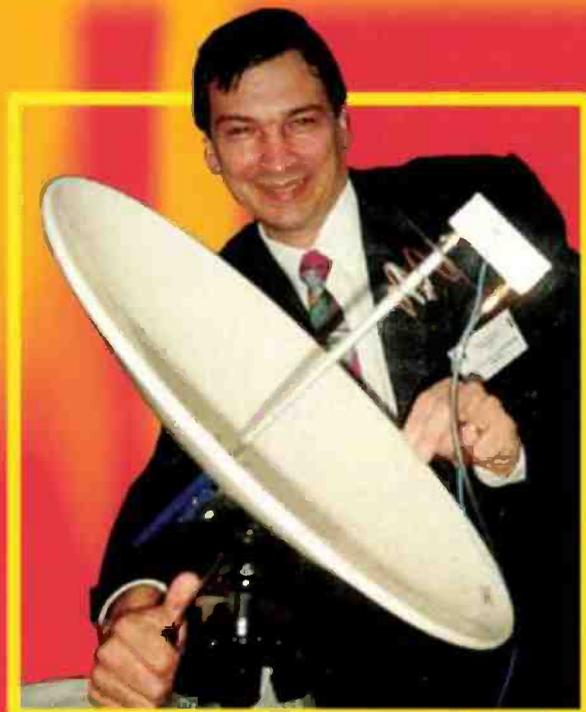


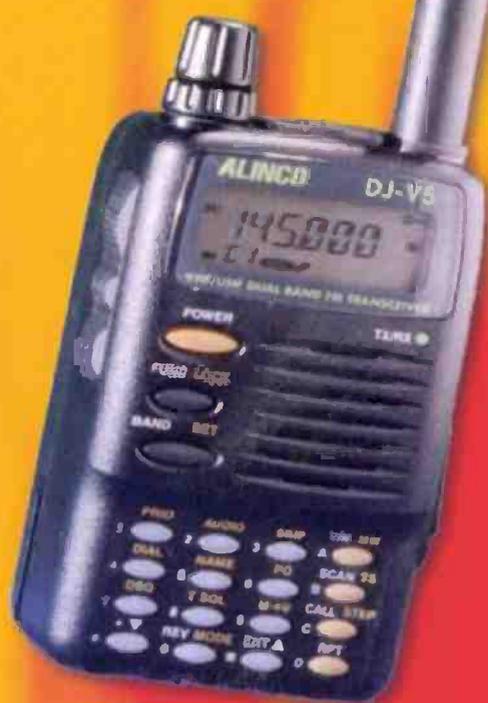
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W-2000	6m/2m/70cm 2.5m	£69.95

Mobile Antennas PL-259 bases

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W-770HB	2m/70cm 1.1m 3/5.5dB	£24.95
W-7900	2m/70cm 5/7.6dB 1.5m	£32.95
W-627	6m/2m/70cm 1.62m	£34.95

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W-3CK	5m low loss cable kit	£18.95
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WMM&	Magnetic mount	£10.95
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20811	2M 11 EL. 14.1Dbi 4.62M	£79.95
20822	2m 11 el. 14.1dBi 4.62m	£117.95
20817	2m 17 el. 15.3dBi 6.57m	£89.95
20909	70cm 9 el 13dBi 1.24m	£45.95
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This antenna is manufactured by a company who specialise in military designs. We stumbled across it by accident and were amazed at its performance. The response is flatish across the spectrum. Element length 6m, Boom 2m, weight 8.5Kg. Power 1kW PEP, (500W VHF)

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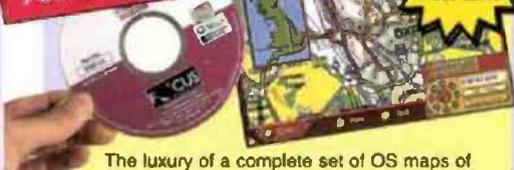


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## 12 RADIO BASICS

This month Rob Mannion G3XFD explains how to build the 'Basi-Tracer' a.f. and r.f. signal tracer 'wand'.

## 17 WHAT IS A?

It's the turn of Ian Poole G3WYX to bring you the next in his 'What is A?' series and this month he follows on from his last instalment and takes a further look at the m.o.s.f.e.l.

## 20 THE HARD-WORKING ALINCO DJ-V5

Richard Newton G0RSN reviews the Alinco DJ-V5 144/430MHz dual-band hand-held and gives it a good run for its money! But did he like it and did it withstand his various tests? Read the review to find out!

## 24 GET GOING ON MICROWAVES!

David Buller G4ASR, our resident 'VHF Report' columnist, brings you the first of a three part series on microwaves - what they are, what they can be used for and what activity can be expected on the microwave bands.

## 28 A START WITH TV...

Ray Herbert G2KU, author of *Seeing By Wireless* (a book about the early days of TV), takes the reader back 70 years to John Logie Baird's inaugural mechanically scanned TV service, transmitted by 2LO.

## 32 UNDERSTANDING RATIOS & RADIATION EFFICIENCY

In his article, Gordon King G4VFV, our resident 'Looking At' author, describes the relationship between s.w.r. and radiation efficiency and how to calculate them both.

## 36 THE PW 'SENTINEL' (Part 1)

Build your very own PW 'Sentinel', an s.w.r./p.w.r. meter courtesy of Jim Brightman G0JXN.

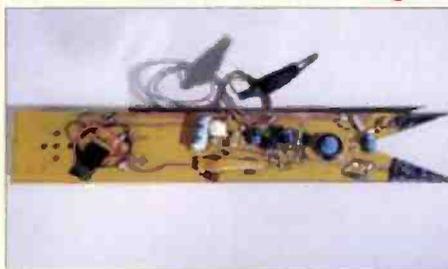
## 40 THE 'TEXAS BUGCATCHER' MOBILE ANTENNA

Rob Mannion G3XFD tries out the h.f. and 50MHz mobile antenna system which he's seen in action in the USA - and he says - "they sure make them big in the 'Lone Star' state!"

## 42 THE MOBILE RALLY

Walter Farrar G3ESP reminisces on the 'Mobile' rallies as he remembers them and discusses the reasons why he feels that the 'Radio, Electronic and Computer' rallies of today just don't compare!

**How to build a 'Basi-Tracer'... Page 12** **Mobile rallies remembered... Page 42**



## 44 LEICESTER SHOW SPECIAL

The Editorial team here at *Practical Wireless* bring you a six page pull-out of all the latest news of what and who are going to be present at the 28th Leicester Amateur Radio Show being held for the second time at the Donington site.



## 50 CARRYING ON THE PRACTICAL WAY

The Rev. George Dobbs G3RJV describes the techniques involved in providing stand-by and receive incremental tuning for use with variable frequency oscillators.

## 54 VALVE & VINTAGE

It's Charles Miller's stint in the *Practical Wireless* vintage 'wireless shop' this month and in Part Two of his article, he casts his mind back again and continues his story of when the British radio industry created their very own 'Unwanted War Baby' - a standard receiver for civilian use.



## 58 ELECTRONICS-IN-ACTION

Tex Swann G1TEX tells you about replacing an f.e.t. in an older transceiver and presents what he thinks is a novel (although not unique) project to help with sorting out Morse signals ... as well as a few appropriate books for you!

## 62 ANTENNA WORKSHOP

This month it's the turn of Dick Pascoe G0BPS to man the PW Antenna Workshop and the subject he's chosen to tackle this time is a return to hiding antennas around the house and garden.

## 70 COUNTING UP FROM THE MILLENNIUM

The continuation of Rob Mannion G3XFD's new satirical & humorous look into the future. Don't forget that the news items on these pages are meant to be thought provoking but totally imaginary!

## REGULARS

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**72 RadioScene**  
**Nine Pages of hand reports from all your favourite authors**

**See page 10 for news of the soon to come PW Amateur Radio Callsign Listing on CDROM!**



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In fact, I'm not sure if traditional components are still made here in the British Isles. Most of the (increasingly rare) new ones that I

I'm now getting some interesting 'feedback' from readers who are enjoying the 'Counting Up From The Millennium' series. This pleased me very much indeed - mainly because I'm enjoying the chance to write purely fictional material (with a definite 'hint' of possibilities!) with a satirical slant.

However, I was rather alarmed when one dismayed reader telephoned the *PW* office to ask about declaring his Amateur Radio equipment at the 'Scottish Customs' at the border post ('Operating North of the Border', page 34 in the July issue). He was about to head for Scotland on holiday! It also became obvious during our telephone conversation that he reads magazine articles backwards and was quite embarrassed when he realised it was a 'glimpse from the future' from G3XFD's keyboard while it was operating in 'probability fiction' mode!

I'm enjoying writing the 'Counting Up' series and in particular last month's offering for the series, page 36, and entitled 'Dialling Up Components'. The article was prepared with the help of **Tex Swann G1TEX** who did the photography (have you guessed what the 'etch resist' pens are yet? (answers on a postcard if you have) and I took a look into the (possible) future where it had become impossible to get standard wire-ended components.

### Traditional Components Disappearing?

In fact, it looks as if my humorous prediction that traditional wire ended components will disappear in the near future, is closer in time than I dare admit. To realise how true this statement is, you've only got to look inside modern equipment - and there you'll find very few wire-ended components indeed.

The gradual take-over by surface-mount components from the traditional discrete resistors, capacitors, inductors and various forms of semiconductors is now rushing ahead at tremendous pace. At one time the incoming tide of 'solder flow' components was just a trickle - but now it's turned into a flood and I'm wondering - just how long will it be before wire-ended components become impossible to obtain?

discover appear to come from the Far East and they are also of the very small 0.25W size with colour codings so difficult to read that I need a magnifying glass! That almost puts them into the same category as most surface mount devices - which don't (usually) have any markings at all!

So, perhaps readers can help me find whether or not traditional wire-ended components are still being made in Northern Europe? I'd be pleased to hear from you on the subject, because even though several of our regular advertisers are still able to offer 'home construction friendly' components - I'm left wondering just how long they will be available for. In the meantime, despite the difficulties involved in getting down to floor level - I'm always going to recover that resistor or capacitor I've dropped on the floor in future!

### Yaesu Antenna

Several readers contacted me with reference to the photograph on page 24 of the July issue within the review I wrote describing my experiences with the Yaesu FT-100 and the ATAS-100 mobile antenna. The questions arose because Yaesu do not recommend the use of the ATAS system with a magnetic-mount because of safety considerations.

Additionally, Yaesu (UK) have also asked me to remind readers again that at no time did I use the ATAS system when actually mobile. The large Triple-magnet mount I use for h.f. is the only type I'd recommended for larger h.f. antennas (including the relatively small ATAS system) which can accept various threads and sockets with the selection of adaptors I have 'in stock'. I have also arranged for an effective 'earth' to the car's body for both of the antenna mountings in use of my Peugeot 405 estate car.

### Buy With Extra Confidence

Although I'm not able to provide full details of the scheme yet, I'm very pleased to announce that *PW* is to include a new service for our readers

soon. It's being introduced so that you can 'Buy With Extra Confidence' with the help and support of the magazine.

As you'll already know - the *PW* Editorial team and everyone here involved with the magazine, whether or not you come into direct contact with them - think very highly of our readers and we do our best to serve you in the best ways possible. We also know that you value our advice and recommendations - so to that end we're to introduce a 'Buy With Extra Confidence' service that you the reader can use whenever you buy anything from any of the dealers advertising in *PW*.

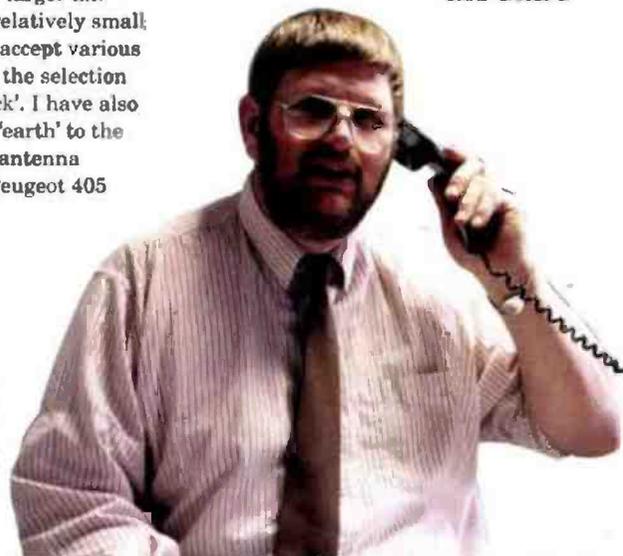
Amateur Radio equipment often requires considerable commitment from the buyer, and once our service is 'up and running' you'll know that along with knowing that you can rely on the Editorial integrity in the magazine itself, you'll also know that *PW* will be providing the additional 'Buy With Extra Confidence' service for any reader who purchases from our trade advertisers. So, watch this space - for another extension of our commitment to you ... our much valued readers.

### See You At The Show?

The time, Friday 24th and Saturday 25th September, for the Leicester (Donington) Show is fast approaching and I'm wondering ... will we see you at the show this year? I hope so, and I say 'we' because it's to be one of the rare occasions when you'll be able to meet everyone on the *PW* Editorial team. Yes, **Jo(anna) Williams** (News & Production Editor) will be there, and so will **Tex Swann G1TEX** and I.

We look forward to chatting to you, getting valuable 'feedback' from you and discussing what you want to see in *PW*. Don't miss your chance, come and have a chat. We're all looking forward to the opportunity!

Rob G3XFD



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Deluxe desk microphone. 50 pieces only. £120.00.

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**ALINCO DJ-V5**

Amazing new dual band hand-held transceiver with up to 5W output and optional wideband receive. 76-108WFM, 108-136AM, 136-174FM, 180-960MHz FM

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- ★ 1.8 - 60MHz HF vertical ★ 15 foot high
- ★ No ATU or ground radials required
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Wire version now available 45ft long end fed.  
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6m	3ele (boom 72"/7dBd)	£54.95
6m	5ele (boom 142"/9dBd)	£69.95
70cm	13ele (boom 76"/12dBd)	£39.95
70cm	13ele crossed (boom 83"/12dBd)	£59.95

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Easy to mount HF mobile whips ready to go with PL-259 fitting.

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PL-20	20m whip (approx 1.5m long)	£19.95 Del £8.00
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Multi-stranded plastic coated heavy duty antenna wire. All parts reusable. Stainless steel and galvanised fittings. Full size - 102ft. Only **£39.95**  
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Carriage £6.00.

## STANDARD G5RV

Full size	102ft	£24.00 P&P £6
Half size	51ft	£21.00 P&P £6

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80mtr inductors. Add them to your 1/2 size G5RV and convert it to a full size. **£22.95** P&P £2.  
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Open Mon - Fri 8am - 4.30pm.  
Sat 8am - 1.00pm

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TSB-3303	GF 144/70.3.6dB (1.1m)	£29.95
TSB-3315	GF 144/70.8.5/11dB (5.4m)	£99.95
TSB-3608	GF 50/144/70.2.15/6.2/8.4dB gain	£69.95

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TSA-6001N	Duplexer (+Coax) 2/70 (N/N259)	£24.95
TSA-6003	Duplexer (Coax) 2/70 (PL/259's)	£19.95
CFX-514	Triplexer (6/2/70) (Coax)	£56.95

## MOBILE ANTENNAS £6.50 delivery

TSM-1612	6/2/70 (2.15/6/8.4dB) 2.1M	£54.95
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DB-1304	144/70 cms, (2.15/3.8dB) .41cms	£19.95
DB-EL2E	144MHz whs, 4.5dB (1.8m)	£29.95
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IPT-20	20m version (10.1m)	£49.95 P&P £7

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## Q-TEK BALUNS & TRAPS

Baluns are wound on ferrite rod and encapsulated into a dipole centre with an SO239 socket. Brass terminals form the balun output and stainless steel screw eyes offer an anchor point for antenna ends. Maximum power rating is 1kW.

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40 mtrs Traps	(a pair) £25.00 P&P £4
80 mtrs Traps	(a pair) £25.00 P&P £4
10 mtrs Traps	(a pair) £25.00 P&P £4
15 mtrs Traps	(a pair) £25.00 P&P £4
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NB: Traps are waterproof with copper hooks for connection.



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★ 4 x 5' 4" lengths of 2" extruded (16 gauge) heavy duty aluminium, swaged at one end to give a very heavy duty mast set

SSP £60.00  
LIMITED STOCK  
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## ★ BARGAIN MAST SET ★

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5 section telescopic masts. Starting at 2" in diameter and finishing with a top section of 1 1/2" diameter we offer a 8 metre and a 12 metre version. Each mast is supplied with guy rings and stainless steel pins for locking the sections when erected. The closed height of the 8 metre mast is just 5 feet and the 12 metre version at 10 feet. All sections are extruded aluminium tube with a 16 gauge wall thickness.

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**MAST HEAD PULLEY** Easy to fit pulley with mast clamp (up to 2").....£8.95 P&P £1.50

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24" T&K Brackets	£20.00 P&P £8

U bolts (1 1/2" or 2")	£1.10 each
8 nut universal clamp (2" - 2")	£5.95
3-way guy ring	£3.95
4-way guy ring	£4.95
2" mast sleeve	£9.95
1 1/2" mast sleeve	£8.95

**Q-TEK DL-1000**  
HF 200W continuous dummy load (0-30MHz).  
SSP £89.95.

INTRO OFFER **£49.95** P&P £8

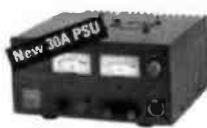
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Easy to tune HF linear amplifier. (Up to 800 watts).

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HF digital SWR analyser + 1.8-170MHz counter/resistance meter.

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DESK MIC (with up/down).

Super quality. (Supplied with 8 pin pre-wired Yaesu lead)

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A high quality headset that will fit most hand portable and most HF & VHF/UHF tx/rx via optional interface.

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Heavy duty rotator for HF beams etc. Supplied with circular display control box and 25m of rotator cable.

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THE IDEAL SWR ACCESSORY

## COAX SWITCHES (P&P £3.00)

CX-401 4 way (SO-239).....£49.95

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Be protected this summer! In-line lightning surge protector. (Gas discharge type). Replaceable fuse.

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Latest UK version complete with moving map of UK & Europe. £449.00.

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Active magmount antenna.....£39.95

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Starter kit includes charger & 4 x AA cells. **£13.99** + £2.50 P&P.

Please note that only the special cells can be recharged with this charger.

Extra cells available @ Rechargeable Alkaline. No

memory effects. 1.5V cells. 3 x

4 x AA pack **£5.99** capacity of nicads.

4 x AAA **£6.25** NO QUIBBLE WARRANTY

## INTERFERENCE - STOP IT!

Rectangular snap-fixing ferrite cores suitable for :- Radio coax/TV/mains/telephone/PC & data cables. Plastic teeth prevent it from sliding on cable. Simply snap close onto cable and job is done! (Will fit large coax).

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Hanging type earphone with boom mic & PTT. Fits Kenwood, Alinco, Yaesu or Icom.

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Over the ear earpiece with lapel mic & PTT. Fits Kenwood, Alinco, Yaesu or Icom.

OUR PRICE **£24.95** P&P £1

This Ear/Mic comes with an "over the ear" earpiece as EP-300

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First microphone to fit Kenwood, Yaesu, Icom & Alinco.

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2M FM handheld amplifier 2.5W input. 30W output (for 5W ip). Turn your handheld into a mobile for under £50

ONLY **£49.95** P&P £4.00

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21cm flexible whip that has 2m + 70cm transmit and wideband receive.

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40cm flexible whip that has 2m + 70cm transmit and wideband receive.

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Matches all hand helds. Can be worn on the belt or attached to the quick release body holster.

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Air vent holder for all hand-helds with belt clip. £9.99.

TO CLEAR **£4.99** P&P £1



## QS-300

A fully adjustable desk top stand for use with all handhelds. Fitted coaxial fly (FAI) with BNC & SO239 connectors

ONLY **£14.99** P&P £3



## EP-300

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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 Patron Saint?

Dear Sir

Almost every human activity that you can think of has a Patron Saint recognised by the Christian faith. For example: accountants have St. Matthew; Candle makers - St. Ambrose; dentists - St. Apollonia and musicians have St. Cecilia - I could go on, there are dozens of them. By contrast, the world-wide movement of Amateur Radio seems to have no such patron and it may desperately need one. So, what is a Patron Saint and why might we need one? A Patron Saint is a Saint who, because of some particular quality in their earthly life, has become an inspiration to people who find themselves in a similar calling or condition. We ask them to pray to God on our behalf.

We all know that Amateur Radio is, at the present time, under great threat and world-wide decline. The Internet, mobile phones, computers, a growing threat to our parts of the spectrum from commercial interests and quite simply a succeeding generation of young people who are mostly just not interested in radio.

So, who might we consider invoking as our Patron Saint? Might I suggest one of our own number, **St. Maximilian Kolbe SP3RN**, 1894-1941. He was a Franciscan Priest and Polish Radio Amateur, and a man of deep spirituality, enormous courage and brilliant intellect. While he was imprisoned in Auschwitz Concentration Camp during the Second World War, he voluntarily offered his life to save the life of a fellow inmate. He was canonised in 1962 by Pope John Paul the First.

May I ask all who are sympathetic to this letter to write to me (care of PW) offering their support for this idea and if you require further information on the life of this man. If the response is encouraging, we can endeavour to have St. Maximilian Kolbe recognised as the Patron Saint of Amateur Radio.

I would like to thank *Practical Wireless* for the news item which prompted this idea. I look forward to hearing from you.

**Adrian Soane M0ABY**  
Hertfordshire

**Editor's comment:** The original news story regarding Maximilian Kolbe was directly due to the interest and support of Willy McCauley EI4EK and John Doherty EI9GB, and I hope that Adrian's efforts achieve something for SP3RN's supreme sacrifice

### Keeping Logbooks

Dear Sir

Before too many people start developing wrong ideas on 'Keeping Logbooks' ('Letters', August PW), I should like to comment on **Walter Farrar G3ESP's** statement that "We should abandon compulsory logging".

There are two very good reasons that we should log all contacts and all transmissions and neither of these are really for the benefit of the operator, but for the benefit of others.

1: One day you may get the dreaded knock on the door from a neighbour about problems with TV reception, etc. If you have an accurate logbook, you can then relate specific times when they seem to have had problems to specific powers and frequencies of transmission. It might also prove that you weren't transmitting.

2: You may not collect QSL cards or awards, but you may receive a QSL card from somebody you have worked and who is desperate to receive proof of your locator square, County, Country or signal report as possibly the last remaining contact for the big award they are going for. Without an accurate log book kept for two or three years, you'll not be able to help.

Finally, everybody was aware of the rules and regulations when they applied for their licence and I would say: "If you don't like the rules, don't ask to play the game!"

**Malcolm Sadler M0BHE**  
Somerset

### Bargain Basement Advertisements

Dear Sir

I second the proposal put forward by **Jack G0RWX**, from Dorking, in the last issue of PW that advertisers inviting enquiries by telephone should give their location.

Several months ago I too was interested in an item which the buyer would have to collect. My telephone enquiry elicited the information that the advertiser was near Aberdeen - too far for me to travel. Thus a long distance national call was wasted, as also was the advertiser's time answering a fruitless enquiry.

I suggest that the last box on the 'Contact Details' grid should be outlined bold and the word **LOCATION** printed to remind advertisers to give this information.

**Bill G0VKO**  
Loos, Cornwall

Dear Sir

Re: 'Letters' page of the August issue of PW and letter headed 'Articles For Sale' - difficulty in locating whereabouts of articles advertised for sale. I suggest that **Jack G0RWX** of Dorking looks at the back pages of his telephone book, where publications are listed.

One such book is *The Phone Book Companion* which lists UK area codes, international codes and a national code decoder. The paperback costs only £2.50. This lists all the codes and not only forwards,

e.g. Basingstoke (01256), but backwards, e.g. (01256) Basingstoke and surrounding villages (specified). I've had one of these books for some time and found it very useful.

If ordered as specified it's added to next telephone bill, the cost that is!

**E W Jones**  
Hampshire

**Editor's comment:** A very useful booklet but let's hope they can keep it up-to-date with the dialling code changes!

### Air Tattoo Tickets - Thanks PW!

Dear Sir

My wife and I left our home at 0715 to go to the Air Tattoo at RAF Fairford in Gloucestershire, thanks to the competition in the June issue of *Practical Wireless*, of which I was fortunate enough to be one of the winners.

After a good journey down there, we busied ourselves looking at all exhibitions, etc. Then came the flying display, what a spectacle, it really was something to behold, with a number of nations taking part.

We departed at about 1830 and soon got onto the motorway back home after a wonderful day out, arriving back almost exactly 13 hours after our departure.

We would both like to say a very big thank you to PW for the opportunity to visit the air show, many thanks to you all and keep up the good work with a superb magazine.

**K M Wells M1ADQ**  
Derby

**Editor's envious reply:** It was our pleasure to help you, and also the RAF Benevolent Fund with publicity. Good luck next year to you and all competition entrants!

### Editor's Surprise & Disbelief?

Dear Sir

In his 'Keylines' editorial, August 1999 PW, the Editor referred, with some surprise and disbelief, that the RSGB seems to be becoming part of the licence regulating authority.

Since the days when the Postmaster General was THE regulating body the responsibility has been progressively unloaded to various disinterested government departments with little knowledge of what they are administering.

Government Ministers and officials, newly in office - or having new responsibilities thrust upon them are very much at the mercy of advisers. In our case, the advice can only come from the RSGB. Natural progression will ultimately place the entire responsibility for licensing with the Society.

The RSGB has always had some influence in these matters. Consider licensing in the period of the 1930s. The initial full transmitting licence at that time would have been obtained with aid from an established member of the RSGB (cooking up a good reason for radiating a signal).

When issued, the initial licence was for 10W power input on the frequency bands: 7MHz and above. To operate subsequently on 3.5MHz, it was necessary to apply through the RSGB to obtain special permission. The same procedure also applied to increase power to 25W. This, remember, is 60 years ago - there is nothing new about Society influence with the licensing authority.

Something new in 1968 was a proposal by the Postmaster General to introduce what he termed a "Beginners licence". The relevant page reporting the matter was *Radcom* April 1968, p.248. This proposal did not receive RSGB approval - in fact the idea was jumped up and down upon until it was flattened and forgotten - nothing more was heard about it.

In recent times, the 'Novice class' licence has appeared - obtained as a result, it's said, of great efforts of negotiation on the part of the RSGB with the licensing authority. This licence could have been introduced 31 years ago if not for the resistance of the RSGB with its advisory tail wagging the submissive dog.

There's nothing new, Guv'nor - are you surprised? With a grin from

**Ray Coley G3IFF**  
Havant

**Editor's comments:** The art of authority is in delegating it, but to remain aware of what is being done on your behalf Ray! Incidentally, the Postmaster General involved with the original 'Beginner's Licence' disappeared (I think it was from an Australian beach) for an apparent 'swim of no return' but re-surfaced in the UK some time later. I can remember the disbelief when he first suggested the licence idea. Did he dive or was he pushed by one of the 'invisible Sir Humphreys, (shades of 'Yes Minister')?

## 'Falling In' With Democracy?

Dear Sir

I belong to an Amateur Radio Club which is most autocratic and several members have tried for a few years to change its rules to make it more democratic. Unfortunately, we have always come up against a brick wall.

For instance, none of the Club Council members are elected to office, but are appointed by the council itself, thus it is self-perpetuating.

One of the Club rules states that "The Chairman and the Council are the only authority empowered to alter the rules of the Club". Another states that "At the AGM the Council may decide not to ratify any decision resulting from a vote taken by the members present".

Two years ago two members put forward a correctly submitted proposal to change the rules of the Club. This proposition was not even put before the meeting!

My question is this - is there any person like an Ombudsman who can investigate the affairs of the Clubs and Societies?

**Dennis Bowden G3PNF**  
Somerset

**Editor's comment:** No - G3PNF is NOT writing about the RSGB! The members of the society involved will easily recognise it's their own organisation involved and hopefully they will 'fall in' with modern democracy. I say no more!

## More On Morse

Dear Sir

Who are these people who refuse to listen to the majority? Especially when it is clear that the Morse test as an entry to the h.f. bands (coming up to the 21st Century, with Internet, data, etc.) is plain silly. Why not an old fashioned ballot and, to save costs, send an s.a.e. for a ballot paper, mark your 'X', send it back and abide by the outcome.

Then, in their wisdom, the same people go for M5 call, which is bound to mean I took it at 12, you got there with 5wpm, yet another division, making a political laughing stock of the hobby and the way it runs.

I am sure that the operator of today sitting in front of his or her black box, the black box that has all the bands: h.f., v.h.f. and u.h.f. is quite capable of operating as good or as bad on h.f. as he or she is on v.h.f./u.h.f.

Of course there is an answer: Scrap the Morse test; Issue the M5 call to all new RAE passes; Don't grant access to the h.f. bands until the M5 licence has been held for one year, giving the new operator a chance to learn and gain experience.

The hobby needs an urgent injection of fresh blood, five w.p.m. is not going to do that, bring the entry to the world of communications to a level the younger generation understand, or run the risk of Amateur Radio being looked at as 'fuddy duddy'.

**Mel Gardiner**  
Suffolk

## And More!

Well Done Jan & Linda!

Dear Sir

I'd like to use your 'Letters' pages to reply to "Jan and Linda". ('Letter under the heading 'Short Straw For The Novice', page 9 *PW* July issue). First, congratulations on passing the Novice exam and especially the 12w.p.m. Morse test! How refreshing to hear of people taking the Morse test rather than spending energy pointing out why they should not.

The answer to your lack of contacts is to use the Morse skill you have acquired. The 3W of c.w. will get you round the world on the right band with the right conditions (See the letter from **2EOARF** on the same page as yours. He describes working into New Zealand despite having hearing problems).

Also, my friend **G3CQR** has just returned from a visit to the USA. He took a home-built QRP c.w. transceiver and worked back to the Yeovil area at least 11 times and he was using 3W.

Ladies, the 'Class A Novice Licence' is a worthwhile one to hold and, dare I say it, in my opinion of more use than a full 'Class B' Novice Licence. The enhanced licence conditions recently announced will make it even better. However, I do think that to really get your money's worth out you should give c.w. a try. With your Morse speeds you will not only get many new call signs in your logs, but new prefixes as well.

**George Davis G3ICO**  
Somerset

## Personal Opinions & Personality Attacks

Dear Sir

I'm taking the opportunity to reply to the Editor's remarks with regard to the letters concerning Morse code (page 9, July *PW*), which he says are more often than not, personal attacks upon fellow amateurs for letters published in the past. Sadly, it's a fact of British life that some enjoy 'slugging others off' in National daily newspapers and weekend tabloids. It is therefore not surprising to find that there are some who carry on the practice, via our journals. I've done it myself, so it comes as no surprise to me that there are some who still persist in personal attacks.

It's unforgivable of us, in our arrogance, both to write the provocative letter in the first place and then have the unmitigated gall to attack another amateur for his or her reply continuing the attack.

We, and I include myself, should be as adept at standing up to the slings and arrows of outrageous fortune, as we are at inciting fellow amateurs with whatever vitriolic missive has been written.

Personally, I enjoy the freedom with which the Editor of *Practical Wireless*, endows the letter writers with. There's little of the sort of sickly sweet 'don't rock the boat' back slapping, etc., that's found in one or two of the other journals. There's lively debate, within the club scene, on air and, fortunately, in the pages of *PW*. It all keeps us on our toes, and up-to-date with relevant subjects and most importantly of all, just who, what, where and why there are 'dinosaurs' still living and working in the British Amateur Radio fraternity. But without the many and varied groups and their opinions 'for' or 'against' (whatever) ... Amateur Radio would be very dull and boring.

Perhaps the Editor should try and edit out most, if not all of the vitriolic language, and return the edited letter to the author. If the editing is not accepted, don't print the author's letter. Why not also ask the authors to send you an s.a.e. with their letters, if they insist on slugging off a fellow amateur?

I also despise Elitism and Elitists and it's a fact of life that many of the so-called leaders of our hobby are themselves guilty of Elitism. It shows up frequently in their letters and their attitudes, at rallies, on air and in journals, which should have known better, but **IF** those letters had not been published, none of us would have known who they were.

**J Davies-Bolton G4XPP**  
County Durham

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COMPILED BY JOANNA WILLIAMS

# Headline News

## Grundig's RF1000

Tim Coates from Vann Draper Electronics Ltd, the Leicester based company, has written to *Practical Wireless* to tell us all about the launch of the new r.f. frequency millivoltmeter from Grundig which is designed, he tells us, for use in broadcast and radio communications applications.

The RF1000 provides a calibrated measurement range of 10Hz to 1GHz and a top frequency of 1.5GHz. It utilises ten input ranges and provides a calibrated readout of the root mean square (r.m.s.) value of the measured voltage for input voltages of < 30µV and the sinusoidal voltage for the higher input levels. Radio frequency power measurement is also possible with a suitable load resistance (50Ω), Vann Draper state.

Ratio measurement on the RF1000 offers a range of -47dBm to +33dBm in seven steps ensuring "excellent resolution" Tim goes on to say, and a rear-mounted analogue output allows the

recording and display of the measured value with external equipment. Vann Draper also state that there's also the chance to purchase an optional adapter which allows the analogue voltage values to be converted and



transmitted to a PC via an RS232 Interface!

The RF1000 comes complete with an r.f. probe, N-plug/socket and insertion head and measures 225 x 85 x 200mm and weighs just 1.8kg. For further information please contact Vann Draper Electronics Ltd, Unit 5, Premier Works, Canal Street, South Wigston, Leicester LE18 2PL. Tel: 0116-277 1400. FAX: 0116-277 3945. Alternatively, you can E-mail them: [sales@vanndraper.co.uk](mailto:sales@vanndraper.co.uk) or visit their Web site: [www.vanndraper.co.uk](http://www.vanndraper.co.uk)

## Charitable Transmission

This month, the *Practical Wireless* news desk received a letter from Fiona Fountain of the British Wireless for the Blind Fund (BWBF) telling us all about their annual fund-raising event - Transmission 99 - an event which is aimed towards raising money for the BWBF and involves Radio Amateurs from all over the world.

The idea of 'Transmission 99' is that any Amateur Radio Club or Individual Radio Amateur interested in helping to raise money should get as many people as possible to sponsor them for every contact they make during the weekend of the October 9 & 10 1999. The money which is raised will help BWBF bring the lifetime companionship of specially adapted audio equipment to UK registered blind people who are in need.

There will be free QSL cards and sponsorship forms plus great prizes to be won so if you're interested please contact the British Wireless for the Blind Fund, Gabriel House, 34 New Rd, Chatham, Kent ME44QR. Tel: (01634) 832501 or E-mail: [margaret@blind.org.uk](mailto:margaret@blind.org.uk) or visit their Web site: [www.blind.org.uk](http://www.blind.org.uk)

Are you an organisation with close links to Amateur Radio? If so, you can help by offering to donate prizes for 'Transmission 99'. The BWBF needs prizes for the club and individual who raise the most sponsorship money for the fund and they would also like to offer some additional prizes for the furthest contact and

for the most contacts, but this depends on the generosity of sponsors and you can help with this. Please contact Fiona Fountain at the above address if you would like to donate a prize.

## World Amateur Radio Day

Bill Felton G3XZF has been in touch with *Practical Wireless* quite a lot recently to keep us up to date with what he is trying to do to encourage more young people into the Amateur Radio hobby. His



Bill Felton G3XZF on, what he termed as, one of his good days.

most recent venture is to take part in World Amateur Radio Day which takes place on 18 September 1999.

He tells us that "with all the changes taking place in the hobby, this event could be an opportunity to improve the future of Amateur Radio. Our hobby needs new, young, enthusiastic and determined people". Bill goes on to say that World Amateur Radio Day will see numerous school and local club stations operating Special Event stations with the aim to both generate and sustain interest in Amateur Radio.

Bill G3XZF puts forward his own plea to other members of the hobby to share their experience and expertise with others as part of a club event and if this happens, then together, you could make the day a success. So, how about it? What can you do to reach out to more people to encourage them into the hobby?

## Coming Soon...So Watch This Space!

The Editorial team on *PW*, with the support of *PW Publishing Ltd.*, are proud to announce the magazine's very own soon-to-arrive Amateur Radio call sign listing CD. Yes, if you've got a CD ROM to use with your

computer you too could soon be using our 'state of the art' CD to full advantage.

Professionally prepared and easy to use, *PW Publishing* will be offering the CD to readers very soon indeed. So, keep your 'eyes

peeled' for further details and perhaps, if you've not got a CD ROM to use with your computer...the new CD 'call sign listing' offer might be the incentive you've been waiting for to invest. Don't miss out!

**Full details next month.**

## Thinking Caps On!

Ray Oliver G3NDS has been in touch with *PW* to tell us about the following RAE & Morse Courses: **Newbury Technical College** is running an RAE course which commences on the 9 September 1999 from 1900-2100 (Course No. 99018A) and a course entitled Morse Code For Amateur (RSCB 5/12 wpm) which starts Tuesday 4 January 2000 from 1900-2030 (Course No. 99210B). **Swindon Technical College** will be running an RAE Course which will commence Monday 20 September 1999 from 1900-2100 (Course No. UFF30S). Further details can be obtained from the colleges: **Newbury Technical College, Tel: (01635) 845215, Swindon Technical College, Tel: 0800-731 2250. Or from Ray Oliver direct on (01672) 870892.**

Ray also tells us that he is running two electronics courses for people who are interested: **Practical Electronics** (Course No. 99032A) starts 15 September 1999 between 1900 & 2100 which covers basic electronics theory with practical emphasis on components, circuit construction and testing. Then there is his **Electronic Construction for Radio Amateurs** (Course No. 99571C) starts 4 May 2000 which is a short course for Radio Amateurs/s.w.l.s to assist those wishing to construct and test their own radio projects. **Details on these two courses can be obtained from the College (01635) 845215 or from Ray on (01672) 870892.**

The North Cheshire Radio Club is also running an RAE and Novice RAE (NRAE) weekly course from Sunday 12 September 1999 starting at 1900. Enrolment can take place on any Sunday from then until the end of November at the **Morley Social Club, Morley Green, Wilmslow, Cheshire.** Contact: **Gordon Adams G3LEQ** on (01565) 652652. FAX: (01565)

## New Home Inaugurated

On April 8th this year the new home of the **Dublin QRP Club, EI2MIE**, was suitably inaugurated and blessed by the **Rev George G3RJV** and **Rob Mannion EI5IW** (airing his 'Irish Whiskey' callsign for the first time!), both great friends of Irish Amateur Radio both north and south. The EI2MIE QRP Club is based at the Marino Institute of Education in Dublin (formally part of the estates of James Caulfield, the first Earl of Charlemont and named after Marino in Italy which he fell in love with whilst on a grand tour). It came about that, after the economic collapse of Ireland in the 19th Century, Lord Charlemont sold his Dublin estate to Trinity College and the Dublin Archdiocese and in 1880 and the Christian Brothers established a college on the Marino lands and it is



**Fig. 1:** And a good time was had by all as the renowned Irish hospitality was turned full on! This photograph was taken at the inauguration of Dublin's Marino Institute QRP Club in April 1990. Seated along side Rob EI5IW (right) is Ron Hall EI4AR, with the George Dobbs G3RJV (left) with Jo Dobbs (G00WH) sat alongside Donal Leader EI5IT, Director of the Marino Institute.

this college campus that is today called the **Marino Institute of Education.**

The QRP Club was set up by the current Director of the Institute, **Donal Leader EI5IT** along with **Bill Ryan EI8BC, John Ryan EI6DG, Ray McCabe EI7AHB, Brother Rory Geoghegan (s.w.l.)** and **Ron Hall EI4AR** to promote QRP, home-construction and c.w.

The Club intends hosting **Celticon**, an Irish Millennium QRP Convention, in association with the **G-QRP Club**, in Dublin in September 2000. This promises to be a full-

featured event that will truly capture the Millennium spirit of innovation and energy, rounded off by a strong Celtic flavour (no it's not true that Sinéad O'Connor will be blessing the event!).

Dublin will be matching London's Millennium dome with its own new public amenities to include a new Liffey-side boardwalk, illuminated bridges, the O'Connell Street Millennium Spike, the new Docklands developments and numerous new cultural centres, including the Smithfield and Temple Bar Galleries and restaurants. However, The Club has not yet negotiated the use of the Millennium Spike for long-wire usage!

**Further details on the planned Celticon event can be obtained by writing to Ron Hall EI4AR at 32 Marino Green, Marino, Dublin 3, Ireland.**



**Fig. 2:** "Tis not as strong as they make it out to be" says Ron Hall EI4AR as he tries to persuade Jo Dobbs G00WH to sample some real 'Irish Whiskey'. Legend says that EI4AR is the Irish version of the famous 'Captain Birdseye' TV advertisement ... but the retired Merchant Navy Radio Officer strongly denies it and claims he's the genuine original!

634560 or by E-mail to: [g3leq@cwcom.net](mailto:g3leq@cwcom.net)

**Warrington Collegiate Institute** will be running weekly RAE courses from **Thursday 16**

**September 1999** starting at 1900.

Enrolment can take place on any weekday at the college's

**Winwick Rd Campus** in Warrington during September, October and November. Contact the lecturer **Gordon Adams G3LEQ** on (01565) 652652 or the College on (01925) 494494.

## GB2HA On Air Again!

**Malcolm Butler G0LMD** has been in touch with *Practical Wireless* to tell us all about



their Special Event station, **GB2HA** for the **HMS Hood Association**, which he says will be on the air again this year on **October 2 1999** from his QTH.

In 1941, the **HMS Hood**

and the **HMS Prince Of Wales** took on the **Bismarck** and the **Hood** was sunk with the loss of 1421 Officers and men. The **HMS Hood Association** was started in 1975 and it has a world-wide membership and the **GB2HA Special**

Event was started on the Association's behalf in 1995.

The bands they will be using this year will be the 3.5, 7, 14, 144 and 430MHz and

**Packet G0LMD@GB7SDN**, the station manager is **QTHR** and also on E-mail at [malc@butler4469.freemove.co.uk](mailto:malc@butler4469.freemove.co.uk)

# RADIO BASICS



Ready to 'snap' into action - the PW 'Basi-Tracer'.

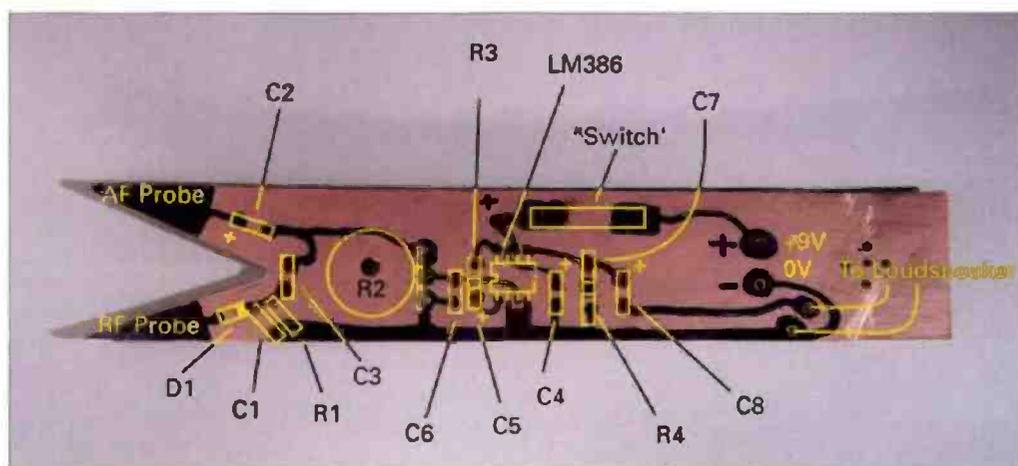
## Building the 'Basi-Tracer'

Rob Mannion G3XFD introduces the 'Basi-Tracer', the second half of a pair of very basic units suitable for fault-finding in simple radio equipment. And with a passing similarity to a small crocodile - it too can 'snap into action' with the 'Basi-Probe' tracing those difficult to locate faults!

Last month I described how you could build a very simple audio frequency (a.f.) multivibrator unit which would generate a signal approximating to a 'square wave' with a frequency of around 2.7kHz. The PW 'Basi-Probe' would provide approximately 9V peak-to-peak and under tests I could still detect harmonics right up to and above 144MHz.

To use the 'Basi-Probe' you connect the 'earth' crocodile clip to the 'chassis' of the unit under investigation and apply the 'probe' pin to inject a signal. If you built the 'Radio Basics' t.r.f. receiver project (September 1998 PW) this will provide a suitable training exercise in using the 'Probe'. **(All references in this section relate to the t.r.f. circuit in September).**

Assuming your t.r.f.



receiver is working, starting your tests at this point, you should hear the tone from the 'Probe' through an amplifier connected at the negative' (darker side of C7 on Fig. 1 on page 17 in September) and at the Gate (G) of Tr2. With the 'Probe' connected to the Gate (G) on Tr1 you should still hear the tone from the

multivibrator clearly - in fact it will probably 'overload' and 'swamp' the detector.

Obviously, if you hear nothing on the amplifier side of C7 you should suspect the amplifier or speaker. If the amplifier is okay and you can hear the multivibrator tone, try G on Tr2. If nothing is heard (or it's at a very low level) suspect this stage. If the stage is working (i.e. you can hear the signal injected through G,

(superhet) receiver, the level of output is lower than you think it should be - this will be because the automatic gain control (a.g.c.) - sometimes called 'automatic volume' control is working! (We'll be covering this later in the series).

## The Signal Tracer

Our project this month compliments the 'Basi-Probe'.

Fig. 2: The 'etch-resist' p.c.b. design drawn onto the s.r.p.b. board ready for etching and with component layout 'overlay' provided. Note the location holes drilled into the material to provide for the loudspeaker aperture (far right), loudspeaker terminals (bottom right), battery connections (marked '+' and '-') and the three for the variable resistor (R2), to the right of the spindle hole for R2 itself.

move on to G at Tr1. If nothing is heard (or it's very low) suspect this stage.

It's a very simple process and **practical experience is very important.** Try it and see and you'll realise what's going on as you progress from stage-to-stage. However, take care and don't become confused if you find that on a portable

In effect the 'Basi-Tracer' provides a hand-held amplifier unit with facilities for tracing audio frequency (a.f.) and radio frequency signals through a circuit.

I opted for a really simple design which combines (hence the two probe tips and 'crocodile' look) to save space. We'll build it this month and I'll go into detail on how you can use them together next time.

## The Circuit

Anyone who built the 'Radio Basics' audio amplifier (page

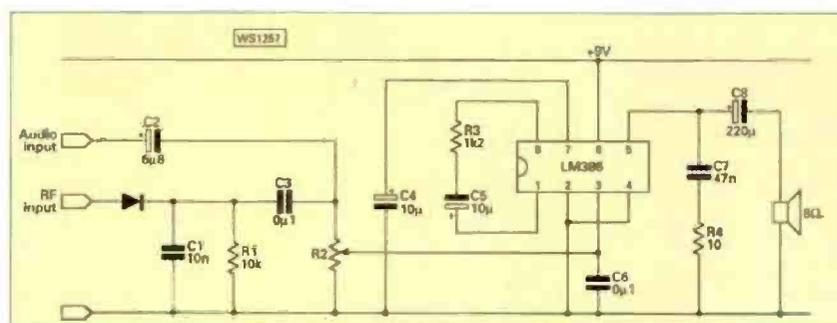


Fig. 1: Circuit of this month's project the PW 'Basi-Tracer', which is presented to compliment the 'Basi-Probe' project described in the September issue (see text).

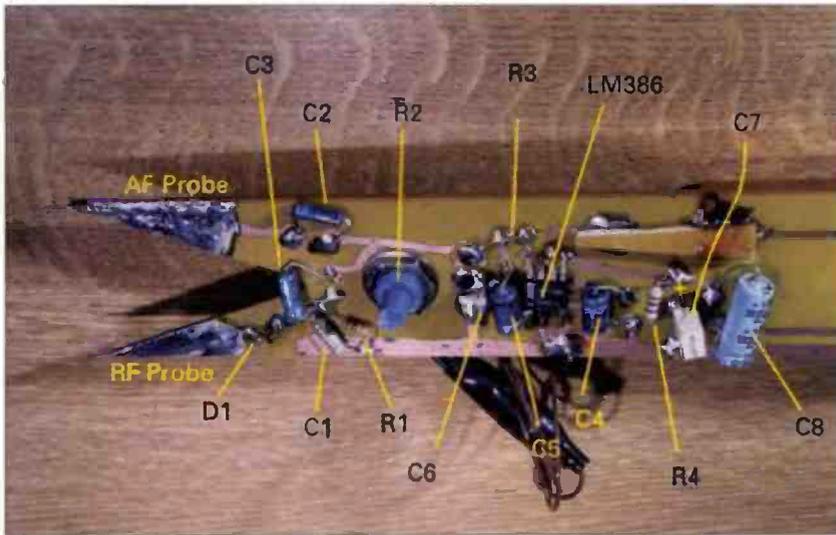


Fig. 3: Close-up photograph of the 'Basi-Tracer' showing the simple 'push on' switch fabricated from p.c.b. (see text). Although in the prototype G3XFD did not use an i.c. socket, this is advised for less experienced constructors. Note the large 'tinned' areas of the probes - the lower is for r.f. and the upper for a.f. (see text).

16, June 1998) will recognise the amplifier circuit, Fig. 1, used in this month's project as that from the amplifier project featured in 'Radio Basics', page 16 in the June 1998 PW. It's very useful indeed and with the precautions taken (the decoupling capacitor C6 is very important) it will prove to be very stable in use.

Very few extra components are required and these are all to the left of R2. The audio input (capacitive, via C2) is simple enough but the r.f. input is via a diode, and is 'decoupled' to earth via C1. This is necessary to minimise r.f. getting into the audio amplifier. Resistor R1 provides a 'load' for the diode and C3 couples the resulting audio into the amplifier. The two pointed 'probes' formed by the p.c.b. are shown as 'Audio input' and 'RF input' in Fig. 1.

To make the unit, copy my (tried and tested) design, (with the component overlay kindly prepared by G1TEX to help you) with a fine marker or fibre-tipped pen onto the p.c.b. material. I prefer not to use sockets for audio i.c.s but I advise that beginners do so.

To mark the position of the i.c. holder correctly, aligning the 'notched' end to point to the left (towards probes, the similarly marked i.c. is aligned in the same way). Then - very gently - mark the end of each individual solder lug with a very fine etch-resist 'dot'. When the dots are dry you can then mark out the 'tracks' as per the design in Fig. 2.

Before you commit the

After etching the board you should wash it clean of etch and dry the board before cleaning off the etch-resist (switch cleaning solvent is ideal). Assemble the components following the photographs I've provided. Attach and solder the battery connector via the solder 'pads', the

loudspeaker wires and the wire leads to the 'volume' control.

Short, sharp lengths of wire (or safety pins - see last month) can be used for the 'probes'. But make sure they're 'clean' to provide good electrical contacts.

The 'cathode' end of the diode (often marked with a dark band or coloured 'bar' should face C1. Attach the earth lead with 'croc' clip and you're ready to go!

## Switch On

After checking for obvious 'short circuits' and seeing that all is well - you can switch on by pressing down on the p.c.b. 'switch' (You can use a 'push-button' or toggle switch here if you wish). With the 'volume' turned up you should hear a 'hiss' from the loudspeaker. Touching the AF probe with a mains powered soldering iron should produce a loud mains 'hum'.

A small speaker connected across the probe and earth lead will provide an audio signal and act as microphone. Tap the (test) speaker gently and you should hear the output on the 'Basi-Tracer' speaker. Try using the 'Basi-Probe' too!

Attaching a short antenna to the RF input should result in several local radio stations being heard. You'll notice that the 'Basi-Probe' signal will sound a little different, and perhaps not quite as loud - but you should hear it okay!

Next time, I'll devote the entire 'Radio Basics' column in describing how you can use these projects together in tracing faults and demonstrate how the 'Basi-Probe' can be used to provide a tone on a dip-meter such as the 'Tinny Dipper'. Cheerio until then!

PW



Fig. 4: Photograph showing simple method of attaching battery and small loudspeaker (1.5in, 38mm diameter) to the rear of the p.c.b. using rapid setting epoxy resin adhesive. Take care that the adhesive does not 'run' under the speaker rim onto the paper cone, but only onto the metal rim of the speaker frame.



Fig. 5: Partners in detecting 'Crime' (faults!). The completed PW 'Basi-Probe' and 'Basi-Tracer' units.

design to the etch-resist pen however, I recommend that you temporarily place the major components (speaker, battery, and volume control, R2) mark their location and drill appreciate sized holes. Then mark out with etch resist.

The photograph, Figs. 3 and 4 provide details of the simple switch (see last month for further details) made from s.r.p.b. 'scraps' together with the speaker and battery mounting.

## Component Sources

The LM386 audio i.c. and recommended socket, 10kΩ variable potentiometer, miniature crocodile clips, and PP3 battery plugs are available from Robin Sykes at Sycom (see advert on page 63, or catalogue presented in July PW).

The small loudspeaker is available for 80p from John Birkett in Lincoln (see advert on page 30). John also has some narrow strips of s.r.p.b. material for 50p ideal for building the 'Basi-Tracer' (please quote 'Radio Basics' for both items, which will be plus P&P).



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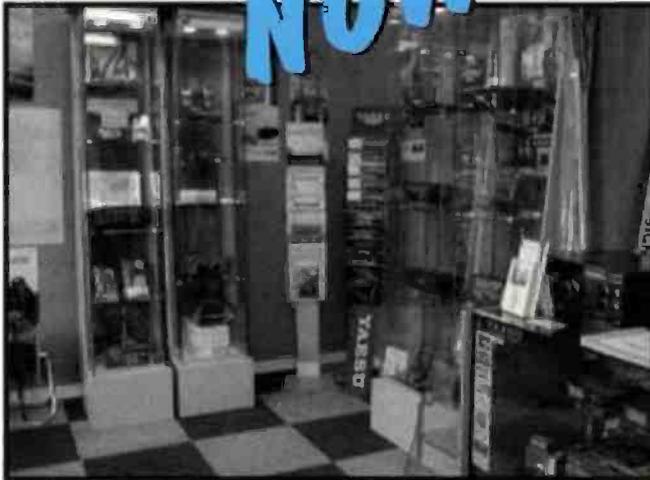
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# RADIO DIARY

**September 11:** The Reddish Rally is to be held at 1000 at St Mary's Parish Hall, Reddish, Stockport. More information from **G4ILA** on **0161-477 6702**.

**September 12:** The Lincoln Hamfest will take place at the Lincolnshire Show ground on the A15, five miles north of Lincoln. There will be extensive free parking and overnight facilities for tents and caravans by previous arrangement. There will also be a licensed bar, catering on the day, trade stands, flea market, Bring & Buy, car boot sale and Morse tests. Talk-in on 2m (144MHz) plus other 'non radio' attractions. Admission is £2 per person (under 14s free). **Bob G3VRD** on **(01522) 533325**.

**\*September 24/25:** The Leicester Amateur Radio Show will be held at the Castle Donington International Exhibition Centre at Donington Park, Castle Donington, Leicestershire. The hall itself is purpose built and features a floor area approximately one third larger than the two Granby Halls combined and the car parking is unlimited and free. More details from **Geoff Dover G4AFJ** on **(01455) 823344**, FAX: **(01455) 828273**.

**October 3:** The Great Lumley Amateur Radio & Electronics Society are holding their rally at the Great Lumley Community Centre, Front Street, Great Lumley, near Chester Street. Doors open 1100 (1030 for disabled visitors). There is free parking and easy access, with good, inexpensive food and drink. There will be radio, electronics, computer, satellite and component stalls, plus a Bring & Buy in two sections - junk and good buys. Admission is just £1,

free of charge for under 14s if accompanied by an adult. Talk-in. More information on **0191-384 2803** or **(01228) 401201** or from the Rally Organiser, **Nancy Bone, 49 South Street, Durham City DH1 4QP**.

**October 17:** The Blackwood Radio, Computer & Electronics Rally is to be held at the Newport Centre, South Wales, one mile from junction 27 on the M4. Opens at 1030/1100 and the entrance fee is £1. There will be a Bring & Buy, Talk-in, Trade stands, special interest groups, a licensed bar, catering, disabled facilities and family attractions. Located in the centre of Newport and immediately adjoining a free open air car parking (Sundays) and the bus station, quarter of a mile from the railway station, one mile from junctions 25A, 26 and 28 of the M4 and 15 minutes from the Second Severn Crossing providing easy access. Further information can be obtained from **Stuart Instone GW0NPL** on **(01495) 243824/(07970) 777756** or E-mail: **fireham@aol.com**

**October 17:** The Portland ARC's annual radio rally will be taking place at the Royal Manor School in Weston Rd on Portland from 1000-1500. Admission will be £1 (including lucky programmes). There will be traders, live demonstrations of WX satellite images, craft stalls, refreshments, Talk-in, etc. For further information contact **Mrs Chris Haddon, 1 Victoria Place, Easton, Portland, Dorset DT5 2AA**. E-mail: **mal@malheddon.freemove.co.uk**

**October 24:** The Galashiels & DARS is to be held at The Volunteer Hall, St. John Street, Galashiels, Scottish Borders. Doors open at 1100 (disabled access from 1045). There will be all the usual attractions. **Jim**

**Keddie GM7LUN** on **(01896) 850245**. E-mail: **jimk@gm7lun.freemove.co.uk**

**November 6/7:** The Thirteenth North Wales Radio & Electronics Show is to be held at the North Wales Conference Centre, Llandudno. The show opens at 1000 both days and the entrance fee is £2 for adults and under 14s free, when accompanied by an adult. There will be a Clubroom and an extensive Bring & Buy. More information from **M. Mee GW7NFY**, Rally Secretary on **(01745) 591704** (combined telephone and FAX number).

**November 14:** The Great Northern Hamfest is to be held at the Metrodome Leisure Complex, Queens Road, Barnsley, near to town centre, less than two miles from junction 37 M1 motor way, just five minutes walk from train and bus station. Doors open at 1000 and admission is £2. The venue is all on one level with excellent disabled facilities. There will be the usual trade stands, component and specialist interest groups and a large Bring & Buy. Morse tests on demand, from 1200 till 1500 (don't forget to bring two passport photos and the appropriate fee with you). Talk-in on 145.550MHz. **Ernie G4LUE** on **(01226) 716339** or **(0836) 748958** between 1800 and 2000.

**November 14:** The Midland Amateur Radio Society are holding their 11th Radio & Computer Rally at Stockland Green Leisure Centre, Slade Road, Erdington, Birmingham. Doors open at 1000. There is a large free car park, free hampers draw, trade stands, local clubs and special interest exhibits. For trader information call **Norman G8BHE** on **0121-422 9787** or for general information, call **Peter G6DRN** on **0121-443 1189**.

**November 14:** The Bishop

Auckland Radio Amateurs Club (BARAC) Rally will take place at Spennymoor Leisure Centre. Please note this is a venue ideally suited to both trader and disabled, as it boasts good parking and easy access to a large ground floor. There will be the usual radio, computer, electronics and Bring & Buy stalls, as well as catering and bar facilities. Morse tests are available on demand. As you can imagine, there is a lot to do within the confines of the leisure centre, for those of the family not interested in radio. Doors open 1100 (1030 for disabled access) and admission is just £1, under 14s free of charge if accompanied by an adult. Talk-in on S22. **Keith M0BLN** on **(01388) 601401** or **(0374) 417660**.

**November 21:** The West Manchester Radio Club are holding their Red Rose Rally at Horwich Leisure Centre, Horwich, Bolton, off Jnc 6 M61. Doors open 1100, 1030 for disabled visitors. Admission by programme, which costs £1.50, £1 for OAP on the door. There will be the usual stands, plus refreshments and a Bring & Buy. **Don Aitchison G3BSA** on **(01942) 871620**.

**November 21:** The Bridgend & District Amateur Radio Club are holding their 13th Radio & Computer Rally at the Bridgend Recreation Centre, Bridgend, Mid-Glamorgan. Doors open from 1030, admission is £1.50. All the usual radio and computer traders, licensed bar, Bring & Buy, refreshments, family attractions and free parking. Plenty of room for visitors to mingle and browse, signposting will be from junction 35 of the M4. Talk-in on 145.550. More details from **Maurice GW0JZN** on **(01656) 864579**, FAX: **(01656) 864579**.

**\*November 27/28:** The London Amateur Radio & Computer Show is to be held at the Lee Valley Leisure Centre, Picketts Lock Lane, Edmonton, London N9 0AS. The Lee Valley Leisure Centre has modern facilities, well illuminated halls, extensive free parking and easy access by roads.

If you're travelling a long distance to a rally, it could be worth phoning the contact number to check all is well, before setting off.  
The Editorial Staff of PW cannot be held responsible for information on Rallies, as this is supplied by the organisers and is published in good faith as a service to readers. If you have any queries about a particular event, please contact the organisers direct. - Editor

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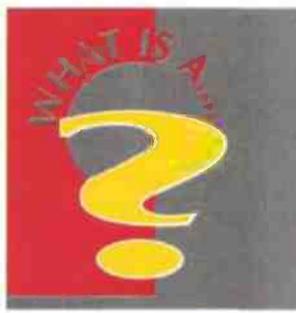
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# MOSFET?

## PART TWO

This month Ian Poole G3WYX follows on from his last instalment and takes a further look at 'What Is A ... MOSFET?'

In the last 'What Is A?', I looked at the enhancement mode m.o.s.f.e.t. and saw how a potential applied to a control gate insulated from the main channel could control the current flow. This month, I'm going to look at the depletion mode m.o.s.f.e.t. These devices are very similar to the enhancement mode f.e.t.s, using many of the same principles. However, as the name suggests, a potential applied to the gate reduces the current that can flow through the channel.

### Structure Similar

As might be expected, the structure of a depletion mode m.o.s.f.e.t. is very similar to that of an enhancement mode device. The main difference, though, is that a lightly doped conductive channel is placed into the device as a permanent feature during fabrication.

A diagram of an n-channel device is shown in Fig. 1. Here it can be seen that a p-type substrate is used. The n+ regions are used for the source and drain and an n-region is used as the channel.

For high frequency applications, the channel is kept as short as possible to reduce the carrier transit time (i.e. the effective time it takes for an electron in this case to travel between the source and the drain). An oxide layer is set down and this normally overlaps the source and drain areas slightly, then the gate contact is

laid down on top of this layer. Materials for the gate contact vary - for the enhancement f.e.t. the gate can be made from metal but polysilicon and some specialised metal compounds and even silicides are often used. These are required to maintain compatibility with the temperatures required in the processing techniques.

### Basic Operation

Let's now look at the basic operation and, unlike the enhancement f.e.t. (which is normally termed an off-device because it does not conduct when no gate potential is applied), the

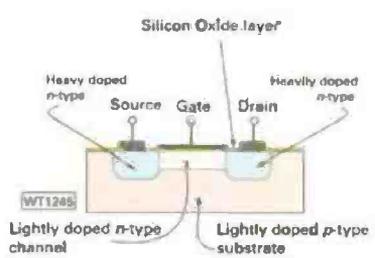


Fig. 1: Structure of a depletion mode m.o.s.f.e.t.

depletion device is normally on and will conduct electricity when no gate potential is applied. This occurs because there is an n-region between the drain and the source that acts as a conduction channel. It can also be noted that the presence of this conduction channel means that there are no p-n-junctions in the path as in the case of the enhancement f.e.t.

If a negative voltage is applied to the gate with respect to the source, then the resulting field changes in the channel of the f.e.t., causing the free electrons to be repelled and thereby making the channel less conductive. As a result we can see that it's possible to control the current flowing in the channel by varying the voltage applied to the gate.

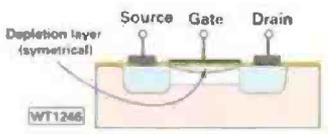


Fig. 2: Depletion layer when there is no drain-source voltage.

### Depletion Layer

With no potential applied between the drain and the source, a potential applied to the gate will cause a depletion layer to be formed. This extends into the channel region reducing the area for conduction and thereby reducing the conductivity of the gate. It can be seen in Fig. 2 that the depletion layer is symmetrical about the centre of the gate.

As with other types of f.e.t., the depletion region is not only influenced by the electric field from the gate of the device, but also the potential gradient along the channel. This means that the potential difference between the gate and any given position on the channel varies and, in turn, results in a wedge shaped depletion layer when a voltage is applied to the gate as shown in Fig. 3.

### Particularly Useful

The m.o.s.f.e.t. is a particularly useful device, enjoying widespread use as a discrete component as well as being widely used in integrated circuits. In fact, it's the most widely used form of transistor found in integrated circuits.

In terms of performance, it has a high input impedance, low input capacitance and a high speed capability. This makes it a very useful component for r.f. applications. It's also relatively inexpensive to produce and the fabrication techniques required for its manufacture mean that the yields are relatively high.

So far I've looked at f.e.t.s that have only one control gate. However, it's perfectly possible to use two gates to control the conductivity of the channel region as shown in Fig. 4a.

The second gate is a particularly useful feature, it provides improvements in terms of performance when the device is used as an ordinary r.f. amplifier and flexibility, allowing it to be used more conveniently in a number of applications. When used in an r.f. amplifier, the

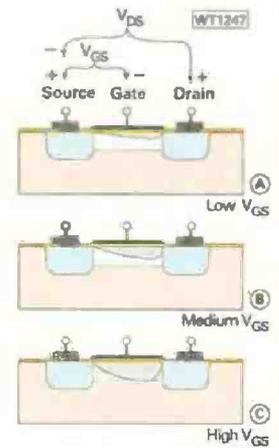


Fig. 3: Depletion layer when a drain source voltage is applied.

second gate can have a fixed bias, or when altered it provides a means of changing the gain.

Dual gate m.o.s.f.e.t.s are also widely used in mixers. The signal is applied to the first gate and a

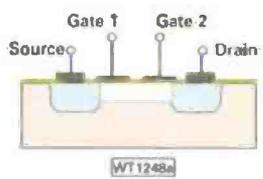


Fig. 4a: A dual gate m.o.s.f.e.t. showing how you can use two gates to control conductivity of the channel region. Note that the Source and the Drain are conductive contacts and pass through the silicon oxide layer and both Gate 1 and Gate 2 are insulated and don't pass through the silicon oxide layer.

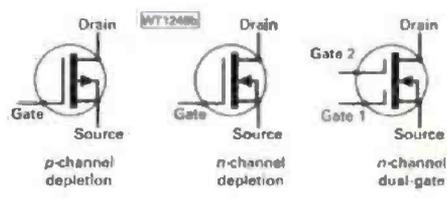


Fig. 4b: Circuit symbols showing an n-channel m.o.s.f.e.t., a p-channel m.o.s.f.e.t. and an n-channel dual gate m.o.s.f.e.t.

local oscillator signal applied to the second. In this way, a large degree of isolation is obtained between the signal and local oscillator ports. The local oscillator signal should be sufficiently large to completely turn the device on and off.

Next time I'll take a look at the v.m.o.s. f.e.t. For anyone wanting to take a look at some of the terms used in semiconductor fabrication there is more information on my Web site at: [http://website.lineone.net/~ian\\_poole](http://website.lineone.net/~ian_poole)

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# Running Around With ... The Hard-Working Alinco DJ-V5!

Richard Newton GORSN quite happily agreed to review the Alinco DJ-V5 hand-held when *Practical Wireless* asked him and he gave this 144/430MHz dual-band hand-held a good run for its money! But did he like it and did it withstand his various tests? Read on to find out!

I find it interesting seeing how equipment develops. We have seen hand-held equipment shrink from being the 'Talking Brick' to the ultra light, ultra small 'sneeze and lose it' radio. We have also seen the simple to operate, good-sized radio become the radio that you need a Master's Degree and a magnifying glass to operate and so it's with genuine interest that I take a look at new hand-held radios. I recently received the **Alinco DJ-V5 144/430MHz dual-band hand-held transceiver** from *Practical Wireless* who asked me if I would have a look at it.

There seems to be a renaissance taking place in hand-held design at the moment. We seem to be going back to the good old days when hand-held radios made no excuse for being large enough to perform well and, although having the features we all want, remained easy to use. The Alinco DJ-V5 seems to fit this bill.

The Alinco DJ-V5 is a 'one band at a time' three band radio which covers the amateur 144 and 433MHz bands as a transceiver and the v.h.f. f.m. broadcast band as a receiver. It's supplied with a 6V 700mAh NiCad battery pack.

It's not clear from the handbook what the highest power output is on battery power but it would appear to be about 2W with 1W on medium with 0.5W on low power. However, the transceiver gives an impressive 6W out on 13.8Vd.c.

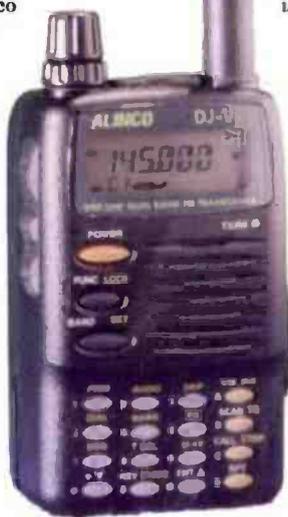
The radio comes with a clip on/clip off belt clip and carry strap as well as an instruction manual. It also comes complete with a wall charger that charges the supplied battery pack (See Fig. 1) in about 12 hours.

## Squat & Square

The Alinco DJ-V5 has an interesting shape. It's more squat and square than the normal rectangular shape radios and is definitely different but in a likeable way.

It took a little while to get used to its size and shape but it actually fitted in my hand very well. The 'build quality' seemed to be good, the antenna connection is an SMA type and the radio has the familiar 3.5/2.5mm jack socket-pair for the speaker/microphone extension on the top of the transceiver. (See Fig. 2).

The display on the DJ-V5 is of a good size and, in my opinion, the controls are very neatly laid out, well labelled and easy to operate. The rotary tuning and volume controls are on the top of the unit and, despite being a dual knob control, they don't interfere with each other at all. The **Press To Talk (PTT)**, **Monitor** (squench defeat) and **Lamp** control buttons are on the side of the radio (see Fig. 3) whilst the remainder of the controls can be found on the front panel.



The "hard-working" Alinco DJ-V5.

## Ease Of Operation

I feel that the Alinco DJ-V5 is designed for ease of operation and an example of this approach is that the rather efficient back light is operated from one touch and lights up the display and most of the front panel controls. The **Band** change control is once again a one button press away and the control is prominent on the front panel.

Another favorite of mine is the **Reverse Repeater** option being a primary one-press control. The Reverse Repeater option is used for checking whether you can receive a station simplex when you're talking with them through a repeater. I tend to use this facility a lot as I favour simplex contacts wherever they are possible.

This transceiver has a DTMF keypad on the front panel which can be used for the direct inputting of a desired frequency, transmitting DTMF tones or to access the **many advanced facilities** on the Alinco DJ-V5. These include **full CTCSS** and **DSQ** selective squelch systems and the ability to alphanumerically name memories and various scan modes - to mention but a few.

## First Test

The first test I gave the Alinco DJ-V5 hand-held was to listen on the (Band II) 'f.m.' v.h.f. broadcast band and I have to say that the results were excellent! The DJ-V5 **out performed** my bedside clock radio and the sound quality was marvellous considering that the Alinco has got a relatively small



Fig. 1: The DJ-V5 comes complete with battery pack and here you can see it detached from the front of the radio.



Fig. 2: Top view of the Alinco. "... the antenna connection is an SMA type and the radio has the familiar 3.5/2.5mm jack socket-pair for the speaker/microphone extension on the top of the transceiver".

speaker and is obviously not a stereo receiver. I was very impressed, even when I was away in the family caravan, the hand-held Alinco did us proud as far as the broadcast band was concerned.

The receive performance seemed just as impressive on both the amateur bands. I was able to hear the local Bournemouth repeaters on both 144 and 433MHz. From my garden in Bournemouth, I could also hear the Salisbury and Weymouth repeaters on the 433MHz band - not bad for the supplied helical antenna!

I decided to take the DJ-V5 away in the caravan over the weekend of the Longleat Rally in Wiltshire. We make this a family weekend away and have a bit of fun looking round the radio rally.

The radio was in constant service, keeping me in touch with my Father-in-law, Terry G7VJJ, my brother, William G7GMZ and my Dad John G8EAM around the rally site. The little hand-held performed very well indeed and received favorable reports on the audio.

As some of you may have read in Rob's 'Keylines' (September issue of PW), shortly after attending the Longleat Rally and helping me put the review radio through its paces (as he so often did), my Dad sadly passed away. I must confess I'm going to miss mentioning him in reviews to come.

### Simplex Contacts

I was impressed with what I had seen and heard of the Alinco DJ-V5 and so I decided to give it a bit of a try out on simplex. I feel that it's difficult to get simplex contacts with a hand-held and so I decided to take drastic action. I drove to Exmoor and with my wife, Diane and my two sons Thomas and Oliver and took the DJ-V5 on a small hike to Dunkery Beacon which is the highest point on Exmoor, 520m above sea level (a.s.l.), near to Minehead in Somerset.

I put out a simplex CQ call on 145MHz and Stan G3RNB from near Williton (about 26km away) answered. He was not able to give me a terribly good report but I was receiving him a good 5 and 5. The weather was not too

good up on the hill and the wind was blowing rather strongly which was to prove rather a problem as it had an adverse effect on my transmitted audio as it blew across the internal microphone.

I next tried a few calls on the 433MHz band. These calls were unanswered so, in desperation, I decided to see if I could open any repeaters. I finally managed to open a repeater on 433.000MHz and spoke to Neil M1DTC in Exmouth.

Neil told me that I was a very nice signal into the GB3EX repeater. Thanks to the geographical information system, 'Psi-Mapper' on my series 5 Psion, I am able to say that the distance between my location and GB3EX was just over 74km. Now I don't think that that is bad for a hand-held on a helical antenna! I guess it says something for the repeater's receiver tool!

I had a very pleasant QSO with Neil who, by the way is 14 years old! Neil told me that the hobby isn't attracting new and interesting people! Good luck with that Morse test too Neil!

After that QSO I decided to go back to 145MHz and try for another simplex contact. After several unanswered CQ calls, I tuned round and heard two Welsh stations chatting away. I called 'break' and they kindly let me in.

Another very pleasant QSO followed with Maurice GW0JZN between Cardiff and Bridgend and Jim

GW3SSK/P in Porthcawl - Maurice was about 48km away from me, Jim was about 42km away. Both gave me excellent reports and I was able to give them 5 and 9 reports too. The only thing with this QSO was that they both told me I had a bad wind problem! Thanks guys!

Visibility wasn't too bad up on the beacon so I could see the Welsh coast quite well and after having had a good old chat, I waved cheerio (metaphorically speaking) to Maurice and Jim and made my way back down the hill.

The Alinco DJ-V5 impressed me. I only used it with the supplied battery pack and antenna and the radio worked very well indeed. It's not the lightest hand-held radio I've ever tried, nor do I think it's the best looking to be honest, but that is a personal preference.

I quickly got used to the slightly squat and wide shape (those who know me may feel I have a certain empathy with the Alinco DJ-V5 in this respect!) of the radio and I have to confess, it was a bit of a wrench having to hand it back.

It is a good, hard working and well-made unit that gave me hours of fun. My thanks go to Mike Devereux at Nevada for the loan of the Alinco DJ-V5 hand-held

which costs £199.95 plus £8 P&P. You can contact Nevada at 189 London Road, North End, Portsmouth, Hants PO2 9AE. Tel: 0239-266 2145. Or hunt them down at the Leicester SHow (stand 11)

PW

### Specifications

<b>General:</b>	
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Transmitter range	144.000-145.995MHz 430.000-439.995MHz
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Freq. stability	±7.5ppm ±10° C to ±60° C
Antenna impedance	50Ω
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Ground	Negative
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Temperature range	-10° C to +60° C
Dimension	58mm(w) 97mm(h) 40.3mm(d) without projections with antenna and battery approx. 335g
*wide-band receive expands to 76-99MHz	
<b>Transmitter:</b>	
Power output	5W
Modulation	variable reactance
Max. Deviation	±7.5 kHz
Spurious emissions	-60dB or less
Microphone impedance	Approx. 2kΩ
<b>Receiver:</b>	
System	Double conversion superheterodyne
First I.F.	f.m. 39.15MHz
Second I.F.	f.m. 450kHz/w.f.m. 13.35kHz
Sensitivity	w.f.m. 0dBμ 144MHz band 16dBμ 430MHz band 15dBμ
Selectivity* except w.f.m.	-6dB/12kHz or over -60dB/30kHz or less
Spurious response	60dB or over
A/P output	500mW or over 8Ω
AF load impedance	8Ω



Fig. 3: Side view of the DJ-V5 which shows you the Press To Talk (PTT), Monitor (squelch defeat) and Lamp control buttons.

"... I have to confess, it was a bit of a wrench having to hand it back".

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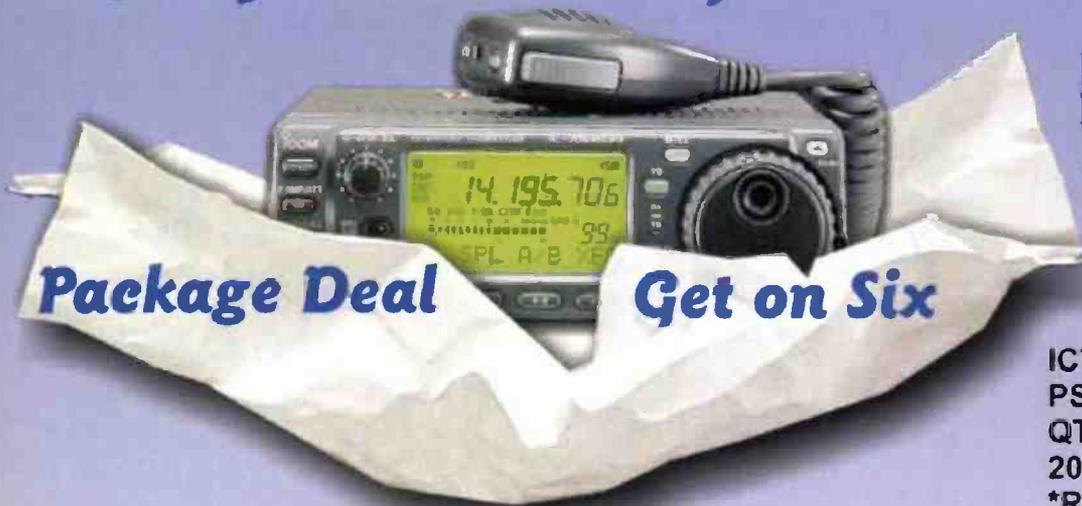


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# Part One Of Our Introduction To Microwaves Series...

## Get Going On Microwaves!

David Butler G4ASR, our resident 'VHF Report' columnist, brings you the first of a three part series on microwaves - what they are, what they can be used for, what activity can be expected on the microwave bands and the difference between them and the h.f./v.h.f. bands - plus much more besides.

If I suggested to you that you should get going on microwaves you might think of appliances for cooking food! However, this article is not about developing your culinary techniques but about Amateur Radio operation on super high (s.h.f.) or microwave frequencies.

But just where are these so-called microwave bands? If you look at the chart in Fig. 1, you'll see that I've given details of the radio frequency spectrum and associated band descriptions. Strictly speaking, the region between 1-30GHz is known as the **microwave spectrum** and the bands between 30-100GHz is known as the **millimetric spectrum**. But, for the purpose of this article, I'm going to describe all bands from 1GHz and up as microwaves.

In the UK there are ten amateur bands in the microwave region between 1.2 and 250GHz and I've shown them all in the chart in Fig. 2. One column shows the wavelength, as many of the lower s.h.f. bands are often referred to in this way. On the right hand side is the band designator, as used in the UK and by Amsat (amateur satellite) organisations. This coding originated during the Second World War to confuse the enemy but, unfortunately, it still continues to cause confusion as some other countries use alternative band designators!

So, what can you use these bands for? The answer to that is quite simple - you can use the s.h.f. bands for the same purpose you would for the h.f., v.h.f. or u.h.f. bands and a whole lot more.

### Any Modulation Technique

In the UK you're permitted to use any modulation technique, including pulse, for transmissions including telephony, Morse, radio teletype (RTTY), data (such as AX25 Packet radio), facsimile (FAX), slow scan television (SSTV) and fast scan television (FSTV). Among the modulation modes you can use are amplitude modulation (a.m.), frequency modulation (f.m.) and single side band (s.s.b.) to name but a few.

Narrow band modes, that is transmissions with a bandwidth less than 3kHz, such as s.s.b and c.w., are used primarily for over the horizon DX working. This is essentially a weak signal mode using state-of-the-art equipment based on conventional transceiver practices. Low noise pre-amplifiers, high power amplifiers (band dependent) using valve or solid-state devices and highly optimised antenna systems with Yagis or parabolic dishes are typical of the type of narrow band system in use today.

Belgian microwave operator ON6UG using a small dish to receive S-band signals from North America via the AO-13 satellite.

Communication via amateur satellites is also possible. The AO-13 satellite had a downlink in the 2.4GHz band and only needed a simple antenna to receive its transmissions. The photograph, below, shows ON6UG using a small dish to receive S-band signals from North America via the AO-13 satellite.

The Phase-3D satellite (which may get launched later this year) has a number of microwave transponders. The satellite has a 50W transmitter on the 2.4GHz band and a 10W transmitter on the 5.8GHz band. But that's not all, it also has a 'whopping' 60W amplifier on the 10GHz band and a 1W transmitter on the 24GHz band. The P3D satellite will also be able to receive signals in the 1.3GHz, 2.4GHz and 5.6GHz bands as well as frequencies in the h.f., v.h.f. and u.h.f. bands.

### Ideally Suited

The wide open spaces of the s.h.f. bands are, however, ideally suited to wide band transmission modes.

That's because all Amateur Radio bands in the microwave spectrum have large bandwidth allocations. At 1.3GHz the band is 85MHz wide, on 10GHz it's 500MHz and at



248GHz there's 2000MHz of band available.

Of course, the respective band plans don't allocate all this bandwidth to wide band modes but nevertheless large chunks of each band are available for such modes. These transmissions can include f.m. telephony (or m.c.w. - tone modulated c.w.), digital modes and Amateur Television (ATV).

Telephony transmissions using frequency modulation on the 10GHz band can be made using very simple equipment (which I'll describe next month) costing only a few tens of pounds. This type of system is ideal for the novice constructor and will enable local line-of-sight contacts to be made. On the 1.3GHz band there are a number of speech repeaters just like you would find on the v.h.f. and u.h.f. band. The coverage area for these units will be less than you experience on the 430MHz band though.

Two transmission modes, data and television, are particularly appropriate for use on the microwave bands. Packet radio on the 144MHz band currently uses audio frequency shift keying (a.f.s.k.) at 1.2kb/s (kilobits per second) typically in an audio bandwidth of 3kHz. With careful circuit optimisation it's possible to increase this to 2.4kb/s in the same audio bandwidth.

If you by-pass the audio stages and connect directly to the f.m. modulator/demodulator, it's possible to achieve a data rate of 9.6kb/s in an occupied bandwidth of 16kHz by using frequency shift keying (f.s.k.). However, even greater data rates can be achieved by increasing the bandwidth or by using a modulation scheme such as quadrature phase shift keying (q.p.s.k.). A rate of 2Mb/s (megabits per second) can easily be accommodated in a 5MHz wide channel making it ideal for high speed data links connecting Packet radio nodes together.

Colour ATV, using f.m. modulation, is gaining in popularity especially on the 1.3GHz and 10GHz bands. Inexpensive surplus satellite television equipment can be used on both bands. The low-noise block converter (l.n.b.) can be easily modified to work on the 10GHz band and a standard satellite integrated receiver/decoder (i.r.d.) with a typical tuning range of between 900-1900MHz already covers the 1.3GHz band making reception very easy. Surprisingly, there are also ATV repeaters with a number of units on the 1.3GHz and 10GHz bands located around the UK in areas of high activity.

Many operators, perhaps restricted by local circumstances at home, are only active during contest periods. There are contests on h.f., v.h.f. and u.h.f. so why not on the microwave bands? In fact they already exist thanks to the hard work of the **RSGB Microwave Committee** and the **VHF Contest Committee**.

For 1999, the Contest Committee have arranged eight events specifically for the 1.3GHz/2.3GHz bands, the v.h.f. national field day contest which includes the 1.3GHz band and a 430MHz and up contest covering all microwave bands.

The Microwave Committee have concentrated on encouraging activity on higher frequencies with four contests periods for the 24GHz and 47GHz bands and seven events for the 10GHz band. In addition, the committee have arranged three contests covering all the microwave bands and five non-competitive activity days. There's an event every month throughout the year and you don't need to be an RSGB member to enter the Microwave

Committee contests. Indeed you don't need to be a member of anything if you just want to make contacts!

For many years all microwave operation was conducted from hill tops and was restricted to line-of-site paths. This was because the technology was largely undeveloped consisting mainly of waveguide-based systems using low power klystrons (a type of microwave valve) and, in later years, solid-state Gunn diodes. As such, there was virtually no home operation (if any) and portable activity was restricted to pre-arranged tests or to contest activity periods.

However in the mid-1980s there was significant development in sensitive narrow band equipment. This and the later availability of surplus satellite equipment led to a shift from the hill-tops to activity from the home QTH. Nowadays, there's something like a 50-50 split between portable and fixed station operation on the microwave bands.

## To Recap

So to recap, you can use the microwave bands for local communication using wide band telephony, data or television transmissions and for weak signal DX working beyond the horizon via tropospheric enhancements or world-wide using amateur satellite communications. But there's one attraction I haven't mentioned yet and that's to do with experimentation and pushing back the limits of what is possible on the microwave bands.

It's true to say that a few years ago there was very little commercial equipment available and s.h.f. construction was somewhat of a black art. However, all that's changed now. It's not difficult to build a simple transceiver and you don't need a degree in microwave engineering. The availability of kits, surplus equipment and knowledge built up over the past decades means that the competent constructor can easily become active on the microwave bands.

Indeed, the era of 'plug-n-play' microwaves, certainly for the 1.3GHz and 10GHz bands, has

## Fig. 1: Radio Frequency Spectrum.

FREQUENCY RANGE	DESCRIPTION
3-30KHz	Very Low Frequency (v.l.f.)
30-300kHz	Low Frequency (l.f.)
300kHz-3MHz	Medium Frequency (m.f.)
3-30MHz	High Frequency (h.f.)
30-300MHz	Very High Frequency (v.h.f.)
300-3000MHz	Ultra High Frequency (u.h.f.)
3-30GHz	Super High Frequency (s.h.f.)
30-300GHz	Extra High Frequency (e.h.f.)

Note:  
1000kHz = 1MHz  
1000MHz = 1GHz

Fig. 1: Table giving details of the radio frequency spectrum and associated band descriptions.

Fig. 2: There are ten amateur bands in the microwave region between 1.2 and 250GHz in the UK. One column shows the wavelength, as many of the lower s.h.f. bands are often referred to in this way. On the right hand side is the band designator, as used in the UK and by Amsat (amateur satellite) organisations.

## Fig. 2: The Ten Microwave Amateur Bands

BAND (MHz)	FREQUENCY (GHz)	WAVELENGTH (mm)	DESIGNATOR
1240-1325	1.3	230	L
2310-2450	2.3	130	S
3400-3475	3.4	90	S
5650-5850	5.7	60	C
10 000-10 500	10	30	X
24 000-24 250	24	12	Q
47 000-47 200	47	6	-
75 500-76 000	75	4	-
142 000-144 000	142	2	-
248 000-250 000	248	1	-

**"If you want to gauge activity in your area take a listen on 144.175MHz, the microwave talkback calling frequency."**

already arrived. But there's still a great deal left to do! So, if you like home-brewing, modifying equipment and experimentation then the bands between 1.3GHz to 250GHz could just be what you've been looking for.

### Activity On The Microwave Bands

What sort of activity can you expect on the microwave bands? First up, I should mention that it won't be like 14MHz! Although there are perhaps 500 stations in Europe active on s.h.f. you won't normally find them by casually tuning around the bands. The activity depends on the frequency band, the transmission mode, the prevailing propagation and whether there's a contest or activity period.

The 1.3GHz band is quite popular because of the commercial availability of equipment. Even so, you're unlikely to find stations using c.w. or s.s.b. as a matter of course, unless tropo conditions are really good. This band does support a number of TV repeaters and you may be fortunate to have one within your locality. If you do, then it means there are some ATV enthusiasts very close to your home QTH!

The 2.3GHz, 3.4GHz and 5.7GHz bands have been very much under utilised and you will probably need to find another local station with whom you can carry out tests and get your system going. However, there has been growth in stations building for the 2.3GHz band because of development and production of a transverter kit by Charles Suckling G3WDG.

Also, a number of stations have been building or modifying equipment for the amateur satellite band at 2.4GHz and this is expected to grow when the P3D satellite gets off the ground. The 3.4GHz and 5.7GHz bands are also slowly gaining in popularity with the release of surplus 4GHz/6GHz terrestrial and satellite communication equipment.

The most popular microwave band in the UK is the 10GHz band with over 150 stations active. It's even more popular in mainland Europe, especially in Germany. The narrow band enthusiast is well catered for with a number of commercial transverters available ready built or in kit form. Surplus equipment can also be found which can be pressed into service on this band. The 10GHz band is also popular as it supports a large contingent of operators active on wide band speech or television modes. The growth area is in ATV with easily modifiable satellite TV equipment.

Having gained experience on the 10GHz band, a small number of experimenters have moved on to the 24GHz and 47GHz bands. The numbers are very small, maybe 30 or so on the 24GHz band and less than ten on the 47GHz band. These are definitely bands where you need a buddy!

The microwave bands on even higher frequencies 75GHz, 142GHz and 248GHz are for the real enthusiast with access to the very specialised components and test equipment and I don't know of anyone in the UK building equipment for these frequencies. Imagine a half-wave dipole only 0.5mm long!

### What's The Difference?

What makes the microwave bands different from say the h.f. or v.h.f. bands? Unlike frequencies below 1GHz the microwave bands are unaffected by ionospheric conditions - by ionospheric conditions, I mean events such as Sporadic-E (Sp-E), Aurora, E-layer and F-layer propagation. In fact, anything that takes place in the ionosphere. These are the modes of world-wide communication.

Propagation on the microwave bands is mainly determined by what occurs in the troposphere. This normally restricts s.h.f. communications to line-of-sight paths. However, just as you observe 'lift' conditions on the 144MHz band so the microwave bands are similarly affected extending the range well beyond the visible horizon. Contacts via tropo enhancements can then be made up to 1000km and sometimes further.

Sea paths, such as between Cornwall and Scotland or across the North Sea or English Channel are very conducive to marine ducting. Super-refractive ducts can form over the sea, creating an almost loss-less 'virtual' waveguide, enabling contacts to be over the horizon for considerable distances.

Interestingly, although rain will cause attenuation (just like on the v.h.f. bands) it can also allow contacts, on bands such as 5.7GHz and 10GHz, to be made via rain scatter with stations up to 500km or so away. During intense rain storms, the clouds act as metal-like reflectors in the sky from which you bounce your microwave signals. You need to know exactly where they are though!

Another type of scatter which works well at microwave frequencies is tropospheric scatter. This requires high power and sensitive receivers and relies on differing refractive indices in the troposphere to refract the signal beyond the horizon. It's a weak signal mode ideally suited to c.w. or s.s.b. transmissions.

Although not a propagation mode, the use of satellites at microwave frequencies has opened up the bands for world-wide communications and the satellites don't all have to be man-made. Some really dedicated microwave operators bounce their signals off the Moon to the other side of the world. This is termed moonbounce or earth-moon-earth (e.m.e.) communications and is the domain of the advanced operator.

One other point that needs consideration when operating on the microwave bands is that you don't use a dipole or Slim-Jim at these frequencies! Antennas patterns are generally very sharp with a narrow beamwidth, almost like a searchlight beam. Communication is therefore on a point-to-point basis and, more often than not, pre-arranged on other v.h.f. or u.h.f. bands.

If you want to gauge activity in your area take a listen on 144.175MHz, the microwave talkback calling frequency. Stations in mainland Europe use 432.350MHz and you may hear liaison being carried out on this frequency during lift conditions.

In the next instalment of 'Get Going On Microwaves' I'll be taking a look at suitable microwave equipment and showing you how you can get going on the s.h.f. bands. If you have any questions relating to microwave operation please contact me. The details are shown in my 'VHF Report' column in the 'Radio Scene' section of *Practical Wireless*. **PW**

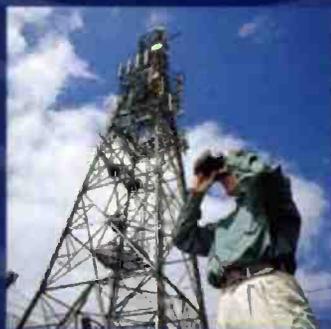




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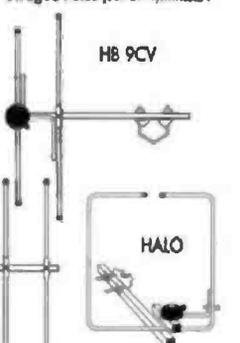
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# On Screen With "A Start With TV ..."

Ray Herbert  
G2KU, author of  
*Seeing By  
Wireless*  
(a book about  
the early days of  
TV), takes the  
reader back 70  
years to John  
Logie Baird's  
inaugural TV  
programme,  
transmitted by  
2LO.



Fig. 1: Sir J. Ambrose Fleming and J. L. Baird in the long Acre studio on the occasion of the first public TV broadcast.

It was 70 years ago when this caption, "A Start With TV From 2LO", appeared in *Amateur Wireless* in their issue for the 12 October 1929. It provided details of the inaugural TV programme which was broadcast from the Baird studios and transmitted from 2LO - situated on the roof of the Selfridges store.

Up until that time, only experimental programmes were available from 2TV, located at the Baird laboratories in Long Acre, whereby technical and office staff formed a concert party and turned out at midnight to provide live performances.

These earliest TV transmissions had a definition of 30 lines, used vertical scanning and a repetition rate of 12 and a half frames per second and, as a result of this low definition, the vision signals came within the limits of audio frequencies and those cables, control room equipment and transmitters used for broadcasting music, were equally suitable for TV. Ultra short wave techniques had not yet emerged from the development stage prior to 1935 and TV programmes for the public were radiated on the medium wave band.

## Inaugural Transmission

The inaugural transmission on 30 September 1929 can confidently be described as the first regular TV service in the world to be available to the public in their homes and where the programme details were published in the daily press. The opening ceremony started at 1100 with Sydney Moseley reading a letter from the President of the Board of Trade followed by speeches by Sir Ambrose Fleming and Professor Andrade (See Fig. 1).

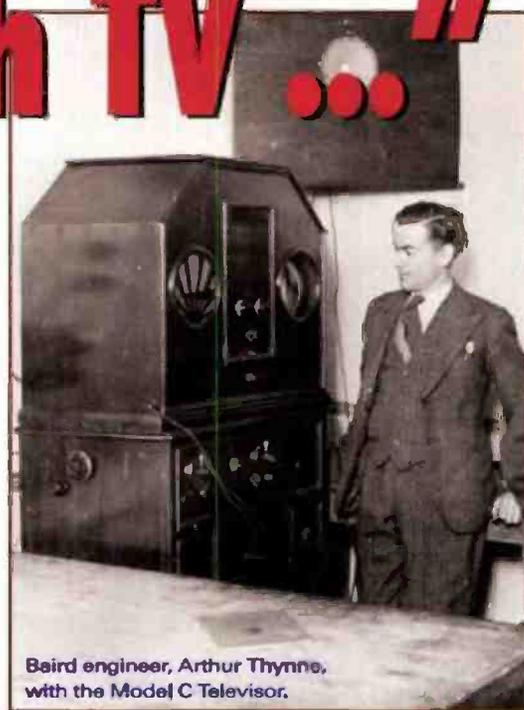
A professional artiste, Lulu Stanley (see Fig. 2), sang a popular dance band tune of the day "He's Tall, Dark and Handsome", while Connie King, a member of Baird's staff

chose a more refined ditty, "Mighty Like The Rose". Afterwards, John Baird was persuaded to say just a few words.

About a dozen televisors had been built by the Baird company, mainly for use during the official demonstrations but, at a price of £150 (more than a small car), hardly any were purchased by the public. However, wireless

enthusiasts soon had home-built TV receivers in operation and even a tele-radiogram was featured in the December 1929 issue of the magazine: *TV*.

At the time, the TV sound required a separate channel but there was no spare transmitter available in the London area. The Baird transmitter, 2TV, could have been put into operation but the authorities probably wished to



Baird engineer, Arthur Thynne, with the Model C Televisor.

avoid creating a precedent by using an experimental station for public broadcasts.

## Lack Of Sound

The lack of sound during the first six months did not appear to blunt the enthusiasm of the early 'lookers-in' (as 'viewers' were then called) and Horst Hewel, writing from Berlin on 10 January 1930, remarked that he was receiving good pictures from 2LO on home-built equipment which employed a cardboard scanning disk. Other letters were received from various parts of the UK, indicating that the amateur enthusiasts had lost no time in getting results!

A special programme had been arranged to launch the dual transmissions on 31 March 1930 with the new BBC Brookmans Park station providing sound on 356 metres with vision on 261 metres. Sir Ambrose Fleming appeared once again and Gracie Fields, the well known actress and comedienne, provided a comic song.

The Prime Minister, The Right Honorable J. Ramsay MacDonald, had already been seen on the TV screen and he accepted a Baird Televisor for use at No. 10 Downing Street. In a hand written letter to J. L. Baird, dated 5 April 1930, he said "I must thank you most warmly for the TV instrument you have put into Downing Street. What a marvellous discovery you have made ...".

During the first six months of the dual transmissions, the producer - Harold Bradley - put on an imaginative and varied selection of programmes: Herman Darewski, a popular band leader, told viewers how to write a song; the five-voiced Mischa Motte entertained; Rupert Harvey had a series called 'Cartoons and Melody'; the London Marionettes became a regular feature and many conjurers, jugglers and instrumentalists participated.

## Arrival Of 1931

With the arrival of 1931, the programme material had moved on from the imaginative to the adventurous. The first band to be seen on the small screen was Jim Kelleher's Piccadilly dance band and, during one midnight

Fig. 2: Lulu Stanley in the Long Acre studio. She is sitting in front of the hole in the wall through which shone the scanning beam of light.



transmission in April, a film starring George Robey in 'The Bride' was shown. In June, the first TV outside broadcast ever to be seen, came from the Derby, at Epsom race course (see Fig. 3).

To appreciate the true impact of TV at that time, it must be remembered that never before had it been possible to see events on a screen just as they were happening miles away. The ability to see, as well as hear what was on the wireless, had an irresistible appeal.

Radio Amateurs using simple TV receivers made up 90% of the viewing public. In contrast to their enthusiasm for this new medium, no interest or support came from the radio industry or the authorities.

The Baird company, only about 40 strong at that time, financed the entire operation, meeting quite 'unaided' the heavy costs of providing studios, equipment and staff, besides engaging and paying for the performers. They also had to meet the BBC's bill of £5 per half hour for the use of their transmitters. It seems extraordinary that the British TV service, between 1929 and 1932, depended upon the efforts of a small company with limited resources for its existence.

In the pioneering days of wireless, there was a reasonable choice of transmissions, both speech and Morse, throughout the day. Early TV experimenters, on the other hand, were severely handicapped by the extremely limited and inconvenient programme times.

At first there was a total of seven half-hour sessions each week, five of them during the morning when people would be at work. The other two involved staying up until midnight. These short, 30 minute transmissions meant that if any circuit alterations needed to be carried out, there was hardly time for the soldering iron to warm up before the programme ended.

Pattern generators for test purposes did not exist at this time, but twin brothers, Ted and John Holmes (now G3ALK and G4GMG respectively), built their own closed circuit TV system in 1931 as a means of increasing the time available for experimentation.

With only one hour of usable (evening) TV time each week, it's surprising that this new form of entertainment attracted so much public interest. Large screen pictures shown on the stage at the London Coliseum produced enthusiastic comments from the press: "Altogether a memorable evening and the Coliseum is playing its part in the making of scientific history". 'Daily Herald'. A particularly accurate prediction came from the 'Sunday Pictorial': "Mr Baird's invention looks like being the most effective means yet devised of keeping children in the home".

The Baird Company organised demonstrations at several provincial towns. At 'Gala Land' in Scarborough, TV had to compete with the rival attractions of the motor cyclists 'Wall Of Death' and Miss Dorothy Lolina and her all star band. A tent contained the equipment at Colchester and the citizens of Bournemouth and Southampton were able to see TV pictures at events presented by the local newspapers. Demonstrations of TV took place on a grander scale during 1930 at the 'Daily Mail Ideal Home Exhibition', both at Olympia and also at the Schoolboy's exhibition.

## Threat To Wireless

Even as far back as 1930, TV was seen as a threat to wireless broadcasting. At the Olympia radio exhibition, the Radio Manufacturers Association declined to allow any demonstrations of TV equipment. The Baird Company were obliged to make alternative arrangements at the premises of Messrs W. H. Oates where a temporary studio was set up together with several receivers. Between the 19 and 27 of September, over 13 500 people made the short journey from Olympia to see these demonstrations.

The 30-line system, often known as the mechanical TV era, had the advantage of simplicity, since there were no cathode-ray tubes, high voltage power supplies or time-bases. The main ingredients consisted of a Nipkow scanning disk, a motor to rotate it at 750 rpm precisely and a neon lamp which provided the varying level of illumination according to the content of the subject being televised.

The radio receiver used to pick up the vision signals didn't need to be modified but superhets using a low intermediate frequency were best avoided due to their lack of bandwidth. The power output stage required an extra 120V for the anode supply to cater for the neon striking voltage.

With a neon lamp acting as a modulated light source, the pictures were inevitably dim, besides being pink and black instead of black and white. They were also very small (not more than about 70mm by 35mm even after magnification using a lens).

The mirror-drum receiver, which arrived in 1932, gave the best 30-line images obtainable. A 100W filament lamp in conjunction with a Kerr cell light valve, produced a bright, steady, black and white picture measuring 230mm by 100mm.

Having regard for the specialised nature of the market an unusually wide choice of components could be purchased by the amateur constructors. Kit sets cost between £3 and £7 - even the cheapest representing a weeks wages at that time.

The unpopular late timing of the evening transmissions had one important redeeming feature which helped to publicise TV throughout Europe. The propagation conditions on the medium wave band were at their best several hours after sunset and the midnight TV transmissions could be received over a considerable distance. Reports came from viewers in Italy, France, Germany, Iceland, Holland, Yugoslavia, Madeira, Denmark, Czechoslovakia and Spanish Morocco and were published each month in the magazine: TV.

Eventually, in 1932, the BBC accepted that TV could no longer be ignored and they took over the public service in August that year (see PW, October 1992). We shouldn't forget ... those flickering beginnings led to the superb pictures we get today!

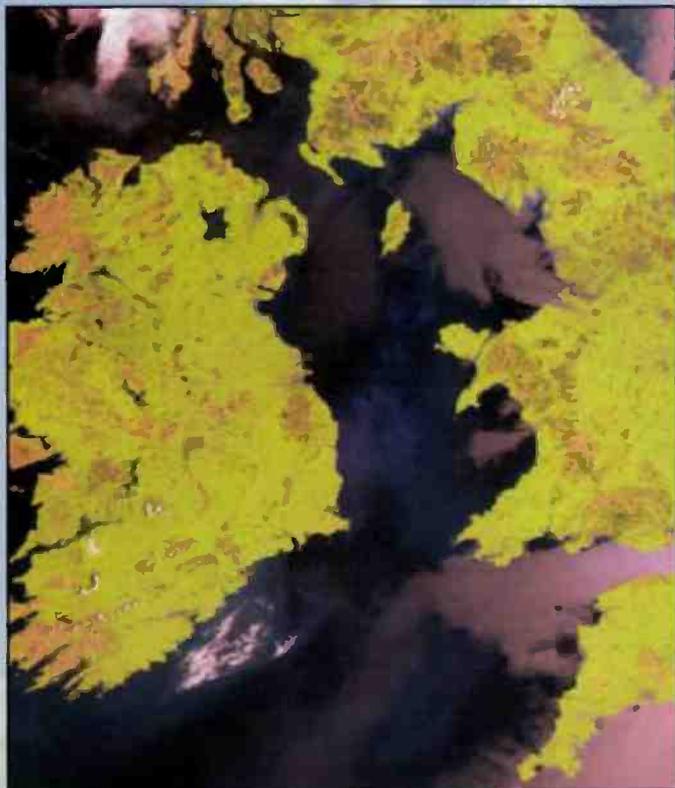
PW

Fig. 3: The outside broadcast caravan at the 1931 Derby. Note: the hinged mirror on the door, which directed different scenes on to the TV equipment.

The Second Edition of *Seeing By Wireless* by Ray Herbert G2KU is available from the **PW Book Store** for **£4.95** including P&P. It deals with the early days of TV and is profusely illustrated with over 41 high-quality photographs. Contact the Book Store on (01202) 659930 to order or write to **PW Book Store, PW Publishing Ltd, Arrowsmith Court, Station Approach, Broadstone BH18 8PW.**



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Layout of 2 trap sloper

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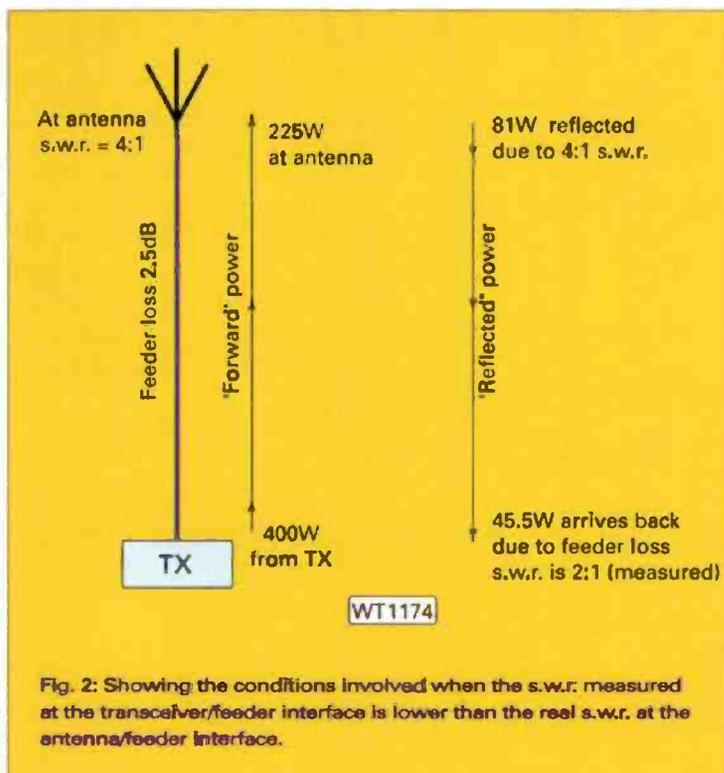
# Understanding Ratios & Radiation Efficiency

In his article, Gordon King G4VFB our resident 'Looking At' author describes the relationship between s.w.r. and radiation efficiency and how to calculate them both.

To start at the beginning then, we should understand that radiation efficiency is the ratio of the power radiated by an antenna system to the power supplied to it. For example, if 400W of r.f. is fed to an antenna of unity power gain (relative to a given reference, usually a dipole) in a given direction, the effective radiated power (e.r.p.) in that direction would be 400W. The radiation efficiency would thus be 100%. With a beam antenna of, say, 12dB gain, the 400W e.r.p. would be increased by 15.8 times to 6320W in the direction of maximum response.

Of course, the r.f. has to be supplied to the antenna through a feeder which, owing to its 'lossy' nature (attenuation factor), reduces the r.f. applied to the antenna. With a length of feeder which has an attenuation of 2.5dB, the 400W would be reduced to 225W, the e.r.p. from the unity gain antenna would also fall to 225W and that from the beam would fall to 3564W. The radiation efficiency of the unity gain antenna system would thus be in the order of 56% and that of the beam, some 89% in the direction of maximum response.

For ease of calculation, it's often preferable to work in decibels rather than in direct ratios. With the unity gain system net loss is 2.5dB, while with the beam the



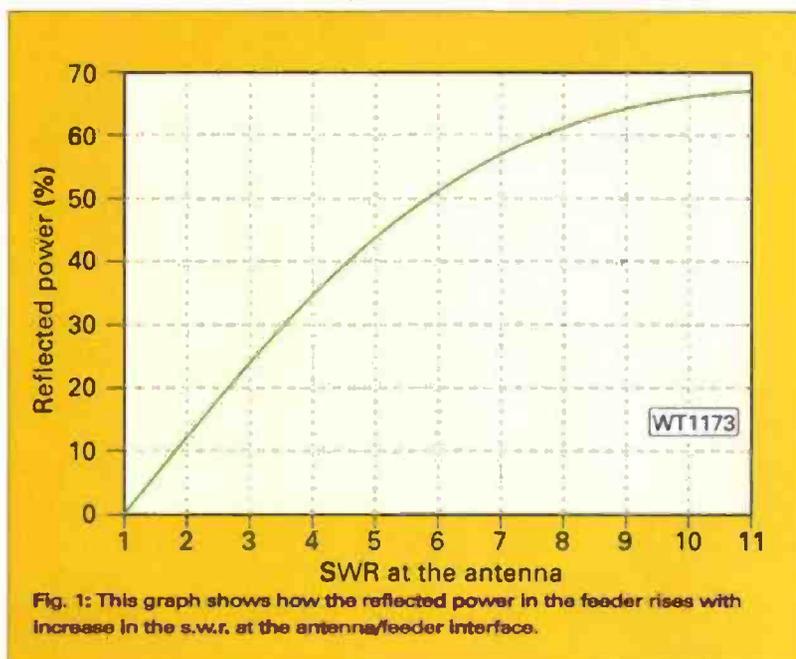
net gain is 9.5dB, which represents the radiation efficiencies of the two antenna systems. They correspond respectively to efficiency factors of 0.65 and 8.91, meaning that the e.r.p. can be discovered merely by multiplying the r.f. power from the transmitter fed to the feeder by the appropriate factor.

## Perfect Unity?

So far so good, but we have, so far, assumed that the standing wave ratio of the two antenna systems was a perfect 1:1 or unity. This is rarely ever the case and when the s.w.r. deviates from this ideal, the radiation efficiency of the station diminishes by an amount related to the degree of mismatch. This occurs essentially between the antenna and feeder interface, because standing waves are then produced along the feeder, making it impossible for the antenna to accept or radiate all of the input power, so the e.r.p. falls.

Clearly, when the antenna impedance exactly corresponds to the feeder impedance, the s.w.r. is unity. All s.w.r. meters are designed to measure a component of both the forward and reflected power along the feeder and then indicate their difference. Commonly, it's the voltage component involved which leads to the term voltage standing wave ratio (v.s.w.r.).

We can understand, then, that a 2:1 s.w.r. would result from a 2:1 difference in impedance between the feeder and the antenna (e.g. 50Ω feeder looking into an antenna impedance of 100 or 25Ω), while a 3:1 s.w.r. would imply a



3:1 mismatch at the antenna interface.

All very neat and tidy so far, but how often do we get up to the antenna feeder interface to measure the s.w.r.? We almost always couple the meter between the transmitter and the feeder in the shack and here measure the s.w.r. This is not to imply that a good transceiver/feeder match is unimportant, on the contrary, it can be important particularly with transceivers where the p.a. transistors are mismatch-protected by the drive and hence the r.f. output being automatically reduced with increasing mismatch and rise in s.w.r.

However, the antenna terminal impedance is established during the design to ensure a fair match to the feeder commonly employed. But reflections stemming from a mismatch at the antenna end can affect the transceiver matching, reducing the power yield, which is where a so-called antenna tuning unit (a.t.u.) can help by showing the transceiver the required load.

## Calculate The Ratio

When the antenna s.w.r. is known, it's possible to calculate the ratio and hence percentage of the reflected power from

$$(s.w.r. - 1/s.w.r. + 1)^2$$

For example, a 3:1 s.w.r. works out to a ratio of 0.25 or 25% of the power reflected back from the antenna down the feeder. The antenna then, only, uses 75% of the power, so the e.r.p. is also down and the radiation efficiency is impaired by a corresponding amount. The graph in Fig. 1 shows how the power loss increases from unity s.w.r. to 11:1.

The coefficient of reflection ( $r$ ) can be determined either from

$$s.w.r. - 1/s.w.r. + 1$$

or

$$(\text{reflected power/forward power})^{0.5}$$

and the s.w.r. from  $1 + r/1 - r$ , all useful little expressions. For example, with a forward power of 100W and a reflected (reverse) power of 10W  $r$  works out to 0.316 and the s.w.r. to 1.92:1.

## Similarly Low?

A modest s.w.r. measured at the transceiver doesn't necessarily mean that the s.w.r. at the antenna/feeder interface is similarly low. The s.w.r. at the transceiver corresponds to that at the antenna only when there is a perfect match all the way round and the s.w.r. is 1:1. Correspondence would also be expected with zero feeder loss! In practice, feeder loss has a significant influence on the measurement, making it appear smaller than the real value at the antenna.

Consider a feeder of 2.5dB attenuation coupled to a 400W transceiver one end and an antenna the other end. The power at the antenna would be 225W, the same as at the antennas looked at earlier. However, this time let's assume there's a mismatch at the antenna end, resulting in an s.w.r. of 4:1. Some 36% of the power, or 81W would be reflected back down the feeder which, at the transceiver, would have fallen to around 45W owing to the feeder attenuation. The situation is shown in Fig. 2.

An s.w.r. meter connected at the transceiver, therefore, would read around 400W forward power and 45.5W (about 11%) reverse power and indicate an s.w.r. of a mere 2:1, half that of the real s.w.r. at the antenna! Moreover, of the 225W at the antenna, only 144W would be available for transmission. With the unity gain antenna, therefore, the e.r.p. would also be about 144W putting the radiation efficiency at about 36%, which is some 20% less than the efficiency with perfect matching.

With the beam antenna, the e.r.p. would be down to around 2275W from the 3564W e.r.p. of the antenna in perfect match, meaning that the radiation efficiency would have fallen to 569% on the main lobe from the matched 891%, which is some 322% lower, even though the s.w.r. taken at the transceiver/feeder interface is shown as only 2:1! The diagram in Fig. 3 reveals how the measured s.w.r. at the transceiver can be significantly lower than the real s.w.r. at the antenna/feeder interface under different conditions.

With abnormally high s.w.r. values, the voltage and current peaks of the standing waves along the feeder can be substantially higher than those under properly matched conditions. For instance, an s.w.r. of 4:1 will produce voltage and current peaks of twice the amplitude of those when the s.w.r. is 1:1. Moreover, high amplitude r.f. peaks along the feeder can result in serious EMC problems.

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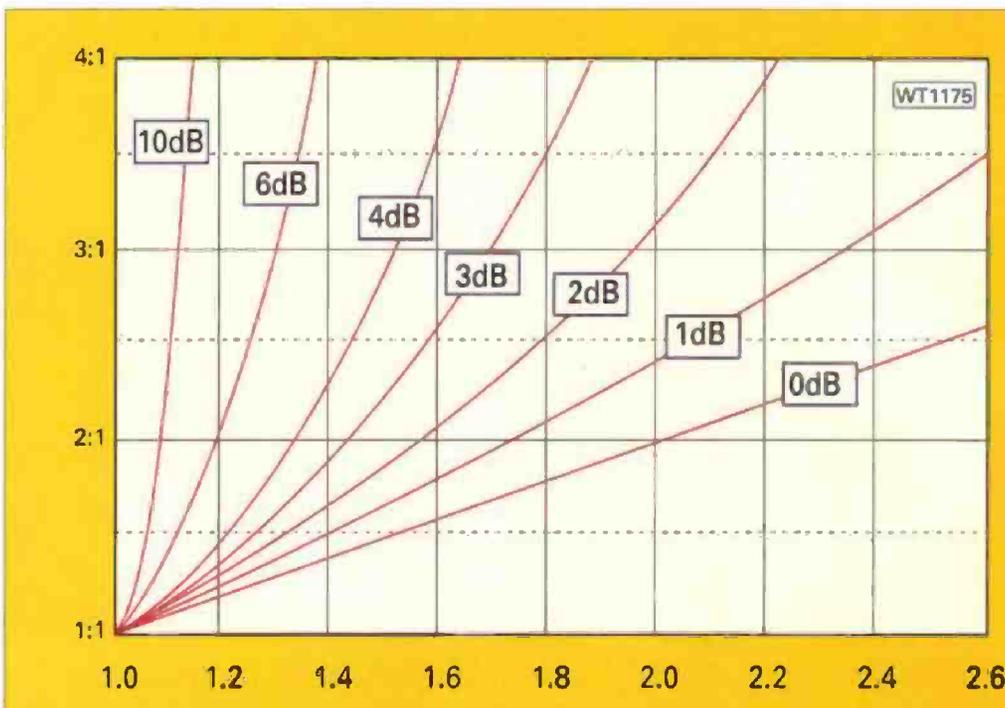


Fig. 3: Showing how the measured s.w.r. at the transceiver/feeder interface can be significantly lower than the real s.w.r. at the antenna/feeder interface under various conditions.

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# Watching Over Your Power Levels

## The PW Sentinel

In Part 1 of his article, Jim Brightman G0JXN describes the design and construction of the PW 'Sentinel'. With this project 'on duty' in your shack you'll be equipped with a useful h.f., v.h.f. power meter, an s.w.r. meter and modulation monitor. All you've got to do is build it - so get busy!

**T**he PW Sentinel multi-purpose monitor uses two four port asymmetrical power splitters as sensors. The through and detector port losses are determined by the turns ratio of the ferrite transformers. Since the detector port loss is set, without the need for any adjustments, the detector output for any given power input may be calculated and the monitor calibrated using a d.c. supply and voltmeter. This avoids the need to beg or borrow a good standard r.f. power meter and dummy load for its calibration.

### Detector Port

The detector port loss has been set to 20dB at which the through loss is very low, the isolation between the two detector ports is extremely high and furthermore all ports offer a very good 50Ω match. This allows the monitor to be left in the antenna feed without significant power loss or the generation of spurious products whilst maintaining the matching conditions.

My prototype employs one h.f. and one v.h.f. sensor which are selected by a toggle switch on the front panel. Alternatively, one or more sensors could be used and they may be h.f. or v.h.f. to meet the user's needs.

The sensors have been designed to provide a full scale deflection at 200W r.m.s./average and 800W peak envelope power (p.e.p.). The use of Schottky diodes as detectors allows power measurement down to 1W.

However, s.w.r. measurements below 20W become increasingly optimistic due to the diodes becoming non-linear at low levels. The range of the **Set Reference** control has therefore been restricted to a minimum of 20W.

In the r.m.s. mode the output of the forward detector port is made available through a phono socket, via a blocking capacitor. This is to allow the modulation envelope to be monitored by an oscilloscope. At 400W p.e.p. 20V peak-to-peak is available.

### The Circuit

Now it's time to look at the main circuit, Fig. 1, in depth. The directional coupler is formed by the transformers T1 and T2, which resolves as a 'T' attenuator in the through path between the transmitter and load and a phase detector in the detector port paths which gives the sensor its directional properties.

The transformer windings are separated by an



The PW 'Sentinel' Meter.

electrostatic screen (details later) to prevent capacitive coupling and provide an earth plane to help maintain the impedance match on the ports. The capacitors C5 to C8 provide additional impedance correction on the h.f. sensor but they are not required on the v.h.f. version.

Both the detector ports are terminated in their characteristic impedance of 50Ω by eight 100Ω 0.25W resistors which are arranged in four sets of two resistors in series (R1 to R8 and R9 to R16).

The resistor arrangement is employed as the forward path spur would dissipate 2W at 200W input and I found that the generally available higher wattage resistors to be reactive.

The diodes D1 and D2 are the detectors and filtering is provided by L1/C2 and L2/C4. The capacitors C2 and C4 are feed-through types which also provide the terminations for the sensor outputs. At 200W r.m.s. input the sensors provide an output of 14.14V.

### Metering Circuit

Moving on, we come to the metering circuit, Fig. 2. Here the output from the sensors is selected by the toggle switch S1. If only one sensor is used this can of course be omitted.

The switch S2 selects the mode and provides ranges of: 200W RMS/Average, 800W PEP, a position to **Set** the s.w.r. reference and a fourth position for the actual **SWR Measurement**.

The resistor network R17, 18, 19 and 20 set the full scale deflection on the r.m.s. and p.e.p. ranges. The

potentiometer, R22 is the Set Ref control and the resistors R21 and 23 set the power limits between which the s.w.r. measurements may be made.

On the p.e.p. range the capacitor C9 is connected across the forward spur output to provide peak detection with a reasonable time constant. The capacitor, C10, is the blocking capacitor for the modulation monitor referred to earlier.

### Die-Cast Box

The preparation of the die-cast box, is not unduly complicated even if you don't have the proper tool for the D holes. The material is quite soft and a series of small holes can easily be filed into the D shape if you mark it out properly.

**Warning:** Don't be tempted to drill it out to the full size as you will find difficulty in tightening up the sockets. Remember at 100W r.m.s. the current in a 50Ω system will be 1.4A and that current will pass through the inners and outers of the sockets.

In my prototype the v.h.f. sensor has a hole not quite at the centre of the back and lid of the box. (The lids do not always fit both ways round so these holes are best drilled out with the lid screwed in place and drilled through from the back). If you don't have a drill stand take care to keep the drill 'square' on to the job.

### Transformer Windings

Since the transformer windings set the detector port losses of the directional coupler, it's important that the instructions be followed carefully and only the specified materials be used. In particular the *pvc* tape should be the type used by the professional electrician and not the hard shiny type that can be picked up cheap at the Sunday market or boot sale.

Again remember that at the full rated power the voltage across the windings peaks at nearly

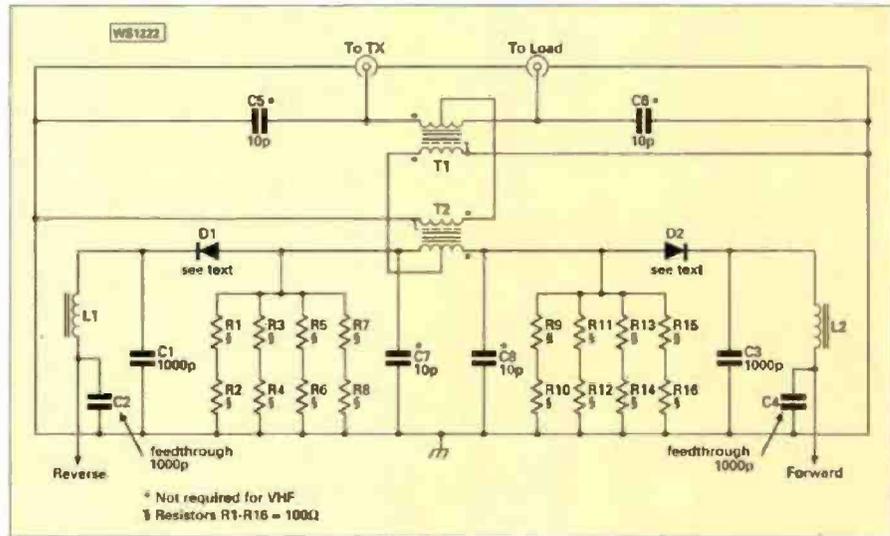


Fig. 1: Main circuit of the PW 'Sentinel' project (see text).

300V. The following instructions are for the h.f. sensor, with any differences for the v.h.f. version noted in brackets.

Firstly, join two cores into a figure '8' shape by winding two turns of 9.5mm wide *pvc* tape through the holes. Pull the tape tight enough to form it round the contours of the cores **but not so tight that its width is reduced**. Smooth out any wrinkles with something like a plastic ballpen cap. The tape so wound now provides a base for the windings.

If the cores are red on one side consider this to be the front for the purpose of these instructions. If not, make some mark to identify one side as the front. (It's important that the winding turns do not overlap and that the number of turns are correct).

Since the wire gauge for the first h.f. winding is quite fine you may find it helpful to attach a 5mm strip of thin double-sided tape to the front and back of the waist of the core assembly. This will help keep the turns in place during the winding process.

The first winding has 25 close wound turns of 36s.w.g enamelled wire, for which you will require one metre (7.5 turns of close wound turns of 32swg enamelled wire, for which you will require 150mm) of wire.

I found that the best technique for winding is to hold the core assembly upright. Then, starting roughly in the centre of the winding space, half way along the length of wire, pass the wire through the top hole of the cores and rotate the top of the cores towards you. (This is half a turn completed).

Now repeat the process to complete one turn. Continue winding towards the right in this manner until you have completed 10 (3) turns. (I find it easier to count in half turns).

Next, turn the cores round so that the completed turns are on the left and repeat the process. Make the last few turns on whatever edge has the most space. (The v.h.f. winding end will be at the back of the cores).

When completed make two turns of cotton round the waist of the core assembly and tie to hold the turns in place. Consider the end on the front left to be the start. Make sure that you do not have any overlapping turns.

Cover the winding with four layers of 9.5mm wide *pvc* tape. This will require a length of 150mm. Pull the tape tight enough to see the profile of the winding but not so tight that its width is reduced. I

Fig. 2: The metering circuit (see text for full explanation).

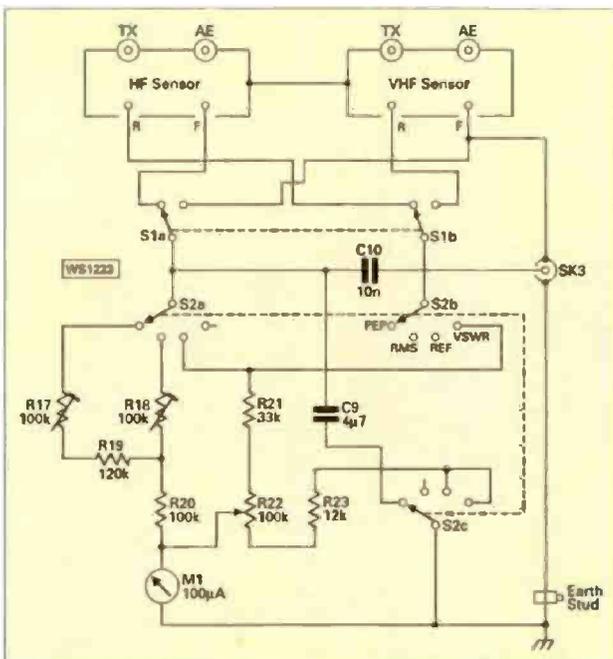




Fig. 3: Rear view of the prototype.

found that pulling the tape through with aid of a pair of long nosed pliers or tweezers helpful.

### Electrostatic Screen

Next comes the electrostatic screen which requires a piece of 0.05mm copper foil 5mm x 35mm (5mm x 25mm) for each transformer. Obtaining this in small quantities can be difficult and probably the easiest

course is to strip it from a piece of p.c.b. material (see end panel for further information).

Then, mark the strip with a sharp razor knife, lift a corner with the blade and peel. Smooth the strip out and cut to length. Then solder about 25mm of 32s.w.g. copper wire (the gauge is not that critical) to the centre and at right angles to the foil strip. Use enough solder to give a smooth joint without any sharp edges.

Now prepare a piece of pvc tape 9.5mm x 170mm and spread it out, running from left to right, adhesive side up. Then place the prepared copper foil on the tape, solder side down, about 5mm from the right hand end, central to the width of the tape and the wire lead towards you. Press the foil onto the tape.

The next job is to pass the short end of the tape through the bottom hole of the core assembly with the lead to the right, i.e. adhesive side down. Align the lead with the winding end lead and press the tape down at the back. (The v.h.f. winding end will be at the back and the screen lead to the front).

Pass the other end of the tape through the top hole of the core assembly and complete four layers of tape. The ends of the electrostatic screen should not overlap and be insulated by one layer of tape.

### Final Winding

The final winding is three close wound turns (one turn) of 20s.w.g. enamelled wire, centre tapped, for which you will require 150mm (30mm) of wire. To facilitate the soldered connection to the centre tap it's necessary to introduce a 'bump' in the winding

to lift it away from the pvc tape covering.

Bend the wire tightly in half and then straighten it out to leave a bump of 3mm (2mm) high. Scrape the enamel off the bump and tin ready for the assembly stage.

As with the first winding, you should start at the centre, with the tap to the front of the

## Building The Project - Help From PW

As is often the case with the more advanced constructional projects, we do not have enough Editorial space within *PW* to provide the very comprehensive and detailed instructions for the project as provided by Jim Brightman. This information includes the author's own p.c.b. drawing and detailed assembly information.

So, for those who are interested in building this very interesting and useful unit and wish to follow Jim Brightman's helpful 'step-by-step' approach, all the extra information we have to help you complete the project is available free from the *PW* Editorial offices in Broadstone by sending a large (A4 sized) self-addressed envelope with two 1st Class stamps. Readers outside of the UK (including Ireland) are asked to write to me (or E-mail me) for further advice. Incidentally, all feedback generated by the requests for extra information such as this, helps us to evaluate the interest there is for similar ideas. **Rob Mannion G3XFD, Editor.**

### Help Line

Jim has a small quantity of copper foil for the transformers. Anyone wishing to avail themselves of this (free of charge) or have any technical queries (s.a.e. please) to **Jim Brightman G0JXN, 35 Perrysfield Road, Cheshunt, Hertfordshire EN8 0TQ** or telephone (01992) 468204 at any reasonable time weekdays.

### Sentinel Specifications

<b>Frequency Range:</b>	h.f. 3 - 30MHz v.h.f. 30 - 150MHz
<b>Through Loss (In frequency range)</b>	h.f. Typically 0.1dB h.f. 30 to 100MHz Typically 0.1dB (rising to 0.2dB at 150MHz)
<b>Spur Loss</b>	20dB
<b>In Frequency range v.s.w.r.</b>	Typically 1.05:1
<b>Maximum power capacity</b>	800W p.e.p.
<b>Output at 200W r.m.s.</b>	14V dc

core assembly, wind from left to right for one and a half turns, turn round and complete the winding. Pull the turns tightly enough to be in close contact with the pvc tape but not so tightly that they bite into the tape.

Centre the winding on the winding area. The actual turns on the cores appear as two and a half turns (half a turn) the other half being completed on the p.c.b. assembly (See information panel at end of text). As the v.h.f. winding is only one turn this is completed at the assembly stage.

If you get one of the windings wound in reverse the outputs of the sensor will also be reversed. To correct this problem, simply reverse the connections from the meter board to the sensor.

### Track Patterns

My prototype 'Sentinel' was built using a combination of Veroboard and p.c.b. assemblies and I've provided the track patterns and lay-outs for those who want to follow my design closely. Full details on these will be available for the *PW* offices.

In Part 2, I'll discuss the metering circuit, provide some suggestions on the assembly stages, the full shopping list and other advice. **Cheerio until then! PW**

*Note: Please see end panel regarding instructions how to obtain the suggested p.c.b. and Veroboard layouts. Editor.*

Fig. 4: Inside view of the G0JXN prototype.



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## Decode Special

This month **Mike Richards** has an extended column featuring Day Watson's latest excellent complex mode frequency list.

**Dave Gentile** hopes that his feature on Digital Signal Analysis will open up a whole new world of possibilities for you.

## Also This Month

**Faris Raouf**, our Scanning regular, gives the Trident TRX-100XLT hand-held scanner the once over.



Continuing with his trip down memory lane, **John Wilson G3PCY** looks at an Icom classic - the R-71.



**Peter Bond**, eager to get his hands on the new AR-108, puts it through its paces. Was he impressed? Read his review and see for yourself.



Whilst examining Timestep's PDUS solution **Lawrence Harris** looks at the type of images transmitted by METEOSAT, the hardware and software required to receive and view them, the costs involved and the future.

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## WINNERS!

\* The waiting is over - Neill Taylor G4HLX presents the winners of this year's *Practical Wireless* 144MHz QRP Contest!

\* Phil Davies MOAYB writes about his attempts at 'QRP In The Lakes' in which he relates the tale of how he took part in both the 1997 and 1998 PW 144MHz QRP Contests.

## REVIEWED!

\* Rob Mannion G3XFD reviews the ADI AR-147 144MHz f.m. with airband receive.

Tex Swann G1TEX analyses the MFJ-269 Antenna Analyser which includes u.h.f.

## \* MORE ON MICROWAVES

David Butler G4ASR brings you the second part of his three-part series which he says will "get you going on Microwaves".

## ANTENNAS!

\* As well as *Antennas-in-Action* being in the November PW, we also have an article on 'Dissecting The Dipole' for you, courtesy of Tony Harwood G4HHZ.

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# They make 'em big in the 'Lone Star' State!

## The 'Texas Bugcatcher' Mobile Antenna

Rob Mannion G3XFD takes a close look - and tries out for himself - an h.f. and 50MHz with an adapter, mobile antenna system he's seen in action in the USA. As he says - they sure make them big in the 'Lone Star' state!

The huge car parks surrounding the Hara Arena in Dayton, Ohio in the USA during the annual Dayton 'HamVention' are a testament to the popularity of the Texas Radio Products 'Texas Bugcatcher' h.f. mobile system. Literally every-other-one of the gigantic motor-caravan and 'pick up' vehicles so beloved by the Americans seem to sport a 'Bugcatcher'.

One of the reasons why the 'Bugcatcher' is popular is the very fact that h.f. mobile operation itself seems to be far more popular in the USA than it is here in Northern Europe.

Anyone who remembers the 'old days' back in the late 1950s and 1960s will remember similar 'home brewed' h.f. mobile antennas. In fact, the whole concept of the 'Bugcatcher' is very reminiscent of high quality - and sturdy - 'home-brewing' from that period. Have no doubt about it - this antenna is **BIG**, sturdy, and requires a strong mounting.

The Texas Bugcatcher is nominally a 3.5 to 28MHz h.f. mobile antenna system, but can cover the 50MHz band with an 'add-on' kit. Based around a large diameter high 'Q' inductance with band selection provided by a 'wander' lead with a crocodile clip<sup>®</sup>, it is promoted as being capable of handling 1.5kW (although this claim seems to be by 'word of mouth' only as there is no reference to this in the documentation or the Web site). \* See note under 'On The Air' heading.

As I've mentioned ... it's a large (2.28 metres long overall antenna) and the heavy duty stainless steel used on the lower mast ends up making the assembly weigh in at 1.7kg (over 3.5lbs), complete with the 50MHz add-on unit.

Rugged in appearance, the antenna loading coil is made in what appears to be good quality 'high impact' modern plastic. (I get the impression it would take a lot to break it!) with high quality plated copper wiring forming the coil. The bolt-on tapping connectors appear to be made from brass, and the crocodile-clipped 'wander' lead is of heavy duty wire in a relatively flexible outer insulation.

The top section whip has a push-and-turn bayonet type fitting<sup>®</sup> for quick removal of the assembly, and above this is the thin aluminium plate 'capacity hat'<sup>®</sup>. The top end of the whip is provided with a large 'ball' shaped protector which in itself is very impressive! \* See note under 'On Air' heading.

The supplied documentation is - to be quite frank - very obviously 'home made' and is of very poor quality when compared to general workmanship of the antenna. For example the so-called 'photographs' that the A4 leaflets direct you to turn out to be nothing more than (poor quality, difficult to read and low definition) computer colour print-outs.

Fortunately though, the antenna



The 'Texas Bugcatcher' h.f. mobile antenna, with large diameter loading coil, capacity 'hat' and the vertical 50MHz 'add-on' element.

is so easy to assemble and install that it's possible to ignore the 'photographs' and just get on with the job! And bearing in mind I wear an artificial arm, assembling the system only took me a few minutes.

No technical specifications are provided with the Bugcatcher so Technical Projects Sub-editor **Tex Swann G1TEX** and I took the opportunity to look at their Web site on the Internet. Here at <http://www.TexasRadioBugcatcher.com/> we found a large site with photographs of the proprietors, how to buy the antenna and E-mailed 'feedback' correspondence from customers, but no technical specifications or s.w.r. plots, etc.

I opted to use the magnetic-mount base on the roof of my estate car. The mag-mount proved more than adequate to hold the assembly but it was not so easy lifting it into place and screwing it into the socket. But I managed it many times, which was very necessary for the comparative tests.

### On The Air

For my 'on the air' testing sessions I took the Bugcatcher with me on various trips, including one to Minehead in Somerset and also with me to a PW 'Club Visit' to Barry in South Wales. The antenna's performance was very impressive but, as you'll see - I've several reservations regarding the mechanical side of the system.

All the 'on air' tests were undertaken by comparing the Bugcatcher with my selection of ProAM whip antennas. These individual antennas provide me with 3.5, 7, 14, 18 and 21MHz coverage and I confined my tests to these bands.

My h.f. portable operations (as explained in previous articles I don't work actually 'mobile' on the move for safety reasons) are carried out with my original Alinco DX-70 at a maximum of 25W on s.s.b. and c.w. Additionally, so that I don't have to get in and out of the car to continually adjust the ProAM antennas, I also use the MFJ-945E mobile antenna tuner (reviewed on page 46 in the April 1999 PW).

Using the Bugcatcher on the air turned out to be very simple, following the selection of the suggested tapping points mentioned in the supplied paper work. This was achieved using the crocodile clip which was attached to bolt-on clips on the coil. Here, however, I thought that the design had a weak point, because the clip could prove to be a nuisance at higher power levels, or could provide an intermittent contact.

In fact, during the review period I didn't have any problems with the crocodile clip tap selector. I was able to achieve a match good enough to provide 1.5: on 14, 17 and 21MHz. I only needed to use the MFJ-945E to adjust the antenna on 3.5 and 7MHz.

Adjustment of the 'capacity hat' was extremely simple and, although I have criticised the presentation and general information provided by the documentation - that for the 'hat' is helpful, and the same can be said for the matching capacitor required across the feedpoint (if you're not using a mobile antenna tuning unit such as the MFJ-945E).

However, I was not that impressed with the general feel and

Fig. 1: Obviously not recommended for normal rooftop 'mag-mount' antenna bases - G3XFD still considered (for fairness in the review) it best to compare results between the 'Bugcatcher' and his usual 'ProAM' h.f. whip antennas.





Fig. 2: Rear 'side on' view of G3XFD's car to illustrate the size of the 'Bugcatcher'.

finish of the 'capacity hat'. It seemed to be made of very thin and vulnerable aluminium - although I realise of course that this factor may well be dictated to the designer because of the capacity required.

Once set up I found that the Bugcatcher consistently out-performed my ProAM antennas and comparative results were particularly interesting on 3.5, 7 and 14MHz. Generally, on the three bands mentioned, the reports I received from the distant station were around two 'S' points better than with the ProAm whips. However, I got very tired getting in and out of the car to change over the antennas each time!

On 3.5MHz the Bugcatcher - on several QSOs in particular - provided me with three 'S' points on the distant station's equipment. (For the tests on 3.5MHz I used my portable 'trailing' ground-plane wire - not recommended for 'mobile' operation of course!).

Up on 7MHz - my favourite inter G working band) the Bugcatcher consistently out-performed the ProAM whips. On receive it also brought benefits because I was able to give better reports.

My 'DX' bands are usually found to be on 14 and 18MHz, the latter because (at the moment) there aren't so many beam antennas around. But this advantage won't last for long! Again the Bugcatcher out-performed the ProAM by several 'S' points.

My last h.f. test was on 21MHz, the band was not so lively but several Italian stations - who showed a great deal of interest in the antenna - proved again the Bugcatcher worked well on this band. They also gave me several 'S' points more for transmissions compared to that of the ProAM antenna.

## The 50MHz Band

For the 50MHz band a modification kit is available and it's extremely simple to install. Apart from setting the main antenna to the preferred 7MHz tapping point - nothing else has to be done as the system covers the entire UK 50MHz allocation with no adjustment necessary (I achieved the 1.5:1 s.w.r. readings which the manufacturers suggested would be attainable).

As usual, the disappointment with 50MHz came in the regular fashion of the band - most people listening for the DX and nobody listens for relatively 'local' transmissions. Despite this I had several n.b.f.m. and several more s.s.b. QSOs and got good reports. I was also able to hear 50MHz repeaters being tested. I look forward to working through the new Wincanton (Somerset) repeater very soon!

## Buying A Bugcatcher?

If you're wondering if G3XFD intends buying a Bugcatcher the answer is no as it's not suitable for me, despite the fact it performs very well indeed. The Dayton car parks prove how popular the antenna is in the USA!

However, I realise that the antenna will perhaps appeal to the really keen mobile enthusiast - particularly if they own a rugged 'Japanese Jeepy' or for that matter a genuine American Jeep or tough 'off road' vehicle. These will be equipped with sturdy fenders ('bumpers') or 'people manglers' ('Bull Bars') where a sturdy base-mount can be attached to provide a safe and sturdy fixing as I consider this is by far the best way of using this sturdy antenna.

My thanks go to Waters & Stanton PLC of 22 Main Road, Hockley, Essex SS5 4QS, Tel: (01702) 206835 for the loan of the Bugcatcher antenna. It's available from them at £129.95 plus £7 P&P. The 50MHz add-on unit costs £19.95 and there are also other options, including a caravan 'extender' mast costing £29.99 and a mobile matcher at £19.95. PW

ROB MANNION G3XFD TRIES OUT THE HF & 50MHz TEXAS BUGCATCHER MOBILE ANTENNA

# AUTEK ADVANCED RF ANTENNA ANALYSTS

## AUTEK RF1

The RF1 adjusts antennas, feedlines, and RF networks, from 1.2 to 35 MHz in 5 bands. It measures RF values of true impedance (0 - 2000Ω), SWR (1 to 15:1), C (0-9999pF) and L (<0.04 to 300μH). It instantly reads out impedance and SWR. Feedline loss and phasing, Q, tuned-circuit resonance can be accurately measured and adjusted. L and C are measured at the RF frequency of interest, not at 1kHz or 100 kHz as with other L and C meters. The RF1 fits in the pocket, and runs on a standard 9v battery.  
**RF1 (1.2 - 35MHz) £179.95 Protective Case**

## AUTEK VA1

The VA1 adds phase detection to the popular RF1. It makes noise bridges obsolete and does more than network analysers. It reads: Frequency, SWR, True Impedance, Series R, Series X, Sign of X, Parallel R, Parallel X, Series Inductance (L), Series Capacitance (C), Conjugate L & C for Matching and Phase Angle (deg.) Only the Autek VA1 calculates R/X of an antenna in the air, by measuring at the transmitter end of your feedline, and is not limited to 50Ω line - select any common line 25 to 450Ω. The VA1 fits in the pocket, and runs on a standard 9v battery.  
**VA1 (0.5 - 32MHz) £249.95 Protective Case**

## AUTEK RF5

The RF5 covers 35 to 75 MHz, and 138 to 500MHz (typically 530MHz) in 3 bands. It measures RF values of true impedance (0-600Ω), SWR (1 to 6:1). It has no direct L & C as the RF1 but an INSTANT SWR mode which finds the frequency of minimum SWR (or Z) on command automatically. The RF5 fits in the pocket, and runs on a standard 9v battery.  
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# Walter Farrar G3ESP Looks Back At The Early Days Of ... The 'Mobile' Rally

Walter Farrar G3ESP reminisces on the 'Mobile' rallies as he remembers them and discusses the reasons why he feels that the 'Radio, Electronic and Computer' rallies of today just don't compare!

Some 50 years ago, as car ownership gathered pace and ex-military rotary and vibrator power supplies were cheaply available to produce the high voltages required, many Radio Amateurs installed equipment in their cars and operated with 'M' after their callsigns. The popular band, at this time, was 1.8MHz and cars were being recognised by the large whip antennas with large loading coils and maybe capacity hats also.

In the 'wilderness' that was Yorkshire, the 'Northern Mobile Rally' was held annually at the end of May in the grounds of Harewood House, just north of Leeds and, if my memory serves me correctly, the weather was always superb! These meetings were true rallies, operators and families came from miles around. The operators chatted together and admired each other's radio gear, competitions were held, involving use of the mobile rigs, there was never a trader in sight and a good time was had by all.

In 1962 the Bridlington and District Radio Society held a mobile rally and 'Hamfest'. A competition there included 1.8MHz operation on the move, stationary and driving slowly in a circle round a given point, with signal-strength measurements being made by G5VO at his home in Bempton, about five kilometres to the north. There was an appropriately designed plaque awarded to the overall winner - modesty prevents me from mentioning his callsign!

## Pleasant Excursions

Such pleasant excursions were doubtless held elsewhere throughout the land, but not, I think, any more. A 'mobile' rally' is now held in a hall or marquee and is not, in my opinion, a rally at all, but merely a place where traders assemble to sell their wares (and junk).

There are large gatherings and small, but all have the same objective: to make money for the organising club and perhaps for the traders. With the passage of time they have now become 'Radio,



Cartoon by John Worthington GW3COI: a 'real' "Mobile Rally" as Walter G3ESP remembers them. (Note the size of the 'mobile' and 'portable' rig!)

Electronics and Computer' rallies and the Amateur Radio presence is getting less all the time.

What with the cost of travelling to such a rally and an entry fee of up to £2 each, I find it's not worth the effort. I think that it's cheaper and more convenient to buy one's bits and bobs from a shop or by mail order.

## All Is Not Lost

All is not completely lost, however. Real Amateur Radio (i.e. constructing, experimenting and self-training as opposed to black-box/computer controlled operating) is still being catered for by the QRP fraternity, encouraged by *Practical Wireless*, with annual conventions in May (Yeovil) and October (Rochdale).

A small number of suitable traders are present, but only to offer components, kits, books, etc. Black boxes are 'verboden'. Illustrated talks are on offer and there is ample opportunity to meet old friends (and make new ones) and to discuss matters of the moment. These are not mobile rallies, but they are indeed real rallies instead of flea-markets.

Traders are finding it uneconomical to attend the many assemblies every weekend throughout the year. I fully agree with Mainline of Leicester, whose literature proposes that a few well-organised gatherings spread across the country would serve the same purpose. Specialist groups could still have their own conventions as at the present time and could keep the real Amateur Radio flag flying. Let us see a renaissance of practical wireless!

PW

LEICESTER AMATEUR RADIO SHOW COMMITTEE PRESENTS

# 28th LEICESTER AMATEUR RADIO SHOW

at

**THE INTERNATIONAL  
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DONINGTON PARK,  
N. W. LEICESTERSHIRE**

on

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Stands as well as Flea Market spaces are going fast so for availability contact asap

**John Theodorson, G4MTP.**

**Tel/fax: 0701 0701 330.**

**E-mail:- g4mtp@lars.org.uk**

Other queries including advance tickets contact

**Geoff Dover, G4AFJ, QTHR.**

**Tel: (01455) 823344. Fax: (01455) 828273**

**E-mail g4afj@argonet.co.uk**

*For the latest information on the show and details of how to get there and accommodation in the area see our web site: <http://www.lars.org.uk>*

**ADMISSION PRICES**

One day ticket: **£3.00**. Two day ticket: **£5.00**

Advance tickets **£2.50** and **£4.00**

Senior Citizens (OAP) and under 16: **£2.50**

Advance tickets **£2.00**

Under 14 free when accompanied by an adult. Half price admission on production of last year's programme or ticket. Advance party bookings **£2.00** each (12 minimum)



# Leicester Amateur

## 24th & 25th September 1999, Castle Do

**W**ith the Leicester Amateur Radio Show taking place for the second time at the new Donington site, *Practical Wireless* thought that they'd give you a little 'sneak preview' of what's to come this year. Many dealers have told us about what they plan to exhibit this year and even if you're not tempted to visit Leicester, you should still find something of interest as many new products are often launched at the show.

The 28th Leicester Amateur Radio Show is taking place at the International Exhibition Centre, Donington Park, NW Leicestershire on Friday 24 and Saturday 25 of September 1999. For queries such as advanced tickets, please contact Geoff Dover G4AFJ QTHR Tel: (01455) 823344. FAX: (01455) 828273 or E-mail: g4afj@argonet.co.uk There is also a Web site which shows details of how to get there and accommodation in the area: <http://www.lars.org.uk>

Admission prices are as follows: A one day ticket costs £3, a two day ticket costs £5; Advance tickets are £2.50 (one day ticket) and £4 (two day ticket); Senior Citizens (OAP) and under 16s: £2.50 (Advance tickets £2); under 14s admitted free when accompanied by an adult; half price admission on production of last year's programme or ticket; advance party bookings at £2 each (12 minimum).

### AOR (UK) Ltd

AOR (UK) Ltd can be found on Stand No. 5C.

Richard Hillier at AOR (UK) Ltd has been in touch with *Practical Wireless* to say that although they won't have anything new as such at the Leicester Show this year, they will be on hand to offer technical advice.

Richard says that they will be happy to answer any questions which *PW* readers might have. AOR (UK) Ltd are based at 4E East Mill, Bridgefoot, Belper, Derbyshire DE56 2UA, Tel: (01773) 880788.

### Haydon Communications

Haydon Communications can be found on Stand No. W4.

Mike Haydon at Haydon Communications wrote to tell us all about their stand at the Leicester Show this year. Mike says that he would like to point out that they will once again have their "purpose built display stand" displaying their range of Q-Tek antennas - there will be two new additions to release from this range: The Q-Tek Triton and 1296MHz Yagis.

Mike says that "The Q-Tek Triton

is a 4-element tri-band Yagi covering 50, 144 and 430MHz. It's boom length is 1.13m, it's longest element is 2.9m and the antenna has 4.5dBd gain on each band. The Triton costs £69.95.

"The 1296MHz Yagi comes in two versions. The 19-element version is 1.5m in length and its longest element is 115mm with 16dBd gain and costs £49.95. The 11-element version is 0.76m in length and its longest element is 115mm also, its gain is 11.5dBd and is priced at £39.95.

"Also on the stand this year will be the new PS-300 30A, "state of the art" power supply from Nissei which features over voltage protection, illuminated meters and enough extra power connections for the most demanding of customers".

Mike also says that Haydon will also be clearing any display model radios which are left over from their move to their new site at "crazy one-off prices". Haydon Communications are based at 132 High Street, Edgware, Middlesex HA8 7EL. Tel: 0181-951 5781/2.

### Icom (UK) Ltd

Icom can be found on Stand No. 19.

Icom (UK) Ltd are currently celebrating their 25th Anniversary and

will once again be attending the Leicester Amateur Radio Electronics & Computer Show. Icom will be showing off their full range of Amateur Radio transceivers and wide-band receivers.

Included will be the very latest sets, such as the unique IC-2800H and the powerful IC-R75 h.f. receiver. The IC-2800H is the very first dual-band mobile to incorporate a full colour i.c.d. display, it offers a full 50W output on 144MHz and 35W on 430MHz and is priced at £549.99.

The IC-R75 is an h.f. all mode communications receiver covering 30kHz-60MHz. It has a wide range of new features to ease operation and improve reception and signal quality and is priced at a remarkable £699.99.

Also on display will be the IC-T81E quad-band hand-held. This is the first hand-held transceiver to be produced covering not only 50, 144, and 430MHz, but the 1296MHz band as well.

Icom will also be showing off its first entry into the licence free PMR-446 market place. The IC-F4SR(446) is a dynamic addition to Icom's constantly changing product portfolio. Based on the successful IC-F4SR the radio has all the benefits of its predecessors. Icom (UK) Ltd are based at Sea Street, Herne Bay, Kent CT6 8LD. Tel: (01227) 741741.

### Kenwood Electronics UK

Kenwood Electronics UK can be found on Stand No. 17.

Dave Wilkins G5HY at Kenwood Electronics UK has told *Practical Wireless* that their existing product lines will continue at the Leicester Show this year and that there will be no new products as such. They will, however, be concentrating on the TH-D7E data radio and Kenwood would very much like to invite all interested amateurs to come to their stand and meet Roger Barker G4IDE who will be on the stand for the two days. Roger is the author

of *WinPack* and will be demonstrating the latest version of this "class-leading" program.

In addition, Dave tells us, Roger has created *Ui-view* which is a position reporting programme compatible with APRS and the TH-D7E. It has many features and is easy to use, Dave tells *PW* - in particular it can "easily import detailed graphic maps from CDROM based sources such as the Ordnance Survey's *Interactive Atlas of Great Britain*".

Kenwood Electronics UK are based at Kenwood House, Dwight Rd, Watford, Herts WD1 8EB. Tel: (01923) 816444.

### Lake Electronics

Lake Electronics can be found on Stand No. W6A.

Alan Lake from Lake Electronics has been in touch with *Practical Wireless* to tell us that this year they will be taking their Novice Kits for people to look at and buy. These are inexpensive kits developed primarily for the Novice RAE student but which are now also proving to be very popular with many newcomers to electronics construction. So, if you're a Novice looking for a decent kit then why not visit the Lake Electronics stand?

As well as the usual range of kits for the ORP enthusiast, there will also be a.t.u.s, filters and antenna couplers for short wave listeners. A large selection of collectible radio books - many over 50 years old - will appeal to the valve and vintage collectors.

Lake Electronics are based at 7 Middleton Close, Nuthall, Nottingham NG16 1BX. Tel: 0115-938 2509.

### Linear Amp UK

Linear Amp UK can be found at Stand No. 15c.

Gwen at Linear Amp UK was kind enough to send *Practical Wireless* some information on what they were going to be exhibiting at the





# Radio Show News

## Donington International Exhibition Centre

Leicester Show, Donington, this year. She tells us that you should visit the Linear Amp UK stand to see the range of r.f. valve amplifiers that they will have available.

There are four h.f. amplifiers, from the top of the range **Challenger II** to the more modest **Ranger 811H**. The Challenger II uses a single 3CX1500A7 to produce over 1500W c.w., which is ideal for the serious DXer or contest station. The Ranger 811H, which uses four Svetlana 811A valves, gives 800W c.w. at a more modest price. The Explorer and Hunter, both of which use 3-500ZG valves are still as popular as ever.



Gwen goes on to say that for the v.h.f. enthusiast there are three models available - the 144MHz Discovery, 50MHz Discovery and the Hunter Six. The Discovery amplifiers both use a 3CX800A7 which gives superb gain so 1000W output can be achieved with only 25-35W drive. For the 50MHz operator who has a transceiver with up to 100W drive, then the Hunter Six is the ideal choice. It uses a single 3-500ZG to give 800W c.w. on 50MHz.

Have a chat to the crew at Linear Amp UK - even if you're only thinking about getting an amplifier in the future!

**Linear Amp UK are based at Field Head, Leconfield Road, Leconfield, Beverley, East Yorkshire HU17 7LU. Tel/FAX: (01964) 550921.**

### Martin Lynch & Sons (ML&S)

ML&S can be found on Stand No. 16.

Martin Lynch & Sons (ML&S) will be attending the Leicester Show at Donington and Martin Lynch tells *Practical Wireless* that "The usual array of new and used products will be on show at the 'Lynchys' stand this year. Of particular interest will be new products from the Yaesu, Icom and Kenwood camp".

The new Yaesu FT-90R will be the star of the show. Some of you may have read Joanna Williams' news



report on it in the September 1999 'News' pages. Also known as the 'Micro Commander', the FT-90R is a "pocketable" transceiver which is actually meant for the car or the shack and produces the usual 50W on 144MHz and 35W on 430MHz. It has a removable head and offers all the usual features of a typical twin-band mobile.

The all new Icom IC-756 PRO which, Martin Lynch says, fits in somewhere between the IC-746 and the IC-775DSP has some "class leading features not seen on any current model available today". Martin and his team hope to have an early sample model on the stand.

Finally, last but by no means least is the Kenwood TS-890D. Martin goes on to tell *PW* that he had a visit from six Japanese Kenwood engineers and planners who visited his showroom earlier this year and have ever since been "beaver away" designing a new all mode all band base transceiver including h.f., 50, 144, 430 and even 1296MHz! Martin says that he is also led to believe that it has a built-in Packet Modem and lots more! Intrigued? Then a visit to the ML&S stand should satisfy your curiosity. **ML&S are based at 140-142 Northfield Avenue, Ealing, London W13 9SB. Tel: 0208-566 1120.**

### Nevada

Nevada can be found on Stand No. 11.

Mike Devereux at Nevada sent *Practical Wireless* some interesting information regarding items that they will have on display at the Leicester Show this year.

They've recently been appointed distributors for the high-quality Dutch manufactured antennas, the ZX Yagis and the owner of ZX will be on the stand with his new 3-element mini beam for 14/21/28MHz.

Nevada will also have two new mobile antennas from Outbacker, the well-known Australian antenna manufacturer. The Outreach is a 12ft (3.6m) antenna covering 1.8-28MHz and the Outrunner is a 9ft



(2.7m) "super efficient" 1.8-28MHz antenna.

Also featured on the Nevada stand this year will be the Alinco DJ-SR1, a new fully featured PMR-446 radio will be selling for just £99.95. Finally, Nevada will have the Palstar AT4K antenna tuner on their stand this year which Mike says is: "Probably one of the largest antenna tuners ever built, a genuine 4kW unit with a 30A edge wound solid copper roller inductor and cooling fans"! So, why not pop along and see Nevada? They might have what you've been looking for. **Nevada are based at 189 London Rd, North End, Portsmouth, Hants PO2 9AE. Tel: 0239-266 2145.**



### Radioworld

Radioworld can be found on Stand No. W15.

Dave Hayward at Radioworld sent *Practical Wireless* a FAX to tell us that, this year, they will be taking a large selection of new and used equipment by all the major manufacturers: Kenwood; Yaesu; Icom, etc. They will also be taking accessories, Dave tells us, for the above companies' products. You can see their advert in this issue for more information on just what Radioworld specialise in.

**Radioworld are based at 42 Brook Lane, Great Wyrley, Walsall, West Midlands WS6 6BQ. Tel: Sales & Service (01922) 414796.**

### SMC Ltd

SMC can be found on Stand No. 12B.

Geoff Brown G4ICD of South Midlands Communications Ltd (SMC)

contacted *Practical Wireless* to tell us all about their plans for the Leicester Show at Donington Park this year. He says that



they will have a very special offer for the show this year - they've cleared the commercial stores and found a massive quantity of p.m.r. sets which are brand new boxed units.

The stock clearance includes v.h.f. and u.h.f. hand-helds that are programmable from a PC and also single channel u.h.f. mobiles for Packet/repeater/simplex use. There's a fixed price of £25 for any one item, which is a saving of nearly £200! Also included in the clearance are Midland 30 to 50MHz hand-helds, again priced at £25 each. SMC say they will also have the usual major manufacturers items for sale at "VERY keen" prices!

The SMC special offer this time around will be "Buy any radio from SMC and you get a FREE 145MHz hand-held, charger and NiCad"! **South Midlands**

**Communications are based at SM House, School Close, Chandlers Ford Industrial Estate, Eastleigh, Hampshire SO5 3BY. Tel: 0238-024 6222.**

### Vann Draper Electronics Ltd

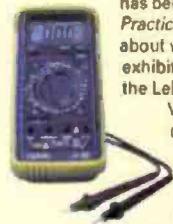
Vann Draper Electronics Ltd can be found on Stand No. 24B.

Tim Coates at Vann Draper Electronics Ltd, the Midlands based manufacturer and distributor of test and measurement equipment, has been in contact with *Practical Wireless* to tell us all about what they will be exhibiting on their stand at the Leicester Show this year.

Vann Draper's stand will contain the usual extensive range of low cost instruments as well as a selection of new products from Grundig including r.f.

millivoltmeters, frequency counters and oscilloscopes all at "substantial exhibition discounts"!

On show in particular, Tim tells *PW*, will be the recently introduced LP300 digital multimeter. This model includes 43 ranges containing 12 measurement functions. These consist of d.c. voltage from 200mV to 1000V, a.c. voltage from 200mV to 750V, d.c. current



Continued on page 48...



# Leicester Amateur

## 24th & 25th September 1999, Castle Donington

### Exhibitor's List

**Stand No: Company**

- W1 Loutronics
- W2 Harwood Trading
- W2A Rigs of Distinction
- W3 A J Paddon
- W4 Haydon Communications
- W5 PW Publishing Ltd**
- W6A Lake Electronics
- W6B T & M Milman
- W7 M & B Radio

**Stand No: Company**

- W9 Waters & Stanton
- W11 Strikalite
- W12 Manhattan Computer Suppliers
- W13 Satellite Surplus
- W14 JPE Ltd
- W15 Radioworld
- W16 Multicom 2000
- W17 Poole Logic
- W18 LMW Electronics

**Stand No: Company**

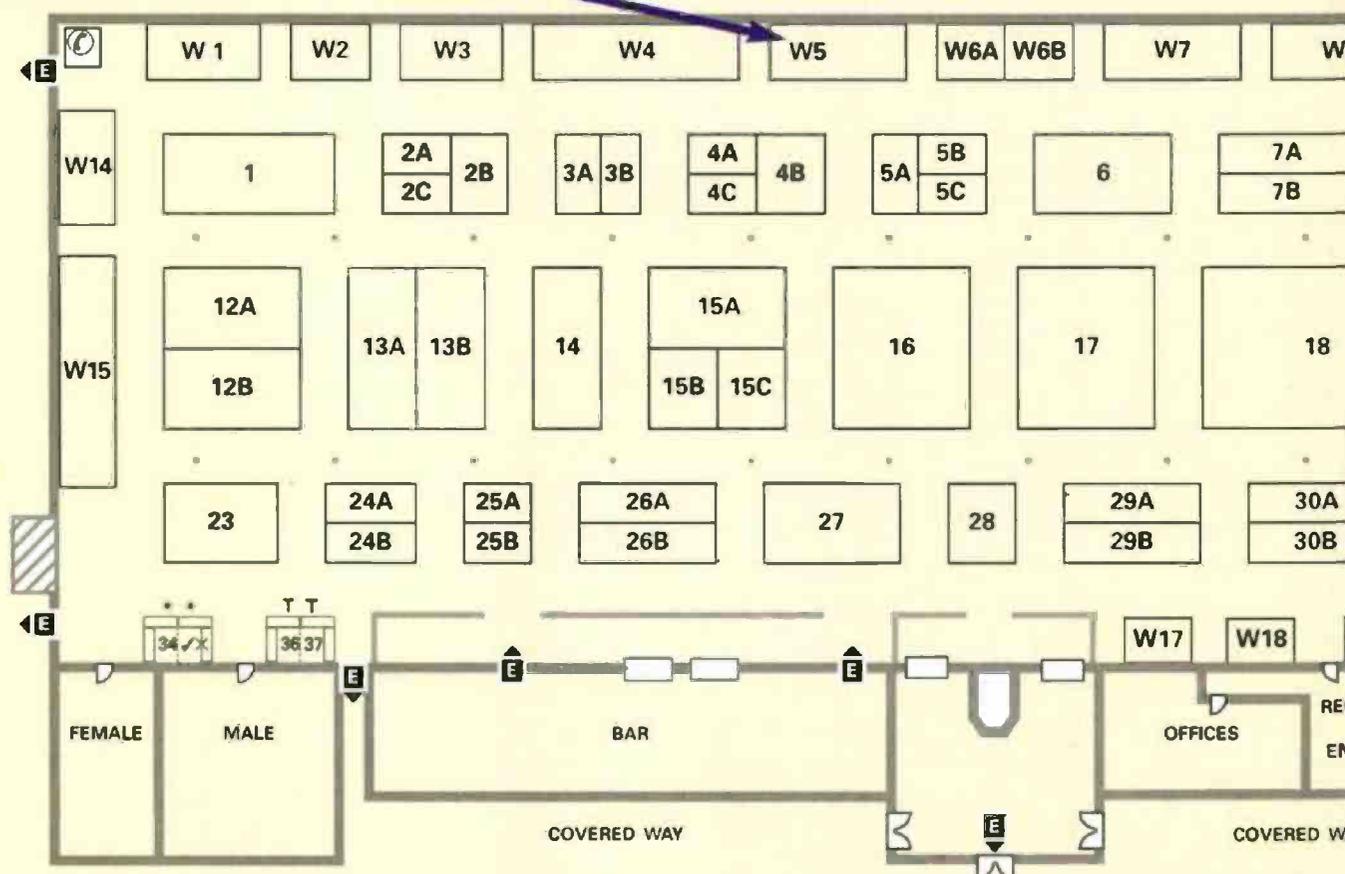
- W19 Timestep Electronics
- W20 Bring & Buy
- 2A H Morgan Smith
- 2B Agile Tools
- 4C Microware
- 5A Nonuts
- 5B R Barratt
- 5C AOR (UK) Ltd
- 6 Taurus Electronics
- 7B Westlake Electronics
- 8 R J Holderness
- 9A Office Land
- 9B Combitek
- 11 Nevada Communications

**Stand No: Company**

- 12A Strumech Versa Tower
- 12B South Midlands Communications (SMC)
- 14 Sandpiper Communications
- 15C Linear Amp UK
- 16 Martin Lynch & Son
- 17 Kenwood Electronics (UK) Ltd
- 18 Yaesu Ltd
- 19 Icom (UK) Ltd
- 20 RSGB
- 21 Lowe Electronics
- 22A Mikay Distributors
- 22B SRP Trading (Radio Centre)

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EXHIBITORS CAR PARK B





# Radio Show 1999

## Donington International Exhibition Centre

Stand No:	Company
22C	UK Hydrographic Office
23	JAB Electronic Components
24A	TLX Electronics
24B	Vann Draper Electronics Ltd
25A	R A Kent (Engineers)
26B	Mirage Designs
27A	Nomis
27B	Capital Products
28	Festival Computing
29A	Transworld Satellite Systems
29B	Barenco
30A	Ronal Computers Ltd

Stand No:	Company
31A	SGS Electronics
31C	HaRP Shareware
32	UBM (London)
33A	Computer Junk Shop
33B	Rich Electronics
34	Moonraker (UK)
35A	HRT
35B	Wentworth Offices
T	InkTec Midlands
T	Remote Imaging Group
?	The QRP Component Co.
?	Spectrum Components

\*All details correct at time of going to press.

### Prices

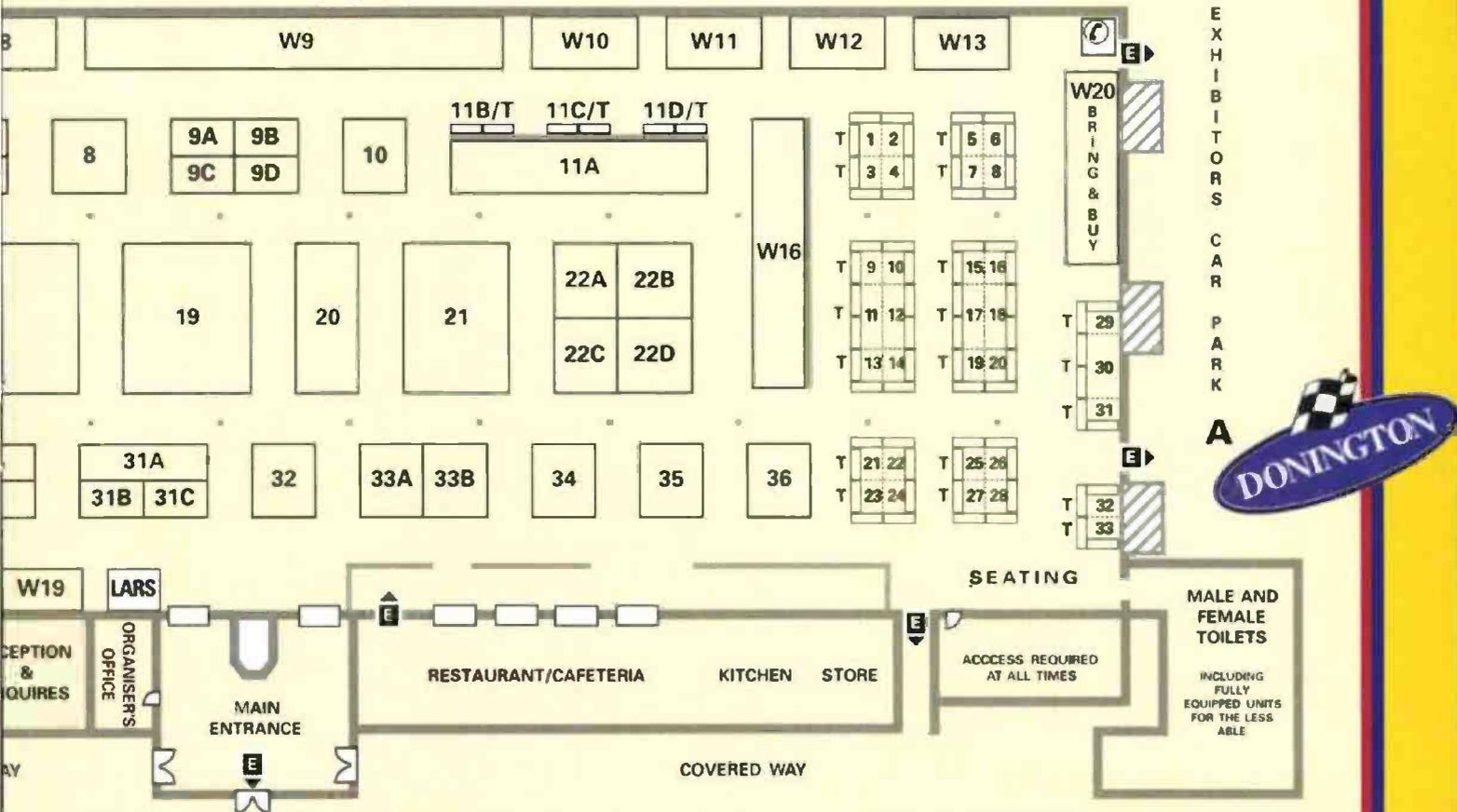
#### Admission:

- £3 (1 day ticket)
- £2.50 (OAP & under 16s)
- £2.50 & £4 (Advance tickets)
- £5 (2 day ticket)
- £2 (Advance party booking 12 minimum)

**Opening Times: 9.30am - 5pm**



Bring & Buy • Free Parking • Prize Draw & Raffles • 150 Stands Including Bring & Buy • Free Parking • Prize Draw & Raffles





# Leicester Amateur

## 24th & 25th September 1999, Castle Donington

### News

...continued from page 45

from 200µA to 10A, a.c. current from 200µA to 10A, resistance from 200Ω to 20MΩ, frequency from 2kHz to 20MHz, capacitance from 20nF to 2000nF, inductance from 2mH to 20, Continuity test, Logic test, Diode test as well as data and Peak hold. Also included are auto power off, an audible input warning and another feature allows the measurement of capacitance and inductance by either the built socket or by the test leads.

Featuring gold-plated switch contacts for long life, the LP300 is supplied complete with rubber holster, test leads, battery and operating instructions. The LP300 normally costs £81.08 but will be available on the stand at the special price of **£59 including VAT**.

Vann Draper Electronics Ltd are based at Unit 5, Premier Works, Canal Street, South Wigston, Leicester LE18 2PL. Tel: 0116-277 1400.

### Waters & Stanton PLC

Waters & Stanton can be found on Stand No. W9.

Waters & Stanton PLC will once again be present at the Leicester Show and Jeff Stanton tells *Practical Wireless* that "The sales team ... will be manning as usual one of the largest stands at the exhibition bringing many new products not yet seen in the UK".

The ADI AR-147 144MHz 50W mobile transceiver (including air band receive) will be on show for the first time as well as a new rotator, model RC5-1, from Creative Design priced at **£299**.

From Cushcraft in the USA, the MA-5B mini multi-band beam will also be on show and is priced at **£289**. Also, this time from Italy, the D2T 2-element wide-band antenna will also be available, priced at **£399**.

Jeff Stanton tells *PW* that there will also be several new products from



MFJ and Ameritron on display at the Waters & Stanton stand as well as (hopefully) Optoelectronics' new CD-100 multi counter.

There will also be a "special" display of SGC products including the new SG-237 mini auto antenna tuner range and the Bugcatcher mobile h.f. antenna from Texas, USA will be making it's first appearance. (See Rob Mannion G3XFD's review in this issue). As well as all of this, the complete range of

Watson goodies will be on display. Jeff says that "As usual, highly competitive prices will be set for the exhibition". Waters & Stanton are based at Spa House, 22 Main Rd, Hockley, Essex SS5 4QS. Tel: (01702) 206835.

### W H Westlake Electronics

W H Westlake Electronics can be found on Stand No. 7B.

Devon-based W H Westlake

Electronics will be attending the Leicester Show again this year and they have written to *Practical Wireless* to tell us all about what they will be featuring at their stand this time around. This year they say that they will be showing an even larger line of cables and connectors for the Amateur Radio and hobbyist market.

They tell us that Westlake's lines of coaxial cables are all made to the latest MIL-C-17 specifications and special offers will be made on complete drum purchases. In addition to this, they will be selling the American "heavy duty" 300Ω and 450Ω slotted ribbon feeders.

The display connectors and adapters will be even more extensive this year, Westlake tells *PW*, with many new lines especially in the "hard to get" SMA series adapters. Also available will be "six different types of antenna wires ... many in special offer 25m and 50m pre-cut coils".

W H Westlake Electronics are based at West Park, Clawton, Holsworthy, Devon EX22 6QN. Tel: (01409) 253758.

The Leicester Show convention will again be taking place this year in the Fangio Suite at Donington over the Friday (24th) and Saturday (25th) of the Show. Some of the lecturers featured are well known to Radio Amateurs and it may be worth your while to pop along to a few.

Here I will give you a brief run-down on what lectures are on offer but further details are available from Geoff Dover G4AFJ QTHR (01455) 823344. FAX: (01455) 828273. E-mail: g4afj@argonet.co.uk

### Friday 24 September 1999 - Fangio Suite

- 1130-1230 **Internet & Amateur Radio**  
How can the two learn to live together and what it means for us?  
Jeremy Boot G4NJH, *Radio Today* Internet Columnist.
- 1400-1500 **An Introduction To The LF Bands**  
A talk for those who want to find out about the background to the I.f. allocations and their characteristics. How to get going on the bands including receivers, transmitters, antennas, operating modes and frequencies as well as details of other countries on the bands. John Moore G4GVC, who succeeded in achieving the first low frequency band award in the UK.
- 1515-1615 **Progressive Licensing Update**  
Following consultations with Radio Amateurs in the UK, the RSGB presented a comprehensive overhaul of the UK Amateur Radio licence structure to the RA designed to cover the lack of progress within the present licence structure. Go along and hear the proposals and what they mean for the future of Amateur Radio. Ian Kyle M10AYZ/G18AYZ, immediate past President of the RSGB.

## Lectures

### Saturday 25 September 1999 - Fangio Suite

- 1130-1230 **Repeater Forum**  
Is your repeater ready for Year 2000? No, nothing to do with the Millennium bug, but the Chairman and members of the RSGB Repeater Management Committee will be on hand to talk about the latest developments in the repeater world and would be delighted to hear your views on the future. If you would like to put any questions to the committee in advance please forward them via the RMCWEB or just turn up on the day. Carlos Eavis G0AKI, RSGB Repeater Management Committee and members of the committee.
- 1400-1500 **The Magic Of Six Metres**  
In the UK (and around the world) there are many amateurs who are hooked on digging out the DX on 6m - 'The Magic Band'. But all too often, newcomers come on, don't hear anything much and then give up, wondering what all the fuss is about. Chris will explain the magic and the mystery of 50MHz and will give beginners some pointers on where and when to look for the DX and what to expect as solar cycle 23 reaches its peak. Chris Deacon G4IFX, Editor of *Six News*, the magazine of the UK Six Metre Group (UKSMG).
- 1515-1615 **SMOC - The Spratly Island DXpedition**  
In February 1998, a British led DXpedition to the Spratly Islands in the south China sea made over 65 000 QSOs in ten days. It was the largest and most successful DXpedition ever organised by British Amateurs, ranking fifth in the all-time world record league. The talk focuses on the logistics of organising a major DXpedition, the innovative use of the Internet and computer systems and the challenges that faced the operators on this tiny island off the East Malayan Coast. John Linford G3WGV, DXpedition member, Treasurer and IT expert.



# Radio Show Extras

## Donington International Exhibition Centre

### PW Special Show Offers

Don't forget to pay a visit to the **Practical Wireless stand** at the Leicester Show on 24 and 25 September. This year we can be found on **Stand No. W5** and on this page you will find information on what **PW** will have on their stand to interest you and also what Special Offers we will have at the show including a subscription offer and many low-cost books on offer! **Practical Wireless** would like to stress, however, that the following book titles at these prices will **ONLY** be available at Donington over the weekend of the Leicester Show. **They must, therefore, be paid for and collected from the PW/SWM stand.** The subscription offer is, however, open to all and if you would like to take advantage of it and aren't able to make the trip to Leicester then please turn to page 65 for how you can order your subscription.



See us on Stand W5, far wall, opposite the main entrance and to the left.

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Subscribe to *Practical Wireless* this month and you will receive a **three year subscription for the price of a two year subscription!**

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To order your 'Three For Two' subscription please visit us at the show on Stand No. W5 and quote **PW10**.

This offer also applies to *Short Wave Magazine (SWM)*. Purchase a two year subscription to *SWM* for **£66 (UK only)** on the stand at the Leicester Show and we will send you the third year **FREE!** Now you really do have to visit our stand don't you?

#### PW Leicester Show Book Offers

##### Ferrell's Confidential Frequency List 11th Edition 1999

This book, compiled by **Geoff Halligey**, is one which you are all probably aware of and know and love. *Ferrell's Confidential Frequency List* claims to be the definitive guide to utility stations, 1.605-30MHz and includes a "Full Reverse Callsign List". In the introduction to the book, Geoff himself says that it is a "comprehensive listing of all identifiable utility stations".



It has a Marine section giving full details of all the world's commercial, government and naval coast stations, the NAVTEX transmissions are listed by the hour, Aviation channels (both military and civil) are also fully covered in the book.

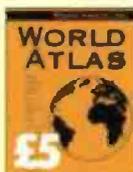
This 11th Edition, produced for 1999, was priced at £19.95 until it went down to £16.95. However, at the show, you will be able to purchase *Ferrell's Confidential Frequency List* for a mere **£10**.

##### Radio Amateur's World Atlas

The *Radio Amateur's World Atlas* is just that! It covers North America, Central America and West Indies, South America, Asia, Indian Ocean, Japan, Australia and Pacific Ocean, Europe, Africa and Antarctica.

In this A4 size book, printed in Germany, you will find that, on each page, the country shown has lines drawn over it depicting locator square and its reference. Other information covered in the book includes: 'Continental Boundaries', 'DX Zone Boundaries', 'Radio Amateur Prefix Boundaries' and 'Capitals'.

Purchase the *Radio Amateur's World Atlas* at the Leicester Show from the **PW** stand and you will only pay **£5!** (was £8).



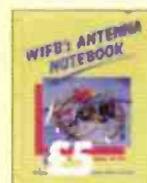
##### W1FB's Antenna Notebook Doug DeMaw W1FB Published by the ARRL

In the Foreword to this book, the late Doug DeMaw W1FB says that he "prepared this text for amateurs rather than engineers or scientists. You will find the material easy to understand, even though you do not have a strong

technical base from which to work" and this does appear to be true. *W1FB's Antenna Notebook* contains some very clear text and diagrams.

The author says that in the book, he explores the many aspects of simple antennas and related matters. Doug also claims that a "large amount of this material is not found in other antenna books". Some of the Chapters include: 'Some Fundamental Antenna Data'; Building and Using Dipole Antennas'; 'Simple Vertical Antennas'; 'High Performance Wire Antennas' and 'Special Receiving Antennas'.

If you pay for and collect *W1FB's Antenna Notebook* at the **PW** stand at the show, you will pay just **£5!** (was £8).



##### W1FB's Design Notebook Doug DeMaw W1FB Published by the ARRL

Following along the lines of the *W1FB's Antenna Notebook*, this book does, however, concentrate more on the building of Amateur Radio equipment and **George Dobbs G3RJV** often quotes from, and uses, the ideas for his 'Carrying On The Practical Way' column - what better recommendation?

In the Foreword, Doug DeMaw states that if you like building Amateur Radio equipment then this is the book for you. He says that it contains "more of the simple equipment". There are basic radio projects for the bands below 30MHz and you will also find explanations of how various circuits work, Doug explains.

Like the *W1FB's Antenna*



*Notebook*, this book is clearly written and well presented with clear circuit diagrams. If you purchase *W1FB's Design Notebook* at the show, it will only cost you **£5** (was £8).

##### Shortwave Maritime Communications B. E. Richardson

This "Step-by-step guide to communications on the High seas" has chapters covering Voice, c.w., RTTY, SITOR A and B NAVTEX, INMARSAT and claims to be "The Most Comprehensive book for the Maritime Enthusiast listing over 25 000 frequencies".

*Shortwave Maritime Communications* is laid out, it claims, with both beginner and the well-seasoned maritime radio enthusiast in mind "providing the most accurate and detailed information in an easy-to-use format". If you want to monitor ships receiving instructions from their agent where to go next, changes in course, etc., then this could be the book for you. It also contains two frequency lists with "every coastal station from around the world" listed "together with the shore and corresponding ship's frequency".

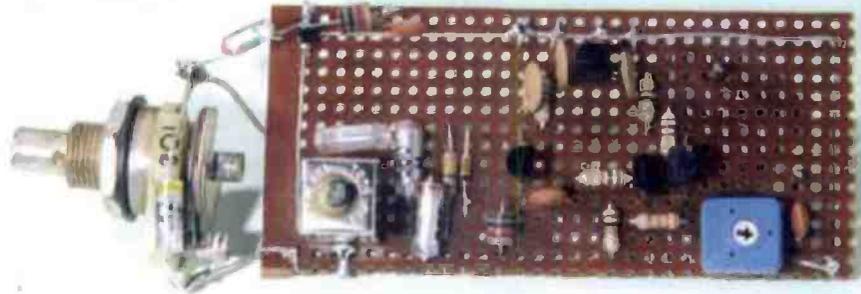
*Shortwave Maritime Communications*, if purchased from the stand at the Leicester Show, will cost only **£10** (was £16.50)!



The team here at *Practical Wireless* hope that you can make it to the Leicester Show this year and that you visit our stand. We look forward to meeting you all!

# Carrying on the Practical Way

This month's project – modifying the original G3RJV v.f.o.



*"For all that moveth doth in change delight"*  
Edmund Spenser, from *'The Faerie Queen'*

The Rev. George Dobbs G3RJV describes the techniques involved in providing standby and receive incremental tuning for use with variable frequency oscillators. But first of course - there's the usual monthly appropriate quotation!

One of the highly desirable traits of a variable frequency oscillator (v.f.o.) is that the frequency does not change very much once it's set. In last month's column I described a variable frequency oscillator which has served me well in many applications in the past. With careful choice of components and careful construction, the circuit should yield a stable and reliable v.f.o.

There are some uses of the v.f.o. which require it to be shifted off its appointed frequency and then quickly returned to the original frequency setting. A simple example occurs when a v.f.o. is used to drive a transmitter to work in conjunction with a separate receiver.

The station using the transmitter will require the receiver tuned to the transmitter frequency. A common way to do this is to 'net' the receiver and transmitter.

If 'netting' is required to call an existing station on the band, the procedure is to tune the receiver to 'zero-beat' with the desired station. (Normally we listen to a c.w. [Morse] station on the upper or lower sideband of the signal so that a tone may be heard).

## Zero Beat

When the required station is at 'zero-beat', the receiver is tuned out of that sideband to the actual carrier frequency where there's a 'null' in the audio signal. The receiver is now set on the exact transmitting frequency of the desired station.

When a separate transmitter is being used, the common practice is to switch on the v.f.o. of the transmitter only and listen for it on the receiver. The frequency of the v.f.o. is adjusted to also zero-beat with the receiver. The desired station and the v.f.o. will then be on the same frequency.

The transmitter can then be used to call the other station and the receiver may be returned to a sideband of the that signal to hear the tone.

## Usual Practice

It's usual practice, when operating v.f.o. controlled transmitters, to leave the v.f.o. running the whole time

because all v.f.o.s suffer from some short term drift after switch on. This is usually much worse than the long term drift after the components have settled down into operation.

Ideally, as I've mentioned, the v.f.o. remains on all the time and the keying of the output signal is done after the v.f.o. stages. The problem here is that, because the v.f.o. is on the frequency of the receiver, it will be heard during the

receive portions of a QSO and the strong local signal from the v.f.o. will mask the desired signal being received.

The simplest way out of the masking problem is to shift the frequency of the v.f.o. out of receiving range during the listening periods. To do this, the v.f.o. must be moved in frequency and then quickly return to the desired transmit frequency for the transmitting periods and the simple circuit to achieve this is shown in Fig. 1.

## Frequency Shifting Circuit

In the frequency shifting circuit, Fig. 1, L1, C1, C2 and C3 are the original tuning components in the v.f.o. described in last month's column. Here, a small value capacitor and a high speed switching diode are connected across the tuned circuit.

When 12V d.c. is applied, the diode switches the small value capacitor to ground. The value of this capacitor is deliberately chosen to pull the v.f.o. frequency out of the receiver passband. A resistor limits the current flow to protect the diode and the 1mH choke reduces stray radio frequency (r.f.) emissions in the circuit.

The additional components **must be mounted rigidly** near the tuned circuit of the v.f.o. A 'feed-through' capacitor takes the circuit from the v.f.o. screened box to the outside world. This should be mounted on the screened box as close to the tuned circuit as possible.

## Desirable Addition

Another very desirable addition to a v.f.o. is a Receiver Incremental Tuning (RIT) circuit. This allows the v.f.o. to be tuned either side of the set frequency on receive. This is a facility required to tune in stations that are slightly off the operating frequency of the transmitter.

A commonly used approach to the RIT circuit is shown in Fig. 2. This circuit uses a voltage variable capacitance. These are usually described using the generic trade name 'Varicap' diodes.

The junction capacitance of a varicap diode changes as a reverse voltage is applied. The varicap is placed in parallel with a tuned circuit and tuned with a variable voltage and in effect a potentiometer takes the place of a variable capacitor.

There are well known problems with varicap tuning.

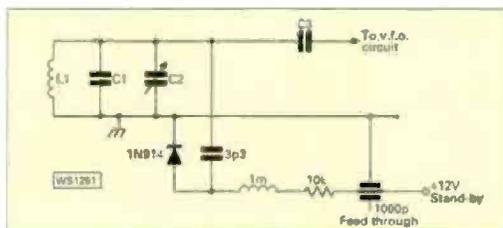


Fig. 1: If a v.f.o. is on the frequency of the receiver, it will be heard during the listening period and the strong local signal from the v.f.o. will mask the desired signal. 'Shifting' the frequency of the v.f.o. out of receiving range is the answer and this simple circuit does the job (see text).

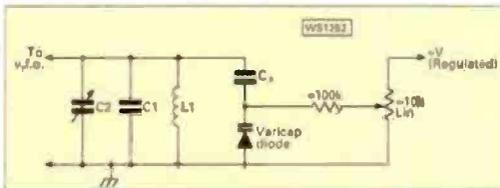


Fig. 2: A commonly used approach to the RIT circuit is shown here. This circuit uses a 'voltage variable capacitance device, usually described using the generic trade name 'Varicap' diodes (see text).

One problem is that all semiconductor junctions change capacitance with changes in temperature of the junction.

Additionally, adding a varicap diode to a tuned circuit will decrease both long and short term frequency stability. Another problem is that a varicap diode has a high minimum capacitance in relation to the maximum capacitance.

Designers have to remember that the change in capacitance is not linear in relation to the change in voltage. However, in most applications this problem is reduced by only using the varicap on a portion of the capacitance/reverse voltage curve which is relatively linear.

### Varicap Connected

The diagram, Fig. 2, shows how the varicap is connected in series with a small fixed capacitance  $C_x$  across the existing v.f.o. tuned circuit. A series limiting resistor, in the order of 100k $\Omega$ , is used to connect the

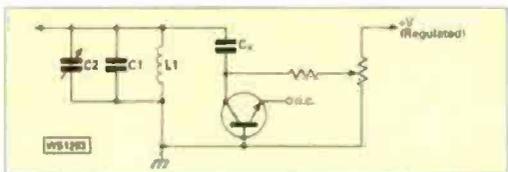


Fig. 3: The diagram, shows the use of a common npn bipolar transistor in an RIT circuit. The circuit will require some experimentation as the capacitance shift will vary with the transistor chosen and even between individual examples of a single type (see text).

varicap to a variable voltage. **And since this voltage will control the v.f.o. frequency it should be well regulated to maintain frequency stability.**

The capacitance shift required for a v.f.o. in the h.f. range is quite small. For RIT to be effective, only 1 or 2kHz shift, either side of the set frequency, is required.

Varicap diodes are commonly used in the tuned circuits of domestic radios and are available for tuning on long, medium, short wave and v.h.f. frequencies. For RIT circuits it's possible to use the varicaps designed for v.h.f. Band II (often referred to as the 'FM' band) tuning which have a smaller frequency excursion and are cheaper and usually more stable.

For small capacitance shifts it's also possible to use conventional diodes. To this end I've often used common high speed switching diodes, like the 1N914, for varicap tuning in RIT circuits.

The diagram, Fig. 3, shows the use of a common npn bipolar transistor in an RIT circuit. However, it will require some experimentation as the capacitance shift will vary with the transistor chosen and even between individual examples of a single type.

### Practical Circuit

A practical RIT circuit is shown in Fig. 4 and this should work well with the v.f.o. circuit described in the column last month. This circuit uses the inexpensive BB105B varicap diode. (Many other types of varicap will do the job - try what you have to hand).

The series capacitor is shown as 10pF. This value worked well in my prototype v.f.o. but constructors may need to experiment to get their desired frequency shift,

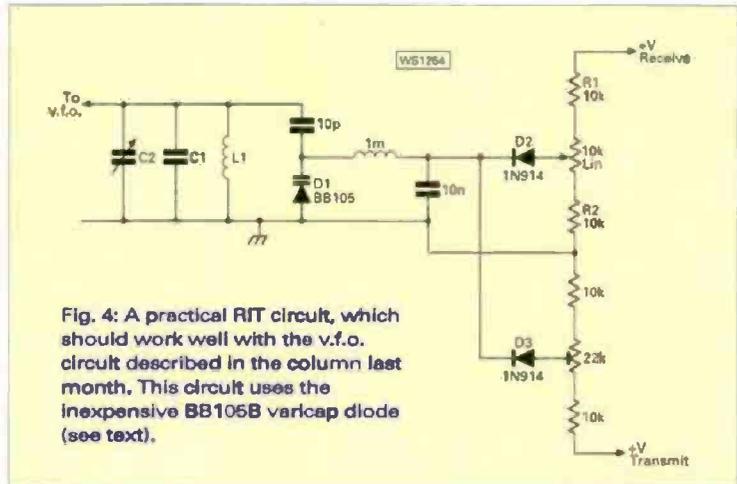


Fig. 4: A practical RIT circuit, which should work well with the v.f.o. circuit described in the column last month. This circuit uses the inexpensive BB105B varicap diode (see text).

especially if an alternative varicap diode is used.

Take care with the polarity of the varicap diode. The markings of the BB105 are a little unusual and are shown in the drawing. Also, bear in mind that a varicap diode uses the reverse voltage and so appears to be the wrong way round in the circuit. (I've made the same mistake myself, and have connected varicap diodes the wrong way in a circuit because "it seemed the right way round").

In the circuit shown a 1mH r.f. choke is placed in series with the diode control voltage. With the decoupling capacitor, this reduces the unwanted r.f. current reaching the voltage control parts of the circuit.

A practical RIT circuit requires control of the frequency between transmit and receive. In most applications, the RIT circuit should enable tuning either side of the set v.f.o. frequency and be able to return the v.f.o. to the set frequency during the transmit cycle.

Two potential divider circuits are provided, one for transmit and one for receive. These are connected to the varicap circuit via diodes. I simply used values for R1

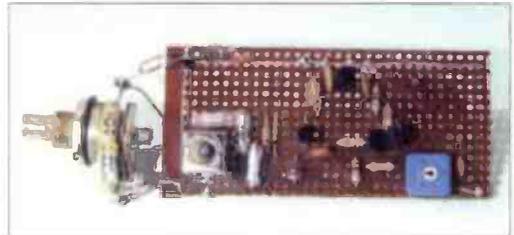


Fig. 5: The original G3RJV v.f.o. project, as modified for incremental tuning (see text).



Fig. 6: Close-up photograph showing the simple modifications using the B105B varicap diode (see text).

and R2 which worked in practice. (Individual constructors might like to take more time than I did to optimise these values to suit their own needs).

Construction should follow good v.f.o. techniques and be short and rigid. A feed-through capacitor could be used to take the control voltage into the v.f.o. screened box. This would be added at the junction of the r.f. choke and the decoupling capacitor.

Regulated voltages are required for the potential divider circuits. Depending upon what's available in the other circuits in the transmitter and receiver, the constructor may have to derive the required voltages by using small voltage regulator chips.

So, now you too can incorporate RIT into your projects. It's not so difficult is it? Cheerio for now, and keep those soldering irons hot!

PW



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It's Charles Miller's stint in the *Practical Wireless* vintage 'wireless shop' this month. And while sitting behind the counter, he casts his mind back again to the Second World War and continues his story of when the British radio industry created their very own 'Unwanted War Baby' - a standard receiver for civilian use.

In the second part of this story - the tale of an unwanted 'war baby' in the form of a 'standard' type of 'Utility' receiver, I'm looking back at the considerable effort that it must have taken to design it. Agreeing the specification alone must have needed much thought! Just as the panel of experts involved with the 'Utility' receiver had found that previous October, the Committee had concluded that the required performance could be obtained with a 'short' superhet. There was much expertise waiting on the sidelines.

Firms such as Ekco, Philips and Ultra had vast experience of making similar sets and any one of their late pre-war designs would have served perfectly well. However, it undoubtedly would have gone against the grain for highly competitive radio firms (a) to share their designs and (b) to produce another manufacturer's brainchild.

Even if the competition problem had been resolved, a second remained. Double-diode-pentodes, having no military use, had been banned for the duration and the Board of Trade wouldn't permit them to be manufactured solely for the proposed Utility sets.

### Out Of Obscurity

To get around the double-diode problem, the Committee brought out of semi-obscurity, a device that had been around for a dozen years or so without

breaking any sales records. This was the 'Westector'.

The Westector was a miniature metal rectifier which worked as a detector at frequencies up to about 1500kHz. It could be used in a superhet in conjunction with an ordinary high-slope output pentode, still in plentiful supply.

Also still in plentiful supply were frequency-changers and r.f. pentodes. But the choice was left wide open by not specifying particular types but common ones carrying arbitrary type numbers devised by our old friends the BVA to cover groups of equivalents made by individual members.

Incidentally, the final figure of each number indicated the actual manufacturer, as follows: 1 Cossor; 2 Mazda, 3 Ferranti, 4 Osram, 5 Marconi, 6 Mullard, 7 Brimar. And you'll note that, even in the middle of a war, the pretence still had to be kept up that Marconi and Osram valves were unrelated, instead of coming from the same factory!

However, the design committee was not yet out of the woods with the adoption of the Westector. It still had to devise a means of meeting its own specification for automatic volume control (a.v.c.), which had to be of the delayed variety.

'Delayed' a.v.c. is no problem when a double diode pentode is employed because one of the diodes can be used separately as the a.v.c. rectifier, with suitable bias applied to give the required delay characteristic. The design difficulty was that whilst a.v.c. could be tapped off the load resistor for the Westector, it would be of the simple type and an alternative means of applying delay would have to be devised.



Fig. 1: An unwanted 'War Baby'? Charles Miller takes a look into the history and difficult 'gestation' of the Second World War 'Utility' receiver. The version shown was made by A. C. Cossor Ltd.

### Simple & Ingenious

To give credit where it's due, the a.v.c. answer was both simple and ingenious. The suppressor grid of the i.f. amplifier was pressed into service to act as a 'clamp diode', with positive bias supplied from the h.t. line of the set so that the a.v.c. could not begin to come into effect until the signal strength of the received station was sufficient to give full loudspeaker output.

It seems likely that the Philips/Mullard representatives on the Committee were responsible for what was a 'gem' of an idea. They also probably influenced the design for the h.t.

smoothing in the set, which used resistors in combination with high value electrolytics, something not in general use at the time.

Talking of h.t. supplies, it's rather surprising, at least at first glance, that the Committee didn't go for the a.c./d.c. design as suggested by the panel of experts. The most likely reason for this is that a.c./d.c. valve rectifiers again had no military use and also had been banished for the duration. Still, a

Westinghouse metal rectifier could have been used!

## The Battery Version

After all the agonising over the mains version, the Committee must have become fed up and opted for the easiest way out when it came to the battery version of the set. This was because the suggestion effectively was the Murphy B89 of 1940, modified for medium waves only and shorn of its variable tone control.

Now, I'm afraid the story brings us to the most serious deficiency of the Utility sets. It's also where the lack of common sense seems to come in, which was the set's provision of the single medium wave band.

(Although, at the time, the BBC was transmitting domestic programmes only on medium waves\*, this was in mid-1944 when the end of the war was in sight and the BBC had pledged to bring back its long wave station for domestic use with 90 days of the end of hostilities.

\*Although the parallel transmissions were being made on short waves, mainly for overseas listeners.

The panel of experts had accurately foreseen that to be acceptable, utility sets would have to be capable of giving good service under peacetime conditions. If only the RMA had taken the provision of long wave into account it would have changed the chances of success for the receivers altogether.

It was reported that an initial production run of 250 000 utility sets had been authorised with the possibility of a further 250 000 at a later date (it wasn't revealed what the proportions of the mains and battery versions would be). It now seems doubtful if even the first figure was attained.

It's difficult to ascertain exactly when the first utility sets arrived at dealers for sale. Some sources suggest June, 1944, but it seems unlikely that it was in fact before the end of July. As regards prices, the mains version was to retail at £12 plus £2.3s.4d. purchase tax and the battery one at £10 plus £1.19s.0d. purchase tax (batteries not included).

## A Nasty Shock!

After all the effort that had been expended in getting the Utility sets into the shops, the reaction of the public must have come as a nasty shock to the manufacturers! This was because - to put it mildly - there was considerable sales resistance. In fact, the timing could hardly have been worse.

With D-day having taken place on the 6th of June and the Allied armies starting to drive into occupied Europe, most people considered (with good reason), that the end of the war could not be far away. And with it would come the promised return of long wave broadcasting.

There was little incentive for potential customers to pay out good money for sets which not only had a single wave band but (frankly speaking) were also ugly and unattractive in their plain wooden cabinets.

The domestic radio set was then widely regarded by owners as a piece of furniture and even the most optimistic dealer could hardly expect to sell the Utility Set on that score. It even led to a question being asked in the House of Commons!

One MP stated that, whilst the components of the utility sets were very good, the outside appearance was cheap and nasty. He went on to ask Captain Waterhouse, a spokesman for the Board of Trade, if he had seen the sets and if he could do anything about improving them.

Not unexpectedly, Captain Waterhouse replied that he didn't agree with the description at all. He

had examined the sets and liked them - they were very practical. (Whether he liked them enough actually to buy one wasn't revealed).

One or two individual manufacturers tried to redress the single waveband situation by adding a long wave band, either in the factory or as a modification kit. But it was a largely futile exercise.

Dealers couldn't even try to inspire confidence in potential customers by announcing that their particular examples had been made by such-and-such a firm. One Murphy dealer tried this and received an official reprimand for his pains for breaking the rule of strict anonymity.

If retailers had moaned about the American sets, it was nothing to what they said about the Utility sets. The RMA made brave noises and said how sales were satisfactory but, in truth, the utility set was a dead duck. However, this did not mean that all the manufacturers had learned a lesson!

Almost unbelievably, one of the first post-war EMI receivers, the Marconiphone T11DA, was equipped for medium waves only, even though when it appeared, the BBC Light Programme on 1500m was already in operation. Well done, lads, it's people like you who helped to make the British radio industry what it is today!

It's closing time now, but I'm looking forward to chatting about the fascinating history of 'wireless' next time. Cheerio until then!

PW

## Utility Set Technical Specifications

### Mains Versions:

**Sensitivity:** To be less than 325 $\mu$ V @ 220m and 625 $\mu$ V @ 500m for 50mW output measured at the loudspeaker terminals.

**Selectivity:** Bandwidth not to exceed 11kHz @ 50% response and 21kHz @ 10% response.

**OVERALL RESPONSE:** To be more than 7dB down @ 100Hz or 9dB down @ 4kHz with respect to the level at 400Hz, to be measured on a resistive output load and using an r.f. input of 1mV modulated at to 30%, applied to the A1 (direct) antenna socket with the volume control adjusted to give 50mW output @ 400Hz.

**Threshold of a.v.c.:** The a.v.c. to be delayed so that its operation commences when the output is approximately 1W on a signal with a modulation depth of 50%.

**Intermediate frequency Rejection Ratio:** not to be worse than 5:1 at any point on the dial.

### Battery Powered versions:

**Sensitivity:** less than 300 $\mu$ V @ 1.5MHz and 600 $\mu$ V @ 600kHz for an output of 50mW across the speech coil terminals with an h.t. voltage of 120V (rather surprisingly, this is better than for the mains set).

**Selectivity:** as for mains version.

**Threshold of a.v.c.:** not specified.

**OVERALL RESPONSE:** More than 10dB down @ 100Hz or 14dB down @ 3kHz with respect to the level at 400Hz, under the same input/output conditions as for the mains version.

**Intermediate frequency rejection:** as for the mains version.

In addition, the oscillator section of the frequency-changer to continue to operate with the set fed from a 60V h.t. battery (i.e., 50% down on normal) via a 2.2k $\Omega$  series resistor.

**The Appearance:** the cabinets used by all manufacturers to be as nearly as possible of the same appearance. Standard drawings to be prepared by the British Radio Cabinet Makers' Association and kept at the RMA offices. The tuning scales to be finished in the standard manner and to have the same appearance as the prototype.

**General Quality:** "In view of the difficulty of producing a sufficiently detailed specification to cover such points as loudspeaker performance, or the durability and workmanship of the receiver, the RMA wishes to draw the attention of manufacturers to the fact that the sets will be so coded that defective apparatus can be traced to its source and it is therefore in the interests of each manufacturer to adhere to the spirit of the specifications". (You have been warned!).

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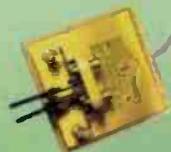
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# ELECTRONICS IN ACTION

Hello and welcome to the October issue of Electronics-in-Action (E-i-A), in which I put on the 'sack-cloth and ashes', tell you about replacing an f.e.t. in an older transceiver and present what I think is a novel (although not unique) project to help with sorting out Morse signals. There are of course, also a few book for your consideration this month.



I suppose I'd better get the 'sack-cloth and ashes' routine over with as quickly as possible. In the last E-i-A column (August 1999) I mentioned that I'd had a message from Roland G7VRN telling me about N. R. Bardwell, in Sheffield, who supply all sorts of interesting electronic bits and pieces. Well, I managed to get their address of 288 Abbeydale Road, Sheffield S7 1FL (Tel: 0114-250 0689) correct even if I mis-spelled their name.

The worst part though, for those of you who tried to 'browse' their Web site using the web-address that I gave in the printed magazine, was that it didn't work! I apologise for that mistake. The correct Web-address for N. R. Bardwell Ltd. is: <http://www.bardwells.co.uk> or send an E-mail to [sales@bardwells.co.uk](mailto:sales@bardwells.co.uk) to ask for your catalogue. If you used the link from our PW Web site, then

you shouldn't have had any problems, as I managed to correct the mistake before putting it on our site.

### Late news

Now for a little late news! Not that it's just happened, rather I'm late in letting you know about it. I'm sure that most of you will already know that Dick Pascoe G0BPS has passed over the very successful radio kit company that he founded, to John Fletcher G4EDX. You can contact John and Kanga at the new address of: Sandford Works, Cobden Street, Long Eaton, Nottingham NG10 1BL. Tel: +44 (0)115 967 0918, Fax: (0870) 0568608. Or by E-mail to [Sales@kanga.demon.co.uk](mailto:Sales@kanga.demon.co.uk). My apologies to both companies, for the problems.

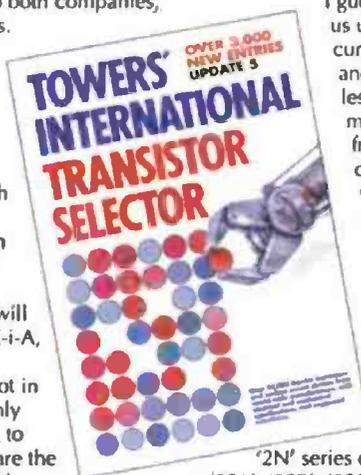
### Some Books

It's said that confession is good for the soul, I feel much better already! Now let me turn to look at some books for your library. As you will see later on in E-i-A, I use reference books rather a lot in the hobby, mainly when I'm trying to work out what are the characteristics of transistors and valves.

I bought my first copy of *TOWERS' INTERNATIONAL TRANSISTOR SELECTOR* more years ago than I care to remember, but I've used one version or other since then on an almost constant basis. While looking around in our Book Service section I came across the Update 5 edition again. The latest edition now has over 470 pages with electrical and mechanical data of over 32 000 bipolar transistors in tabular form.

In the tables, arranged in alphanumeric order by device, there's

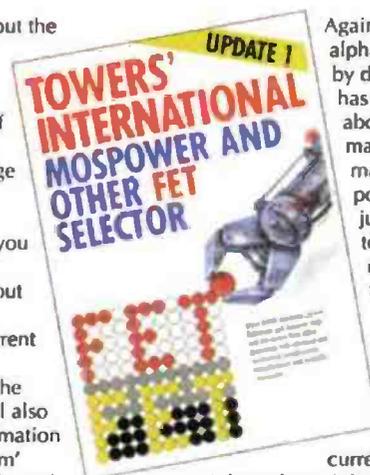
Information about the package and pinout, the 'main' manufacturer of the device and the normal usage of it. In the electrical characteristics you will find Information about the maximum voltage and current and power dissipation for the device. You will also find some information about 'maximum' frequencies, gain and various capacitance values.



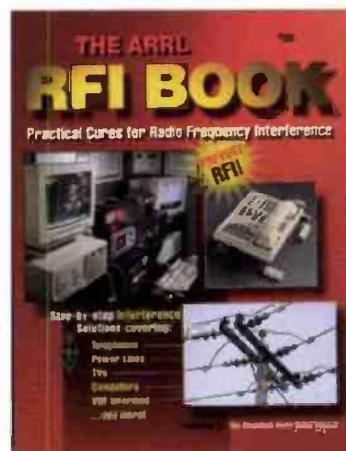
I guess that most of us use only the current gain figures and the are make less use of the maximum frequency and capacitance values. The last column of the data may be the most useful for anyone looking for a suitable replacement transistor, especially if it's an American '2N' series or the Japanese '2SA', '2SB', '2SC' or '2SD' range of transistors. The proffered substitute is in most cases of the 'Pro-Electron' or European style numbered device. It's an excellent reference book.

### Field Effect data

I'll turn to a book of f.e.t. data and equivalents now. *TOWERS' INTERNATIONAL MOSPOWER AND OTHER FET SELECTOR* is in a format similar to the transistor data and equivalents book, albeit somewhat slimmer. The update 1 of the Towers' f.e.t. tables contain information about 9000 field effect transistor of many differing types.



Again arranged in alphanumeric order by device, each f.e.t. has information about construction, maximum voltage, maximum current, power and junction temperature. But unlike transistors, where the gain is given in current-for-current form, gain in f.e.t.s is shown as current for voltage, where the unit is the Siemen



### The Siemen

The definition of a Siemen makes it the reciprocal of the Ohm. As it's quite large, often the quoted unit is the milli-Siemen (mS). The Siemen is defined as 'amps/volt' (or milli-amps/volt for the milli-Siemen). This is a unit that has been 'renamed' and the 'old' term that many readers may remember was the 'mho' or 'millimho'. The term is most frequently seen as a gain figure for valves or simple f.e.t.s (mA/V) or for Power f.e.t.s where their gain may be quoted as A/V.

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Fig. 1: A picture provided electronically by Shane GONCF, of how the replacement dual gate m.o.s.f.e.t. is fitted into his FT-107.

(this reference used to have the term 'mho' applied to it. See separate panel).

Unlike transistors, there are few agreed standard numbering techniques, and each manufacturer seems to have their own. Although this lack of convention does give an insight into which semiconductor manufacturer made the device, it can make finding out about any one device difficult. Sometimes truncated type numbers used on individual devices makes the job of identifying the f.e.t. more difficult.

By quickly scanning the lists for a similar number after the initial identifying letters, an f.e.t. may be more easily identified. And once identified a suitable substitute may be searched for. Like the transistor data book from Towers, this is an excellent reference book.

### Final Offering

The final offering I'd like to present to you is *The ARRL RFI BOOK*, a fairly thick and large book that should be of great use to almost all radio amateurs. Radio frequency Interference (r.f.i.) is a problem that all of us will suffer at some time or other.

The subject that one that is continually needs addressing.

Subtitled 'Practical Cures For Radio Frequency Interference' *The ARRL RFI BOOK*, has 18 sections covering ideas such as: 'first steps', Electromagnetic compatibility, (e.m.c.) fundamentals and troubleshooting problems. The final two chapters of 'RFI Regulations and Standards' and 'Forming a local RFI committee' are far more relevant to our American readers, but offer good reading for others.

On the practical side there are 11 sections of dealing with r.f.i. to, and due to, such things as cars, computers, television, 'hi-fi' units, power lines, telephones, transmitters, 'rusty bolts' and receivers. If you are suffering (or causing) almost any form of interference, there should be help within this book. Every shack, or club, should have a copy!

### E-mail Conversations

In a series of E-mail 'conversations' with Shane GONCF, one of the subjects that came up, was replacing semiconductors in older (?) transceivers when he said: "I have a question regarding f.e.t.s. I have just purchased an FTV-107R transceiver which has a faulty f.e.t. on the 2m receive. When it gets warm the gain drops dramatically. The device is listed as 3SK51, and I was wondering if there is a modern equivalent with higher gain and lower noise I could fit?" A good question Shane!

Fig. 2: The circuit diagram of the PW Morse Stager project. The small diagram within the circuit diagram should help to explain the working of this circuit. See text for more detail.

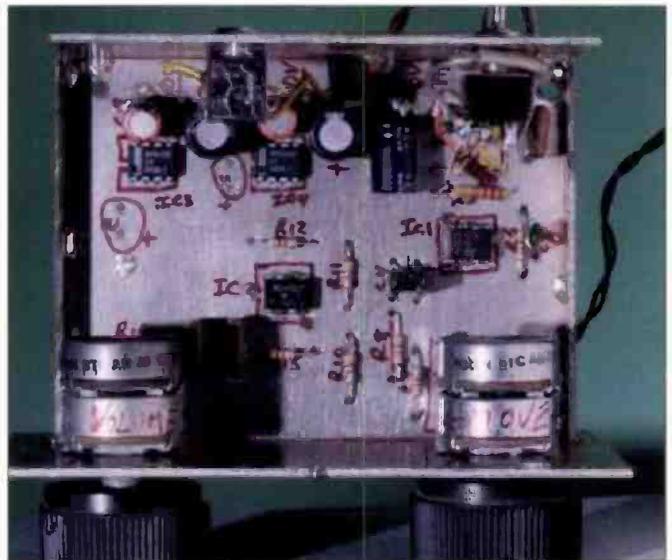
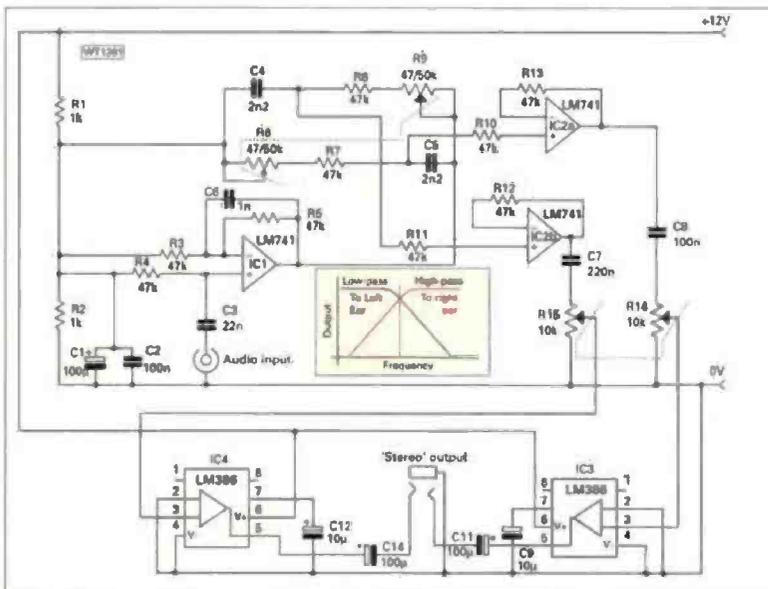


Fig. 3: An overhead view of the prototype Morse Stager showing component placing. (Refer to the overlay diagram of Fig. 4, for more detail).

In my answer to Shane, I mentioned that the 3SK51 f.e.t. is shown in my reference books as an n-type dual-gate depletion mode device, I suggested a number of possible replacements including: BF988, BF998, BF964S, BF994S, and reasonably low-noise variants. I could also have suggested an MFE201, or one of the similar T072 can dual-gate m.o.s.f.e.t.s. that may be found at rallies.

But the next E-mail from Shane said: "I have now replaced the f.e.t., and the transceiver works fine, although I could not obtain the suitable ones on your list. I would need an account for Farnell, and another supplier said there would be a two week wait when I personally called, and the mail order department would not order it.

"I have used a BF960 which is an equivalent to the BF988, and mounted it on the track side of the p.c.b., as the leads are too thick to go through the holes. I had to mount the device itself upside down to allow the pins to be in the correct position, although Gate 1 and Gate 2 are reversed. I was not sure if this would be a problem, but I assumed they are the 'symmetrical' and fortunately it does work! After realigning the filters around it the receiver is now better than it originally was! I have enclosed a photograph, Fig. 1, of the new transistor fitted to the under side the board."

I'm pleased to think that I was able to help Shane to get his system back up and running, though my help may only have been minimal. I'm even more pleased that his rig seems to be even better than before.

### Morse 'Stager'

Now let me present the PW Morse 'Stager' project (it's pronounced 'stay-ger' by the way not 'stager'). In the last few months there have been many E-mails on the QRP-list 'notice-board' about making Morse signals, on the more simple type receiver, easier to listen to. One of the projects I 'toyed' with several years ago was a method making the audio sound appear to come from one direction, as if it were one voice on a stage in front of you.

When you go to a real musical concert, rather than an electronically amplified one, the orchestra is spread out in front of you. If you close your eyes whilst listening you can 'look' at the instrument playing at the time. This project is a first step in trying to do that with the audio output from a radio.

The idea behind the PW Morse Stager is to blend the band of signals containing the wanted (and unwanted) Morse tones across both ears - low frequencies to the left ear and the higher frequencies to the right ear. When a tone gave equal levels in both ears then the sound would be 'seen' as directly in front on the listener.

There have been many ideas for providing this type of frequency tailoring to signals applied to each ear, but in the PW Morse Stager, I have tried to get an amount of 'movement' into the frequency tailoring. In effect I've tried to make a system where the signal may 'move' around, rather like

playing the Morse sounds on different instruments to help make it clearer.

The circuit of the PW Morse Stager is shown in Fig. 2 so, let me describe it to you. The audio input from the receiver is fed into a unity gain buffer amplifier, IC1, that has a high frequency roll-off above about 3kHz. The low frequency response is to below 100Hz so it has a bandwidth about right for most audio signals. The output from this buffer amplifier feeds two frequency selective networks.

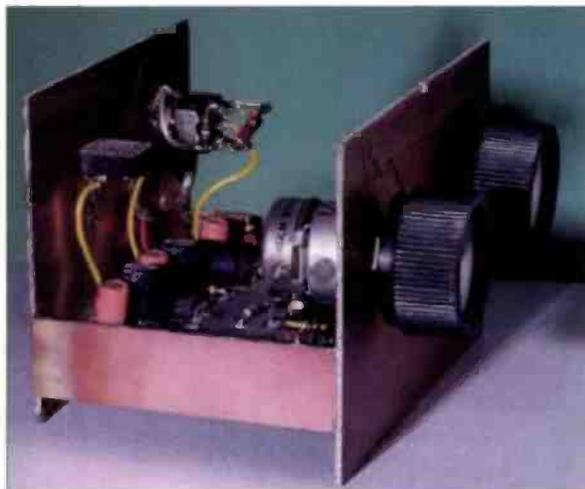
### Two Networks

The two networks of R8, 9 and capacitor C4 act as a low-pass filter, while the other components in R6, 7 and capacitor C5, form a high-pass filter. These two networks 'steer' the audio signals towards a further two buffer amplifiers contained in the double dual Op-amp of IC2 before being applied via twin volume controls (R14/15) to separate audio amplifiers of IC3 and IC4.

The small diagram within the circuit diagram of Fig. 2, should help to explain the workings. By making the two filter networks variable a degree of 'movement' can be imparted to the tone that appears at equal level in both ears. The tone that should appear at equal levels may be chosen from around 650-1500Hz. This range should suit most listeners. However, there's nothing to stop you changing the range to suit yourself by varying C4 and C5.

The prototype unit is shown in the 'overhead' photograph of Fig. 3, where you can see that all

**Fig. 5:** On the back panel are stereo output socket in the foreground and an input matching network, allow either an 100Ω (high level) or a 47kΩ (low level signal) input matching.



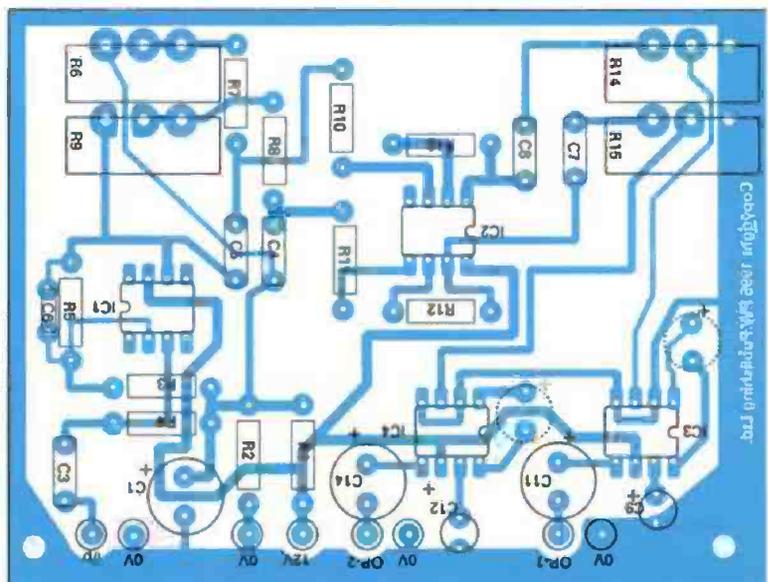
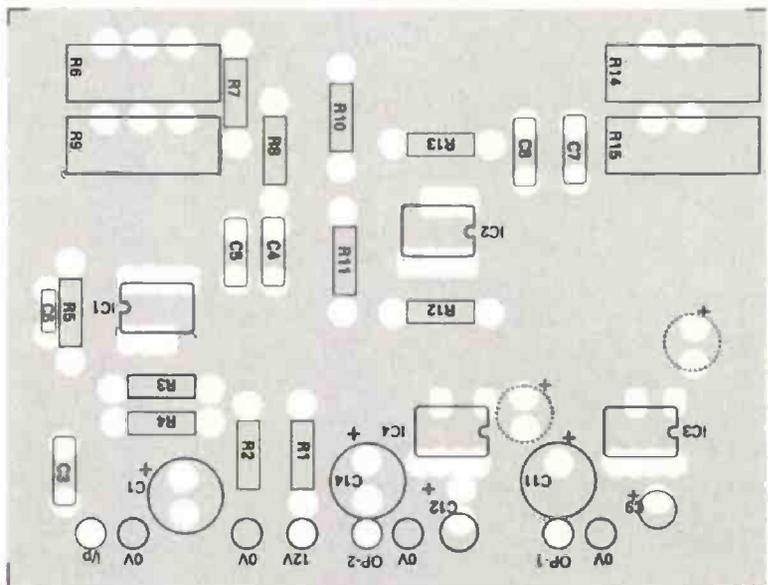
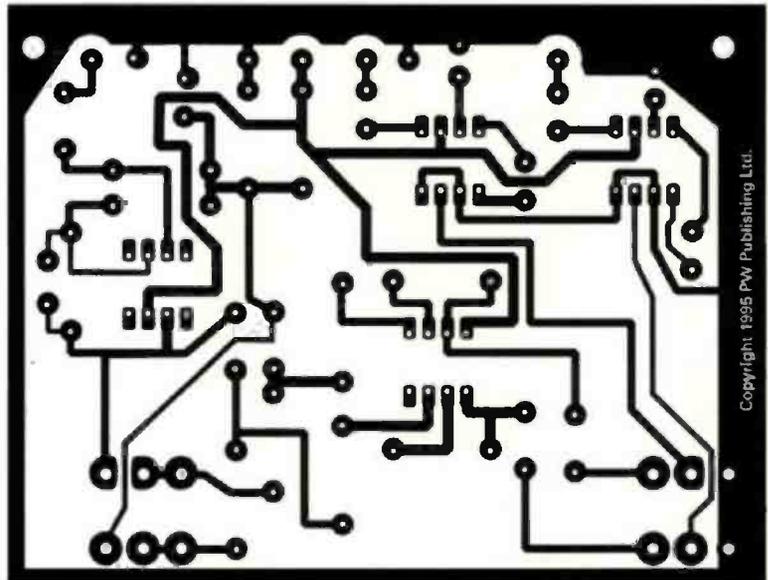
component labelling has been done by hand. The track pattern underneath is as shown in the drawing of upper part of Fig. 4. The middle and lower parts of Fig. 4 are the groundplane pattern and component overlay. A ready made p.c.b. should be available from Badger Boards by the time you read this article.

### Warning Words

I've noticed that occasionally, depending on the type of signal, there can be a high level of white noise in one earpiece at times. Please take note of these words of warning about listening levels. When listening to headphones with different frequency bands in both ears, remember this: Hearing loss is a continual downward spiral, your hearing does not recover if you mistreat it by listening at too loud a level. But what's too loud a level you may ask? To answer, a sound level is too loud if you have any sense of 'hearing' the sound after the sound is no longer there.

The worst part about hearing damage is that the damage done isn't like a receiver going 'deaf', and hearing less and less. It's like having a continual and increasing permanent background QRM, that intrudes more and more

**Fig. 4:** Combined full sized track pattern, ground plane and overlay diagram for the PW Morse Stager Project.



into what you are trying to listen to. Unlike a radio, where you have the 'off-switch', noises in the ear (Tinnitus) are with you all the time. Please remember this, when using

headphones for any listening!

Ah well space runs out again for this month. See you next time.

*TEX*

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# Antenna Workshop

## Hiding wires from the YXL!

This month it's the turn of Dick Pascoe GOBPS to man the PW Antenna Workshop and the subject he's chosen to tackle this time is a return to hiding antennas around the house and garden. Now ... is that him, disguised as a standard light in the corner of the room?

Once round the deck, twice round his neck and.... Dick got 'agor' from the YXL after the tape he was using to hold this antenna in place removed the paint from the walls as well.



In the April 1997 issue of *Practical Wireless* during one of my visits to the 'Antenna Workshop', I expanded some of my thoughts about 'hiding' antennas by disguising them as something else. If you have restrictions about the type of antenna that you may use then it's worth considering 'hiding' your antenna as another common item to be found around the house.

There are several ways that antennas can be hidden and in the April 1997 column I suggested a few simple methods. But now a few more ideas have come to mind. In fact, they came to mind as I was doing some work in the garden recently.

Now, I know I am lucky in that I have a half acre plot of land with enough space for a 20m tower, but a walk around the garden brought forth a few more ideas that complement my previous ones. Although the following ideas came to me in my garden that may seem like open countryside, the same ideas can be applied in a small town-garden.

My original plan was to take down the four sheds that stood in a line and then to replace them with a single large 'shed' that I could walk through. I'm certain that not many of you will have an 8x3m garden shed, or even space for it. But I'm sure that many of you will have the more standard 2.4x1.8m version.

As I studied my shed and with the thought in mind that this column had to be written, I quickly realised the potential of the humble garden shed. I wondered if I could use the sides of the shed to hold loop antennas in place! So, I set about tacking a loop of wire around the end of the shed!

### Sprat Cartoon

There was a cartoon that appeared in *Sprat* (the quarterly magazine of the G-QRP club) some years ago that showed a station using a loop of wire around the lounge fed by open wire feeder. This was not the complete joke it might have seemed to many readers at the time. I tried putting a loop of wire around the room and, apart from the signal level being somewhat low, it worked. But, I had to redecorate the room afterwards!

You may ask, why did I have to redecorate the room afterwards? Well, as with all 'experiments' within the home, I'd checked to see

what problems I might encounter. I tested the sticky film tape on an area of emulsion paint, hidden behind a curtain before I started doing anything more elaborate.

But, I'd forgotten the rule that I'm sure you're all aware of (meaning that Murphy's law, came into full effect once I'd started, ensuring that, when I tried to remove the wire after the event, the paint came off the wall in great sheets).

Unable to hide the 'results' of my tests, I encountered the wrath of 'She who must be obeyed'. The net result was that 'swmbo' made sure the room was redecorated very soon afterwards. You see the things we columnists must do for you, the readers of PW!

In the April 1997 issue of PW, while talking about such things as ladders hung on walls, dummy water pipes and wires hung on garden fences. One item of 'garden occupants' that I hadn't thought of at the time was metal gates and fences.

### Garden Gates

Metallic garden gates and long runs of metal mesh fences are a wonder. I have a large metal gate into the side garden which is almost 5m long. Your gate might be smaller but it could work just as well. To utilise the gate as a radiator, take one side of the feeder (I always use twin feeder for these experiments) to the gate itself. Then couple the other feeder wire to a ground post.

As this is in effect an unbalanced system, you could, in this instance, use coaxial cable as the feeder. If you do use coaxial cable, then the inner conductor should be connected to the gate and the out to the 'earth' bar of course.

Just as a bit of fun I took a look around the garden and checked out what could be used as an antenna. In most cases there will be something that can be used. During the summer months (in reality in dry weather, though we have had little of that this summer) even a metal framed garden gazebo or greenhouse can provide some means of getting on the air.

If the greenhouse is positioned on a plinth that has insulating properties when dry, then a good earth mat can form the 'other side' of the antenna system. In fact if you're thinking of putting a new greenhouse in the garden, why not put a good earth mat under its foundations, before putting either a brick or wooden plinth in for the frame of the greenhouse to attach to.

I also keep chickens in the garden. Not a battery hen-house (a mains powered version perhaps? Ed.), merely four birds that provide us with exceptionally tasty eggs. Not only are the eggs we use very fresh but the taste is indescribably different from the 'fresh free range farm' eggs from the local supermarket.

### Old Scaffolding

Our egg suppliers have a large run made up of some old scaffolding that was originally a tower, but is now unsafe to use for that purpose. And of course there's the inevitable chicken wire. Loading the chicken run fence against a good ground and I found I had a useful 'invisible' antenna.

The important thing to remember when considering an antenna is, that any radiated r.f. is better than radiating no r.f. at all. In all the examples I've talked about, the signal has been lower than a dipole or a beam antenna in a similar location. But of course, a good ground will help enormously in almost all cases.

I've shown some of the 'antennas' I've tried in the photographs on the pages here. They're only a guide

**Continued on page 64...**

Practical Wireless, October 1997

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A metal gate set on a wooden post could be a suitable hidden antenna. Note: the wiring joints are for illustration purposes only and should be far more secure in a permanent installation. (For use in your own property only - for safety reasons).



Two 'Egg-suppliers' look on unconcerned as their wire cage is used as an antenna. Note: the wiring joints are for illustration purposes only and should be far more secure in a permanent installation.



Two supermarket trolleys form the elements of a dipole. I wonder if the car is taking the part of a reflector? Making the system into a Yagi Array. For ORP use only and with permission of the supermarket trolley owners of course!

### Continued from page 62...

and not what I would really want to use. I've even found that a crowbar can be used as a temporary 'earth', but only when it was hammered well into the ground.

## Good Earth

I have heard many variations of 'getting a good earth'. I suppose the most well known ones are the standard copper clad steel rods sold commercially at shops and most rallies. The best examples have a solid copper connector at the top for connecting the 'earth' cable. I've even seen some types that may be screwed together to penetrate even further into the ground.

Long metal earth spikes are fine in an area where the soil extends a fair depth. But here, where I live on the South Downs, there's clay and chalk less than a metre beneath the surface grassland. In this case I've seen adapters that can be made to 'saw', or screw down into the ground.

As chalk is quite soft(?) and fairly easy to drive a metal spike through, adding a hardened point to the earth spike may be all that's needed. The bad news is, that very often flint 'nodules' will be found within the chalk bringing further progress to a halt in most cases.

As with the radiating element, with the earth side it's important to get as much metal into the ground as possible. In many cases soaking the ground with water, and keeping it moist afterwards may also help. §

## Unusual System

Whenever you use an unusual system as an antenna, it will almost certainly not match or resonate on any amateur band you wish to use. I would suggest that if the standing wave ratio (s.w.r.) is excellent immediately then suspect that there's a fault somewhere within the installation.

When using a simple or unusual 'antenna', a good antenna tuner unit (a.t.u.) is a necessity. The choice of configuration and type that is most suitable, is the subject of a different article. Although the many various units as sold a t.u.s, I actually prefer to call them matcher units, because, in no way, do they 'tune' the antenna. The variation on these ideas are myriad and I would love to hear from any reader who has successfully tried these or any other things that have worked

Remember, with every antenna installation, or whatever antenna you decide to try out, make sure all connections clean and tight. And that if the installation is to be more permanent, all joints are waterproof. The various photographs are for illustration only, so the joints are merely simply made. In working systems, the joints should be made with a metal strap and tightened fully before waterproofing.

## Finally

Finally, in a previous occupancy of the Antenna Workshop, I mentioned about using a couple of supermarket trolleys as a dipole. Using an IC-706 in the car and an elderly KW a.t.u. and 300Ω open wire feeder to load up a pair of baskets. Well, radio is supposed to be fun after all, but I did get a few strange looks as the sound of Morse drifted over the supermarket car park!

PW

§ John Heys G3BDQ discussed r.f. earthing solutions in his visit to the 'Antenna Workshop' back in the November 1998 Issue of PW on page 42. Ed.

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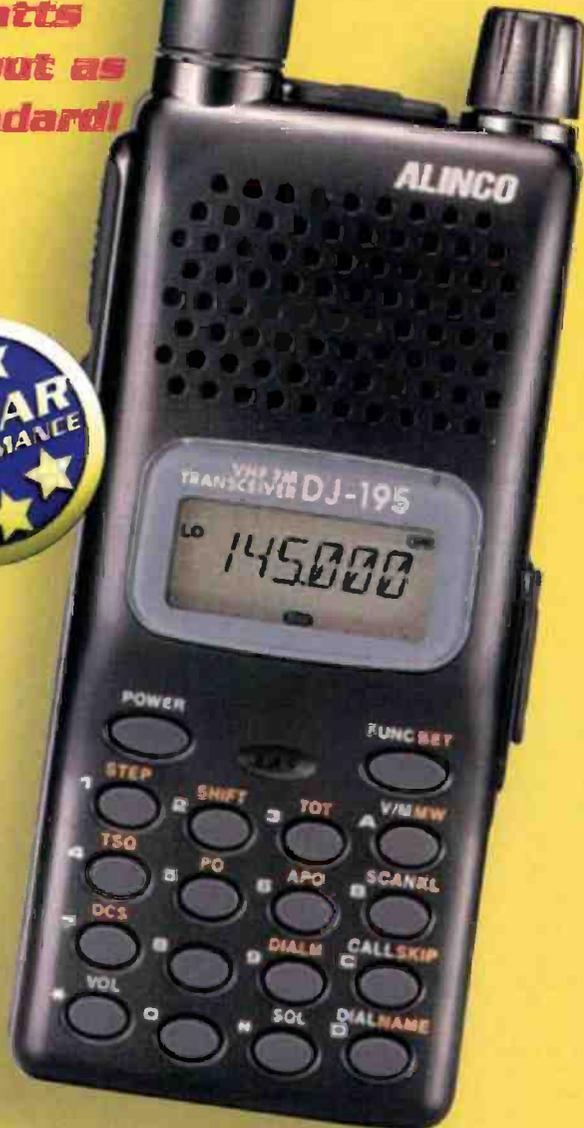
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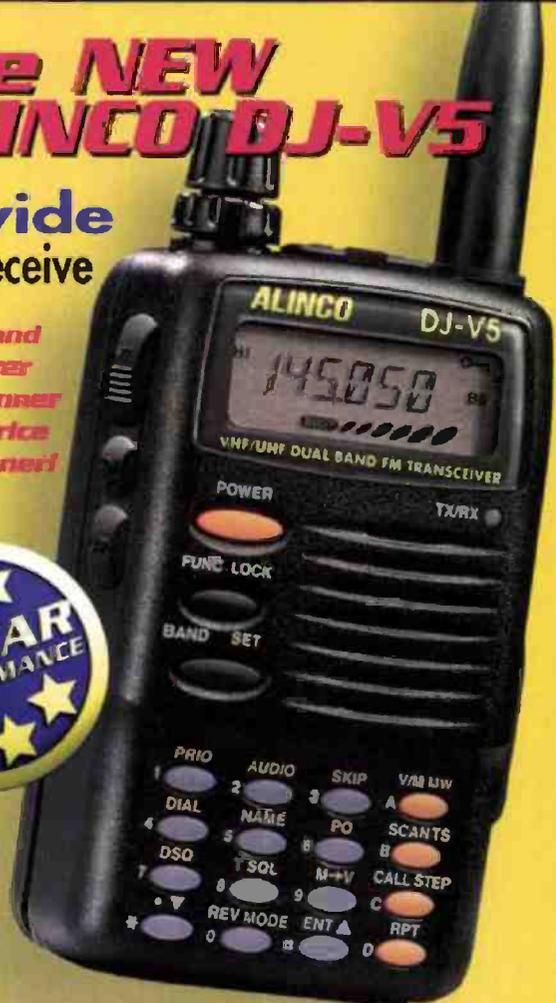
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# Counting Up From The Millennium!

Most of us are somewhat tired of the various 'count downs' to the coming 'Millennium'. However, for the remaining part of 1999 Rob Mannion G3XFD is doing something quite different by 'counting up' from the Millennium! Rob is letting his imagination run wild with 'cuttings' of imaginary Amateur Radio 'news' items which (might) appear in the magazine in future years. This month we've 'looked into the future' and have discovered a 'laser' themed story and another based on helium and hot air! They're intended to be thought provoking, sometimes controversial and interesting but above all ... totally imaginary!

## Moon Lasers Probed

The increasing use of the large laser-mirror reflectors on the Moon by Radio Amateur users on Earth, is causing much concern to the American Government's Lunar Base Authorities. The *PW* News desk Staff have learned, that a probe into the over-use of the Lunar reflector system has been launched by the American Government to see whether some form of encoding toll might be charged. If successful, incoming laser beams from the Earth (if they don't originate from the USA or the American extra-territories and don't have a recognised pulse content) they'll be severely attenuated unless prior permission has been granted.

The American proposals to attenuate Amateur laser communications via the Moon's huge number of reflector panels is causing consternation here on Earth. In recent years the American Government has gradually 'opened up' access to the Moon for the Earth's scientific community and the International Amateur Radio Union (IARU) now has a permanent resident liaison officer who works from the USA's Nixon Base.

It's at the USA's Nixon moon base where incoming signals are

monitored and recorded for evaluation on Earth at the IARU's headquarters in Geneva. The IARU's resident Liaison officer - a retired European Astronaut - also looks after the many microwave passive-deflector assemblies maintained - with permission from the American Moon Government - and v.h.f. and u.h.f. monitoring equipment.

It took many years for the World's Amateur Radio communities to obtain regular access to the Moon's scientific potential. But now that the matter has come to a head you can be sure that the IARU, along with other interested sections of the Amateur Radio hobby (including *PW* of course) will be closely following developments. Also, no doubt, keen space-watching Radio Amateurs on Earth are hoping that the recent developments won't work against us with regard to the (already agreed with the Joint American-European Martian Project) equipping of the soon-to-be launched regular Martian ferry link with Amateur Radio beacons and transponders.

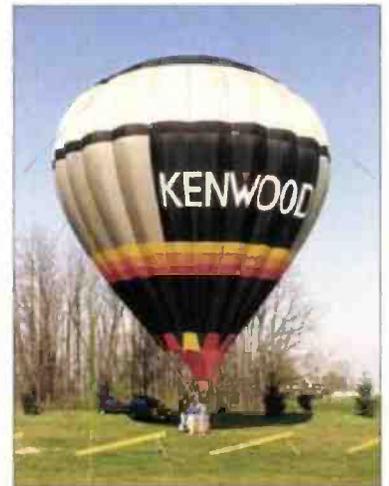
(News report from the *PW* magazine-disk, June 2071).



## Hot Air & New Heights!

A combination of hot air and Amateur Radio has managed to take the hobby to new heights here in Northern Europe - thanks to a change of policy in the European Community regarding 'Aeronautical Mobile' operations. The change of policy by the EC now means that Amateur Radio operators can take low power hand-held transceivers aloft with them in balloons and also launch short-lived balloon mounted transponders.

Although Belgian Radio Amateurs were able to operate from hot-air powered balloons earlier this year (creating tremendous interest and activity on



144MHz) the 'First off the ground' operation with a hot-air free flying balloon mounted transponder on 144MHz in the English & Welsh Federated States (E&WFS) went to the Bristol Balloon Repeater Group, based in the old County of Avon, now in the Wessex Region.

The Bristol initiative was Sponsored by Kenwood and was launched from a field near Bristol earlier this year into the cold March air. This operation - pictured in preparation for launching - provided the ground-based Radio Amateurs with 144MHz n.b.f.m. QSOs (operation is restricted to f.m. and an output of 1W) with stations as far away as Cork in Ireland, Glasgow in Independent Scotland and Holland.

Chief Balloon Pilot Mike Basquet said "It was freezing up there ... but we enjoyed it!"

The Kenwood balloon, which was actually launched from Birdlip Hill near Gloucester, not far from the famous old 'Air Balloon' public house, also provided simplex QSOs for the air-borne operators with ranges exceeding 500km for the regulation permitted hand-held transceivers with non-directional antennas, before they landed near Lincoln. Kenwood have announced that they'll also sponsor free-flying balloon transponders when permission is granted for this in the E&WFS.

(*PW* news report, May 2009).

Please direct any correspondence or comments to the *PW* office in the correct year - remembering to add the relevant space-time-warp code.

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ECC83	3.00	PL504	3.00	6BW6	4.00	12E1	10.00
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ECF85	3.50	PY800/801	1.50	6CD6G	5.00	811A	7.50
ECH42	3.50	QDV02-6	12.00	6CL6	3.00	812A	55.00
ECH81	3.00	QDV03-10	5.00	6CG7	7.50	813	27.50
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EF86	5.00	UCL83	2.00	6GK8	4.00	5763	6.00
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# RadioScene

## VHF REPORT

REPORTS & INFORMATION  
BY THE LAST SATURDAY OF  
EACH MONTH.

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THIS MONTH DAVID BUTLER  
G4ASR HAS NEWS OF  
CROSS-BAND CONTACTS ON  
THE 70MHz BAND AND  
IONOSPHERIC SCATTER  
TESTS ON THE 144MHz  
BAND.

First out of the bag this month is **Gordon Curry G16ATZ** (IO74) who passes on details of his recent v.h.f. activities. Although catching many Sporadic-E (Sp-E) openings on the 50MHz band, he doesn't think it has been a particularly good season for this propagation mode.

On the 144MHz band there has only been one Sp-E opening from Northern Ireland which occurred on July 20 providing contacts into ISO, IT9 and TK. Gordon wonders if there is some sort of connection between increased solar activity and the decrease in Sp-E activity?

Despite observing less activity on the 50MHz band he still managed to work some excellent DX. On July 4 between 1701-1718UTC he worked Z21FO (KH52), Z23JOR (KH53), Z22JE (KH52), 7Q7RM (KH74) and 9J2BO (KH44). Later in the evening he worked KP4EIT (FK58) at 1810UTC and VP2E/W6JKV (FK88) at 2226UTC.

Gordon used an Icom IC-706 MkII transceiver running 100W into a 4-element home-made Yagi at 6m above ground level (a.g.l.) to work all this DX.

The stations of 7Q7RM and 9J2BO were worked again on July 7 between 1630-1700UTC. A good opening to the Middle-East on July 9 found OD5SX (KM74) and 5B4AFB (KM64) in the log book. Finally on July 16 the stations of Z21FO and Z23JOR were worked in a brief opening around 1740UTC.

Another station to comment on this year's Sp-E conditions is **John Hilton GM1ZVJ** (IO86). He thinks the openings haven't been as intense as in previous years and that signal strengths haven't been that strong. Nevertheless, he has managed to work 40 countries and 207 locator squares in one year of operation on the 50MHz band.

John uses an Alinco DX-70TH transceiver running 100W into a 5-element F9FT Yagi and recently made s.s.b. contacts with EH2AGZ (IN91), EH6VQ (JM19), IOVHL (JN61), LA1PHA (JP76), LA5TFA (KP09) and 9A1CIG (JN73). He also worked IW3AAD/TK (JN42) on the island of Corsica. Unfortunately, no operation is allowed from Corsica on the 50MHz band so this one can't count.

Between June 24 to July 5 **Jimmy Treybig W6JKV** and **Dick Hanson K5AND** operated from Anguilla using the call sign VP2E/W6JKV. They used an Icom IC-706 transceiver, a home-made 700W amplifier and an 8-element M2 Yagi on an 11m long boom.

A total of 815 contacts were made on the 50MHz band, 337 contacts being with stations in Europe. Some 32 countries were contacted including G, GD, GI, GM, GU and GW. The best opening occurred on July 4 with the band being open to Europe (and the USA) for 14 hours. Jimmy worked approximately 270 European stations when at 2230UTC his wife allegedly said supper or divorce!

**Lysy Viacheslav ER1LW** reports that he was active on the 50MHz band during the field day contest on July 3-4. Using the call sign ER1LW/P he made 595 contacts with stations in 31 countries which included G, GD, GI, GM, GU and GW. He was using an Icom

IC-736 transceiver and 1.5kW power amplifier (based on the surplus Russian GS-35B valve) and a home-made 6-element Yagi. Lysy mentions that his best DX was 4124km. **QSL cards should go via Box 112, Chisinau, MD2012, Moldova.**

According to **Roger Wassmer HB9WNV** stations in Switzerland are now authorised to operate on the 50MHz band during daylight hours. Previously they were restricted to times when local television transmitters had closed down. They will be allowed to run 25W into a vertical antenna.

**Andy Repetto ZD9BV** (IF32) is now active on the 50MHz band from the island of Tristan da Cunha. He runs 15W of c.w. and s.s.b. into a 5-element Yagi. He reports that he will monitor the band from 1730UTC and whenever possible at weekends. Andy knows about the 50MHz liaison frequency on 28.885MHz and can also be found on 21.325MHz on Sunday mornings.

## CROSS-BAND CONTACTS

**Bill McDowell GW6ZMN** (IO81) reports that at 1005UTC on May 23 he made a cross-band contact with the station of **Tom Babut SP5XMU** (KO02). Bill was transmitting on the 70MHz band using a Yaesu FT-706 transceiver driving an RN Electronics transverter and an 80W Pye A200 solid-state amplifier. The antenna is a dual-band Sandpiper Yagi comprising of 4-elements on the 70MHz band and 3-elements on the 50MHz band.

The station of SP5XMU transmitted on the 50MHz band giving Bill a report of 57. Tom is located in Warsaw and reports that he is using a Yaesu receiver and a 5-element Yagi. On May 22 he made his first cross-band contact between the 50MHz and 70MHz bands when he contacted S57A (JN65). Events on the following day were considerably better.

At 1009UTC he contacted GW6ZMN for his first UK cross-band contact. He then heard the GB3ANG beacon (IO86) and the station of G1LJT (IO81) calling CQ on

70.200MHz. Transmitting on 50MHz Tom then went on to make cross-band s.s.b. contacts with G0IMC (IO02), GW3HWR (IO71), G3HBR (IO91), G3NKS (IO81), G3IKR (IO82) and GBAPB (IO83). It is expected that SP5XMU will be one of the first Polish stations to be active on the 70MHz band when permits are possibly granted in 2000.

**Heath Rees GW3HWR** (IO71) is now active on the 70MHz band from a QTH near Swansea, south Wales. He runs a Yaesu FT-847 transceiver, 150W from a TE-0610G amplifier and a 5-element Yagi. In addition to making the cross-band QSO with SP5XMU he also worked ZB2EO on the rock of Gibraltar. A number of other UK stations have also reported making cross-band contacts between the 70MHz and 50MHz bands.

On June 25 at 2008UTC **John Livesey G0JIL** (IO83) worked CT1DYX receiving a report of 51 on the 70MHz band. John running 100W into a 5-element Yagi wondered if this was the first UK-Portugal cross-band contact. Unfortunately it is not. (The station of CT1WW (now silent key) was very active via this mode for many years and worked numerous UK stations). On July 4 John contacted HB9OAB and HB9QQ and also worked IK00KY who reported hearing stations in G, GM, GW and EI stations, some at 59+.

**Neil Carr G0JHC** (IO83) also bagged the Swiss and Italian stations and made a direct two-way contact on the 70MHz band with Slovenian station S54M (JN86). Neil has just become active on the 70MHz band and was pleased with the additional activity during v.h.f. field-day on July 3-4. He managed to work 40 stations in 17 locator squares and 7 countries during the weekend.

Of course, not everyone is interested in - or has the equipment for - making cross-band contacts. However the release of the 70MHz band to Radio Amateurs in Slovenia (S5) has provided additional interest for UK operators.

**Ivan Dobnik S51DI** (JN76) reports that during the s.s.b. session of v.h.f. field-day the stations of S53VV, S54M, S57NLX, S59S and S51DI were active. About 50 stations in the UK and EI were worked by S53VV, around 25 by S54M and 18 by S51DI. At Ivan's QTH the band was open via Sp-E propagation between 0952-1320UTC.

The Cornish beacon GB3MCB was audible for much

of this time. At 1500UTC the 70MHz band opened up again with S53VV working EI7GL and again at 1900UTC with S51DI working the stations of G3FYX and Jon Eastment GW4LXO (shown in the photograph Fig. 1).

Other Slovenian stations known to be active include S52AU, S53J, S53X, S57A, S57UUD and S59F. Darryl Mawhinney G14KSO (IO64) made the first G1 to S5 QSO when he contacted S54M at 0938UTC on July 4. He also worked S53VV and heard S53J and S59F but lost them due to broadcast interference.

Rod Banerman GM4LUD (IO86) mentions that there was a good opening on July 10 when he worked S51DI, S53VV, S57A, S57UUD and S59F. In fact Rod has now worked more stations in Slovenia than in Scotland! During the same opening Sheldon Hands GW8ELR (IO71) also managed to work S53VV, S57A and S57UUD. Sheldon was using the Hands RDX70 transceiver running 6W into a dipole and reckons it beats the hell out of operating on 50MHz!

## IONOSPHERIC SCATTER

Leif SM5BSZ (JO89) reports that he has been attempting ionospheric scatter tests on the 144MHz band with Dave Edwards G7RAU (IO90) for a number of months. Ionospheric scatter, also called ionoscat, is a propagation mode that can be exploited on the v.h.f. bands. It is more often found at the lower end of the spectrum between 30-60MHz and although this mode of propagation may exist in principle on the 70MHz and 144MHz bands contacts here are rare and/or extremely difficult.

According to the *VHF/UHF DX Book\**, ionospheric scattering is similar to tropospheric scattering except that the variations in refractive index are due to differences in ionisation density rather than meteorological properties. Tropospheric forward-scatter uses irregularities in the atmosphere to refract or 'bend' the signal to follow the curvature of the earth.

\* Editorial comment: The *VHF/UHF DX Book*, Editor Ian White G3SEK ISBN 09520468 06

Depending on the site, equipment and propagation conditions, contacts via troposcatter can be made up to 1000km or so. From my QTH, at 233m above sea level (a.s.l.) with a relatively clear take-off

to the east, running 400W into a single 18-element Yagi on an 11m boom, I can regularly work similarly equipped German stations up to 800km away.

Some years ago I carried out tropospheric scatter tests with a station in Berlin (JO62) over a path of 1100km. Using c.w. and occasionally s.s.b. we could always make contact with each other no matter what the prevailing conditions were like. Signals were typically S2 in appropriate narrow bandwidths.

Most ionospheric scattering takes place from heights of below 100km and peaks in the D-layer at around 85km. This height corresponds to a maximum range of about 2000km. The minimum range is set by the troposcatter signals taking over, somewhere between 800-1000km.

The mechanism for ionoscat is far more complicated than it is for troposcatter. The scattering effect increases with the ionisation level of the D-layer, so signals are strongest during the peak of the sun-spot cycle, in the summer and around noon.

Sudden ionospheric disturbances (s.i.d.) which are associated with high D-layer ionisation can enhance signals on the 50MHz band while causing fadeouts on the l.f. and h.f. bands. A similar effect may be associated with the precipitation of auroral particles. All this movement of ionisation is guided by the earth's magnetic field as well as by atmospheric winds and turbulence.

Although the station of SM5BSZ has been making ionoscat tests with G7RAU for some time he had to wait until midday on June 30 before conditions were stable enough to make the 1500km contact. Dave's signals were peaking S49 on c.w. when SM5BSZ elevated his antennas up at 5°. (He later worked the station of G3LQR [JO02] with the antennas at a slightly higher elevation angle. This makes sense as G3LQR is 250km nearer to SM5BSZ).

The station at G7RAU runs 400W into a pair of 9-element Yagis tilted a few degrees above the horizontal. Leif mentions that whenever they try to make a contact via this unusual propagation mode they often



Fig. 1; Jon Eastment GW4LXO adjusting the controls at a recent microwave round-table event.

hear each other but it is difficult to identify the weak ionospheric scatter signals between the bursts of signals caused by reflection from meteor trails (meteor scatter). However, on June 30 it was very much different. The ionoscat signal almost sounded like a regular signal received via tropospheric forward-scatter and was peaking to S4 which is comparatively strong for this mode.

So, what was so special about conditions on June 30? Dave G7RAU reports that he didn't hear any Sp-E signals on the 28MHz band. However, he did note that stations in Northern Ireland and Scotland were making contacts into Estonia and Finland on the 50MHz band at the time.

Dave thinks that, although there was some weak residual ionisation toward the centre of the path, the maximum usable frequency (m.u.f.) at the time was no more than 69MHz. Leif wonders whether the Earth passed through a dusty zone with a large number of very small dust grains. This might cause low level ionisation as the dust passed through the ionosphere.

Other stations were reporting high sun noise at the time on both the 50MHz and 144MHz bands. Whether this had some bearing on the relatively good ionospheric conditions is difficult to determine. As an aside, Dave makes the observation that good ionospheric scatter days often seem to precipitate a 144MHz Sp-E opening on the following day. As he doesn't have much data though he's not too sure whether this is a coincidence or wishful thinking.

Dave also mentions that, unless you have a very big station (e.m.e. power and large antennas), then the use of c.w. is obligatory. The signal to noise ratio (s/n) is much better at a few hundred Hertz than in typical s.s.b. bandwidths of around 2kHz.

## 'SPACE WEATHER'

As mentioned earlier, the ionisation mechanism is rather complex and not fully understood. Recently NASA carried out some experiments designed to study the 'space weather', the interaction of the solar wind with the Earth's magnetic field and atmosphere. A chemical,

trimethylaluminum, was released in the ionosphere at heights between 69 to 154km altitude to form large glowing clouds in space. This region above the Earth at first appears to be empty and very quiet. In fact, the Earth's upper atmosphere is always very active.

It is here (the Earth's upper atmosphere) that the solar wind (a fast-moving stream of particles emanating from the Sun), the Sun's magnetic field, the Earth's magnetic field and the atmosphere all come together. As you may be aware their interactions can create disturbances just above Earth's lower atmosphere. These disturbances lead to a number of propagation modes that form in the ionosphere.

The specific aim of the experiments was to explore the metallic ion layers (regions of electrically charged particles) that exist about 100km above the Earth and to understand how their interactions with wind in the upper atmosphere create large electric fields and turbulence. The metallic ion layers are formed by material from meteors that have collided with the Earth's upper atmosphere.

## MARITIME ACTIVITY

Now I'll turn to news from Andy Adams, G0KZG/MM onboard the Royal Research Ship *RRS Challenger*. Having just returned from a working area of the English channel and southern North Sea (JO12, JO13) Andy has recently been operating from 'wet square' IN18. This cruise will finish in Southampton on September 10.

Andy's next tour of duty will take place between September 16-27 and will cover locator squares JO12, JO13, JO14 and JO15 and then back to Southampton. During one recent cruise G0KZG/MM had a meteor scatter (m.s.) schedule with LY2WR but although receiving some good bursts he couldn't complete the 2000km contact.

The trouble was that the antenna is on the aft of the ship and they were tracking at 070° almost on the same beam-heading as the LY station. He therefore had to off-set the beam a considerable way to the north putting it into an unfavourable position.

## ACTIVITY ON 1.3GHZ

Geoff Grayer G3NAQ passes

# RadioScene

on the news of increased activity on the 1.3GHz band. After discussion on the Internet it has been decided to promote Sunday mornings as the 1.3GHz activity period. Call on 1296.200MHz, the narrowband centre of activity from 0900 hours onwards. If you can only make it for a limited period try to be active between 1000 to 1100 hours.

Stations known to have shown interest in the initiative include G0EHV (IO94), G0KPW (JO02), G0MJW (IO91), G3NAQ (IO91), G4BAO (JO02), G6IQL (IO92), G8XVJ (IO83), GM4LBV (IO86), GM4OGI (IO85) and GM4WLL/P (IO85). If you've got c.w. or s.s.b. equipment for the 1.3GHz band then why not try to be active on Sunday mornings?

**Nick Shaxted GM4OGI** mentions that he is active on the 1.3GHz band and is always willing to make tests if required. On July 10-11 the tropo conditions were enhanced and he was able to hear the Swedish beacon SK6UHG with signals up to S4 over the 957km path. To the south, on a more obstructed path, he heard the GB3MHL beacon some 545km away.

Conditions on the 1.3GHz band were also good during the first week of August. **Sam Jewell G4DDK (JO02)** worked ON5EW/P (JO20) and OZ2LD (JO54) on August 1 and DJ3LE (JO44) on August 2. Up in central Scotland GM4LBV worked the stations of DL5LF (JO54), G8XVJ (IO83), PA0BAT (JO31), PA3CEG (JO33), PA5DD (JO22), SM7ECM (JO65) and SM7FMX (JO65).

Other contacts on the band during this period included G3XDY (JO02) to LA6LCA (JO59), G0EHV (IO94) to DJ3LE and DL5LF, G0KPW (JO02) to SM7ECM and SM7FMX. He also heard the LA1UHG and OZ7IGY beacons.

## LICENCE CHANGES

The recent announcement regarding changes to the UK Amateur Radio Licences could have major effects on the v.h.f. bands. A new class A/B licence with the call sign series M5xxx is expected in the Autumn. This

allows 100W output on frequencies below 30MHz and 400W on frequencies above 30MHz.

Changes have also been made to the Novice A & B licences allowing an increased power output to 10W (previously 3W) and access to the 144MHz band. It is hoped that this will redress the high drop out rate of Novices who are frustrated by the restrictions currently imposed. The Novice Licence has the highest growth rate of any of our amateur licences at present.

## DEADLINES

That's it again for another month. Please forward any news, views, comments or photographs to the address and by the date given at the top of the column.

**THANKS FOR THE LETTERS AND GOOD LUCK WITH THE DX. SEE YOU AGAIN NEXT MONTH!**

*73 David GAASR.*

## SCENE USA

**PLEASE SEND ME REPORTS & INFORMATION FOR THE JANUARY COLUMN BY OCTOBER 15TH.**

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**E-MAIL: N0ED@RadioLink.net**

**THE USA IS A COMPETITIVE PLACE AND THIS IS REFLECTED IN THE AMATEUR RADIO HOBBY. MANY AMERICANS LIKE TO HAVE THE BEST STATION THEY CAN AFFORD AND TO PUSH THEMSELVES AND THEIR EQUIPMENT TO THE LIMIT. FOR SOME, THIS MEANS RADIO CONTESTING - THE SUBJECT OF ED'S COLUMN THIS MONTH.**

Let me set out a scenario: you've had a hard week and you want to spend some time on your radio at the weekend. You settle down to a quiet few hours and tune to 144 or 14MHz and have a look around. What do you find? The whole band is full of lunatics calling 'CQ Contest' and swapping meaningless numbers!

The way I see it is this, you have a number of choices - you could switch off in disgust and see what's on the TV, you could look for another band where there is no contest, or you could find out what these crazy people are doing and go along with their strange antics. In my column this time, I'm going to propose that the latter is a good option and to explain some of the benefits from joining in.

I'm influenced a little by the fact that, here in the USA, people's attitude to contests appears to be different from our own in the UK - in a nutshell, most American 'hams' think they are a good thing. I'd like to suggest why this may be and to propose that the British point of view, if negative, is inappropriate.

But let's begin by finding out how American radio contests got started. Then we'll look at some of the contests sponsored by US organisations, in which there is (not surprisingly) strong American participation.

Although you may think that 'ham' radio contesting is a recent innovation, the history of competitive radio actually goes back a long way. You could even say that the whole thing started with the Transatlantic Tests, in the 1920s - although these were not contests in the modern sense, there was a strong competitive element.

American stations were keen to become known as having made it "across the pond". The separation between amateur and commercial stations was not as distinct as it is today and most of the 'contacts' were one-way, made by powerful transmitters operating on an 'hour-on, hour-off' schedule.

## FIRST 'REAL' CONTEST

The first real contest in the USA was organised in 1927 by the US national radio society, the American Radio Relay League (ARRL). It was called the "1928 International Relay Party" and required messages to be sent between countries. There were handsome prizes available, which would undoubtedly be illegal today. These prizes were donated by manufacturers and

comprised of equipment such as receivers valued at three or four hundred dollars (a substantial sum in those days). The winner was a British station, 5BY, who was well ahead of his US rivals. (Though I have no information on what prize he received and if he ever took delivery!)

The ARRL organised a birthday celebration for its founder, Hiram Percy Maxim, in 1929. The essence of this competition was to exchange and acknowledge short messages over a 48 hour period. This has become typical for major contests ever since, with (of course) many variations in duration and type of message. The idea of rapidly and accurately swapping information with as many other stations as possible is nowadays the main objective of most amateur radio contests worldwide.

Another format was begun by the ARRL in 1933 and the plan was to set up emergency equipment and keep it going for a whole weekend. These Field Days still exist today and attract a large number of participants, many of whom help out, but don't operate or even hold an Amateur Radio licence. (It's debatable whether a Field Day is a contest in the traditional sense, since it continues to have a slightly different flavour, that is, of an exercise in setting up a station from scratch and using it to send and receive messages over an extended period.)

## THE MOST ENTRANTS

The contests with the most entrants globally are those organised by the US magazine, CQ. These had their origin in the 'World-Wide DX Contest' (CQ WW) of 1939 - a success, if short-lived because of the Second World War. The CQ WW contests really began in 1948, with rules which aren't much different from those today - the objective is for stations to find and work DX and it was this aspect (rather than the message-handling) that attracted participants from all over the world.

In calculating an entrant's score, points are earned for QSOs, depending on a simple formula. But the heart of the scoring system is the multiplier, which, as its name implies, is multiplied by 'QSO points' to calculate the final score.

The multipliers consist of Countries and Zones worked and the world was divided by CQ Magazine into 40 Zones and the exchange of information between participants is a signal report and the sender's Zone number.

The simple scoring and the straightforward goals have continued to keep the CQ WW contests enormously popular.

Other contests are sponsored by CQ Magazine, including the WPX (Worked Prefix) and 160 metre (1.8MHz). In these contests, stations can all contact each other for points and multipliers. By contrast, most of the international contests sponsored by the ARRL require contacts only between the USA/Canada and the rest of the world. This adds an interesting twist for non-US stations, who can concentrate on working North America. The exception is in the Ten metre (28MHz) contest, where everyone works everyone.

I have listed some of the US contests which you might come across in Fig. 1. Generally speaking, there are c.w. and s.s.b. sections on separate weekends and there are also contests for data modes, with a new one recently started for PSK31. (I will leave you to research these and find out their rules for yourselves).

You can use this chart (Fig. 1) either to decide on weekends to avoid, or to plan forays on to the bands to find DX! For full details on many contest rules, a good place to start is a Web site entitled 'The Contest & DX Library by KA9FOX': [http://www.qth.com/KA9FOX/links\\_contest\\_info.shtml](http://www.qth.com/KA9FOX/links_contest_info.shtml)

**INSTINCTIVE?**

It seems almost instinctive to take a human activity and make it into a competition for

those who are interested, hence we have races for runners and swimmers and competitions for any other sport you can think of. Amateur Radio is no exception and perhaps even Marconi was thinking of some way of introducing a competitive element into the early radio experiments?

I feel that some Americans are very competitive in both their work and leisure environments, they have certainly made Capitalism (which requires enterprise and competition for its existence) into a most potent economic force. It should come as no surprise to learn that radio contesting is highly popular in the USA and generally well-received by the Amateur Radio community.

The big-gun American contesters and DXers spend a great deal of time and money on their hobby. Their attitude is that they want to push themselves and their equipment to the limit and that winning a contest is a way of showing what they can achieve. Most of us have neither the resources or the inclination to do the same, but I think it is useful to find out what contesters are doing and learn from it.

It became clear, in talking to US contesters, that they generally consider the level of expertise and equipment in Amateur Radio to be driven forward by their efforts. You could compare contesting with motor racing, where (it is alleged) the design of ordinary automobiles has been improved by the research carried out to improve racing cars. Similarly, I think there is some truth in the idea that

radio equipment has improved partly because contesters (and probably DXers) demand the best facilities.

**I WANT TO JOIN IN!**

Why would you want to participate in one of the events I have mentioned? Even if you're not feeling particularly competitive, you achieve a lot by going on the air and having a few contacts. A very good reason for doing so might be that there's some (perhaps rare) DX on the air.

The key to working rare stations in a contest is this - they are just as keen on a contact as you are. Every QSO gives them points and you are as good as anyone else for this purpose. Remember that some of these contests last for 48 hours, so in the 46th hour you may be one of the few left to help out a DX station and provide more points.

In addition, you are allowed to contact each station once (but only once) per band. If you can't get through on (say) 14MHz, wait for an opportune time on 21 or 7MHz. The big stations will be multi-band and with a little patience, you will be able to contact them somewhere. All the contests I've listed cover 1.8, 3.5, 7, 14, 21 and 28MHz (except for those specific to a single band).

If you're sufficiently intrigued to want to take part in some of these US contests, here follows a couple of paragraphs on what to do. I will only be dealing with h.f. contests, although there are v.h.f. and u.h.f. contests in the USA as well. My explanations should give you enough information to participate and make contacts. I won't be covering things such as sending in an entry, but when you have a little experience, it's worthwhile to do so. You can find out the correct format and the deadlines from appropriate US

**Web Watch**

'The Contest & DXLibrary by KA9FOX': [http://www.qth.com/KA9FOX/links\\_contest\\_info.shtml](http://www.qth.com/KA9FOX/links_contest_info.shtml)  
Contest Web site: <http://www.affcom.com/cqcontest/contest.html>

magazines - CQ or the ARRL's QST - or try this Web site: <http://www.affcom.com/cqcontest/contest.html>

First, find a station that is looking for contest QSOs, listen for a few minutes to find out the procedure and rhythm being used. Some stations are in demand and have a flow of perhaps two QSOs a minute. They are probably rather terse, without too much greeting and frivolity. You can, however, expect a few "Good mornings" and "73" from the less popular and slower stations! You should try to match the style with your own.

When your target is ready to receive a new call, you will hear, on s.s.b., something like "VP9GE contest" and, on c.w., "W1AW test". Transmit your own callsign just once, on c.w. using a speed which you are comfortable with. On s.s.b., use correct phonetics - if you're lucky, you will hear something such as: "G9QRM 59(9) 462". This means that your call is acknowledged and your signal report is 59 (or 599 on c.w., often sent as 5NN).

Generally, in h.f. contests, 59 is sent regardless of real signal strength. Your serial number is 462, but note that the 'exchange' varies depending on the contest. If you are in the CQ WW contest, you send and receive two-digit Zone numbers - see Fig. 2 as a guide.

Now it's your turn to send information - simply transmit "Roger (R on c.w.) 59(9) 001" or whatever your own serial number is (start at 001 and work upwards). If it's the CQ WW and you're in the UK, your zone number is 14. You don't need to send the other station's callsign (who already knows it), or your own (we all know it), unless there's a mistake.

To correct your call and send information, just say "The call is Golf 9 Quebec Romeo Mike 59 14", or on c.w.: "de G9QRM 599 14". Your contact will respond: "Thank you, VP9GE contest" or, on c.w.: "TU W1AW test", with many variations depending on the speed and mood of the participants! If you had to correct your callsign, you can expect the other station to repeat it back as well.

Organiser	Contest Name	Mode	Date & Time	
			Start	Finish
CQ Magazine	World-Wide DX	s.s.b.	October 30 (0000z)	October 31 (2400z)
CQ Magazine	World-Wide DX	c.w.	November 27 (0000z)	November 28 (2400z)
ARRL	160 Metre	c.w.	December 3 (2200z)	December 5 (1600z)
ARRL	10 Metre	c.w./s.s.b.	December 11 (0000z)	December 12 (2400z)
CQ Magazine	160 Metre	c.w.	January 28 (2200z)	January 30 (1600z)
ARRL	International DX	c.w.	February 19 (0000z)	February 20 (2400z)
CQ Magazine	160 Metre	s.s.b.	February 25 (2200z)	February 27 (1600z)
ARRL	International DX	s.s.b.	March 4 (0000z)	March 5 (2400z)
CQ Magazine	World-Wide WPX	s.s.b.	March 25 (0000z)	March 26 (2400z)
CQ Magazine	World-Wide WPX	c.w.	May 27 (0000z)	May 28 (2400z)

Fig. 1: US Contest dates for 1999-2000.

Fig. 2: Contest Exchanges for US Contests.

Name Of Contest	UK works	You Send	You Receive
CQ World-Wide DX	Everyone	RS(T) + Zone (UK=14)	RS(T) + Zone
ARRL 160 Metre	USA+ Canada	RST	RST+Section Name
ARRL 10 Metre	Everyone	RS(T) + Serial No.	RST + State/Province or RST + Serial No.
CQ 160 Metre	Everyone	RS(T) + Country (e.g. 'G')	RS(T) + Country/State
ARRL International DX	USA+Canada	RS(T) + Power o/p	RST + State/Province
CQ World-Wide WPX	Everyone	RS(T) + Serial No.	RS(T) + Serial No.

# RadioScene

That's it! You've had your first contest QSO and you can look for more DX. Don't forget you should only call stations who will benefit from your call. For example, in the ARRL DX contest, this means a mainland US or Canadian station. In this sort of contest, where the North America works the rest of the world, it's a good way to build up contacts for the ARRL's "Worked All States" award.

What if you really don't want to take part in a contest? If you can't find a place on the h.f. band and a mode you want which is free of contesters, try looking on the WARC bands (10, 18 and 24MHz). Most contests are single mode, so you may be able to use the same band but the 'other' mode. Please be tolerant, you might find that the presence of contesters on a 'dead' band such as 28 or 144MHz will show that the band is really open and can produce some good DX!

I HOPE YOU ENJOYED THIS SHORT TOUR OF CONTESTING WITH A US FLAVOUR. IT'S EVEN MORE APPROPRIATE THAN USUAL TO GIVE YOU MY ANNUAL REMINDER ABOUT THE CQ WW CONTESTS IN OCTOBER AND NOVEMBER (SEE CHARTS). WITH LUCK, CONDITIONS WILL ENABLE US TO HAVE QSOs IN THESE EVENTS.

73 Ed NoED

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LEIGHTON SMART GW0LBI IS BACK THIS MONTH WITH MORE BAND NEWS FROM HIS INTREPID REPORTERS

### FROM AROUND THE UK AND, APPARENTLY, PROPAGATION CONDITIONS HAVE NOT BEEN GOOD.

Well, according to reports this month, propagation conditions have been nowhere near as good as the weather conditions! What a scorcher this July has been! Still, fine weather is certainly a good incentive to get out and work on those antennas, I guess!

Where DX was concerned this month, our reporters generally agree that conditions have been on the 'patchy' side, although there have been days when the bands have shown a marked improvement and, when all is said and done, all parts of the globe have been worked, so it's not all bad news folks!

### NEW BRITAIN

No, it's not a change of name for 'old' Britain, or indeed anything to do with Tony Blair, but a tiny island off Papua New Guinea. It's where Tony Bevington G4ZUI of the Cornwall ARC will be operating as P29PB for the foreseeable future.

Tony says he'll be operating regularly around 14.260MHz s.s.b. and will be looking out for UK stations especially (and his pals from the CARC). So have a listen out and see if you can snag him!

### SPECIAL EVENT STATION

A letter came in from veteran 'Special Eventer' Dennis Egan GW4XKE who, this month, enlisted with special event station GB75AFS, to celebrate the 75th anniversary of the Air Formation Signals. (See Fig. 1).

A joint venture between the Royal Signals ARS and the Royal Air Force ARS, the station was on the air over a three-day period between the 27 and 30 of July, using four h.f. stations plus a v.h.f. set-up and was a huge success with literally hundreds of stations calling in.

Dennis himself is a keen special event operator, having participated in many operations

like this, adding his support and expertise to all kinds of operations - must be the camaraderie of it all I guess!

### YOUR REPORTS

I'll delve straight into your reports now, starting with the 14MHz band as space is at a premium this time around. First along comes the report from Sean Gilbert G4UCJ in Milton Keynes who, using 30W and a loft mounted G5RV antenna, reports all c.w. contacts with VK5QB (Australia) at 0655UTC, XE2JFB (Mexico) at 0751, VY00 (Nuva Island) at 2334, as well as OJ0/LAOCO (Market Reef) at 0750UTC and a series of 3W QRP contacts with P40HQ (Aruba Island) at 0125UTC, R1MVA (Malij Vysotski Island) at 1411, V2PE

(Guantanamo Bay), VQ9CV (Chagos Islands), WE8P/KH6 (Hawaii), as well as ZK1JD (South Cook Island), 9M2XA (Malaya), 9G1MR (Ghana) and 9J2AM (Zambia).

Don's exploits on the 21MHz band, however, brought in contacts with A61AP (United Arab Emirates), BV2TL (Taiwan), HLOEXN (Korea), HS0/A6GJJ (Thailand), G0AUG/VE7 (Canada) and DU8DJ (Philippines).

Down in Skewen in West Glamorgan we find Carl Mason GW0VSW, who used 90W of c.w. into a half-sized G5RV antenna to hook up with FP/W8MV (St. Pierre & Miquelon Island) at 1229UTC, while a switch to 21MHz brought in SV5/DL8YRM (Dodecanese Islands) at 0838, K3VJ (USA) at 1043, R1MVA (Malij Vysotski Island) at 1633



Fig. 1: The QSL card of the GB75AFS Special Event - a "Millennium Celebration", celebrating the 75th Anniversary of the Air Formation Signals.

(Antigua) at 2153UTC. He even switched to s.s.b. at one point to hook up with V63KU (Micronesia) at 1955UTC.

After a period of working in foreign climes, short wave listener (s.w.l.) Gordon Hurrell BR5-01705, on the Isle of Wight, returned to the radio for a short session. He reports 14MHz s.s.b. reception of RA9LI/9 (Bely Island, Arctic Circle) at 2241UTC, in contact with 9A6AA, plus YS1ECB (El Salvador) at 0017, A92GH (Bahrain) at 1659, 9Y4SF (Trinidad & Tobago) at 1937 and finally JW/F5BU (Svalbard Island) at 1730UTC.

### THE 18 & 21MHz BANDS

On to the 18 and 21MHz bands now, and the ever-active s.s.b. DXer Don McLean G3NOF of Yeovil certainly dug up some interesting stuff on the 18MHz band this month, which included AE7H (Arizona), AP2WAP (Pakistan), KL7/DL1YMK (Alaska), D5SUSH (Korea), KG4AS

and 4X1FC (Israel) at 2246UTC.

Someone else who gave s.s.b. a go this month was Eric Masters G0KRT of Milton Keynes, who used 100W and a W3EDP antenna. His 21MHz phone contacts included CU3TRP (Azores Islands) at 0954UTC, WB9Z (USA) at 1637, VP5JM (Turks & Caicos Islands) at 1650, VE2UFO (Canada) at 1655 and K6CZ (west coast USA) at 1913UTC. Back on c.w., he snagged RA9SKA (Asiatic Russia) at the unearthly hour of 0551UTC and UA4LCQ (European Russia) at 0751UTC.

Down on the Isle of Sheppey in Kent resides Ted Trowell G2HKU, who used c.w. to crack UR3LDD/MM off the coast of Madagascar and OJ0/LA0CX (Market Reef) both at around 1500UTC on the 18MHz band, while 21MHz brought in contacts with JH4UYB (Japan), OH0EA (Aaland Island) and EA8BWP (Canary Islands), all at around 1500UTC.

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# RadioScene

Where the 24 and 28MHz bands were concerned this month, however, the fine July weather led Ted G2HKU to predict that he may have a fine crop of apples this year, but he also says that the supposed sunspot maximum has not done much for the DX so far! Nevertheless, Ted's exploits on 24MHz c.w. brought in a harvest of stations in the form of 5N3CPR (Nigeria), OH0EA (Aaland Island), 45XR (Oman), CY9SS (St. Paul Island), and VR2BG (Hong Kong) for a nice one.

The higher bands was where Robin Trebilcock GW3ZCF of Bishopston near Swansea spent most of his time operating this month. Using a Sandpiper mobile whip antenna on his caravan while on holiday in north Devon as G3ZCF/P, Robin reports much to his delight (and surprise, he admits) some nice 24MHz s.s.b. contacts with ZP5CJL (Paraguay) at 1613UTC, CY9SS (St. Paul Island) at 1637, PA2GFL/MM off the coast of India at 1941 and AB5A (USA) at 1718UTC.

The 28MHz band however gave Robin contacts with PU2NIX (Brazil) at 1930UTC, 4Z5GV (Israel) at 1720, LU1FGZ (Argentina) at 2017, OD5RZ (Lebanon) at 1542, JY5HX (Jordan) at 1600, and finally K4JYO (USA) at 1500UTC.

To round things up this month comes John Wheeler G0IUE of Melksham in Wiltshire who sends in his usual single band s.s.b. report for the 28MHz band and, apart from the usual European stations vis sporadic 'E' (Sp-E) propagation, he worked LU6HDF (Argentina) at 1457UTC, 4X6WF (Israel) at 0940, CX5ABM (Uruguay) at 1937, plus 2A/DJ6AU, a German amateur working from the Shetland Islands, as well as an interesting 29MHz n.b.f.m. contact with F5OBV (France) who was using just 7W into an indoor loop antenna. However, the most pleasing contact this month for John was 3B8CF (Mauritius) at 1233UTC, who was a solid 5/9 throughout the contact he says.

## SIGNING OFF

So, it seems that despite the 'patchy' conditions, our intrepid reporters have been busy digging out that juicy DX! Just goes to show what can be done, even when propagation conditions are less than reliable, eh? keep up the good work and good DX!

**THANKS AGAIN TO ALL REPORTERS FOR THEIR TIME AND EFFORT IN MAKING THE COLUMN A SUCCESS. AS USUAL, REPORTS, INFORMATION AND PHOTOGRAPHS BY THE 15 OF THE MONTH. DETAILS AT THE TOP OF THE COLUMN.**

*Leighton G7WLB1*

## FOCAL POINT

**REPORTS & INFORMATION TO:**

**GRAHAM HANKINS G8EMX  
11 COTTESBROOK ROAD  
ACOCKS GREEN  
BIRMINGHAM  
B27 6LE**

**E-MAIL:  
graham@ghank.demon.co.uk**

**PACKET: G8EMX@GB7SOL**

**THIS TIME AROUND,  
GRAHAM HANKINS G8EMX  
DISCUSSES THE FUTURE OF  
ATV AND FAST SCAN ATV ON  
THE 70cm BAND AND ALSO  
TAKES A FURTHER LOOK AT  
SOME ATV COMPUTER  
SOFTWARE AVAILABLE FROM  
THE BATC WEB SITE.**

The future of the Fast Scan Amateur TV mode within the UK, 432-440MHz (70cm) amateur band has been the subject of much recent discussion within printed, Packet and E-mail correspondence. The removal or retention of Amateur TV (ATV) as a permitted mode on 70cm would (logically) be of

interest to the British Amateur TV Club (BATC), the Radio Society of Great Britain (RSGB), the

Radiocommunications Agency (RA), the United Kingdom Radio Society (UKRS), local ATV clubs and individual ATV operators. It is considered that there is need to justify the continuation of the ATV mode within the 70cm band and one initiative in response to this has been a call for ATV operators on 70cm to make their activity known to the BATC.

Transmitting and receiving a high definition analogue picture, by definition, requires a wide bandwidth and ATV standards have followed the broadcast specifications of 405 then 625 lines, producing around 5MHz of video waveform. Simple amplitude modulation of a carrier creates a bandwidth of 10MHz, so 70cm, which used to extend from 430-440MHz, was the first band available for the ATV Radio Amateurs.

Eventually, the 70cm band was reduced to 432-440MHz but this did not have a major impact on ATV. Stations put 3MHz video filters in front of their vision modulators, producing an in-band 6MHz signal, albeit with loss of the 4.43MHz colour sub-carrier. The other main users of the 70cm band were some voice simplex operators and use of higher bands for ATV were beyond amateur budgets to generate the r.f. powers needed for noise-free pictures.

Then along came vision frequency modulation and affordable u.h.f. power semiconductors which brought the use of the 1.3GHz band and above for ATV with plenty of spectrum space for colour, sound and repeater channels.

So, why retain an ATV allocation within the 70cm band (which is now a smaller yet more crowded band with a multitude of voice repeater

input/outputs) and channels for Packet radio - said to be the most rapidly expanding branch of Amateur Radio?

## 'SHUTTLEWORTH 99'

Here is a brief round-up of the news from 'Shuttleworth 99'. Principal members of the RSGB Repeater Management Committee, together with RSGB President, Hilary Clayton-Smith G4JKS, produced one of the highlights of 'Shuttleworth 99'.

The RSGB team explained the working of the RMC, fielded questions and comments about the RSGB and its magazine *RadCom* and presented an updated specification for ATV repeaters. Both the RSGB and the BATC hoped that the improved understanding between the two organisations would continue to yield a mutual benefit.

At the BATC's General Meeting, Chairman Trevor Brown G8CJS outlined some of the progress since the last BGM; the Web site, CQ-TV now in A4 and many back-issues archived on CDROM, a much-improved and speedier approval system for 24cm ATV repeaters.

All main officers were elected to continue, but several committee members had chosen to retire and no new faces were willing to join the committee. All agreed that the venue and social gathering the previous night had been superb, but the future of BATC rallies remained very much in question.

## HERE FIRST

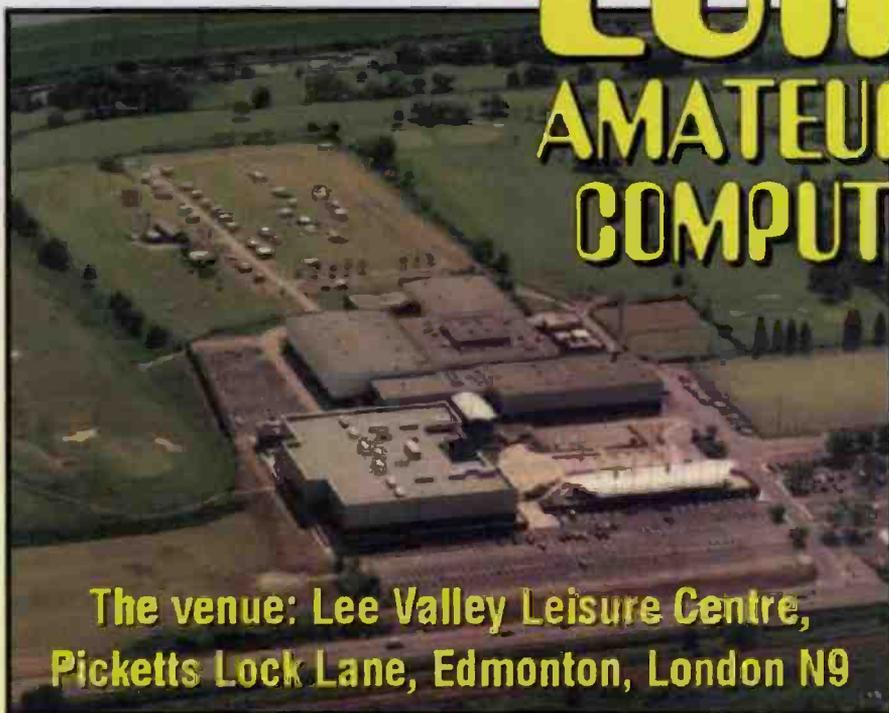
Personally, I do not agree with the "We were here first" defence of ATV on the 70cm band. Nothing is for ever, the world turns and changes and the band occupancy on 70cm is radically different from years ago, with arguably more



**Fig. 1: "Serious hardware" department. A 10GHz microwave dish ready for an ATV contest as part of the Severnside ATV Group's antenna array.**

# The last major Radio & Computer Show this century will be held at Picketts Lock!

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The venue: Lee Valley Leisure Centre,  
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\* not included in admission to the event

ROGER G3LDI BEGINS THIS MONTH'S 'DATA SCAPE' WITH A LOOK AT NEW AMATEUR RADIO WEB SITE.

# RadioScene

prolific users.

However, the remainder of the case for retaining ATV on 70cm is strong - Amateur Radio needs new operators to enter the hobby and the 432-440MHz band is the easiest and cheapest band for an ATV beginner. Over normal propagation paths, an ATV picture will achieve a greater distance on 70cm than on any other band. Higher r.f. powers for noise-free pictures can be more economically achieved on 70cm than on the higher bands.

Appeals for users of 70cm ATV to make themselves known has yielded only a small response, but that in itself doesn't mean that there's low activity out there. There are probably stations regularly on 70cm, even though they didn't choose to reply to a survey.

Here in the West Midlands,

will face north. These may be changed for new Alford-Slot antennas at a later date, when the desired service area has been established".

## COMPUTER SOFTWARE

In the August 'Focal Point' I looked at a piece of ATV computer software called *PCATV*, which generated various types of test card on screen and is available for downloading from the BATC's Web site at <http://www.batc.org.uk>. The version of *PCATV* here is shareware and will demonstrate some of the functions for a limited number of days, users are then invited to purchase the full version from the address given within the software.

My computer has a new graphics card, with a 'TV Output' socket, so this was

### Web Watch:

BATC's Web Site: <http://www.batc.org.uk>

there's usually a twice-weekly ATV 'net', there's 70cm ATV available in the Southampton area and activity around Crawley, says Phillip Fuller G0PVQ: "There are several regular 70cm ATV stations here with vision and many local Novices are building 435MHz ATV transmitters". This is very good news and Phillip has been encouraged to inform the BATC of this activity.

Staying in Crawley for a moment (because there is more ATV news to come). Around ten years ago, the town was served by a 1.3GHz ATV repeater, G83CT, until the ageing Alford-Slot antennas began to go off-tune and produce harmonics, then interest and activity reduced and hence the repeater was taken out of service.

Now, largely due to Phillip's efforts, the repeater has been reinstated at the Crawley Amateur Radio Club's premises and, when an intermittent fault with the transmit video relay has been cured, a new licence will be applied for. Phillip adds: "We already have some 'Butterfly' antennas available so, when the repeater comes back on-air, its coverage pattern

plugged into the 'Monitor' socket on my portable TV. At first only a locked but blank raster appeared, until all the driver software had been loaded from the compact disc that came with the card. Then select 'Control panel', 'Display', and 'TV Output' via the computer's v.d.u. That screen shows a little 'On' button, clicking that icon blanked the computer's screen, putting the image onto the TV monitor.

Running the *PCATV* software via the TV screen (the reduced resolution of a normal TV display made this quite tricky, visually, but I'm only using a small monitor) brought up a 625 line PAL system test card in the normal way, ready for transmitting or recording - everything worked! I'd better send £5.75 to Worthing, register my copy of *PCATV* and enable the full facilities.

Fourteen more ATV software programmes are available at the BATC site and a few of them deal with the programming of the Peripheral Integrated Controller chip, or PIC. *Picdream.zip* creates a scrolling character message across the top of a screen, with

a grey scale at mid-screen and a 'real-time' (i.e. the actual time of day) clock at the bottom of the picture.

*Tone.zip* turns your PIC into a Morse generator; *'beyond12.zip'* is a simple PIC programming demonstration. I will download some of these and let you know how these work in practice. Keep watching these pages.

THAT'S ALL FROM ME THIS TIME AROUND. UNTIL THE NEXT TIME MY COLUMN'S IN PRACTICAL WIRELESS.

Graham Hankins G8EMX

## DATA SCAPE

NEWS, VIEWS & PICTURES TO:

ROGER COOKE G3LDI  
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G3LDI @ GB7LDI

THIS MONTH, ROGER COOKE G3LDI TAKES A LOOK AT ALL THINGS DATA AND STARTS OFF WITH A LOOK AT A NEW AMATEUR RADIO WEB SITE.

July saw the launch of a comprehensive 'Amateur Radio Portal' on the Web. The URL is [www.dxbands.com](http://www.dxbands.com) and it has been designed for Radio Amateurs throughout the world, giving them the opportunity to find up-to-the-moment Amateur Radio news, details on DXpeditions, contests and page upon page on 'ham' radio links.

The site includes a unique "DX-diary" which, month by month lists DXpeditions large and small the world over. The style shows the start and finish date of each event, together with details, QSL manager and other information.

Updated each day with the latest Amateur Radio news, this site is destined to become an



Fig. 1: The home page of the Amateur Radio Portal which you'll find at [www.dxbands.com](http://www.dxbands.com)

important online resource. It includes links to other sites, an on-line call-book, using the Buckmaster CDRom, together with other interesting features. E-mails can also be sent to [news@dxbands.com](mailto:news@dxbands.com). The news about this new Amateur Radio site came from Nigel G4KIU and the home page can be seen in Fig. 1.

## DATA ACTIVITY

As I no longer write the column in *Radcom*, I can now combine some data activity within this column, thus giving the readers a chance to stay fairly current with 'on-air' activities. This will be combined with information obtainable from the Internet, thus inter-twining the land-line and radio methods of staying up to date. I will appreciate your input on this, so please keep your ideas and opinions coming in, together with any photographs if you have them.

The following piece of information came in to me from Peter Hunter G0GSZ, Editor of the RAIBC's *Radial* Magazine for the disabled. Al K3TKJ has set-up an E-mail forwarding service specifically for Radio Amateurs. This means that you still keep your current E-mail address, just give all your radio friends your new 'yourcall@qsl...' address and you'll receive all your mail as normal but with a unique 'Amateur Radio' address.

You can also establish your own personal Web pages there, so watch out for news of a new address for the RAIBC Web site. This service is provided free, but donations are welcome and thankfully received. See the Home page in Fig. 2.

Remember, you KEEP your current E-mail address so, if you want people to contact you as normal, then don't bother giving them the 'qsl' address.

Visit the QSL.NET Web site at [www.qsl.net](http://www.qsl.net) and read more. Even if you don't want to use this service take a look at the site anyway, it's well worth a visit. Much more information and a full report will be in the next (September 99) *Radial*.



Fig. 2: The QSL.NET Web site can be found at [www.qsl.net](http://www.qsl.net)

## THE N2HOS NEWSLETTER

For anybody interested in h.f. band, RTTY or PSK31 the **N2HOS Newsletter** is a very useful one to subscribe to. It gives current DX activity on these modes, and is a chatty and friendly type of Newsletter, edited by N2HOS himself. It's called 'Jim's Gazette' and here are a few snippets from the latest one, just to wet your appetite.

"This happens all too often. **THE GOOD NEWS**, a 'DXpedition to XX9YY (the DX of our dreams) announced for September-October 1999'. We get excited and begin to check our gear and antennas. Then, **THE BAD NEWS** arrives. 'The crew going to XX9YY will not operate RTTY because (take your pick of the excuses: no operator, don't have the equipment, can't carry that much more equipment, can't stand that low rate, etc.) and we lose another golden opportunity to make the honour roll.

"There is no **SURE** way to determine the reasons for our disappointment. Years ago, it might have made sense to leave RTTY at home because the minimum gear would break a camel's back. But, in this day and age when the extra gear is nothing more than one seven pound laptop computer, the excuse doesn't hold much water. There could be times when no operator is willing to volunteer and pay for the trip, but the RTTY gang is a daring bunch and I suspect that almost all expeditions could recruit one if they really tried.

"When some say 'we don't have the equipment', they mean it. They neither have it in their inventory nor can they afford to add it. And that is the saddest situation of all. Take the upcoming PY0/S (St. Peter and Paul Rocks) jaunt. Karl PS7KM would really like to have RTTY capability, but needs an unaffordable laptop to achieve his goal.

"Joost ZS5S advises that the

Fig. 3: Picture taken from Fred VE7PL's Web site which can be found at [www.mscomputer.com](http://www.mscomputer.com)

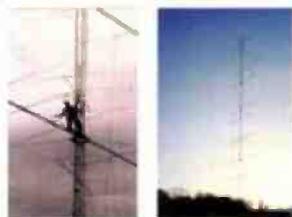


Fig. 4: Another antenna picture from [www.mscomputer.com](http://www.mscomputer.com)

A45XH MBO closed down and will remain so until further notice. Tom A45ZO advises that a series of radio and computer failures caused by power surges did the damage. Unfortunately, the problems cannot be remedied locally. It has also caused Tom to pull out of the Satgate network".

"PSK31 notes. The latest VK2SG RTTY DX Notes tell a fascinating story of this new mode's success. It seems nearly impossible, but about one half of the DX sightings listed show the mode as PSK31. All parts of the globe are represented. Clearly, the first PSK31 DXCC cannot be too far in the future.

"Another PSK31 contest. The Chautauqua County Contest Club will sponsor a contest for the full 24 hours of September 4, 1999. All bands, including WARC, are included. Exchange is RST and QSO number".

You can subscribe (and contribute) to the N2HOS Newsletter by sending an E-mail to Jim at: [jem@n2hos.com](mailto:jem@n2hos.com)

## LOW-COST INTERNET DEVICES

Low-cost Internet access devices are set to revolutionise 'ecommerce' by the end of the year. (Another addition to the English Dictionary - 'ecommerce'!). Promoted by Dixons, a cut-down Web access and E-mail machine could be produced before Christmas for around £200. Although no details are available at this time, it's low price suggests it will not use the PC standard commercial operating system *Windows*, which costs PC makers around £50 per machine to license.

The move follows news that Seattle-based Internet device manufacturer **Micro-workz** is talking to companies, including AOL, about co-branding opportunities for its Web access device **iToaster**. Plans might include offering this device, currently on sale in



Fig. 5: Another antenna picture from Fred VE7PL's site. The wording along the bottom reads: "45 Foot long booms, 8 "m2" Antennas, 0.5in thick Phillystran Guys".

## Web Watch

Amateur Radio Portal: [www.dxbands.com](http://www.dxbands.com)  
Ivor G10AIF's Web site: [www.mscomputer.com](http://www.mscomputer.com)  
QSL.NET: [www.qsl.net](http://www.qsl.net)

the USA at \$US200, free to UK customers. In return for a one year's subscription to the service. Things are really hotting up in the Internet world!

## POSTAGE STAMP DISK DRIVE

The American company, IBM is now shipping postage stamp size disk drives for use in portable machines, capable of storing up to 340Mb. They say that they are committed to doubling Microdrives capacity annually for the next three years. This means that by 2001 the drive should offer more than 1Gb!

At \$US499, the drive isn't cheap, but its size is mind-boggling, both in the storage and physical sense. The device is similar to flash memory in that it conforms to the CompactFlash standard's physical dimension and, with an adapter, can also fit into a PC Card slot.

Microdrive works where flash capacity cannot fit or is too expensive. Several companies that use flash as data storage are now buying Microdrive. The expansion of the digital camera market and high capacity data back-up for notebook computers will be the main areas of growth. IBM's redesigned motor and spindle allow Microdrive to spin up to writing speed in less than a second, so pictures can be taken almost instantaneously.

## GREEN WITH ENVY

If you want to make yourself really green with envy, visit the site of Ivor G10AIF. He has a series of pictures describing his antenna system. It really is one to behold. My friend Fred VE7PL in Victoria, western Canada, guided me to this site.

Fred wondered why this station was always 5 - 9 + 30. There's little wonder when you see that Ivor is using a 61m rotating tower with stacked arrays. This is combined with an ideal location as well, something that most of us can only dream about!

Just look at the pictures here and then go and look at lots more at [www.mscomputer.com](http://www.mscomputer.com) (Figs. 3, 4 & 5 give you some idea)!

## SAD NEWS!

Sad news! Ray Petit W7HM,

the inventor of Clover, passed away early 13 June at the age of 55 at his home in Oak Harbor, WA. Ray suffered a stroke in early March, caused by a brain tumour, it left him mostly paralysed which resulted in additional strokes and lead to the one that finally took Ray's life. Ray is survived by his wife Joyce, a twin brother, and older brother and a younger sister.

**THAT'S ALL FOR THIS MONTH, SORRY I HAD TO FINISH ON A SAD NOTE. KEEP SENDING IN YOUR NEWS, VIEWS & PICTURES TO THE ADDRESS AT THE TOP OF THE COLUMN.**

73 Roger

## BROADCAST

REPORTS AND INFORMATION TO ME PLEASE:

PETER SHORE  
C/O PW EDITORIAL OFFICES  
ARROWSMITH COURT  
STATION APPROACH  
BROADSTONE  
DORSET  
BH18 8PW

E-MAIL:  
[petershore@pwpublishing.ltd.uk](mailto:petershore@pwpublishing.ltd.uk)

PETER SHORE BRINGS YOU SOME GOOD NEWS ABOUT INCREASES IN THE AUDIENCES OF SOME RADIO STATIONS AS WELL AS THE USUAL UPDATE IN FREQUENCY NEWS.

There is heartening news from Voice of America (VOA) where the station's global audience has reached a new high of 91 million. According to William Bell, director of audience research at the International Broadcasting Bureau (which looks after not just VOA, but also Radio Free Europe, Radio Liberty and Radio Free Asia), five countries account for around half of VOA's total audience. Nigeria, Bangladesh, China, Ethiopia and Afghanistan have the greatest number of VOA listeners, with Africa as a whole having 39% of the station's audience.

Dismissing the notion that short wave is a dying means of

Fig. 2: A sticker from China Radio International.

# RadioScene

getting programmes to listeners. VOA research shows that 90% of its audience listen via short wave and medium wave and 10% are served by local re-broadcasting.

The VOA audience figures were released almost simultaneously with the swearing-in of new VOA Director, **Sanford Ungar**. Mr Ungar is a journalist who has worked in print and broadcasting. The 54-year old veteran of America's National Public Radio and 'Washington Post' said: "I'm delighted to be back in the world of radio journalism. Directing an organisation with such a rich history and tradition of journalistic excellence and integrity is a great honour".

However, the *Washington Times* newspaper reported that many of VOA's broadcasters are torn between their roles as journalists and the fact that the agency is basically an arm of the US government. An anonymous VOA staff member, quoted by the newspaper, said: "There should be more democracy in the newsroom".

The paper went on to say that the staff member noted that while VOA journalists generally report stories on the basis of standard journalistic principles of objectivity, managers often overrode them and ordered coverage of stories based on US foreign policy or public relations concerns.

## MORE GOOD NEWS

There's yet more good news as other radio stations increase international activity. **YLE Radio Finland** is adding two new languages: Mari and Udmurt. These may not be the most common languages in the world, but they are both related to Finnish (actually they are Finno-Ugric languages) spoken in parts of the former Soviet Union.

## THAT'S ALL

That's all I have room for this month. Do remember that the clocks change in most of the world at the end of October and so the times and frequencies of international broadcasts will alter. I'll bring you news of the changes as I get them.

It's also worth noting that new editions of the *World Radio TV Handbook*, *Passport to World Band Radio* and the *Global Radio Guide* will all be published in November. Each of these has up-to-date frequency information and you can order copies through the PW Mail Order service by contacting the **PWBook Store**, PW Publishing Ltd, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Or Tel: (01202) 659930. Alternatively, you can E-mail the Book store on [bookstore@pwpublishing.ltd.uk](mailto:bookstore@pwpublishing.ltd.uk)



Fig. 1: An example of what can be found at the IRIB Web site.

The programmes start this autumn at weekends, broadcast via short wave and satellite but as we go to press, times and frequencies have not been announced. If you can log both programmes and get verification from YLE Radio Finland in Helsinki, let me know. There's a prize for the first log I receive!

Iran has added Japanese to its growing stable of languages. **IRIB, the Voice of Iran**, launched the new language stream on 11 July with a half-hour daily programme at 1300UTC on 15.20 and 17.62MHz. The programme is also available on the Internet in RealAudio: <http://www.trib.com> (see Fig. 1).

The **Voice of Vietnam** has joined the Internet revolution. It has a daily 60-minute programme available in RealAudio. Check out: <http://www.vov.org.vn>

A major deal between **Merlin Communications International** (the company that provides most of the transmission services to BBC World Service) and the **Central Broadcasting System of Taiwan**, means that Merlin now has access to short wave facilities in Taiwan.

## FREQUENCY NEWS

Programmes from **Radio Taipei International** are already on the air from Merlin's site at Skelton in Cumbria beaming to Europe. **Herald Broadcasting**, the religious station in Boston, is on the air from the Taiwanese transmitters targeting China and India.

As this column went to press, the Radio Taipei International schedule had not been updated to reflect the new exchange agreement that should improve reception of the station here in Europe. Let me know what you hear from Taiwan via Skelton. Meanwhile, here's the schedule without Merlin's transmissions (all times are in UTC):

0200-0300 on 15.345, 11.825, 11.745, 11.74, 9.68, 5.95MHz  
 0300-0400 on 15.345, 11.825, 11.745, 9.68, 5.95MHz  
 0700-0800 on 5.95MHz  
 1200-1300 on 9.61, 7.13MHz  
 1400-1500 on 15.125MHz  
 2200-2300 on 15.60, 11.565MHz

Merlin's own radio service, **Merlin Network One**, has increased its operation on short wave with programmes on the air (all times are in UTC):

Global Sound Kitchen on Sunday:  
 0000-0100 on 9.72, 7.325 and 6.015MHz  
 1300-1700 on 15.235, 12.035 and 9.75MHz

Roy Masters Monday-Friday:  
 1600-1700 on 6.175 MHz

Global Sound Kitchen on Friday:  
 2100-2300 on 9.72, 7.325 and 6.14 MHz  
 2300-2400 on 9.72, 7.325 and 6.015 MHz

**China Radio International** broadcasts in English to Europe (all times are in UTC):

1700-1800 on 15.31, 11.91, 9.57, 7.405, 5.22MHz  
 1900-2000 on 15.36, 13.65, 11.75, 9.44MHz  
 2000-2100 on 15.50, 9.535, 9.44, 7.59, 6.95MHz  
 2100-2130 on 15.50, 15.415, 11.735, 9.535, 7.59, 6.95MHz  
 2200-2300 on 9.88MHz  
 2300-2400 on 5.99MHz  
 (China Radio also has Esperanto to Europe at 2000UTC on 9.965 and 7.405MHz).

**Glenn Hauser** has reported in his programme 'World of Radio' that **Radiobras**, the overseas broadcaster from Brazil, is off the air. There is domestic wrangling over which government department should have responsibility for the programming. Keep an ear on 15.265MHz between 1800 and 1920UTC, which is when Radiobras has been on the air up until this summer.

**Radio Tashkent** in the capital of Uzbekistan, Central Asia, has English programmes on short wave (all times are in UTC):

0100-0130 on 9.715, 9.53, 9.375, 7.19MHz  
 1200-1230 and at 1330-1400 on 17.775, 15.295, 9.715, 7.285MHz  
 2030-2100 on 9.545 and 9.54MHz  
 2130-2200 on 9.54 and 7.105MHz

As we move towards autumn in the Northern Hemisphere, medium and long wave DXing can come into its own again. Tune around for some fairly far off signals, including for example **Radio Algiers International**. It's on the air at 2000UTC in English on 252kHz long wave, plus short wave channels of 15.16 and 11.715MHz. The two short wave frequencies are also on the air at 1600UTC for an hour with English.

## Web Watch

IRIB (Voice of Iran): <http://www.trib.com>

Voice of Vietnam: <http://www.vov.org.vn>

UNTIL NEXT MONTH, GOOD LISTENING! *Peter!*

# Vann Draper Electronics Ltd

Unit 5, Premier Works, Canal Street, South Wigston, Leicester LE18 2PL

Tel: 0116-277 1400 Fax: 0116-277 3945

E-mail: sales@vanndraper.co.uk  
Home page www.vanndraper.co.uk

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- Sine and square outputs
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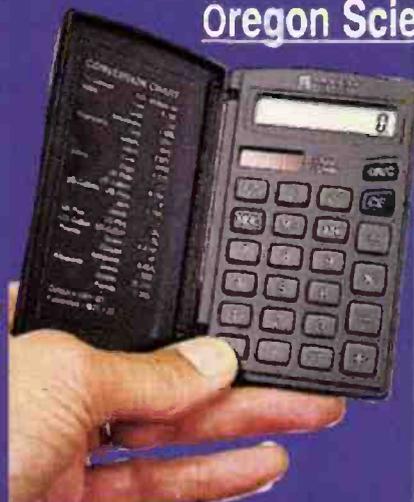


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# Trader's Table

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- ALINCO DX70 TH100W HF + AM TRANSCEIVER..... £475
- ICOM IC-705HF 100W TRANSCEIVER..... £399
- KENWOOD TS-440S/THF 100W TRANSCEIVER..... £499
- KENWOOD TS-480S/100W HF + 10W FM + CTCSS..... £499
- KENWOOD TS-480S/100W HF TRANSCEIVER + 6M + CTCSS..... £499
- TOKYO MX-240 2M HF TRANSVERTER..... £345
- TRIO TS-940S 100W HF TRANSCEIVER..... £395
- YAESU FT-707GX HF 100W TRANSCEIVER..... £355
- YAESU FT-757GX HF 10W TRANSCEIVER..... £267
- YAESU FT-757GX HF 100W TRANSCEIVER..... £375
- YAESU FT-1000 300W HF TRANSCEIVER + ALL FILTERS..... £1599

**TRANSCEIVERS VHF/UHF**

- ALINCO DR-112E 2M FM MOBILE..... £125
- ALINCO DR-130E 2M FM MOBILE..... £195
- ALINCO DR-990 2M/70CM MOBILE TRANSCEIVER..... £225
- ICOM IC-207H 2M FM MOBILE TRANSCEIVER..... £225
- ICOM IC-228H 2M 45W MOBILE..... £185
- ICOM IC-229E 2M FM MOBILE TRANSCEIVER..... £159
- KENWOOD TM-201A 2M FM MOBILE..... £159
- KENWOOD TM-732E DUAL BAND MOBILE TRANSCEIVER..... £339
- KENWOOD TM-732E 2M/70CM MOBILE TRANSCEIVER..... £325
- KENWOOD TR-751E 2M MULTIMODE TRANSCEIVER/STANDARD C-5200 TWINBAND 50W MOBILE..... £299
- STANDARD C-8900 2M MOBILE..... £185
- TRIO TR-2200 2MTR PORTABLE..... £159
- TRIO TR-2200 GX 2MTR PORTABLE..... £159
- TRIO TR-9130 2M MULTIMODE..... £249
- TRIO TS-700 2M MULTIMODE BASE..... £375
- YAESU FT-127R 2M 10W FM MOBILE..... £199
- YAESU FT-1500M 2M 50W FM MOBILE..... £189
- YAESU FT-900R1 2M MULTIMODE + CASE..... £285
- YAESU FT-23A 2M/70CM HF MULTIMODE BASE..... £549
- YAESU FT-23M HF/2M/70CMS BASE TX..... £599
- YAESU FT-5100 DUAL BAND MOBILE..... £267
- YAESU FT-100R 2M/70CM MOBILE TRANSCEIVER..... £325

**RECEIVERS**

- DRAKE - RFA HF RECEIVER..... £799
- ICOM ICR-71E HF RECEIVER+REMOTE..... £399
- KENWOOD R-2000 + VHF HF RECEIVER..... £329
- KENWOOD R-5000V HF RECEIVER + VHF CONVERTER..... £699
- LOWE HF-130 + ACC HF RECEIVER + INTERFACE..... £235
- SANGHAN ADS-400A 5WAY RX..... £125
- YAESU FRG-100 HF RECEIVER..... £225
- YAESU FRG-700 HF RECEIVER..... £225
- YAESU FRG-800V HF RECEIVER + VHF CONVERTER..... £385

**HANDHELDS**

- ALINCO ALM-302E 2M H/HELD TX..... £99
- ALINCO DI-180B 2M HANDIE - EX DEMO..... £139
- ALINCO DI-180 2MTR H/HELD + EDC46 FAST CHARGER..... £99
- ALINCO DI-480 70CM HANDIE..... £99
- ALINCO DI-GIE 2M HANDIE + AIR + LHF RX..... £129
- KENWOOD TH-215E 2MTR H/HELD TX..... £75
- KENWOOD TH-28E 2MTR HH TX+70CM RX..... £149
- KENWOOD TH-45E 70CMS H/HELD TX..... £119
- YAESU FT-208R 2M HANDIE..... £59
- YAESU FT-208 70CM HANDIE..... £69
- YAESU FT-27R 2M/70CM HANDIE..... £99

**MISCELLANEOUS EQUIPMENT**

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- AMDAT ADC-40 FREQUENCY STANDARD CLOCK..... £99
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- KENWOOD AT-200 ANTENNA TUNER..... £175
- KENWOOD BPF-2A 2M BANDPASS FILTER 100W..... £29
- KENWOOD PS-430 POWER SUPPLY..... £169
- KENWOOD VC-H COLOUR SSTV UNIT..... £225
- KENWOOD AT250 AUTO ATU (TS14096R)..... £189
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- NW MODULES MAA25 10M PREAMP..... £29
- NW MODULES MM-4000B KITTY TRANSCEIVER..... £149
- INTERFACES..... £49
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- TOKYO HY-POWER HL-160V 6M 160W LINEAR + PREAMP..... £399
- TOKYO HY-POWER HL-66V 6M 60W AMP + PREAMP..... £289
- TOKYO SAGRA 600 2M 600W AMP..... £549
- TOKYO HL1340U 23CM 40W LINEAR + PREAMP..... £375
- TRIO TL-120 100W HF AMP..... £185
- TRIO YB-2200GX 10WATT AMP FOR 2200GX..... £29
- YAESU FT-517 CTCSS + PT 41/111 ETC..... £39
- VECTRONICS PWR-30 PWR/SWR METER..... £59
- YAESU FC-30 ANTENNA TUNER (FT-847)..... £179
- YAESU FC-35TAT AUTO ATU (YAESU FT-757)..... £249
- YAESU FT-4 AMP YAESU PSU..... £39
- YAESU Q-40 ROTATOR + MAST CLAMP..... £179
- YAESU MM9-20 MOBILE MOUNT-PT-20L 20V ETC..... £15
- YAESU PA-3 MOBILE ADAPTOR FT-20L 20V ETC..... £12
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- Garmin GPS 45XL handheld GPS..... £169
- Packrat PK232MBX + leads..... £149
- Diamond SX100 SWR/PWR meter 3kw..... £75
- Unken 360 lazer radar speed detector..... £199
- Garmin GP38 G.P.S..... £89
- MJF 1214 PC fax,cw,rtty decoder..... £99
- Kenwood MC90 digital desk mic..... £99
- Yaesu FR17700 short-wave A.T.U..... £49
- Watson 25amp P.S.U. Demo model..... £79
- Vectronics VC300m 300watt mobile A.T.U..... £69
- Microwave Modules 10m to 144mhz transverter..... £99
- Night Vision Scope by Moonlight new..... £299
- MJF 989C 3KW Tuner..... £239
- Davies Weather Station, wind speed etc. new..... £149
- MJF-451 CW sender with keyboard..... £89
- MJF-207 HF SWR analyser..... £69

**VHF/UHF TRANSCEIVERS**

- Kenwood THD7 latest 270cms h/h demo..... £299
- Yaesu FT8100 2m/70cms mobile..... £319
- Yaesu FT3000 2m/70cms RX 70 watts..... £299
- Yaesu FT50R 270cm mil spec as new..... £199
- icom ICW2E 2m/70cms handie + accessories..... £149
- Alinco DJG5E 270cm wide RX charger..... £199
- Alinco DR150E 2M 50watt wide RX..... £199
- icom IC821H 2m/70cm base mint..... £699
- Yaesu FT2200 50 watt 2 meter mobile..... £169

**HF TRANSCEIVERS**

- Kenwood TS950S ATU PSU mint..... £1199
- Yaesu FT747GX 0-30mhz..... £325
- Yaesu FT767GX HF+6M+2M mint ATU PSU..... £799
- Yaesu FT847 boxed and mint..... £1149
- Yaesu FT1000MP/AC demo..... £1899
- icom IC737 mint, auto A.T.U..... £649
- Yaesu FT920 AF HF+6M demo..... £1095
- icom IC726 HF+6M mint..... £499

**SHORTWAVE RECEIVERS**

- JRC NRD535 mint..... £799
- AOR 7030 with remote control..... £449
- AKD Target HF receiver 0-30mhz..... £85
- Lowe HF225 0-30mhz all mode..... £225
- Lowe HF150 0-30mhz with keypad..... £249
- Realistic DX394 0-30mhz new..... £29
- Sony SW77 boxed mint with PSU..... £299
- Sony ICF7600 Portable receiver..... £99
- Yaesu FRG 7700 0-30mhz..... £219
- AOR 3000 0-2030mhz all mode..... £399
- icom IC8500 0-2000mhz Demo..... £1049
- icom IC-R70 0-30mhz all mode..... £349
- AOR 3000A boxed mint..... £449

**SCANNERS BASE/MOBILES**

- Realistic Pro 2006 25-1300mhz..... £119
- Bearcat 3000XLT 25-1300mhz AM, FM, NFM..... £179
- AOR 8000 0-1900mhz 1000 memories..... £239
- icom PCR100 0-1300mhz AM, FM, NFM..... £169
- icom IC7100HF 0-2000mhz all mode 1000mem..... £699
- Yupiter MVT7100 0-1650mhz charger nicada etc..... £179
- Realistic Pro2042 1000 memories base..... £149
- Realistic Pro 2025 60 memories 66-512mhz..... £79
- Realistic Patrolman 66-950mhz..... £149
- AOR 8200 0-2000mhz boxed mint..... £289
- Bearcat 9000 XLT base 25-1300mhz 500 mem..... £189

All prices in Sterling

## UNICOM

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Items marked with \* are sold on behalf of customers, cash or cheque, no warranty. All other equipment includes 3 months warranty.

**HF TRANSCEIVERS**

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- icom IC-745 Gen cov RX 100W 12V DC..... £475\*
- IC-735 Gen cov RX 100W 12V DC..... £495\*
- IC-725 Gen cov Rx 100W 12V DC..... £495
- IC-730 HF 100W 12V DC..... £259\*
- IC-730 HF 100W 12V DC..... £195
- Ten Tec Conair plus PSU CW filters..... £360\*

**RECEIVERS & SCANNERS**

- icom IC-R7000HF wideband + RC12 remote..... £695
- IC-R71E HF Receiver..... £549\*
- IC-R72E HF Receiver..... £399\*
- Kenwood R-5000 HF Receiver..... £599
- Yaesu FRG-100 HF Receiver..... £295
- Uniden UBC50XL Handheld scanner..... £50
- UBC200XLT Handheld scanner..... £99
- Ten Tec RX325 HF Receiver..... £195\*
- Yupiter MVT-7000 Handheld scanner..... £125
- Lowe HF-225 HF Rx + FM, sync AM..... £295\*
- HF-225 HF Rx + FM, sync AM..... £289\*
- AOR AR 900 Handheld scanner..... £100

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- icom IC-275E M/mode Base 25W..... £495
- IC-251E M/mode Base 10W..... £395
- IC-25E FM Handheld..... £125
- IC-H6 6ch FM Handheld..... £40
- Yaesu FT-230R FM mobile 10W..... £125
- FT-208R FM Handheld + fast charger..... £89\*

**70cms**

- icom IC-471E M/mode Base 25W..... £395
- IC-4GXET FM Handheld..... £129
- AKD 7003 Packet ready..... £125\*
- Yaesu FT-790R2 M/mode portable..... £289
- FT-41R FM Handheld..... £125

**Dualband 2/70**

- Yaesu FT-726R M/mode Base 10W..... £495
- icom IC-W2E FM Handheld..... £150

**Multiband**

- Yaesu FT726R 6/2/70 M/mode Base 10W..... £595\*

**STATION ACCESSORIES**

- icom AT1 50 Auto ATU..... £195
- RM-3 Controller (IC-211E)..... £45
- Yaesu FC-102 ATU..... £139
- Microwave Mod 144-30LS 2m L/amp 30W £75\*
- Zetagi BV131 amp 240v 10m 75W..... £75
- MJF 989C 3KW ATU..... £175\*
- Dalong ANF Notch filter..... £25
- Welz AC-38M ATU..... £39
- CH-20N Coax Switch N type..... £29
- Tono 2M-50W L/amp..... £45
- CB
- Midland 77104GTL + PSU..... £45
- Danita 640 (Err)..... £30
- Altai 5-7A PSU..... £15

## WATERS & STANTON

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**HF TRANSCEIVERS**

- icom IC-737 Base Transceiver 4th Gen.Cov. 12V..... £699
- Kenwood TS-440S Base Transceiver with Gen.Cov. 12V..... £499
- Kenwood TS-440SAT Base Transceiver with Gen.Cov. and ATU 12V..... £549
- MJF MFJ-9020 x2 20m CW QRP Transceiver..... £125
- Mizabo MX-145 20m SSB,CW Handy with PL-1000 3.5-50MHz Amp..... £250
- SGC SG-3000 Base/Mobile with Gen.Cov and Remote Head..... £390

**VHF/UHF BASE/MOBILE TRANSCEIVER**

- AKD 2001 x2 2m FM Mobile Channelised 25W..... £145
- Alinco DR-990E x2 2m,70cm FM Mobile 45W,35W Full Duplex..... £345
- Alinco DR-605E 2m,70cm FM Mobile 50W,35W..... £289
- Alinco DR-M065X x2 6m FM Mobile 40W..... £159
- icom IC-229H 2M FM Mobile 50W with 20Ch..... £229
- Kenwood TM-441E 70cm FM Mobile 35W..... £235
- Kenwood TM-732E 2m,70cm FM Mobile 50W,35W..... £479
- Yaesu FT-225RD x2 2m All Mode Base 25W with Match Mast/12V..... £549
- Yaesu FT-726R 2m,70cm All Mode Base Mains..... £499
- Yaesu FT-5100 2m,70cm FM Mobile 50W,35W Full Duplex..... £299

**VHF/UHF HAND HELD TRANSCEIVER**

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- Alinco DJ-F1E x2 2m FM H/Hand..... £99
- Alinco DJ-S11 x2 2m FM Palm Transceiver with 136-174MHz RX..... £69
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- icom IC-2E 2m FM H/Hand..... £95
- icom IC-24ET 2m/70cm FM H/Hand..... £179
- icom IC-W2E 2m/70cm FM H/Hand (with up. mic)..... £179
- icom IC-W21E x2 2m/70cm FM H/Hand..... £199
- icom IC-W21ET 2m/70cm FM H/Hand..... £199
- Kenwood TH-28E 2m FM H/Hand..... £199
- Kenwood TH-42E x2 70cm FM H/Hand..... £189
- Kenwood TH-46E 70cm FM H/Hand..... £199
- Kenwood TH-78E x3 2m/70cm FM H/Hand with Full Duplex..... £249
- Standard C-55A 2m/70cm FM Handheld..... £299
- Yaesu FT-10R 2m FM H/Hand..... £125
- Yaesu FT-470R x3 2m/70cm FM H/Hand with Dual Display Mains/12V..... £189
- Yaesu FT-530 2m,70cm FM Handy with Full Duplex..... £195

**Shortwave Receivers**

- AOR AR-7030 x2 0-32MHz All Mode Receiver 12V with PSU..... £449
- Drake R-8E 150kHz-30MHz All Mode Receiver Mains..... £425
- Drake SW-8 50kHz-30.07-10V,11B-137MHz AM, SSB, WFM..... £399
- Grundig YB-306 Portable Receiver with FM..... £69
- Grundig YB-400 Portable Receiver with FM stereo and SSB..... £99
- Grundig YB-400PE Portable Receiver with FM stereo and SSB..... £109
- Grundig YB-500 x2 Portable Receiver with SSB..... £130
- icom IC-R72 Base Station Receiver..... £449
- icom IC-R72 DC 100kHz-30MHz AM,CW,SSB 12V with PSU..... £449
- Lowe HF-150 30kHz-30MHz All Mode 12V with Keypad/PSU..... £299
- Lowe HF-250 x3 30kHz-30MHz Receiver 12V PC Compatible..... £399
- Realistic DX-394 x2 150kHz-30MHz AM,CW,SSB 160Ch Mains/12V..... £115
- Sony ICF-SW55 Portable Receiver with FM stereo and SSB..... £109

**SCANNERS MOBILE/BASE**

- AOR AR-950 60-950MHz (with gaps) AM,FM 100Ch. 12V..... £125
- JIL SX-400 26-520MHz AM,FM,WFM 20Ch. 12V..... £225
- Realistic Pro-2014 68-512MHz (with gaps) FM Receiver 50Ch. 12V..... £25
- Realistic Pro-2026 x2 66-950MHz (with gaps) AM,FM 100Ch. 12V..... £149
- Realistic Pro-2042 x3 25-520,760-1300MHz AM,FM,WFM 1000Ch..... £399

**SCANNERS HAND HELD**

- Alinco DJ-X1 x2 100kHz-1300MHz AM,FM,WFM 100Ch..... £139
- Alinco DJ-X10 x3 100kHz-2000MHz All Mode 1200Ch with Interface..... £229
- Fairmate HP-200E 0.5-1300MHz AM,FM,WFM 1000Ch, with desk PSU..... £115
- icom IC-R1 x3 0.1-1300MHz AM,FM,WFM..... £199
- Neutro Pro-46 66-950MHz (with gaps) AM,FM 100Ch..... £89
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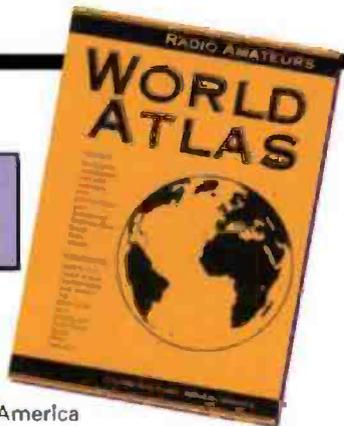
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This month the Editorial team here at Practical Wireless have more books for you which cover aspects of the last century in Amateur Radio. This time they cover such topics as Tesla, crystal radio, Maritime Coast Radio Stations and a technical history of radio communications in the British Army. Does any of this interest you? Good, read on ...

# Book PROFILES

'Regenerative Vacuum Tube Hook-Ups'; 'Combination Hook-Ups'; 'Radio Frequency Amplifiers' and many more.

The author gives a basic introduction and explains that it is best that the reader "acquaint himself somewhat with the various instruments used in the reception of radio telegraph and telephone messages". This book is fairly interesting for the historical enthusiast and contains some good circuit diagrams. **Recommended.**

## Watchers Of The Waves Brian Faulkner

In this book, *Watcher Of The Waves* the author, **Brian Faulkner**, claims that it is "A history of Maritime Coast Radio Stations in Britain" and in the introduction he writes: "The research I have carried out while writing this book has been, one minute fascinating, the next infuriating, infuriating because at times it has been difficult, if not impossible, to corroborate some of the information I have been given. In some cases different accounts of the same event contradict each other and other stories have been impossible to check".

As you can imagine, this book is really quite fascinating if you have a particular interest in the history of some of our Maritime Coast Radio Stations. It contains some really good photographs as well as some circuit diagrams of some of the stations' transmitters. Anglesey Radio/GLV, Ilfracombe Radio/GIL, North Foreland Radio/GNF and Wick radio/GKR are just some of the stations featured in this book and it comes **Highly Recommended.**

## Crystal Radio: History, Fundamentals & Design P. A. Kinzie

This book claims to cover the history and development of the crystal



detector and starts with the discovery of solid-state rectification and commences through the development of the crystal detector. *Crystal Radio: History, Fundamentals & Design* is published by the Crystal Set Society and those who have seen a copy of any of their books will know that they are always clearly written and presented and this particular book has some clear circuit diagrams.

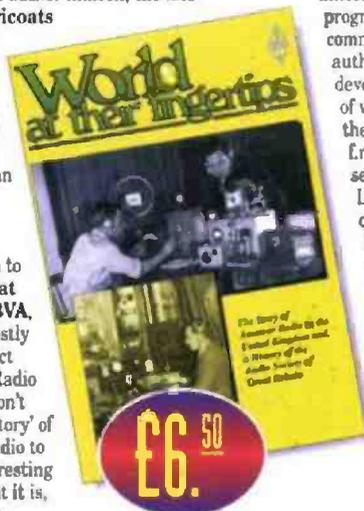
With such chapters as 'The First Practical Crystal Detectors', 'Mass-Produced Rectifiers', 'Lightning Protection' and 'Wave Traps' this book would make very interesting reading for any Radio Amateur who is interested in the Crystal Set and its history and much more. **Recommended.**

## World At Their Fingertips John Clarricoats G6CL

On the front cover of this reprinted book, it claims that it is "The story of Amateur Radio in the United Kingdom and a History of the Radio Society of Great Britain" and is actually published by the

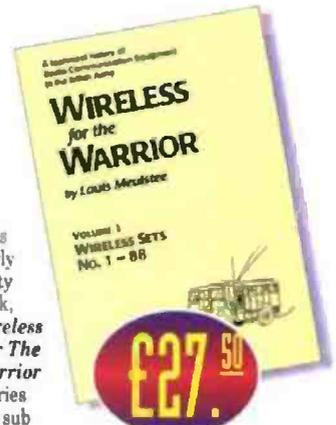
Radio Society of Great Britain (RSGB). The author himself, the late **John Clarricoats G6CL**, was a Secretary of the Society during 1930 to 1963 and then made an Honorary Member.

In an introduction to this book, **Pat Hawker G3VA**, speaks honestly about the fact that many Radio Amateurs don't find the 'history' of Amateur Radio to be very interesting but says that it is, nevertheless,



becoming more and more important that written records be "assembled into one continuous, coherent story ... But if it is important that this account be written - far more important that it should be read and lessons drawn from it". These sentences are quoted from the Introduction because it is felt that this is a very valid point and what better reason to read a book than because we can learn from it. **Recommended** at the fair price of £6.50.

## Wireless For The Warrior - Volume One Louis Meulstee



This fairly hefty book, *Wireless For The Warrior* carries the sub heading -

'A technical history of Radio Communications Equipment in the British Army' and contains mentions of Wireless Sets No.1 to No.88.

In the introduction to the book, the author, **Louis Meulstee**, claims that this book is primarily intended as a reference book and is a "compendium of the history and development of radio communication equipment in use by the British Army over the period 1932-1945". This period, **Louis Meulstee** comments was chosen because it "represents two

milestones in the technical progress British military radio communication" which, the author states, were the development of a new series of wireless sets in 1929 and the introduction of v.h.f. f.m. and hermetically sealed equipment of the Larkspur range at the end of the Second World War. **Recommended** for all those Radio Amateurs who have a distinct interest in the wartime sets used by the British Army.

## Tesla - The True Wireless Edited by George Trinkaus

According to the front page of this book, *Tesla - The True Wireless* is "the inventor's final published statement on how radio - at the radical - really works". **George**

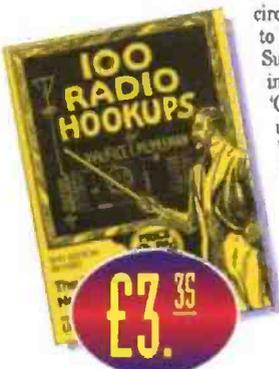
**Trinkaus** says that Tesla claimed that the "orthodox Hertzian radio we've been taught is a 'fiction' and insists that the "amount of energy that can be transmitted is 'billions of times greater' than conventional radio would allow".

This book is only 16 pages long but is really an interesting read. "Can we transmit electric power to our homes and workplaces without wires? Can the unsightly and vulnerable grid come down? Tesla is convinced", **George Trinkaus** writes. **Highly Recommended.**



## 100 Radio Hookups Maurice L. Muhleman

In *100 Radio Hookups*, **Maurice L. Muhleman** describes various hook-ups (the nearest British term for "hook-up" is "lash-up" or "prototypes" Editor) with circuit diagrams to illustrate. Such "hook-ups" include: 'Crystal Hook-ups'; 'Plain Vacuum Tube Hook-ups';



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The HM-98 remote control microphone controls almost all functions remotely. Key backlighting in the HM-98 provides easy operation even at night.

#### Cloning capabilities

All memory channel contents and set mode contents are programmable from your PC with the optional CS-2800 cloning software and OPC-478 cloning cable.

#### Convenient memories

A total of 232 channels, 99 regular, 5 for log and repeater and 1 call channel for each band, are available.

#### FM narrow capability

To improve operation on narrow band VHF FM channels the IC-2800H is equipped with a dedicated narrow band FM mode.

#### Plus much, much more.



# INTRODUCING THE MOST DURABLE HT EVER!



## VX-5R

50/144/430 MHz TRIPLE-BAND  
HEAVY DUTY FM TRANSCEIVER



Actual Size 5 W Version

### Features

- Frequency Coverage  
Wide Band Receive  
RX : 0.5-15.996 MHz 48-728.990 MHz  
800-998.990 MHz  
TX : 50-52 MHz 144-146 MHz  
430-440 MHz
- 5 W Power Output (430 MHz 4.5 W)
- AM/Shortwave Receive
- AM Aircraft Receive
- Ultra Compact: 2.4" x 4.1" x 1.3"
- Aluminum Diecast Case
- MIL-STD 810 Rating
- High-Capacity Lithium-Ion Battery: 7.2 V @ 1100 mAh
- CTCSS and DCS Built In
- Dot Matrix LCD
- Optional Barometric Sensor Unit

Va 145.000  
BARO 1024hPa

- Dual Watch
- Spectra-Scope™ Graphical Display
- 220 Memories plus "Home" Channels
- Ten Pairs of "Band Limit" Memories
- Ten Auto-Scan Weather Channels (North American version)
- 8-Digit Alphanumeric Memory Tags
- Convenient Icon Display Mode
- Smart Search™ Automatic Memory Loading
- Automatic Repeater Shift
- Auto-Range Transponder System (ARTS™)
- Multiple Battery Savers
- Time-Out Timer (TOT)
- Busy Channel Lock Out (BCLO)
- Versatile High-Speed Scanning
- 16-Digit Memory DTMF Autodialer
- One-Touch Emergency Channel
- Analog Windows™ PC Programmable
- Innovative Earth Reaction Antenna
- Full Line of Accessories

## YAESU

*Leading the way.*



FT-50R  
5 W Heavy Duty  
Dual Band Handheld

VX-1R  
Ultra Compact  
Dual Band Handheld

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Amateur bands. Some accessories and/or options are standard in certain areas.  
Check with your local Yaesu dealer for specific details.