

**Fig. 1: Leo Labutin UA3CR at the Adventure Club Station in Moscow.**



forwarding has been very popular in the Pacific area for the last few years and at 1200baud it represents quite an improvement on the 300baud links. The link, of course, must be good enough to support it in the first place.

Leo also has regular skeds with **U2MIR** via the **TR8CA** node and exchanges information with Musa. It is

Worthing Radio Club, to keep in touch with Rostov.

**Boris UA6LQ**, runs a BBS in Rostov to feed traffic to Africa and the Middle East. He has a v.h.f. Gateway to Misha **UA6LU**. Misha has been forwarding to Western Europe and also v.h.f. links.

The latest news from Misha, is that he has now established the first v.h.f. city to city packet link in Russia (Leo uses v.h.f. over about 20km but all in Moscow districts). The link

pictures. My thanks go to Kenn **G0NKZ**, for the photographs. It looks a very nice place for a holiday!!

**73 and happy packeting - Roger, G3LDI @ GB7LDI QTHR.**

**E N D**



This month Peter brings you news of changes to the BBC's French Service, satellite testing and stations to watch out for.

Round-up

# BROADCAST

Welcome once again to our monthly look at the world of short wave listening. I start this month with news of the BBC's French Service that closed somewhat unexpectedly, on 2 July.

The BBC service reduced some months ago from short wave covering the whole of French-speaking Europe to medium wave transmissions on 648kHz, which reached just about to Paris, and dwindling audiences meant that the service was not cost effective.

While the French Service to Africa remains on short wave, European output has adopted a new approach. A 24-hour-a-day music and news service has come into operation, fed to radio stations in France by digital satellite link. The stations pay a fee, depending on how much of the output they take, and the BBC can then be heard with CD quality on f.m. in cities from Mulhouse to Lyon and Paris to Marseille.

Meanwhile the much-vaunted *BBC for Europe* trilingual service on 648kHz is now down to two languages, just English and German. The monthly programme guide, *BBC Worldwide*, has not yet caught up with the change: the August issue still shows French on 648kHz!

The Voice of America has announced that its German language service will close in October of this year, and cuts are likely to Portuguese, French and Spanish services. Meanwhile there has been speculation in the press in the United States and in Eastern Europe that some of Radio Free Europe's services may be cut soon. The rumours have been denied

by RFE in Munich, but it is debatable how much longer RFE and sister station Radio Liberty can survive without merging with the Voice of America.

## Country To Watch

Nigeria could be a country to watch at present. As this column went to press, the country's president, General Babangida, had just annulled the first multi-party elections in years, and prevented the candidates who stood for the presidency from taking part in new elections.

It used to be relatively easy to tune to the Voice of Nigeria here in Europe. They used a 15MHz channel early in the morning (which was monitored by various authorities in case a coup had occurred overnight).

Transmitter faults mean that only an African service is operated, in addition to the Radio Nigeria domestic

service. English to Africa is heard at



0455 to 0700, from

0900 to 1100, 1500 to 1700 and 1900 to 2100, all on 7.255MHz. Other languages include French, Hausa, Swahili and Arabic.

The domestic schedule with multilingual programming is: 0430 to 1000 on 4.99 and 3.326 MHz; 1000 to 1700 on 7.285 and 4.99 and

1700 to 2305 closedown on 4.99 and 3.326MHz.

Further north in Africa, the Voice of America's new relay station in Morocco started operations at the end of June. The new site is larger than the existing Tangier site and will eventually boast ten short wave transmitters. Only two are operational at present,

English language news bulletin at 2030 GMT on 918kHz which gives good reception in northern Europe, despite a Spanish station on the same channel. Radio Yugoslavia's international service can be heard with English at 0030 on 11.87 and 9.58, at 0130 to 0200 on 9.58, at 1400 (with other languages) on 9.505, at



and can be heard broadcasting English and west African languages at 1600 to 2200 on 15.41 and 17.785 MHz. The introduction of the new transmitting facility means that broadcasts from the US site at Greenville will stop.

## Satellite News

In satellite news, Astra 1C has been testing since the beginning of June, although the satellite was not co-located with Astra 1A and 1B. If you have a steerable dish, try to find the satellite at around 18° East and tune to 10.920GHz.

Radio France Internationale will be joining the international broadcasting community on Eutelsat in the autumn. Further details will be known shortly.

In the meantime, you can tune to the English service of RFI at 1230-1300 on 15.365, 15.195, 15.155, 11.67 and 9.805; at 1400 to 1500 on 17.695 and 17.65; and at 1600 to 1700 on 17.85, 17.795, 17.62, 15.53, 11.705 and 6.175MHz.

Radio Slovenia has an

1830 on 17.71, 7.20 and 6.10MHz, at 2100 on 9.505, 7.20 and 6.10 and finally at 2130 on 9.72 and 6.10MHz.

The Voice of Turkey in Ankara could be a station to watch as the Kurdish resistance movement continues to cause disruption to Turkish interests across Europe. English can be heard at 0300-0400 on 9.445 to North America; at 1230-1300 on 9.675 to Asia; at 2000-2100 on 9.445 to Europe and finally at 2200 to 2300 on 11.895, 9.445 and 7.185 to Europe, the Middle East and North America.

That's all I've room for this month, so until next time good listening and don't forget to keep sending your letters to me via the PW offices.

E N D



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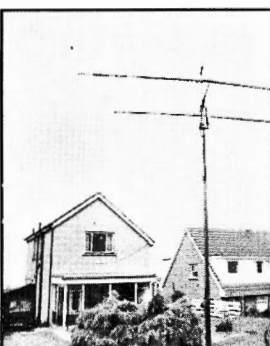
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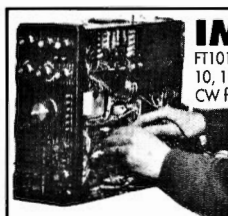
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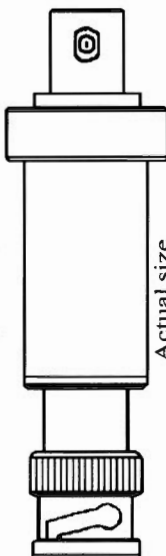
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# ARCADÉ

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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*!

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- 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.

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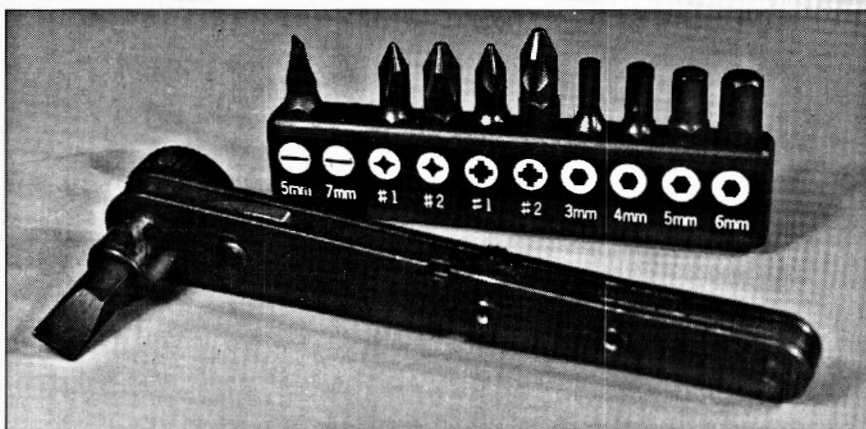
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This month's introductory offer is a really useful, miniature (and very neat) reversible ratchet socket screwdriver set. Attractively manufactured in steel, this set offers 5 and 7mm screwdriver blades, plus a variety of crosshead drives for screw types that frequently appear in radio and electronics work. Particularly useful are the 3, 4, 5, and 6mm Allen Key sockets. All the various adapters are kept in a special semi-flexible plastics holder. In use, the small size and neat construction of the reversible ratchet-wrench (it's only 110mm long) will prove to be very useful for getting into those awkward spaces in radio equipment. Additionally, the extra tool should help shift those often difficult-to-move crosshead screws and Allen Key headed screws.



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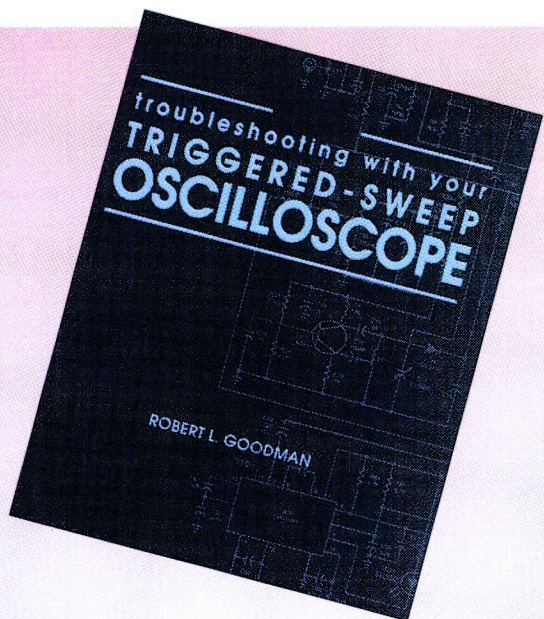
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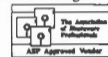
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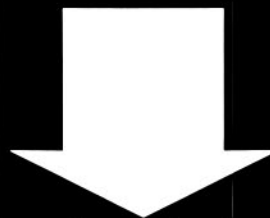
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