

# PWW

**Leicester Show News,  
Discount Voucher And  
Centre Page  
Pull-Out Guide**

**Reviews:**

**Alinco DJ-F1E Miniature  
Hand-Held Transceiver**

**Optoelectronics Frequency  
Meter**

**Nelson Electronics Three Band  
VHF Antenna**

**The Untenna VHF & UHF Low  
Profile Mobile Antenna**

**Build**

**The Beaver 50MHz AM  
Transmitter**

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By connecting an external 13.5 ~ 16V DC power supply, a full 5 Watts of output power is available. You can choose 3.5W, 1.5W or 500 mW of low output power.

Product shown larger than full size.



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Appearing simultaneously are the clock and transmit frequency for total monitoring capability.

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Store and retrieve all necessary frequencies with 96 channels as follows:

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Memory ch.	30	60
Call ch.	1	1
Scan edge ch.	2	2

## Ready to operate

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## Other attractive features

Listed below are a few of the other sophisticated features.

- Triple tuning system: direct keyboard entry, the up/down keys or main dial on the top panel.
- Pocket beep, tone squelch and subaudible tone encoder functions.\*  
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The large LCD has selectable lighting mode, shows a full six digits and has a bar graph for signal strength and power output.

Vox circuitry is included to enable hands-free operation with the optional YH2 headset.

Battery saving functions are standard with a constantly updated battery save facility based on past operation history. Automatic power off can be selected for 10, 20 or 30 minutes.

Other features include 53 memories, 5, 10, 12.5, 15, 20 or 25kHz + 1MHz steps are available along with an optional CTCSS unit and many other matching accessories - see below.

<b>FTS17A</b>	CTCSS module	<b>NC18C</b>	Charger for NFB27
<b>FBA12</b>	6 x AA cell case(empty)	<b>NC28C</b>	Charger for NFB25
<b>FNB25</b>	7.2V 600mAh nicad	<b>NC34C</b>	Charger for FNB26
<b>FNB26</b>	7.2V 700mAh nicad	<b>NC42</b>	Desktop quick charger
<b>FNB27</b>	12V 600mAh nicad	<b>MH12A2B</b>	Speaker/microphone
<b>E-DC-5</b>	DC adaptor c/wnoisefilter	<b>MH18A2B</b>	Mini speaker/mic
<b>MMB49</b>	Mobile bracket	<b>MH19A2B</b>	Earpiece c/w mini mic
<b>CSC53</b>	Vinyl case for FNB25	<b>YH2</b>	Headset
<b>CSC55</b>	Vinyl case for FNB26/27		

Both the FT26/FT76 come supplied complete with FNB25, NC28C and CLIP3 as standard.

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RS40X	1-15v Variable	32A/40A max.	£189.00	D

### COAX SWITCHES

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CS201G2	2 Way N	DC-2GHz	1kW	£27.50	A

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CX-702	6m/2m/70cms Tribander	2.1m long	CA-50HR	6m Monobander 2.1m long
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#### COAX SWITCHES

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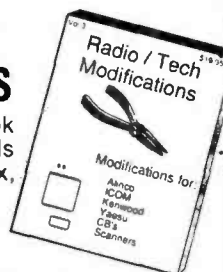
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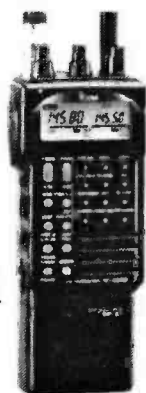
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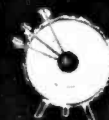
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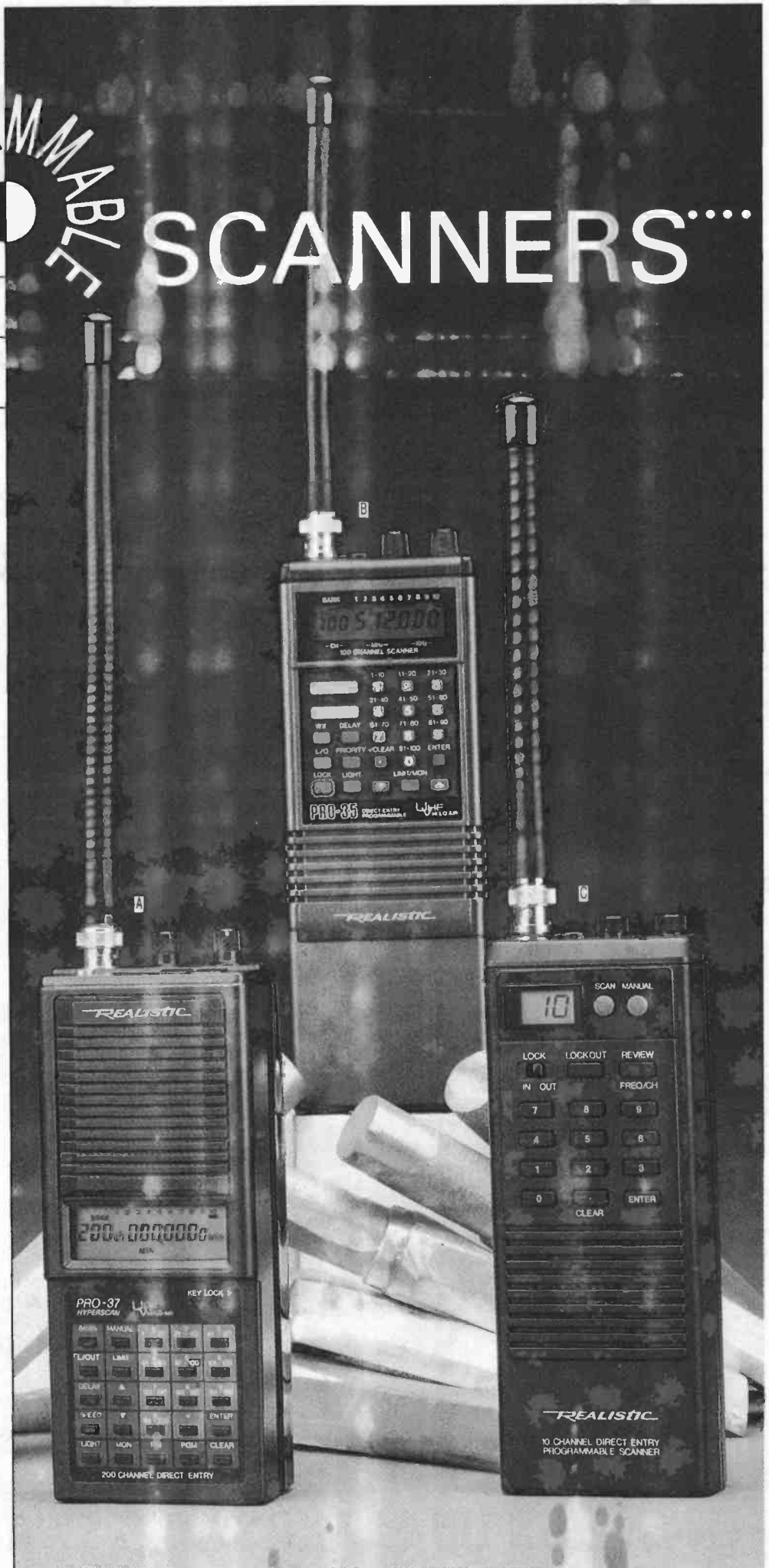
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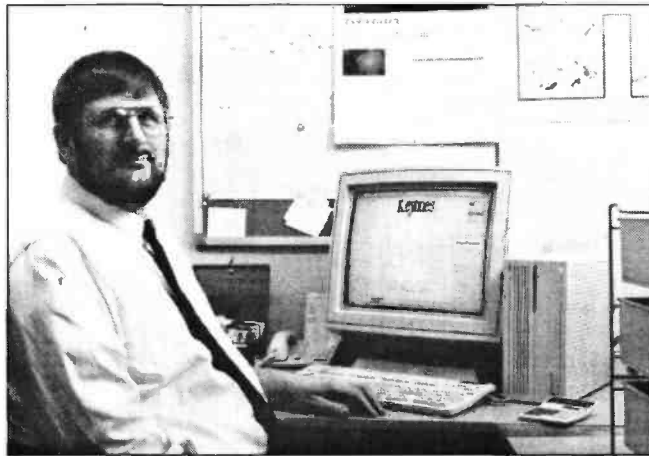


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# Keylines



Rob Mannion G3XFD

We've got a new competition for you this month, and like many facilities in today's world of electronics, it's interactive. Our 'Cartoon Caption Competition' allows you to have a bit of fun, make your own topical comment and provides a chance for you to win a prize into the bargain!

As usual, John Worthington GW3COI, our cartoonist, has come up trumps interpreting a topical subject. Before I explain though, why don't you look at the competition page and try and guess what the topical comment is this month. I don't think you'll have much trouble!

We're planning to run this competition fairly regularly and it will aim at a topic of interest to the radio hobby. If, like me, you are a keen *Punch* reader (my dentist keeps a goodly stock ranging from 1952 to 1972), you'll have seen their excellent cartoon caption competitions. The *PW* team is looking forward to your captions, whether they're acid, decidedly corrosive or just plain funny. So get writing NOW!

## A Testing Time

Exams provide more than a test of academic ability. They also try the patience, your good humour and nerves and help you remember things you never realised you'd absorbed.

Now and again though, the examinations themselves are called into question, as people realise that problems have been found. The recent high tide of interest regarding the Novice Licence introduction, left behind some interesting comment on the City and Guilds Radio Amateurs' Examination, as the initial flood of publicity receded.

It turns out that many operators, including me, realise that the Novice training course has touched raw nerves. Far from being a second best system, the Novice scheme has included some long-needed PRACTICAL training in the course.

In my mind, and others too as I've heard on the bands, the requirement for Novice trainees to receive practical training in conducting a QSO, is an excellent idea. Obviously, John Worthington's cartoon takes the idea to humorous extremes, but the basic idea surely makes sense?

## Proven Pilot

When I learned to pilot an aircraft myself, I eventually had to prove that I could apply the theory learned in the classroom, into a practical flight and safe landing (albeit rather bumpy!).

There wasn't a requirement to prove myself in a similar way with the RAE. Despite the fact that I had been

immersed in radio for quite a few years before I got my licence, I made some embarrassing mistakes when I first came on the air. For example, the late Jack Watts G2DSW very rightly gave me 'a right telling off' when I once used a semi-automatic bug key on 1.8MHz c.w. without key-click filter.

Dear, crusty old G2DSW knew instinctively that I'd not even remembered to filter the key. My key-clicks had been heard all over the band throughout Hampshire that evening. If I'd thought a little more about it, and had been shown the effect during training, the annoyance could have been avoided.

So, why can't we incorporate simple, practical tests into the RAE? As I've said, it's difficult to imagine the scene GW3COI's drawn for us, but at least the nearby carpenter would provide experience in carrying out a simulated QSO in the face of interference!

## Practical Tests

As I see it, RAE candidates would have to prove that they knew how to use an absorption wavemeter and tackle simple interference problems. The practical tests could be taken separately, and to save (us) money, could be overseen by radio amateurs themselves.

Having to undertake a simulated QSO, using 'phone

or c.w. or both, wouldn't be a problem either, because this aspect would have been covered in their course. Many readers have written to me on this point, and I've yet to see or hear anything against the idea.

My comments aren't meant to be taken as a criticism of the system. It's just that as our hobby matures and approaches its second century, to cope with the onslaught of modern technology (with all its weaknesses, whether it be originating or suffering from interference), we must adapt to survive.

## The Lad Himself

Editors often drop clangers, but how could an amateur radio magazine journalist forget the name Hancock! I did, and offended someone into the bargain.

I owe a sincere apology to George Hancock G1ZJH of Hull, who although shown in the picture (page 17, August *PW*) at the Dayton HamVention standing between Michael GONEE and Liz' GOJWN, wasn't even given the courtesy of a mention!

Sorry about that George, and I hope that your friends will now believe that you really did go, and that *PW* didn't intend to ignore you. Put it down to G3XFD's size 14 hobnails again!

## Leicester Show

I'm looking forward to meeting many of you at the 1991 Leicester show as I really enjoy the annual Granby Halls event. I've only missed one show. Last year, despite having moved QTH on the Friday (and not finishing the move until 2a.m. on the Saturday!), I was there on the second day.

This time, I'm planning to be there throughout the two days. So, please come along to the *Practical Wireless* and *Short Wave Magazine* stand. I'll look forward to chatting to you, and hearing your ideas, comments and criticisms. They're all welcome because we care. See you there!

73 DE

Rob Mannion

# Receiving You...

**Dear Sir**  
In reply to the 'Receiving You' column (September) and cartoons with captions as an extra competition. I have enclosed some of the old chestnuts which I enjoy.

**John Tye G4BYV  
Dereham, Norfolk**

**Editor's reply: John Tye's letter contained some delightful cartoons from the pen of John Worthington GW3COI. As from this month, you'll see that we're introducing a new competition based on a cartoon. The cartoon will reflect a topical issue involving the hobby, and be published with a caption. You then have an opportunity to comment (printable captions please!) on the topic via your caption, air your opinions in a humorous way and stand the chance of winning a prize! The first 'Caption Competition' pokes fun at the idea of introducing practical elements into the RAE (see 'Keylines'). We're looking forward to receiving your captions!**

Send your letters to the Editorial Offices in Poole, the address is on our contents page. Writer of the Star Letter each month will receive a voucher worth £10 to spend on items from our PCB or Book Services, or on PW back numbers, binders, reprints or computer program cassettes. And there's a £5 voucher for every other letter published.

Letters must be original, and not duplicated to any other magazines. We reserve the right to edit or shorten any letter. Brief letters may be filed via our Prestel Mailbox number 202671191. The views expressed in letters are not necessarily those of *Practical Wireless*.

**Dear Sir**

I read with interest the valve versus solid state debate. It brings back old memories of the 60s. Let's look at it this way, valves can, and do offer a very good performance for very little cost. Often, valves can be obtained from old equipment for next to nothing.

I do not agree with John Hey G3BDQ's opinion on the t.r.f. These receivers if properly built and operated, can give a superhet a run for their money, as far as signal-to-noise ratio is concerned.

It is better to separate the regenerator from the detector, by using an infinite impedance detector and separate Q-multiplier for regeneration.

I have developed a valved high-fidelity amplifier with the help of a friend, GM4FDT. It does not need an output transformer and so far it has left a top-of-the-range solid state amplifier standing! So let's not condemn valves, as they're useful devices and very rugged.

If there's a ghost of a chance that you print this letter please give donation to a good cause in amateur radio.

**Stuart Martin G6OHR  
Invergordon, Ross-Shire, Scotland**

**Editor's reply: A voucher will be sent to the Radio Amateur Invalid and Blind Club, on your behalf Stuart.**

**Dear Sir**

May I take this opportunity of thanking you for a first class magazine, but don't hang back!

By the way, in your review of the Cap.Co antenna switch (*PW* April) you talked about weather-proofing. What I do with my home-brew remote switches is to enclose the switching unit in an old ice-cream box.

I use the lid of the carton, suitably stiffened with an aluminium sheet on the outside surface, to provide the mounting plate. The box then fits on the box in the usual way as a cover.

So that the box can then 'breathe', I drill a few small diameter holes on the downward face. This allows air to circulate without letting the weather in.  
**Derek Holmes  
GW3JSV  
Welshpool, Powys**

**Dear Sir**

I first read *PW* during the last war. I believe the year was 1944, 47 years ago! The price was 4 old pence (two and a half new pence).

I remember reading F. J. Camm's article about TV and that it would not be possible to record TV pictures as we then recorded sound. I wrote a letter which *PW* published. In the letter I suggested TV pictures in the future would be recorded on a strip of metal fed through a pick-up at high speed.

The editor in the next edition dismissed this idea as nonsense, but I received a little book for my letter which explained about wire and wire gauges, transformers, etc.

I've enjoyed *PW* ever since then!

**Dennis Wood  
Saffron Walden  
Essex**

**Editor's reply: Thank you for your memories and loyalty Dennis. I hope you enjoy using your voucher, but don't wait for another 47 years before writing again! We would be pleased to receive more reader's memories to be used in the 60th anniversary *PW*, due to be published in the September 1992 issue.**

## ★★★★★STAR LETTER★★★★★

**Dear Sir**

I am writing to suggest that you have an article, or better still a series of articles in *PW*, concerning kits and their building. In the year or so since I renewed my interest in radio (dormant for 20 years!) I have greatly enjoyed reading *PW*, especially the constructional projects.

However, I have only ventured to build kits, it's certainly much easier than having to first buy all the separate components! I have purchased and built kits from about half a dozen different suppliers, most of whom advertise in *PW*.

To me the difference between a 'good kit' that is easy-to-build and works first time and a 'bad kit', are the instructions (or lack of them), a good p.c.b. with component positions printed on the upper side and no need for any test equipment (I have only a multimeter).

So how about a review of what is available and the 'pros and cons' of particular manufacturers/suppliers kits? Perhaps you should get someone with little or no kit building experience, to try to build each kit using only the instructions supplied. That would be most interesting!

Anyway keep up the good work at *PW* which I read every month and particularly enjoy, because it covers such an interesting and wide range of topics each month. I very much like the attractive, easy-to-read style in which everything is presented. It's much more readable and enjoyable than any of its rivals.

**Nick Hobbs G7IYG  
Uxbridge, Middlesex**

**Editor's comment: The *PW* team thank you for your kind comments Nick. It makes the hard work worth it! Your suggestion is a good one, and we hope to cover kits, kit building and what's available early in the new year. We've got some exciting new projects and ideas coming as the magazine enters its 60th anniversary year.**



## Services

### Queries

We will always try to help readers having difficulties with a *Practical Wireless* project, but please note the following simple rules:

- 1: We cannot give advice on modifications to our designs, nor on commercial radio, TV or electronic equipment.
- 2: We cannot deal with technical queries over the telephone.
- 3: All letters asking for advice must be accompanied by a stamped, self-addressed envelope (or envelope plus IRCs for overseas readers).
- 4: Make sure you describe the query adequately.
- 5: Only one query per letter please.

### Back Numbers & Binders

Limited stocks of many issues of *PW* for the past years are available at £1.65 each including post and packing. Binders, each holding one volume of *PW*, are available price £4.50 each (£1 P&P for one, £2 for two or more).

Send all orders to the Post Sales Department.

### Subscriptions

Subscriptions are available both for the UK and overseas. Please see current issues for the latest prices.

### Constructional Projects

Each constructional project is given a rating to guide readers as to its complexity.

**Beginner:** A project that can be tackled by a beginner who is able to identify components and handle a soldering iron fairly competently.

**Intermediate:** A fair degree of experience in building electronic or radio projects is assumed, but only basic test equipment is needed to complete any tests and adjustments.

**Advanced:** A project likely to appeal to an experienced constructor and often requiring access to workshop facilities and test equipment for construction, testing and alignment. Definitely not recommended for a beginner to tackle on their own.

Components for our projects are usually available from advertisers. For more difficult items a source will be suggested in the article. Kits for many of our recent projects are available from CPL Electronics and FJP KITS, both of who advertise in the magazine. The printed circuit boards are available, mail order, from the Post Sales Department.

### Mail Order

All *PW* services are available Mail Order, either by post or using the 24hr Mail Order Hotline (0202) 665524. Payment should be by cheque (overseas orders must be drawn on a London Clearing Bank), Access, Mastercard or Visa please.

### Wireless Line

This is an information service for the radio enthusiast, updated each Friday. Calls cost 48p per minute peak time and 36p per minute off-peak. The number to ring is: (0898) 654632.

### Dear Sir

I see that the 'Receiving You' column has not received any letters in support of Mr Mitchell EI5GQ. May I, as a 'listener' offer my humble, unlicensed views?

I have been listening to short wave broadcast stations for some nine months now and contribute regularly to the 'LMS' column in your sister publication *Short Wave Magazine*.

Recently, I became interested in listening to the amateur bands on h.f and 144MHz. As part of my job I regularly use v.h.f. radio. My main source of 144MHz QSOs

for listening are from the two London repeaters GB3SL and GB3EL.

I find that the standard of QSO for on h.f. far exceeds that of the 144MHz. The r.t. discipline on h.f. I find to be almost 100% correctly applied, with callsigns regularly given and the content of each persons QSO informative and knowledgeable.

Unfortunately I find that a large proportion of the 144MHz activity is foul mouthed, lacking in interest and severely lacking any semblance of r.t. discipline or procedure.

I don't think that

144MHz repeaters should be closed down, but that the elder statesman of the amateur fraternity should take the time to educate the younger ones in the correct ways and traditions of a wonderful hobby. Perhaps the RAE instructors, who do such a wonderful job, might consider this point.

A gun is only sold on production of a licence. How about this for radios? It would be simple to operate and should pose no problem for genuine amateurs. I shall now sit back and see if this is published.

If it is, I'll live in fear of being boxed in by irate 144MHz mobiles on the M25!

**Ron Galliers  
Islington  
London**

**Editor's comment:  
The correspondence  
resulting from  
EI5GQ's original  
letter is now closed.  
Let's get on with  
being responsible  
radio amateurs,  
whether it be class A  
or B, Morse or no  
Morse, h.f. or v.h.f.  
repeater or no  
repeater. It's all the  
same hobby!**

### Dear Sir

Reference the articles you print in *Practical Wireless*. Considering that 934MHz CB is a minority group, you write mainly with that allocation in mind, in fact 75% of your article deals with it each month.

The 27MHz CB service is hardly mentioned, but that's where the bulk of the CB population is. Why not give a little more print to the many and less to the few?

Thank you for an otherwise good service.

**W. Butcher, Leeds, Yorkshire**

**Editor's reply: Mr Butcher's letter was originally written to the 'CB High & Low' contributor, but in this case I think it's better to publish it in 'Receiving You'. Our CB contributor 'Quaynotes' tells me that the percentages quoted reflect the feed-back from readers. However, we look forward to receiving readers' comment on Mr Butcher's suggestion.**

## New Caption Competition

Could the RAE ever be like this? Worthington our cartoonist has shown what he thinks a 'practical' test in the RAE could be like, when it's taken alongside other City & Guilds subjects. All it needs is a suitable caption. So, send in your entry whether it be humorous, slightly acid, or decidedly corrosive - it could win you a prize and give you a chance of voicing your opinion into the bargain!



Write your caption here.

**The winner will receive a year's subscription, and the two runners-up will be awarded six month subscriptions.**

Send your entry to (photocopies acceptable with the flash below): PW Publishing Ltd, November Caption Competition, Enecfo House, The Quay, Poole, Dorset BH15 1PP. Closing date Friday 22 November 1991.

The Editor's decision will be final, no correspondence will be entered into.

## Ramsey Kit Tranceiver

The Ramsey 144MHz f.m. synthesised transceiver kit is the ideal starter rig for mobile, base and packet radio (it even has a dedicated packet connector). The FTR-146 kit features six expandable diode-programmed channels, 5W r.f. output, sensitive dual-conversion receiver and easy assembly. This kit comes complete, except for the case, mike and speaker, although Ramsey do their own case for a professional finish.

The FTR-146 Kit costs £129.95, with the FTR-146-C case and knobs set at £24.95.

**Raycom Communication Systems Ltd.**  
**International House**  
**963 Wolverhampton Road**  
**Oldbury, Warley**  
**West Midlands B69 4RJ.**  
**Tel: 021-544 6767.**

## Digital Audio CQ Call

Digital techniques have come to the contest operator. Store your 'CQ contest' call digitally and use it to control your rig next field day. The DL100 Digital CQ Loop, manufactured by CMR Audio, stores up to 20 seconds of audio, to be used in contest or for testing purposes.

Fitted between the microphone and transceiver, it offers a transmit-wait-transmit cycle, allowing the operator to listen in the adjustable wait period. A built-in tone gives a more constant level tone for tuning up. A quick and simple record function allows any operator to record his or her own voice, so reducing the confusion for the answering station. Other lines allow control of external units such as p.a. or pre-amp.

The Digital CQ Loop is priced at £147.50, which includes post & packaging, and you can get more information from:

**CMR Audio, 40 Felton Road**  
**Parkstone, Poole, Dorset BH14 0QS.**



## The G4TYF Log

Ernie Aston G4TYF has produced the latest update to his 'G4TYF Log' program, adding many new facilities to the amateur radio logging program. Starting life for personal use, it has now been rewritten for the Commodore, C64 or Amiga, the BBC B or for

the IBM PC (or clone).

The full version costs £25. If you would first like to see a free demonstration, for any of the above machines, send a suitably-sized s.a.e. to:

**Ernie Aston G4TYF**  
**64 Gurney Valley**  
**Bishop Auckland**  
**DL14 8RW.**  
**Tel: (0388) 607500.**

# Newsdesk '91

## Jurby Community School

Between June 24 and 28th, teachers and pupils of Jurby Community School held an indoor camp at Ardwhallin Outdoor Pursuit Centre, West Baldwin on the Isle of Man.

Visits to the Manx Museum and Cregneash Village Folk Museum were among their many educational visits, but one special highlight of the trip was a visit to Ardwallin, to see Denys Hall GD4OEL, the Isle of Man Scout and Guide adviser.

Denys set up a special event station with the callsign GB2MSR, and the children were thrilled to hear him contact a large number of countries around the world. He explained all about amateur radio to the pupils, and how the station was set up. He showed how the antennas worked, all about QSL cards and how amateur radio can make you friends all around the world.

The teachers and pupils of Jurby Community School expressed their gratitude for the time and trouble he took to put the station on the air.



**Jurby Community School visit Denys Hall GD4OEL.**

## German ATV Convention

The German ATV club (AGAF) has invited all ATVerS to attend their 23rd ATV convention in Cologne, on October 26/27th. A fabulous programme has been laid on, highlights including: fleamarket; scanner van; live presentation of ATV; demo of multi-media transposer DB0KO; stereo picture transmission over ATV; touch-tone remote control of repeaters and a charcoal grill evening in the Pingen forest with cutlets, roast sausages and real ale from the barrel!

Anyone interested in going, should send three 1st class stamps for an information pack to **Andy Emmerson G8PTH, 71 Falcutt Way, Northampton NN2 8PH.**

## j.Com

If reading the fine print has reduced the number of QSL cards you're sending out, you'll be glad to hear that there's now a better way from j.Com of Ben Lomond, California. This company is now supplying the HamBase™ database and retrieval software.

Owners of IBM PC compatible and Macintosh® personal computers, can access the entire database of information on over 500000 radio amateurs. The software searches all of the data for the desired callsign in a fraction of a second, and immediately displays the address on your computer screen.

If you have a hard disk drive, the data files are easily installed and access to the data is virtually instantaneous. Even if you don't have a hard disk, you can still use the HamBase program. The program will even accept a text file list of callsigns as input, effortlessly producing labels for clubs, hamfests and dealers.

The HamBase program is available for the PC on 17 5-1/4in 1.2M diskettes at \$69.95 and 14 3-1/2in 1.44M diskettes at \$79.95; or on 25 800k Macintosh diskettes at \$79.95. HamBase may be purchased at your local amateur radio dealer, or directly from **j.Com, PO Box 194, Ben Lomond, CA 95005 California USA.**

Purchasers of the 1991 version will receive a coupon worth \$20 when purchasing the 1992 HamBase available in January.

## The Vityaz Award

The Museum of The World's Ocean in Kaliningrad, Russia, is now issuing the Vityaz award, to commemorate a famous series of oceanography ships that bore the name. Each of the ships made valuable contributions to research in the world's oceans, and the third *Vityaz* sailed until 1979. The ship is now moored near the centre of Kaliningrad on the banks of the river Pregol.

The awards are printed on silk pennants depicting each of the ships, the corvette *Vityaz* 1862-82, her successor which sailed from 1886-93 and the last research ship which worked between 1947-79. The pennants also record the countries and areas visited by each vessel. All radio amateurs and s.w.l.s can obtain the award, and contacts dating from 1979 are eligible.

There are no band or mode restrictions and the award organisers ask that only lists, **NOT QSLs**, are sent, although they reserve the right to ask for QSL checking. Cost of the award is \$10 or equivalent. Further details on the three separate award pennants and rules can be obtained from: **B. V. Osmak UA2FO, Awards Manager, c/o S. G. Sivkova, Director of the Museum of The World's Oceans, Kaliningrad, Russia.**

## BARTG News Alive And Well

BARTG news is still broadcast on 144.600MHz, on the 1st and 2nd Sundays of each month Robert Andrews, the BARTG's News Editor, is always on the look-out for any reports and articles of data orientated subjects for inclusion in the GB2ATG news broadcasts. All articles and reports, etc., received by him, will be acknowledged by a QSL card and logged.

**Robert Andrews G1JZJ  
52 Lindridge Road  
Erdington  
Birmingham B23 7HX.**

## Orkney Wireless Museum

Orkney Wireless Museum was founded in April 1983 by the late Jim MacDonald GM8BFG, after a lifetime passion in working with and collecting all things electrical. The museum is essentially a local collection, and it attempts to capture the evolution and swift passing of an intriguing era.

Orkney's wartime electronic history is strongly represented in the Museum, together with wireless in the Orkney home, both pre and post war.

The founder died in April 1988, before he could enjoy the fruits of his work in retirement. But his family were determined his work and collection wouldn't be lost, and a Charitable Trust was set up in June 1990.

Many people have donated items with an Orkney connotation for the collection and in view of the interest 'A Society of Friends of Orkney Wireless Museum' was established on 29 June 1991 with an annual subscription of £3. Contact The Secretary, **Peter MacDonald, 9 Quoybanks Place, Kirkwall, Orkney KW15 1JQ.**

# Newsdesk '91

**Margaret Klinowska of Cambridge University and Dick Bond of Racial Recorders, with the dolphins Neptune and Juno in action!**



## Supporting Research To Stem Dolphin Deaths

Developing a technique to prevent the deaths of vast numbers of dolphins and small whales each year, which become entrapped in fishing nets in many of the world's oceans, has proved to be an immense challenge for leading scientists around the world.

Windsor Safari Park's dolphinarium, however, recently played host to a team of researchers from Cambridge and Loughborough Universities, who are well on the way to success in meeting this challenge.

The project leaders are Dr. Margaret Klinowska of Cambridge University's Research Group in Mammalian Ecology and Reproduction, and David Goodson from Loughborough University's Electronic and Electrical Engineering Department. They are supported in their work by Racial Recorders, the Dolphin Centre Flamingoland in North Yorkshire, and Windsor Safari Park.

The research so far has covered the collection and analysis of data on dolphin behaviour patterns, particularly in relation to the animal's sonar use when pursuing prey. The team have been observing how the dolphin receives returning, reflected sonar signals - a crucial factor when considering the fishing net hazard.

Both captive and wild dolphin studies provide important data, and in the latter case, the team has been studying the uniquely useful Atlantic bottle-nose dolphin - Freddie the Amble dolphin off the Northumberland coast of North East England, being the most famous of these.

The dolphin uses a region below the nasal plug to produce 'clicks' of ultra-high frequency. These are focused by the large head area known as the 'melon' and targeted towards the dolphin's prey, which is likely to be a fish at a distance of up to 80m.

The high frequency echo reception from such a target is now known to involve the lower jaw and may exploit the teeth, whose function could be similar to that of a transducer array. This gives range and direction information to the dolphin as it homes in on the target.

Combined with studies into the underwater characteristics of net sounds, the team hopes to gain a better understanding of how a dolphin perceives nets when swimming (or why it doesn't, as seems to be the case), so that an effective solution to one of the major causes of dolphin mortality can be eliminated.

**Racial Recorders Ltd.  
Hardley Industrial Estate, Hythe, Southampton SO4 6ZH.**

# Newsdesk '91

## The Art of Operation



Shown here is Nicola Harman, operating under her Novice callsign 2E1ABQ, on the morning she received her validation document. Her operating style was very good indeed, and among those she contacted were G4GGC/M, G0PAO/M and G7HMF.

## Cardiff RAE Course

There's an RAE course at BT (Wales) ARS, BT Headquarters, Coryton, Cardiff. Enrolment night for the next course will be on Tuesday 22 October. For further details, please call **Graham GW3BUT on (0222) 628430 office hours.**

## Scottish Tourist Board (RA) Expedition Group

Full lists of events, award details and an information pack on the Scottish Tourist Board Expedition Group, can be obtained from **Paddy GM3MTH, tel: (0236) 40495**, on receipt of two second class stamps or one dollar.

**PO Box 59  
Hamilton  
Scotland ML3 6QB.**

## G QRP Club Mini Convention

The Northern Gathering for G QRP Club members is here once again. On Saturday 19 October, from 10am to 5pm, at St. Aidan's Church Hall, Manchester Road, Sudden, Rochdale, Lancashire.

Among the attractions are: a full lecture programme, bring/buy/swop stall, component and kits sales, equipment display, food and drink and Mr Salaway's famous meat pies! Admission £1. Talk-in on S22 from 9am. Bring your items to sell or swop, from equipment to just junk. Bring your home-built equipment for display and discussion.

Two guest speakers this year: Peter Dodd G3LDO, author of the new *The Antenna Experimenter's Guide* on antenna matters and David Stockley (Hewlett Packard) *Amateur Radio Any Questions*, ask any technical questions!

Accommodation in the same road as the mini-convention: 'Tudor House' B&B Guest House, Catherine Traynor (0706) 861103; 'The Midway Hotel' (0706) 32881; 'Norton Grange Hotel' (0706) 30788.

More details from the **Rev. George Dobbs G3RJV, QTHR.**

## Open Night

On Wednesday 30 October, Glenrothes & District ARC have their annual Open Night at The Crown Hotel, Thornton, Fife, 7.30pm. A speaker will give a short talk on items of common interest and entertainment. Club awards will be presented. A knife and fork meal will be served and there's a Bring & Buy. All the usual hotel facilities will be available to those attending. More details from **John Hardwick GM4ALA on (0592) 742763** outside office hours.

## Free From Switzerland

Swiss-based **Ascom Radiocom Ltd.**, have produced a **FREE** publication *The Radio Communications Glossary*, which can be obtained direct from their Zurich headquarters. The glossary provides answers to questions such as: 'What is radio transmission, what determines its characteristics and limits, and what effects do radio transceiver specifications have?'

This new edition of the glossary provides an introduction to the basic terminology, and the most commonly used expressions employed in radio and it can be obtained direct from: **Max Flick of Ascom Radiocom Ltd., Kommunikationstelle, Feldstrasse 42, CH-8036 Zurich 4 Switzerland.**

## Arrow Radio On Target

Chelmsford-based Arrow Radio Ltd., are on target to make a big impact at the 1991 Leicester Show. The company are planning to show the new Telex Contester Headset, and almost the full range of Daiwa equipment including the range of antenna tuners - including a 50MHz model.

Arrow plan to show their range of Comet antennas, and the company claim to be showing 82 different Comet products. The company are also to start distributing the antenna tuners, dummy loads, v.h.f. and h.f. antenna analysers made by MFJ Enterprises of Mississippi, USA. **Contact Arrow Radio on (0245) 381626.**

## Alinco Introduction

Alinco have announced the introduction of their first scanning receiver. It is hoped that the first shipments will be made at the end of October or early November. Designated the DJ-X1, it comprises a very compact design measuring only 110x53x30mm, thus making it one of the smallest models available. Frequency coverage is from 500kHz to 1300MHz without gaps. It has the widest number of programmable steps ever to be made available: 5/9/10/12.5/20/25/30/50/100. Modes include a.m., n.b.f.m. and w.b.f.m. and sensitivity is claimed to be unsurpassed. Price has not yet been announced but it promises to be highly competitive!

For those needing details, a phone call or letter will bring full technical details to customers.

**Waters & Stanton Electronics  
22 Main Road  
Hockley  
Essex SS5 4QS.  
Tel: (0702) 206835.**



## RN Electronics

A 1.3GHz transverter with 144MHz drive is the latest item in the RN Electronics range of professionally designed equipment. Visit them at the Leicester Show on Stand 58.

# Newsdesk '91

## Practical Wireless 144MHz QRP Contest 1991 Overall Results

Pos.	Callsign	Points	Pos.	Callsign	Points
1	GOMCG/P	11808	47	GW20P/P	832
2	G8TFI/P	8769	48	G8DDY/P	803
3	G7APD/P	7350	49	G7EKH/P	741
4	G1NUS/P	6832	49	G0NZI/P	741
5	G3UAX/P	4888	51	G0MQW/P	730
6	G0GXT/P	4475	52	G7GAB	715
7	G4RLF/P	4008	53	G0JDA/P	672
8	G1ORC/P	3860	54	GW30IN/P	663
9	G0CLP/P	3322	55	G6YZR/P	588
10	GW1KN/P	3173	56	G3BPK/P	550
11	G4SRS/P	2560	57	G0OSH	504
12	G4RSE/P	2400	57	GM4UYZ/P	504
13	G0GRI/P	2363	59	G10EJN/P	494
14	G0HAS/P	2346	60	G0LAR/P	480
14	G60OD/P	2346	61	G0MRZB/P	477
16	GM4CAA/P	2310	62	G4SLH/P	448
17	G1SAS/P	2286	63	G1POS	430
18	E13GF/P	2046	64	G3MAE/P	390
19	GW1HGV/P	2034	64	G14OWA/P	390
20	G00GS	1803	66	G7DJK	383
21	GW5RS/P	1800	67	G8ESJ/P	380
21	G4WGE/P	1800	68	GW4LV/P	351
23	G00VA/P	1744	69	G1TAI	342
24	GW0NWR/P	1683	70	G6HH/P	320
25	GM1FML/P	1680	71	G1CEI	306
26	G0FUW/P	1540	72	PA3EKK	300
27	GW7HMV/P	1440	73	G1MZD	288
28	G00CE/P	1392	74	G7HIA	256
29	G2TD/P	1368	75	G0HRW/P	246
30	GW6ORE/P	1328	76	G7EYA/P	224
31	G1JGE/P	1224	77	G1MRZ/P	222
32	G1JOP/P	1156	78	G0MWW/P	192
33	G0PCX	1148	79	GM3DS	190
34	E16ARB/P	1140	79	G7FDC	190
35	G2HR	1111	81	PE1EWR	180
36	GW8ZRE/M	1072	82	GW7BOY	174
37	G7FOX/P	1027	83	G7HME	160
37	G4TSW/P	1027	84	G1THG	147
39	G0JKD/P	1001	85	G7GEE	138
40	G4ARI/P	994	86	G6NUO	133
41	G1DPL/P	984	86	G7DOE	133
42	G1APV	969	88	G17FGQ/P	96
43	GX4AAX/P	950	89	G4BPJ/P	28
44	GW2FOF/P	913	90	GM7IFS	24
45	G7DNM/P	900	91	G2DHY	12
46	GW4ARC/P	860	91	G8BMV/P	12



### The Antenna Experimenter's Guide

Peter Dodd G3LDO, has been licensed since 1956. He served with the Royal Air Force where one of his tours of duty took him to East Africa, where he operated as VQ4HX and VQ1HX. After leaving the RAF he worked in Sierra Leone as the police force communication officer and operated as 9L1HX.

Of the many facets of Ham radio, he still finds experimenting with antennas the most fascinating. Experimenting with antennas, however, can be a frustrating waste of time, unless means are available to measure their performance. The r.f. measuring equipment need not be expensive if you build it yourself.

Peter has written and published a book called *The Antenna Experimenter's Guide\**. Much of the book is devoted to construction of test equipment, and how it can be used to measure antenna performance. The book also includes material on antenna and mast construction. There is also a chapter on antenna analysis using computer software such as MN.

**Peter Dodd on (0903) 770804.**

\**The Antenna Experimenter's Guide*. Now available from the PW Book Service.

### Chassis-Style Cases

Minffordd Engineering have recently introduced a new range of cases, which should come in handy for those of you who build receivers, transmitters and power supplies.

These cases feature an integral aluminium chassis, which can be mounted between the front and rear panels at any desired height.

Four 4mm holes are located in the chassis rim. Four matching holes are then drilled at the chosen height in the two panels. The three parts can then be assembled, with the four screws and nuts provided, into a U-shaped or H-shape section.

Around this, the pvc-coated steel top and base covers fit, and are finally secured by the eight self-tapping screws provided.

At present the cases are available in three sizes, although they will be happy to quote for cases to the customer's chosen dimensions.

All enquiries to:  
**Minffordd Engineering**  
Sun Street  
Ffestiniog  
Gwynedd LL41 4NE.  
Tel: (0766) 762572.

### BBC Engineering Information

From now on, the BBC will be using the Engineering Information page on Ceefax - Page 698 - to inform you about current transmitter activities. This is currently available from 6am to 6pm every weekday and all day at weekends.

If you have an enquiry about BBC Engineering that concerns your area, you may obtain additional information by writing or phoning to their enquiry office:

**Engineering Information**  
**BBC White City**  
201 Wood Lane  
London W12 7TS.  
Tel: 081-752 5040 (during office hours).

### Briticent International Ltd.

New from Briticent is a range of twin-line and mono-line sockets, made from a rubberised or toughened nylon.

The sockets feature a fully shuttered outlet with the main body sealed for safety. Both ranges are rated to 13A/250V and are available in black or white.

Conforming to BS1363, both twin-line and mono-line sockets may be supplied complete with plug and extension lead. Leads may be standard cable in 2 or 4m lengths, or curly cable in 2.5 or 5m lengths.

For further information, contact:  
**Bill Stanley**  
**Briticent International Ltd.**  
Crow Arch Lane  
Ringwood  
Hampshire BH24 1NZ.  
Tel: (0425) 474617.



### David's First QSO

Here you can see David 2E0AAB putting out his first QSO from home, to his dad Alan Hull G0KYD. An historic moment for both dad and David, since dad was also the Novice course instructor. It really made dad's day!



## Alinco DJ-F1E Hand-Held Transceiver



*Tex Swann GITEX, likes a challenge. So, when the editor asked if he'd like to have a look at this feature-packed hand-held transceiver, Tex took one look at the specifications, and started work!*

### The Alinco DJ-F1E hand-held transceiver with its associated battery-charging units.

I was looking forward to reviewing the Alinco DJ-F1E hand-held transceiver, and wondered how different it would be from the last hand-held I'd tried. On opening the box, I was surprised that it was much smaller than I had imagined.

In front of me was a smart charcoal-grey hand-held, somewhat smaller than my hand. In the middle of the rig was a small l.c.d display, that seemed hardly bigger than a digital watch.

Under the display was a matrix of sixteen off-white buttons, looking slightly like a small calculator. Each of the buttons had at least two annotations, marked in two colours and they illuminate for night-time use.

### More Buttons

The speaker grill in the top half of the rig, had a further six light grey buttons surrounding it. All of these, bar one, again had two functions.

The top panel had three controls. A rotary switch is used to set frequency, memory or other variable quantities. The combined volume control on/off switch, was concentric with the squelch control. Finally on the top panel, was an BNC antenna connector with a helically wound antenna, colour-matched to the rig.

There are three further control buttons to be found. These are on the slight protrusion on the left-hand side of the set. A p.t.t. switch, with another, smaller switch directly underneath, engages the repeater tone access

and the p.t.t. function. Above this pair, there's a slightly differently shaped function switch, used to activate the second function of all the other switches.

### Extended Receive

I was particularly interested in the extended receive capability of the DJ-F1E. The handbook claimed that the set would cover 118 to 136MHz in a.m. mode.

This band 118-136MHz is used extensively for aircraft communication. I live only a few miles from a regional airport, but nevertheless it's quite busy. I find it fascinating to listen on these frequencies, even when I'm doing other other things.

A quick skim through the handbook, gave me an idea of the facilities available in this small rig. The manual specifications suggested the rig had a sensitive receiver.

The receiver is paired with a transmitter capable of producing 5W of r.f. in the 144MHz band, if it's fed from 13V or an optional battery pack. Immediately captivated, I took the set into the *PW* workshop to try it out.

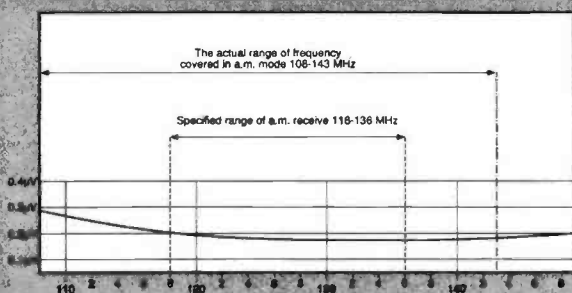
### Sensitive Receive

The receiver was indeed sensitive, and the results from my tests are set out in Fig. 1. The rig achieved well within the claimed  $-15\text{dB}\mu(0.18\mu\text{V})$  over the whole 144-146MHz band.

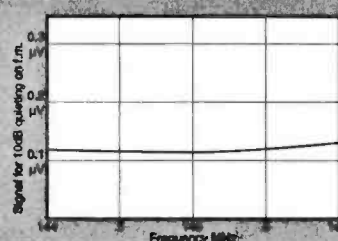
The receiver features dual conversion i.f.s of 23.05MHz and 455kHz, and gave a clean received signal. I also found the audio to be very clear and clean. This is rather surprising when the small size of the built-in loudspeaker is considered.

On switching the DJ-F1E into the extended receive mode, I was very surprised to find that it covered far more than the claimed 118-136MHz. I was able to tune the set from 108 to 143MHz.

The sensitivity was fairly constant over the whole of this range. However, there was a small 'fall-off' towards the lower frequency end, as shown in Fig. 2. This drop in sensitivity was measurable on the test equipment, but I doubt that it would be noticed in actual use.



**Fig. 1: Sensitivity of the DJ-F1E within the 144MHz band.**



**Fig. 2: Sensitivity over the air-band, extended receive coverage. Note that the coverage extends beyond the specified frequency coverage. The level shown is for a 10dB S/S+noise with a an amplitude modulation of 50% from signal source.**

## Remarkably Easy

Using the transceiver's controls proved to be remarkably easy. In normal use, the frequency could be set by one of two methods.

For small adjustments around the frequency shown on the display, adjustment of the rotary control caused the tuning steps to move up or down in frequency.

The tuning rate could be set to 5, 10, 12.5, 15, 20 or 25kHz steps by selection (using the rotary control again). The small labelled buttons, can also be used for direct entry of frequency if you want to tune over a large range.

There is no <Enter> button, so the full frequency must be entered. The rig then flips to this new setting, as soon as the last digit is entered.

The third method of frequency setting, is to use one of the 40 memories to hold a channel frequency. As I found out later, it may also hold an extended receive frequency setting. But more on that later.

## To Work

Enough of this dry and dusty laboratory waffle! How did it work? I can imagine you asking.

Frankly speaking, it was very easy to get to grips with this little rig. The l.c.d. screen, which I had originally thought to be very small, proved to be very easy to see and use.

I've reproduced the screen layout, to show just what is to be seen on the display. There are 23 areas on the screen. These are laid out around the main frequency display, and all are easy to read in spite of the small size.

Although the display was good, I found that in poor light, those items on the right-hand side did seem more difficult to see quickly, when I was using the in-built green illumination.

## Month's Loan

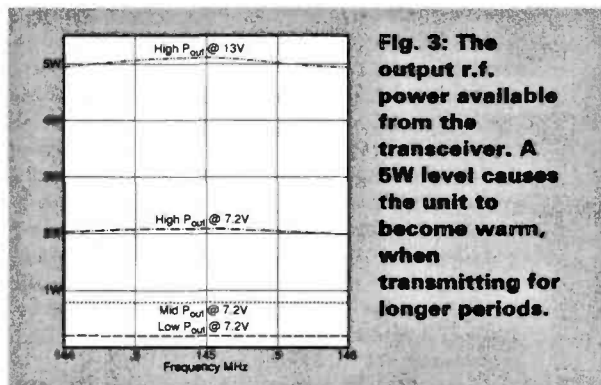
I used the set over the period of about a month. I found it to be as easy to use as my other portable rig, but a fraction of the size and weight.

There's one strange effect brought about by the set's small size, as the transceiver appears to be heavier than it actually is! On first picking up the DJ-F1E it seemed to be heavier than my Kenpro KT-44, although it's very much smaller.

So, I weighed them on the office postal scales to compare weights. The Alinco was actually about 100g lighter. Which just goes to show how easily you can be deceived by size!

## Other Bands

I'd tried it on the amateur band, but how was it going to measure up as a scanning v.h.f. receiver? The



answer, is that it performed very well.

The rig gave a performance equal to that of my home-base scanning receiver. Even on the in-built helical antenna, sensitivity was more than adequate to pick out the various frequencies in use by Hurn (Bournemouth) about 20km away. When I re-set some of the memories, I was even able to hear the Channel Islands' airports radio traffic.

The more I used it, the more interested I became. Not only was it a splendid amateur transceiver, but it also doubled as a very creditable scanning v.h.f. receiver, covering the a.m. air-band and the v.h.f. f.m. band from 136 to 174MHz.

## Storing Frequencies

The DJ-F1E has 40 memories, able to store a frequency and the reception mode. So it's possible to enter the frequencies you use most, not forgetting the local (or not so local) amateur repeater, or calling channel.

There are two further memories which are used in scanning mode. These set the upper and lower edges of the band to be scanned. So you can have 40 memories scanned, using either mode of modulation.

In v.f.o. control mode, you can scan a smaller band of frequencies, set by the additional two memories. As the receiver passes through the MHz point, it emits a pair of dual audio tones, low/high when going up and high/low when it's going down. When the 500kHz point is passed, the receiver emits a single tone.

Other scan facilities include a timed, rather than a 'busy' stop and automatic power-off, if the rig is inadvertently left on, with no received signal. This facility may be turned on or off. It can also be programmed to switch-off the rig at times varying between five minutes and one hour, in five minute steps.

## Memory Setting

Setting of the memories proved to be easy, quick and simple. Stepping to the required channel number was equally easy. This can be done by the rotary control, up/down stepping, or by direct keyboard entry.

In amateur use the repeater offset was set at 600kHz, but it could be set above or below the received frequency. The DJ-F1E can also be used on split frequencies.

In the split-frequency mode the set receives on the currently displayed v.f.o. frequency, with the transmission on the currently selected memory frequency. This includes listening anywhere within the range covered by the receiver, but allowing transmission in the amateur band only.

## Priority Channel

A priority channel facility is included. This facility allows a 10:1 (5s to 0.5s) watch to be kept on two frequencies, with either the v.f.o. or the selected memory

**The remarkably small size of the DJ-F1E is made even more apparent when the unusual full-length, rear-mounting batteries are removed.**

# REVIEW



channel being given priority.

In both cases, if the secondary channel is activated, a warning beep is sounded. This may also be extended to the calling channel.

A 'watch' is kept on the calling channel for five seconds, and then there's a 0.5 second switch to check the v.f.o. frequency. Again, there's a bleep provided as the alerting signal.

If you transmit in the 5s period, priority scanning resumes after release of the p.t.t. Transmitting within the 0.5s period stops the priority scanning. Additionally, the priority scan facility may even be used during normal limit or memory scan.

### Squelch Control

The squelch control is concentric with the audio volume control knob. This also works when the set is tuned to the aircraft band, or to the extended f.m. band of 136-174MHz.

A secondary control, the 'sub-audible tone' squelch, is fitted. In this mode, a low-level audio tone in the range 67-250.3Hz is transmitted at the same time as the required audio. At the receiving end, this tone is used to open up the other squelch to allow the received audio to be heard.

This technique is little used in Europe, but is sometimes used on repeaters in other countries. There are 38 sub-audible frequency settings in this facility.

An enhancement of tone squelch is the 'DSQ' or tone-paging function. In this mode, a series of dual-tones, similar to those found on modern d.t.m.f. (dual tone multi-frequency) telephones, are transmitted before each 'over'. And in fact there's a facility for this on the system although it's not fitted as standard, and requires the optional EJ-12U board (costing £35) to function.

There are two types of code. There's 'group code', a three-digit code common to all members of a group. The other is 'own code', a three-digit code that is particular to only one person. Each person is able to choose or change his own code.

If the group code is used, then all members of the group are alerted, and their units will automatically activate.

The d.t.m.f. system, fitted as standard on the transceiver, is also useful to transmit the 'digital message'. This is a two character message which may be sent, with reasonable security to other units. But don't forget that any of the QSOs made using this facility, will be heard on a non-equipped rig. In other words, you can't regard it as a 'secure' system in the full meaning of the word.

### How It Comes

The DJ-F1E was supplied with an helically wound antenna, a belt-clip fixing and a wrist loop. Also standard is the EBP-16N battery pack of 7.2V, 700MAH nominal capacity. They also supply a battery charger into which the unit, or the battery alone, is plugged.

I have one small 'niggle' regarding the charger unit. The unit I had, was supplied with a fixed American-type plug and a European adapter. Although this form of plug seems to be fairly common on imported equipment, as such, it wouldn't fit into a normal UK three-pin socket. (Waters & Stanton report that they have suitable adaptors available, price £2. Editor).

To provide higher outputs the battery pack EBP-18N, a 12V 500mAH unit, is available as an optional extra. With this pack the rig will produce up to 5W of r.f. There's also a dry cell battery case, which I'm sure will be rarely needed.

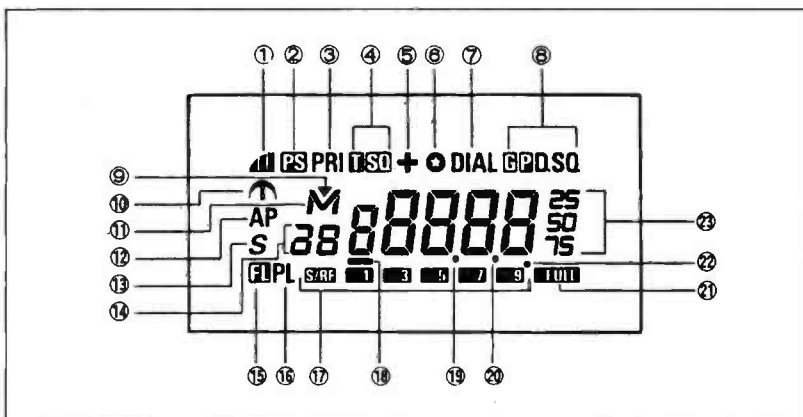


Fig. 4: Details of the comprehensive l.c.d. display from the transceiver.

### Specifications

<b>Physical Size</b>	110 x 53 x 37mm with standard supplied battery pack, and excluding the antenna
<b>Weight</b>	395g including helical antenna.
<b>Transmitter Frequency</b>	144.005-145.995MHz
<b>Power out</b>	High/Medium/Low 2W/ 1W/ 0.1W nominal with standard battery pack (see the r.f. power chart)
<b>Offset</b>	Nominal ±600kHz (See text for full range of settings)
<b>Receiver Frequency Coverage</b>	
<b>Air-band</b>	118-136MHz (actually 108-143MHz) for sensitivity see the Air-band receive chart
<b>Extended Amateur</b>	136-174MHz see the extended receive chart.
<b>General Modulation</b>	Transmit 144-146MHz f.m. Receive 108-143MHz a.m. Receive 136-174MHz f.m.
<b>Loudspeaker</b>	8Ω
<b>Microphone</b>	electret type
<b>Operating voltage</b>	Nominal 7.2V, (6-13V range allowed)
<b>Memories</b>	40+2, storing frequency, offset and mode
<b>Antenna</b>	50Ω BNC fitting on top panel

### Summary

Although I'm running the risk of seemingly only cataloguing the features, I suppose in many respects it has to be so. There are so many available on this tiny transceiver, but I'd better sum up my opinions on this amazing little rig.

I found the small size of the rig a positive advantage when I attended rallies, etc. It could be tucked into a shirt-pocket without causing too much of a bulge and a small earpiece made it even more convenient.

The transceiver is without any doubt, very nice and easy-to-use. Many of the features didn't require reference to the manual when I wanted to use them.

I found that the audio was crisp, and bearing in mind the small size of the loudspeaker, it was surprisingly clear. The transmitted audio was also of high quality. I found that except for very noisy locations, there was no need to 'eat the mike'.

I enjoyed using this little rig. Alinco have really crammed an enormous number of facilities into a very small space, and half the package in the hand is the battery! My thanks for the loan of the review model go to Waters & Stanton of 22 Main Road, Hockley, Essex SS5 4QS, tel: (0702) 206835 or 204965, who can supply the DJ-F1E for £239 inclusive of VAT and p&p.



# ALINCO

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## Nelson Electronics Three Band VHF Cubical- quad Antenna Kit

Look in many books on antennas, and you'll find an example that looks like a spider's web, the Cubical-quad. This is a multi-band antenna with a nominal gain of 6-8dBd.

Unusually for a multi-band antenna, all the dimensions are correct for each band in use, and they are not electrically corrected, as many beam antennas have to be for efficient operation.

### New Product

At many rallies in the south this year, there's been a range of multi-band h.f. boomless cubical-quad antennas on sale. They've originated from the electronic stables of Ernie Quinnell G4JEV, of the Portsmouth district based Nelson Electronics.

Almost all commercial cubical-quads are for two or more of the h.f. bands. Due to their larger size, they really do look like a spider's web. Many operators mistakenly believe that the cubical-quad antenna is a purely h.f. antenna. However, they're most definitely wrong!

### Ideal Alternative

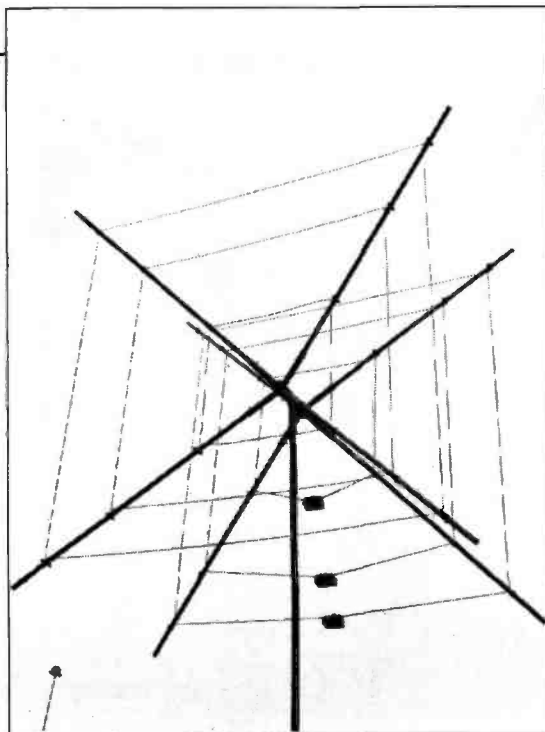
The v.h.f. cubical-quad could well turn out to be the ideal alternative antenna for many potential v.h.f. operators. It has the positive advantages of providing good gain, within a remarkably small area. Despite this, the cubical-quad antenna on v.h.f. has the disadvantage of being virtually 'unknown' by most amateurs.

Nelson Electronics had obviously realised that an antenna of this type was unavailable to v.h.f. operators. Tex and I had shown a lot of interest in the Nelson cubical-quad for 50MHz at the Wimborne Hamfest, but we were in for a surprise and good news sooner than we'd expected.

Tex and I were surprised, and pleased one day to be asked if we'd like to try out a cubical-quad antenna kit designed for the 50 and 144MHz bands. Tex, as the sub-editor mainly involved in *PW*'s recent 70MHz project, immediately came out with "What a pity that it doesn't cover 70MHz, after all the work we put into the Meon-4 transverter!"

Nelson Electronics reacted quickly. The immediate response was, "can you wait another few weeks until I've had time to make a few modifications". The results of those modifications, the Nelson cubical-quad for 50, 70 and 144MHz are reviewed here.

*Rob Mannion  
G3XFD and Tex  
Swann G1TEX,  
take a look at an  
old idea, re-born  
in a new product  
that should  
encourage more  
radio amateurs to  
enjoy the  
challenge of v.h.f.  
operations.*



### Kit Form

Basically speaking, the Nelson v.h.f. cubical-quad antenna comes as a kit. It's a three band v.h.f. cubical quad antenna kit, suitable for 50, 70 and 144MHz.

This antenna is capable of very good results, for a directional array with a small turning circle. But, unlike a Yagi configuration antenna, it does require some work, experimentation even, to obtain the best results for each location. Despite this, you then end up with the ability to work on the three bands, with an excellent antenna taking up less room than most single band arrays for 144MHz.

### Prototypes Delivered

The day arrived, and the prototypes were delivered direct to the *PW* office by Ernie Quinnell himself. The antenna kits consisted of two boxes each, one approximately 1.15m long, and another one about 325mm cubed. It was the sort of box everyone's met - you know, just a little too big to carry comfortably under the arm!

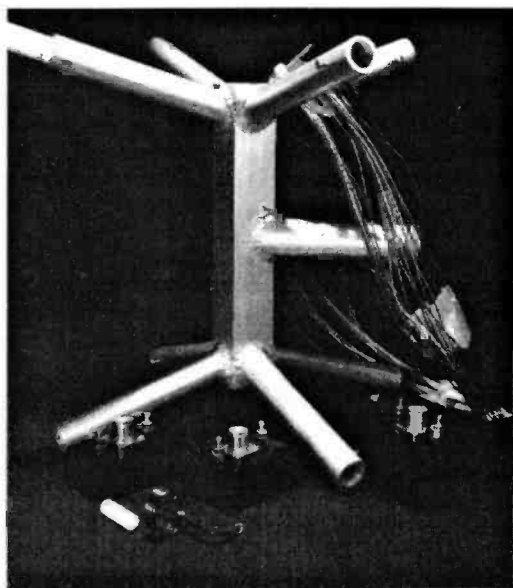
Before he left, Ernie reminded us again that the antenna was in kit form. We were also left without complete instructions, as the pre-production prototypes had been put together quickly (see note in summary). So, it was a question of 'suck it and see'. With that in mind, Tex headed off to his QTH to try out the antenna we'd suggested, so I'll let G1TEX take over for a while!

### Boxed Spider

On arrival at the G1TEX QTH, I opened each box, wondering what I was going to find inside. In the smaller container was the centre 'spider' which is a truly descriptive name! This spider is made from square section aluminium alloy. The tube has eight 'arms' growing out of it, four at each end.

The engineering quality of the welding on this item was a joy to see. Also in the box were three double lengths of wire, and three junction boxes.

Each of the lengths of wire was marked with the band it was designed for. For the 50MHz reflector, there were in addition, a small nylon spacer and a pre-wound coil of heavy copper wire. This was designed



**Fig. 1: The basic components of the Nelson Electronics three band v.h.f. cubical-quad antenna. The glass-fibre spreader rods with the element fixing/adjusting clips are not in the picture. The central 'spider' is fabricated from high quality aluminium alloy.**

to resonate the reflector slightly lower in frequency.

The longer box contained the eight spacer rods, strongly made from glass-fibre tubing. These were white with red marker-pen rings. The marks indicated suitable starting points for the nylon retainers, for the quad-loop wires, held in place with jubilee clips. The contents had all the appearances of a 'do-it-yourself' surveyor's pole and everything was of sturdy and high quality.

### Assembling The Antenna

Assembling the frame and spreaders didn't take long. Each pole is inserted in one of the leg ends of the 'spider', until the marked ring is flush against the end of the leg.

A small hole must then be drilled into the rod. There's a hole already drilled in the spider to allow a clamping screw to seat home, and retain the rod in that position.

It really did look like a spider, once all the legs were on! Searching round for a suitable short stub mast, I discovered that the garden rake handle was just the right size. Oh well, I didn't like gardening that much anyhow!

### Resonating Reflector

As we were working with few instructions with the prototype, I looked at several books dealing with cubical-quad antennas. Each book suggested that the reflector had to resonate about three to five percent lower in frequency than the driven element.

I randomly chose one end to be the reflector end, and moved the nylon retainers outwards in proportion. Starting with the middle reflector (70MHz), I strung the wire through and made it as tight as I could, to a small single loop connector.

This loop was to be the coupling loop to the 'dip' oscillator. I find the 'dipper' a useful instrument, and they're still known as 'grid dip' oscillators by many people, even though most are transistorised nowadays!

I could then use the 'dip meter' to check the resonant frequency of the reflector. By careful trimming, I set it to 68Mhz for the band (70MHz). A similar method was used for the 144MHz band, and here I set the resonance of the reflector to 140MHz.

For the 50MHz band, a slightly different tech-

nique is used. The copper wire coil is used to join the ends of the loop, and the turns are pulled or compressed to set the resonance to about 48-49MHz.

### Driven Elements

Turning to the driven elements, I made a small one-and-a half turn loop of copper wire attached to crocodile clips. With this coupled to the junction box ends, and using the 'dip meter' again, I resonated each driven element to relevant mid-portion of the bands at 51, 70.25 and 145MHz respectively.

Each antenna has its own feed point. This is a little inconvenient, but that's something I'll have to address in the future.

Checking the v.s.w.r. on each antenna, I found it to be about 1.3:1 at band centres. I felt that this was adequate for the purposes of testing, as it remained below 1.8:1 over the entire band.

So, that's the setting up described. It's not difficult and the antenna looks graceful and very small for a three band array.

As my QTH isn't very good for v.h.f. testing, Rob Mannion G3XFD's going to take over now and describe his findings. So, the mike's coming your way Rob!

### G3XFD On VHF

Tex and I had assembled our antennas independently. Despite the fact that Ernie from Nelson Electronics hadn't time to produce the final instructions, neither Tex or I had difficulty in assembling the antenna.

Most people will realise that I have an artificial right hand. It's rather obvious, and I don't try to disguise the fact. Even though there are one or two things that cause me problems (left-hand shirt-sleeve buttons for instance!), I don't regard it as a disability.

Having said that, I expected to find the assembly of the Nelson Electronics antenna to be a bit 'fiddly'. It wasn't and I soon had my antenna up and working.

As Tex has described, setting up is not difficult. However, with this cubical-quad, you end up with three separate feed points.

In other words, as supplied, you will need three 50Ω cables to use the antenna. Actually, I used 50 and 75Ω cables, and found that longer lengths (10m or more) of cable acted as an effective coaxial 'transformer'.

In practice, the three feed-points won't be a problem. It will allow you to use each antenna totally separately for cross-band work and monitoring, etc. Although it's perfectly feasible to either arrange to have a mast-mounted coaxial switching arrangement, I don't think anyone will bother, and I certainly won't.

Following a similar setting-up pattern as Tex had done, I was soon ready to go. Like G1TEX, I found that due to the small diameter of the 'spider' mounting shaft, a broomstick was the best option for mounting.

### On Air

Cubical-quad antennas are renowned for providing excellent results, even when they're mounted close to the ground. I've always envied the results the late Charles Shilley G3PZO, obtained with his h.f. cubical-quad. Despite a very small garden, using his antenna only at about knee-high Charles worked all continents with 50W a.m. No-one in the Southampton club could match his results!

Although I didn't carry out comparison testing, I wasn't to be disappointed with the v.h.f. antenna. On 144MHz I worked up into East Anglia, to Holland and managed my first Spanish station on the band when an

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opening occurred on Sunday evening, September 8.

Like Tex, I'd arranged my cubical-quad to work mainly horizontally polarised (feed-point at the bottom), but as there's a small vertical component, it proved useful for mobile working too.

There's not a great deal of activity on 70MHz in Dorset, but I had several QSOs working portable. Personally I think that 'four' is badly neglected, and I thoroughly enjoyed working on the band again.

With the antenna mounted approximately 2m above ground, I managed to work into the Birmingham area from some open heathland on the New Forest borders near Verwood. In fact, it was only because I'd just been on 144MHz, that the 70MHz QSO took place because I worked the same station again.

Although I didn't have any 50MHz transmitting equipment, I was able to listen on the band with a kit I'd built (the Ramsey Electronics model) and found there was a pleasing amount of 'local' working. I heard stations along the south coast, up into the midlands and the London area and over towards Bristol.

I was very pleased with the results. I had three band facilities from a relatively small antenna which was very lightweight and easy to handle.

## Final Thoughts

On the disadvantage side, Tex and I had several suggestions to improve the design. One involved the feed-point plastics boxes. As these are exposed to the weather, they have to be made fully weather-proof before the antenna is erected.

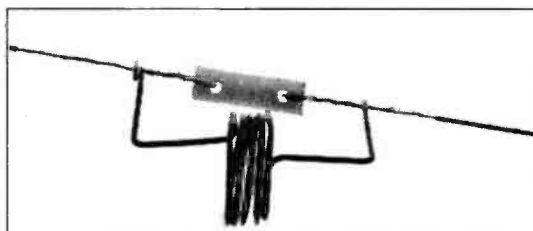
Another suggestion involved the 'spider' mounting spigot. This item, is extremely well made, but the diameter chosen made it too big to go inside a standard scaffold pole\* (see note below).

Our final, constructive, suggestion involved the cubical-quad loops. We thought that although the pre-cut colour-coded element wires (for each band) were an excellent idea, heavier gauge wire would extend the life of the antenna in our variable climate!

The other idea was that, to assist the setting-up, Ernie's idea of a 'squeezable' inductance on the reflector of the 50MHz element, be incorporated on the 70 and 144MHz reflectors. This would make the operation even simpler\* (see note to right).

PW

**Fig. 2: A demonstration assembly of the Nelson antenna on the Quay at Poole. The sturdy glass fibre spreaders fit into the 'spider', with the loop element holders being spaced out along each spreader. The relatively small size of the three band v.h.f. cubical-quad can be gauged, when it's compared to Tex Swann G1TEX, who bumps his head at 1.9m!**



## Summary

Altogether, Tex and I were very impressed with the Nelson Electronics three band v.h.f. cubical-quad antenna. It was G1TEX who I have to thank for suggesting the idea to Ernie in the first place. We both feel that this antenna will prove very attractive for operators wishing to be active on all three bands, without a really huge antenna farm.

I'm also pleased to say that the finalised instruction booklet arrived in the office, just before we went to press. It contained simple, very easy-to-read instructions and one glance should dispel any doubts that you might have on cubical-quad assembling.

It's an economical way of getting on v.h.f., with space savings thrown in too. I'm already looking forward to trying a 'zip-up' folding version of the antenna for regular portable operation from my car.

Tex however, will have to wait longer for a version to fit in his Reliant three-wheeler, unless we turn the roof of the famous G1TEX 'Plastic Pig' into a pop-up lid!

Our thanks go to Ernie Quinnell G4JEV, from Nelson Electronics, for the opportunity to evaluate the cubical-quad which is available from them at £165 including VAT, plus carriage at cost. They can be contacted (callers by appointment) at 36b The Green, Stubbington, Fareham, Hampshire PO14 2LE. Tel: (0329) 668080. FAX: (0329) 668068.

\*Note: The 'squeezable' coil for reflector tuning will be incorporated in future production antennas and all production models of the antenna will have a spigot suitable for mounting on standard scaffold-type poles.

## Manufacturers' Specifications

Weight (centrally balanced)	4.5kg
Turning Circle	1.93m
Forward gain (relative to a dipole)	6dB (144MHz) 6.7dB (70MHz) 7.1dB (50MHz)
Front-to-back ratio	10dB (144MHz) 10dB (70MHz) 15dB (50MHz)
Side rejection	35dB (144MHz) 35dB (70MHz)

## Further Reading

For information about the design of quad antennas: *All About Cubical-quad Antennas*. William Orr W6SAI and Stuart Cowan W2LX. Radio Publications Inc. ISBN 0-933616-0301. Available from PW Book Service £6.75 plus £1 p&p.

For general information about improving and optimising antennas: *The Antenna Experimenter's Guide*. Peter Dodd G3LDO. DD Publications, ISBN 0-9516024-0-3. Available from PW Book Service £8.90 plus £1 p&p.

**Fig. 3: Temporary placement of the 50MHz reflector inductance, mounted either side of the nylon spacer. The coil is soldered into place, and final adjustment is carried out by gentle squeezing of the coil (see text).**

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G4HKS

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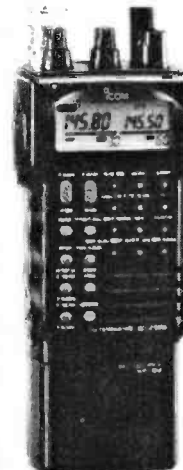
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# The Optoelectronics 2600H Hand-Held Frequency Meter



*There's a new family of frequency meters arrived in the UK from the USA. Tim Stanley G4DBL had a look on behalf of PW, and now he's going to share his findings with us.*

The annual HamVention in Dayton Ohio, USA, has been responsible for quite a few new products arriving in the UK. The family of frequency counters from the Optoelectronics company in Fort Lauderdale, Florida is just one example.

It seemed an interesting job when the Editor of *PW* approached me and asked if I would take a look on behalf of the magazine. So, a Model 2600H 'Handi-Counter' eventually arrived in my shack, and I took a good look at the machine.

## The Family

This family of frequency meters appears not only to be in the price range for radio enthusiasts, but they're also quite novel in that they are small enough to be hand-held. The 2600H features very high sensitivity, as it's intended for normal measurements on the test bench and 'off air' tests with its built-in whip antenna.

Significant features on the 2600 are the frequency coverage from 1MHz to 2.6GHz, better than 1mV sensitivity in the h.f. and v.h.f. range which drops to 10mV at 2.4GHz. There's also a sensitive bargraph input level display.

The standard instrument offers good frequency stability with a specification of  $\pm 1$ p.p.m from 20 to 40°C. However, the meter I had, was fitted with the high stability option, which is specified as  $\pm 0.2$  p.p.m. for the same range using a temperature compensated crystal oscillator.

Frequency read-out resolution is as high as you'd expect with such high stability, being 0.1Hz in the lower range, up to approximately 200MHz. The higher frequency ranges are achieved by using the built-in prescalers, one for measurements up to 600MHz and another covering up to 2.66GHz.

## Gate Times

Push-buttons on the front panel select gate times. They are: 10ms, 0.1s, 1s and 10s. Another front-panel control is the power switch, which selects either 'On' or 'Charge', for re-charging the internal NiCad battery pack.

Other panel controls are the 'Direct/Prescale switch and a 600MHz/2.6GHz switch, depending on which prescale range is required. There's also a 'Hold' switch for 'freezing' the display when necessary.

Together with the frequency read-out and bargraph indication, the l.c.d. display annunciators include the gate time selected and a 'Prescale' flag when either of the prescalers is selected.

The r.f. input is via a BNC socket on the top of the instrument. There are also facilities for external power, 9.1V, to be connected via a standard d.c. socket on the side of the case.

## Small And Smart

When I unpacked the instrument, I was struck by its small size, portability, smart overall appearance and robust metal casing. The meter is ideal for hand-held use. It comes with a soft carrying case, which also houses the telescopic whip antenna.

A good manual is essential with equipment of this nature, and the 2600's is very good. It provides detailed information, even to the extent of showing the nominal bargraph display calibration (indication threshold -40dBm, maximum indication of 16 segments at 0dBm).

There's also a clearly presented circuit diagram supplied and the manual describes how you adjust the calibration. Re-adjustment of the calibration may be necessary after a year or so of use, to compensate for the ageing of the internal frequency standard, or when

REVIEW

# REVIEW

you need to make high accuracy measurements. Note: Any re-calibration must be done in conjunction with a known frequency standard.

## Bench Test

Although I didn't have access to a frequency standard of laboratory-type specifications for long-term stability tests, I made some comparative checks. The results are shown in Table 1.

I gauged the warm-up drift by monitoring the output of a high stability crystal oscillator in a Lowe HF-235 (a professional development of the HF-225) communications receiver fitted with a crystal-oven.

This receiver had been given a good warm-up period before the comparison was made. The high-stability specification of the receiver suggested that it was at least as good as the claimed specification of the 2600H.

The counter's read-out drift over a 20 minute period from switch-on, equated to approximately 0.2 p.p.m. which wasn't too bad at all. By this time, the drift had reduced to approximately 0.01 p.p.m every 2.5 minutes, although by this time the counter's reference oscillator drift may have been as significant.

## Sensitive Instrument

The 2600's sensitivity was within its specification up to 520MHz (this was the upper limit of my signal generator). The sensitivity was very much better than the quoted specifications below 60MHz.

Variation in sensitivity with frequency was reflected in the bargraph input level display. This is useful as a rough guide indicating the input level, but it could of course, be used for more accurate readings if you drew up a calibration chart using a signal generator of known accuracy.

## Off Air Performance

To get an idea of the 'off air' performance, I carried out a reception range test using my 144MHz transceiver. These were carried out running the rig at 10W output to a  $5\lambda/8$  whip antenna on the roof of my van, parked in the driveway.

I found that a reliable frequency reading could be obtained up to 150m away from the vehicle. The l.c.d.



## Basic Specifications

Range	1MHz to 3GHz
Typical maximum frequency at 25°C	3GHz
Input impedance	50Ω v.s.w.r. < 2:1
Input coupling	a.c.
Connector type	BNC female
Max. input voltage	15dBmV

display is large and clear and is easy to read out in daylight.

The bargraph display showed that there was a fairly high level of background noise/interference. I suspect that this was mainly due to strong transmissions from short wave broadcasting stations, particularly as the meter is so sensitive at these frequencies.

The range from the transmitter therefore, could be improved considerably by the use of some filtering between the antenna and the input connector. This could be a high-pass filter or even a simple tuned circuit.

A further test was made 'in the field' (literally!), by going up to the local radio broadcast v.h.f. transmitter site. A read-out of its frequency was obtained several hundred metres from the transmitter. Despite this, it was difficult for the counter to pick out the broadcast signal, due to the many other services (p.m.r., etc.) originating from the same site.

With everything considered, it was a creditable performance. Obviously reception range could be enhanced considerably by using higher gain antennas, and with a fair amount of filtering and pre-amplification you could provide a frequency checking service for other amateurs, without leaving the shack!

## Summary

Altogether, I think this is a rather good instrument. It has good stability for a unit of its type, and the high sensitivity makes it a very useful tool for hands-off measurements. The sensitivity was even good enough to check the frequency accuracy of my hand-held scanner, by detecting the local oscillator at the antenna input!

My thanks go to Raycom Communication Systems Ltd., of International House, 963 Wolverhampton Road, Oldbury, West Midlands, tel: 021-544-6767, for the loan of the review model which is available from them at £325 inclusive of VAT, plus carriage.

Table 1:  
Warm-Up Stability Results

### Time from switch-on Frequency Read-out

Minutes	Seconds	MHz
0	10	10.0000611
0	30	10.0000612
1	00	10.0000615
1	30	10.0000616
2	00	10.0000618
2	30	10.0000620

Table 2:  
Plotted Sensitivity Versus Frequency

Frequency MHz	Reliable Reading mV	Threshold dBm
520	1.4	-44
200	0.81	-48
30	0.1	-67
10	0.16	-63





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# Radio Diary

**October 13:** The Armagh & Dungannon District ARC will be held in Gosford House Hotel, Markethill, Co. Armagh. Doors open at 12pm. Usual trade stands plus other events. For further information please contact T. Hall G10MSJ, 1 Hamiltontsbawn Road, Armagh City BT60 1DL. Tel: (0861) 523454.

**October 13:** Blackmore Vale ARS have their annual rally at Wincanton Racecourse, Somerset. This is an indoor event, doors open 10am to 5pm and entrance fee is 50p. Talk-in on S22. Details from Norman G4YXX on (0749) 85432.

**October 13:** South Devon RC have their seventh annual Ham Radio & Computer Exhibition and rally at Hill Head Camp, Hill Head, Brixham, Devon. Doors open 10am. Trade stands, AR supplies, kits, computer sales, raffle, refreshments, unlimited free parking and overnight camping. Car boot sale, bigger and better this year. Outside attractions. Talk-in on S22 + SU22 by G7FDC and G4SSB. Special event station GB4CPU. Details from G6ZRM. Tel: (0803) 522216 or (0836) 577220.

**October 20:** The Wirral Radio & Computer Fayre will be held at The Masonic Hall, Manor Road, Liskard, Wallasey, Merseyside. Doors open 10.30am. Further details from D. Clifford G0NVF on 051-639 5922.

\***October 25 & 26:** The Leicester Amateur Radio Show will again be held at the Granby Halls, Leicester.

\***November 2/3:** The 5th North Wales Radio & Electronics Show will be held at the Aberconwy Conference Centre, Llandudno. The rally opens at 10am with the entrance fee at £1, OAPs 50p and children under 14 free of charge. Siggie Fergusson GW0DYH. Tel: (0492) 532459 (day). Tony Wilkinson GW4PVU. Tel: (0492) 49121 (evenings).

**November 10:** The 1st Barnsley Amateur Radio Rally will be held at Willowgarth Senior High School, Brierley Road, Grimethorpe, Barnsley, South Yorkshire. Details and trade enquiries from Ernie G4LUE, 8 Hild Avenue, Cudworth, Barnsley, South Yorkshire S72 8RN. Tel: (0226) 716339 (6-8pm).

\***November 17:** Bridgend Rally. Further details from Charles Sedgebeer, 50 Minffrwd Road, Pencoed, Mid Glamorgan, South Wales CF35 6SD.

**November 24:** The West Manchester Radio Club's 'Winter Rally' takes place at the Bolton Sports And Social Exhibition Centre, Silverwell Street, Bolton (town centre). All the usual trade stands, societies, Bring & Buy, etc. Admission £1. Dave G1100 on (0204) 24104 evenings only.

**December 1:** The Bishop Auckland Radio & Electronics Rally will be held at the Sunnydale Leisure Centre in Shildon, County Durham. Doors open at 11am, disabled 10.30am at ramped entrance. The usual traders will be present and talk-in will be via S22 on 145.550MHz. All enquiries to G4TYF or G0FBK, QTHR or telephone (0388) 606819.

**December 8:** The Leeds & District ARS have their 'Christmas Rally' at The Pudsey Civic Centre, Dawsons Corner, Pudsey (at junction of the Leeds Ring Road with Bradford Road, do not follow signs for Pudsey). Doors open at 10.45am, all the usual facilities. More details from Geff Stubbs on (0532) 585801.

**December 8:** Now in its 7th year, the Verulam Christmas Rally will again be held at Hatfield Polytechnic, adjacent to the A1 (M). Traders' stands are located on two floors with the main hall being located on the first floor (together with the Bring & Buy stand). A smaller number of stands are available in the ground floor refectory (together with the catering and bar area). Access to the rally will be from 8am with the rally opening to the public at 11am, although they will try to open at 10.30 if all traders are set up. Table space is allocated on a first-come-first-serve basis, so early booking is recommended. Further details from Steve Dunning on (0923) 211643.

\***December 15:** The Centre of England Amateur Radio Rally will be held at the British Motorcycle Museum, Bickenhill, near the NEC Birmingham (junction 6 M42). Doors open 10.30am, admission £1, OAPs 50p, children free. Over 60 trade stands in three large exhibition halls, Bring & Buy, talk-in on S22, bar and restaurant available, ample free parking, concessionary rates to visit museum. Frank Martin G4UMF. Tel: (0952) 598173.

*It's time to look at the transposition of formulae. These are words that seem to strike fear into the heart of even the bravest of men. But Ray Fautley G3ASG shows you that the wisely-led need feel no fear.*

Formulae appearing in text books, often have the term we are trying to calculate mixed up with other terms. Ideally, to solve any one component term, that term should be alone on one side of the equals sign. We would then find a formulae in the form  $c=??$  much easier to solve. This doesn't mean that the original formulae can't be used. It just means that it can't be used in that form. We need to swap the terms around to isolate the desired unknown.

## Basic Equations

But first, what is a formula? A formula is a statement of equality, two sets of terms separated about an equals (=) sign. A formula says that the terms on the left-hand side (l.h.s.) have the same value as the terms on the right-hand side (r.h.s.). The centre point is of course the '=' sign.

So, I think of the rule of formulae manipulation as the 'see-saw' rule. Imagine an equation as a see-saw, or a set of scales, at the point of balance. Whatever we do to one side, if we do the same to the other side, balance will be maintained at all times. So, to isolate a single term on one side of an equation we use transposition and manipulation of terms.

## Rules Again

It's a good idea to generalise the rules before we try a few examples.

Those simple rules are:

(i) To remove a positive term on one side, move the term from that side to the other side, and change the sign to a minus.

(ii) To remove a negative term from one side, move the term from that side to the other side, and change the sign to a plus

(iii) To remove a dividing term on one side, remove the term and multiply the other side by the same term.

(iv) To remove a multiplying term from one side, remove the term from this side, and then divide the other side by the same term.

(v) To remove a square root on one side, take the sign away and square the other side (DO NOT apply rule (vi) at this point).

(vi) When squaring one (complete) side, the other (complete) side must be squared too.

(vii) When inverting (turn upside down) one side, the other side must be inverted too.

When multiplying or dividing one side of an equation by a term, every term on that side must be multiplied, both above and below any dividing line. These rules may be combined as you become more proficient, but until then, do them as individual steps.

## Best Ways

As usual, a worked example is the best way to explain how to do it.

If we want to find  $c$ , given the simple formula:

$$a = \frac{b}{c}$$

How do we determine the value of  $c$ ?

If we knew the values of  $a$  and  $b$ , you could make multiple guesses, trying the figures. In this case it would be fairly easy as there are only a few simple terms, but this is not always so! What we want is a simple formula of the term  $c=??$  which is true under all conditions. But  $c$  is not on its own, we must transpose terms to isolate it.

Let me rewrite the equation as:

$$\frac{a}{1} = \frac{b}{c}$$

How do we change the terms around, to isolate the unknown? To begin to isolate  $c$  on one side, multiply both sides by  $c$ , as here:

$$ac = \frac{bc}{c} = \frac{b}{1} = b \text{ (divide both sides by } a)$$

$$\frac{ac}{a} = \frac{b}{a} \text{ (cancel l.h.s.) } c = \frac{b}{a}$$

## Proof Of The Pudding

A little bit of proof is needed here, so we'll substitute numbers for letters. Let  $b=10$  and  $a=5$ . Then putting these values into the formula. The result of our cross multiplication is:

$a*c = 1*b, 5c = 1*10$ , so  $c = 10/5 = 2$ . Now go back to the original problem, and see if this answer is correct.

Another example:

Calculate  $x$ , given that,  $xy = 3z + 4y$ . Again there are three quantities  $x$ ,  $y$  and  $z$ . We need to isolate  $x$  in terms of  $y$  and  $z$ ?

Remembering the 'see-saw' rule, divide both sides by  $y$ , then cancel out to leave  $x$  isolated.

$$\frac{xy}{y} = \frac{3z}{y} + \frac{4y}{y}$$

$$x = \frac{3z}{y} + 4$$

Similarly, to find  $y$  in terms of  $x$  and  $z$  in the same equation,  $xy = 3z + 4y$

Subtract  $4y$  from both sides of the equation:

$$(xy - 4y) = 3z + (4y - 4y)$$

$$(xy - 4y) = 3z$$

$$y(x - 4) = 3z$$

by putting  $y$  outside the bracket, before dividing both sides by  $(x-4)$ :

$$\frac{y(x - 4)}{x - 4} = \frac{3z}{x - 4}$$

Cancels out the  $x - 4$  on the l.h.s. leaving:

$$y = \frac{3z}{x - 4}$$

### Third Form

We'll now try the third form, what is  $z$  in terms of  $x$  and  $y$ ? in the same equation. Start by subtracting  $4y$  from both sides:

$$(xy - 4y) = 3z + (4y - 4y)$$

$$(xy - 4y) = 3z$$

Divide both sides by 3:

$$\frac{xy - 4y}{3} = \frac{3z}{3}$$

$$\frac{y(x - 4)}{3} = z \quad (\text{rewritten as : } z = \frac{y(x - 4)}{3})$$

### Just One More

One final example, but this time just a little more difficult:

$$a = \frac{1}{\sqrt{bc}}$$

(i) Find  $b$  in terms of  $a$  and  $c$

(ii) Find  $c$  in terms of  $a$  and  $b$

The  $\sqrt{\quad}$  symbol means square root of the number underneath it. So, using the 'see-saw' rules again, do unto one side as you do unto the other!

$$a = \frac{1}{\sqrt{bc}}$$

$$a^2 = \left| \frac{1}{\sqrt{bc}} \right|^2$$

Remember, as long as you do exactly the same operation to **BOTH** sides of an equation it will still be true, and this applies to squaring terms as well.

$$a^2 = \frac{1^2}{(\sqrt{bc})^2} = \frac{1^2}{\sqrt{bc} \sqrt{bc}} = \frac{1^2}{bc} = \frac{1}{bc}$$

This has isolated a simple term with  $b$ , on the right-hand side. So we can now multiply through by  $bc$ .

$$bc \left( a^2 = \frac{1}{bc} \right) \quad \text{becomes} \quad a^2 bc = \frac{bc}{bc}$$

$$b(a^2 c) = 1 \quad (\text{divide both sides by } a^2 c \text{ gives})$$

$$b = \frac{1}{a^2 c}$$

$$\text{and similarly } c = \frac{1}{a^2 b}$$

### Final Final Example

Take another example:

From  $xy = 3z + 4y$  find  $x$ ,  $y$  and  $z$ . Start by finding  $x$  in terms of  $y$  and  $z$ . Divide both sides of the equation by  $y$ .

$$\frac{xy}{y} = \frac{3z}{y} + \frac{4y}{y} = \frac{3z}{y} + 4$$

Now find  $y$  in terms of  $x$  and  $z$ .

$$xy = 3z + 4y$$

To take  $+4y$  from the r.h.s. move the term to the other side of the equals sign, remembering to change its sign.

$$xy - 4y = 3z$$

The term  $y$  is common to both items on the l.h.s so may be taken outside a bracket.

$$y(x - 4) = 3z$$

now divide both sides by  $(x - 4)$  (using rule (vi)).

$$y = \frac{3z}{x - 4}$$

Finally, what is  $z$  in terms of  $x$  and  $y$ ?

$$xy = 3z + 4y$$

Start by changing  $+4y$  to the other side of the equation (don't forget to change its sign!)

$$yx - 4y = 3z$$

lastly divide both sides by 3 (using rule (vi) again)

$$\frac{xy - 4y}{3} = \frac{3z}{3} \quad \text{becomes} \quad \frac{xy - 4y}{3} = z$$

### Problem Corner

Here are some algebraic problems for you to try. I'll give you the answers in the next article.

(i) If  $5x = 10y$  find  $x$  in terms of  $y$

(a)  $x = 2y$     (b)  $x = 15y$

(c)  $x = 5y$     (d)  $x = 50y$

(ii) If  $3a = \frac{b}{2c}$  find  $b$  in terms of  $a$  and  $c$

(a)  $b = 3a + 2c$     (b)  $b = 6ac$

(c)  $b = 1.5ac$     (d)  $b = ac$

(iii)  $z = \frac{1}{w\sqrt{xy}}$  Find  $x$  in terms of  $w$ ,  $y$  and  $z$

(a)  $x = \frac{1}{wzy^2}$

(b)  $x = \frac{1}{(wzy)^2}$

(c)  $x = \frac{1}{\sqrt{y(wz)^2}}$

(d)  $x = \frac{1}{y(wz)^2}$

*That's the end of the purely mathematical part. From now on we will be looking at how basic maths is applied to solve practical problems facing the intrepid traveller, entering the technical jungle of the RAE and Novice licence radio theory.*

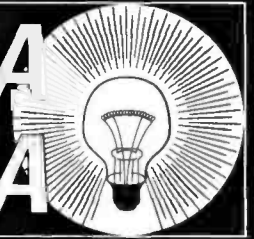
## Innovation Into Investment

We've always been proud of our authors and their work. Now you can join in - and win £25 - by sending circuits and projects to 'What A Good Idea'. It's the ideal solution to the advice often offered by friends who suggest that 'You should publish that!'

Circuits - accompanied by the minimum of text - must be neatly and clearly drawn in ink. Wherever possible the idea must be original, although your suggestion might be a significant improvement based on another idea. In which case you should always quote the original source. All entries will be acknowledged. Send your entry, with your name and address, to: 'What A Good Idea', Practical Wireless, Enefc House, The Quay, Poole, Dorset BH15 1PP.

PLEASE NOTE: that we at PW may not have built and tested the circuit, but present it on an 'as-is' basis. We do take the greatest care in preparation of the article, but cannot be held responsible for the suitability of the original suggestion, or for any damage that may occur to property or equipment in implementing this idea.

# WHAT A GOOD IDEA



## Two Valve Safe Radio

What is a 'safe' radio? you may ask. This valved regenerative radio is 'safe' because it will run from a 12V power supply similar to those many of you use to run the main station. If you use a 3V regulator to power the valve heaters, the overall power drain is less than 75mA.

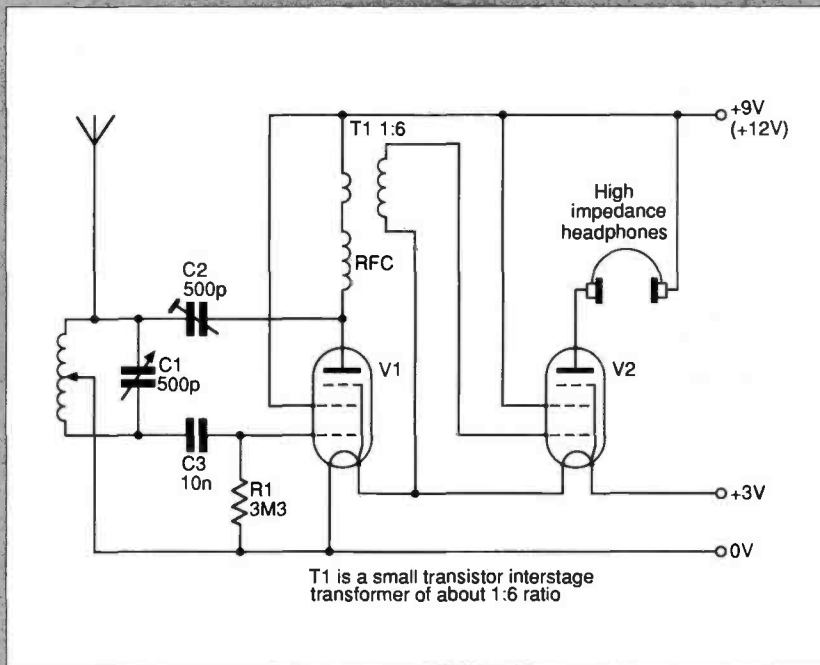
The transformer in the anode of V1 is a step-up type (Maplin type LT44 might be suitable *Ed.*). The headphones should be as sensitive as possible for best results. The centre tapped coil and capacitor combination may be altered for the band required. It should be possible to make the system work reasonably well up to at least 10-15MHz.

Resistor R1 in combination with C3 form a 'leaky grid' detector. The coil RFC, may be almost any size, but about 100-200 turns of fine enamelled copper wire on a 1-2W resistor (of at least 100kΩ) or a 6mm former should work reasonably well. Both valves may be the same. I used IT4 type, but almost any small pentodes should work fairly well.

This circuit is presented as a start point for experimentation, rather than as a finished item. To this end no valve base details have been quoted as pinout varies with the valve type used.

Experiment, after all, it is safe!

John Tye  
Swanton Morley  
Norfolk



# 1992 Radio Diary

\* PRACTICAL WIRELESS & SHORT WAVE MAGAZINE IN ATTENDANCE

**January 19:** The Oldham Rally will be held at the Queen Elizabeth Hall, Civic Centre, Oldham. Doors open 11am, 10.30am for disabled and for those taking the Morse test. Bar & catering facilities available and parking is free. Details from **Kathy G4ZEP** on 061-624 7354 day or 061-652 8617 evening.

**January 26:** The 2nd Lancastrian rally will be held at the University of Lancaster. Opening times are 10.30am for the disabled and 11am for everyone else. Further details from **Sue G1DHH** on (0524) 64239 or QTHR.

**February 2:** South Essex ARS have their 7th mobile radio rally at the Paddocks Community Centre, Long Road (A130), Canvey Island, Essex. All the usual traders, Bring & Buy, refreshments, free car parking, including parking for the disabled outside the main door. Doors open 10am. Talk-in on S22. For further information contact **Dave Speechley G4UVJ** on (0268) 697978.

**February 23:** The Northern Cross Rally is to be held at the Rodillian School, Lofthouse, West Yorkshire, nr. the junction between the M1 and the M62. All the usual rally attractions. Further details from **John-Lloyd Bailes G0MVA**, 239 Towngate, Ossett, West Yorkshire WF2 0QE. Tel: (0924) 260048.

**March 7:** Tyneside ARS have arranged a new venue for their annual Rally, the Temple Park Leisure Centre in South Shields. The centre offers up to 17 000

square metres of floor space, all on one level, with easy access for traders where needed. Catering facilities, including a bar on site, as well as family rooms. For those other members of the family not wishing to partake in the Rally, all the amenities of the Leisure Centre are there too, including heated Leisure pool and gymnasium. Plenty of free parking. Further details about the Rally from **Jack G0DZG** on 091-265 1718.

**June 14:** Royal Naval ARS have their annual mobile rally at HMS Mercury, Nr. Petersfield, Hants. There will be dozens of trade stands; a Bring & Buy; flea market; radio-controlled power boats and trains; local radio clubs and repeater groups; childrens' rides and amusements; vintage fire engine; TV detector van; ices and refreshments; arts and crafts' exhibition; two Grand raffles; spectacular arena displays and other attractions, making this a great day out for all the family. 144 and 430MHz talk-in, free parking and picnicking, free admission for children, adults £1.50, no dogs except guide dogs. For full details, contact **Cliff Harper G4UJR**, 34 Neva Road, Bitterne Park, Southampton SO2 4FJ. Tel: (0703) 557469.

**June 28:** The 35th Longleat Amateur Radio Rally. Details from **Shaun G8VPG** on (0225) 873098.

**July 25/26:** Norfolk ARS are planning a 2-day event. **G4ONF**. Tel: (0603) 747782.

# WHY NOT COME AND MEET US AT THE LEICESTER SHOW

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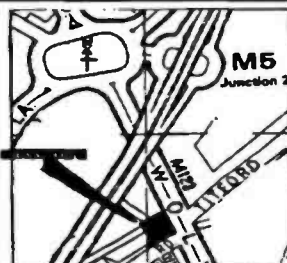
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**Wanted Transmitters:** LabGear LG300 TX; RCA TX of serial type ET4336, (any in series); No: 12 TX & a.t.u.; Rascal transmitter driver; Receiver: Redifon R145. Write to Peter G7FXO, 'Tanglin', 47 Ulwell Road, Swanage, Dorset BH19 1LG.

**For Sale Versatower P60.** Tilt over 3, section lattice galvanised steel tower 6 to 20m, with two auto braked winches and head unit, £400 o.n.o. J. A. Ward G8AWY, 71 Rothschild Avenue, Aston Clinton, Bucks HP22 5LY. Tel: (0296) 631174.

**Wanted Ashtray.** RSGB convention - Bristol - September 1954. Produced by Watcombe pottery with a cottage design. Contact Frank G4YXS, QTHR. Tel: (0373) 832678, please don't speak to Sue - it's a present!

**Wanted Amateur radio software** (5<sup>1/2"</sup>) for Apple II Euro computer - RTTY, AMTOR, packet, etc., and RTTY or audio analysis programs. Books dealing with above also required. Print-outs of programs acceptable. Contact G4JSB, 3443 Tyldesley Road, Hindsford, Atherton, Greater Manchester M29 9AP. Tel: (0942) 892572.

**For Sale Comtel 934MHz transceiver** new and unused, offers. Tel: (0860) 724180, mobile only, Stoke-on-Trent area.

**For Sale Icom 275E+SM8, £715.** Yaesu FRG-8800, £395. BBC-B plus monitor, drive and software, £395. All absolutely perfect, any reasonable offers considered. Must be seen soon! Robin G8VVY. Tel: (0453) 828891 (work) or (0453) 886400 (home).

**For Sale Toshiba radio cassette recorder,** excellent condition, very good performance l.w., m.w., s.w., f.m. Offers, £30 o.n.o. Mr M. Allen. Tel: (0742) 464186.

**For Sale AOR 1000 and D130N** discone, £200. Eddystone EC10MkII, £50. Tandy 1007 40ch, H/H and access, £50. All equipment as new, boxed. Contact G1EYL, QTHR. Prefer buyer collects or carriage extra. Tel: (0246) 415667 after 5pm.

**For Sale Icom IC730 transceiver,** £450. Datong FL3 filter, £95. Datong PC1 general coverage converter, £85. BARTG Versaterm RTTY terminal unit - cased, £45. Dragon 32 computer, £40. Tony. Tel: (0608) 811102.

**For Sale Tokyo HY Power HL160V** 2W/160W linear 144MHz, £210. Also 3W/110W 430MHz linear, £300.

**BNOS 12.25A p.s.u., £120.** All items mint. Paul G4XHF. Tel: (0293) 515201 evenings.

**For Sale FT-200/FP-200 TX/RX 80/40/20/15/10 s.s.b./c.w./a.m., p.s.u.,** speaker, mic and manual with circuits. Fault on transmit hence only, £75. Mike Gathergood. Tel: (0753) 540520 (Slough) or (0628) 770929 (Maidenhead) daytime.

**For Sale Eddystone 770U, £150 and EC10, £65,** good condition. Tel: (0702) 522929.

**For Sale Yaesu FRG-8800, v.h.f.** converter fitted. Realistic PRO-2004 scanner, Dressler ARA900 antenna, global AT1000 coupler, Bremi power supply Barracuda CB, s.w.r. meter/matcher, £725 o.v.n.o., may split. Tel: (0606) 47806.

**For Sale Yaesu FRG-8800 general** coverage receiver 150kHz to 29,999MHz plus 144MHz module, 118MHz to 174MHz, £500. Ricky GITGC, Manchester. Tel: 061-491 3755 after 6pm.

**Wanted Ex-MOD teleprinter type** Siemens T100, or other with twin 4MA current signalling carpenter type relay to suit army R234 receiving console. Mr Lebbon, 7 Keld Head Orchard, Kirbymoorside, North Yorks YO6 6EF.

**For Sale Microset SR100 144MHz** linear amp with pre-amp new and unused, 4 to 25W input-100W out. Save £25, price £135. Tel: (0952) 505050 (Telford).

**For Sale Icom IC02E 144MHz hand-** held with NiCad, charger, case, box and instructions. Excellent condition, must sell hence, £150. Tony G6HPQ. Tel: (0702) 351936.

**For Sale Ex-gov., PRC3 Philips re-** ceiver, no mods, mains unit input, v.g.c. R209 i.f. unit, still in package. AR88 vibrator unit, offers for all. **Wanted** Eddystone speakers any condition, price. Tel: 041-649 4345.

**Wanted Remote Control Unit 310** working condition. R. Fixter, 18 Linley Drive, Boston, Lincs PE21 7EJ. Tel: (0205) 360044 evenings.

**Exchange Amstrad PC1640 5<sup>1/4</sup>in** disk drive mono display with DMP3000 printer wordstar. Supercalc, Accountmaster. All in excellent condition. Exchange for Cap.Co AMA5 3.5MHz loop antenna or mobile tower on trailer. Mick G0NBB, QTHR. Tel: (0227) 738248 anytime.

**Wanted information on Lunar Elec-** tronics v.h.f. 30-150 P 144MHz linear amp and its devices No. SD 1416 or equivalent. Richard Hayward, 9 Mill Lane, Wickham Market, Woodbridge, Suffolk IP13 0SF. Tel: (0728) 746741.

**Wanted Eight-track cartridges, Pilot** Radio, Lissen valves, old wireless books/magazines, pre-war TV, spy sets, mikes, Morse keys etc. Douglas Byrne G3PKO, 52 Westhill, Ryde, Isle of Wight PO33 1LN. Tel: (0983) 67665.

**For Sale Microwave modules** 144MHz linear with pre-amp 200W output, 3, 10 or 25W input, £220 o.n.o. G4NTY, QTHR. Tel: 061-790 7673 evenings.

**For Sale Navico 1000 transceiver, as** new, £175. FRG-7700 receiver with a.t.u. and v.h.f. converter, good condition, £180. Uniden BC200XL scanner, boxed, £160. Kenwood MC55 mobile microphone, unused, £12. John G6DCH, 18 Bay Close, Horley, Surrey. Tel: (0293) 775702.

**For Sale NRD 525 quality general** receiver hardly used so as new, boxed with manual, new - £1195, sell - £695 o.n.o. Also second-hand Dressler ARA30 antenna, £25. Tel: (0202) 424219.

**For Sale Kenwood TH77E 144/430MHz** hand-held. Complete kit with 7.2 and 12V battery packs chargers, cases, head set/mic, telescopic antenna, all boxed, mint, £370. Also Yaesu FT-767GX transceiver with 50 & 144MHz modules fitted, excellent condition, £1350. Nick G7IYG. Tel: (0895) 236397 Uxbridge.

**For Sale Realistic DX200 receiver 5** bands - 150kHz-30MHz, £120 o.n.o. 6in crt VCR 517B with base, £17. Valves, 850 new and ex-equipment, £120. Fairchild model 210 sound film strip system, £25. Tel: (0249) 812293.

**Wanted Ballast tube R-39 for** Hallicrafters Co. model S-77A. Bill Naylor G7KKG, 80 Burnside, Parbold, Lancs WN8 7PE. Tel: (0257) 464252.

**Wanted Minimitter mobile receiver** for 1.8, 3.5 and 7MHz to go with my matching Minimitter mobile a.m./c.w. transmitter. G3XFD, PW Office. Tel: (0202) 678558.

**CLUB NEWS...CLUB NEWS...CLUB NEWS...CLUB NEWS...CLUB NEWS...CLUB NEWS...CLUB NEWS...CLUB NEWS...CLUB NEWS...CLUB NEWS...CLUB NEWS...CLUB NEWS...**

**Aylesbury Vale RS** meet 1st & 3rd Wednesdays, 8pm at the old Village Hall, Hardwick. October 16 is a Used Equipment Sale and November 6 is Slide Show of the Year! Further details about the club from **Geoff on (0290) 817496** or **Marty on (0908) 560026**.

**Barnsley & District ARC** meet Mondays in the radio club room and shack, at the rear of the Darton Hotel, Station Road, Darton, Barnsley. October 28 is a talk by G. Bond G4GJB on 'Planning' and November 4 is a discussion on Bring & Buy at the Barnsley Rally. For further information, ring **Ernie G4LUE on (0226) 716339**.

**Bradford ARS** meet 2nd & 4th Thursdays, 8pm at the Polish Ex-Service Club, Shearbridge Road, Bradford, West Yorkshire. October 19-20 is a Special Event Station, JOTA-GB0CBS, the 24th is a natter night and November 14 is a Discussion evening - 1992. **Charles Bolt G0ACX on (0247) 494694**.

**Braintree & District ARS** meet 1st & 3rd Mondays, 8pm at the Community Centre, Victoria Street, Braintree. **D. Andrews, 22 Arnhem Grove, Braintree, Essex CM7 5UQ. Tel: (0376) 27431**.

**Bromsgrove ARS** meet at Lickey End Social Club, Alcester Road, Burcot, Bromsgrove. **Mr D. Edwards G4ZWR, 2 Mason Close, Headless Cross, Redditch, Worcs B97 5DF. Tel: (0527) 546075**.

**Conwy Valley RC** meet 1st Thursdays, 7.15pm at The Studio, Penrhos Road, Colwyn Bay, Clwyd. On November 7 they have a Junk Sale. For further details, contact **Mertyn Jones GW4NLL, 72b Princes Drive, Colwyn Bay, Clwyd LL29 8PW. Tel: (0492) 530725**.

**Coulsdon ATS** meet 2nd Mondays, 7.45pm at St. Swithun's Church Hall, Grovelands Road, Purley, Surrey. **Andy Briers G0KZT on 061-668 7004**.

**Coveentry ARS** meet Fridays, 8pm at Baden Powell House, 121 St. Nicholas Street, Radford, Coventry. October 11/25 and November 8th are nights on the air/Morse tuition, the 18th is a Rig Test and November 1 is Bangers & Mash (meal & social evening). For further details phone **Jon on (0203) 610408**.

**Dragon ARC** meet 1st & 3rd Mondays, 7.30pm at the Four Crosses Hotel, Menai Bridge. October 21 is a Sale of Surplus Equipment, November 2-3 is Club Stall at the North Wales Radio Hall and the 4th is an evening in the capable hands of Stewa Rolfe GW0ETF. **Tony Rees GW0FMQ on (0248) 600963**.

**Echelford ARS** meet in the Community Hall, St. Martin's Court, Kingston Crescent, Ashford, Middlesex, 7.30pm. October 14 is 'Basic Test Equipment for Construction' by G3MCK. Further details from **P. Townsend G6PMT on (0344) 843472**.

**Fareham & District ARC** meet Wednesdays, 7.30pm in Portchester Community Centre, Westlands Grove, Portchester, Fareham, Hants. October 23 is a talk on 'The World Above 1GHz' by Bob G8VOI and November 6 is a talk on 'Coding' by Peter G0FIM. Details from **Rod Smith G0ERS on (0705) 373572**.

**Fylde ARS** meet 2nd & 4th Thursdays, 7.45pm at South Shore Lawn Tennis Club, Midgeland Road, Blackpool. October 24 is an Equipment Browse Sale and November 14 is a Construction Competition. **Eric Fielding G4HIF on (0253) 726685**.

**GB3HZ Repeater Group** meet at Chiltern Communications, Lincoln Road, Cressex Industrial Estate, High Wycombe, Bucks, 8pm. Details from **Francis Rose G2DRT on (0494) 814240**.

**Gloucester ARS** meet at St. Johns Ambulance HQ, Heathville Road, Gloucester at 7.30pm. October 12 is a Jumble Sale, the 16th/30th are both Construction Group nights and the 23rd is Morse sending practice. More info from **J. Beckingham on (0452) 528533 Ext. 2741**.

**Great Lumley AR&ES** meet Wednesdays, 8pm at Great Lumley Community Centre, Great Lumley, Nr. Chester-le-Street, Co. Durham. For more details, contact **Barry G1JDP on 091-388 5936**.

**Hambleton ARS** meet in Room A5 of Northalleron Grammar School at 7.30pm. October 14 is RAE, the 28th is 'Electronics Production' by Pieter Smit G0LIY, November 4 is RAE and the 11th is 'My First Project' by Rodney Richardson. For more details, contact **Nigel Robertshaw G0NHM on (0609) 776608**.

**Horsham ARC** meet at the Guide Hall, Denne Road, Horsham, West Sussex, 8pm. November 7 is an Inter-club Quiz. Further details from **Peter Stevens G8SUI, 11 Nutwood Avenue, Brockham, Batchworth, Surrey RH3 7LT. Tel: (0737) 842150**.

**Ipswich RC** have a new secretary, and she's **Mrs S. M. Elden G8HYE, 124 Larchcroft Road, Ipswich IP1 6PQ**.

**Kettering ARS** meet Tuesdays, 7.30pm at the Electricity Sports & Social Club, Eksdale Street, Kettering. All enquiries to **Lan G7EHM on (0536) 514544**.

**Kidderminster & District ARS** meet alternate Tuesdays, 8pm at The Queens Head, Wolverley, Worcestershire. For more details contact **Geoff Philpotts G7JIR, 62 Ermeley Close, Stourport-on-Severn, Worcs DY13 0AH. Tel: (0299) 379229**.

**Lothians RS** meet on the 2nd & 4th Wednesdays, 7.30pm in the Orwell Lodge Hotel, Polwarth Terrace, Edinburgh. October 23 is 'Practicalities' by Mel Evans GM6JAG and November 13 is a Junk Sale. Further details from **Mel Evans at 56 Southhouse Road, Edinburgh EH17 8EU or telephone 031-664 5403**.

**Loughton & District ARS** meet in Room 14 of Loughton Hall, 7.45pm. For more details contact **Mike Pillsbury G4KCK on 081-504 4561**.

**Maidenhead & District ARC** meet at The Red Cross Hall, The Crescent, Maidenhead, 7.30pm. Details from **Neil G8XYN on (0628) 25952**.

**Mansfield ARS** meet at the Polish Catholic Club, off Windmill Lane, Woodhouse Road, Mansfield. On November 7, John G4GYU will give a talk on 'The Short Wave Broadcast Bands'. Further information from **Mary G0NZA on (0623) 755288**.

**Morecombe Bay ARS** meet every other Tuesday, 7.30pm at the Trimpell Sports & Social Club, with Morse instruction each Tuesday during club meetings. For more details, please contact **J. Burrow G0NYD, 36 Longfield Drive, Cragbank, Barnforth, Lancashire LA5 9EJ. Tel: (0524) 733212**.

**Nelson & District ARS** meet Wednesdays, 7pm at Llancaich School Nelson. They also run a c.w. class at their meetings. Anyone wishing to find out further information is welcome to call in, or otherwise contact **Leighton Smart GWOLBI at 33 Nant Gwyn, Trelewis, Mid-Glamorgan, Wales CF46 6DB. Tel: (0443) 411736**.

**Norfolk ARC** meet Wednesdays, 7.30pm at 'The Norfolk Dumpling', The Livestock Market, Harford, Norwich. October 16 is Vintage Radio - 'Hear It Like It Was!' by Mike Lemm G4UUB, the 23rd is an informal, the 26th is a Club Dating to the Leicester Show, the 30th is 'Introduction to Microwaves' by Sam Jewell G4DDK, November 6 is a 'Real Radio' evening and the 13th is 'Satellite TV' by Steve Sewell G4VCE. **Jack Simpson G3NJQU on (0603) 747992**.

**North Bristol ARC** hold their meeting at S.H.E., 7 Braemar Crescent, Northville, Bristol. October 10 is JOTA station at Woodhouse Park, the 25th is a Bring & Buy and November 1 is QSL Cards and Awards night. **Chris Budd G0LDJ on (0454) 616267**.

**Nottingham ARC** meet Thursdays, 7.30pm at the Sherwood Community Centre, Mansfield Road, Nottingham. On October 10 there is a talk on Kit Building by Derek G3ZOM of Jandek, the 17th is a 70cm Foxhunt on foot and Activity on the air and the 31st is an Activity Construction evening. Further details from **Rex Beestall on (0602) 733740**.

**Poole RAS** meet 2nd Fridays, 7pm at Lady Russell-Coates House, Lower Constitution Hill Site, Bournemouth & Poole College of FE. More details from **Phil G0KKL on (0202) 742453**.

**Prudential ARS** is open to all employees of the Prudential companies, and also those who are retired/pensioned, together with any short wave listeners. They are world-wide

and have members overseas, who should contact their Overseas Liaison Officer - **Alan McCulloch ZS6KU, PO Box 2291, Helderkuin, 1733, South Africa**. Those in the UK can contact **Dennis Egan GW4XKE, 4 Hazel Grove, Longmeadow, Dinas Powis, South Glamorgan CF6 4TE. Tel: (0222) 512959**.

**Reading & District ARC** meet 2nd & 4th Thursdays, 8pm at The Woodley Pavilion, Woodford Park, Haddon Drive, Woodley, Reading. **Vin Robinson G4JTR, 4 Hilltop Road, Caversham, Reading RG4 7HR**.

**Salisbury Radio & Electronics Society** meet Tuesdays, 7.30pm at Grosvenor House Centre, Churchfields Road, Salisbury. October 15 is a committee meeting and the 22nd is 'Test Equipment - don't poke and hope, learn how to use a scope!' For further details, contact **Bert Newman G2FX on (0722) 743837**.

**Shefford & District ARS** meet Thursdays, 8pm at the Church Hall, Amphil Road, Shefford, Bedfordshire. October 17 is CQ WW Contesting Planning, the 19-20th is JOTA, the 24th is Cambridgehire Repeater Group 'Roadshow', the 25, 26 & 27th is CQ WW Contest and the 31st is 'Barcoding For Beginners' by Doug G1BWW. For further information, contact **Nigel G1JKF on (0908) 274473**.

**Silverthorn RC** meet Fridays, 7.30pm at The Chingford Community & Adult Education Centre, Friday Hill House, Simmons Lane, Chingford, London E4 6JH. October 11 is Club Project evening, the 18th is On the Air night and the 25th is their AGM. More details from **Andrew Mowbray G0LWS on 081-529 4489 between 5.30 and 6.30pm weekdays only**.

**South Dartmoor ARC** meet Mondays, 8pm at South Dartmoor School, Balland Lane, Ashburton, Devon. This radio club has a committee of only one adult - the rest being school-age youngsters! Although anyone wishing to join in is welcome. For more details on this Novice-run radio club, contact **Peter Thornhill G6ZKQ, 21 Elmbank, Buckfastleigh, Devon TQ11 0DX. Tel: (0364) 43433**.

**South Dorset RS** meet 1st Tuesdays, 7.30pm in the Wessex Lounge of Weymouth Football Club. October 13 is a HF Contest, the 19/20th is JOTA weekend, the 20th is a SDRS Fox Hunt and November 5 is 'Space Communications' by Andy G3VMZ. **Geoff Williamson G4FJD, 13 Overlands Road, Wyke Regis, Weymouth DT4 9HS. Tel: (0305) 781164**.

**South Notts ARC** meet at Highbank Community Centre, Farnborough Road, Clifton Estate, Nottingham. For further details call **Trevor G4IRH on (0509) 672734**.

**Southgate ARC** meet at Winchmore Hill Cricket Club Pavilion, Firs Lane, Winchmore Hill, London N21. October 10 is a Special Junk Auction, the 24th is a Vintage Radio evening and November 14 is Construction Judging for G6QM Trophy & Brains Trust evening. **Brian Shelton G0MEE, 22 Berkeley Gardens, Winchmore Hill, London N21 2BA. Tel: 081-360 2453**.

**Spalding & District ARS** meet Fridays, 8pm at The Riverside Centre, The Old Fire Station, Double Street, Spalding, Lincolnshire. October 11 is a talk on 'Designing and Building Homebrew Equipment' by David Johnson G4DHF. Further details from **David Johnson, 65 West Street, Bourne, Lincolnshire PE10 9PA. Tel: (0778) 425367 (6-7pm)**.

**Stevenage & District ARS** meet in Ground Floor Lecture Room, 'D' Block, Ridgemoor Training Enterprise, Ridgemoor Park, 7.30pm. October 15 is a Visit to Baldock Radio, the 19/20th is JOTA from Weston Park, nr. Baldock, the 22nd is Practical Component Testing, the 29th is a talk, 'Know Your HF Data Tones' by Peter G0GTE, November 5 is Practical Rig Testing and the 12th is a talk on 'Data Tones' Part 2 by Peter G0GTE. More details from **Pete Daly G0GTE, 48 Lincoln Road, Stevenage, Herts SG1 4PJ. Tel: (0438) 724991**.

**Stirling ARS** meet Thursdays, 7.30pm at premises near Throsk, Stirling, Scotland.. Details from **Brian Mulleady G6MKWL, QTNR on or (0324) 36235**.

**Stourbridge & District ARS** meet 1st & 3rd Mondays, 8pm at Robin Woods Community Centre, Scotts Road, Stourbridge. October 21 is 'American Adventure' by G3CAQ and November 4 is an On air/Discussion evening. Details from **Dennis Body G0HTJ at 53 Grove Road, Wollscote, Stourbridge, West Midlands DY9 9AE**.

**Stratford-Upon-Avon & District RS** meet 2nd & 4th Mondays, 7.30pm at the Home Guard Club, Main Road, Tiddington, Stratford-Upon-Avon, Warwickshire. October 14 is a demonstration of Jandek Kits by Derek Pearson G3ZOM, the 28th is 'Oscilloscopes for Beginners' by Terry Downing G3MXH and November 11 is 'Amateur Radio Observation Service' by Geoff Griffiths G3STG. Further details from **Alan Beasley G0CXX, 2 Ilmington Road, Blackwell, Shipston-on-Stour, Warwickshire CV36 4PE. Tel: (0608) 82495**.

**Sutton & Cheam RS** meet 3rd Thursdays, 7.30pm at Downs Lawn Tennis Club, Holland Avenue, Cheam, Surrey with natter nights on 1st Mondays, in the Downs Bar. October 17 is a Junk Sale, the 20th is a Visit to the Dulwich Wireless Museum, the 27th is 1296MHz Fixed Station Contest, the 31st is a committee meeting and November 4 is a natter night. More details from **John Puttock G0BVV, 53 Alexandra Avenue, Sutton SM1 2PA**.

**The Three Counties ARC** meet every other Wednesday, 8pm at the Railway Hotel, Liphook Hampshire. October 23 is 'The Development of British Windmills' by Stanley Knight and November 6 is Best Buys in Amateur Radio Equipment - presented by SMC Ltd. **Kevin Roche G8GDS on (0420) 83091**.

**Torbay ARS** meet Fridays, 7.30pm at the ECC Social Club, Highweek, Newton Abbot. October 11, 25th/November 1, 8th are all club nights and October 18 is monthly meeting & talk on 'Solomon Islands DXpedition'. More details from **Andy Stafford G4VPM on (0803) 329055**.

**Trowbridge & District ARC** meet at 8pm, in the Territorial Army Centre, Bythesea Road, Trowbridge, Wilshire, 8pm. On November 6 they have a talk on two Cellular Radio Networks, presented by **GOBBL**. More details from **Ian Carter on (0380) 830383**.

**Verulam ARC** meet 2nd & 4th Tuesdays, 7.30pm at the RAF Association Headquarters, New Kent Road (off Malborough Road), St. Albans, Hertfordshire. 2nd Tuesdays are their activity evenings and 4th Tuesdays are their main monthly meetings. On October 22, Dr. C. Sucking G3WDE will be giving a talk entitled 'Latest Developments on 10GHz'. More details from **Walter Craine G3PMF, 5 The Crescent, Abbots Langley, Watford, Hertfordshire WD5 0DR**.

**Wakefield & District RS** meet Tuesdays, 8pm in First Floor Rooms, Ossett Community Centre, Prospect Road, Ossett. October 15 is 'The Walrus' talk by G0ISJ, the 22nd is a Construction Project Introduction - G3WVF, the 29th is On the Air, November 5 is a Quiz night & Pie & Pea Supper with Sheffield & DRS and the 12th is On the Air. **John L. Bailes G0MVA on (0924) 260048**.

**West of Scotland ARS** meet Fridays, 7.30pm at the Scout HQ, 21 Elmbank Street, Glasgow. For further details, please contact **John Power G6MKT, PO Box 599, Glasgow G3 6QH**.

**Wiesbaden ARC - DA1WA** - is a club mainly for US military personal stationed anywhere near Wiesbaden, Germany. For more details, contact **Robert Kipp DJOPU, Hugelstr. 25, D-6070 Langen, Germany**.

**Wimbledon & District ARS** meet 2nd & last Fridays in St. Andrews Church Hall, Herbert Road, Wimbledon SW19. October 11 is 'Radio in Modern Aircraft' by Chris Volney G0IPD, the 25th is their AGM and November 8 is Desert Island Radio. **Chris Frost G0KEB, 61 Selbourne Avenue, Tolworth, Surrey KT6 7NR. Tel: 081-397 0427**.

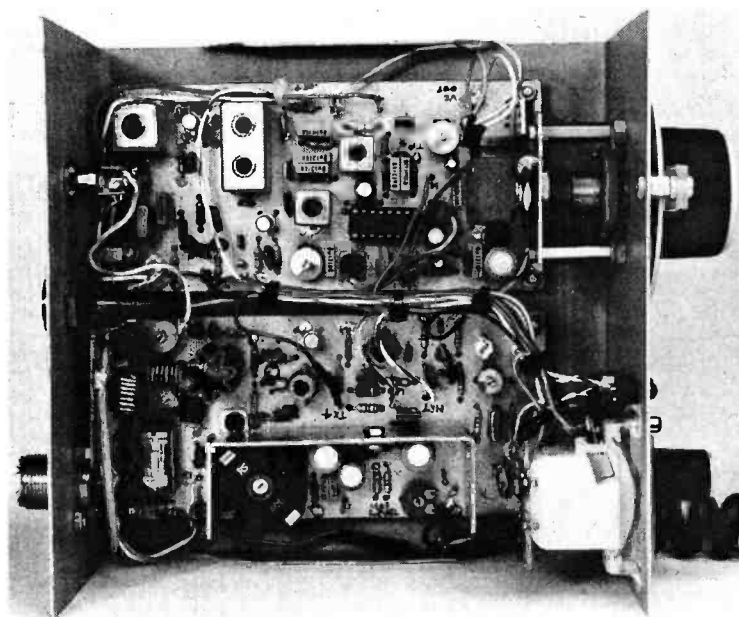
**Wirral ARS** meet 1st & 3rd Wednesdays, 7.45pm at Ivy Farm, Arrowe Park Road, Birkenhead, Wirral. October 16 is Open Forum/Problems' night and November 6 is a Chairman's night with Guest Speaker JY8SE. More details from **Alec Seed G3FOD on 051-644 6094**.

## Construction

### Errors & Updates

**PW Beaver  
50MHz Receiver  
October issue.**

*The Beaver receiver shopping list, incorrectly showed T1 as a Kank 3426 (which is the type used for T2). The correct component for T1, is a S18 violet Ferrite core (Toko), with one turn of enamelled copper wire (22s.w.g. suitable) wound over the original winding. The filter, FL1, was incorrectly shown as the CFM 455D. The correct component is the CFM 2455D. Also, L3, shown as a S18 violet, is incorrect, and it should be KANK 3333, which is 45µH, to provide the correct tuning range. (My apologies for these errors: Editor)*



*This month, Mike Rowe G8JVE describes the transmitter circuit and other details of PW's simple 50MHz a.m. 'starter' rig.*

## The PW Beaver A Simple Transmitter-Receiver For 50MHz Part 2

Having described the receiver in detail last month, I'll start off this time by describing the Beaver transmitter circuitry. The transmitter circuit is shown in Fig. 2.1.

Suitable frequencies for operating a.m. were discussed with the band-planners, and together we came up with workable channel based around 51.3MHz. Clubs and groups may want to make bulk orders on the crystals, as there are rewarding discounts to be had this way!

The oscillator is a Colpitts type using 3rd overtone crystals, tuned by a trimmer capacitor on each channel. The output of 51.3MHz is coupled from the emitter by a series tuned circuit to the buffer amplifier, which is a dual-gate m.o.s.f.e.t.

This device was chosen for its high impedance which reduces damping on the series circuit. The output from the buffer is link-coupled to the power amplifier, which is operated in class AB. Bias is provided by R36, 37, and 38.

The emitter is decoupled both for r.f. and a.f. and modulation is provided by the audio amplifier, to the p.a. stage by a home-wound modulation transformer, T4. Modulation level control is provided by R39, and the stage is adequately provided with r.f. decoupling on its inputs. The r.f. output to the filter board is matched by C54 and 55 and L11.

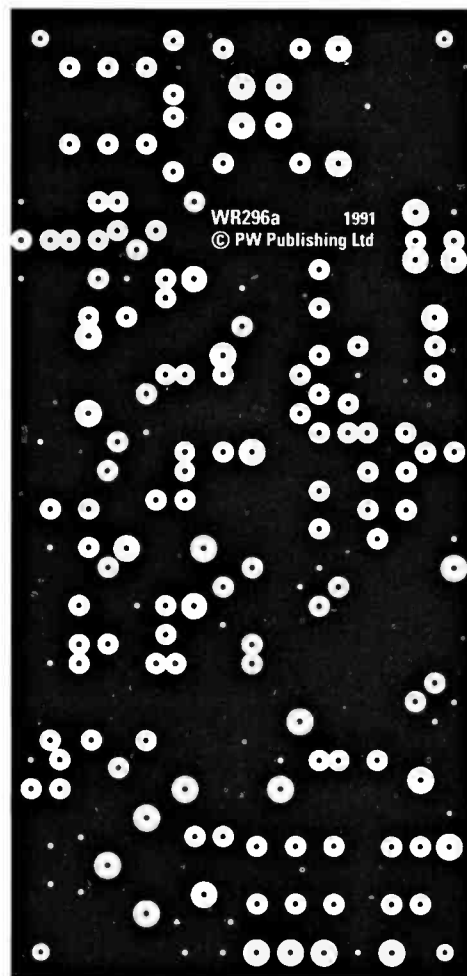
### Switching And Control

Power supplies to the transmitter, receiver and antenna switching are controlled by relay RL1, which is operated by the p.t.t. switch on the hand-held microphone. Protection against back e.m.f. from the relay coil is provided by D4.

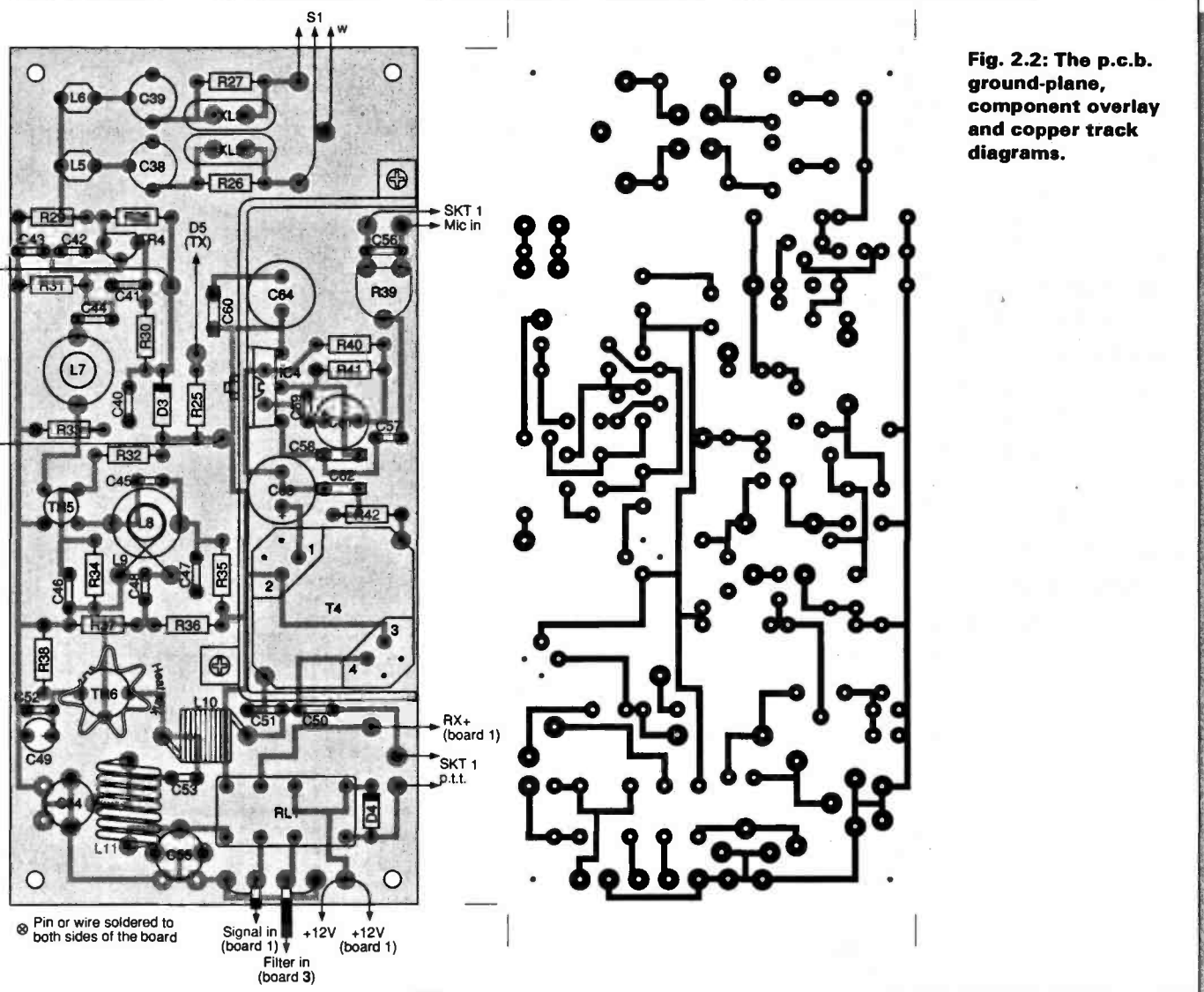
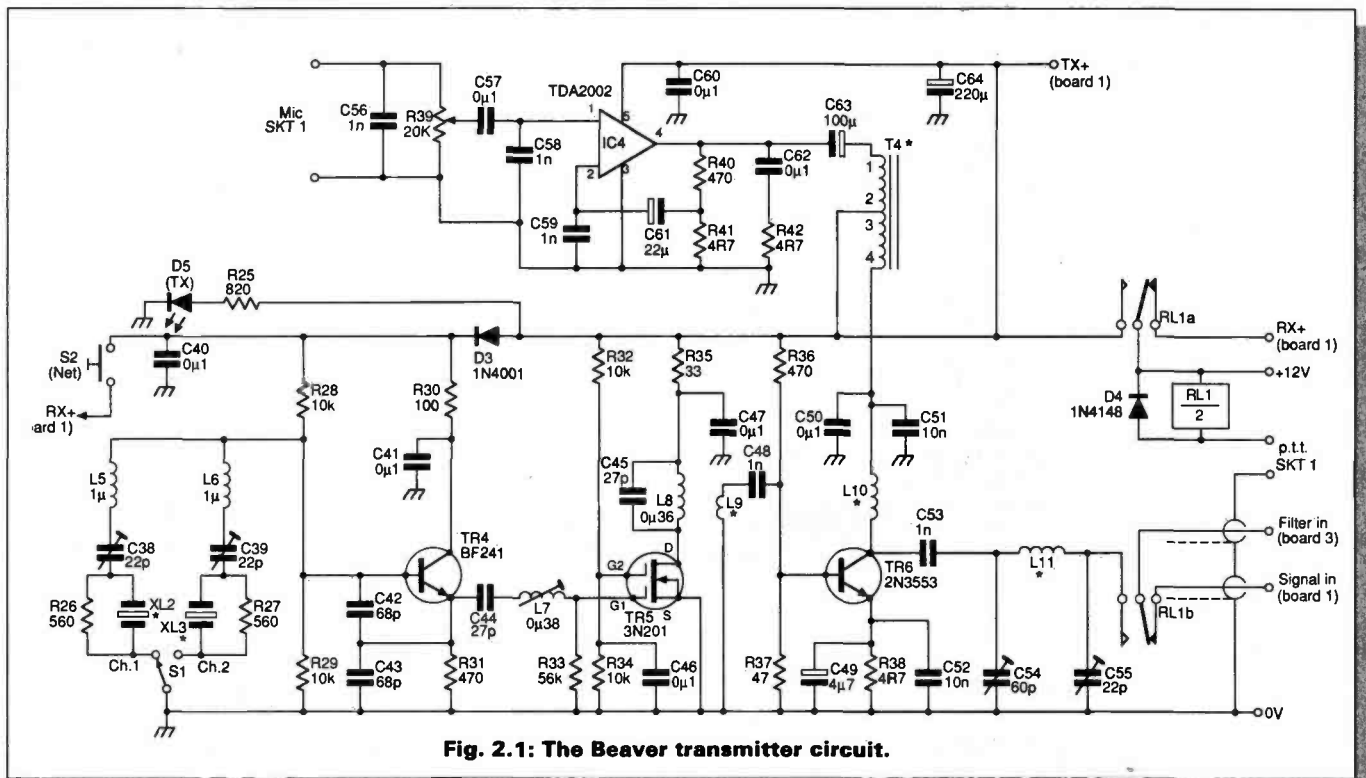
An additional supply to the transmitter oscillator only, can be applied, during reception, for netting purposes. This supply is provided by S2, which is a push-button type. When the transmitter oscillator is switched on, for receiver tuning purposes, the supply is taken from the connection RX on board 1. The diode, D3, is reversed biased under these conditions and the buffer amplifier, p.a. and modulator stages cannot be energised.

### Modulation Transformer

The modulation transformer, T4, is a centre-tapped home-







wound job, using a special former, the RS Components Ferroxcube 228-264. This is also available from Maplin Electronics as part FT33L.

The cores are designed for power oscillators and switch-mode power supply systems. The component is made up from two 'E'-shaped halves of the ferrite core, and a moulded former.

You must take great care when handling the ferrite sections, as they are very brittle. However, if you do break them, the two halves can be glued and used, but it's better to be careful in the first place!

### Moulded Former

The transformer (in effect an auto-transformer) is wound on the moulded former, and the E-shaped ferrite cheeks are then added to the assembly. Wind the primary using 32s.w.g. enamelled wire starting from pin 1, (T4 Fig. 2.1) making 50 turns connecting to pins 2 and 3 (this forms the centre tap) which is then followed by the secondary winding which is made up by a further 110 turns finishing up at pin 4.

Finally, when you're soldering the winding lead-outs to the pin connections on the bobbins, make sure that you thoroughly tin the wire before soldering.

### Transmitter Construction

You should start the transmitter construction in the same way I advised you to use on the receiver. It's best to use the p.c.b. component overlay guide, Fig. 2.2, when you're fitting all the resistors and capacitors. Don't forget to check the polarity of the capacitors where necessary.

After you've completed that job, it's time to wind the coils, L10 and L11 and fit them to the board. Next, it's the turn of the ready-made Toko coils, and these can be correctly orientated by using the locating moulding on the side of the coil.

The coil, L9, is a 1 turn winding wound over L8 (a ready-made Toko coil). The winding is formed from insulated wire, which is then pushed down, gently does it!, to the bottom of the former of L8.

Make sure, that when you fit the coils on to the board, that

the base of the formers nestle right up to the p.c.b. itself. This will help to keep them rigid on the board, and avoid any possible chance of frequency instability or microphony.

The p.c.b. (available from the PW PCB Service) provides an option for two crystals of your frequency choice. I recommend that you mount them in appropriate holders. However, if you do solder the crystals directly on to the board, take care and don't overheat and damage them.

### Heat Sinking

After you've finished carefully mounting the various inductors, the next stage is to fit and carefully orientate all the semiconductors. A heat-sink is needed for TR6, as this device dissipates some heat. For this particular job I recommend a 25mm long heat-sink for safe operation.

So far, so good! The next job is to fit the relay RL1, and the necessary Veropins for the off-board connections. The integrated circuit, IC4, also needs a heat-sink and this can be made from a scrap of 18s.w.g. aluminium bent as shown on the diagram, and bolted to the p.c.b. The i.c. is then bolted directly to the heat-sink, no insulating washers are necessary.

Finally, the p.c.b. should be checked for solder splashes, which could cause bridging. Don't forget to carry out a thorough search for dry-joints. This should be followed up by a final check with a test-meter to trace any possible short-circuits.

### Simply Made

We're entering the final stages now. Next time we'll be finishing the project off by assembling the filtering and metering p.c.b.s. These are very simply made, and I used the 'surface mount' technique, where the components are mounted directly on to the p.c.b.

The metering board is actually mounted directly on to the rear of the meter itself. The board is then secured by double-sided adhesive tape.

More about that next month. I shall then round off the Beaver project by describing the construction of the meter and filter boards in detail, along with the final setting-up and adjustment of the transmitter. Cheerio until then!

PW

**How Much? £30 + p.c.b.s**  
**How Difficult? Intermediate**

### Shopping List

#### Resistors

Carbon film 5% 0.25W

4.7Ω	3	R38, 41, 42
33Ω	1	R35
47Ω	1	R37
100Ω	1	R30
470Ω	3	R31, 36, 40
560Ω	2	R26, 27
820Ω	1	R25
10kΩ	4	R28, 29, 32, 34
56kΩ	1	R33

#### Rotary

20kΩ	1	R39 (see text)
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#### Capacitors

Disc ceramic

27pF	2	C44, 45
68pF	2	C42, 43
1nF	5	C48, 53, 56, 58, 59
10nF	2	C51, 52
0.1μF	8	C40, 41, 46, 47, 50, 57, 60, 62

#### Variable

22pF	3	C38, 39, 55 Miniature foil trimmer
60pF	1	C54 Miniature foil trimmer

#### Electrolytic

Radial 16V working minimum

22μF	1	C61
100μF	1	C63
220μF	1	C64

Tantalum bead 35V d.c. working

4.7μF	1	C49
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#### Semiconductors

BF241	1	TR4
TDA2002	1	IC4
1N4001	1	D3
1N4148	1	D4
Red l.e.d.	1	D5
2N3553	1	TR6
3N201	1	TR5

#### Inductors

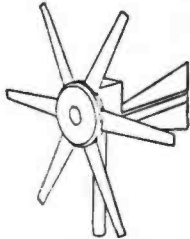
L5	7BA 1μH choke
L6	7BA 1μH choke
L7	S18 violet ferrite core (Toko)
L8	S18 violet ferrite core (Toko)
L9	1 tum insulated wire wound over L8 (see text) diameter.
L10	10 turns 26s.w.g. enamelled wire, 5mm internal diameter
L11	7 turns 22s.w.g. enamelled wire, 5mm internal diameter.
T4	Wound on RS 228-258 RM10/400 ferrite core/bobbin (See text for details)

#### Miscellaneous

Microphone (Pye a.m. type or similar), suitable microphone socket (SK1), Maplin Electronics case 231 or similar, Jackson slow-motion drive or similar, d.c. input jack, fuse-holder, Relay double-pole changeover 12V operating, RS Components stock no. 351-831, tuning meter (Cirkitt), u.h.f. type socket, mounting hardware, 6mm threaded pillars, miniature push switch (netting switch S2, see text). Single-pole changeover switch (S1). Suitable crystal holder and crystals (see text for frequencies). Crystals are available from various sources including QuartSlab Marketing Ltd, PO Box 19 Erith Kent DA8 1LH, and Piezo Products Ltd, of Millstream Trading Estate, Christchurch Road, Ringwood Hampshire BH24 3SD and Gollidge Electronics of Merriott, Somerset TA16 5NS. (See text for bulk-order discounting).

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2 x 22p stamps for List 47

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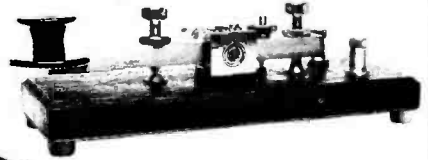
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## Quality MORSE KEYS

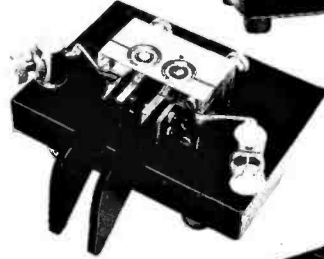
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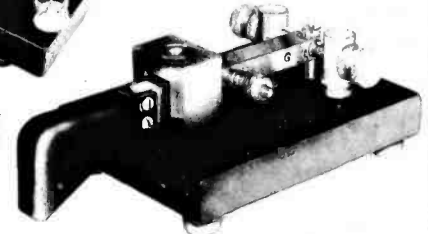
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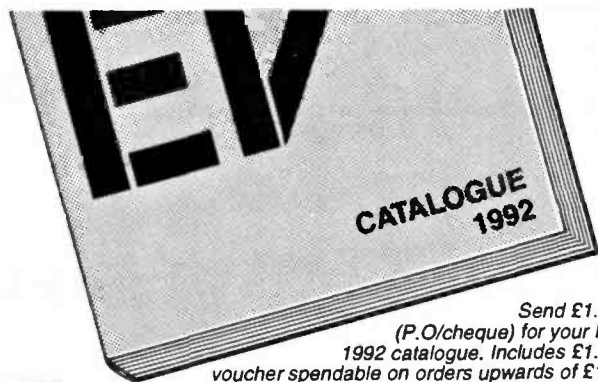
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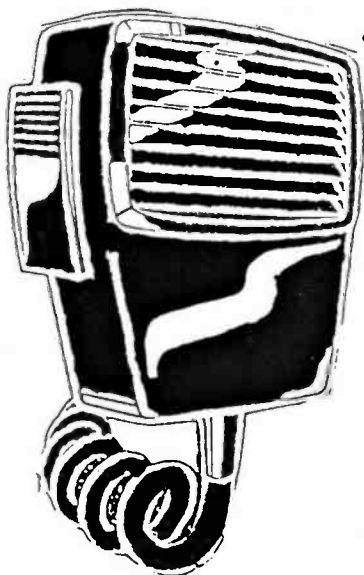
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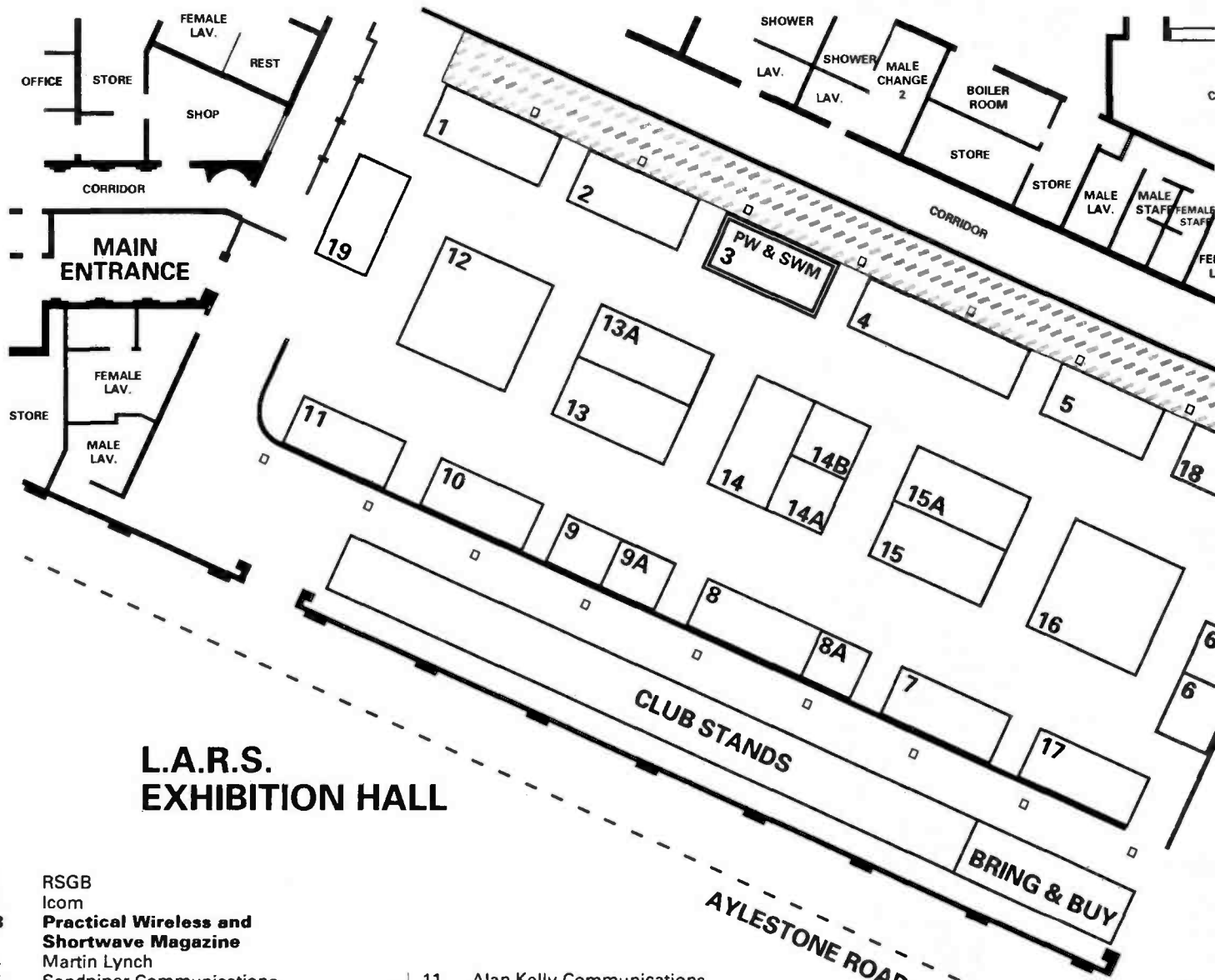
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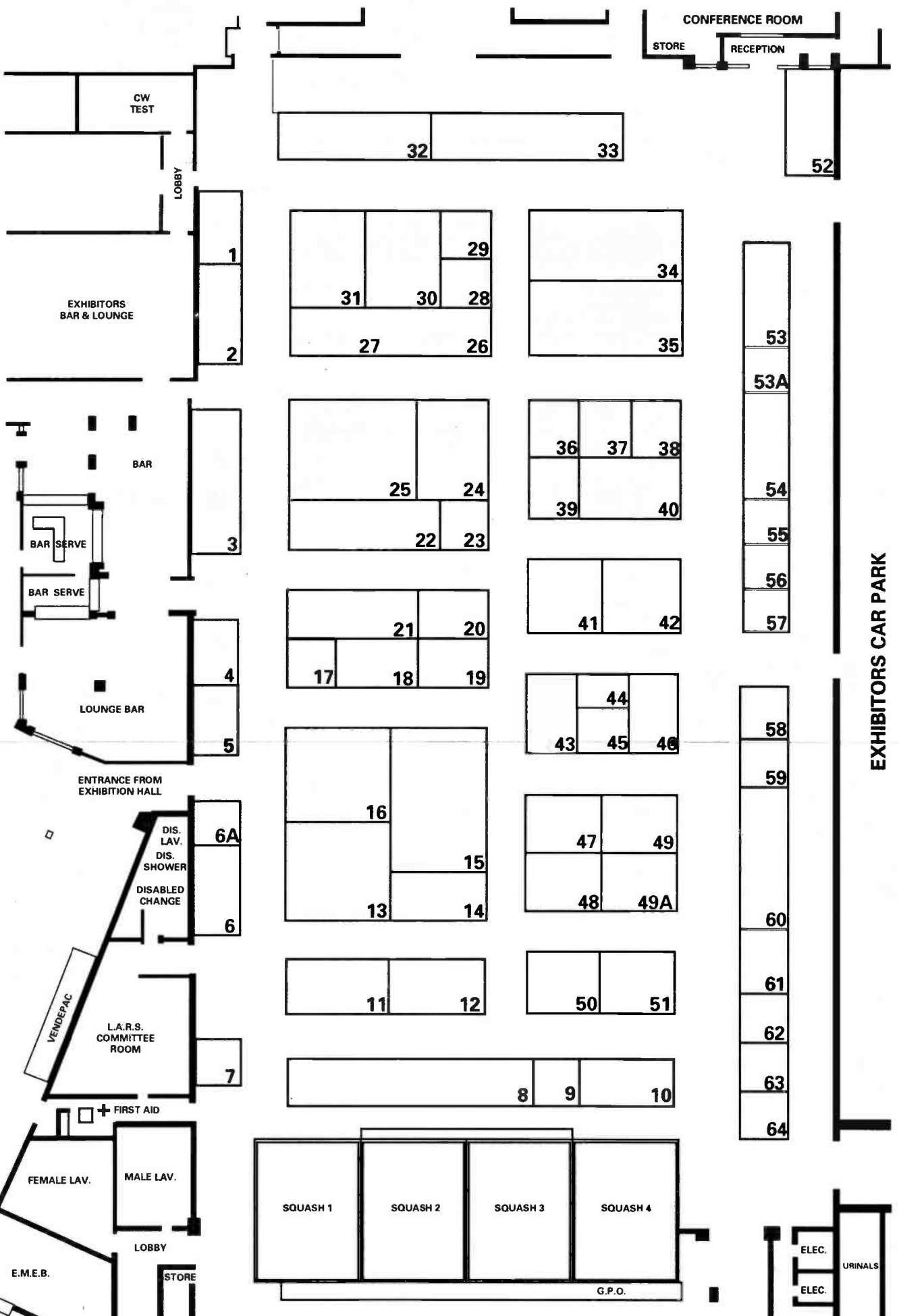
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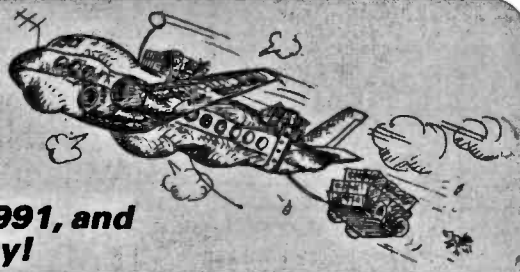
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# A Holiday of a Lifetime Remembering The Gambia

**W**here is the Gambia I hear you ask? Well, it's a small strip of land approximately 240 to 320km long and anything from 24 to 48km wide around the River Gambia.

Why is it called The Gambia and how did it come to be? Well, this rather unusual strip of land takes its origin from the slave trade. The crafty British made sure that they had the land beside the river, and therefore had communication inland.

The British maintained a presence until 25 years ago, when the country became independent. The capital Bathurst was then renamed Banjul.

## Easy Location

The first thing I must say is, how easy it is to work from The Gambia as an amateur radio DX location. As a holiday it's also a great pleasure as Ernie C53GS, and his charming wife Anna make everything so easy.

All you have to do is to send a photostat of your validation document, and on arrival in The Gambia, there's a reciprocal licence, rigs and a beam antenna waiting for you!

When you arrive in Banjul, local people immediately ask if you have any British newspapers. These are normally extremely scarce, and are looked on as a good source of income by the boys at the airport.

## Beside The Sea

Our delightfully named guest house, 'Bunkoyo', was only about 400m from the Atlantic Ocean. So it's not surprising that a short CQ brings back an almost immediate call from the USA.

After the initial CQ, there can be as many as 300 people calling you at once! One of the reasons for the amazing 'pile-ups' is that apparently, your callsign immediately goes into the bulletin boards of DX packet clusters and is seen on the screens throughout the USA.

During the three weeks that I was there, I had about 750 QSOs, mainly to the USA during the night on 14MHz. In February 1989, Nigel G3TXF and Roger G3SXW made 14 783 contacts in a week!

This staggering number of contacts shows what can be done if you put your mind to the business. It makes my 750 QSOs look rather puny, but after all, I was on holiday!

## Melon Medicine

Anna, our hostess, told me that G3XTF and G3SXW gave her a most difficult job. She had to literally prise them away from the rig to have a meal. And that's saying a lot because the food was really first class.

She also had to treat them for swollen feet, using, funnily enough, water melon! This delicious swollen-foot remedy now grows in their garden, along with papayas, bananas, mangoes and other 'goodies'.

My day usually started with a 'sked' at 1000UTC with my friends in north Norfolk and, of course, my old colleague G3MY. In order to try and escape forming a pile-up, it was previously arranged that they would call me.

*The Gambia is the smallest independent republic in Africa. Doctor Tom Appleby G3RZ, shares the thrill of a visit to this fascinating country, where every amateur station coming on air is much sought after!*



**Fig. 1: Doctor Tom Appleby G3RZ working the bands while on holiday in The Gambia.**

We were successful almost every day, but often ended with a free-for-all with other Europeans jumping on the band-wagon.

## Interesting Countryside

One of the pleasures away from amateur radio, was when I toured around with Anna and Ernie to see something of the interesting countryside. In the evening, we would watch a video or just chat, before the real work of the day started.

Usually I worked from about 2300-0400 or 0400-0730 or so, with several trips to the fridge for a cool drink. However, after the first CQ and a normal chatty QSO, all hell was let loose!

I soon had to learn how to handle a pile-up. Everyone was calling at once. It was difficult to pick out a number and a letter consecutively, let alone a callsign.

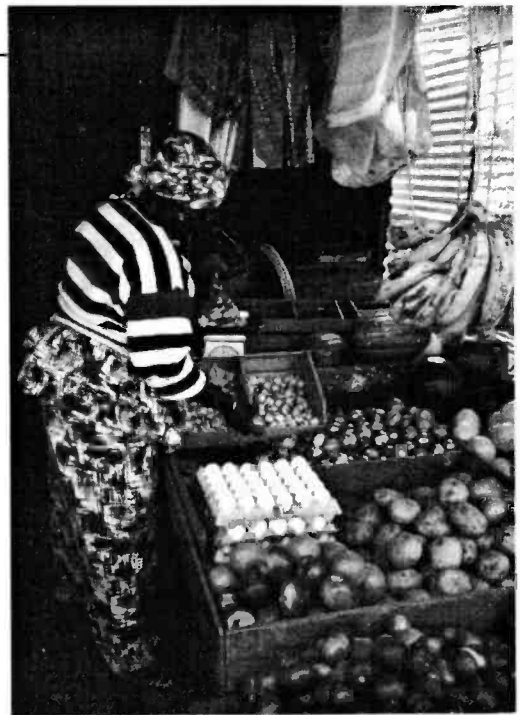
The other hazard was that some operators insisted on calling even when I was in contact with somebody else. The frequency soon ended up as pure bedlam.

I found that if I made a list of consecutive letters heard, and then called for silence, that was the easiest way of managing the situation. My QSL information, station details, etc., could then be given at regular intervals.

But despite my organised methods, it soon became a real toil to sort out from the general noise, even consecutive pairs of call letters. Working split frequency didn't help much, until I realised that it was a mistake to say "listening 5 or 10kHz down" as the problem still remained.

The thing to do was just to say "listening down", and then at least the stations calling me were spread out a bit! I then had the chance of catching the stations on the upper and lower edges of the noise.

**Fig. 4: Everything's fresh at the local 'supermarket' !**



**Fig. 2: Tom's holiday QTH 'Bunkoyo' in The Gambia, (the h.f. beam antenna was mounted on the roof).**

### Impressive Hunters

I was extremely impressed with the persistence of the DX hunters. On my last night, I was amazed by the number of people who said "Thank God I've caught you at last. I've been calling you every night for the last two weeks". It's nice to be popular, perhaps for the first time in your life!

On the whole, but with certain exceptions, I found that the American stations were extremely good. They were well disciplined, and it was a pleasure to be able to give them a new country for DXCC.

One interesting point, was that I heard very few Russian stations. Their place was taken by the South Americans who were there in profusion.

### Long Distance Shops

West Africa is around 5000km from the United Kingdom. Any radio amateur visitor soon realises that, for all practical purposes it's virtually the same distance from the nearest supplier of radio equipment.

The Gambia is also a Third World country, with all the associated problems. Electricity, for example, may be off at times for practically the whole day. Another problem is that the water supply is only available for short periods during the morning and evening.

Because of this everyone has large water storage tanks. The Hotels have their own generators, but fuel is often in short supply. We spent many hours driving around, looking for a filling station with petrol.

When we did find petrol, often there was no

electricity to work the pumps. Filling the tank had to be done by the 'Armstrong method'. Or should I say by the 'strong arm' method!

### Beam Heading

For operating purposes I had an FT-101ZD, and for back-up, a FT-707 working from a 75AH battery. The important thing however, was to remember to leave the beam pointing in the direction in which it might next be needed, before going QRT. It was quite possible that there would be no earthly (electrical) means of turning the beam when it was next needed.

It's helpful if you can do your own servicing, as there's no-one to do it for you. There are few radio amateurs in The Gambia, apart from a few priests and nuns who use the facilities for purely local communication.

### Pleasant Winter

West Africa used to be called 'The White Man's Grave', but nowadays nothing could be further from the truth. Up country can be very sticky, and perhaps a bit uncomfortable. On the coast however, it's very pleasant indeed, especially in the winter.

There always seems to be a refreshing breeze coming from the Atlantic. Indeed, when I was there in January, everyone was complaining bitterly about the cold!

The local people were wearing woolly jumpers, although I was very happy in pair of shorts and a Tee-shirt, even at four o'clock in the morning.

### Healthy Advice

Before going to The Gambia, you should take advice on health precautions. It's also essential to have a Yellow Fever injection. The protection given by the inoculation lasts for ten years, and my injection gave no reaction at all.

You also have to take anti-Malaria drugs, but this is no great sweat! (groan). There are, I suppose quite a few mosquitos, and I did get the odd bite, but they don't really cause a problem.

For anyone wishing to work DX from a rare country, I can thoroughly recommend 'Bunkoyo'. I'm certainly going back there again. It's quite easy, just drop a line to C53GS, PMB 274, Serekunda, The Gambia.

I'm looking forward to seeing you there!

PW

**Fig. 3: A Gambian amateur radio 'pile-up' consisting of Ernie C5GS, Tom G3RZ, Phil G3SWN and Peter OZ9PP.**



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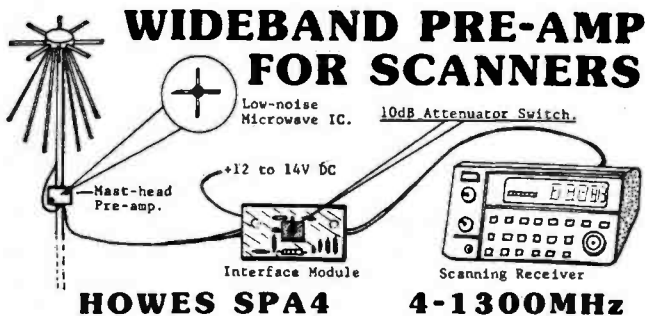


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**73 from Dave G4KQH, Technical Manager**

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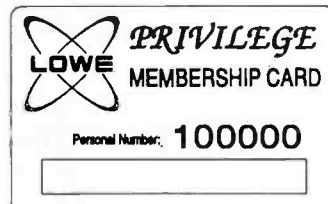
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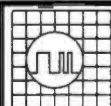
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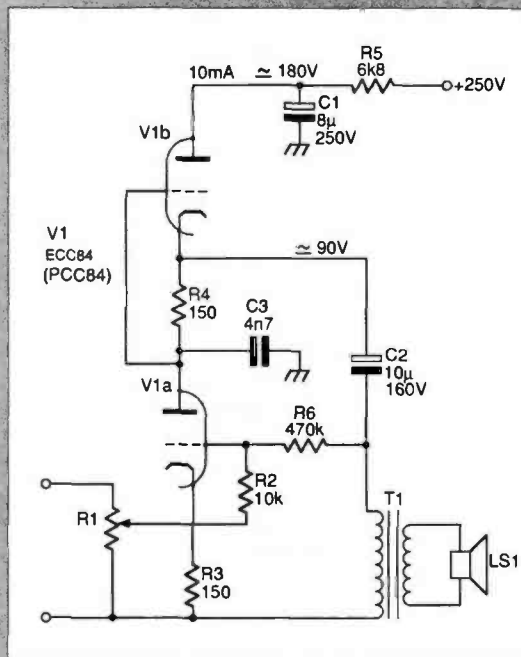
## Cascade Cathode-Follower

I have often restored ex-military receivers, and like many I've tended to use the 'standard' single-ended valve output circuit. This is fine if the original, or a suitable output transformer is available. There comes a point though, when they are not available. What then?

This circuit is one answer to that question. It is a cascode cathode-follower, with gain controlling feed-back. Valve-half V1a acts as a common-grid amplifier with the other half of the valve, V1b, acting as the anode load. This other valve-half not only acts as anode load, but also as a cathode-follower for the output side. The output impedance of a cathode follower is only a few hundred Ohms. This is unlike the anode output impedance, which may be several hundred kΩ, and unsuitable for driving a loudspeaker or headphones directly.

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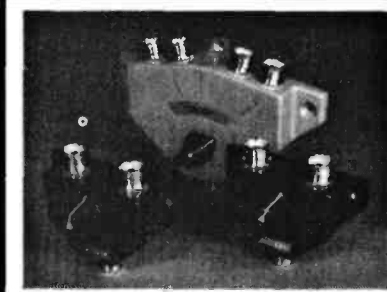
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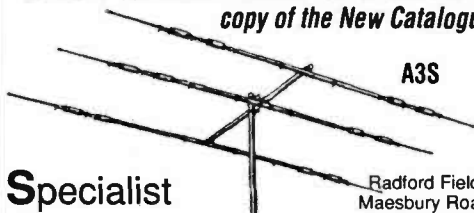
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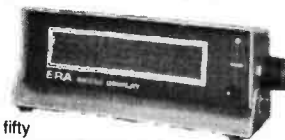
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# REVIEW

**A**lthough I was told that the COM-RAD Industries 'Untenna' was on its way for a possible review, I was rather surprised when it arrived. When I first saw the unit, I thought it was part of a food mixer, complete with its plastic bowl!

This was a rather inauspicious start for a review on a very specialised v.h.f. and u.h.f. antenna, specifically designed for mobile use. However, as you can see from the photographs, I could be forgiven for the first, false, impressions!

My look at the antenna is not an in-depth trial. Although I didn't get the opportunity to use the 'Untenna' on a test range, I tried it in various applications. I also received valuable 'on air' comments from other operators before reaching my conclusions.

## Low Profile

I was intrigued with this low profile antenna from the very start. It's designed for those applications where a normal sized antenna can't fit. The American manufacturers, COM-RAD Industries of Grand Island, New York, aim at large lorries and other high-roofed vehicles where antennas are prone to damage.

The other advantages with this format are that the assembly doesn't attract attention from unwelcome directions (vandals) and that it provides dual-band operation from one very compact unit.

## What is it?

The 'Untenna' is in fact a form of 'Halo' antenna, providing vertically polarised, virtually omni-directional transmissions on 144 and 430MHz. Although aimed specifically at the vehicle mobile market, it has many other applications.

The unit I had on loan from the UK importers, Bredhurst Electronics, came complete with a magnetic mounting assembly. The manufacturers also offer a direct mounting system for permanent fixing on a vehicle. I found that the magnetic-mounting made the 'Untenna' a very versatile unit, and quite frankly, for this particular antenna, I can't see any demand for the version that requires a hole to be made.

Made from stainless steel, brass and bronze, the 'Untenna' is a robust little device. With its two tuning

discs for 144 and 430MHz underneath the radiating elements, it will certainly stimulate technical discussions if the reaction from the staff of *Practical Wireless* and *Short Wave Magazine* are anything to go by!

## Matching And Tuning

As supplied from the manufacturer, the 'Untenna' is matched into 50Ω. However, there's an adjustable impedance matching point on the v.h.f. and u.h.f. elements so that final adjustments can be made.

The antenna tuning is carried out by adjustable discs projecting down from the main elements. In operation I found this was not a difficult job, as it can be done while receiving signals 'off-air'. However, I discovered that the disc had to be re-adjusted when the antenna was moved, even on the same vehicle.

The manufacturers claim that the tuning disc on 144MHz tunes the antenna between 144 and 151MHz. My measurements agreed with their claim, but I found that tuning at the lower frequency end of the band, was quite critical. This was due to the tuning disc drawing closer to the vehicle bodywork.

On 430MHz, the tuning was much more critical, due to hand capacity effects. Despite this, once I had set the antenna up, it worked very well indeed.

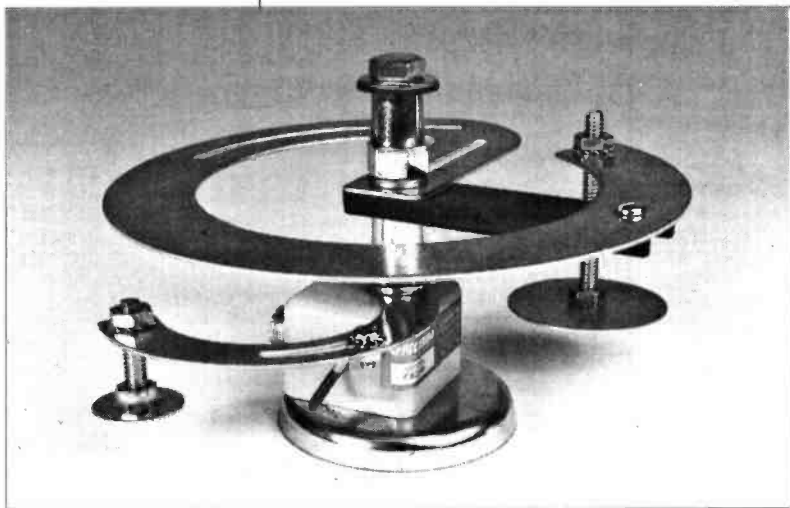
Although the 'Untenna' is supplied with a radome type of plastics housing, I was concerned as to whether or not rain could cause detuning. To this end I thoroughly wetted the car roof, before replacing the antenna. Sure enough, the resonant frequency had shifted down a few kHz, but it didn't seem to make any difference on the s.w.r. readings or reported signal levels.

## Using The Untenna

On 144MHz, I compared the performance of the 'Untenna' with the λ4 magnetic-mount whip I've got on my elderly Ford Escort estate. Without exception, everyone I worked reported no measurable difference in the signals received from either antenna.

Sufficiently convinced that it was working, I set off gingerly and drove along the busy A31. I was half expecting to see the radome assembly appearing in the rear-view mirror in full flight! Needless to say, I needn't have worried and it stayed firmly in place and provided excellent signal reports.

*An unusual v.h.f./u.h.f. antenna has recently arrived from the USA, and after trying it out, Rob Mannion G3XFD says that it could prove to be the answer for some of those 'difficult' mobile applications.*



# The COM-RAD 'Untenna' 144 & 430MHz Mobile Antenna



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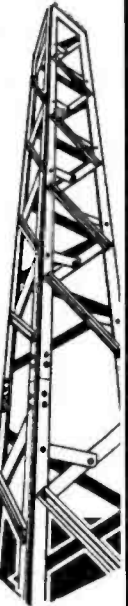

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# REVIEW

For testing on 430MHz I used a Kenpro KT-44 hand-held transceiver, courtesy of Tex Swann G1TEX! While parked on some high ground, I managed to work several stations on the 'rubber duck' before transferring to the 'Untenna'.

The 'Untenna', as I'd expected, proved better than the transceiver's antenna. Other operators noticed signal levels two to three S-points higher than with the KT-44's 'rubber duck'.

On the 430MHz band I didn't have anything else to compare the 'Untenna' with. Despite this, I felt quite satisfied that it provided a useful, low profile antenna as it brought me some good signal reports.

## An Ideal Solution

Altogether, I think that this antenna will prove to be very useful for any keen mobile operator owning or driving a 'difficult' mobile QTH. By 'difficult', I have in mind Luton-bodied vans, motor-caravans, lorries and other slab-sided or high-top vehicles.

Motor-caravans (particularly coach-built) are very difficult vehicles when it comes to fixing mobile antennas. Personal experience with a Commer 'Highwayman' over a 15-year period proved that point for me!

Many vehicles, even large lorries, have roofs and cabs made from non-metallic materials nowadays. That could be a problem, but the 'Untenna' can cope with this situation, provided that it is located on a metal plate. The manufacturers recommend a minimum metal plate size of 300mm<sup>2</sup> for effective operation.

## Specifications

Frequency range	144 to 151MHz v.h.f. and 430 to 470MHz u.h.f.
Impedance	50Ω
Power handling	200W
Height	130mm (from magnetic base)
Dimensions	96 x 240mm (radome mounted)
Weight	700gm (approximately)



The 'Untenna' mounted on a Luton-bodied van next to a standard flexi-type car radio antenna.

## Other Uses

Earlier on in the year, my wife and I had a delightful holiday on the Oxford canal, travelling up as far as we could, eventually ending up on the Ashby canal. I took a 144MHz hand-held transceiver, and enjoyed myself chatting away while working /IMM (Inland Maritime Mobile?).

Antennas are a problem with narrow boats, and the 'Untenna' would have been the ideal system to use on the boat we had. The magnetic base would have adhered well to the steel-hulled craft, and I would have been able to work from the cabin rather than stay up on the deck during the QSO!

## Summary

So, to sum up, I think that from my practical, 'on air' tests and subjective trials, the 'Untenna' will prove to be very useful. In my opinion, the antenna will soon find its way on to the Norfolk Broads and the inland waterway network.

It is so unlike the usual antenna (hence 'Untenna'), that many operators will find it a useful 'invisible' radiator. It could live on a roof, with very few people realising what it is. At least, I now know what it is, and won't be caught by surprise again!

My thanks for the loan of the review model 'Untenna' go to Bredhurst Electronics Ltd., of High Street, Handcross, West Sussex RH17 6BW. Tel: (0444) 400786, who can supply the 'Untenna' for £69.95 inclusive of post and VAT.

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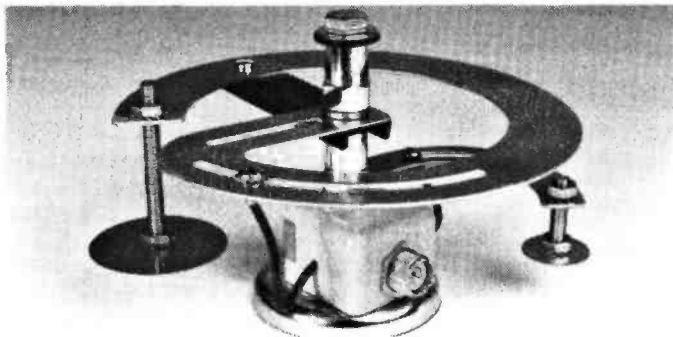
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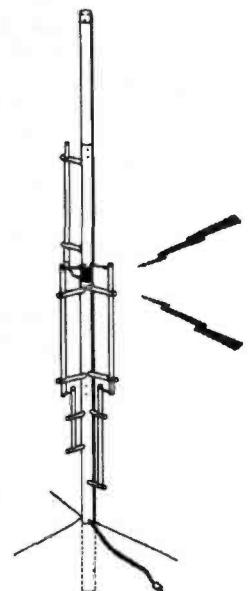
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# From Bookbinding To The Story Of Michael Faraday

Michael Faraday. Taken from *British Scientists Of The 19th Century*, by J. G. Crowther, (1935).

Novice radio amateur Richard Marks 2E1AAQ, indulged in a little mental time travel during an exam. Richard eventually discovered some fascinating details on Michael Faraday and reminds us about a special exhibition on this great man.



While I was sitting the Novice radio amateurs' examination last May, my mind wandered back in time, more than a century and a half. What started the journey? It was when I had arrived at the question asking about transformer ratios!

My day dreaming may not have done my examination chances much good, but without Michael Faraday's huge strides forward in electrical discoveries, there would be no transformers to ask questions about!

I found out that Count Rumford founded the Royal Institution in 1799. Eight years earlier, an even greater event happened, Michael Faraday was born. As I show later, these two events became very important.

## Poor Family

The birth of this boy in 1791 added to the family's problems, as he was one of ten children in a poor working class household. As he grew up, there was little chance for anything that he wanted to do, because he only learned the basic things.

But at the age of 13 he started as an errand boy to George Riebua, and then a year later he became this old bookbinder's apprentice.

Some time later, a visitor to the bookbinder's shop gave him tickets to four of Sir Humphrey Davy's lectures at the Royal Institution. He found the performances so interesting, he followed up with other visits.

Michael Faraday made notes and sent them bound in a book to Sir Humphrey, asking for a job to do with science. Davy warned Faraday that: "Science is a harsh mistress".

## New Assistant

Despite the warning, he started as an assistant in 1813. Also in 1813, Davy decided to go to Paris with his new wife, and to take Faraday along too. Unfortunately at the last minute his valet panicked at the thought of being among enemies, as England and France were at war, and refused to go. Lady Davy chose to regard Faraday as a servant.

Later, Faraday started his own experiments. These were based on the remarkable discovery by Hans Christian Oersted in 1820, that electric currents produce magnetism.

Faraday tried to do the opposite thing. He found you can get electricity from a magnet, by making a coil and moving the magnet in and out of the coil.

## The Transformer

The crowning glory of this search came on 29th August 1831. Michael had successfully constructed the first transformer.

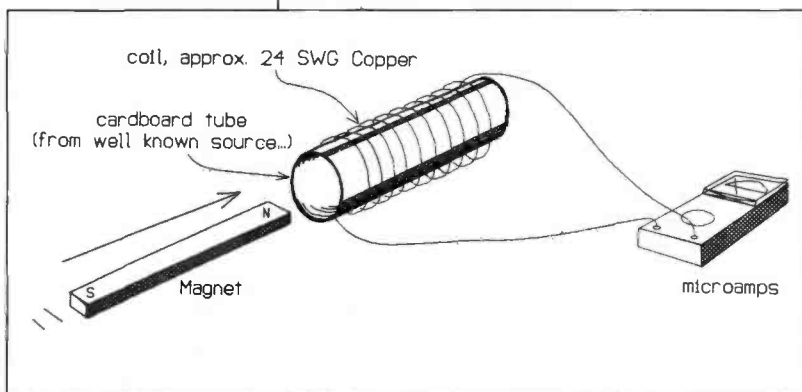
He wound two coils of insulated wire on opposite sides of a soft iron ring, which was thought to be from an anchor. When he passed a current through the first coil, a pulse of current twitched the needle of his galvanometer connected to the second coil.

Was Michael Faraday the first 'radio amateur', with his success in passing a 'signal' from one coil to a completely different one 'some distance away'? Perhaps not, but it has all come from this great work.

However, part of a letter Faraday wrote to his young friend Benjamin Abbott makes interesting reading: "I Sir, I my own self, cut out seven discs (of zinc) the size of halfpennies each. I, Sir, covered them with seven halfpences and interposed between seven or six pieces of paper soaked in a solution of muriate of soda".

I think that this enthusiasm shows the very same curiosity and sense of fun, that the best of radio enthusiasts show to this day in their urge to keep on experimenting.

**Fig. 1: You can wind a coil of thin copper wire along a tube of, for example, cardboard. Make this so you can move a magnet as shown. Then, with a microammeter connected you will see the induced pulses of current as the magnet moves. Just as Faraday discovered!**



# Capacitors

The Faraday ring in close detail. (Photographs allowed by kind permission of the Science Museum, London, and the Royal Institution, where the ring is normally kept).



## Interesting Experiments

You will find repeating Faraday's electromagnetic experiments just as interesting as I did. Fig. 1 and Fig. 2 show the two most easy-to-do experiments.

All you need is a bar magnet and a coil as I show, and your multi-range meter, set on the lowest current range.

If you are keen, you can repeat the 'ring' experiment in Fig. 2. If you do, you will have made a transformer a la Faraday!

I found that the work Faraday did on condensers (capacitors) and his pioneering measurement of the 'dielectric constants', has been honoured by his name being adopted as the unit of capacitance. Because of his work, we now have the Farad, and therefore the microFarad, picoFarad, etc.

So, here was the career-journey which took him from bookbinding to the capacitor. Was this journey of discovery one of the longest and most important in history? I think it was!

## Consultancy Work

Michael Faraday had given up most of his consultancy work in favour of his electrical research. He was not a rich man when he retired in 1862. He went to a house at Hampton Court which Queen Victoria made available to him, and here he spent his last five years.

Michael Faraday advised Trinity House about lighthouses, was a member of the Senate of the University of London, and examined at the Royal Military Academy at Woolwich.

He also worked on colloids, and on the passage of electricity through gases at low pressure. Some of the things Faraday began were carried on by his admirer William Crookes and then by J. J. Thomson.

In 1897 at Cambridge, they 'discovered' the electron



Richard Marks 2E1AAQ standing by an exhibit of the actual ring Faraday wound in 1831. The Science Museum exhibition of his work is open until 31st December 1991.

then first publicly described the experiments at the Royal Institution. Another admirer, James Clerk Maxwell, mathematically described Faraday's achievements in electricity and magnetism. He then added an important next step, predicting "electromagnetic waves" and therefore radio!

## Simple Headstone

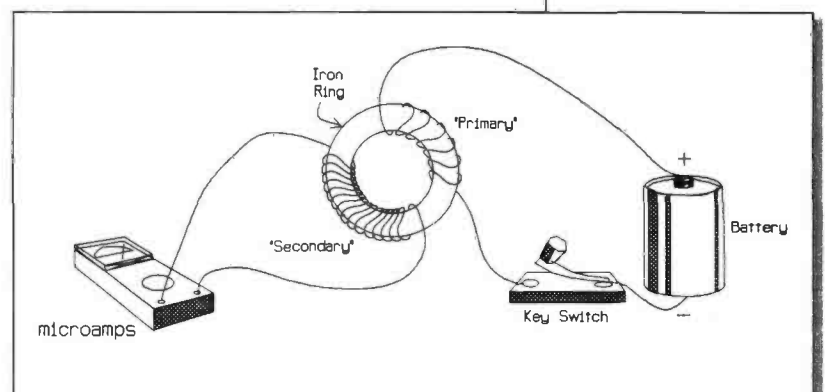
Michael Faraday, great natural philosopher and Englishman, died in 1867. His grave is marked with the simplest of headstones on his insistence. It is still standing, where it has been for 124 years.

Always a modest man, an Elder in a fundamentalist church and a gifted lecturer, he was not only one of the great Victorians, but was also crucial in ensuring that we think and live in a different world from his.

**Before I finish, I must thank my Club leader and Novice Instructor, Dr. Ken Smith G3JIX, for a little help with my grammar and style in this article.**

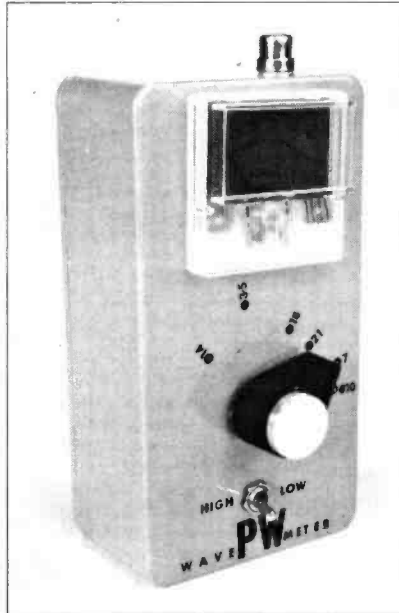
PW

**Fig. 2: The changing magnetism produced in the iron ring by a current starting and stopping in the 1st (or primary) coil, sets up 'kicks' of current in the 2nd (secondary) coil, as shown again on the microammeter. I wound coils of about 50 turns or so on a large bent nail. You could use a large link from a chain if you can find one. A friend of mine coiled strips of tin-plate into a ring, which he cut from a tin with a pair of scissors. If you do this, watch out for your fingers on the sharp edges!**



*Although Richard, who is 13 years-old, has been kind enough to acknowledge the assistance of G3JIX, Ken assures us that his help was minimal. In fact, Richard approached me at a rally with the idea of the article. His work and drawings have been reproduced with minimum of editing, and in the case of the drawings, as they were received in the office! Well done Richard. Everyone at PW wishes you the best of luck in your chosen hobby.*

**Editor.**



When I was waiting to receive my amateur radio licence, I was given a number of things by fellow members of my radio club. My first transmitter was built with the help of my friends. It contained a power amplifier valve, variable capacitors, and was housed in a case all given to me by club members. The local clubs were like that in those days!

#### Odd Gift

The oddest looking radio gift I received, was a short wooden pole with a square of Bakelite at the end. The pole held a large variable capacitor, a big open wound coil and a torch bulb. It looked like an instrument from a vintage 'Flash Gordon' film!

It was of course an absorption wavemeter. However, since it didn't cover 1.8 or 3.5MHz (my favourite bands in those days), I never used the device and lost it somewhere along the line. It's a pity I didn't keep it.

#### The Circuit

My original 'vintage' wavemeter was probably like the circuit shown in Fig. 1. As you can see, it's a simple instrument.

The wavemeter consists of a tuned circuit, which is usually equipped with a large coil to pick up the signal. This is coupled via a smaller winding to a small pilot light bulb.

In use, the tuned circuit is placed near a radiating transmitter, or the tuned output stages of a transmitter.

## Getting Started - The Practical Way

*This month, the Rev. George Dobbs G3RJV introduces and shows you how to make an absorption wavemeter, a basic but essential workshop instrument.*

The variable capacitor is then adjusted to the frequency of the transmitter. Radio frequency energy, picked up by the tuned circuit is coupled to the bulb, which then lights up, indicating the presence r.f. It also gave an indication of the strength of the signal, as the bulb grew brighter with more power.

The absorption wavemeter is still a useful item to have around the amateur radio station. They have a variety of uses with transmitters and antennas and are simple and inexpensive to build.

#### Practical Instrument

A circuit for a simple but practical wavemeter for the amateur bands from 3.5 to 30MHz, is shown in Fig. 2. You may remember that a few months ago, we looked at the circuits of a crystal set and an r.f. probe. The wavemeter circuit in Fig. 1, combines these two circuits.

A tuned circuit, formed by C1 and L1, is used to select the required frequency. The signals are received from a pick-up wire.

Wavemeters are often equipped with whip-type antennas, but a pick-up wire makes the instrument more versatile. This is because the sensitivity of the wavemeter can be controlled by the length and placement of the wire.

#### Voltage Doubler

Two diodes, D1 and D2, provide a voltage doubler detector circuit. You'll probably remember this idea from the r.f. 'sniffer' circuit we built recently.

A capacitor, C2, decouples any remaining r.f. signal to ground, and the detected signal is shown as a voltage on a meter, M1.

The meter can be any of the budget-priced types found in tape recorders. These little instruments usually have a full scale deflection of around 200µA.

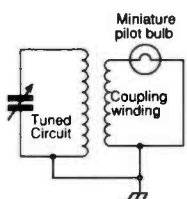
There are many of these little meters available on the surplus market. To help, I've named the source of a suitable inexpensive meter with an f.s.d. of 250µA in the shopping list.

#### Building The Project

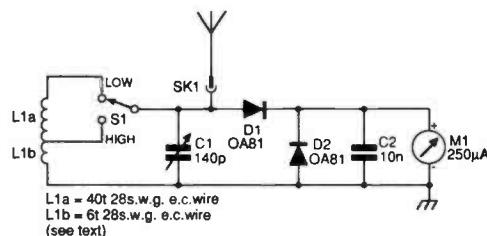
The wavemeter is housed in a plastics box, which was chosen for cheapness and simplicity. There are slight hand capacity effects (this is the effect which makes the readings change a little as the tuning knob is touched), but they are unimportant because the readings are only relative.

I used a Maplin Grey ABS Box 2004 (Order Code LH60Q) which measures 120 x 65 x 40mm, although any similar housing, made from wood or plastics would be suitable. The layout inside the box is shown in the photograph, Fig. 4. It's not a difficult job, and there's plenty of spare space.

Practical Wireless, November 1991



**Fig. 1: A basic absorption wavemeter circuit (see text).**



**Fig. 2: The practical, modern absorption wavemeter circuit as described in the text.**

## Coil Winding

Past experience has taught me that if readers do go wrong, coil winding is a common stumbling block. However, you're not going to let me down, are you?

The prototype coil was wound on a cotton reel, or cotton bobbin as they should be called. I can say this with all the authority of a Vicar, currently living in Rochdale, the best known of all Lancashire cotton towns!

The former I used, started life as a reel for the commonly available Gutermann thread, and it has a diameter of approximately 15mm. If these aren't available, even a piece of wooden dowel could be used.

## Two Parts

The coil is in two parts, L1(a) and L1(b). Begin the winding about 10mm from one end of the former by making the wire secure, with a small piece of pvc tape, and leaving a free end of some 30mm.

You should now wind 40 complete turns, close wound (side by side), on the former. This forms L1(a) and a tapping has to be made at this point.

Tapping is easy! This is done by drawing out a loop of wire about 30mm long, and then twisting the loop to make a twisted pair of the wire. This twist should keep the two ends tight to the side of the former.

A further six turns of wire are added, and the coil is finished off with another small piece of pvc tape. This forms L1(b) and completes the winding process. The completed coil should look like the diagram, Fig. 3.

More tape could be added to secure the turns but this looks untidy and I prefer beeswax. It can be dripped onto the windings and spread round the turns with a slight touch of the soldering-iron tip. I keep a block of the wax on my workbench and use it to secure coil turns and loose items on circuit boards.

## Mounting Holes

It's easy to make the mounting holes in the box using a hand-drill and small files. The layout is not critical. The bobbin coil former is a loose fit across the inside of the box, and it can be wedged with matchsticks or similar packing.

The wiring is all point-to-point, and can be seen in the diagram, Fig. 4. Remember to scrape the enamelling off the ends of the wires on the coil, and to tin the ends with solder before making connections. Finally, you should cut the end of the loop on the twisted pair of wires, cleaning and tinning both ends **BEFORE JOINING THEM**, to complete the coil tapping.

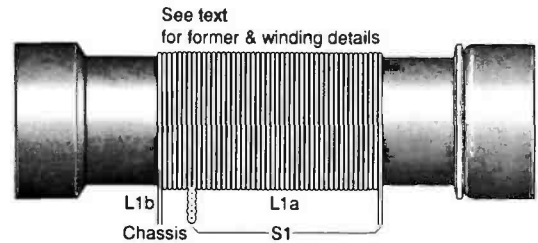
## Calibration

Accurate calibration is not needed for most applications of a wavemeter. I simply marked the positions of the amateur bands in the range 3 to 30MHz.

The easiest way to calibrate the wavemeter is to use it, which may be a problem for the non-transmitting radio amateur. The method I used, was to feed a transmitter of known frequency accuracy, with the output reduced to about 2-3W into a 50Ω dummy load.

A piece of wire, approximately a metre long, was used from the pick-up point and this was laid over the dummy load. Keying the transmitter and rotating the tuning control for a peak reading, provided me with the calibration points for the amateur bands.

**Fig. 3: Coil construction and winding details for the 'Getting Started' wavemeter.**



The bands are covered in two ranges using S1 to select the whole coil (L1 a and b) or the smaller section L1(b). The Low range covers the 3.5MHz and 7.0MHz bands. The High range covers all the bands higher than about 8MHz.

The sensitivity can be varied by moving the pick-up wire in relation to the dummy load. An alternative method, is to use a 'dip meter' to check the resonant frequency of the tuned circuit and to find the calibration points.

## Many Applications

The wavemeter has many applications. These include a tuning indicator for peaking transmitter output, testing for transmitter fundamental frequency output and detecting unwanted harmonic frequency outputs. It also provides a helpful indication as to whether an oscillator is working.

A wavemeter can also help when comparing the relative outputs of transmitter stages, and making relative field strength measurements from an antenna. It can be used when adjusting an antenna for maximum gain and radiation and for 'looking' at approximate radiation patterns from an antenna. Another, important application is the detecting of unwanted oscillations in transmitter or receiver circuits.

## Build One!

Build a wavemeter and add it to your collection of test equipment. Every radio amateur should have one. Cheerio for now, and keep building!

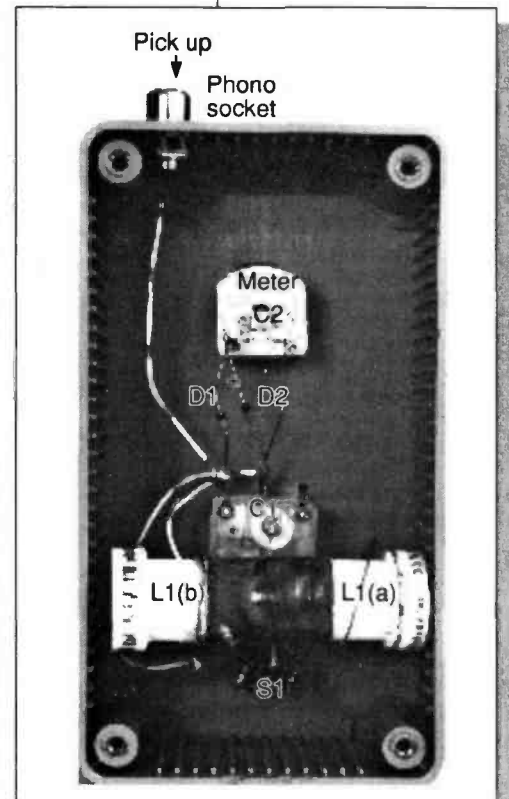
## Safety First

**A word of caution! It's dangerous to use the wavemeter too close to high power r.f. amplifier stages, especially if these contain valves and hence, high supply voltages.**

## Shopping List

Variable capacitor (Polyvaricon a.m. type) Maplin FT78K or similar. Diodes (2) type OA81, OA91 or similar, capacitor 10n miniature ceramic, meter 250μA f.s.d. Maplin LB80B or surplus meter (see text), single-pole change-over miniature toggle switch. One 120 x 65 x 40mm ABS plastics Maplin LH60Q or similar type. Single hole fixing phono socket, pointer knob, coil former: Gutermann cotton bobbin or similar (see text). PW

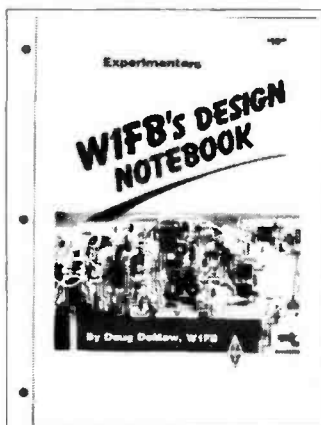
**Fig. 4: Diagram of the completed meter, showing the simple construction and point-to-point wiring.**



# Book Reviews

**W1FB's Design Notebook**  
Doug DeMaw W1FB  
American Radio Relay League  
ISBN: 0-87259-320-7  
198 pages, price £8.50  
Available from PW Book Service, £1 post and packing.

The name on the front cover of this book should be enough to make many constructors go out and buy it immediately. Doug DeMaw's reputation is such that all his work commands attention. This, notebook-form, robust little manual is no exception. The newcomer to home-construction can feel quite confident that W1FB's guiding hand is there all the time, while the more experienced amateur will find much of interest. Amongst many other areas, it covers topics such as: designs and techniques, from semiconductor basics to their applications and on to construction practices, practical receivers and transmitters. There are many excellent projects and ideas, and it's a book to be recommended for your bookshelf.

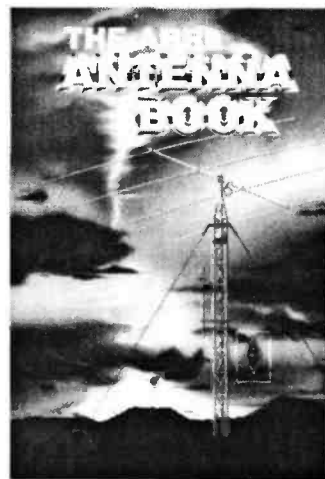


**The Satellite Experimenter's Handbook**  
Martin Davidoff K2UBC  
American Radio Relay League  
ISBN 0-87259-004-6  
150 pages, price £14.50  
Available from PW Book Service, £1 post and packing.

The growing awareness of radio amateurs on amateur radio in orbit, is graphically demonstrated in the fact that this book is in its 2nd edition. As usual, the ARRL have done it again, and have produced another, clear, concise and 'easy reading' text book on a very deep and fascinating subject. Martin K2UBC covers a very wide subject area in his book, ranging from a look at the early history of 'amateur radio in orbit' to fundamentals, with a good section covering the often confusing topic of antenna techniques and polarisation. The 'getting started' section is well worth looking at if you are interested in the exciting world of AMSAT and OSCAR. The more advanced enthusiast is well catered for with some in-depth articles and up-dates covering orbits, tracking, radio links, systems and the very interesting 'So You Want To Build A Satellite?' section. The attraction of this book is made greater by an easy-read, bold typeface that is very pleasant to read in conjunction with the usual high standards of graphics. Recommended for your bookshelf.

**The ARRL Antenna Handbook**  
Edited by Jerry Hall K1TD  
American Radio Relay League  
ISBN 0-87259-206-5  
300 pages, price £14.50  
Available from PW Book Service, £1 post and packing

This book is considered by many people to be an amateur radio classic. Now in its 16th edition, it seems to grow thicker year-by-year. Although it's a paper-back, the quality of the paper and the sheer number of pages make it a very heavy book. Fast becoming a standard reference work, *The ARRL Antenna Book*, covers everything from antenna fundamentals to instruments and measurements. A truly excellent publication, it comes as no surprise that it has been a consistent best seller for over 50 years, running into many editions. Very highly recommended.



**Reflections - Transmission Lines And Antennas**  
M. Walter Maxwell W2DU  
American Radio Relay League  
ISBN 0-87259-299-5  
240 pages, price £14.50  
Available from PW Book Service, £1 post and packing.

This book covers a topic that many professionals, as well as radio amateurs, tend to neglect. Transmission lines, matching and antennas are often neglected, but in this hard-backed, beautifully presented and printed book, the author provides a well balanced approach. Essentially a non-mathematical look at the complex world of transformation at r.f., matching, s.w.r. and a host of other topics, many myths are destroyed by the author's essentially practical approach. Sections such as 'Low SWR For The Wrong Reasons', are countered by 'Low SWR For The Right Reasons'. Altogether, this book is an ideal companion for any enthusiast wishing to learn more about transmission lines and techniques. Recommended.

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*Fresh from his holiday, 'Quaynotes' has returned to find he's got a lot of letters, and some interesting suggestions from the readers of 'High & Low'.*

**W**ell, I'm back, although I don't know how long for! I enjoyed my break, and I hope those of you who were waiting for the 934MHz antenna project were pleased with Fred Judd G2BCX's design.

My invitation, following some adverse comment at how I was approaching the column, brought in a very good response. All told there were over a hundred or so letters, all containing constructive criticism and suggestions. Thank you one and all for taking the trouble to write.

### Flow Pattern

I'm not going to follow my usual pattern this time, but instead, I'll let the letters flow. Despite this though, I must point out that if there seems to be more letters and comments from 934MHz operators, it's because that's the way I received them! If I don't manage to mention your letter in the column, I'll be writing to you personally as soon as possible.

Firstly, although I was away on holiday during the Wimborne 'Hamfest' in August, the Editor of *Practical Wireless* and the technical sub-editor, **Tex Swann G1TEX**, were there. These two gentlemen, with the help of editorial assistant **Donna 'Toad' Vincent**, met many 934MHz Club UK members.

Tex Swan took some photographs and I'm pleased to say that many of the 934MHz Club UK members were gathered together for the group picture in Fig. 1. I have it on good authority that the lady

# CB HIGH & LOW

By 'Quaynotes'

behind, and immediately to the right of the gentleman displaying the club pennant, is **Doris Spencer UK1391**, the Secretary of the 934MHz Club UK and editor of the club magazine.

### Letter From Featherstone

It's appropriate that Doris Spencer appears in the picture because I've recently had two letters from the secretarial base in Featherstone in Yorkshire. One letter came to me personally, via the office and another was passed on from the editor.

In the letter Doris apologises for not writing sooner (no need Doris, I appreciate the situation!) and takes time out to thank *PW*, and 'High & Low' for filling a need and not ignoring CB radio.

Thank's for the letter Doris, as I'm always pleased to receive feedback from our readers. Photographs and stories of what you're up to on 27 and 934MHz are always welcome.

By the way 934MHz Club members, copies of the group photograph taken by Tex Swann at the Wimborne Hamfest, will be available through the club. Tex has suggested that any of you who want a copy, can contact Doris and the club could make a bulk order. It'll be cheaper that way. In any case, G1TEX can be contacted at the *PW* office on this matter.

### Interesting Letters

As I've already said, all letters received were interesting. They were also very constructive in their criticism. Among the most interesting letters, crammed full of suggestions, was the one from **Henry Harrison G0IVX** who wrote from Stanley in County Durham.

Henry wrote that he was pleased that 'High & Low' was introduced. However, after a few months, he feels that Mr Stanley's comments (September *PW*), are valid. Henry

says that "I feel that most of the comments to date are of an incidental nature, in view of the limited space allocated to the CB enthusiast, and offer little encouragement or advice to *PW*'s CB readers".

I read and understood Henry's comments (agreeing with a lot of what he'd written), but he then continued with some very useful and constructive ideas to support 'High & Low'. I'm pleased to report that one or two of them will, in any case, be appearing later, but in the meantime. I've extracted all the relevant comments from a long and most interesting letter.

Henry Harrison G0IVX suggests that we should include: Tackling TVI, How to combat the problems and queries, and doing this in a way to help us to relate in a better way to other users of the radio spectrum.

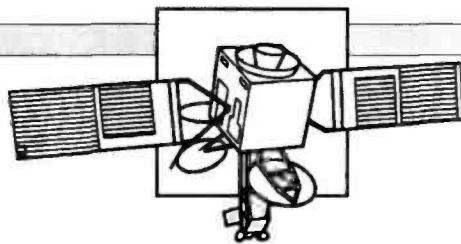
Another suggestion involved the installation of mobile equipment, where best to run the antenna feeder, and where best to connect up to the car's electrics to minimise ignition interference, and the fitting of suppressors.

Next on the list are the problems associated with the base station. For example, how to choose the best location for the antenna, planning permission, what feeder to use, and the various ways of feeding the antenna. Henry also pointed out that most of the CB group he belonged to at one time, were very unsure about s.w.r., and antenna techniques and terminology in general.



**Fig. 1: What a happy group! The gathering of the 'clans' took place at the Wimborne Hamfest during August.**





# SATELLITE SCENE

by Pat Gowen G3IOR

## Colloquium

For the sixth consecutive year, the Amsat-UK Colloquium was held at the University of Surrey from July 25 to 28. The 150 delegates from 21 different countries, enjoyed 42 presentations in the four-day marathon satellite session.

Talks, debates and discussions were held on the preparation for WARC-92 and CCIR Participation were conducted by PA0QC and W4RI, 'Selecting Orbits for Radio Amateur Missions' was run by K2UBC, 'Past, Present and Future Telemetry' (with the hope of a common format) by W3/G3ZCZ.

The discussion on the VITA operations of UoSAT-3 was presented by WD3Q, 'Low Cost Receivers For UoSAT-OSCAR-11 and DO-17 DOVE' was by ZS6AKV. The presentation 'Digital Satellites And Their Ground Station Requirements' was given by WIBEL.

'OSCAR-13 Management' was presented by G3RUH with 'Portable Antenna Systems For UoSAT-3 and PACSAT' being given by WA2LQQ. The subject of 'WEBERSAT' was presented by KB7HTA, and details of the new UO-22 c.c.d. camera provided by the UoS team.

*This month Pat Gowen reviews the recent University of Surrey AMSAT-UK Colloquium where a wide variety of AMSAT speakers discussed some interesting findings along with new and exciting satellite projects.*

Other topics included video presentations of rare space programs, policy reviews, gateways, phase II, III and IV satellite considerations, 'A-O-13 Orbit Decay' by OE1VKW and 'UoSAT-3 and PACSAT Store and Forward Communications' by G0/K8KA.

Other areas covered were *Oscar News* content by G3AAJ, 'Satellites for the Simple Amateur' by G3CDK, 'Kettering Input' from Geoff Perry, 'SAREX' by KO5I, 'EME' by W2RS, and 'Phase-III-D' by DJ4ZC.

The new RS satellites were covered by UA3CR; ON6UG spoke on preparing for the coming 10GHz satellite communications, EA1KT discussed AMSAT-URE; G6CJ dealt with 'Practical Antenna Farms' and DB2OS on 'A RUDAK-II Update'.

'An Educational Transponder For Phase III-D' was presented by ZS6AKV, and G1WTW dealt with 'Radiation Monitors'. And there was

a great deal more in the menu on satellites to satisfy the needs of all, from the absolute beginner to the most dedicated amateur radio space enthusiast!

## New Satellites

Perhaps the most exciting news was that of the future, and about satellites now in the planning or manufacturing stage. Following on from my news of last month, several new pieces of information have arrived. The news has come from those involved at the colloquium, that even more satellites are forthcoming.

## ITSAT

The ITSAT microsat should fly in 1992, or if it's not fully completed and tested, it should go up in 1994. The spacecraft will use packet mode in the rate range 9600 to 32kbps, and will also carry a scientific research payload to investigate the solar calcium spectral line.

## South African Satellite

The Stellenbosch University Department of Electrical and Electronic

Engineering in South Africa, are now developing the satellite shown in Fig. 1. This satellite is intended to fly with the 1994 HELIOS mission.

News comes from ZR1AFH, who says that the equipment payload will consist of a 145/435MHz store-and-forward packet BBS with both f.s.k. and a.f.s.k. It will also have broad bandwidth microwave 'L' and 'S' band equipment, to be used for both communications and imaging.

The satellite will provide position location by sun, star and horizon sensors, c.c.d. stereoscopic and multi-spectral imaging while over South Africa. There's also to be a novel 'momentum wheel' attitude guidance and stabilisation system. This will provide a powerful and highly accurate means of control when used with magnetorquers.

The attitude control system will be controlled by a microcomputer, backed up by the main computer, the sensors and the magnetometer. The 100mm diameter 5mm thick 100g mass reaction wheels, will be able to slew the satellite through 180° in 50 seconds when driven by a 1W servo motor. In comparison, magnetorquers take far more energy, and yet takes some 10 minutes to accomplish the same task.

While the full functional block diagram of SUNSAT is shown by Fig. 2, Fig. 1 shows the constructional detail. The left-hand top projection is the magnetometer. Next to this, placed centrally on top, is the omni-directional antenna. To its right, on the corner block, are the horizon

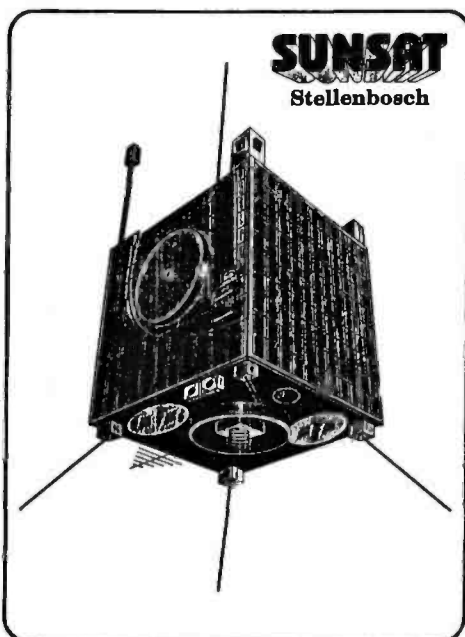


Fig. 1: The satellite being developed by Stellenbosch University in South Africa.

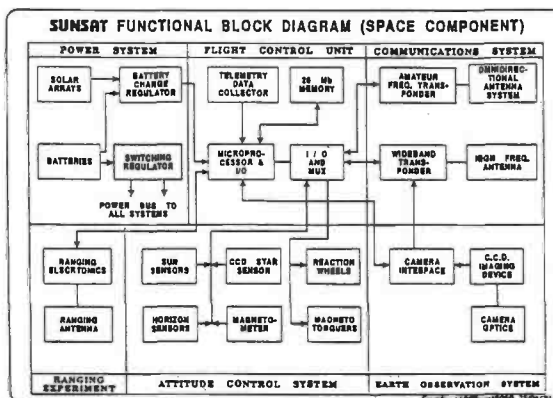
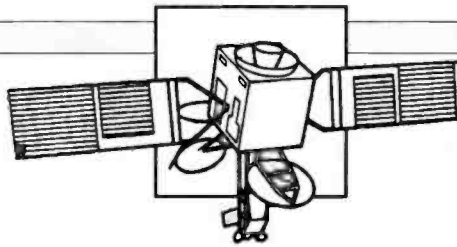
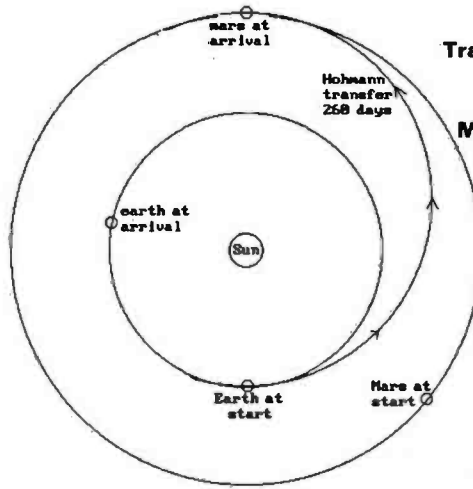


Fig. 2: Block diagram of the SUNSAT from South Africa.



**Fig. 3:  
Hohmann  
Transfer fuel  
economic  
path for  
MARS-SAT.**



sensors. The sun sensors are contained in the block at the right-hand upper corner.

The base of the diagram shows the 145MHz antenna at the left-hand corner, and the 435MHz antenna on the right. The Yagi array projecting from the left base is the L-band microwave antenna, and that on the right the S-band antenna.

The helix antenna is shown centrally surrounded at the base by the circular launching attachment. At the right hand corner the circular patch is the forward imager window and in the opposite corner is the rear window. The pair of square blocks on the lower left-hand face are star imagers. The pitch reaction device is the large circular wheel which can be seen in the upper centre of the left-facing of solar cells.

### Israeli AMSAT

The long term Israeli AMSAT group objective is to produce a new satellite every two to three years. The present project is for a three-axis stabilised satellite carrying both digital and imaging equipment.

The BBS will have two transmitters on 435MHz, five receivers on 145MHz, and five receivers on 1260MHz. It will have 1200bps a.f.s.k. on 145MHz, 1200bps similar to FO-12 and 20 on 435 and 9600bps, and 9600bps in the same manner as UO-14 and UO-22 on 1260MHz. The transmitter output power is to be around 5W.

Like SUNSAT, the satellite position reporting is by sensors. It will have ion and particle counting ability, millimetric wave propagation, ozone level observation instrumentation, and will also employ heat pipes for thermal stabilisation.

### Korean Group

The Korean group has a launch planned for 1992, that will place its satellite into a 66° inclination 1380km circular orbit. It will have approximately the same dimensions and weight of the UoSATS, and will be used for emergency communications to the Korean Antarctic base with

c.c.d., DSP and DCE using 435MHz up and 145MHz down.

### Education In Orbit

The United Kingdom Science Education Group are planning to launch a simple primary cell powered satellite. The craft will stay active for up to 60 days, transmitting the results of a simple electrometer experiment via synthesised speech in a five second on-and-off cycle.

The satellite will only weigh two to three kilograms, and be no larger than a 200mm tall 100mm diameter cylinder. The organising group plan to ask the Soviet ENERGIA authorities, if they will hand-launch this small but effective experiment, from the MIR air-lock.

### ARSENE Launch

From France, F6BVP confirmed that the June or July ARIANE launch of ARSENE with its own solid fuel rocket motor would take it to equatorial orbit. The planned orbit has an apogee of 36000km and a perigee of 20000km, a seventeen and a half hour period.

Italy will provide GaAs solar panels that will generate the necessary 60W of power, to deploy the main solar panels. The Mode B operation will be a 1200bps digipeater with uplinks at 435.0625, 435.0875 and 435.1125MHz.

It will give a single downlink at 145.975MHz, using Bell 202 tones, rather than those of FO-20 that will only Doppler-shift some 100Hz. Due to insufficient memory capacity, there won't be a mailbox.

Mode S will be a linear transponder with an uplink passband ranging from 435.050MHz to 435.125MHz. This will provide a downlink from 2446.470 to 2446.540MHz.

### News Up-Date

Further to my news published last month, Dr. Karl Meinzer DJ4ZC, head of AMSAT-DL has provided an update. He reports that following initial injection of the Phase III-D satellite into a standard geostationary transfer orbit, they would aim for the first motor firing to occur at perigee. This would raise the apogee to approximately 50000km.

Subsequent firing of the kick motor will be made at apogee, to raise the perigee and to make a plane change to between 60 and 63° inclination, for which the energy requirement will be less than that which was needed for AO-13.

The intention is to carefully and selectively thrust to meet an orbital period of exactly 16 hours. This is in order to give regular and repeatable access times, with consecutive repeating apogees occurring over Europe, the USA and the Far East. This will provide optimum access times from 0500-0800 and 1800-2400 local time.

The spacecraft will carry high-gain beam-width adjustable antennas with intended optimum gains of 13dB at 435MHz and 20dB at 1260MHz. They will be ground or on-board computer-controlled to give maximum gain narrow beam-width at apogee, widening in beam-width and re-

ducing in gain at lower altitudes closer to perigee.

Digital communications links will be similar to the existing RUDAK, and analogue links will be equipped with the 'LEILA' system.

The 'LEILA' device is a delightful and widely applauded concept to kill the 'alligators' that continually ruin our satellite transponder links, due to the use of excessively high powers.

Excessively strong detected uplink signals will first be overlaid with a tone. If the power of the stations uplink is not reduced to a logical level after this warning signal, the offender will be completely notched out of the transponder passband.

There's another interesting idea, 'SCOPE', a camera experiment from Japan being carried on Phase III-D. It will have lenses with 24 and 90° angle of capture to return colour images of the earth. A third lens system to return sky, planet and star images will also be attempted. The resolution aimed for will be 750 x 580 pixels.

Yet another experiment to be carried comes from AMSAT South Africa. It will provide educational broadcasts of up to 15 minutes duration by digitised speech in the 29MHz satellite sub-band by using 'CAM'. This stands for 'Compatible Amplitude Modulation', e.g., s.s.b. plus carrier.

These transmissions are planned to occur at perigee, and are aimed as educational projects for schools, colleges and universities, etc.

Karl pointed out that despite the high loading for the launch of PHASE III-D, space on board is still available. If any group has a project or experiment to be carried, Karl asks them to let him know at AMSAT-DL at the earliest possible opportunity. This is because the formulation needs to be finalised by mid-November 1991.

Finally, if you remember last month's diagram of Phase III-D, you will recall that the 'doughnut' shape of the satellite shape selected, showed a hole in the centre. Since then I've heard that DJ4ZC and his team have been thinking about how to use this available empty space to best effect. Now I understand that they're think-

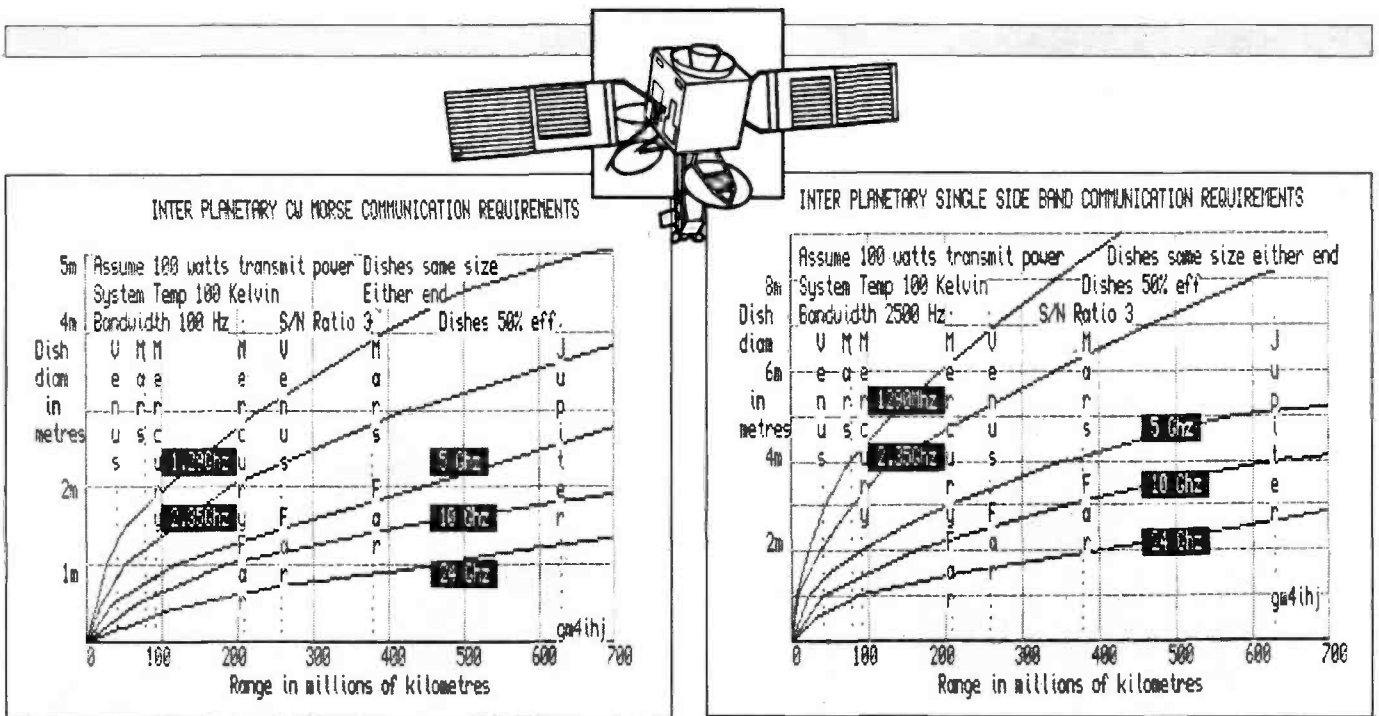


Fig. 4: Interplanetary Morse requirements.

Fig. 5: Interplanetary s.s.b. requirements.

ing of popping another satellite in the hole! Perhaps it's a case of jam on both sides of the doughnut?

### MARS-SAT

Soon after I was first licenced, I was amazed to hear an American voice with an 'AC' callsign calling 'CQ MARS', just outside the lower edge of our 14MHz band! I was even more amazed when a station responded!

Up to that time I didn't know about the Military Amateur Radio Service stations then operating from the American Air Bases in this country! Perhaps the next time you hear this call, it may well be in earnest, as there is a distinct possibility that the doughnut hole in the centre of PHASE III-D may be filled with an amateur spacecraft intended for orbiting the planet MARS.

Engineers in AMSAT have already proved the basic technology required for this project. Other improvements incorporated in Phase-III-D, such as an on-board kick motor can make this possible.

When it's fired at the right place, time, and attitude to change the orbit and plane, it can be used to take the spacecraft from elliptical earth orbit to Mars orbit by a Hohman Transfer fuel-economic path. This depicted by John Branegan GM4IHJ, in Fig. 3.

John's calculations show that an earth orbit started on 3 December 1996 would bring the satellite to Mars orbit 260 days later, arriving on 19 August 1997. The next opportunity would occur on 30 January 1999, arriving at the Red Planet on 16 October 1999 (Change spaceships at the aster-

oid belt). Opportunities would then occur with the synodic intervals of 2.13 years.

With further refinement based on the OSCAR-10/13 and PHASE-III-D concepts, but using higher gain antennas, similar earth pointing systems can be employed. Telemetry and a ROBOT 'echo' type transponder is planned, as real-time communications will be impossible due to the long path delay.

Mars varies from a minimum of 56 200 000km to a maximum of 400 000 000km distance from earth. Because of this, signals will take between 6.24 minutes minimum to 44.44 minutes maximum to go from earth to Mars and then return transponded back to earth again. The next oppositions of earth and Mars are in February 1995 and March 1997.

Calculations carried out by GM4IHJ indicate that the earth and Mars ends of the links will need 100W of c.w. to a 3m dish. The calculations assume no solar or galactic noise. It would need a receiver of 100Hz bandwidth and a systems temperature of 100 Kelvin at 2.4GHz.

The same power would need only a 1m dish on 24GHz. When Mars is furthest away from Earth, the same power will require a 6.5m dish at 2.4GHz or a 2m dish at 24GHz.

On s.s.b., with its wider required bandwidth, more power or a larger dish will be needed. The Morse c.w. requirements for different dish sizes and amateur bands for the various planets are shown by Fig. 4, while those for the s.s.b. link are given by Fig. 5.

"The problem is" says John "that we are highly unlikely to get a dish on

the satellite. We might get it locked in earth sun ecliptic plane, beaming in that plane from a 12dB slotted waveguide, but again we won't get 100W from the satellite. We might get 20W if we use it cycling 90% off, 10% on".

It is obvious from what John says, that lots of design effort needs to go into these aspects. We need to win a lot of decibels if ordinary amateur radio operators are to hear and use it.

John also points out some further problems in considering how we are going to track the craft. Some degree of accuracy is needed for narrow beam, high-gain antennas such as dishes. He says "We radio amateurs kid ourselves that we track earth satellites. In fact, NASA and NORAD radars do all the difficult stuff. We just put their derived Keplerian elements into our computers. But, who will provide our Mars satellite 'Keplerian elements'?"

To that end, NASA run a complex deep-space network based on antennas in Spain, USA and Australia. No station sees Mars for more than a few hours per day.

Navigation of NASA deep-space vehicles is based on Doppler-shift and is therefore quite accurate in range, along the line of sight, but is less accurate in azimuth and elevation. The NASA Doppler-shift technique requires constant carrier signals, so they use phase modulation so as not to disturb this. We might use Doppler-shift techniques or we might use secondary robot repeater ranging, timing the two-way round trip earth-to-Mars-satellite, Mars-sat-to-earth".

Will it have a normal elliptical orbit? Most interplanetary flights use a method called 'patched conics'. This,

as the name suggests, is a system of approximation, because we cannot solve the problem of interaction of three bodies, viz earth, sun and Mars directly.

We assume normal orbit inside earth's 1 000 000km sphere of influence and a similar orbit at the Martian destination. However, in between, when the satellite is under the sun's influence, we assume a 'half ellipse leaving earth orbit at its perihelion and reaching Mars orbit at its aphelion', which 'patches' our earth orbit to a Martian orbit.

However, we can't expect to get a perfect track. We haven't the facilities of NASA in using on-board cameras to give us visual images as the satellite approaches Mars, which would permit last minute course corrections. In other words, if we get within a million miles of Mars it will be very good going!

For sure, we cannot simply just type a set of Keplerian elements into our computers and go. As John Branegan points out "It is in fact going to be much more interesting than that, which is, after all an excellent reason for doing it!"

### Book Early!

So, you now know some of the interesting contents which came out at the 1991 AMSAT-UK Colloquium, and the fascinating considerations and concepts which have evolved as a result since. Next year's event will be held from 30 July until 2 August at the University of Surrey. Book early to ensure a place, so YOU can hear first-hand the fascinating information that will undoubtedly evolve.

# Reflections

*Ron and Joan Ham are both active archivists, and after this month's offering could perhaps be considered as active radio researchers!*

## Voices From The Past

For many years, Joan and I have been members of the West Sussex Archive Society and, at present, while she is researching for her 5th local history book I 'word process' transcriptions from original documents. For the past 18 months I have been working on the private letters to Richard Cobden M.P. who died in 1865.

After his correspondents, mainly in parliamentary circles, have written about their daily lives, I have to remind myself that these were times before the telephone and wireless was available for communication. This was when international news took weeks to travel around the world and not 'ticks' as we know it today. What makes this work so interesting to me, and more importantly to posterity, is that these letters were written by people of the time, which was more than 125 years ago.

## All At Sea before Wireless

Recently, I found the following example that should prove my point about news:

"I write to inspire you with some confidence I feel increasing in me as the steamer bringing us the Presidential news approaches our shores. We may look for her arrival next Wednesday or Thursday", wrote a Fredrick M. Edge (Pimlico), to Richard Cobden M.P. (Midhurst) on 12 November 1864. He continued, "for the *Glasgow*, which left New York on the 5th inst, will probably touch Cape Race on the 9th with the object of bringing the result of the previous day's election. I need not remind you that the decision will be fully known over the Union by 11pm of the 8th. Should the *Glasgow* fail to bring it, the Southampton steamer *New York*, a fast screw-ship which also left on the 5th, may allay our curiosity: if both ships fail, we must await the arrival of the *Canada* which left New York the day after the election:



she being a wretched tub, will probably reach Queenstown about Monday week. If you so desire and will let me know to whom I shall address it at Midhurst, I will send you a telegram of the result immediately on the news reaching this city".

## Scientific Reality

Between Cobden's death and the end of the 19th century, scientists like Branly, Hertz, Lodge, Marconi and Maxwell showed the reality of electromagnetic waves and that messages, using the Morse code, could be transmitted and received between two points without being connected by wires. In 1901, Marconi's 'wireless' signal crossed the Atlantic between Cornwall and Newfoundland and from that moment on, communication across the 'pond' was reduced from weeks to minutes.

Wireless advanced so rapidly in the following years, that the longest delay for news was gathering, collating and preparing it for transmission. However, as we near the end of the 20th century, information reception is almost immediate.

On August 24, Joan and I were among the hundreds of people who attended a special visit to Uppark, a National Trust house and garden on the Hampshire-Sussex border. The idea was for people to see the progress of reconstruction, following a disastrous fire at the property in 1989.

On arrival I spotted the hand-held transceiver sets in constant use by the stewards controlling the car-parking, and also the sets being used by the security officers. In the exhibition area there was an impressive demonstration, showing how computer aided design (CAD) is helping the architects in the detailed restoration of this unique house.

Instant communications, handling all kinds of information, is part of our everyday lives. It involves everything from the computer networks of banks, building societies and big stores, to the hand-helds used by staff on large building sites, film-locations, sports-grounds and supermarkets and by ambulance crews and traffic wardens, just to name a few. In addition there is mobile radio used by private vehicles, ranging from farm-tractors to haulage-lorries and

in public use by the police, fire and ambulance services.

Of course there are many more examples and it all adds up to massive demands for space within the limited radio frequency spectrum. Equipment efficiency, channel-sharing and low-power transmitters are just some of the methods being used to cram multitudes of signals into the available v.h.f. and u.h.f. bands.

## Propagation

Despite all these highly technical, but simple-to-use transceivers, the signals they transmit must travel somewhere through the earth's atmosphere and are sometimes absorbed, enhanced, deflected and reflected by natural causes. This is a field where amateur radio enthusiasts have a great deal of experience, because their special frequency allocations are sensibly spaced throughout the spectrum and are in daily use.

"What are the yearly 'prop' differences on 144MHz and does 50MHz operate like h.f. or v.h.f. for propagation?" asks Nigel Alford (Larkfield) who has an HF-225 receiver, fed by a G5RV antenna for



Fig. 2: Sport from USSR on 49.75MHz.

Fig. 1: BBC microwave link antenna.

the h.f. bands, and a PRO-2004 scanner for v.h.f. That's a good question Nigel, and thanks to the consistent observations over several decades by thousands of radio enthusiasts like yourself, we now have some of the answers. There are many fine books published on this subject and because you can buy copies, or possibly borrow a few from your local library, I will confine my reply to general guide lines.

Firstly, you should keep in mind that a radio signal, on any band, has an intended path to its target area, which it follows according to the laws of nature governing that particular area of the radio frequency spectrum. For instance, a broadcast signal around 15MHz, leaving the UK for Australia, will be transmitted towards the ionosphere at a pre-determined angle.

On arrival at this natural refractive region it will be gradually deflected downward to the earth's surface where, at point of contact, it bends back to the ionosphere and so on, until it reaches its target.

Everything's fine, until a solar flare, disrupts the state of the ionosphere and either makes it so dense that the signal is sharply reflected and so drops short of its target, or it is absorbed by the ionosphere and consequently goes nowhere.

The result of the latter is a 'radio blackout' and normal service cannot be resumed until the ionosphere reforms. To provide a world service, broadcast engineers and programme planners must also consider that, because it is influenced by the sun, the normal state of the ionosphere varies between day and night and so must the frequencies they use. On the other hand, radio signals transmitted in the v.h.f and u.h.f. bands have a much shorter range, and are usually line-of-sight travelling through the troposphere. The latter, being the home of the earth's weather, means

that the normal range of these signals can be retarded or enhanced by a combination of changes in atmospheric pressure, humidity and temperature.

In your case Nigel, this applies to the 144MHz band and can of course happen at anytime of the year, especially when the weather is on the change following a period of high pressure and a fine spell. A sure sign of a v.h.f. opening and the likelihood of 'DX' on 144MHz is patterning on your home u.h.f. television receiver and/or continental and Scandinavian programmes appearing, in Band II (87.5-106MHz), on your domestic portable. This is caused by stations sharing the same, or nearby frequencies, increasing their normal range due to the changing conditions. Generally speaking, to overcome such interference problems and to get a 'clean' signal between two, line-of-sight locations, broadcast authorities, like the BBC and the ITC (formerly IBA), use microwaves sent and received on a pair of precision aligned 'dish' type antennas. One of these, mounted on a mobile unit, is featured in Fig. 1.

### Sporadic-E And 'F2'

The 50MHz region is used in many countries for their domestic television (see *World Radio TV Handbook*) and, because of the interesting propagation that often occurs around this frequency, some countries have permitted amateur radio operators to use 50 to 54MHz for general communications. Briefly, the E-layer of the ionosphere, about 100km above the surface, forms at sunrise and disperses at sunset. However, during the months of May to August, peaking in June and July, it is liable to break up suddenly into random clouds of more densely ionised gas, from which signals in the vulnerable 50MHz region can

increase their range by a factor of 10. This is known as Sporadic-E. During one such opening I received a sports programme from the USSR on Ch. R1 (49.75MHz), Fig. 2. Television pictures that appear smeary, distorted and unlockable, have usually arrived over great distance via disturbances in the upper ('F2') layer of the ionosphere. Such events normally take place in the winter months and Simon Hamer (New Radnor) has, in the past, positively identified signals from Australia, New Zealand and China. Back in February, Lt. Col. Rana Roy, (Meerut, India) logged Bangkok TV via this mode on Ch. E2 (48.25MHz) Fig. 3 and his photograph of their 'CH3' transmission clearly shows the distortion that occurs.

### Sporadic-E Expedition

Between June 1 and 27, Bob Cooper Jr. ZL4AAA from Mangonui, New Zealand, using the callsign CU3/K6EDX, operated a special expedition station, on 50MHz in the Azores, along with CU3AK and ZL1GG, to study Sporadic-E propagation. During the period they contacted 429 stations spread through 28 countries.

Their equipment included an Icom 575H for the 50 and 28MHz bands fed by a Cushcraft 3-element and a Tonna 5-element beam respectively. They also installed a 17-element Tonna array to feed an Icom 271A for the 144MHz band.

In addition, the crew kept a watch for television signals in Band I, especially on Chs. E2 and R1 and were rewarded periodically with pictures from Belgium and Germany. They received all Scandinavia, Spain and Yugoslavia on Ch. E2, and Austria, Czechoslovakia, Hungary, Poland and many regions of the USSR on Ch. R1.

## August Reports

While using his spectrohelioscope, Cmdr Henry Hatfield (Sevenoaks) located two sunspot groups, 14 filaments and six quiescent prominences on the sun's disc at 1440 on August 4 and recorded individual bursts of solar radio noise, at 136MHz, on the 5th, 1297MHz on the 4th and 5th and a very high noise level at 136MHz on the 6th. Patrick Moore (Selsey) kindly sent a drawing of the sunspot group that he observed at 0840 on the 7th, Fig. 4 and Ted Waring (Bristol) counted 56 individual sunspots on the 18th and 22 on the 26th. Between them Gordon Foote (Abingdon) and Ern Warwick (Plymouth) heard the German beacon DK0WCY, on 10.144MHz, give auroral warnings at 1350 on the 2nd, 1515 on the 3rd, 1600 on the 4th and 11th, 1700 and 2000 on the 12th, 1740 on the 15th and 1015 on the 16th. Ern Warwick heard solar noise around 28MHz at times on days 2, 3, 4, 13 and 21 and Fred Pallant (Storrington) reported "high level of solar noise all day" on the 19th. Ern also found the 28MHz band "dead" at 1625 on the 3rd, 1800 on the 4th, 1500 on the 5th, often on the 6th, 1600 on the 11th, during the afternoons of the 17th and 18th and at 0930 on the 23rd. Fred Pallant's 28MHz log for the 27th and 28th reads, "Two very 'quiet' days - like someone has stolen the ionosphere."

I send my congratulations to Francis Cloke, who has built a simple magnetometer and would like a "glossary of terms" to explain some of the technical words used in both radio and astronomical work. For this information Francis, I suggest you try your local library for *The Practical Astronomer* by Colin Ronan (ISBN 0 330 26231 9) or something similar. The RSGB publication *Radio Auroras* by Charlie Newton (ISBN 1-872309-03-8) is also a good reference book on the subject.

### A New Toy

Finally readers, I have just added an Amstrad PC2286 with a 40mb hard disk to my office computing arrangements at home. So far, all is running well and I now realise just how fast a hard disk really is!



Fig. 3: Bangkok TV received in India.

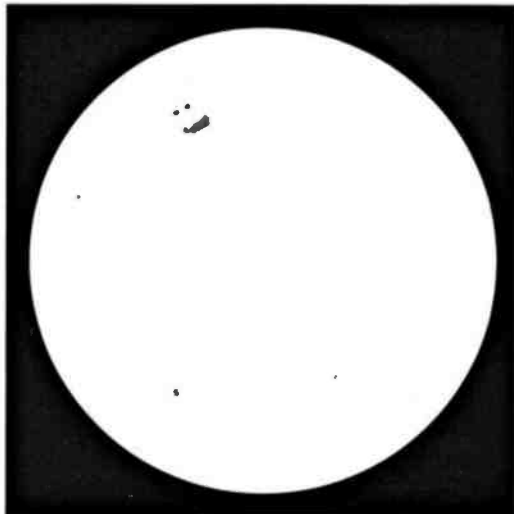
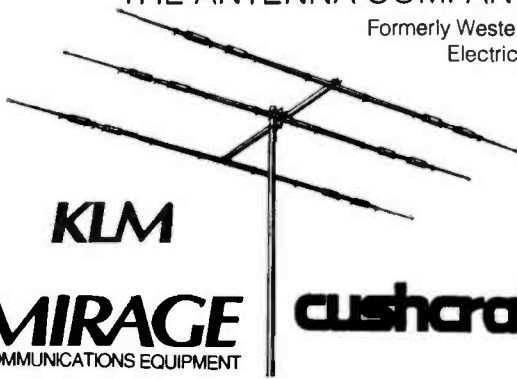


Fig. 4: Sunspot group on August 7.



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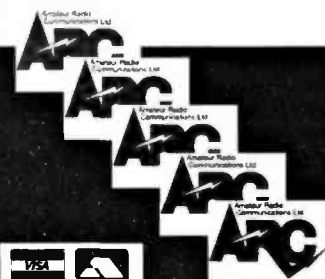
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# PACKET PANORAMA

*In this month's column, Roger Cooke G3LDI presents edited highlights of the replies to his proposals in the July 1991 issue of PW.*

In response to my outspoken views on certain bulletins in the July issue, I am presenting extracts from ALL the mail received on the subject. In view of the way I worded my comments, and the disparaging remarks I made regarding some of the bulletins, I was quite surprised at the few replies received. I can only come to one of three conclusions, and leave you to assume the one that I believe to be the case!

**1. Everybody else agrees with me.**

**2. Nobody on packet reads Packet Panorama. (I)**

**3. All those who did disagree either couldn't be bothered to reply, or were on holiday.**

In any event, my comments set people thinking and I did get a response. So here are the unsolicited and, what's more, uncensored comments (due to space considerations they have been edited, but not censored. Ed).

The first to write was Chris G7HUV, who vented his anger and wrath upon me thus:

"First of all let me say that I have the greatest of respect for the pioneering work you and others have done to set up the packet network, and am aware that we wouldn't have a network without this work".

Not an apparently good start, then he went on;

"In my message to him (Dave G3VOM) I said how lucky I was to live near GB7LDI, as I was able to get foreign language bulletins before they got deleted".

He then got down to the what he wanted to say;

"Your article cannot be ignored. The fact remains that it does define ALL foreign language bulletins as

'garbage', whose only use might be for students of the language. It does call for them ALL to be deleted".

"The issue at stake here is not just that some of us in Britain want foreign language bulletins. It is much more than that. The real question is whether we truly wish to become part of an integrated INTERNATIONAL network. Isn't there something absurdly anomalous about @ EU bulletins from Europe to Britain being vetted in Israel? Why can't we have a series of h.f. links directly to Europe? At the moment, it is obvious that for you to vet all foreign language bulletins for relevance, is a mammoth task.

"How much easier it is to delete all foreign language bulletins! This task could be shared between a number of people in a properly integrated system. If foreign language bulletins were distributed in Britain then they would gradually become more relevant. At the moment, since Europeans get few replies from Britain they tend to ignore us. When I have replied to such bulletins the authors are generally astounded and pleased to receive a reply from Britain".

He commented further, referring to an old daily newspaper story after a fog in the channel had 'cut off the continent, "The truth is, of course, that it is Britain that is cut off"

"If British packet cannot distribute relevant foreign language bulletins, then we should be honest about it and remove @ EU and @ WWW from the system in Britain. Anything else is a fraud perpetuated against the rest of European and World packet".

"Finally, Roger, I want to

make it clear that I am certainly not accusing you of deleting foreign language MAIL. I would like to thank you for the prompt way in which you have handled such mail on my behalf in both directions".

As many of you remember, in that issue I gave an invitation to attend a barbeque. Chris declined the offer with the answer, "I will, in fact, be at the Friedrichshafen rally. At the moment, it is my intention to distribute a leaflet there at the PW stand pointing out the implications of your article for European packet. I am sorry to do this but I still feel that the position you have expressed publicly in a prestigious amateur radio publication cannot be ignored or brushed aside. 73 de Chris, G7HUV @ GB7DDX".

A sting in the tail from Chris in his last paragraph! He is obviously a Scorpio, but then, so am I! I sent Chris a packet message to reassure him and received a further reply:

"Those of us who want foreign language bulletins, are probably in a relatively small minority at the moment, but it would be impossible for that number to grow if the circulation of these bulletins is curtailed". He then said that Cambridge and Heidleburg in Germany were twinned, and what a great idea, to bring amateur radio to the notice of those in authority, if the BBSs were also twinned. Sounds a super idea to me.

Some other views were shorter and indeed some like the two following, seemed to underwrite my comments.

From Kevin G4ATZ @ GB7CYM

Hello Roger ...only just read your PW Article... As 'DXA

would say ABSOLUTELY MARVELLOUS!!!!!!!!!! I fully agree with EVERYTHING you say. 73 from Kevin G4ATZ Master Sysop @ GB7CYM (Boston Spa) NB..Note the 'Master Sysop' bit...'DXA only a Remote and lesser form of life."

Then from G0CFB @ GB7CFB

"Agree with your comments entirely Rog. Most of this EU stuff is out of date anyway! 73, Rich".

## Policy

Martin GM8AOB of GB7AOB, even went as far as to accuse another sysop, by saying "It seems to be policy for him to take as much as possible whatever it is!" His final words were "I just made the point specifically on binary files, that they (more than other bulletins) should be stopped. I certainly would not decode and use a PC file now - unless it was sent to me personally by someone I know".

The point made by Martin, regarding binary files, one of 4X1RU's pet hobby horses, is about programs with up to 70 parts. Some of these parts are very long. If one part is corrupt in only one line, the whole exercise is pointless. **PLEASE** do NOT send lengthy programs over packet. A disk in the post is **MUCH** the better way of doing this.

Another Scottish user, Jim G4RGA, who signed himself "G4RGA/GM4RGA a citizen of GM", expressed his 'let's have them all' views and included a comment regarding spelling (also a pet hobby-horse of mine) in so-called 'English' bulletins. I might be a Sassenach Jim, but at least I can spell it! Incidentally, I

# PACKET PANORAMA

haven't seen a bulletin in Gaelic yet.

George G1NNB, is notorious for his comments, and I fully expected some from him! He sent these comments: "My first thoughts were 'blimey', Roger must have just lost a fiver and found a penny. Or he's just received his tax demand when he wrote that. You must have a very strange lot round your way. On this BBS a great deal of the EU bulletins in foreign languages are read, and indeed answered. I agree one or two may be a bit out of date, but that is no reason the kill the lot." George continued "With the greatest respect Roger, you sound very much like someone who is getting a bit fed up with running a packet BBS, or was it just a bad day when you wrote that article?"

"I trust the views expressed in your article, are not the sort of thing you intend bringing up in your post as a member of the DCC, as I feel sure they do not represent the feeling on the majority of sysops and users. Best regards George G1NNB @ GB7ESX"

George also said he was for allowing humorous bulletins as long as they were humorous, did not offend and were decent.

I also achieved my aim in 'stirring' Chris GU4YMV, who also runs an h.f. BBS, into putting fingers to keyboard to send: "Hello Roger. I read your section in *PW* each month. This month's, is the first I felt like replying to, and in any case you did request comments".

He then typed "I feel it is wrong of you to censor bulletins. You should only kill those which contravene your licence. Adverts yes. You

advocate killing 'risque' and humour bulletins. From BR68, it only mentions 'grossly offensive' messages. Apparently, mildly (risque?) messages are OK".

I agree with Chris, we are over 14, but we now have the Novice licensees who will want to see what's on the board, so what then? Chris continued "Some of us do speak a foreign language. I read the French and German messages. They can be quite interesting. You are denying the opportunity to others. Is this a symptom of the general UK short-sightedness on Europe and foreigners in particular?" He went on to mention a reason why I was co-opted to the DCC. Was it really, because I wanted to ban the gang of three or four 'debating society'?"

Finally he finished up with "You are wrong in censoring mail without valid reasons. GB7GUR will not be censoring mail (apart from adverts). Any valid message will be passed to and from Europe, anti RSGB included (if there are any). 73 from Chris GU4YMV @ GB7GUR"

You have to accept criticism if you run a BBS. This does not mean that friendships are at risk, indeed, it proves the friendship if you can take, as well as give, criticism.

Another Sysop, Dave G3VOM @ GB7GMX, decided to write via 'snail-mail'. He agreed with me on several points, but his major disagreement was with the

foreign language and debating type bulletins.

Although Dave does not necessarily agree with the content of the debate, he leaves them all.

Lastly, a message from Peter G6JNS, confirms the need for foreign language bulletins. There is obviously a difficulty in deciding what 'adverts' to delete, but generally if financial gain is the object of the advert, that is the deciding factor as far as I am concerned. He asked "do you REALLY consider that sending a bulletin asking if anyone has a hard-to-locate piece of, probably unwanted, equipment is breaching the letter or spirit of the licence?"

On humour, he wrote "A couple of years ago G6TRS and I wrote an article about the use of a treadmill powered by gerbils as an emergency power source for hand-helds. When we submitted it to *Radcom* for the possible consideration as an April fool, the response was a 'po-faced' letter saying 'That it might upset our animal loving readers!' 73 and keep up the good work."

## That Committee Appointment

My appointment to the DCC has, of course, NO bearing at all on my personal views. I was asked on to the DCC to help with the h.f. band-planning situation and so forth, having operated an h.f. BBS since packet arrived in the

UK. As for the humour-type of bulletins, what might seem inoffensive to some can be grossly offensive to others. To quote a local example, we have a local BBS run by an Irishman who has been living in the UK for quite a number of years. There have been a plethora of Irish jokes (usually all old ones anyway) which have upset the sysop of this BBS to the extent that he had considered closing down.

The packet network is considerably overloaded enough now, without making room for frivolous, superfluous messages.

The foreign language bulletins are left alone, I also read French and German, but the out-of-date ones will be killed. Personal mail, of course, is NEVER touched. I have also asked 4X1RU to relax his editing of this type of bulletin.

The debating type messages are left alone UNLESS they are defamatory in some way, in which case, since it is my licence which is at risk, they are killed. However, I am STILL of the opinion that there is another place for them.

Sysops lead a lonely but busy life, and probably tend to have a blinkered view of what actually is required of them from their users. A verbal 'kick in the pants' can sometimes prove effective!

## Finally

I do hope I have presented your views in an unbiased way. If you have any other views you feel strongly about, just let me know. G3LDI @ GB7LDI, QTHR, or tel: (0508) 70278, answering machine during the day.

**73 and happy packeting  
de Roger G3LDI**

*Come on you packet fans, let's be hearing from you! I know you refer to ordinary letter-writing as 'snail mail' but 'Receiving You' is waiting for your opinions. Editor*

# Back-Scatter

## HF Bands

Reports to

Paul Essery GW3KFE

287 Heol-y-Coleg, Vaynor, Newtown, Powys SY16 1RA

Hello again! During the past month the dramatic events in the USSR have been the focus of everyone's attention. As I sit down to write, I wonder just what it will all mean in terms of amateur radio activity, maybe a number of 'new ones' to put the DXCC scores up? Perhaps by the time everything's settled down, we shall have more of a clue.

The week up to the time of writing has been a real heat-wave job. Just when the shack is least attractive, the conditions have perked up a bit as equinoctial effects came into play!

The month in retrospect has seen yet another equipment failure here, my TS440S went to KW Communications Ltd. for a 'medical', as one of the oscillators decided to go on strike. That means every commercially-built item in the shack has 'played up' this year, although there have been zero failures of home-brew items in the same period. A moral somewhere?

### The Bands

Let's have a look around the bands, starting this time with the WARC allocations.

Pat ON7PQ (Kortrijk) kicks off for us. Pat starts his list with 24MHz where he netted HZ1HZ, NP2Q, HF0POL, 5W1CW, JA2MYA, KH0/JJ1QLX, 3B8FE, VP5VPX, 3C0CW, OY3QN, VU2RX, TA2AO, D44AA; down to 18MHz and there were UD85ODC, N4YBF/6Y5, ZC4EW, OD5/LA4GHA, VU2RX, TF3CW, C30EHA, JJ1VKL/4S7, HZ1HZ, V85FC, VP5VPX, VK2DXI/9M2, FP5DX, HC5AI, 3C0CW, TA4/KU0J, 4U1ITU, 9H3OZ, VK2DXI/9M8, NH6HF, A35TX, A45ZN, T77C, 4K2PGO, EA6ZY, 4X/K2XA and UG6GAK. As for 10MHz, the clip here mentions E050PQ, 9H4R, FY5FO, UD85ODC, 9J2HN, 4K1A, ZS6QH, UM8MBA, FP5DX, HB0/Y24AO, TA1/KU0J, 3C0CW, VP8GAV (Antarctica), VP25EQ, ED5ICE, 4U1ITU, Z21HS, EA9KD, OY1R, 4K2PGO, HF0POL, PZ1DV, SVQDV/9, H18A, J3/AE6I, PJ2AM, 4S7NB, TA2AD, LU4FFG and UF6FEI. Pat, by the way, is all c.w.

Although Don GM3JDR (Auck-english) is almost all c.w., he tried s.s.b. out on 24MHz to net JY5EC and JA0BUZ.

Turning to Ted G2HKU (Minster), we note him on 10MHz with ZL2AGY and ZL4HB, while on 18MHz there was RA1N/UA3SDT. That was before he went on holiday; on his return he was confronted by me, complete with sick rig!

On to Andrew G3VWC (Bath) who was a bit of a dare-devil this time, picking up a microphone on 7MHz; but the feeling passed off and he was then able to use 18MHz for c.w. contacts with OJO/DZ1NG, OHQ/DF1NH, W6OWI, WAOCML (Colorado), K9SSB/7 (Arizona), VE7SR, ZP6CW and 4X/K2XA.

Next we have Don G3NOF (Yeovil) who always uses s.s.b. and on 18MHz he managed A43DX/P, AL7I, ED5PAT

ES1QD/0, H18A, JH7FMJ, PZ1EL, ST0DX, V51BG, VK3ED, VP8GAV (Antarctica), WA6CTX/7 (Arizona), Z21CS, ZB2AZ, 4U1ITU, 9K2JH, and 9M2DM. On 24MHz he came up with T77T, YB0XX, ZD7KT, 3C0CW, 9Q5TE and Ws.

For Mary GONZA (Kirkby-in-Ashfield) 18MHz took somewhat of a back seat; nonetheless s.s.b. contacts were made with PY3TD, VP8CGL and VK7GK.

### The 1.8MHz Band

Not much to record on 1.8MHz I'm afraid, as I've missed the Tuesday local net several times. Almost everything around here happens on a Tuesday! However, when winter settles in, maybe I'll get a few Tuesday evenings to spare.

For Ted G2HKU, the regular s.s.b. topband work continues with ON7BW, and the odd c.w. foray came up with OH0BBF.

Shortwave listener Phil Townsend is in London E17, where 1.8Mz antennas, even for listening purposes, are in short supply. So, towards the end of last winter he wound a four-turn loop and tuned it with a 500pF capacitor. During the summer it had been tried on the odd occasion and yielded G3AJX in Winchester during daylight, which seems promising. The next move would seem to be to make a pre-amp to go between the loop and the receiver. A fascinating subject, small receiving loops!

### The 3.5MHz Band

First to report on 3.5MHz is again Pat ON7PQ, who has been filling up the gaps in his lists for WAZ. They are all on 3.5MHz and so 4K1A (Zone 39), CX4GL, PY1AJK, VP5VPX, RH0E, UA9CCQ, H18A, CN5A, UH0Y/UV3HD (Zone 23), VK2DXI/9M2, 9H3OZ, Z21HS, RZ1QA/A and VK8HA were all raised. Pat now wants Zones 1, 12 and 27 to complete the set on 3.5MHz.

Angie G0HGA, as shown in the photo, didn't spend time on the bands, but she did mention QRP contacts with G3YIG and G3TLY.

Eric G0KRT (Welling) is all QRP and all 3.5MHz. He has a Lake DTR3 at 2W c.w. out, plus a Howes receiver and 25m of wire, end-fed against a counterpoise. Eric wasn't as active as usual, thanks to a combination of time-shortage and summer static, but QRP-QRP contacts were made between Eric and G0MOU, G4ZZB, G4EEM and G4VGS. Among the QRO chaps were G3INR, G3JSK, G0GZN, G0OXT and DL3YDY.

### The 7MHz Band

Now here's a band, but those who use 7MHz mostly keep quiet about it! Ted G2HKU, notes his c.w. contacts with UZ9MXM, S05ASL, UH0Y/UV3HD, 4U1ITU and RH0Y/UV3DX. In addition, Ted wonders whether anyone else noticed 'metronome-like' noise on 7MHz on August 9. The noise was audible all day and evening, both with G2HKU and over in Belgium.

Pat DN7PQ notes his contacts with 4K1D, 5B4ADA, CX5BW, K4CX/6Y5, FY5EW, CP0RCB, 4K1ADQ (S. Shetland), VU2PTT, C9RZZ, ZS4TX, UM8MCF, 4K1AFM, 9H3DZ, YN/SM00IG, 3C0CW, VP5VPX, RH0E, UA9CCQ, H18A, CN5A, UH0Y/UV3HD (Zone 23), VK2DXI/9M2, 9H3OZ, Z21HS, RZ1DA/A and VK8HA.

His s.s.b. on 7MHz provided Don GM3JDR contacts with EJ7FRL, EJ4GRC, EJ5ID, GB2TSR, GB4TSR, GB0TSR, GB8RT and EI2TSR.

On to Andrew G3VWC (Bath) who mentions his s.s.b. QSOs out to 4U1ITU, UC70, UW2F, I1A, all in the WPX contest.

Another s.s.b. addict is Don G3NOF, who came on 7MHz to work GW6UW/P (St. Tudwal's Is) and 3C0CW.

For Angie G0HGA (Stevenage) the c.w. score included PY7FNE, WA1GUV, VY2QST, UA9CM, LU2ODR, CN8ST, CY5CJN, VE2FU, LU2ICX and PY6AEJ, plus in the WAE contest, many USA and Russian stations.

### The 14MHz Band

The 14MHz band is busy! At the time of writing the XY0RR, Burma, operation seems to have started, although an enormous pile-up was observed at the bottom of the c.w. end of 14MHz last night. Close inspection of the mess failed to yield a callsign, since everytime he started to sign, someone sat on him. However, I think Burma was the attraction! As for the ZA operation, the Hungarian operation was aborted even though they had licences; the Albanian Ministry of Defence apparently put a stop to it. Still, the latest news is that the ZA authorities, by way of a speech at the Tokyo Hamconvention, in the presence of Dick Baldwin of ARRL and IARU, JARL representatives, and others, have permitted a national society to be formed, and are said to be preparing to issue licences. A fat lot of use that will be if the Defence Ministry scupper every attempt to operate! But, we can hope!

Stop press: Just as this month's news closed for subbing, I received

word that the ZA program was due to start with an opening ceremony, including a contact between ZA and ITU HQ in Geneva, in the presence of the ITU General Secretary.

In addition, XY0RR is confirmed as having come as promised, and Jim Smith reports a breakthrough which promises real amateur radio from Bangladesh in a few months!

Ted G2HKU, keyed with PZ1DY, VK2APK, N6EA, W2LZX, YN1CC, CT3FN, G4AAL/8R1, HB0/Y24AD and DH0BOA.

Signals from Pat DN7PQ reached out to C6AFN, SV5/SM0CMH, C9RZZ, ZD8WD, 7P8FE, XU1NQ, 4K1ADQ, V8500, ZK1XB, K6NA/KL7, 5W1JU, VK2DXI/9M8, 3C0CW, HC1MD/HD4, ZL1AL and TL8FD.

One of the few operators to use both modes is GM3JDR; Don used s.s.b. for VR6ID, RJ0J, RX3M/RA9SB, 4K4/UA0KBZ, AA6DX/KL7, NH6ES, UA0HAE/UA0K, K6MA/KL7, KL7IKR, RJ1S/UI9GWA, 4K4/UA9KW, VK, ZL and JA. On the c.w. front I notice BV2DA, TL8FD, VR6ID, S2NQ, V8500, LU1EN, P29PNG, R420A, EJ7FRL, FP14DX, IG8R, ZK1CQ, RJ0J, UR5M, VP2EI, PZ1DY, 4K4/UA9KW, 4K4BEU, Y90SOP, 4K5ZI, SN9PP, YS1MAE, HC1MD/HD4 and VK2RQ/4.

Down in Somerset Don G3NOF recorded entries in the log against such calls as ED5VDX, EX8V, HB0/DK5WN, HL2LPT, JT1CS, KP2/VS6CT, KP2A/KP5 (Desecheo), RA2FM, SU1ER, SU1RR, TA1AR, UJ1K, UY0U, VKs, XE1AE, ZL4AN, 3B8FA, 5H3DC and 5Z4FM.

Mary GONZA, in deepest Nottinghamshire seems to have given the band a bashing this time; as she mentions OH0/SM7JNT, W1KEL, PY7HFA, EX8V, VP8CGL, and T40PAN at the Pan-American Games in Havana. Mary also worked JX3EX, ES1QD/0 (Muhu Is, IOTA EU-34), KK6NE/T4, CP6RP, VP9MN, VK5FOX, TS9AFA, 4N2AA (Pag Is, IOTA EU-136) and 4X6RL.

Angie G0HGA only operated in the small hours; which resulted in contacts with W4FGH, K1GUP, N5CE, WA3UQB, VE1ABO, TL8FO, N4AR, W2LZX, VE3CRG, UI8DX, W8BE, N2IEV, 4K20IL, K4EFZ, K8RWL, VP5VPX, 4L1QRQ, AA9AX, AA2DT, 4U1UN, HC1ND/HC0, W8SH, K2MGR, W0UFO, XE8V, K1AA, K4BJ, VE3KR, EX9V, K8NW, KA1ZX, and various signals in the WAE contest.

### The 21MHz Band

Pat ON7PQ's computer print-out is considered first on 21MHz, with contacts between Pat and 4K1ADQ, HH7PV, A35EA, Y11BGD, 3C0CW, 8J21HS, ZD8LII, XU1NQ, TA7/KU0J, BY1VZ and J45KOS.

Crossing the Scottish border to GM3JDR, I found that Don keyed with BV2DA, Y11BGD, UM8MDE, CN5A, YB2HAP, XU1NQ, 3B9FR, BY50QA, HL2KHE and 9M2IV; turning the mode switch to s.s.b. resulted in BZ4RBX, UA9AJ, RY7QK, 4K5ZI and 9M8FH.

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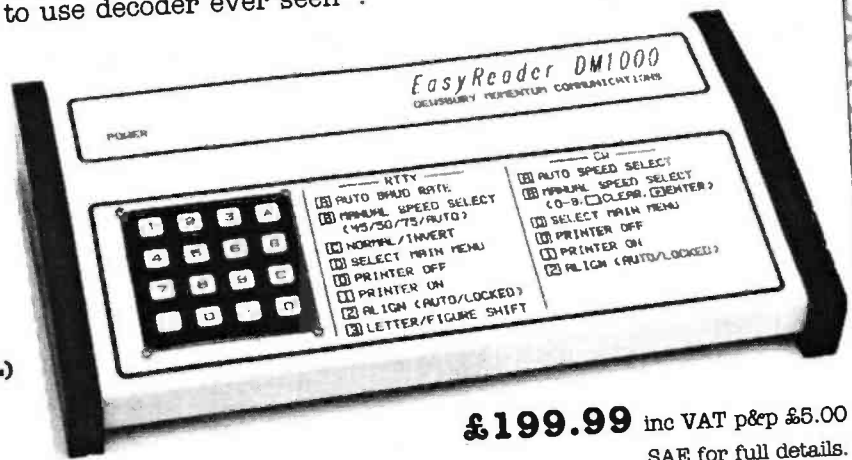
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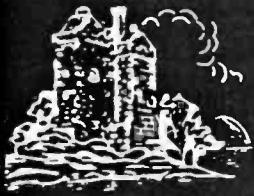
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# Back-Scatter

For Andrew G3VWC, c.w. was favoured; it gave him PY2BDN, PY3PR, PR7JB, LZ1CY/MM, JA7AGK and ZZ2YY.

Don G3NOF's crop included A22AA, BY5RT, BZ4RBV, BZ4RBX, CE4MT, CM6LE, CN8GM, D66RH, ED5VDX, EX8V, HF0POL (S. Shetland), HG02JP, HG32JP, HR3JJR, HV3SJ, IK2HTW/IA5, IK8NIM/ID9, JAs, JT1CE, P29NCS, RA1AKB (IOTA EU 133), RY8DI, RY8BI, TJ1FN, UA0FF, UJ8XA, UM9MY, VE7XN, VKs, VK9NS, VP2MR, VP25EQ, XY0RR, YJ8RN, Y88POL (Antarctica), ZD7DP, ZF2QQ, ZL4AN, 3C0CW, 8P9BZ, 8Q7CO, 9H8F (Comino Is), 9L3BM, 9M8ST, 9V1WW and 9X5SW.

Mary G0NZA had what she described as 'just a loner' contact with 8P9BZ.

Angie G0HGA worked NQ3M, UA9JDW, EX9V, K4DIU, VE3CRG, all c.w., plus VE7XN on s.s.b..

## The 28MHz Band

This has been 'like the curate's egg', difficult at times but brilliant at others. It's of course, partly due at least to normal summer doldrums, but

there periods when old sun seemed to have stomach-achel

For ON7PQ the band seems to have tried hard; Pat recorded his keying to 4K5ZL, HS1/JH8YDY, 4K1D, 5Z4FO, TJ1SR, FR5FA, 3C0CW, 5H3RA, ZC4EW, 4K1A, J28FO, P29PNG, 5A1TL, CX4GL, 9Y4YB, ZD8LII, XU1NQ and HF0POL.

On the other hand, being that bit further north meant that Don GM3JDR could only book in Y11BGD, 4K1A, PY2NY and PP7JR.

Operating on 28MHz for Don G3NOF involved HG02JP, KP2A/KP5, KP2/V56CT, LU8XPD (Tierra del Fuego), ZD8WD, 5B4MF and 9J2HN.

Angie G0HGA had just the one morning session, and raised IY3MCB, EA8EA, SP8YU and RH0E.

## Here And There

Don G3NOF reports that Yeovil club member G8AWB has recently become licensed as XX9AW, a year after arriving in Macau. He's to be found on 14.180 or 21.250MHz, between 1500-1700GMT. I'll pass on QSL data as soon as it's known.

Reference the problem of QSLs

## Angie G0HGA.



from 3W3RR, G0CEY (Westgate) says that he received a card some time ago, from PO Box 308, Moscow 103009.

Short wave listener **Matthew Probert** (Basingstoke) wrote to announce revival of activity after a couple of years of being QRT. Matt says he found the KP2/V56CT operation commendable both in operating and in self-control, when the bad-mannered types were being a nuisance. I'll second that!

Thanks to everyone who provided input this month, including the RSGB

*DX News Sheet*, K1AR's Contest Calendar for October, *The DX Bulletin*, and the *DX Magazine*, not to mention all our other correspondents.

## Finally

That's it until next time. Letters and input please, to reach me by October 24 and November 21, aimed as always to me at the address at the top of the page.

## Solar Data for August 1991

During the later part of July and the period up to August 4, there was a large increase in the sun spot numbers, a jump in flare activity and a rise in the geomagnetic indices. The sun spot count was around the 220 mark and the solar flux level averaged 214 units. A magnetic storm on August 1 pushed the A index up to 34 units.

Between August 5-11 the quiet side of the sun was facing our way and the sun spot and solar flux levels rapidly declined. There was a small magnetic storm on August 5, but nothing appeared to have come of it. There was very little activity at first during the period August 12-18 but a number of type 4M flares, which started on August 16, pushed the sun spot and flux levels way above that expected. During this period the geomagnetic levels were very unsettled, averaging 18.4 units, but on August 12 it reached 36 units and auroral activity was prevalent on the v.h.f. bands.

The massive increase in the sun spot count continued well into the latter part of August, and it is now obvious that a massive restructuring has taken place. It may now be possible that sun spot maximum for cycle 22, presently July 1989, could be displaced. During the period August 19-22 the sun spot count increased every day reaching 472 on the 21st. These levels were the highest for cycle 22, averaging around 445. The solar flux also remained high, averaging 286 units, the highest since February 1991.

The geomagnetic activity was up to sub storm levels during the period,

giving an average A index of 32 units. This gave rise to a number of small auroral openings, commencing on August 19. The quieter side of the sun came into view from August 23 and the sun spot count dropped from 478 down to 245 by the end of the month. There was a large flare on August 25 accompanied by a small proton event which produced a magnetic storm on August 27. Further magnetic disturbances occurred at the end of the month giving rise to auroral propagation in central England on August 30-31.

## Complicated Forecasting

A few months ago I predicted that there would be Sp-E on 144MHz! It just shows how complicated propagation forecasting can be. However, the way things are shaping up indicates that you should all be working much DX during the next few months, especially on 50MHz.

Traditionally, the months of October and November are the most likely for an opening to VK at this stage of the

sunspot cycle. In fact, the 50MHz band has opened up to Australia during October for the last two years. I see absolutely no reason why it should not continue to do so this year and possibly again in 1992.

If conditions are right, the band will be open between 0730-0930UTC. One of the easiest ways of knowing when the band will open, is to wait for someone else to work into VK in the morning. Then you can find out on the grapevine in the evening that an event occurred.

Assuming that the sun remains stable, the band will be in exactly the same state the next morning and you can then work the real DX. In 1989 and 1990 this is how I and many others accomplished our 6th continent. My records show that if conditions are undisturbed, the band can remain open for up to six or seven successive mornings before the noisy side of the sun comes into view again to disrupt the proceedings.

The other bands shouldn't be ignored. The period just after the equinox, October/November, is normally

favourable for auroral activity. So, look north on 144MHz if you want to work some good DX on that band.

October also frequently provides good periods of tropospheric ducting. This is when the atmosphere can act in a similar way to a waveguide, trapping signals and carrying them for a 1000km or more. These ducts are sometimes referred to as temperature inversions, and they are formed during the autumn months when warm, calm days are followed by cool nights. Results can often be spectacular, especially on the microwave bands.

On July 28 of this year, **Chip Angle N6CA** and **Paul Lieb KH6HME** set a new world record on 3.4GHz and 5.7GHz by spanning the 3976km path between California and Hawaii. Both stations were running 5W into 1.2m dishes. They also worked each other on 144, 430 and 1296MHz

Sea paths are very prone to this type of propagation, and the 3160km contact, shown in the 144MHz QRB Table, between **GM4YXI** and **EA8BEX** is just another example of what can be accomplished via this mode.

## Aurora!

By now, the more observant of you will have realised that auroras have been effecting the v.h.f. bands every month this year, and August was no different. My correspondents reported events on August 2, 4, 12, 15, 20, 27, 30 and 31 and I have no doubt that others existed but were not reported!

**Mark Holloway G4YRY (I090)**

# Back-Scatter

## VHF Up

Reports to  
David Butler G4ASR  
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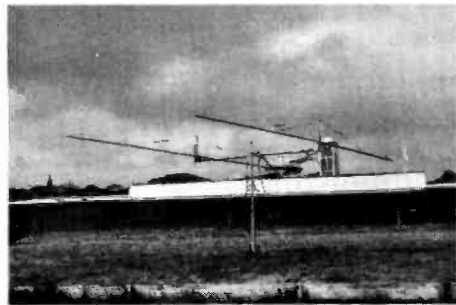
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# Back-Scatter

worked SM5BSZ (JO89), SM5MIX (JO78) and DK1KO (JO55), all on 144MHz, during the afternoon of August 2 but he found very little else in the way of DX. However, John Regnaut G4SWX (JO02) found SM5BSZ (JO89), SM5EFP (JO79), SM5PRE (JO78), SM6AQQ (JD67), SM6TOL (JO78) and SM7LXV (JO65). At 1647UTC, he worked OH1AWW (KP10) and OH1NHX (KP01), at QTF 10° and around 1715UTC, worked SP4MPB (KO03) and UZ2FWA (KO04), at QTF 40°.

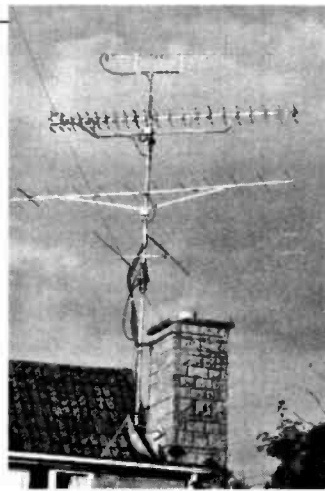
Ela Martyr G6HKM (JO01) made a number of contacts on the 50MHz band during the event on August 12. Prize catch was a QSO with the Faroe Islands expedition, OY/G4ODA (IP61). Other contacts included GD, GI, GM and OZ.

The event on August 12 was also very good up on the 144MHz band. Tony Jones GW4VEQ (IO73), located on Anglesey, worked a string of DX contacts between 1815-2000UTC. Some of the QSOs included ES0SM



**Fig. 1: LA6HL/TF in Reykjavic, Iceland working e.m.e. with two 15-element Cue Dee Yagis.**

**Fig. 3: The 50, 144, 430, 1296MHz and meteorsat antennas at G4FCD.**



(KO08), OK1MS (JO70), OY/G4DFH (IP61), SM3BEI (JP81), SK5DB (JO89), SM5BSZ and SM0ELV (JO89). At 1914UTC, Tony was called by a very suspect UA9QF (MO16TO) 52A52A. The distance? Only 4181km! Does anyone have any ideas on this one?

## Sporadic-E

At last, a 144MHz Sp-E opening which lasted more than the 'five minutes wonders' recorded in June and July. The event, on August 13, was detected between 0745-0902UTC and allowed many stations in the UK to make contact with operators in OE, OK, LZ, YO and YU.

Steve Damon G8PYP (IO90) found YQ2AVM (KN05), YU1EV (KN04), YU7AS (KN05), YU7BW (JN95) and YU7EW (KN05), whilst G4YRY, located a few kilometres away, worked OE3JPC and OE30BC, both in JN88, LZ2AB (KN33) and 6 YUs.

Gordon Smith GW6TEO (IO71), located in Pembroke, caught the opening between 0852-0902UTC and managed to work seven YUs, the best DX being YU7EW at 2236km.

The opening was also detected in West Yorkshire, John Hoban G0EVT hearing LZ1ZB at 0748UTC. He then went on to work seven YUs in JN65, JN75, JN76 and JN94 between 0831-0836UTC.

Over on the east coast, John G4SWX managed to work, between 0811-0850UTC, LZ1ZB (KN14), OK2KZR (JN89) and 20 YUs.

Ela G6HKM almost missed the Sp-E opening on 144MHz as she was active on 50MHz at the time. Fortunately she managed to work YT5G, YU1EV, YU2CCY, YU2SB, YU2YF and YU7AU.

## Tropo

For the most part of August the tropo conditions were excellent, allowing many contacts to be made throughout Europe on the v.h.f. bands.

Propagation on the u.h.f. and s.h.f. bands were exceptional, and some very long distance contacts and new records were established.

Gary Nicholas GW7EVG (IO83) made a number of s.s.b. contacts on 144MHz recently, contacting GM1FML/P, GM4AFF, GM4BAP/P, GM4UYK/P, GM0PLY/P and GB2MRI on Rathlin Island, Co.Antrim.

Gordon GW6TEO found the 144MHz band conditions to be very good to the south on August 10. From 1315UTC he worked EA1CJT (IN63), EA1NV (IN73), EA1TA (IN53), FC1LOC/P (IN93) and FD1NH0 (IN77). He also worked EA1TA on the 430MHz band. On August 27 he made it to EI4AQB (IO53) and PA0BOE (JO21).

Another operator to work into Spain on 144MHz was Mark G4YRY. He worked EA2ARD (IN93) on August 4, EA1CJT (IN63) on the 5th and EA1TA on the 10th. A new wet square, IN75LA, was added to the total by contacting EA2AWD at 2028UTC on August 13.

The southerly path was also very good on August 18, enabling Tony GW4VEQ to work many stations on the 144MHz band. Contacts made during the afternoon and evening included EA1CJT (IN63), EA1DAV (IN63), EA1DKV (IN53), EA1EBJ (IN73), EA1QJ (IN53) and EB1DNK (IN73). At 1715UTC, the EA1VHF beacon was peaking 59 +30dB. This beacon was heard again on August 20, around 2240UTC, at 529.

Conditions were also good in other directions, and on August 29 Steve G8PYP made contact, on 144MHz, with OZ1BEF (JO46), OZ1HNE (JO57) and SM6KJX (JO67).

At my QTH, propagation was good to Scandinavia during the morning of August 30. Contacts, on 144MHz, were made with OZ1BEF, OZ1LPR (JO44), SM70VK (JO65) and two stations in northern Germany, DK2UJ and DH0LAJ, both in JO44.

Rik Royall G8ESB (IO94) made some very good contacts on the higher frequency bands. The tropo ducting

enabled him to get over the North York Moors to the east, and work many stations in Germany on 430MHz.

Rik reports that this band is getting more active, and that he still runs his 432.210MHz schedule every weekday at 1800UTC with G6JQV in Derbyshire. On Monday, Wednesday and Friday he then follows up with a schedule with GM0DNH in Dundee. Incidentally, this station is now QRV on 1296MHz and is looking for contacts.

On August 30, Rik worked GU8IRF on 430MHz f.m. and 1296MHz s.s.b. The station on Guernsey is looking for 2GHz contacts and has a personal beacon running on 2320.063MHz.

On August 30, G3PYB and G4PMK contacted DC9XG on the 10GHz band, over a path length of 703km. Narrow-band equipment was used at the UK end, running 250mW of s.s.b.

## Meteor Scatter

The following data, concerning meteor showers occurring in the next few weeks, will help you determine in which direction to beam at specific times, and when the shower is below the horizon.

The Orionids meteor shower will be encountered between October 17-26, peaking on Tuesday 22nd. Between 0000 to 0300UTC beam north-east or south-west, 0300 to 0700UTC beam east or west, 0700 to 0900UTC beam south-east or north-west.

The radiant is too low for effective working between 1100 to 2200UTC. This shower is broad with several sub-peaks, and predicting when its maximum activity occurs is very difficult.

The Taurids shower lasts from October 11 to December 5, with maximum activity occurring on Monday November 4. Between 2100 to 2300UTC beam north-east or south-west, 2300 to 0300UTC beam east or west, 0300 to 0500UTC beam south-east or north-west. The shower radiant is low between 0700 to 1900UTC.

The Leonids meteor shower will be encountered between November 13-19, peaking on Monday 18th. Between 0100 to 0300UTC beam north or south, 0300 to 0400UTC beam north-east or south-west, 0400 to 0800UTC beam east or west, 0800 to 1100UTC beam south-east or north-west. The usefulness of the shower for radio communication purposes is not very good from 1100UTC onwards. Between 1700 to 2300UTC the radiant of the shower is below the horizon.

**144MHz QRB Table**  
Distances in kilometres

Station	Tropo	Aurora	Meteors	Es
G0KON	1438	1578	1708	1965
G0CUZ	2943	1758	1996	2943
G0DAZ	2923	1780	2026	2923
G0DKM	2811	1488	—	2203
G0EVT	3080	1640	1808	3080
G0FYD	1315	1624	—	2019
G0ISW	1059	566	—	2057
G0Lbk	3060	1755	1876	2350
G1DWD	1454	1812	—	1836
G1EFZ	1730	1757	1920	2375
G1KDF	3023	1421	—	2386
G1LSB	1319	733	1732	2723
G1SWH	3035	1429	1650	2372
G3FPK	1835	1686	—	2337
G3LTF	1824	1846	2021	2174
G3SEK	1560	1681	1872	2154
G4ASR	2848	2029	2107	2853
G4DHF	1498	1530	2000	2448
G4JCC	1334	1158	1018	2173
G4MUU	1163	684	1533	2068
G4NBS	1321	1714	—	1901
G4RKG	1466	1757	1920	2375
G4VXE	2862	1446	1501	2880
G4YTL	1450	1774	2025	2172
G4ZTR	1040	1640	—	2130
G6DER	1834	997	1957	2068
G6DZH	2924	711	—	2303
G6HCV	2880	1450	1912	2880
G6HKM	1304	1555	—	2265
G6LEU	2620	910	—	2430
G8HHI	1742	—	—	2058
G8JDX	2667	1368	—	2663
G8LHT	3070	1780	1868	2510
G8MFJ	1209	1210	1329	2168
G8PYP	1240	1451	1479	2318
GD4XTT	3053	—	—	1700
GI1JUS	3067	1614	1507	2216
GI8YDZ	1216	1809	1901	2562
GJ4ICD	1620	1100	2050	2090
GM4CXM	1428	1750	2100	2023
GM4YXI	3160	1881	—	2513
GW1MVL	1553	—	—	2320
GW4VXX	2823	1391	1313	1910
GW6VZW	2830	1473	—	2236
ON1CAK	1420	1166	—	2725
ON1CDQ	1420	1166	—	2124

**Annual v.h.f./u.h.f. table**  
January to December 1991

Station	50MHz		70MHz		144MHz		430MHz		1296MHz		Points
	Countries	Counties	Countries	Counties	Countries	Counties	Countries	Counties	Countries	Counties	
G6HKM	60	49	—	—	68	18	39	8	31	6	279
G4FCD	12	19	—	—	82	13	53	12	30	5	226
G8ESB	6	6	20	5	82	11	44	8	13	5	200
G8ASR	6	51	50	9	55	28	—	—	—	—	193
G4LDR	24	19	10	2	51	12	35	5	—	—	158
G8PYP	15	36	1	1	43	19	19	5	—	—	139
G0EVT	13	10	—	—	32	16	11	3	—	—	85
G1THG	8	11	—	—	23	9	—	—	—	—	51
GW7EVG	—	—	—	—	36	7	—	—	—	—	43
G7CLY	—	—	—	—	36	6	—	—	—	—	42
GM4CXP	2	1	2	2	22	3	—	—	—	—	32

Annual c.w. ladder

Station	Band (MHz)					Points
	50	70	144	430	1296	
G4ASR	44	47	326	—	—	417
G4OUT	—	38	118	—	—	157
G0FYD	10	—	37	—	—	47
G0EVT	15	—	11	—	—	26
GW4VXX	—	—	11	—	—	11
GM4CXP	1	6	—	—	—	7

Number of different stations worked since 1 January 1991



# Back-Scatter

**Fig. 2: Moon tracking information for the ARRL e.m.e. contest.**

## Moonbounce

Johannes Baardsen LA6HL was recently active from Iceland, and between July 12-17 he set up a two-Yagi system to run some e.m.e. tests. The 144MHz antenna, shown in Fig. 1, consisted of two 15-element Cue Dee Yagis, with a horizontal spacing of 320cm and mounted 2.5m above the ground. These were fed through 15m of Cellflex hardline.

Antenna steering was simply done by using a compass and elevation meter. Using an FT-225 and a pair of 8874 triodes, Johannes worked DL8DAT, HB9CRQ, I2FAK, LA1TN, OK1MS, PA2CHR, PA3DZL, PA0JMV, SM2CEW, SM5FRH, SM7BAE, UA1ZCL, VE3BQH, Y22ME, AA4FQ, AF9Y, KB8RQ, KB8ZW, N1BUG, K13W, N5BLZ, W5UN, WA6MGZ, W7FN and W7VXW.

It was quite an impressive list, considering the lack of antenna steering and single-handed operation from a caravan. In next month's column, I'll give details of the results of LA6HL/TF via Sp-E and meteor scatter.

For those that wish to participate, the ARRL e.m.e. contest dates have been set for October 26-27 and November 23-24. Details of moon rise and moon set times for October are given in Fig. 2, to enable those of you with fixed Yagis to hear signals off the moon. I have based the calculations on central England and have also included the amount of Doppler shift to be expected on the 144MHz band.

With a good antenna system, something like a 16-element Yagi fed with low-loss feeder, you should hear a number of the multi-Yagi operators. Listen very carefully at the bottom end of 144 or 430MHz for the DX stations. Don't expect to hear stations straight away, however, because Faraday rotation causes the polarisation angle of the incoming signal to rotate. Because of this, it can be several minutes, or sometimes hours, before the received signal lines up with the polarisation of your antenna.

## VHF News

If you happen to be in the Cologne area during the weekend of October 26-27, then you could visit the German Amateur Television Convention being held in the city. Further details can be obtained, by sending three 22p stamps, to Andy Emmerson G8PTH.

Wyn Mainwaring GW8AWT, has informed me that G6YFW will soon be active, presumably on 50MHz, from the Falkland Islands. He will be the Archbishop of Canterbury's 'man' for the Falkland Islands, South Georgia and British Antarctica.

It is with regret, that I report the death of Bob Nixon G1KDF. He was a very active DXer and is well known for his frequent trips to Ireland, activating some of the rarer counties. Following a stroke earlier in the year, Bob was confined to a wheelchair but despite

his handicap, still managed to get on the air. A few days before his death, at the end of August, I received a letter from Bob giving details of his recent activity on all bands between 50MHz-2.3GHz.

Derek Moore G1THG (IO81) has written in for the first time to the column, giving details of his v.h.f. activities. He runs 25W from an RN Electronics transverter into a 3-element Yagi on 50MHz, and 20W of f.m. on 70MHz, and soon expects to have a PW Meon transverter ready for that band.

On 144MHz Derek runs 25W from a Trio TS711E into a 10-element Yagi. His location, in Wiltshire, is 90m a.s.l. and surrounded by hills up to 330m, but he still manages to get signals over the top. Recent contacts on 144MHz have included YU7BW (JN95) on August 13 via Sp-E and EI3GE (IO63) via tropo on August 20.

Richard Girling G4FCD informs me that he has returned to amateur radio after a break of 14 years, and that he is now active on the 50, 144, 430 and 1296MHz bands. His antenna system is shown in Fig. 3. As Richard mentions, "a little more down to earth than some of my other contributors!" Incidentally, I would much prefer to have photographs of 'normal' systems, so please send them to me and I will include them in the column.

Bob McQuarrie ZL3TY is the third reader to write to me this year from New Zealand. Happy Christmas Bob! He tells me that he's really keen on 50MHz and hopes to work into Europe sometime on that band. Bob has a 10W beacon on 50.0525MHz running into a vertical dipole, sending 'de ZL3MHB RE57'. Another beacon, ZL3MHF, is on 50.043MHz and is located about 180km east of Bob's QTH.

The station at ZL3TY runs an IC551 into a 100W amplifier, feeding two stacked 5-element Yagis at 15m. If conditions look right for a QSO, (I suspect this will be in March 1992), then you can telephone Bob on 010 64 37687388 or via FAX on 010 64 37682710.

## DX On The Rock

For a number of years there has been little serious v.h.f. activity from Gibraltar. However, for the last 18 months or so, both Mark ZBOT and Paul ZBOW have been very active on the 50, 70, 144 and 430MHz bands.

In previous months I have given details of the results of ZBOW on 50

and 70MHz, and this month it is the turn of ZBOT and his results on the 144MHz band.

Stations located on or near the Mediterranean sea experience much better v.h.f. conditions than we do in the UK. Very stable tropospheric ducting can exist for weeks at a time, over paths in excess of 1500km. Regular contacts are therefore made with stations in the Canary Islands, Sardinia, Sicily and Italy and occasionally to Malta.

With a Yaesu FT-225RD fitted with a muTek front end, a masthead low-noise amplifier, also by muTek, a single 19-element Yagi and a pair of 4CX250B's in the p.a., the lads can hardly go wrong. One interesting contact recently was with 7X2AJ (JM16) in Algiers. He's thought to be the first legal 7X on 144MHz, and is running 3W into a 12-element Yagi. Keep a look out for him during the 1992 Sp-E season!

Apart from all the regular tropo DX, Mark has also worked stations via Sp-E and tried his hand at meteor scatter and e.m.e. communication. On June 16, he made what is believed to be the first e.m.e. contact from ZB.

Surprisingly, it all came about by accident, as Mark was trying to calibrate the antenna rotator on the visual moon when he heard W5UN calling CQ!

Signals were strong enough to try for a QSO, and Mark was pleased to copy both call signs during his first receive period. It took a few more periods to make sure he was receiving RO, confirmation that both call signs had been copied, but within 15 minutes the contact had been completed.

Following this QSO, Mark decided to increase his antenna system to four Yagis with elevation control, to enable more stations to be worked off the moon. Unfortunately, this has been temporarily thwarted by a UK antenna manufacturer, who sent the required number of Yagis but a variety of boom lengths!

Mark mentions that he would try 430MHz e.m.e., if someone could provide a bigger power amplifier! On that band he runs a TS780, GaAs f.e.t. low-noise amplifier, four 17-element Yagis and a 4CX250B amplifier.

## DXpedition Update

Rik G8ESB, will be active on 144 and 430MHz from the Shetland Islands

SATURDAY OCTOBER 26				SUNDAY OCTOBER 27			
UTC	AZ	EL	H <sub>z</sub>	UTC	AZ	EL	H <sub>z</sub>
0730	276	26	-214	0800	270	31	-215
0800	281	22	-219	0830	276	26	-225
0830	287	17	-221	0900	281	22	-230
0900	292	13	-218	0930	287	18	-232
0930	297	9	-211	1000	292	14	-229
1000	303	6	-200	1030	297	10	-223
1030	308	2	-186	1100	302	6	-212
1900	54	4	+257	2000	54	3	+245
1930	59	7	+270	2030	59	7	+258
2000	65	11	+279	2100	65	11	+267
2030	70	15	+284	2130	70	15	+273
2100	75	19	+285	2200	75	19	+274
2130	81	24	+282	2230	81	23	+272
2200	86	28	+275	2300	86	27	+265

**QTH Locator Squares Table**

Station	50	70	144	430	1296	Total
G3IMV	359	—	457	125	52	993
GJ4ICD	446	—	269	119	59	893
G4ASR	279	43	350	41	3	716
G6HKM	316	—	228	112	49	705
G1KDF	318	9	186	108	39	660
G3JXN	204	22	187	134	88	635
ON1CAK	249	—	280	53	11	593
EISFK	314	—	187	58	—	559
G0DAZ	146	—	221	137	39	543
G6HCV	309	—	233	—	—	542
G3UVR	—	50	258	141	84	533
G4KUX	—	—	372	120	—	492
ON1CDQ	168	—	256	55	10	489
G1SWH	201	30	166	62	9	468
G0EVT	186	—	221	57	—	464
G4RGK	—	—	294	124	50	458
G3XOY	—	—	211	150	92	453
G4MUT	143	25	155	94	34	451
G0OFE	264	—	163	—	—	427
G0LBK	—	—	267	89	46	402
G4DEZ	55	—	249	49	49	402
G8ATK	103	—	145	94	52	394
G1LSB	73	—	176	144	—	393
G6DER	—	22	183	110	78	393
G8LHT	79	19	185	93	14	390
G1IEZF	—	—	263	93	—	388
G4XEN	—	—	274	111	—	385
G4NBS	—	35	138	108	67	348
G4YTL	38	27	278	24	—	340
G4ARRA	—	—	255	80	—	335
G3CQJ	—	—	186	103	44	333
G8PWN	7	25	129	99	64	324
G4SSO	—	—	229	93	—	322
G4FRE	—	—	102	146	72	320
G1SMD	205	—	112	—	—	318
GM0HKB	132	8	156	19	—	315
G4TIF	—	—	200	110	—	310
G4DFH	—	—	307	—	—	307
G4ZTR	78	28	120	50	30	306
G1EGC	—	—	198	80	23	302
G8HHI	—	—	148	110	38	296
GM6GL	—	—	141	89	59	289
GM4XPL	50	—	201	32	—	283
G6MXL	84	23	100	52	22	281
DL8FBD	—	—	280	—	—	280
G0FYD	110	1	160	6	—	277
GW6VZW	118	—	143	6	—	267
G0NFH	124	26	81	22	11	264
G4PCS	—	—	258	3	—	261
G3BDO	—	—	—	—	—	256
G1GEY	—	—	168	77	11	256
G3NAQ	—	—	175	80	—	255
G6DZH	—	—	158	87	—	245
G8STI	—	—	152	69	24	245
G3FPK	—	—	241	—	—	241
G4IGO	—	—	238	—	—	238
G0EHV	—	—	160	75	—	235
GW4FRX	—	—	231	—	—	231
G4DOL	—	—	216	—	—	216
G4MEJ	—	—	213	—	—	213
G8LFB	—	—	209	—	—	209
G8MKD	—	—	150	49	—	199
GJ6TMM	—	—	151	48	—	199
G4YCD	—	—	197	—	—	197
G1TCH	94	—	95	6	—	195
G1JUS	—	—	192	—	—	192
G8XIR	—	—	123	—	62	185
G7ENF	59	—	89	24	—	172
G4FYK	—	—	82	50	23	155
G7ANV	—	—	153	—	—	153
G4AGQ	—	—	104	42	1	147
G8XTJ	29	—	116	—	—	145
G8MEN	41	2	63	26	4	136
GW4VXX	10	—	120	—	—	130
G1WPF	—	—	97	29	—	126
G0FEH	—	—	101	24	—	125
G0ISW	45	—	59	17	—	121
GW6ARL	116	—	—	—	—	116
GW1MVL	—	—	109	7	—	116
G11MM	—	—	98	17	—	115
GM0GDL	—	—	88	23	—	111
G0KON	—	—	104	—	—	104
G7CFK	109	—	—	—	—	109
GM1ZVJ	58	—	48	—	—	106
G1CEI	11	—	77	18	—	106
G4OAWA	—	—	103	—	—	103
G7CLY	—	—	100	2	—	102
G1SWH	—	—	148	53	—	101
GM0JOL	—	—	88	—	—	88
G4WHZ	—	—	76	—	7	83
G0GTF	76	—	—	—	—	76
G1THG	34	—	35	—	—	69
G1NVB	—	—	73	—	—	73
G0HDZ	—	—	64	—	—	64
G0HEE	—	—	73	—	—	73
GU4HUY	—	—	73	—	—	73
G2DHW	—	—	33	7	2	42
G7AHO	—	—	34	—	—	34
GW7EYG	—	—	26	—	—	26

No satellite or repeater QSOs  
Starting date January 1 1975

# Back-Scatter

between October 12-17. There is also a possibility that he may take equipment for 70MHz and 1.3GHz.

The Finnish "Vileens Bargain VHF-Group" plan to operate from KP22FD between 2200UTC on October 11 to 1000UTC on October 13. The group will use the call sign OH3EX on 144.138MHz for m.s. schedules and 144.147MHz for random operation, transmitting during the first 2.5 minute period. They will be running 150W into a 21-element Yagi. Keep a listen out on the v.h.f. net for either OH2BAP or OH3EX.

The recent expedition to Spain by OZ1DQ, resulted in 159 meteor scatter contacts from various locators, 23 f.a.i. QSOs from IN83 and a number of good tropo contacts from IN63. You can obtain your QSL card from Uffe Linhardt, Ostrigsgade 49, 2tv., DK-2300, Kobenhavn S, Denmark.

## Beacon And Repeater News

**Terry Cooper G4XOP**, Secretary of the Mid Cornwall and Repeater Group, passes on the news that all GB3CTC

beacons have changed their call sign to GB3MCB, standing for mid-Cornwall beacon. The group are also planning to build new beacon equipment, as the old units are proving to be unserviceable.

Unfortunately, as the group looks after beacons for all bands between 50MHz-1.3GHz, this will put a significant strain on the group's resources. Donations are therefore willingly accepted and can be sent to either G4XOP or G4WVD.

The Northampton 1.3GHz repeater/beacon GB3CN is now operational on channel RM5. It runs 15W output and reports of its coverage area would be welcomed by G0HWC.

## QRZ Contest!

The Scandinavian 50MHz activity contest takes place on October 22 between 1700-2100UTC. If you are a Morse enthusiast then you will be pleased to know of five c.w. events planned for the next few weeks.

First up is the 70MHz contest on

October 20 between 0800-1200UTC, followed by the last two sessions of the RSGB 144MHz c.w. cumulatives being held on October 23 and November 8, between 2030-2300 local time. Only fixed QTH, single operator stations, are allowed to compete in these.

An IARU co-ordinated 144MHz c.w. contest takes place between 1400-1400UTC on November 2-3. If you don't fancy pushing the key up and down for 24 hours, you could enter the RSGB six-hour section being run between 0800-1400UTC on the 3rd. If you don't like c.w. or fireworks, but you do like 144MHz, then you can participate in the Scandinavian activity contest on November 5!

A number of u.h.f. and microwave contests have been planned for October and November, to take advantage of the autumn tropo conditions. The RSGB 430MHz cumulative contests will be held on October 16 and November 1, with the 1.3 and 2.3GHz events on October 24 and November 9.

A 1.3GHz fixed station contest will be held on October 27 between 1600-2000UTC. Scandinavian activity con-

tests are scheduled for October 15 for microwave bands and November 12 for 430MHz.

## Deadlines

Please send your letters to reach me by the end of the month. I always write up the column in the first few days of the following month. Don't forget that I can also receive messages via packet radio at my mailbox GB7TCM.

Photographs of your shack, antennas or any v.h.f. activity are especially welcome. Other pictorial items such as QSL cards, awards, certificates etc are also required. These can all be returned if necessary.

## 144MHz QRB Table

### Top distances (km)

Tropo	3160	GM4YXJ
Aurora	2029	G4ASR
Sp-E	3080	G0EVT
Meteor	2107	G4ASR

The mailbag this month has been larger than usual and more international too, with reports from Canada and Sri Lanka, proving that *PW* is becoming even better known throughout the world. **Alan Roberts** sent in some feeder news from Quebec, whilst **Asantha Cooray** in Colombo mailed a variety of Asian and African news, and **Roy Merrall** back home in Dunstable has contributed his latest finds. The news from these three contributors appears throughout the column.

Whilst it will be October when you read *PW*, I am writing this less than a month after the attempted coup in the Soviet Union and the turmoil and opportunities which that presented in radio terms. I won't dwell on the subject since it has been covered in great detail elsewhere, but short wave radio listening received an almost incredible endorsement - and the BBC World Service in particular - when Mikhail Gorbachev, giving a press conference after his release from house arrest, admitted that he had kept in touch with events in Moscow through World Service, Radio Liberty and the Voice of America. What a good job that jamming ended a couple of years ago.

Elsewhere, the newly recognised independent republics of Estonia, Latvia and Lithuania, regained control of their broadcasting centres when Soviet troops, who had been occupying the premises - since January in the case of Lithuania - left. Programmes are now back on the air on the usual frequencies.

Deutsche Welle has completed its agreement with the Soviet authorities, on the use of former jamming transmitters to send DW's programmes in to Asia. Programmes in English, Chinese,

# Back-Scatter

## Broadcast Round-up

Reports to Peter Shore via the PW Editorial Office

Japanese and a variety of other Asian languages will be carried at a cost to DW of DM6 million (around £2 million).

Relay agreements between international broadcasters and domestic radio stations in the east of Europe continue to develop. Radio France International is carried on a new station in Czechoslovakia, 'Radio Plus'. I've heard that RFI has been involved with the establishment of this all-news station which is transmitted on f.m. from Prague, with coverage of up to 50km. They are also now making use of Radio Budapest's transmitters to improve coverage of North Africa. Frequencies appear in the European news section.

Radio Beijing's programmes may sound better in four years time, when a new broadcasting centre for the station is due to be completed. The present building was constructed in 1958 and the operation has now outgrown the building. Radio Beijing broadcasts in 39 languages, and as the last bastion of communism in the world, will no doubt keep going for some time to come. It is interesting to remember that Radio Moscow's more esoteric language services have been cut over the past 18 months.

In early September, the bi-annual International Funkausstellung took

place in Berlin. This is the European consumer electronics fair and it's a mind-boggling spectacle of radio, TV, video, hi-fi and satellites. Grundig, Sony and Siemens launched new shortwave radio receivers - in total seven new models are now, or about to be, on the market. Included is the replacement for the Sony ICF-2001D (2010 in North America), previewed in the September edition of *Short Wave Magazine*, the ICF-SW77. There is also a smaller version, the SW55. Both sets have station names and frequencies pre-programmed in Tokyo, enabling users to page through the principal international broadcasters and find the best signal, without having to page through the *WRTH* or 'Broadcast Round-up'!

Grundig launched the replacement for the Satellit 500. The new Satellit 700 will be available in the early part of January 1992, and is the first portable receiver to offer RDS or Radio Data System. This set is also pre-programmed with the frequencies of international broadcasters, but more interestingly, the total memory capacity of this receiver can be increased to more than 2000 memories by means of external memory files (EEPROMs), which can be loaded via a PC. Grundig is working on computer software which will be made available to stations and

clubs, to enable their listeners and members to download frequency data.

Siemens, the German consumer electronics giant, launched a new set with built-in cassette recorder and a sister version with exactly the same layout but minus the recorder. These sets, unlike those from Grundig and Sony, are not designed in-house, but bought in from the Taiwanese Sangean company. We'll bring you more details on the latest sets here in 'Broadcast Round-up' and in *Short Wave Magazine*.

## International Broadcasting News - Europe

All times GMT (=UTC)

The new relays via Radio Budapest of Radio France International can be heard:

0500-0800 on 17.69MHz  
0500-0600 on 11.85MHz  
0600-0800 on 15.53MHz

The powers are 100 and 250kW and all programmes are beamed to North Africa. The relays are possible following the cutbacks in Radio Budapest's schedules earlier this year. The current English schedule of Radio Budapest is:

0200-0300 on 11.91, 9.835 and 6.11MHz  
2100-2200 on 11.91, 9.835 and 6.11MHz

There is a *DX News* programme aired each Tuesday and Friday, whilst a *DX World* programme can be heard on Wednesday and Saturday.

Italy still uses short wave trans-

# Back-Scatter

missions for domestic audiences. RAI's *Notturmo Italiana* which, as its name implies operates during the night, can be heard on 6.06 in parallel with the medium wave channels of 900 and 846kHz. English news bulletins are included at three minutes past the hour between 0000 and 0500. Radio Uno is on the air between 0500 and 2200 on 9.515 and 6.06MHz, whilst Radio Due, active from 0500 to 2230, can be heard on 7.175MHz. Finally Radio Tre uses 3.995 from 1400 until 2300.

Radio Sweden has introduced a new hour-long broadcast to Europe in anticipation of its satellite service over Astra, which is due to start next Spring. The new programme is heard at 1930 on the medium wave frequency of 1.179MHz and on short wave at 15.27, 9.655 and 6.065MHz.

A variety of Soviet feeders have been reported by Alan Roberts in Canada:

9.18 u.s.b. Mayak network at 2325 in parallel with 18.195 and 18.87MHz.

9.21 u.s.b. Soviet domestic feeder at 2100.

14.41 u.s.b. Mayak feeder at 1858 in parallel with 18.195 and 18.87MHz.

15.75 u.s.b. Russia's Radio at 1845.

18.195 u.s.b. Mayak feeder at 1815 in parallel with 14.41 and 18.87MHz.

18.87 u.s.b. Mayak feeder at 1515.

19.035 u.s.b. Unidentified Russian language domestic channel at 1630.

20.85 u.s.b. Mayak at 1455 in parallel with 18.87 and 20.905.

20.905 u.s.b. Mayak at 1450.

If you'd like to brush up your Russian, Radio Moscow is currently running a 'Russian by Radio' course with books, available free-of-charge from the station. Alternatively, try to tune in to Russia's Radio from Moscow. At 1800 the station can be heard on 9.73, 9.615, 7.355 and 7.255 and two feeder channels of 15.75 and 6.805 both u.s.b.

## Africa And The Middle East

Radio Hargesa in Somalia, has been noted again on 6.39MHz at around 1600 until 1700.

From Asantha Cooray in Sri Lanka come these loggings:

RTV Burkina Faso on 4.815 in French around 2000-2100.

Kenya Broadcasting Corporation on 4.935 in parallel with 6.045 noted from 2000 until sign-off in English at 2130.

Voice of Nigeria, Lagos heard on 4.99 and 3.325 around 1900-2100 with strong clear English signals including news and announcements.

Voice of Ethiopia uses 9.56 and 7.165 in English, with the best signal on the 31m band channel. The station verifies with QSLs. Regional languages also heard between 1500 and 1800 on 7.11 and 9.705MHz.

Roy Merrill has been keeping his ears on this continent and reports that Radio Rwanda can be frequently heard on 3.3302MHz around 1900 from SIO 122 to 332, with cluttered signals in Swahili and French.

In Accra, the Ghana Broadcasting Corporation on 3.366MHz, is more consistent with English at 2100, with signals up to SIO332, although there is interference from a ship-to-shore RT link on the same channel.

The RTV Centrafricaine in Bangui can usually be heard on 5.0343MHz around 2100, but often overrides Alma Ata, at up to SIO222, with mixed vernacular and French programming.

The service from RTV du Mali, Bamako can be heard on Sundays at sign-on 0655 on both 7.285 and 9.6349MHz. There's a slow almost monotonic guitar signal for approximately three minutes followed by a rapid French monologue. Then there's a shortened version of the national anthem, played by a military band between 0704 and 0712. Roy reports that the 31m band outlet is very cluttered and fades quickly, but the 41m band channel tends to linger, although it degrades rapidly.

The Voice of Turkey has English transmissions at:

0300-0400 on 17.88 and 9.445MHz  
1230-1300 on 9.675 2000-2100 on 9.445MHz  
2200-2300 on 17.88, 9.685, 9.445 and 7.225MHz

## Asia And The Pacific

The Voice of Free China in Taiwan is heard usually very strongly in English, at 2200 for an hour on 17.75 via WYFR in Florida. It's in parallel with

21.72MHz. The station runs a 'Let's Speak Chinese' course.

Radio Bangladesh has Arabic, albeit noisy and weak, at 1600 on 13.608MHz with Bengali later suffering severe QRM from Australia on 13.605MHz.

Radio Pakistan also has a strong Arabic transmission on 13.62MHz from 1657MHz, although signals are distorted and peak around 1830 up to SIO322, but degrade later towards sign-off at 1900. English is heard between 1700 and 1800 on 11.57 and 15.55MHz and at 0800 on 17.9025 and 21.52MHz and on the same channels at 1100.

Radio Australia offers a twenty-four hour English service, but it is only audible from time-to-time here in the UK. Roy Merrill offers these tips:

At 0630 on 15.24 with strong signals to sign-off at 0930 but severe interference from REE blocks the channel from 0700.

At 0800 English is heard on 15.365 with a watery SIO343, and signals degrade slowly until the channel is blocked by strong signals from the Voice of Turkey at 0900.

English at 1000 on 13.605 and 15.17 follows Chinese on these channels at 0900.

Signals from ABC Brisbane on 9.66MHz can be heard frequently at 1915 until 2045 with a rating of up to SIO233 for short periods.

The Voice of Indonesia transmits to Europe at 2000 following Spanish, German and French on 11.785, 11.752 and 9.675MHz.

Some Asian news from Asantha:

Radio Afghanistan has English to SE Asia at 0930-1030 on 17.655, 21.600 in parallel with 15.255, 9.635 and 4.94MHz. The last two channels are direct from Kabul, the others via the USSR. The European English service is at 1800 on 15.51 noted in Sri Lanka with SIO343.

The Voice of Myrmar in Burma has English at 0700-0730 and 1430-1600 on 5.99 - an unlikely catch in Europe.

The Voice of Malaysia has English 0600-0830 on 15.295 and 9.75. Radio 4 in English can be heard on 7.295MHz between 1200 and 1500. At around 1300 Radio and Television Malaysia from a transmitter located in Kuching is on the air on 4.95MHz. Radio 6 also from RTV Malaysia in Tamil uses 4.845 at 1400.

Indonesian stations noted during July and August in Colombo include:

RRI Kendari on 4.00MHz around 2100.

RRI Kupang on 4.805 at 2100-2130 with English at some times.

RRI Jakarta National Programme is on 9.68, 11.77 and irregularly on 15.155 from 0400 until 1000 and also around 0000-0100.

The Voice of the People of Kampuchea has confirmed a report on 9.695MHz and also uses 11.938MHz with English at 1200.

Radio Thailand has English: 2300-0430, 0500-0600, 1130-1230 on 4.83, 9.655 and 11.905MHz

## The Americas

Radio Quito has been noted on 4.92MHz with strong steady signals at around 0300 up to SIO343 with frequent idents and lengthy excited advertisements for Coca-Cola!

Roy Merrill reports a number of well-received stations from South America:

Radio Globo on 6.03MHz.  
Radio Aperecida on 6.135MHz.  
Radio Nacional de Amazonia on 6.18MHz.

Radio Universo on 9.565MHz.  
Radio Rumbos on 9.661MHz.  
Radio Marumbi on 9.665MHz.  
Radio Cancao Nova on 9.675MHz.  
Radio Nacional de Paraguay on 9.735MHz.

Radio Cultural on 17.815MHz at around 2130.

Radio for Peace International is currently on the air on 13.6306MHz following an antenna burn-out, although 21.465 is off the air whilst antenna re-rigging proceeds. The three operational frequencies of 7.375, 13.6306 and 15.03 have all been heard well at varying times.

Transmissions from WRNO have been heard sporadically on 7.355MHz around midnight, with programming continuing to 0300 with a frequency change to 7.395MHz.

Reports for Peter via the PW office please.

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