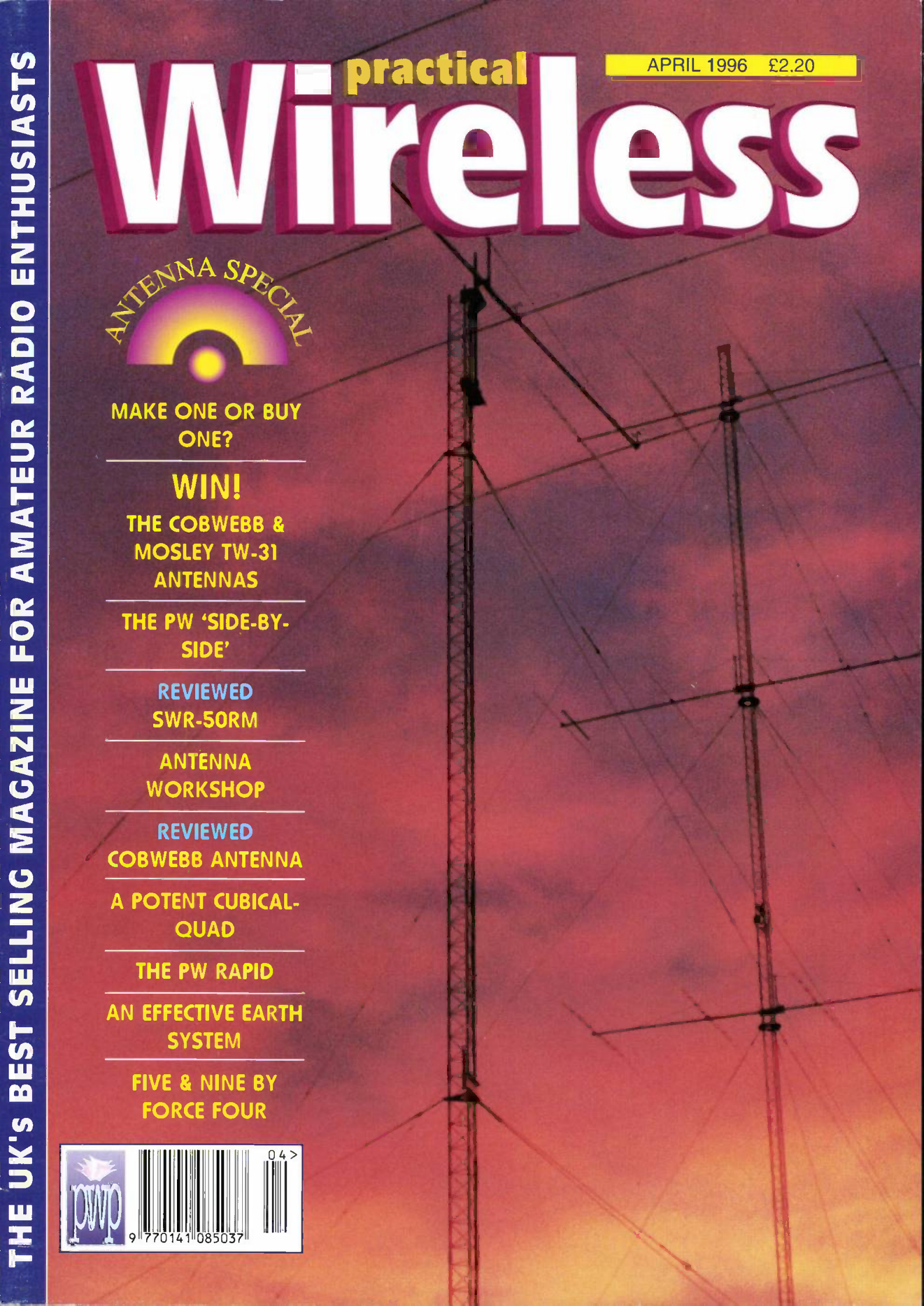
practical Wireless

APRIL 1996 £2.20



THE UK'S BEST SELLING MAGAZINE FOR AMATEUR RADIO ENTHUSIASTS

ANTENNA SPECIAL

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WIN!

THE COBWEBB & MOSLEY TW-31 ANTENNAS

THE PW 'SIDE-BY-SIDE'

REVIEWED SWR-50RM

ANTENNA WORKSHOP

REVIEWED COBWEBB ANTENNA

A POTENT CUBICAL-QUAD

THE PW RAPID

AN EFFECTIVE EARTH SYSTEM

FIVE & NINE BY FORCE FOUR

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ADMS-1 COMPUTER PROGRAMMABLE

Ultra Compact Handhelds FT-10/40R

ARTS
Tracks range of 2 identically programmed HTs.

TOP NOTCH™
Multi-function knob controls programming and volume.

PTT THUMB SWITCH
Ergonomically designed, conveniently located, insures maximum comfort.

ALPHANUMERIC DISPLAY
Allows 4-character labelling of important frequencies.

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State of art miniaturization givest greatest RX volume and clarity.

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Protects against corrosion from dust, rain or spray.

12 V DC JACK
Use optional E-DC-5B power adapter in your car for 5 W PWR O/P.

"This HT is the first amateur radio with built-in Digital Coded Squelch (DCS) for RX and TX."

"For a radio this small and rugged, the audio is genuinely LOUD!"

"I used ADMS-1 to program my FT-10 when we went camping, and the new ARTS system to keep track of my kids on the trails!"

"Yaesu did it again!"

Military spec commercial grade HTs loaded with new features and a choice of keypad, too.

FTT-10/A16S
16-Key, CTCSS Enc/Dec, DCS Enc/Dec, Digital Voice Recorder 99 Channels

FTT-10/A16
16-Key, CTCSS Enc, DCS Enc/Dec, 30 Channels

FTT-10/A06
6-Key, CTCSS Enc, DCS Enc/Dec, 30 Channels

FTT-10/A16D
16-Key, CTCSS Enc/Dec, DCS Enc/Dec, 99 Channels

Specifications

- Frequency Coverage
  FT-10R
  2m: RX: 140-174 MHz
  TX: 144-146 MHz
  FT-40R
  70cm: RX: 420-470 MHz
  TX: 430-440 MHz
- Choice of 4 keypad options (6, 16 or Deluxe and DVRS16 Keypads)
- Auto Range Transpond System™ (ARTS™)
- MIL-STD 810
- High Audio Output
- 12 V DC Direct Input
- Alphanumeric Display
- RX/TX Battery Savers
- Digital Coded Squelch (DCS)
- Digital Voice Recording System (DVRS) w/FTT-10/A16S
- True FM for better voice clarity
- High Speed Scanning System
- 2.5 and 5 W available
- Full line of accessories

The FT-10/40R is a totally new HT concept! Built to rugged, tough military spec, commercial radio standards inside and out, it's small, powerful, feature-packed and ready to roll out in four versions!!

Four different keypads – count 'em, FOUR! First true user-choice customized HT on the market, offers a 6, and three 16 keypad selections plus 2.5 and 5 W battery choices, too! Easy for Yaesu, the electronics are in the keypad. Easy for you, they're already installed. Just pick the one that suits your HT "style"!

New technology high-efficiency speaker design provides super-loud audio. No small surprise – after all it is Yaesu!

First ever, amateur HT rated MIL-STD 810! What else could you hope for? This, maybe. Dual Watch – see two frequencies displayed simultaneously in the display. No other single band HT has this feature. Another Yaesu exclusive, the Auto Range Transpond System™ (ARTS™) alerts you visually and audibly when a companion HT is out of simplex range. Most radio functions, are controlled of the Top Notch™, the neatly placed knob on the HT. This minimizes complex key sequences. Only Yaesu has this. Digital Coded Squelch (DCS) – for convenient semi-private operation. Digital Voice Recording System (DVRS) – records voice messages for playback, and received messages. And, of course Omni-Glow™ display, because you won't be able to put this one down!

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practical Wireless

April 1996
(ON SALE MARCH 14)
VOL. 72 NO 4 ISSUE 1069
NEXT ISSUE (MAY)
ON SALE APRIL 11

EDITORIAL & ADVERTISEMENT OFFICES
Practical Wireless
Arrowsmith Court
Station Approach
Broadstone
Dorset BH18 8PW
☎ (01202) 659910
(Out-of-hours service by answering machine)
FAX (01202) 659950

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@pwpub.demon.co.uk You can send mail to anyone at *PW*, just insert their name at the beginning of the address, e.g. **rob@pwpub.demon.co.uk**

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Front Cover Photograph:
John Brosnahan W0UN
(see 'Scene USA' Pg. 48)

Published on the second Thursday of each month by PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel (01202) 659910. Printed in England by Southernprint (Web Offset) Ltd. Distributed by Seymour, Windsor House, 1270 London Road, Norbury, London SW16 4DH. Tel 0181-679 1899. Fax 0181-679 8907. Telex: 8812945. Sole Agents for Australia and New Zealand - Gordon and Gotch (Asia) Ltd., South Africa - Central News Agency. Subscriptions INLAND £25, EUROPE £30, OVERSEAS (by Airsaver) £32, payable to PRACTICAL WIRELESS, Subscription Department, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel (01202) 659930. PRACTICAL WIRELESS is sold subject to the following conditions, namely that it shall not, without written consent of the publishers first having been given, be lent, re-sold, hired out or otherwise disposed of by way of trade at more than the recommended selling price shown on the cover, and that it shall not be lent, re-sold, hired out or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of Trade, or affixed to or as part of any publication or advertising, literary or pictorial matter whatsoever. *Practical Wireless* is published monthly for $45 per year by PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Royal Mail International, c/o Yellowstone International, 87 Burlews Court, Hackensack, NJ 07601. UK Second Class Postage paid at South Hackensack. Send USA address changes to Royal Mail International, c/oYellowstone International, 7375 Prart Boulevard, Elk Grove Village, IL 60007-5837. The USPS (United States Postal Service) number for *Practical Wireless* is 007075.

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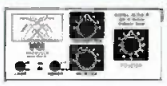

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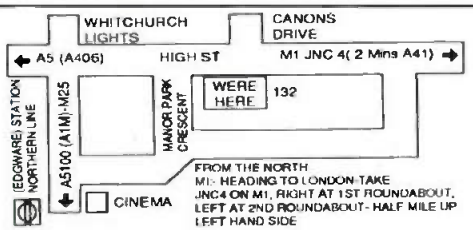

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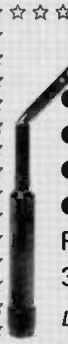
DB-122



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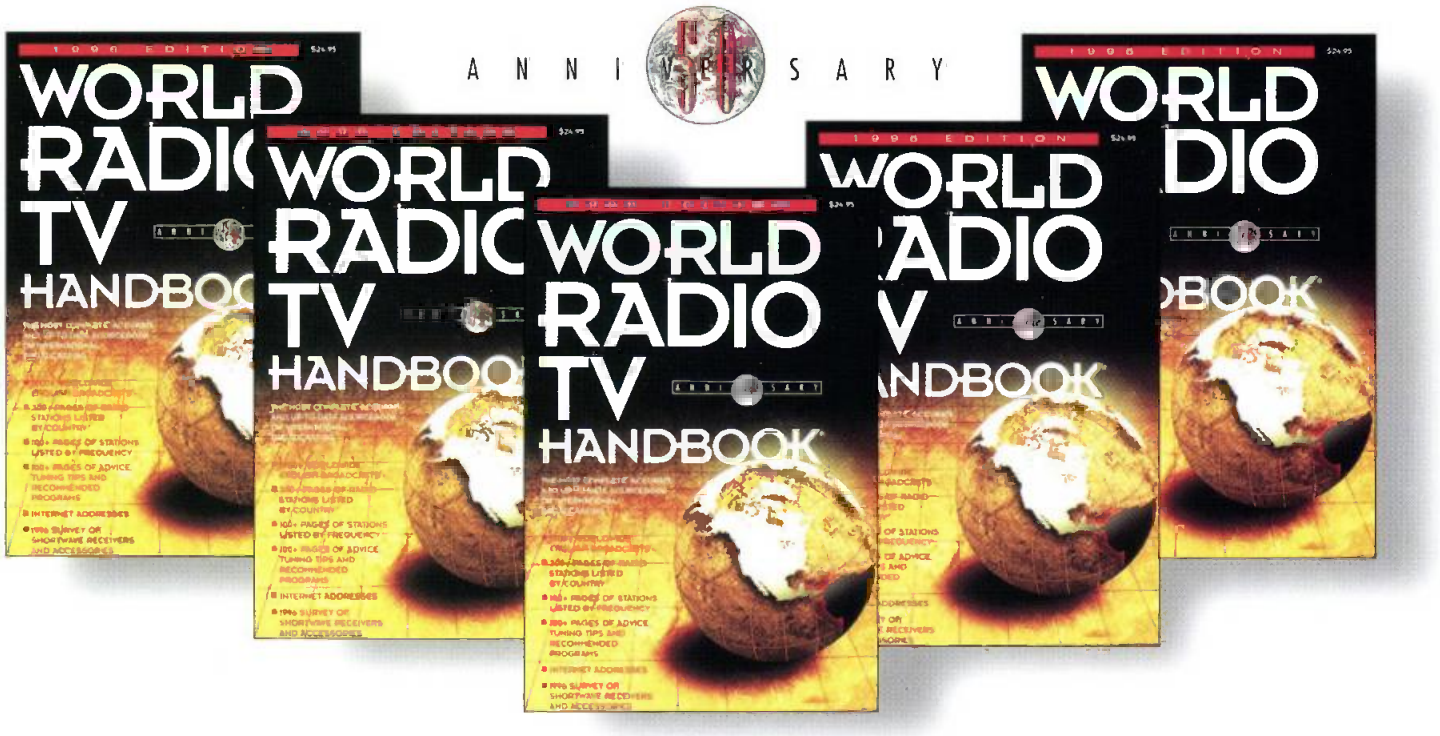

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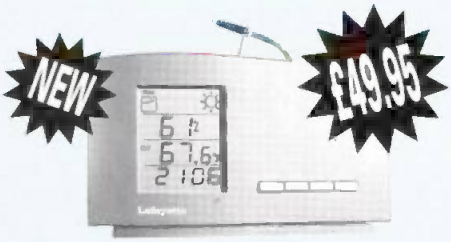

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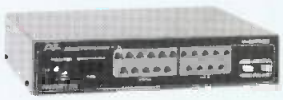

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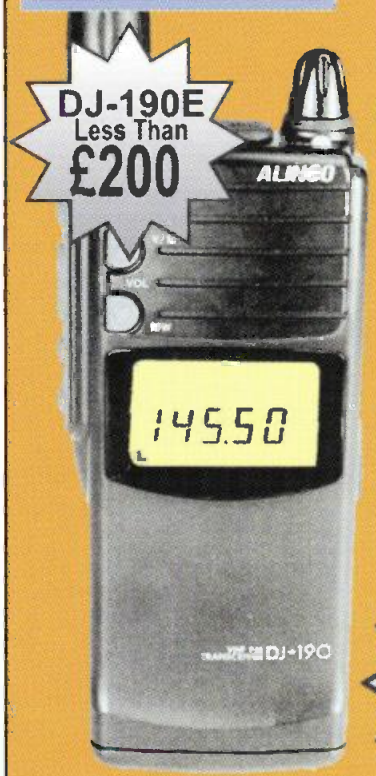
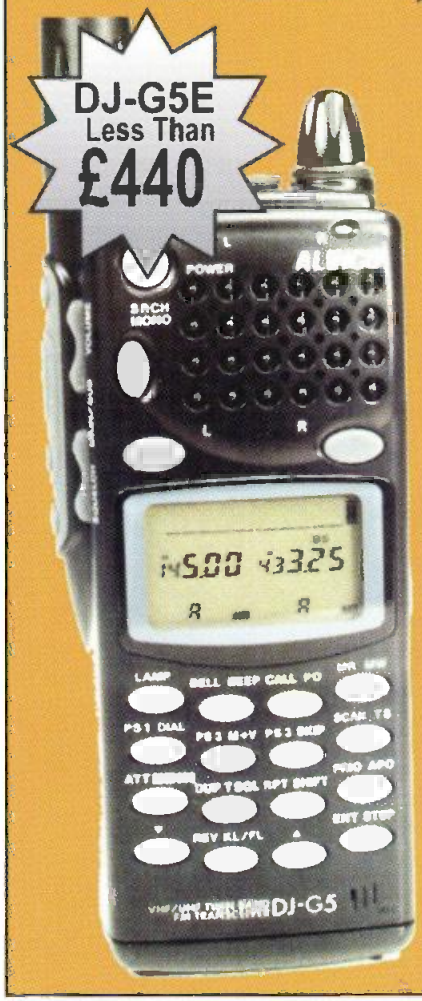
Now You're Talking

ALINCO



DJ-190E 2M FM Handy
40 Memories - CTCSS Encode - 1750Hz T
Rx 135 - 174MHz - Auto Power Off
Battery Save - 5W on 12V - Scanning
Includes 700mAH Ni-cad and AC Charger.

DJ-191E 2M FM Handy
100 Memories - CTCSS Encode 1750Hz T
Rx 135 - 174MHz - Battery Save
Large Display - Auto Power Off - Easy Pad
9 tone Auto Dialer - Time Out - 5W on 12V
Cable Cloning - Programmable Steps
Includes 700mAH Ni-cad and AC Charger



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DTMF - Crossband Repeater - 9600bps - 120 Mems - 1750Hz tone
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Electronic Vol & Squelch - Real Time Spectrum Scope - Air Cloning
900MHz Receive - Programmable Scan - MOS-FET Power Module

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100W (10W 6M) - Narrow SSB & CW filters - Reverse CW - QRK
10W Low Power - Speech Compressor - Rx 150kHz - 30MHz
100 Memories - RIT - IF Shift - Split Operation - Channel Tune Mode
Scanning - Squelch - Noise Blanker - Detachable Head

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EDITOR'S Keylines

Rob Mannion's viewpoint on the World of Amateur Radio

Over the past three or four years I've become increasingly frustrated by the consistently bad press the Amateur Radio hobby has received - particularly from the so called 'Tabloid Press'. And with the recent stories involving (no less!) than HRH The Duke of Edinburgh (who is of course Patron of our National Society, the Radio Society of Great Britain), I resolved to try and 'do something about it'.

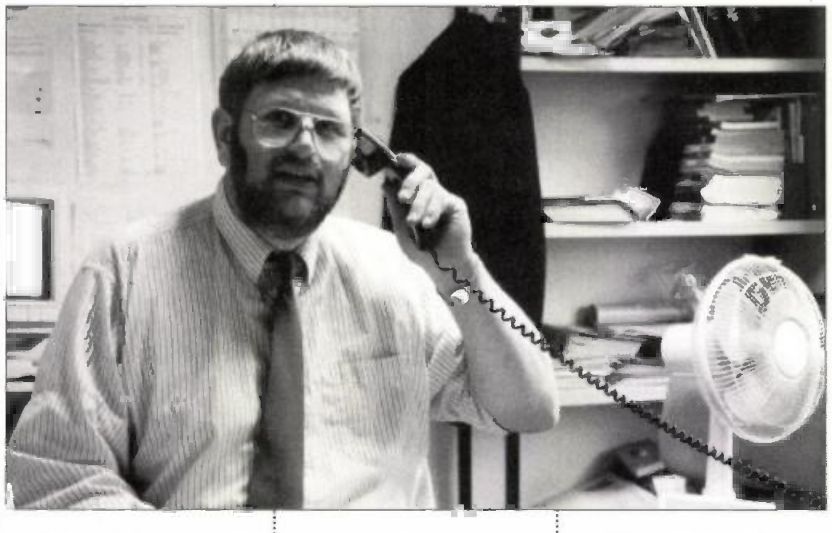
My 'something' was to organise an Amateur Radio Rally with a difference - in Trafalgar Square. I got busy organising and soon found out just how much was involved with a demonstration of this sort.

Soon I found myself deeply involved with the Metropolitan Police and the National Heritage Department (both very helpful) with the result that a date was set for the rally. The *PW* ('Protest Walk') rally was to take place on Saturday March 16 and start by the Temple Underground Station and end up in Trafalgar Square.

From Trafalgar Square

From Trafalgar Square (I was hoping to have a good few hundred Radio Amateurs and s.w.l.s supporting the event) we would have walked to 10 Downing Street to present petitions and letters at the Prime Minister's official residence. But, after arranging everything, I had to take the decision to cancel the event, for two very important reasons.

The first reason for the Protest Walk being called off was the resumption of terrorist activity in London. The second reason was that the RSGB Council did not consider they could support the idea.



Of course, the Amateur Radio hobby has to stand united to combat the bad publicity generated by poor journalism. So, without the support of the RSGB I thought that it was pointless if we were not to be seen as 'standing together'.

To be fair, the RSGB Council, replying through the General Manager **Peter Kirby G0TWW**, gave me their reasons. It turned out that they considered the publicity generated by Radio Amateurs walking from Trafalgar Square to present letters to 10 Downing Street could 'backfire' on Amateur Radio, and especially that from the 'Tabloid Press'.

Terms like 'Anorak Brigade' and 'Rent-A-Mob' have been used to describe honest, decent citizens who have felt aggrieved enough to join a protest march in London. But speaking for myself, I feel that 'Joe Public' would have been very surprised indeed to see the wide range of ages, type of person (student, professional, retired, etc.) that our hobby attracts. They would also have been surprised to see that we **are ordinary** people.

By their very nature, Radio Amateurs are usually an un-demonstrative group of people and we are very much a 'background minority'. I honestly felt that the 'March March' would have drawn attention in a positive way.

Vociferous Criticism

My efforts on behalf of the hobby have been described as "vociferous" and this may be considered a criticism. But I promise readers that I shall continue my efforts to protect our hobby in any way I can...even if it means being "vociferous"!

When it comes to protecting our image, the RSGB have been busy doing just what a National Society **should** do by actively reacting against adverse press publicity. They've done this by issuing press releases, and providing a spokesman to appear on radio and TV news programmes dealing with the subject, and generally tackling the problem in whatever way they think is best. And again, I resolve to **support them** in any way I can, because after all, **I am a Radio Amateur and a member** of the RSGB and **we must work together** to be successful.

In the past I've often advocated that the 'local PR approach' works well when adverse publicity appears in or is broadcast on the media locally. Very often, an approach from a local club (or individual) can clear things up, but if you can't sort out the problem you can contact: **The Press Complaints Commission at 1 Salisbury Square, London EC4Y 3AE. Tel: 0171-353 1248 (general enquiries), FAX 0171-353-8355** who will be able to advise you further and can supply comprehensive information packs on resolving press complaints.

Worksop Club

On 6th February I visited the Worksop Club in Nottinghamshire to provide a *PW* Club Talk. I was made very welcome and enjoyed the opportunity to meet the friendly membership and see their renovated club building (they have virtually rebuilt it from some derelict, but historic stables) complete with all facilities - including a bar!

In fact, the story behind the Worksop Club's marathon efforts deserve to be told. So I'm hoping we can publish the story soon. Jobs may be scarce in Worksop since the coal mines closed, but obviously enthusiasm and dedication are not!

During the 'Question & Answer' session after the main *PW* talk at Worksop, I was asked if I thought their club was typical in the way the membership was made up. I said it was, and I had noticed that there were relatively few young people attending.

We then spent the rest of the session discussing ideas on how radio clubs could attract younger members. I heard some very interesting ideas and offered some of mine and next month in 'Keylines' I want to devote my editorial to this subject. However, I need your help so perhaps you'll write and tell me how **YOUR** club is attracting new members **(from all age groups!)**.

Martin Lynch

On behalf of the *PW* team I'd like to announce that we've got a very special prize competition coming up next month, thanks to **Martin Lynch**. Knowing that many of our readers would like to own an Icom IC-706, The Martin Lynch & Son (mustn't forget 'MicroHenry!) Amateur Radio Exchange Centre based in Ealing, have donated an **IC-706 as a prize.**

The competition will run over three issues of *PW*, starting from the May magazine. So, look out for details and have a go. I wish everyone could win, but as that's not possible I can only wish **you** the best of luck!

Rob Mannion G3XFD

RECEIVING You

PW's Postbag. If your letter is published you'll win a prize.

PW Reviews

Dear Sir

I read with interest the letter from **Dave Wilkins G5HY** who professes himself happy with the review of the company's TS-870S transceiver which appeared in the December 1995 issue. However, I do not think he got as good a review as he might have had.

My financial advisor (XYL!) has released funds for the purchase of a new radio, so I am a potential purchaser of one of the new digital transceivers. I can tell you therefore that the Editor's review is of no help whatever in helping me decide which one to get.

I have heard rumour of these new 'wonder rigs' whilst talking to other amateurs on the air, especially in the USA. However, I have heard it said that adding a good digital signal processing (d.s.p.) to an existing radio is just as good and a lot cheaper.

Both Dave Wilkins and the Editor say that a comparison type of review would be unhelpful. I agree that different manufacturers may have different design philosophies and this is exactly why I, for one, need a comparison.

In other fields, magazines like *Which?*, *What Hi-Fi*, etc. do the comparisons very well for an unqualified public. We radio amateurs are technically qualified and aware, so don't patronise us.

In future, I think Dave Wilkins would be better off selecting an experienced amateur off the 'DXCC Honor Roll' to write the review. I've no doubt that the Editor enjoyed using the TS-870S, but in comparison to his usual KW2000B, any modern rig must be a revalation!

I was absolutely astonished to read that in the Editor's opinion the TS-870S was excellent on s.s.b. and c.w., but that he had 'no doubt that it will be excellent on the other modes'. This is no good at all - I and many other prospective purchasers need to know for sure!

To summarise, I find it very surprising that Dave Wilkins is happy with a review which is really no more that a 'What I did on my holidays piece' from the Editor. Sadly, it is now down to another magazine to do the job properly. Needless to say, I will not be buying a TS-870S on the strength of the *PW* review!

Peter Halls G4CRY
York

Editor's comment: We will shortly be publishing an article featuring the comments and experiences of several TS-870 owners and why they bought the transceiver. Their experience will obviously reflect the fact that they have had the transceiver for a far longer 'review' period than is possible for *PW*. I've no doubt the article will prove to be interesting reading! Finally, I remind readers once again, in the interests of impartiality that we do not allow equipment suppliers to choose reviewers, in the same way we refuse unsolicited equipment reviews.

Kazakhstan Reader

Dear Sir

In January 1996 I bought and read the February 1996 issue of *PW*, and saw many interesting articles. And as I am just taking my first steps in the field of radio - broadcasting and receiving - I feel that I

Converting Illegal CB Equipment

Dear Sir

I agree with the comments made by both **G3XFD** and **Denis Barber G0UFS** regarding the present legal situation relating to the conversion of 26/27MHz s.s.b. transceivers. I currently own and use a converted 26/27MHz multi-mode transceiver with the RA approval. I purchased it, in these days of low sunspot activity, purely because it was reasonably priced. I couldn't afford anything else and would enable me to work DX when the band opens, and use it for local working when it's not. A cheap way to get onto 28/29MHz!

I understand and appreciate the apprehension of the RA when it comes to the conversion of such radios. They have a very difficult and unenviable job to do with fewer and fewer resources. But the fact is that once converted to 28/29MHz, **they will remain converted**, and used by licensed radio amateurs and will **NOT** be handed back into the hands of unlicensed 26/27MHz single sideband operators.

The argument that they would get back into the hands of illegal operators does not really hold water. I say this because you only have to listen to 26 and 27MHz to hear the sideband operators DXing with modern amateur radio equipment! Although I have no axe to grind, it is apparent that stopping radio amateurs converting 26/27MHz multi-mode rigs will not stop sideband DXers operating on 26/27MHz!

They will simply go out and buy the latest h.f. transceivers, carry out some modifications and start transmitting. They are doing it already, as well as using them on 13.9, 6.6 and 3.4MHz.

While there is nothing that radio amateurs can do about the problem, surely it would be better to allow amateurs to take illegal 26/27MHz sets out of circulation and onto the legal 28/29MHz amateur band, where they would be used within the law, rather than being used outside the law as they are now?

As a licensed amateur who came into the hobby via the CB route, I've been on 'both sides of the fence' so to speak. So have many thousands of my fellow amateurs who have been licensed since the late 1970s, including the President of the RSGB 1995 **(Clive Trotman GW4YKL)** himself.

However, being on 'this side of the fence' is far better for your nerves I can assure you and as someone who values being on this side of the fence, if I were to sell my converted 28/29MHz rig, it would only go to a person who holds an amateur radio licence. No licence - no sale.

Leighton Smart GW0LBI
Mid-Glamorgan

Dear Sir

Reference illegal CB rigs. On reading the **Colin Richards** (from the Radiocommunications Agency) views on illegal rigs in *PW*, I would like to ask why did the RA send a questionnaire regarding the views of CB users on the topic of 80 channel, a.m. and s.s.b. rigs last summer?

I also read in another publication that the RA had been involved in talks for a standard for s.s.b. and a.m. rigs, so why is Mr Richards so against the idea of converting them to 28MHz? I mean, if what I have read is true, and with the questionnaire on the subject by the RA themselves, would it not be better to confiscate these rigs and bring them up to a certain standard and give them back to the owners IF a.m. and s.s.b. are to be legalised?

I am, of course, assuming that the publication I read before was correct. And believe me, I have noticed that they have been wrong on certain topics, I say no more!

A. Campbell
Northern Ireland

must put pen to paper and ask that some *PW* readers can perhaps write to me. I'll be glad to become friends with them.

Editor's reply: We would like to help this reader in Kazakhstan (post code 480083) but the name and full address is not understandable. If the reader would like to contact us again, we will be pleased to help and pass over letters from possible pen-friends.

Price Of RAE

Dear Sir
Having read **Tom Girdler**'s letter published in the February edition of *PW*, I wholeheartedly agree with his comments concerning the exorbitant price of sitting for the RAE for young people. Is it any wonder that Novices get annoyed when asked 'when are you getting a full licence?', when it is so expensive to do so.

However, I feel that it is not just the price of the exam that prohibits young (and older) people from taking up the hobby of amateur radio. It's also the price of radios and the attitudes taken by some retailers.

For example, if you were entering the hobby as a youngster today, would you be able to afford a supposedly 'budget' radio costing approximately £200? When are manufacturers going to learn that there is a vast market waiting for them, were they to release a simple, cheap radio, even if it did use old technology? (ie thumbwheel frequency control).

Finally, on a different note. I wonder how many young amateurs have suffered from the familiar experience in that having saved for a piece of radio equipment, they have been virtually ignored by the sales person (usually at a rally) as though they did not want to sell them the item?
Simon Jude GW7SOZ
North Wales

Hearing Aid Help

Dear Sir
Ref: hearing aids! I am desperate. Being a helper at a home for the elderly, I am surrounded by the hard of hearing. No one seems to get on with their hearing aids, but perhaps your readers could help?

There is one elderly gentleman who has adapted an old record player into a successful hearing aid. This player was one of those with built-in microphone and headset jacks.

My friend gives the microphone to the person sitting next to him, dons the headset and thereby they carry on an unimpaired conversation. (The person sitting next to him has to have reasonable hearing).

The equipment is, of course, large and heavy and has to be plugged into the mains. Very inconvenient!

I offered to build him a miniaturised version operating on batteries if he gave me the circuit diagram. Unfortunately, he doesn't know enough about electronics to do this. I have asked many electronic shops and looked through books in the library, but to no avail. Is there anyone out there who can help?

I know that some pensioners magazines advertise cheap foreign made hearing aids of this type, but they are unreliable and unrepairable, so I don't wish to go down that road.
Mr J. Joyner
Middlesex

Editor's comment: Not such a difficult technical problem. So perhaps there's a reader with recent experience who can help? (We'll pass on any letters).

Modular Plugs

Dear Sir
Ref: Icom IC-706 review page 20 of Jan issue *PW*. Regarding reference to **Richard Newton G0RSN** lamenting about the use of telephone style modular plugs on the IC-706 inhibiting home-brew attempts, I would draw his attention to the fact that spare modular plugs are available from Maplin (order code JW11X, at 89p each).

Also available from Maplin are the 13-pin DIN plugs (order code JW95D, £1.59 each) for the a.c.c. socket at the rear of the set. I enjoy reading your 'practical' articles and projects. I'm glad *PW* has gone back to being 'practical'.
Dr Alan Chin G17OTB
Northern Ireland

Year Planner

Dear Sir
I am just writing to say what an excellent idea it was producing a *PW* year planner. I rely on a year planner on my office wall to keep information such as birthdays and club talks, etc. instantly available at a glance. (All this because I have not yet disciplined myself to keeping a computerised diary!).

Well, to get to the point, this year I had to 'phone all my contacts to acquire a planner before the 1st January. (Yours was issued mid January - and you've no idea how much grovelling one has to do for a wall planner these days!). So, I am wondering if you would consider producing this as an annual event, with the planner the same size and quality as the 'Reference Data Chart' issued with January 1996 issues, and also timed for the *PW* on sale in mid-December.

Best wishes to you all at *PW*.
Ray Petri G0OAT
Kent
Editor's comment: We're pleased that you found the 'Year Planner' to be useful Ray. The *PW* team would be interested to hear from readers as to their preferences on date of publication and sizing. And of course, modesty stopped Ray Petri from mentioning that it was he who prepared the 'Reference Data Chart' on our behalf.

Letters Received Via The 'Internet'

Many letters intended for 'Receiving You' now arrive via the 'Internet'. And although there's no problem in general with E-Mail, many correspondents are forgetting to provide their postal address. I have to remind readers that although we will not publish a full postal address (unless we are asked to do so), we require it if the letter is to be considered. So, please don't forget to include your full postal address and callsign along with your E-Mail hieroglyphics!

The Star Letter will receive a voucher worth £10 to spend on items from our Book or other services offered by *Practical Wireless*. All other letters will receive a £5 voucher.

THIS MONTH'S STAR LETTER

Farewell Ferranti

Dear Sir
Your issue February 1996 reference the article by **Ian Poole G3YWX** on the demise of Ferranti (or, to give its full title at the end, Ferranti International PLC). I found the article very interesting and it moved me to tears.

I am an ex Ferranti employee and was made redundant in 1993 after only 13 years with the company at the Microwave Division in Poynton Cheshire. This is where a great number of MOD contracts for Microwave SAT COMMS and EW systems were placed).

There was great sadness and the air of uncertainty was unbearable. In Poynton, we had some very fine engineers who were and had, developed 'leading edge' microwave technology equipment from the old L to W band.

That section of Ferranti is now owned by a French/English Company, part of GEC called Matra Marconi Space UK. It's a multi-billion dollar concern, where I am pleased to say the good designs and work still go on. In particular, satellite ground communication packages both up and down link and MOD contracts by the score.

I am now back working at the same factory, albeit on a contract basis, doing and enjoying the same job which I consider to be like an extension of my hobby. Thanks to Ian Poole for his article and for the way you published it. An excellent magazine, keep up the good work.
Roger Barrow G8ILD
(Test Engineer, Matra Marconi Space UK)
Cheshire

Editor's comment: Pleased to be of service Roger!

Send your letters to the *PW* Offices, marking it clearly for 'Receiving You'

NEWS 1996

Compiled by Donna Vincent G7TZB

Installation Of RSGB President For 1996

Peter Sheppard G4EJP, RSGB President 1996, accompanied by his wife Sue, at the Presidential Installation Ceremony in Hull on 13 January.

Peter Sheppard G4EJP was installed as President of the Radio Society of Great Britain for 1996 in a ceremony in Kingston-upon-Hull on Saturday 13 January. Peter, who lives in Beverley in Humberside, is the RSGB's 62nd President.

It was a truly international occasion at the Forte Crest Hotel situated on the picturesque old waterside in Hull, as the Presidents of the Irish, Belgian, Dutch, French and German Amateur Radio Societies were there to lend their support with RSGB members who attended from all over the UK. Also attending the installation dinner and ceremony were *Short Wave Magazine* Editor **Dick Ganderton G8VFH** who was accompanied by his wife **Peggy**, and **Rob Mannion G3XFD**, *PW* Editor.

Around The Table At Martlesham

The **Martlesham Radio Society** will be hosting a v.h.f. Round Table event at the **BT Laboratories, Martlesham Heath, Nr. Ipswich, Suffolk** on Sunday March 31 at 10am. The event will include round table sessions and seminars, testing facilities and a Bring & Buy.

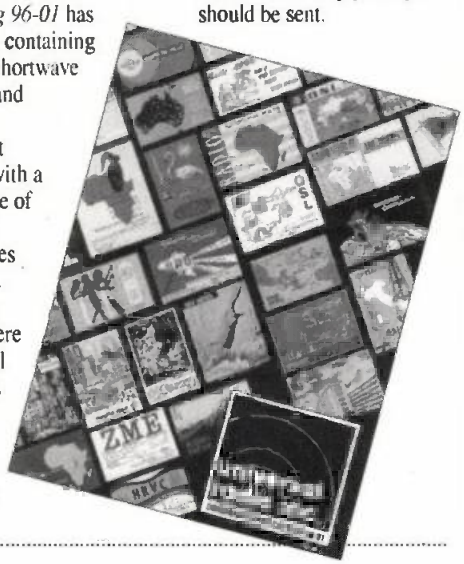
As the BT Laboratories have strict security requirements, entry to the event is by ticket only and therefore all names of persons attending must be included when ordering tickets. For tickets and further information please send an s.a.s.e. to **Roy Smith G0RRC, 'Lykkebo', The Street, Burstall, Ipswich, Suffolk IP8 3DN.**

Universal Communications

The 1996 *Communications Catalog 96-01* from Universal Radio Inc. has recently landed on the 'Newsdesk'. Universal Radio who are based in Ohio, USA have been serving the amateur and listening world since 1942 and **Fred Osterman** the President of Universal says they welcome orders from overseas customers.

Catalog 96-01 has 112 pages containing amateur, shortwave listening and scanning equipment together with a wide range of antennas, headphones books and accessory items. There are several new items featured in this year's catalogue including the Kenwood TS-870s, Sangean ATS-909 and Lowe HF-250.

To get your copy of the *Communications Catalog 96-01* contact **Universal Radio Inc., 6830 Americana Pkwy, Reynoldsburg, Ohio 43068-4113, USA. Tel (USA): 614 866-4267 or E-mail: dx@universal-radio.com** The Catalog is available **free** on request by fourth class mail or for **$1** by first class mail. For those outside North America five International Reply Coupons should be sent.



Historical Data

Savoy Hill Publications of Combe Martin suppliers of service data and manuals has recently undergone a change of ownership. **Tudor Gwilliam-Rees** has purchased the unique library of radio historical data, which he orginally collected and sold through his old company The Vintage Wireless Company Ltd. (no longer trading).

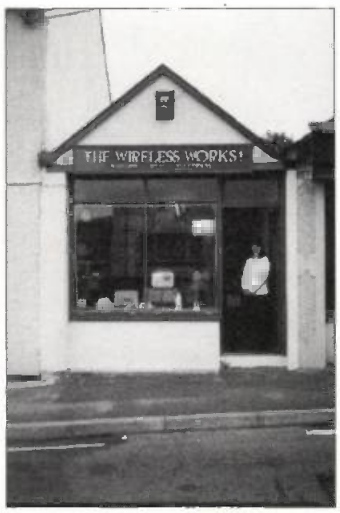
Tudor Gwilliam-Rees who has 25 years experience in the vintage radio field in addition to service data offers free technical advice, as well repair and restoration work. For more information please contact **Tudor Gwillian-Rees (Vintage Services), 50 Meddon Street, Bideford, Devon EX39 2EQ. Tel: (01237) 424280** (evenings or answerphone daytime), 7 - 9pm Monday to Saturday or all day Sunday.

The Wireless Works

If you're a valve and vintage radio enthusiast, live or are planning a holiday in Cornwall you'd be wise to pay a visit to **The Wireless Works** in Bugle. The Wireless Works is run by *Jo Rusbridge* and her husband *Rob*, (the resident engineer) and caters for all aspects of vintage radio.

Jo and Rob have a good stock of fully restored radios for sale together with plenty more awaiting attention in the workshop. They also have several crates of valves, knobs, dials, transformers, etc. and several interesting unrestored sets.

The Wireless Works is situated at **48A Fore Street, Bugle, Cornwall PL26 8P. Tel: (01726) 852284** and should give all you devoted valve and vintage enthusiasts the perfect excuse to go further south-west into Cornwall for a holiday!



Additional Award for WAB

On January 1st this year the **Worked All Britain Group (WAB)** introduced a new award for radio amateurs and short wave listeners under the name of The Millennium Award. This has been introduced because of an uncertainty regarding the local authority and county boundaries following a recent review of Local Government. The existing award programme will continue as before.

The Millenium Award will be based on 10km squares of the National Grid but without county boundary complications and will be available for those operating from base stations. Meanwhile mobile operators will be able to try for the Millema Award.

If you would like full details of the Millennium Award then you are invited to contact **Brian Morris G4KSQ** at **22 Burdell Avenue, Sandhills Estate, Headington, Oxford OX3 8ED**. A full set of claim forms for existing book holders are available for **£2** from **G4KSQ** or £1.50 if brought from a rally (please make cheques payable to Worked All Britain Award Account).

Ten Years Of Masts

Tennamast of Scotland have been supplying the Amateur radio market with antenna masts of all types for the past 10 years. More recently they have suppled a number of masts to the Ministry of Defence. In 1994 they achieved registration to ISO9001, the prestigious Quality Management system which is recognised throughout Europe and beyond.

The Tennamast range of masts is now available to amateurs in Holland, Belgium and Luxembourg from their Dutch distributor **Doeven Elektronicke** who can be contacted on **0031 5280 69679**. Tennamast also custom build a selection of brackets, fabrications and other related products, details of which are available direct from them at **81 Mains Road, Beith, Ayrshire KA15 2HT. Tel/FAX: (01505) 503824**.

Receiver NOT Transceiver!

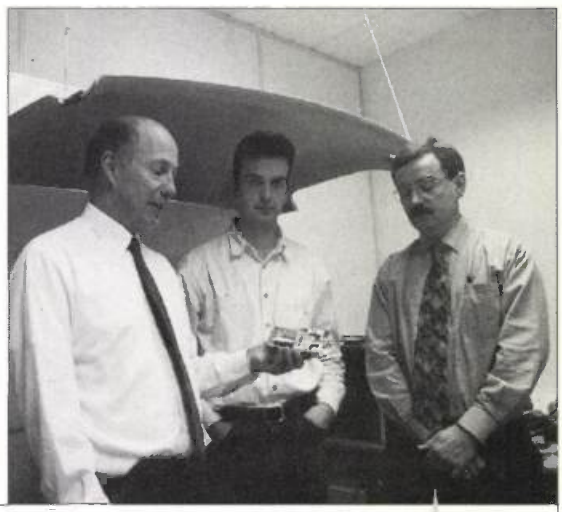
In the March issue of *PW* on the 'News' pages we reported that AKD were in the process of developing a new h.f. transceiver. Unfortunately this is not the case, AKD are in fact developing a new **h.f. receiver.**

The Editorial team apologise for any embarrassment or inconvenience this may have caused to AKD or any of their potential customers. Details of the new h.f. receiver can be obtained direct from **AKD, Unit 5, Parsons Green Estate, Boulton Road, Stevenage, Herts SG1 4QG. Tel: (01438) 351710, FAX: (01438) 357591.**

Golden Jubilee

This year, 1996, sees the **International Short Wave Leagues' (ISWL)** Golden Jubilee Celebration to commemorate the formation of the League in 1946. As part of the Celebrations the ISWL members will be operating the Special Event callsign **GB5OSWL** throughout 1996.

Special GB5OSWL QSL cards will be available to anyone hearing or working the special ISWL station. To claim a QSL card you must send to the Bureau or direct to **David Beale G0DBX, 'Kenwood', London Road, Louth, Lincolnshire LN11 8QH**.



Len Williams, Martin Stone and Malcolm McDonald from NCT Inc. stand under their company's innovative car headlining 'loudspeaker'. Len Williams (Director of Business Development for NCT) is holding one of the company's audio filters which will soon be available in i.c. format.

New Noise In Cambridge

There's soon to be a new noise on the radio scene if Cambridge-based **Noise Cancellation Technologies Inc.** (NCT) are as successful as their ideas suggest. This American company, with its European headquarters in Cambridge, have been involved with noise cancellation technology for some time, but now they are branching out and hope to solve one of the biggest problems associated with 'In Car' audio - where to place the speakers?

Many radio enthusiasts are faced with an awkward task when it comes to fitting loudspeakers in their cars. It's difficult enough for an ordinary radio, but when it comes to high quality reproduction...the placing of speakers becomes more difficult.

Design engineers at NCT's headquarters, located on the outskirts of Cambridge think they've solved a major problem for 'In Car' audio by turning the vehicle's 'headlining' into a loudspeaker. And in effect, the entire 'headlining' becomes a pair of high quality loudspeakers, with the drive assemblies hidden behind and above the lining.

Rob Mannion G3XFD, Editor of *PW* visited NCT to see some of the company's products and was impressed with the headlining 'speaker' technique. "Standing underneath the prototype the audio reproduction was excellent, and the stereophonic effect was not affected" said Rob, who added that "I'm looking forward to seeing the 'headlining' speaker fitted into a car, so that I can fully evaluate the idea".

Len Williams Director of Business Development for NCT told Rob during his visit that the new loudspeaker system was about to be fitted in vehicles in the USA. And a lot of interest was also being shown by European manufacturers for cars 'at the higher price end of the market'.

The Cambridge-based company are also working on a range of audio filters, using both analogue and digital techniques. These are still under development and are in the process of being changed from a combined discrete i.c. and p.c.b. components form to the fully integrated circuit state.

Mainly designed for the professional telecommunications industry, the new i.c.s, developed jointly by NCT in a business partnership with National Semiconductors in the USA will be available later in 1996. And although intended for professional use, the new range of i.c. filters will almost certainly find applications in the amateur radio world. Especially as the manufacturers claim the price is going to be competitive.

So, watch this space for more news from NCT Inc.! For further details contact **Len Williams, Director of Business Development at NCT Inc. European Headquarters, 1 Cambridge Business Park, Cowley Road, Cambridge CB4 4WZ. Tel: (01223) 424898, FAX: (01223) 425265.**

NOVICE Natter

For Radio Beginners Of All Ages

This month Elaine Richards G4LFM devotes her column to trying out various equipment with a view to helping you set-up your station economically.

The cost of setting up a station can be off-putting to many newcomers. You see so many adverts that need a 'favourite aunt' to remember you in her will before you can think of buying all the things you see.

And it's not just the radio, what about the antenna, the coaxial cable, a clock, log books, maps.....the list can be endless. But it doesn't have to be so costly that you have no hope of ever getting a station on the air, but it does take a bit of detective work.

As you can probably guess, this line of thought was prompted when I was loaned a few bits and pieces to try out. The first thing you need to do is contact some of the bigger advertisers in *Practical Wireless* and find out about their catalogues.

Advertisers' catalogues contain just about everything that the company stocks, usually with some kind of description and the price. Then you have to spend a bit of time reading through seeing what pieces of equipment you want, how many can you afford to buy at once and whether there are any alternatives.

So what would I list as the items I would want to set-up a station? Obviously, I would start with a transceiver, ideally multi-mode but we'll see about that when to comes to prices! Next I'd list an antenna, some coaxial cable and hopefully a rotator (depending on what antenna I end up with).

After that, I would like some kind of s.w.r. meter and a wavemeter (just to keep legal). Then we move onto the small items - a log book, a clock, a few useful books and a pair of headphones.

The Transceiver

The Com-Talk GEE-890 with its £65 price tag makes it a radio to bear in mind especially when you are ready for 144MHz. Fortunately, the prices for transceivers are coming down these days and you don't have to take out a second mortgage to buy one. Also the number you have to choose from is much greater than it was 10 years ago.

If I was going to get onto the v.h.f. bands and was going to buy new, prices start at around £150 (give or take a few pounds and depending on the special deals available at the time). This cost of £150 would give you an f.m. transceiver for the 144MHz band, probably a low power hand-held. But if you want to cut this even more you could try one of the two-channel f.m. rigs that are now appearing in a few adverts.

If you just want to start off by having the odd chat on the air, perhaps join in on the club Net and natter to your friends who live nearby then you don't need to spend all that much to get you started. I recently borrowed a pair of the two-channel **Com-Talk GEE-890** hand-helds, from **South Midlands Communications** just to see what you can get for £65.

The **Com-Talk GEE-890** produces 1W on S20 and S22 and are really small hand-helds that felt a great deal more solid than they looked. The design isn't that different from many other budget hand-helds, controls on the top panel, speaker and microphone on the front, either a rubber duck or telescopic antenna on the top panel and the **push-to-talk** (p.t.t.) switch on the side.

The p.t.t. switch was a bit difficult to feel as it seems to be a type of micro-switch underneath a rubber button. Despite this it worked okay and that's all I wanted.

Neat Idea

One neat idea that the transceiver does have is a **monitor** button just below the p.t.t. Pressing this temporarily switches the squelch off without you having to fiddle with the main **squelch** control after you have got the level set right. This is so you can check the channel quickly if you think you can hear something in the background.

Now if you are going to play around with just 1W you need to be transmitting from a good location. Now, I don't mean that you have to sit on the top of a huge hill, just that you need to be amongst a reasonable number of amateurs.

Ringwood is not the centre of the universe - that's why we moved here! There aren't dozens of amateurs chatting away on the air in the town either.

But when I was first licensed I lived in both Poole and Bournemouth. And at the time there were loads of people on the air at all times of the day and night.

The Com-Talk GEE-890 with its £65 price tag makes it a radio to bear in mind especially when you are ready for 144MHz.

Also when I was first licensed I was on the air with a home-made 'Slim Jim' antenna and a hand-held rig. I didn't need to have much power available as I was only talking to people fairly close to my location. I could have easily used something like the Com-Talk GEE-890 with great success then.

If you are interested in the Slim Jim antenna, see the PW Publishing book called *More Out of Thin Air* for details (*More Out of Thin Air* is available for **£6.95** plus **£1 P&P UK, £2 P&P (overseas)** from the *PW* Book Service). The Slim Jim is really easy to build (it must be, I built mine 15 years ago!), consequently it's cheap and reliable too.

So, if I was starting out now I think I would certainly try and get to a dealer's show room and have a look at the two channel radios and compare them against what I need from a radio. I was surprised at what it could do, and the £65 price tag makes it something to bear

in mind when you're looking for a 144MHz station on a budget.

If you have a bit more money to spend, then how about one of the f.m. only mobile rigs, these are now being advertised for just under £200 or the hand-helds at £165. Whatever you decide, when you are buying your first radio, talk to the dealers first as they will give you lots of advice and can often help you make the right decision.

Thinking About Antennas

When it comes to thinking about antennas and trying to save money, I would certainly recommend you have a go at building your own. If you go along to your local radio club, you will find that someone has had plenty of experience in building antennas.

Ask around. Someone must have made the antenna the club use for contests, or those on the mast outside the club house.

You can usually buy reasonably priced antennas from any good dealer. But there are so many good designs around that you can make a decent antenna at a good price.

Shack Clock

You really will find a separate clock in the shack a real benefit. It's all very well looking at your watch each time you want to fill in the log, but how about during the summer months when you have to remember to take off an hour to get UTC?

A clock for the shack is a not an expensive item, you can pick up cheap little digital clocks in almost any high street for under £5. But what if you feel like having something a bit more up-market, what could you get?

If you feel like being very up-market, how about investing in a MSF clock. These receive time signals and so tell the correct time, even if you switch it off and then switch it back on later as the clocks correct themselves!

The clock I've had sat by the radio this week is unusual looking, it's the Weather Data World Clock by Lafayette. As you can see from the photo, the clear clock body has a map of the world, divided up into 16 time zones.

Twenty-four cities are marked from Honolulu and Tokyo to Bangkok and Rio de Janeiro along with 12 months of weather data! For example did you know that Seoul usually has only three rainy days in February, but 15 rainy days in August?

You can also find out the average minimum and maximum temperatures for a given month too. Well, I know it's novelty value, but it does look rather unusual and it does tell the time very clearly. It's one of those clocks that looks like it belongs in the shack and not on the mantlepiece.

Luxury Barometer

One final piece of equipment I want to tell you about is a barometer. This comes under my heading of luxury (but useful) goods. By careful use of a barometer, you can 'predict' how the propagation may be going to improve or deteriorate.

I'm not going to go into the detail here. If you would like to read an article on propagation forecasting, let the Editor know and I'm sure he will arrange one! (*See 'VHF Report' this issue*. **Editor**).

Let me just say that it is useful to know whether the atmospheric pressure is steady, falling or rising. Then you can make some educated guesses as to whether it is useful to get the homework / chores / ironing or whatever out of the way quickly so you can spend some extra time on the air.

I'm sure you can remember seeing those barometers (usually in someone's hallway) and you have to tap the glass to see where the pointer has moved. Now you can get everything from complete weather stations (these tend to be very expensive) to those 'old fashioned' barometers.

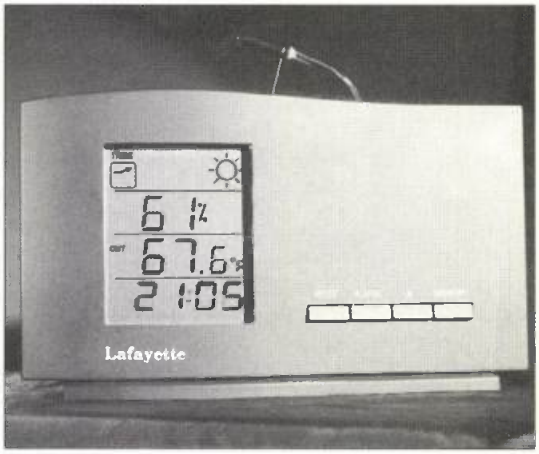
I've had the Lafayette barometer sat on top the television for the last couple of weeks. Fortunately, we have had a really unsettled spell of weather, everything from snow through rain and hail to lovely sunny days.

There's also been several low pressures work their way over our area as well as some welcome high pressures. It has been very interesting watching the changes occur and see how conditions have changes too - unfortunately they keep getting worse! I have enjoyed watching the barometer and I think perhaps we could talk some more in a future column if you would like to know more on propagation.

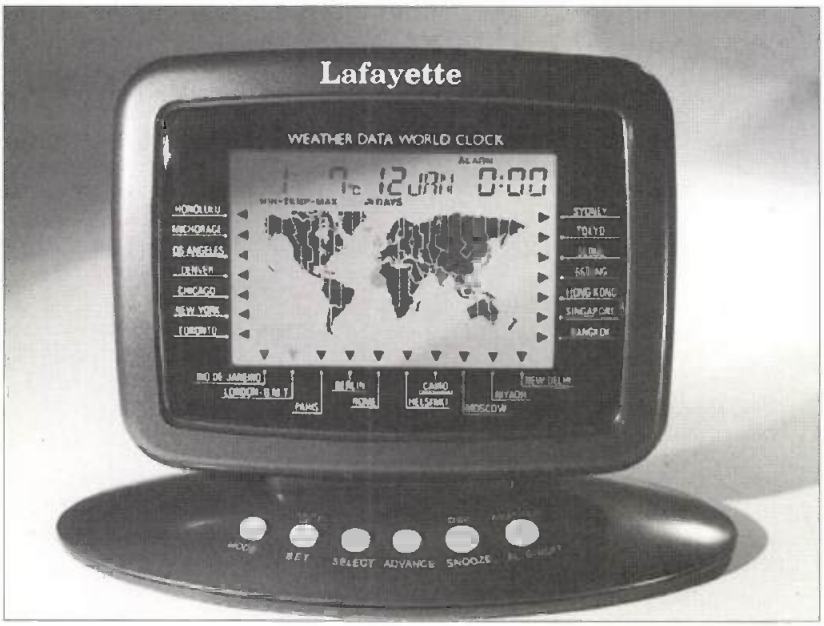
My thanks go to **South Midlands Communications, School Close, Chandlers Ford Industrial Estate, Hampshire SO53BY. Tel: (01703) 255111** for the loan of the various items mentioned here. The **Com-Talk GEE-890** is available for **£65**, the **Lafayette Weather Data World Clock** for **£21.50** and the **Lafayette Barometer** for **£49.95**.

Space has run out on me for the moment, I'll tell you about the rest of the things I've been looking at next month and report on anything of interest I've discovered at the London Amateur Radio & Computer Show.

Elaine G4LFM



A Barometer maybe a luxury item, but it's useful for determing whether the atmospheric pressure is steady, falling or rising so you can plan your airtime!



Send your letters to Elaine Richards G4LFM, PO Box 1863, Ringwood, Hants BH24 3XD.

CLUB Spotlight

Compiled by Zoë Shortland

Caravan, Camping & Amateur Radio

In 1979, a group of amateurs from the Leicestershire area, who were also keen caravanners, met by chance at a radio rally. They realised that, although amateur radio and camping combined well, no single organisation catered for both. The **Amateur Radio Caravan & Camping Club** was the resulting solution!

The new club was able to obtain (and still holds) a Department of the Environment Exemption Certificate permitting it to hold rallies of up to five days' duration. Apart from its affiliation to the RSGB and to ACCEO, an umbrella organisation for clubs holding similar DoE certificates, the club is completely independent of any other organisation.

Membership usually hovers around 50 and is limited to 60 by constitution. Although the club has spread geographically since its formation, many of its members are still drawn from Leicestershire and adjoining counties. Rally locations largely reflect this.

A typical corner of a rally field with a portable antenna mast rigged up.

The club have no trade or other stands at the rallies, which are purely for members to enjoy as they wish. Depending on the rally marshall (the task is shared around the membership), there may be some family social activities. Rallies are often located near some place of special interest. The sites chosen usually have space to put up good sized wire antennas to 'play radio'.

Sounds interesting? The club would be delighted to welcome you as a temporary member to any rally. Any recognised style of camping is acceptable: camper, trailer van, trailer tent or even bivouac. Since regular sites are not used however, it is essential for ralliers to provide and use their own chemical toilets.

Want to find out more? Please telephone or write to **Alan Gard G4LWA** (Membership Secretary), **4 Iveldale Drive, Shefford, Bedfordshire SG17 5AD** or 'phone on **(01462) 811208**. Alan says that 'A' licensees can join the 3.5MHz (80m) Nets on or about 3.77MHz on Tuesdays and Thursdays at 2000 local time or 1500 on Sundays.

New Chairman For Saltash

At the **Saltash & District Amateur Radio Club's** recent AGM, a new chairman was elected, **Kevin G7NHW**. Kevin said that he hopes to rejuvenate the club and attract new members. The committee have drawn up a programme which should provide something of interest to all.

The club meets on the first and third Friday of the month. New members and visitors are always made welcome. On March 15 there is a talk on Mariners tales by **G0RUP** and on April 5 there is a skittles night.

More information is available from **Brian G7SSH** on **(01752) 844321**.

Wakefield & District Radio Society

The **Wakefield & District Radio Society** meet at 7.45pm on Tuesday evenings at the Ossett Community Centre and cover a wide range of activities. There is a modern well equipped radio shack, a comprehensive library and a licensed bar.

For newcomers to the hobby, there is a Novice class and Morse tuition for those wanting to learn the code. A newsletter called *QSU* is published from time to time, although a broadcast server on Packet radio is used for hot news.

The interests of the present membership are wide and varied, covering most modes and bands. A couple of the members belong to the RSGB propagation studies committee and another two are officers in the local repeater group.

Other members have connections with scouting and guiding and Wakefield

Obituary - Charles Austin G4MEW

On Friday 29 December 1995 **Charles Austin G4MEW** died. Readers of *Practical Wireless* will perhaps remember that earlier in the year there was an article in 'Club Spotlight' concerning Charles and the Bedford Net.

The Bedford Net started on h.f. about 25 years ago. Charles became the 'controller' of this Net - now on v.h.f., ten years ago. His cheery voice was heard by many from 7am onwards whilst on their way to work. His friendliness acquired him many friends and a great deal of respect.

Charles was 79 years of age. He suffered from Angina and after being transferred to Papworth Hospital from Bedford General Hospital following another attack, this time more serious, he died in the small hours.

His cheery smile and friendly nature made him friends wherever he went. He was very proud of his hobby as a radio amateur and also of his callsign, which became known to many.

The day before he went to Papworth, **Ken Whitbread G3XDU** visited him in hospital, where the topic from Charles was mainly how he planned to develop his antenna system. He made very light of his illness.

Charles lived in a small bungalow with a rather small garden. This caused him to spend much time reading about and designing antennas. He managed to 'work the world' mainly with QRP. Very seldom did he transmit more than 10W.

Charles was also a first class c.w. operator and had the ability to have a 'phone QSO on v.h.f. and to listen to a couple of c.w. stations on h.f. elsewhere in the world at the same time.

In the last few weeks, Charles, a member of the Bedford Radio Club, had decided to use the club callsign, which is **G3WTP**, aptly named Winnie The Poo. Sadly, he only aired this call for a few days. He will be missed by his many friends, both in the Amateur Radio world and otherwise.

The Bedford Net is still operated on 145.275MHz every morning.

Our sympathies to Charles' family & friends. **Ed.**

A new fascination is in SSTV/FAX as shown by the attendance at G3WWF's recent demonstration of JVFAX.

Dave G7NAP shown with his lovingly restored Landrover in W&DRS livery.

& DRS provides equipment and help for participation in Thinking Day on the Air, JOTA and other scouting events at which communication badges may be earned. The City of Wakefield is twinned with Alfeld in Germany and members of the two radio societies have kept in touch on the air and made exchange visits in the past.

Despite members' diverse interests, there are times when they all come together. The biggest of these is the Northern Cross Rally, which takes place at the beginning of February and it's all hands to the pumps!

In September, for many years G3WRS has gone portable in the 144MHz Trophy Contest. The station is well equipped and nowadays housed in a mobile shack.

They have yet to win, but the main objective is to get everyone joining in, old and new hands alike. A good time is had by all as was the case too at the recent annual dinner, where fancy dress cabaret was staged! If you would like more information, contact **Rae** on **0113-282 5519**. She'll be pleased to hear from you, whether you are an old timer or a beginner.

Benelux QRP Club

Shortly after the end of the Second World War, Belgium, The Netherlands and Luxemburg decided to start political and economical co-operation. This led to the creation of the BeNeLux countries, (the title being a contraction of the names and member states).

Although the countries have their own national amateur radio societies, the background of cooperation between these countries was favourable to the formation of a transational **Benelux QRP Club** - BQC for short - to promote low power radio communication

The club was formed in 1975 by **Frans Priem PA0GG** (now a silent key) who took the post of Honorary Secretary in the first elected committee. Only a few years later did Frans agree to stand for the office of Chairman, to which he was elected with acclaim.

Frans PA0GG is still remembered after his death for the tireless energy and enthusiasm which he put into the club. Currently, BQC has 500 members, mostly licensed amateurs in Belgium and The Netherlands, but also has amateurs in Luxemburg, a few in DL, EA, G and SM, plus some s.w.l.s. It has a four man committee which is chaired by **Robert van der Zaal PA3BHK**.

Members received a quarterly newsletter, *De Nieuwsbrief*, in Dutch (some articles have an abstract in English). The club holds two major meetings each year, one indoors and one outdoors. The Camping Weekend, held around mid-June, is a family event with large antennas strung to small tents!

The annual (indoor) meeting is held at Apeldoorn each September. It's not only a 'housekeeping meeting', but also a great get-together for technical presentations and the display of equipment home-brewed by the members.

The BQC annual QRP Activity Week takes place on the air in the period between Christmas and New Year. There is a marathon in which members score points for QRP QSOs (contest or non-contest) made over the 12 month period July to June.

Weekly Nets take place around 3.795MHz s.s.b. each Saturday morning from 0930UTC (0830 in the summertime period) and around 3.560MHz each Sunday morning form 1000UTC (0900 in the summertime period). If you have worked ten BQC members in at least two countries (with at least two members in 'other' countries) you can apply for the Benelux QRP Club Award. QSL cards must show the power used by the worked club member (QRP of course) and QSOs made after January 1983 are valid.

The annual subscription to BQC is 15 Guilders (approximately £6) for Benelux members and 20 Guilders (approximately £8) for other European countries. The club, which is incorporated under Netherlands law, can be reached at **PO Box 15, 2100 AA Heemstede, The Netherlands**. The club's traffic manager is **Adriaan T. G. Willeboordse PA0ATG**.

Zoe says:
"keep the News and those Club magazines coming!"

At a camping weekend PA3EKK, PA0DEF and PA0JHS taking bearings in an 3.5MHz 'fox hunt'.

An impressive cubical quad made by PA0EPI at a camping weekend.

Send your club information to Zoë Shortland at the PW Offices.

RADIO Diary 1996

Compiled by Zoë Shortland

***March 17:** The largest single day amateur radio rally in the UK - the Norbreck Radio, Electronics and Computing Exhibition by the Northern Amateur Radio Societies Association at the Norbreck Castle Hotel Exhibition Centre, Queens Promenade, North Shore, Blackpool. Doors open at 11am (10.45am for disabled visitors). Over 100 trade stands, Bring & Buy stand, RSGB stand and book stall, club stands, amateur computer stands, construction competition, free car parking, free shuttle bus from car park, wheelchair access to all stands, radio talk-in on S22. Admission is £2, OAPs £1 and under 14s free. More information may be obtained from **Peter Denton G6CGF on 0151-630 5790.**

March 24: Bournemouth Radio Society's 9th Annual Sale will be held at Kinson Community Centre, Pelhams Park, Millhams Road, Kinson, Bournemouth. Doors open at 10.30am until 4.30pm. Talk-in from G1BRS on S22. Amateur radio, computer traders, clubs and specialised groups. Excellent refreshments. Admission £1. Details from **Malcolm G0UCX, QTHR on (01252) 845900.**

March 24: Pontefract & District Amateur Radio Society Annual Radio Rally & Components Fair. Details from **Colin Wilkinson G0NQE on (01977) 677006.**

March 31: Thames Valley Electronics Rally is to be held at Kempton Park Racecourse, Staines Road East, Sunbury On Thames, Middlesex. Doors open 10.30am to 4.30pm. There will be refreshments and a bar available. Admission is £1.50 for adults, OAPs £1 and children up to 14 years old free. The entire event is on one level. There will be retailers, accessory suppliers, antenna suppliers, a Bring & Buy stall, etc. More information can be obtained from **HD Promotions on (01494) 450504.**

April 5: The Bangor & District Amateur Radio Society will be hosting a talk by Rob Mannion G3XFD, Editor of *Practical Wireless* in the Winston Hotel, Bangor, Co. Down. It will commence at 8pm and all are welcome. The hotel lies along the seafront opposite the marina. Refreshments will be available and there is ample car parking available, opposite the venue. Further information from **Terry GI3USS on (01247) 473948.**

April 7: The Feltham and Hounslow Sea Cadets are holding their Computer and Radio Rally at Feltham and Hounslow Sea Cadet Corps, 2 Popular Way, Feltham, Middlesex TW13 7AB. Doors open at 10am and entrance fee is £1, children under 14 accompanied by an adult go free. Refreshments will be available. Talk-in on S22. **Allan on (01784) 456486.**

April 14: The Cambridgeshire Repeater Group annual rally will take place again this year at the Philips Telecom Catering Centre, St Andrews Road, Cambridge. The event will feature an auction sale, trade stands, Bring & Buy and a car boot trading area. More information can be obtained from **Paul Dyke G0LUC on (01920) 821536.**

April 14: Bury Radio Society Annual Rally will be held at the Castle Leisure Centre, Bolton St., Bury. Doors open at 11am and 10.30am for disabled visitors. The Bring & Buy will be run by members of the Rochdale ARS. Refreshments and a licensed bar will be available. Facilities for the disabled. The Leisure Centre is next to East Lancs Railway (steam preservation line), so why not bring all the family and have an enjoyable day out. **Laurence G4KLT on 0161-762 9308.**

April 14: Lincolnshire AMS '96 - Computer & Electronics Show, Springfields Exhibition Centre, Springfields Gardens, Camelgate, Spalding, Lincolnshire. Entrance fee for adults is £2.50, OAPs £2.30 and children under 14 free. There will be a wide range of new and second user goods, accessories, electronic components, multimedia, CDs, software, upgrades, consumables, etc., there will also be a Bring & Buy. **Sharward Promotions, Upland Centre, 2 Upland Road, Ipswich, Suffolk IP4 5BT. Tel: (01473) 741533.**

April 14: The Swansea Amateur Radio Society are holding their Amateur Radio & Computer Show at the Swansea Leisure Centre. Doors open 10.30am to 5pm. Entrance fee is £1 for adults and 50p for children. There will be trade stands, Bring & Buy, local repeater groups, special interest groups, as operational h.f./v.h.f. station, s.s.b. and packet. Talk-in on S22. There will be full catering and a licensed bar. The Leisure Centre is located near the City Centre on the A4067 Swansea - Mumbles coast road. Further details from **Roger GW4HSH on (01792) 404422.**

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

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

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

Editor

* Practical Wireless & SWM in attendance

practical REVIEW

The ADI AR-146 Mo

By John Goodall G0SKR

Keen mobile operator John Goodall G0SKR takes a look at a newly introduced 144MHz transceiver from Taiwan.

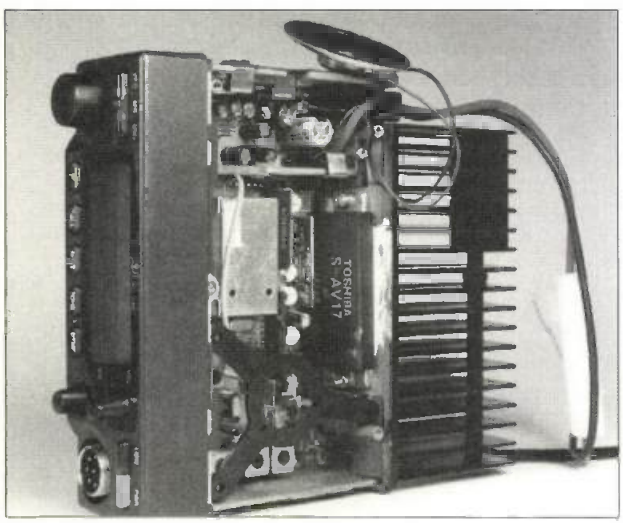
With the results of the last Radio Amateur's Examination not long off the press, it has been refreshing to review a piece of equipment, affordable to most who were successful. In fact, it's a transceiver that would not just be suitable for the newcomer to the hobby, but, one that's ideal for all users of 144MHz f.m.

The ADI Telecom AR-146 (to give its full title) is a superbly manufactured, high quality, compact yet high powered, mobile 144MHz transceiver.

Opening the box reveals a rather familiar type of large heatsink on the rear end of a similarly familiar small black box transceiver. But enough of the familiarities for now!

The box also contains all necessary hardware to enable the purchaser to be (with the simple addition of car and antenna!) on the air in a very short time. A d.c. power supply lead, screws, mobile bracket, microphone and even a simple wrench for fixing the rig to its mobile bracket, are also included.

The transceiver itself measures 140 (wide) x 166 (deep) x 40mm (height). A massive 65mm of this overall size is occupied by the transceiver's rear mounted heatsink. This is not surprising when the high power output of this small transceiver is a cracking 50W (yes 50 Watts!).



Overall view of the ADI-146 144MHz f.m. transceiver, illustrating the extensive heat-sinking used on the 50W p.a. stage.

Front Panel

Looking at the rig itself, the front panel sports the usual large tuning knob to the left of the large clear l.c.d. display. And there are two smaller knobs for volume and squelch to the right.

To the upper right of the panel are the two momentary push switches for **On/Off** and **Power H/M/L** (**H**igh, **M**edium, **L**ow power). To the upper left are found three other switches: **VFO**, **Memory** and **MHz**.

To the lower edge, below the l.c.d. display, are a row of five momentary push buttons. These are: **F** (**F**unction), **Call**, **Shift**, **Tone** and **DTMF**.

Most of the front panel buttons have dual function. The secondary functions being accessed after first pressing the **F** (**F**unction) button.

The rig is supplied as standard with a 16 tone DTMF, MC146D Microphone for use with the optional DTF146. Both the CTS146, CTCSS Unit, and the DTF146, DTMF Unit are available at a nominal additional cost from the suppliers.

Comprehensive Manual

There's a comprehensive User's Manual supplied with the ADI AR-146. And despite a couple of minor printing errors, the manual is easy to read and understand.

Personally, I much prefer to read through the Manual a couple of times before attempting to operate a piece of equipment. This is rather than the all-too-familiar 'If all else fails - consult the User Manual approach'!

Being of such a compact size, this rig will cause few problems to install, even in the most modern of cars, which often have hardly enough room to stick an in-car air freshener! (I have such a car!).

Henry Ford's successors did not have the radio amateur in mind when the Company's designers hatched the Mondeo! But, having never been anyone to be outdone or to give in, I was able to install this little beast comfortably to the right-hand side of the steering column.

The mobile bracket supplied has three recessed positions. This enables the transceiver to be angled to the most suitable viewing position.

So, it was time to fit the antenna. And with a Sirio HP 2000 Mono Band antenna, kindly loaned by **Bob Burrows G6DUN** of **The Shortwave Shop**, firmly in place on the rear of the car, it was time to put the transceiver through its paces.

On The Air

On the air, operation of the transceiver was simplicity in itself. The design making it an ideal piece of equipment for mobile operation (of course!).

Once powered up, the large l.c.d. display panel was easy to read. It has three separate light settings together with one of light **Off**, making it ideal for all driving conditions.

However, as I reviewed the transceiver during the gloomy, dull days of January and February, it proved difficult finding a day with bright sunshine to view the display!

However, never to be outdone, I had inside information from the man at the Meteorological Office at Hurn Airport, that the sun was due at 1305 on a particular day! With this information, armed with sunglasses (just in case!) and the sun-roof open, I drove up and down the A338 Bournemouth 'Spur' road until the sun appeared. So, I can categorically say the display is still easy to read even in strong sunlight!

Power Levels

The AR-146 has three power levels available, **High** (50W), **Medium** (10W) and **Low** (5W). But, using the reasonable gain antenna I was able to hold clear QSOs in both simplex and repeater mode, only using the medium and low power settings.

Only on a couple of occasions did I find it necessary to use the **High** power setting. One of those being to access and chat through the Torquay Repeater GB3TR whilst stationary on Bournemouth's Sea Front! (That's approximately 160km or 100 miles

bile Transceiver

via an obstructed land and sea pathway).

Scan Modes

Three **Scan Modes** are available on the AR-146. These include **Band Scan, Memory Scan** and **Programme Scan**.

Band Scan is activated by depressing the **VFO** button on either the rig or the microphone and holding it for longer than one second. The transceiver will then scan the entire receive coverage of the set. The AR-146 has wide-band receive capabilities, from 130-180MHz.

Memory Scan is activated by depressing the **Memory Recall** button on either the rig or microphone, and holding it for longer than one second. The transceiver will then scan any or all of the 40 memories available - providing they contain data. A **Lock-Out** facility is available to skip unwanted memory channels.

The **Programme Band Scan (PBS)** allows the operator to scan between two pre-programmed frequencies. These frequencies being entered into memory Channel 11 for the lower frequency, and memory Channel 12 for the higher frequency.

The PBS facility is activated by depressing and holding for one second, the **F** (Function) button, then pressing the **Call** button on either the transceiver or the microphone.

In all scan modes the direction of scan can be reversed by simply turning the tuning control. Alternatively, it can be achieved by pressing either the **Up** or **Down** buttons on the microphone.

Dual Watch

Dual Watch is also available on the AR-146. This feature provides monitoring of the displayed frequency, along with one of the following: The **Call Frequency**, or any memory Channel, **Memory Channel 1** and a scan of all memory channels. (Very useful if you are monitoring the local repeater and wish to listen for a call on another frequency).

Now let's take a quick look at my dislikes of this otherwise superb transceiver. And the first is a simple design fault which I feel can be easily corrected.

The three rotary controls on the front of the transceiver are to (my rather large digits!) difficult to operate. They have no serrations or knurling to aid grip.

The **Volume** and **Squelch** controls are slightly oval, but as they're tapered this makes gripping them very difficult. Should I be fortunate enough to own one of these delightful rigs, I would change the three control knobs immediately.

My only other 'beef' on this transceiver is connected with it being a **mobile** rig. In the car, I use a 'hands free' Kenwood MC-55 microphone and p.t.t., and as the majority of mobile operation is carried out through a repeater, it would be nice to have a tone burst in the rig and **not in the microphone**.

With its own microphone in place, the AR-146's tone-burst is activated after the p.t.t. has been pressed. Then the operator presses the **Call** button on the microphone.

Excellent Transceiver

So, in conclusion, I must say that I think the ADI-146 is an excellent quality transceiver. It's likely to enhance any car or shack, and at a thoroughly affordable price.

Thanks go to Waters & Stanton Electronics of 22 Main Road, Hockley, Essex SS5 4QS, Tel: (01702) 206835/204965, FAX: (01702) 205843, for the loan of the review transceiver which is available from them at £269. My thanks go to Bob Burrows G6DUN of The Shortwave Shop in Christchurch, Dorset for the loan of the Sirio HP 2000 antenna.

PW

Manufacturer's Specifications

General	
Frequency range	144 - 146MHz
Mode	F3E (f.m.)
Antenna impedance	50Ω
Operating temperature	-20°C to + 60°C
Power requirements	13.8V d.c. (11.7 - 15.8V)
Ground	Negative
Maximum current drain	
(transmit)	11A @ 13.8V
(receive)	600mA
Dimensions	140 x 166 x 40mm
Weight	1.2kg
Transmitter	
Output power	50W(High), 10W(Medium), 5W(Low)
Modulation type	Reactance
Spurious radiation	<-60dB
Microphone Impedance	600Ω
Receiver	
Circuitry	Double conversion superhet
Intermediate frequencies	10.7MHz and 455kHz
Extended receive coverage	30-180MHz (approximate)
Sensitivity	(12dB SINAD)<0.18µV
Selectivity	(at -6dB:)>12 kHz -60dB: <24kHz
Squelch sensitivity	0.1µV
Output	(@ 5% distortion) >2W into 8Ω
External speaker	8Ω

ANTENNA SPECIAL

MAKE ONE OR BUY ONE?

By Dennis Payne G3KCR

Denis Payne G3KCR takes a general look at h.f. antennas.

'What type of antenna shall I use?' This is a question all of us have asked ourselves.

The antenna is probably the most important part of a radio equipment set-up, whether you are a licenced amateur, CB operator or listener. Since radio was first used, nearly a hundred years ago, the antenna has been an essential part of the system for both transmission and reception. Thousands of new antenna systems have been invented, and many of the basic types are still being used today, such as the half-wave dipole.

The range of antennas available today is very large. And you have the choice to make one or buy one!

Fortunately there are plenty of books available for those willing to have a go at making their own. A look through the *PW* Book Service pages will give you some ideas to be getting on with, whatever your band of interest.

Antenna Resonant

To operate correctly, the antenna should be resonant. A half-wave length at the desired frequency is the basis for most antennas, but a quarter-wave length can be made to resonate against ground.

The half-wave is resonant because of inherent inductance and capacitance distributed along its length. For practical purposes, this length can be calculated by dividing 142.6 by the desired frequency in MegaHertz. The answer will be in metres.

Let's look at antennas in general, and at what is needed. First you should consider the size of the space you have available to erect the antenna, the frequencies you plan to use, and if you want the antenna to be directional.

Next do some measurements, and draw a plan of your house and garden to scale before proceeding. This can be very useful for future use.

Remember that wire antennas can be bent down at the ends when the space is not quite large enough. In practice it will make very little difference to the results.

For transmitting purposes, note that the maximum radiation will be from the high current portion of the half-wave (the centre). In the case of a vertical quarter-wave, it will be nearer the base. **Keep the base of a vertical radiator clear of other objects.**

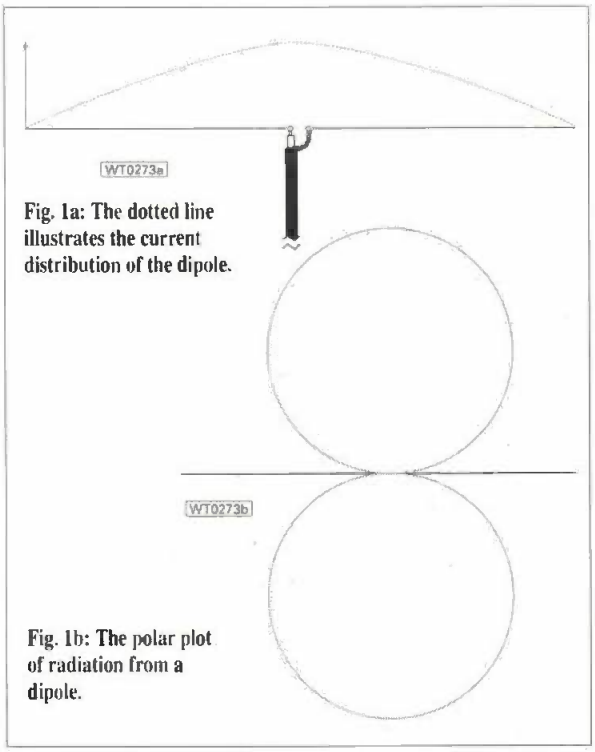


Fig. 1a: The dotted line illustrates the current distribution of the dipole.

Fig. 1b: The polar plot of radiation from a dipole.

Wire Antennas

Wire antennas are usually easy to make. This type includes the end-fed long wire, half-wave dipole, quarter-wave vertical, Windom, Zepp, G5RV, various loops and many others.

The long wire anenna is the easiest, and is fed at one end. Suspended as high as possible, a low impedance feed will require a quarter-wave of wire to resonate at the lowest frequency you propose to use. I'll deal with antennas shorter than one quarter-wavelength later.

Using a step-up balun r.f. transformer, the long wire can be one or more half-wavelengths long and have a low impedance feeder. Baluns can be made to step-up impedances by as much as 12:1. Commercial models are usually 1:1 or 4:1.

The half-wave dipole is still one of the most popular antennas. This will require a low impedance feed in the centre to closely match the radiation resistance, which is 72Ω if the antenna is a half-wave length above the ground, or 50Ω if it's much lower.

Practically the dipole can be horizontal, vertical or an inverted V using a single pole. An inverted 'V' will require a 50Ω feeder. The diagram **Fig. 1a** illustrates the current distribution of the dipole with a dotted line while **Fig. 1b** shows the polar plot of the radiation from a dipole.

Traps Shorten

Traps, which will electrically shorten the dipole to a second resonance can be used in the dipole to allow multi-band use at higher frequencies. The traps are basically parallel tuned circuits which have a high impedance at the frequency at which they are tuned.

The traps should be positioned a quarter-wave length from the centre at the higher frequency you have selected. Re-tuning of the original dipole may be required.

Windom Antenna

Many years ago the Windom antenna was used for multi-band operation by radio amateurs. This antenna is a half-wavelength long at the lowest frequency, with a single wire feeder connected one third from one end.

The feeder wire should be thinner than the antenna wire. This antenna is best fed from a Pi tuned network, which will match a wide range of impedances., see **Fig. 2**. The Windom antenna can be purchased from **Lowe Electronics, Nevada Communications** and **Waters & Stanton.**

The Windom has now been overtaken by the G5RV, a very successful antenna available on the market. Traditionally the G5RV was fed with tuned open feeder but as shown it can be fed with coaxial cable. Dimensions are shown in **Fig. 3** for those wishing to construct one. This antenna can also be purchased from the companies I've already mentioned and also from **Sandpiper**

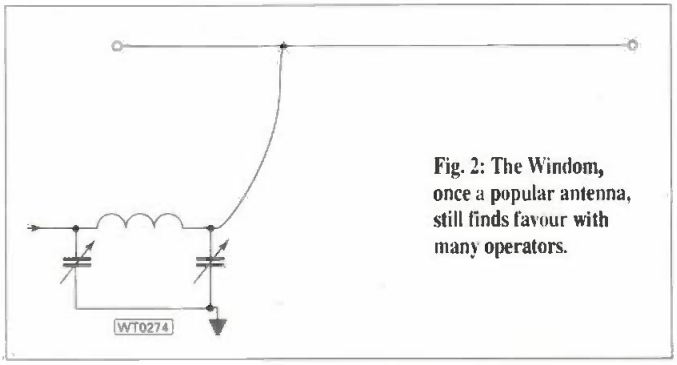


Fig. 2: The Windom, once a popular antenna, still finds favour with many operators.

Communications and **Vine Antenna Products.**

For the lucky person who has a field at the back of the house, there is always the Rhombic antenna to consider. This is a very large horizontal diamond shaped antenna for fixed direction use.

Directional Wires

Other directional wire antenna types include the cubical quad, which is box shaped and can also be constructed for multi-band operation. Another is the VK2ABQ, a small two element beam. Both of these can be rotateable.

Wire loops are used by many operators. The wire should be 2.15 times the length of a dipole at the lowest frequency you propose to use and can be mounted parallel to the ground or suspended vertically.

The loop can be roughly triangular or rectangular in shape. It will require a low impedance feeder fed at one corner of a triangle, or the centre of one side of a rectangle.

Wire antennas can be constructed using several half-wave lengths in series, and fed at a high or low current point. A larger antenna of this type will not radiate more power, but will radiate the power in a different pattern to a dipole.

Examples can be seen in **Fig. 4**, where **(a)** is a full-wave fed at high current, or low impedance point and **(b)** is the same size, but fed in the centre high impedance point, and requires a 600Ω feeder. The type shown in Fig. 4b is known as a Zepp antenna.

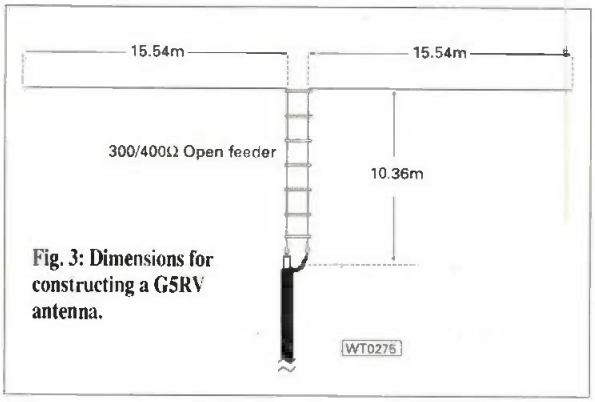


Fig. 3: Dimensions for constructing a G5RV antenna.

Limited Verticals

Vertical antennas are often chosen because of limited space, or for low angle radiation. They are mainly based on the quarter-wave principle, using ground as the return for the feeder.

Using ground as a feeder return requires an earth rod near the base of the antenna. As an alternative to ground, a counterpoise or several radials will give better results.

It's easy to construct a single band vertical quarter-wave for the higher frequencies, using tubing. This type of antenna can be mounted at ground level, or on the top of any pole or building. Radials should be used when not mounting a vertical near the ground.

Below 14MHz, when the height is about five metres, the construction of verticals becomes difficult. Commercial models are available, many for multi-band operation.

Loading

Although it's possible to reduce the length of any antenna by inductive or capacitive loading, it should be remembered that such loading will reduce the efficiency. This is because the radiation resistance is dramatically reduced.

Inductive loading is achieved by inserting an inductance in series with the element (as used in mobile antennas). The inductance can be placed at the highest current point, which is the base for a vertical.

The further the inductance is placed from the feedpoint, the greater the inductance is required to bring the antenna into resonance. Changing the position of the inductance up the antenna will also raise the radiation resistance.

The radiation resistance for a full-size quarter-wave is about 35Ω. Reducing the size can bring that down to just a few ohms, creating matching problems.

Capacitive loading is achieved by making the open end physically larger with cross members or a disc. Any linear antenna can be reduced in length by the same methods.

Reducing the size of the antenna by the methods I've mentioned also reduces the bandwidth. (Bandwidth being the range of frequencies that doesn't result in an excessive s.w.r.). This is usually 2:1.

Multi-band verticals usually use a combination of traps, plus inductive and capacitive loading, and are difficult to design. These antennas also suffer from reduced bandwidth on the lower frequencies.

Directional beams, or Yagis are the other alternatives. These can be single band or multi-band.

There is a large range of beams and Yagis to choose from. Full size will give you better bandwidth, but they are usually heavier and require a stronger rotator.

Full specifications for most of the commercial antennas mentioned are available from the stockists. They will also recommend a suitable rotator.

Small loop antennas are becoming popular with people with limited space. These are mainly multi-turn loops with a diameter very small compared to the wavelength of its resonance.

Tuning is critical on loops, and the bandwidth is narrow. But many are being used very successfully.

There are other types of antenna designs that you won't find in the text books. These are new and special designs, some of which may be found in magazines such as *PW*.

There are also commercial designs which are very small, and are based on new ideas. Many people claim them to be successful. **Hately Antenna Technology** is one company that offers this type of antenna.

The Feeder

The impedance of the feeder should closely match the radiation resistance of the antenna. Commercial antennas are usually designed for 50Ω coaxial cable, of which there are several choices.

For h.f. use, the standard RG-58 cable is most commonly used. Other feeder impedances available are 75Ω coaxial, 150Ω flat twin, 300Ω ribbon, 400Ω slotted ribbon and 600Ω open wire.

Open-wire feeders are the most efficient, with very low loss. Next comes the 400Ω, and the 300Ω ribbon feeders. They are also low loss, but the characteristic of the 300Ω ribbon tends to change as a result of wet weather.

To be really economical, it's possible to use twin electrical flex for low impedance use. However, it's recommended that you check the impedance before use.

It's also possible to make your own open-wire feeders by utilising short lengths of rigid plastic pieces. The November '95 issue of *PW* fully describes this type of feeder, (starting on page 50).

Matching Important

Matching your antenna to your radio equipment is important. Although it's easy to match a radiation resistance of 50Ω to the 50Ω impedance of your equipment by joining the two with 50Ω coaxial cable, it's not so easy to match antennas with a different radiation resistance.

The radiation resistance will vary according to the type of antenna and where you going to feed it. The voltage standing wave ratio (v.s.w.r.) will be the ratio between the radiation resistance and the feeder impedance. If this is high, then loss of power can occur.

The antenna tuning unit will not correct any mismatch between the feeder and the antenna. It only corrects the s.w.r. **between the transmitter and the feeder**, and **not** the s.w.r. on the feeder. Because of this, it is important to try and match the feeder to the antenna radiation resistance.

With a limited range of feeder impedances available, an attempt must be made to obtain a near match of the two. A maximum ratio of 2:1 is generally acceptable.

Reflected power, s.w.r., only represents power loss in the feeder. This is usually small at h.f. frequencies. In a loss-less feeder, no power would be lost regardless of the s.w.r.

Check the s.w.r., when on low power, at several points across the band. The lowest reading will indicate the resonant frequency of the antenna. For example, to change the resonance of a dipole you will need to add wire to lower the frequency, or trim wire off to raise it.

Matching antennas to feeders is a subject covered in many books. See the February '96 issue of *PW*, page 38 for an example.

Checking for resonance, radiation resistance and s.w.r. can be done in several ways. Resonance can be checked using a 'Dip

MAKE ONE OR BUY ONE?

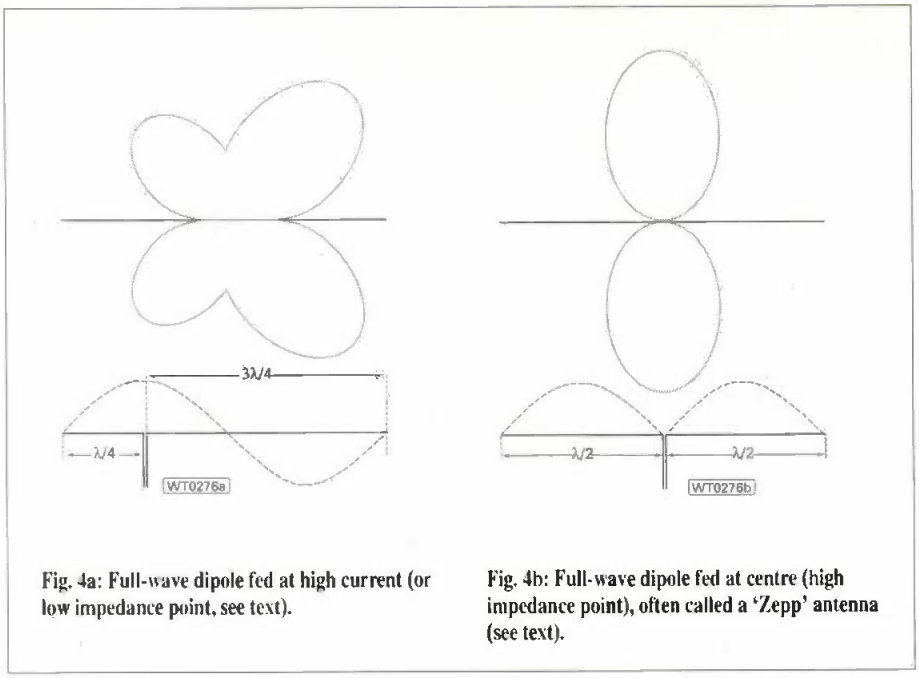


Fig. 4a: Full-wave dipole fed at high current (or low impedance point, see text).

Fig. 4b: Full-wave dipole fed at centre (high impedance point), often called a 'Zepp' antenna (see text).

Oscillator'. However, these are not usually very acurate for reading frequency, and can give some misleading readings.

Resonance and radiation resistance can be measured quite accurately using a Noise Bridge and a digital read-out receiver. The s.w.r. can also be measured using a s.w.r. meter

After using all of the items I've mentioned here quite successfully, my personal preference is the MFJ-259 Antenna Analyser. Although expensive for most pockets, it will give you all the information you need from the antenna, quickly and accurately.

Accessories

Some accessories are essential to all. So it's interesting to know just what is available for antenna use.

To start, there is a large range of masts and poles on the market. And for a basic mast scaffold poles are ideal for those with a limited pocket.

Aluminium alloy tubes in long lengths, or telescopic sections can be easily obtained. There is also fibre glass tube in limited sizes.

Rotators must be carefully selected to suit the size and weight of the antennas they are to be used with. If you are making your own verticals, there are bases on the market for most types of mountings.

Wire, insulators, dipole centre-pieces, guy ropes, coaxial, openwire feeder, clamps, brackets, connectors; the list is endless.

One or two things to remember are that: you should use stainless steel fixings where possible, they will save you having to struggle with rusted-on nuts later on. Braided cords will wear better than twisted ones, and are easier to handle.

I have used white braided nylon cord, 3mm diameter, as guys for my 10 metre pole. I only change them about every ten years, and they are still holding their strength.

Seal outside connectors with flexible filler to protect against weather. Don't use a sealer that will 'run' in the very hot summers.

A Few Tips

- **Horizontal antennas are better than verticals for general h.f. use. The higher they are mounted, the better.**
- **Vertical antennas have an all-round radiation pattern, low angle of radiation for DX, but can skip some of the intermediate distances.**
- **A short vertical can be inefficient and have poor bandwidth.**
- **Verticals can be improved by adding a counterpoise or radials.**
- **Always use low power when testing transmitting antennas.**
- **Use an antenna tuning unit, even on receiving.**
- **Buy a book on basic antenna design before starting to build.**

Commercial Products

There's a vast range of products available now, from all over the world. Suppliers have sent me literature covering a vast range of antennas for almost any frequency range, plus details of accessories you may need to construct your own models.

There are many wire antennas, from the dipole through to more complex models covering several bands. For limited space there are verticals, for single or multi-band.

The DX chasers have not been neglected. There are cubical-quads and yagis, again for single or multi-band. Some of these are quite small, for those with a limited rotating space.

My advice is to obtain details from one or more of the stockists. Check and compare the specifications of several models, and ask yourself some questions, such as:

- Will it fit into my garden?
- How large can the turning radius be for a Yagi?
- What size rotator do I need?
- Is my current pole or mast strong enough?

Try and find someone who can recommend an antenna, or check your stack of magazines for reviews of antennas. These usually tell you how good they are, and how difficult they are to assemble and tune.

Finally

Finally, I would like to thank the following companies for sending me the literature which helped me to compile this article: Aerial Techniques, Hately Antenna Technology, Haydon Communications, Lowe Electronics, Martin Lynch, Nevada Communications, Sandpiper Communications, Vine Antenna Products and Waters and Stanton.

I hope this has helped to answer some of your h.f. antenna queries. Happy 'antenna selecting'! **PW**

USEFUL ADDRESSES

Aerial Techniques, 11 Kent Road, Parkstone, Poole, Dorset BH12 2EH. Tel: (01202) 738232. FAX: (01202) 716951.

Hately Antenna Technology, 1 Kenfield Place, Aberdeen AB1 7UW. Tel/FAX: (01224) 316004.

Haydon Communications, 132 High Street, Edgware, Middlesex HA8 7EL. Tel: 0181-951 5781/2, FAX: 0181-951 5782.

Lowe Electronics, Chesterfield Road, Matlock, Derbyshire DE4 5LE. Tel: (01629) 580800. FAX: (01629) 580020.

Martin Lynch & Son, The Amateur Radio Exchange Centre, 140-142 Northfield Avenue, Ealing, London W13 9SB. Tel: 0181-566 1120. FAX: 0181-566 1207.

Nevada, 189 London Road, North End, Portsmouth PO2 9AE. Tel: (01705) 662145. FAX: (01705) 690626.

Sandpiper Communications, Unit 5, Enterprise House, Cwmbach Industrial Estate, Aberdare, Mid-Glamorgan, Wales CF44 0AE. Tel: (01685) 870425, FAX: (01685) 876104.

Vine Antenna Products, The Vine, Llandrinio, Powys, Wales SY22 6SH. Tel: (01691) 831111. FAX: (01691) 831386.

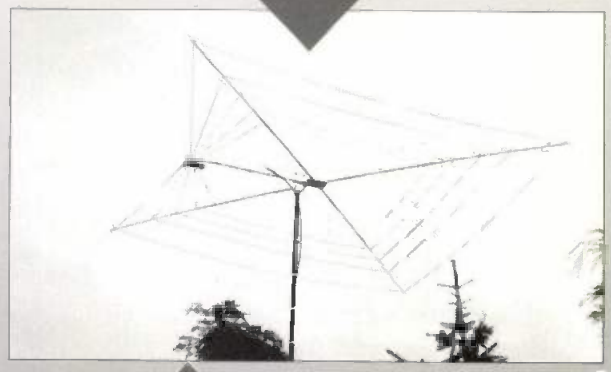
Waters and Stanton Electronics, 22 Main Road, Hockley, Essex SS5 4QS. Tel: (01702) 206835/204965, FAX: (01702) 205843.

SPECIAL PRIZE COMPETITION

Two Great Prizes worth over £400!

Catch that DX in your CobWebb! Our antenna specialist author John Heys G3BDQ says in his review (starts on page 32) that the CobWebb "Is a compact and efficient 5-band antenna". So if you win the CobWebb reviewed by John (**worth £161 and kindly donated by Steve G3TPW of SRW Communications Ltd., Astrid House, The Green, Swinton, Malton N. Yorks, YO17 0SY.**), you too can catch the DX in your own 'Web'!

Stuck for space and want to get on to the WARC bands? The Mosely TW-31 heavy duty rotary dipole (**worth £289 and kindly donated by Tim Thirst of Eastern Communications, Cavendish House, Happisburgh, Norfolk NR12 0RU**) will be just the prize for you! With coverage of the 10, 18 and 24MHz bands, a turning radius of 4.8m (16ft) and a power rating of 2.5kW, the TW-31 will prove useful for any h.f. operator.



The CobWebb Antenna

The Mosley TW-31 Rotary Dipole Antenna

Wordsearch rules:
Twelve different words have been hidden in the letter grid. They have been printed across (forwards or backwards), up and down, diagonally, but they are always in a straight line without odd letters between. You can use the letters in the grid more than once for different words. Once you have found all 12 words, mark them on the grid and send it, along with your name and address (photocopies accepted with the corner flash) to our editorial address, marked 'Competition Corner' Wordsearch April 1996.

Entry Form

Name .....

Callsign.....

Address.....

.....

.....

Postcode .....

Send your entry (photocopies acceptable with corner flash) to: **Wordsearch Competition, April 1996, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW**. Editor's decision on the winner is final and no correspondence will be entered into.

If I am a winner I would like my prize to be (please tick):

❒ CobWebb Antenna
❒ Mosley TW-31

❒ If you do not wish to receive future mailings as a result of entering this competition please indicate

Entries to reach us by Friday 26 April 1996.

N	M	P	N	Q	D	A	N	S	W	V	D	J	T	S	A	M	I
G	V	Z	L	D	D	Z	N	X	I	R	N	Y	G	N	N	D	I
M	O	F	A	O	R	M	R	X	C	N	U	X	R	S	R	F	T
Y	V	K	C	M	D	N	E	I	X	O	J	C	T	A	J	F	Z
S	K	U	I	M	W	W	T	K	S	M	K	U	G	X	T	A	W
S	W	V	T	N	B	R	S	J	X	X	N	K	O	G	S	O	G
G	M	R	R	S	M	V	A	B	V	I	E	C	O	G	E	H	R
W	E	C	E	H	A	C	E	E	N	L	H	Q	G	U	D	E	C
O	P	S	V	L	E	S	Y	G	O	B	F	G	R	P	L	D	E
Q	C	W	Q	Q	B	E	P	P	A	K	C	N	J	O	A	Y	P
H	S	T	E	U	L	Y	I	L	I	F	D	X	J	N	N	H	G
Q	F	Q	A	S	G	D	Z	N	X	Y	R	S	T	O	E	A	D
H	F	N	O	A	C	O	B	W	E	B	B	E	W	L	D	V	I
D	V	M	T	H	I	B	T	K	I	W	N	Z	A	F	X	M	A
K	B	B	U	P	C	I	Q	I	P	N	W	Y	W	L	O	Y	O
G	R	I	E	X	P	R	R	K	A	N	J	G	Y	A	Y	Q	H
S	N	O	I	T	A	C	I	N	U	M	M	O	C	W	R	S	L
P	Q	X	V	Z	N	H	L	F	D	Q	F	T	R	A	P	S	Q

Words To Find

ANTENNA
BEAM
COBWEBB
DIPOLE
EASTERN
MAST
MOSLEY
ROTARY
SRW COMMUNICATIONS
TRAPS
TUNING
VERTICAL

ANTENNA COMPETITION APRIL 1996

ANTENNA SPECIAL

By Chris Williams G7NBP

Chris Williams G7NBP has come up with an interesting multi-band h.f. to u.h.f. vertical antenna system.

THE PW 'SIDE-BY-SIDE'

Some time ago, I was looking for an easily built dual-band 144/432MHz antenna. The item had to be reasonably efficient as the best antennas are. But, as I was living in a flat with a tiny garden, size was a limiting factor.

I searched through several textbooks and ended up experimenting with a design from the *ARRL Handbook*. The original design was for cross-band satellite use. It consisted of a single monopole fed by quarter-wave stubs in an easily built J-Match configuration.

My prototype was soon built and results were very good on both bands. In fact, due to the low angle of radiation, the J-pole performed as well as a commercial collinear on 432MHz. I also noted that the J-pole caused no TVI or BCI (which the collinear did!).

I was so pleased with the simplicity and good results from the antenna, that I wrote a small article about it for my local club magazine. Several other club members tried variations on the theme and all reported reasonable results.

Since building the original dual-band antenna, I've moved to a cottage in the south Shropshire hills, so large antennas are no longer a problem, (other than that they keep blowing down!). However, the experimentation continued and eventually I arrived at this version covering h.f. to u.h.f.

A 'plus' point of this new design was that all the harmonically related h.f. bands were available when using an a.t.u. It needs no radials and works well at low heights. One version I know of works well just tied to a pole approximately one metre off the ground!

A further super advantage is from the point of view of planning permission (both council official and 'radiophobic' partners). Although the antenna covers most of the popular bands in one go, it's no more obtrusive than a 'home-base CB antenna'. This isn't surprising, because that's how the design started out!

Table 1

Freq. (MHz)	Radiator (mm)	Stub (mm)	Gap (mm)	Feedpoint (mm)	coaxial λ\2* (mm)
432.0	482	160	9	19	230
145.0	1443	480	28	59	680
51.0	4102	1366	80	169	1941

* assuming a velocity factor factor of 0.66 (such as RG58, etc.)

Dimensions for each band element.

Silver Rod

As you will see from the overall layout shown in **Fig. 1**, the main part of the antenna is based on a 'Silver Rod' type λ/2 'CB' antenna. The antenna makes up the radiating element for all bands and provides a convenient method of mounting the antenna onto a pole.

I've seen CB antennas available at car boot/junk sales for about the price of a pint. So buy a couple and you will end up with all the aluminium tube you need for this project.

Adjust Antenna

Having built the antenna, the first thing to do is to adjust the antenna for the 28MHz band. This should be easy - as sliding the second tube into the bottom one a short distance should accomplish the adjustment.

You should then find that the s.w.r. is almost flat from 28-30MHz. It should be possible, with an a.t.u., to load up the antenna on the other h.f. bands, though at lower frequencies, the efficiency drops somewhat.

The next stage of the operation is to build the J-matching stubs for the v.h.f./u.h.f. bands. **Fig. 2** shows the basic parts of the J-pole stub matching. You'll find **Table 1** gives the dimensions for each of the sections.

Please note that, in order to prevent inter-reaction between the bands, the stubs are located radially around the pole. So Fig. 1 is not quite accurate,

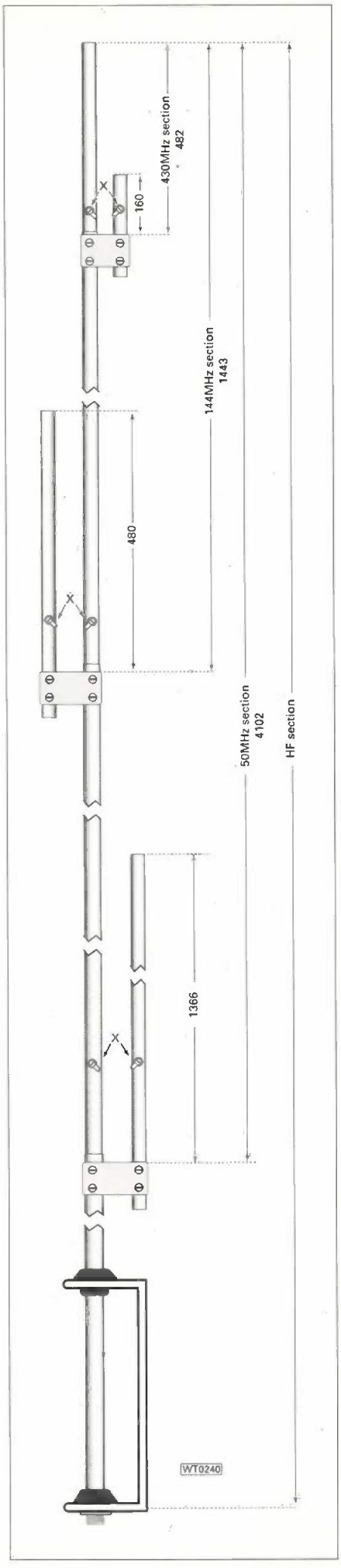


Fig. 1: The basic layout of the h.f. to u.h.f. vertical antenna. Note the stub elements are mounted at 120° from each other.

each section is one third of a turn round from the other sections.

To measure the elements for each band, start at the tip of the antenna and measure down the 482mm required for the u.h.f. section. Mark this point with a spirit marker or with a light file mark.

Again measuring from the tip, measure down 1443mm and make a mark for the bottom of the 145MHz section. Finally, mark off 4102mm from the tip, for the 50MHz section of the antenna.

Each of the marks you've just made is the bottom of the J-section for each band. Note however, that the bottom of the J is formed by the **top of the alloy plates**, not the bottom!

Mark and drill the plates first, you can then use them as templates to drill the holes into the radiating element, but remember the one third turn between each section. Once the plates have been securely bolted into place, you can move onto the next stage, adding the stubs themselves.

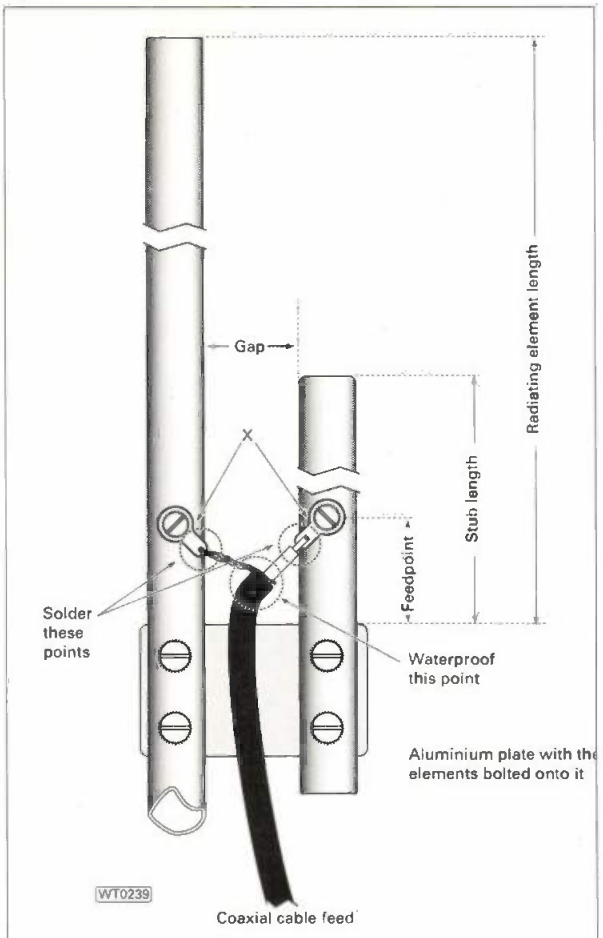


Fig. 2: Detail of the J-stub section, see Table 1 for dimensions.

Length Of Section

The length of each of the sections is given in Table 1, but remember that the dimensions refer to the length above the alloy plate. So, you will need to add 50mm to the length shown to allow for the stub to be attached to the alloy plate.

The plates themselves may be any dimension that suits, but they should be of an appropriate size to support the stub. The plates on the prototype are approx 50 x 30, 50 x 50 and 50 x 200mm on 432, 144 and 50MHz respectively and are about 2.5mm in thickness.

In order to get the correct gap between the radiator and the stub, which is quite important, the best technique I found was to elongate the holes on the stub side of the plate, using a small file.

Making the holes into slots allows a fair degree of adjustment. I you use this 'sloppy construction' method, then shake-proof washer, and lock nuts are needed to keep the gaps correctly adjusted in use.

Due of the lengths of the 144 and 50MHz stubs, an additional insulating spacer will be required. This spacer should be either thick plastic sheet, or Perspex (the best option) if you can get it cheaply. (The spacers should be bolted across the gap between the radiator and a point near to the top of the stub).

True Reading

In order that an s.w.r. meter at the shack end of the feeder can give a true reading of the s.w.r. present at each feedpoints (X - X), the coaxial cable between the feedpoints and the transceiver should ideally be an odd number of half wavelengths long (for the band in question).

When calculating these coaxial cable lengths you must take the velocity factor of the coaxial cable into account. When using RG58 cable you calculate the $\lambda/2$, divide 150 by the frequency (in MHz), then multiply the figure you arrive at by 0.66 (the velocity factor of the RG58).

The new figure is the actual half-wave length of the cable at one frequency. You must use an odd number of half wavelengths for the run of coaxial cable.

Feed points distances shown in the table, are those I found on my prototype, but these dimensions will vary slightly depending on the differing tube diameters. Start by assuming the dimensions are correct and mark the stub and radiator as shown.

Using some big 'crocodile' clips trap the terminal tags of the coaxial feed onto the marks you have made. (**Note** - *the coaxial inner goes to the stub and the outer goes to the radiating element. This might seem unusual, but that's the way it works - honestly!*).

Note the coaxial cable must **not** enter the gaps

of any of the lower stubs. So use tape or cable ties to keep the feeders tight to the centre element.

Band Under Test

Connect up a low power transmitter for the band under test and check the s.w.r. at band centre. Slide the tags (X - X) up and down (keeping them in step however) to get the lowest s.w.r. Then check the s.w.r. at the band edges.

On the prototype, the 50 and 144MHz bands were about 1.3:1, but on 432MHz the s.w.r. was fine as far as 435MHz but very high above that. Still no problem there as all the s.s.b., f.m. simplex and f.m. repeater channels were covered with an s.w.r. of less than 1.7:1.

When you are happy with the s.w.r. on each of the stub fed bands, mark the points where the tags are on each element. Then drill a small pilot hole and using star washers and self-tapping screws, firmly connect the coaxial cable links.

Final Checks

The first of the final checks is to verify that the s.w.r. on 28MHz has not altered too radically. On the prototype it was no worse at band centre, though at 29.7MHz the s.w.r. had risen to 1.5:1 - nothing to lose any sleep over!

The antenna will then be ready for air testing, placed on a small pole. The v.h.f. and u.h.f. bands should perform well just as it is. The h.f. band of 28MHz will give a lower s.w.r. and better angle of radiation with the base of the antenna at least halfwave high.

So don't be too disheartened if 'Ten' is a little poor to start with. Finally, try the remaining h.f. bands using an a.t.u. You will find the vertical is a lot better than you might imagine, even at the lower end of the h.f. bands.

If all is well, thoroughly waterproof all the feedpoints and joints using a bathroom style type of sealant. (The type that stinks of vinegar when curing is ideal for this task, but any other type may need some heatshrink tubing around it to help).

PW

Conclusions

The prototype now resides where it was first tested, which is at G0RVE's QTH. He reports many repeaters, previously inaudible, are now fully workable. His signal to my location (about 20km of obstructed path) is between two and four S-points better.

I've carried out extensive EMC tests, and the antenna causes no appreciable amounts of TVI or BCI. Not bad for a 'CB Twig'!

I would welcome any feedback regarding this antenna (G7NBP QTHR or G7NBP @ GB7PMB) and I hope that you will experiment still further with this design. I see no reason why a 1.3GHz section can't be added - but that's up to you!

ANTENNA SPECIAL

TWO TUNED-ONE BOX!

By 'Tex' Swann G1TEX

'Tex' Swann G1TEX, our Technical Projects Sub-editor gets his hands on a dual v.h.f./u.h.f. antenna tuner. Here's what he thinks!

There are many h.f. antenna tuning units (a.t.u.s) around, both manual and automatic. In fact, there are so many units available that they are almost part of the furniture.

I've managed to get hold of an interesting a.t.u., the **SWR-50RM**. But what sets the SWR-50RM apart from most other a.t.u.s is that this one is for 144 and 430MHz band use. (And as you'll see later, it can be used for either band at the same time!).

The unit was supplied with a small keyring-style adjusting tool (screwdriver). Also supplied are two matching 40mm² pieces of Velcro material to attach the unit in place.

The SWR-50RM is a small, but surprising heavy box (at 260g), some 102 x 64 x 30mm. It hardly looks big enough for the s.w.r. meter, never mind a dual-band a.t.u! There are two SO239 sockets sticking out along the long axis to complete the unit.

Work Effectively

In the past I've played around with a.t.u.s for the lower v.h.f. bands and I know how difficult they are to get to work effectively. The ones I've experimented with have followed the traditional Pi-match layout, but use smaller value capacitors and inductors.

As I was unable to open the a.t.u.'s box without damaging it I cannot say with any certainty what type of circuit it uses. However, there is a limitation to the unit that shouldn't cause many problems.

The limitation of the twin a.t.u.s built into the SWR-50RM is that they will only cope with a maximum unadjusted s.w.r. of 2.5:1. The specified limits are that 20 to 125Ω loads may be handled.

Personally, I think this item was meant to be used on an antenna in a dual-band mobile system. (Those rigs that share a common antenna line, and are designed to feed a dual-band collinear antenna would be ideal).

But enough ramble, let's now look at the unit itself. The power/s.w.r. meter has two slide switches under the single meter. The right hand switch changes the meter to display either forward power or s.w.r.

The left-hand switch is the power range control, choosing either 15 or 60W for full scale reading. On its own, this would provide a very useful instrument for trimming either a v.h.f. or a u.h.f. antenna.

The right-hand (the a.t.u. half) of the SWR-50RM has two rows of access holes in the front face. Through these holes can be seen the slotted ends of trimmer capacitors - three for the u.h.f. and two for the v.h.f. tuning paths.

The tuners appear to be separate, but in parallel in the 'through path' to the output socket. The tuners cover far more than the normal amateur bands. The v.h.f. tuner covers 136 to 175MHz, with the u.h.f. tuner covering 420 to 460MHz.

Mobile And Handy

I tried the unit on both a 20W mobile rig and also on a pair of lower power 'handy' transceivers. The sensitivity of the unit was more than adequate to cope with both situations.

In use, a low power signal is transmitted in the middle of the required band. Then two (or three) capacitors are 'tweaked' - with the supplied 'low-loss' adjusting tool - to give the lowest indicated s.w.r. It couldn't be easier.

The supplied tool is in effect a plastic moulding with a small, fairly stiff piece of metal at one end. (It's important that you use the supplied tool when trying to set up the u.h.f. side).

The presence of a normal screwdriver 'throws' the tuning out quite easily. Although using a normal screwdriver has less effect on the v.h.f. tuning, I feel that it's better to use the supplied tool to tune the system.

Should you lose the tuning tool I'm sure that you could find a suitable substitute in either of the Maplin or the Cirkit catalogues for only a few pence.

Adequate Range

In use, the SWR-50RM had adequate range to tune a variety of antennas that I tried it out on. I managed to get most of the systems to run with an s.w.r. of just about 1.2:1, as the double-sided A4 instruction sheet says it should.

The instruction sheet left a little to be desired in the way of instructions for the absolute beginner. But they were more than adequate for anyone who has used an a.t.u. beforehand.

I think that the unit may not be as useful for the other uses mentioned in the instructions. These include CB (27MHz) and long range 'cordless' telephones.

However, for anyone wanting to trim up a single or a dual-band antenna for v.h.f./u.h.f. I think the SWR-50RM would prove itself ideal.

The combined specification/instruction sheet mentioned the companion SWR-50R unit that doesn't have the s.w.r. meter fitted. This could prove a slightly lower cost option if you already have a good s.w.r. meter.

PW

Manufacturer's Specifications

Frequency Range	
Amateur Radio	140-150MHz 430-450MHz
CB Radio v.h.f.:	27MHz
Long range cordless phones v.h.f.:	72, 137, 245 and 380MHz
Power range	0-60W (two ranges 0-15 and 0-60W)
SWR Range	1.0 - 5.0:1 (meter range)
Impedance matching	20 -125Ω
Insertion Loss	<0.5dB
Tolerance	± 10% at full scale
Dimensions	128(L) x 63(W) x 30(H) (length includes sockets)
Weight	260g

My thanks go to Waters & Stanton Electronics of 22 Main Road, Hockley, Essex SS5 4QS. Tel: (01702) 206835/204965, FAX: (01702) 205843, for the loan of the review SWR-50RM unit. They can supply it for £59.95.

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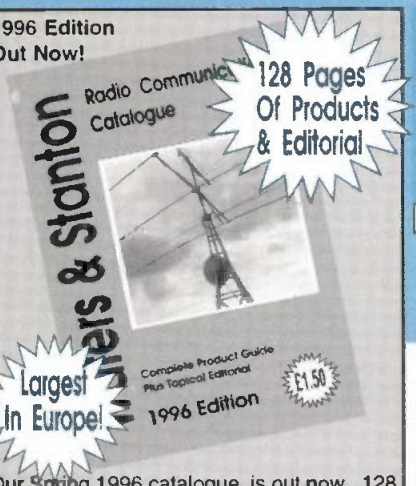

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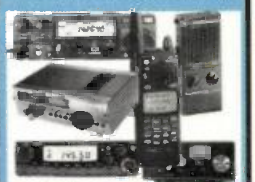

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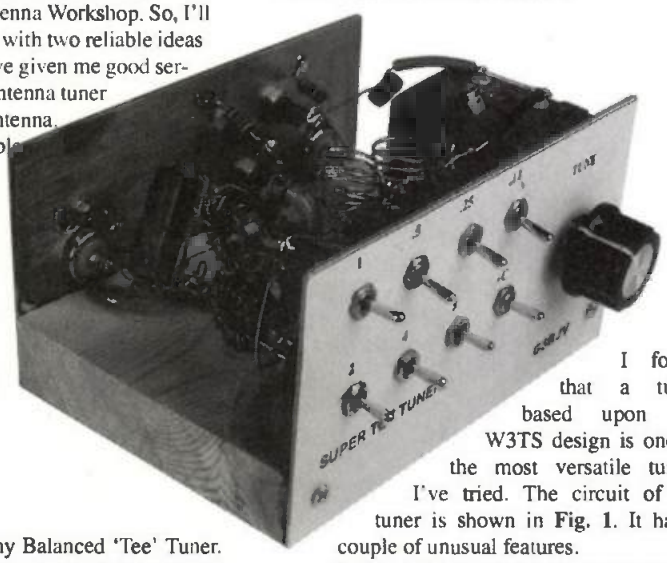
ANTENNA SPECIAL

ANTENNA WORKSHOP

By George Dobbs G3RJV

The Rev. George Dobbs G3RJV, in his last visit to the 'Antenna Workshop', presents two favourite items, a 'sure fire' antenna tuner and a simple, but effective antenna.

This is my last contribution to the Antenna Workshop. So, I'll leave you with two reliable ideas which have given me good service: an antenna tuner (a.t.u.) and a simple antenna. One of the more notable old timers who gave me reliable advice in my early days as a radio amateur, once suggested that "There are no new antenna designs, merely the reworking of old ones"!



'Tee' Tuner

So let me introduce my Balanced 'Tee' Tuner. And as the old timer suggested, ideas certainly do 'go the rounds'!

In recent years there has been considerable interest in using switched fixed inductors to build antenna tuners. Recently I was asked to test a Hands Electronics prototype programmable a.t.u. using fixed inductors.

A considerable amount of work on switching fixed inductors in a.t.u.s was done by **Ha-Jo Brandt DJ1ZB**. In many a.t.u.s the coil element is in the form of a roller-coaster type variable inductor. Sometimes switching sections of large wound inductors may also be used.

The advantage of using fixed inductors is that these can be shorted out when not required reducing the 'shorted turn' effects found in the other methods. Another idea gaining popularity in the amateur radio world is the tuner with a T-configuration ('Tee'). Articles by **DJ2LR** in *QST* and *Electronic Design* helped to circulate the designs in amateur radio circles.

Several versions of the circuit have appeared in print. **Ernie Helton W8MVN**, produced a 'Tee' Match Tuner using switched fixed inductors and **Mike Michael W3TS**, offered his version of the switched fixed inductor 'Tee' Match designed for open feeders.

I found that a tuner based upon the W3TS design is one of the most versatile tuners I've tried. The circuit of the tuner is shown in **Fig. 1**. It has a couple of unusual features.

The transmitter is fed to the tuner using a 4:1 impedance matching transformer (Balun). The nominally 'earthy' side of the 'Tee' Match may be allowed 'to float' above ground so that balanced feeders may be used.

The simple resistive balancing of the tuner seems to work very well. The capacitor feeding the antenna is a fixed value (500pF). (This is usually a variable capacitor but a high fixed value does not appear to impede the effectiveness of the tuner).

The variable capacitor is a two-gang 365pF (or 500pF) unit of the type used in some older broadcast receivers. One of the larger types from the days of valved receivers is ideal. This is an item best sourced via the surplus market or junk box (new ones can be very expensive).

High capacitance settings are common in this circuit, so an extra 660pF can be added in parallel by switching in a pair of 330pF fixed capacitors. The a.t.u. produces a balanced (suitable for open feeders) output between ANT (a) and ANT (b).

The tuner also works very well with singled ended antennas, in this case the antenna is connected to ANT(a), with the ANT(b) connection linked to ground. In practice I have found that this tuner can match quite short (in terms of wavelength) pieces of wire against ground.

Two Versions

I've built two versions of the tuner. The first version used slide switches, with all the parts soldered to brass screws on a piece of wood. **(Steve Ortmayer G4RAW**, *PW's drawing-pin expert*, would have loved that one). Like many projects it was a prototype, and didn't reach the final form for some time.

The version presented here was also built on a wooden base board, but with front and back panels made from printed circuit board material. It's designed for low power operation and should, using the parts described, be good up to about 10W of r.f. power.

The latest version uses small toggle switches, all mounted on the front panel. In my first version I had some trouble with poor contacts on slide switches.

I had a surplus equipment front panel which I bought because it contained lots of miniature toggle switches. To my dismay, when I got home, I found that these were centre-off switches.

For this a.t.u. though, almost any type of switch that can open and close will serve the purpose, so eight of the surplus switches were used. The inductors are all self supporting, and are mounted on the back of the switches.

The variable capacitor was one of my 'I know not whence' parts from the 'RJV stockpile (junk-box). This was glued to the wooden base board.

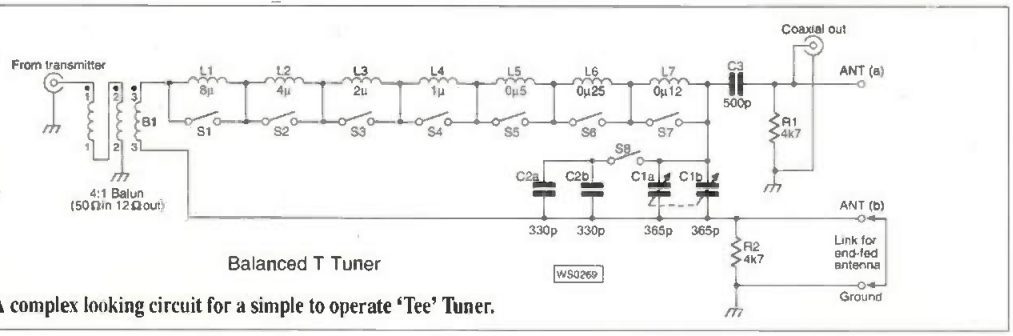


Fig. 1: A complex looking circuit for a simple to operate 'Tee' Tuner.

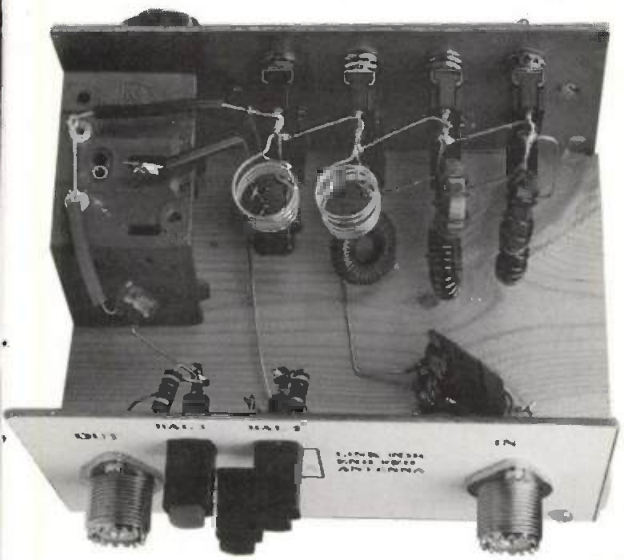


Fig. 2: Overall layout can be seen from this internal view of the 'Tee' Tuner. The shaft of the tuning capacitor must not touch the front panel. (Also the tuning knob should have a deeply indented fixing screw).

Due to the balanced nature of the tuner, it's important the both sides of the variable capacitor are isolated from ground. Use a large tuning knob with a set-screw that's deeply recessed, **(it's possible to receive r.f. burns even when using low power)**.

The back panel contains an input coaxial socket, three terminal posts for ANT (a), ANT (b) and GROUND, and an optional coaxial output socket. All the ground connections are made on the back panel with the copper clad side of the board facing inwards.

Problem Balun

The only operation likely to cause problems is winding the Balun transformers - and getting the connections right. The transformer is made by lightly twisting three lengths of wire and, for the purpose of winding, treating them as one wire. The winding follows the directions shown in the diagram **Fig. 3.**

Insert the wire through one hole and make one turn round the outside from that hole. Then make one complete winding around between the two holes and then a final winding around the other side of the former. The three wires are designated as 1* - 1, 2* - 2 and 3* - 3. The balun is connected by bring the input to 1*, 1 is soldered to 2* and 2 is connected to ground. The high end of the Tee Match goes to 3* and the low end to 3. These connections are best sorted out using an ohmmeter.

Setting Note

Once settings have been established for each band take a note of the required inductance for each band. A large range of inductance settings can be achieved by combinations of the fixed inductors.

The easiest way to set up the tuner is to short out all the inductors. Then remove the extra 660pF and fully mesh the variable capacitor.

Listen on the receiver and introduce inductance for a noise peak. Then using transmitter power and an s.w.r. bridge, adjust the inductance and capacitance for the best match. (I have yet to find anything that this tuner will not match).

Skelton Cone

The 'Skelton Cone' is one of my favourite antennas. I have used many versions of it, all to good effect. It is simply two doublets, with each side's legs spaced about 30° apart, fed by one common open wire feeder.

I first met the Skelton Cone when **Tom Chiswell W6XF**, sent me a copy of an article, by Eddy Shell W5ZBC, about the antenna. The 'classic version' shown in the diagram uses the same lengths for each leg as a G5RV antenna.

I've tried a variety of lengths for the 'SKelton' legs and had good success by replacing the 32m overall length by 40.85m. I have never managed to get the two sets of legs spaced by 30°, but this seems not to be critical.

The antenna looks quite large but you can greatly reduce the space needed by making it an inverted V arrangement. If you can get one high spot somewhere near the middle of your site, a lot of the length of each leg is lost in the drop.

My versions have often come very close to the ground at the ends of the legs. And in some cases, I have had to 'dogleg' the ends of the antenna to get it to fit at all.

Every combination seems to have worked. I once had a problem with one version, loading up on 14MHz, but this was solved by changing the feedline length. (I must have struck an unfortunate resonance length).

Give the 'Skelton Cone' a try. It's surprising where the antenna will fit and how well it functions across a range of bands.

PW

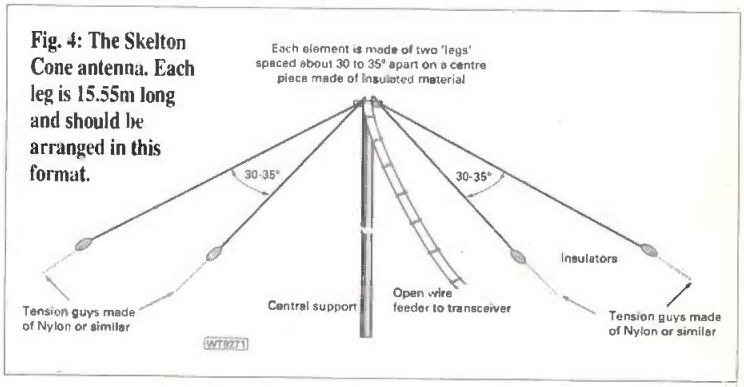


Fig. 4: The Skelton Cone antenna. Each leg is 15.55m long and should be arranged in this format.

C1 2 x 365pF variable capacitor (ex broadcast receiver type)
C2 2 x 330pF polystyrene or silvered mica (in parallel)
C3 500pF polystyrene or silvered mica
R1 4K7 Ω or 1 watt
R2 4K7 Ω or 1 watt

Fig. 3: The 50Ω to 12Ω balun transformer uses two ferrite balun cores together. Tape them together end-to-end with pvc tape, then thread the twisted together wires through as shown.

Table 1

Coil	Value	Core	Turns	Wire (dia in mm)
L1	8 H	T68-2	36	0.56(24s.w.g.)
L2	4 H	T68-2	25	0.71(22s.w.g.)
L3	2 H	T68-2	18	0.91(20s.w.g.)
L4	1 H	T68-2	12	0.91(20s.w.g.)
L5	0.5 H	T68-6	7	0.91(20s.w.g.)
L6	0.25 H	0.91mm 5t 12mm dia 12mm long		
L7	0.12 H	0.91mm 4t 12mm dia 12mm long		

Inductors
See **Table 1**
The two balun cores are type BLN43-202 (JAB Electronic Components Order Code 43006301)

Well that's my last time in the 'Antenna Workshop', but don't worry, I'm still going to be around. I've got a new regular column, 'Carrying On The Practical Way', which starts in the August issue of *PW*. See you then! **George Dobbs G3RJV.**

ANTENNA SPECIAL

REVIEW
THE COBWEBB ANTENNA

By John Heys G3BDQ

As one of our regular 'Antenna Workshop' authors, John Heys G3BDQ was very pleased when we offered him the opportunity to try an unusual antenna. Being a keen DX operator, John's enjoyed the opportunity.

I was delighted when **Rob Mannion G3XFD** *PW's* Editor asked me to review this interesting antenna. I like nothing better than experimenting with and evaluating h.f. antennas, and so I eagerly awaited the arrival of the package from **SRW Communications Ltd**.

It was early November when the 'CobWebb' arrived and the weather was kind enough to allow outdoor work. The kit of parts included a most comprehensive six page A4 size set of instructions which had many well annotated drawings.

I spent some considerable time studying the drawings before deciding to assemble the antenna on the next day. This gave me time to check out all the parts and get some idea as to how they fitted together.

Operations Commenced

The next day was dry and sunny so operations commenced! Much of the assembly can be done indoors, and then the made-up sections should be taken out to where there is enough room to lay out the 2.5m square antenna.

My patio proved adequate and the whole job took just a little under two hours to complete. I then carried the antenna down the garden (it weighs 6kg) to a temporary aluminium mast just 2.5m high.

After fixing the CobWebb in position and connecting the coaxial cable feeder (more than 30m of RG-58c/U) the daylight was fading fast. So, further work was postponed until the next morning.

Compact Five

In effect, the CobWebb is a compact five-band horizontally polarised antenna which has no traps or loading coils. It uses five full sized half-wave dipoles arranged in concentric squares - hence its name - CobWebb.

The dipoles are made with twin plastic covered wires which are held in position by an 'X' of strong fibre-glass rods. Each is gamma matched to a common feed point.

There's also a coaxial balun which stops radiation from the outer surface of the 50Ω feeder. This technique lessens the likelihood of TVI.

Nylon strings are used to hold the ends of the dipoles together. They are positioned where adjustments may be made to change their resonant frequencies. (The designer, G3TPW, clearly explains in his instructions how these adjustments can be made).

The dipoles cleverly cancel out high angle radiation and do not have the radiation nulls of conventional horizontal dipoles. As a result, there's 'all round' low angle radiation on the five bands from 14 up to 29MHz.

The antenna is 'U' bolted to a vertical pole which can be up to 55mm in diameter. The electric fields tend to concentrate between the opposite phased ends of each dipole element so that it is little affected by nearby objects.

Even when just 2m above the ground there were no problems. I found that the CobWebb's resonant frequencies and the s.w.r. readings were little different from those obtained when it was raised to full working height.

John Heys G3BDQ with the CobWebb antenna, mounted on its temporary test mast.

Antenna Height

It was only possible for me to put the review antenna up to a height of 8m. But even then its performance was still impressive.

A 'crosshead' screwdriver and a spanner were the only tools needed when putting the CobWebb together. The small pieces of hardware such as the 9.5mm 'Supadrive' screws, the eyelet terminal and the cable ties were supplied in greater quantities (25%) then were actually needed. This is a feature that many antenna manufacturers neglect!

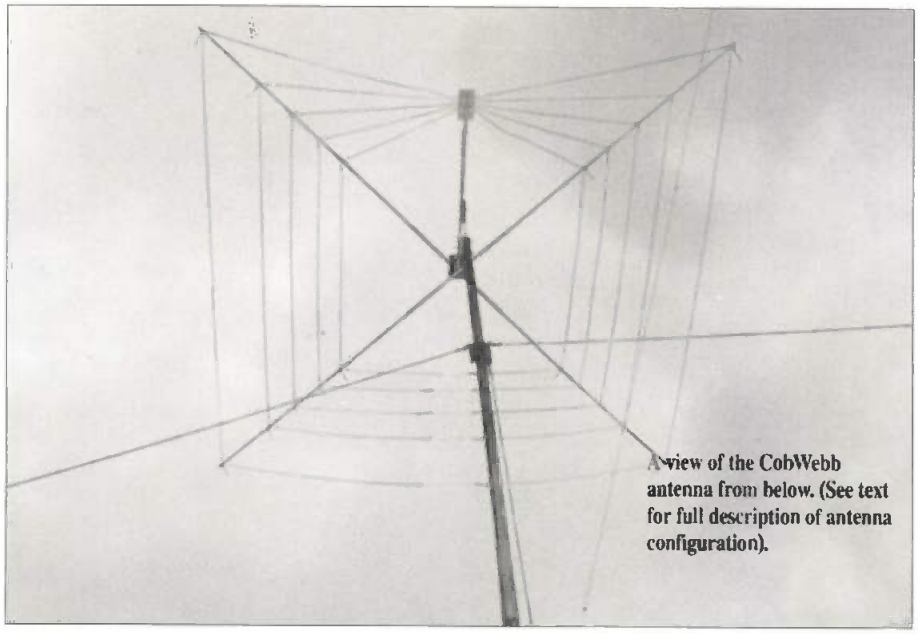
There was even a test piece of fibreglass rod to allow practice in using the correct amount of pressure when tightening the self-tapping screws. This was to prevent thread stripping and crushing of the fibre-glass.

Testing Frequencies

At the temporary height of 2.5m, I tested the CobWebb for its resonant frequencies and s.w.r. over the five bands. As supplied, the antenna is pre-tuned for operation on the s.s.b. sections of the bands and the s.w.r. readings obtained are given in **Table 1**.

I found that there's an unusual rise and then fall in s.w.r. over the 28MHz band. This is caused by some interaction with the other dipole elements and is no disadvantage.

The antenna can be used with transceivers which do not have internal a.t.u.s. My own transceiver has an a.t.u. so the CobWebb could be tuned to unity s.w.r. on all bands. (The antenna has been designed to operate at up to 1kW).



A view of the CobWebb antenna from below. (See text for full description of antenna configuration).

ANTENNA SPECIAL

Just for fun, I sometimes operated on 10MHz with the CobWebb. And despite the mis-match which was compensated for at the receiver, contacts were made which provided reasonable reports.

Operating Period

I operated using the CobWebb over a period of about eight weeks. This was so I could make comparisons with my antenna 'farm' of dedicated wire antennas, all of which were up at least five or six metres higher.

Sometimes DX contacts provided reports from the CobWebb just 3 to 5dB down from those with the other antennas. But the difference sometimes rose to as much as 3 'S' points.

Table 1: Plotted CobWebh s.w.r. measurements

Frequency (MHz)	s.w.r.
14.05	2:1
14.15	1.5:1
14250	1:1
14.35	1.3:1
18.1	2:1
18.15	1.6:1
21.05	1.7:1
21.15	1.5:1
21.25	1.2:1
21.35	1:1
21.45	1.2:1
24.9	1:1
24.99	1.3:1
28.05	1.2:1
28.15	1.3:1
28.25	1.4:1
28.35	1.7:1
28.5	2:1
28.6	1.7:1
28.7	1.6:1
28.8	1.5:1
29.0	2:1
29.6	1:1

If the CobWebb had been raised to 12 or more metres from the ground, I feel sure that the differences in reports would not have been so great. Despite the poor h.f. conditions during the winter of a sunspot minimum, I worked a lot of DX on the CobWebb.

My DX included PJ8, West Coast Ws on 'Long Path', LU, ZD8, J28, 4S7, JA, VK, ZL, 5T5, etc. Reports when using 90W averaged S5 to S8 on s.s.b. and c.w. reports often up to S9.

Tried And Abandoned

Over the years I have tried and then abandoned several commercially made multi-band verticals in favour of well positioned horizontal wires. But I found the CobWebb easily out-performed the verticals and also had an inherently low noise level.

In use the CobWebb seemed to show no noticeable directivity. It also stood up without damage to a couple of gales and proved to a be a useful standby antenna.

Few stations were worked on the 24 and 28MHz bands which were 'closed' during the test period. I also found that stations on my local 29.6MHz f.m. net using vertically polarised antennas were very weak. (This strengthens the maker's claim that CobWebb's radiation is almost completely horizontally polarised, this fact and the use of the feeder balun also greatly reduce the chances of TVI).

The antenna's designer G3TPW is always available on the telephone to advise owners of his antennas. He even told me of one satisfied customer who has a CobWebb installed in his roofspace!

Pair Of CobWebbs

The 'adventurous' operator might like to invest in a pair of CobWebbs. They could then be set-up as a driven, phased 5-band beam with a front-to-back ratio of up to 40dB and a forward gain equal to that of a 3-element tribander. (Detailed instructions for making the beam can be obtained from **G3TPW** at SRW Communications Ltd.).

I can recommend the CobWebb to those amateurs who have very little space or who have antenna restrictions. Big beams or extensive long wires will normally out-gun the CobWebb, but for those unable to use such antennas, the CobWebb will give them a compact and efficient five band radiator.

No technical skills or expensive test gear is needed when putting together and setting-up a CobWebb. It's very compact and when up at 12m or more is visually unobtrusive and unlikely to upset the neighbours.

My thanks for the loan of the review antenna go to G3TPW at SRW.The CobWebb can be obtained from the manufacturer, **SRW Communications Ltd., Astrid House, The Green, Swinton, Malton, N. Yorks YO17 0SY** at a price of **£161** plus **£8 P&P.**

PW

You could WIN the CobWebb Antenna which has been kindly donated by G3TPW - Turn to page 25 of this issue to find out how!

After seeing a copy of G3BDQ's review, Steve G3TPW of SRW Communications Ltd., sent us the following comments:

The low s.w.r. at the top end of the 28MHz band is caused by the resonance of the 14MHz double gamma matching section as full-wave on 28MHz. This was not intentional, but can be very useful for DX f.m. operation around 29.6MHz!

The CobWebb is supplied with a PL-259 plug on the end of a short length of coaxial. To keep losses low, it is best to extend the coaxial with 'half inch' type ie. RG213 or UR67.

The mast can extend right through the CobWebb with no ill effects. Thus the CobWebb can easily be added to a typical v.h.f./u.h.f. installation on the same mast. **Steve G3TPW**

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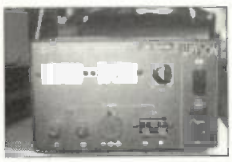

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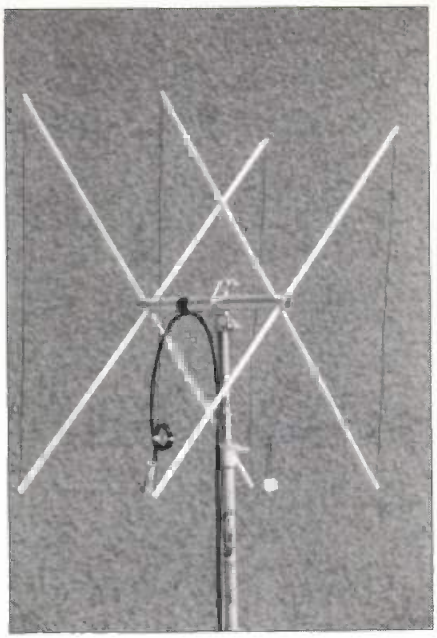
ANTENNA SPECIAL

A POTENT CUBICAL-QUAD FOR 144MHZ

By Kevin James G6VNT

Kevin James G6VNT has 'brewed' up a 'potent idea' in the form of a v.h.f. cubical-quad antenna.



There are many different kinds of antenna and one of them is the cubical-quad. Additionally, there are also many variations of the cubical-quad, and with this in mind, I set about designing a compact high gain version for 144MHz.

The antenna I'm describing is cheap to make using only dowel rod and copper wire from an old car alternator, yet the performance is outstanding. I tried many configurations before arriving at the final version, which gave the desired results.

Many designs fail to give maximum gain because they have a rectangular loop and not a square loop. Some designs also make the rear loop physically larger to achieve the lower resonating frequency.

I made none of the mistakes! Instead, I made both loops square and the same size, putting in a tuning stub at the bottom of the rear element to get the lower resonance.

As both loops are square, they provide the best performance gain wise. (Circular loops are better, but they're difficult to make from a mechanical constructional point of view).

High Gain

Cubical-quad antennas offer high gain for a relatively small physical size. But this advantage is offset by being a mechanical nightmare to construct!

The cubical-quad antennas are also a little prone to vertically polarised interference. And certain types of quad are also difficult to match to the feeder.

I wanted a small antenna with high gain (don't we all!). So, it was a question of trying to solve some of the cubical-quad's difficulties.

Four Sides

The normal quad loop on its own consists of four λ/4 wave sides. When fed in the bottom horizontal element, the antenna exhibits horizontal polarisation.

The cubical-quad arrangement has a gain of 1.4dB over a normal half wave dipole. Adding a reflector, shown in **Fig. 1** raises the gain to a maximum of 7.4dB over a dipole.

Cubical-quads don't perform well unless the reflector element is tuned so that it's 'just right'! The reflector should resonate generally 3 to 6% lower in frequency than the driven element.

When correctly adjusted, cubical-quads also have an excellent front-to-back ratio. The design will also provide more gain when thinner wire elements are used, rather than if heavier gauge wire is used.

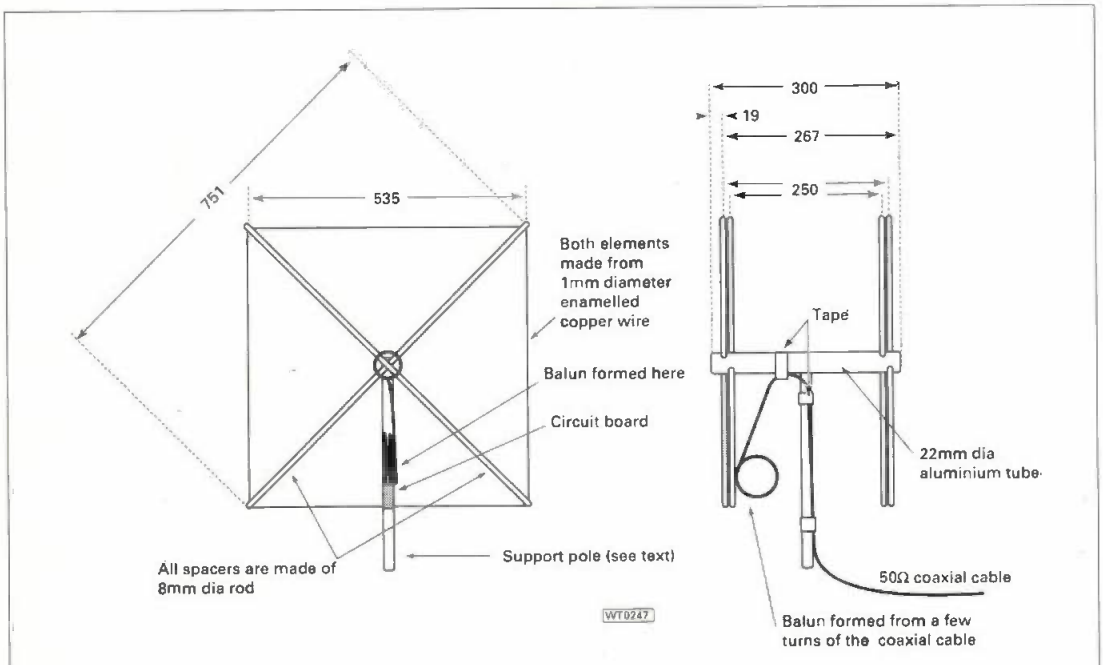


Fig. 1: Overall diagram and dimensions of the G6VNT 144MHz cubical-quad antenna.

Optimum Gain

Optimum gain is obtained from a two element cubical-quad, when the elements are spaced 0.125 of a wavelength apart. With this in mind, I did try this, but at this spacing the impedance of the driven loop was in the region of 65-100Ω.

I could have moved the elements closer together, until 50Ω was achieved. But then maximum gain would not be realised as the spacing was not at optimum.

What was needed was a small, efficient adjustable circuit to transform the 50Ω feeder up to the driven elements impedance. I achieved this with the circuit board shown in **Fig. 2**. The circuit is merely a simple LC matching unit.

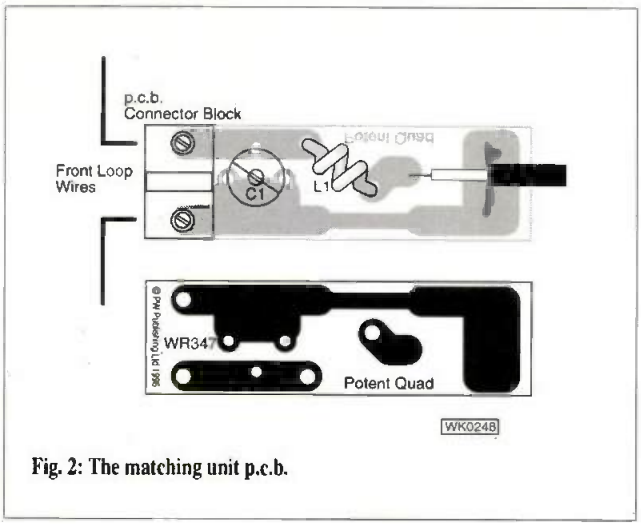


Fig. 2: The matching unit p.c.b.

Matching Circuit

I constructed the matching circuit on a small p.c.b. just 15 x 15mm in size. On my prototype, the v.s.w.r. was adjustable right down to 1:1 for a number of different sites.

The cubical-quad had to be set-up in a open space as it's sensitive to the presence of surrounding objects. The p.c.b. is simplicity itself, and has just a 10pF trimmer and a two-turn 0.91mm (20s.w.g.) enamelled copper wire coil with a 4mm internal diameter, as in the detail photograph **Fig. 3.**

Boom Length

The boom consists of a 300mm length of 22mm diameter aluminium tube. You should refer to Fig. 1 for main dimensions of the antenna.

The element stays were made of 4 x 750mm lengths of 8mm dowel rod obtained from the local d.i.y. shop. An 8mm hole was drilled 10mm in from the end of the boom and another 250mm away at the other end. (This is the optimum distance for maximum gain with this antenna, being one eighth of a wavelength).

A third hole is drilled 8mm down from the first hole, but at 90° to it. You should drill the fourth hole 250mm away, again at the other end of the boom.

It's **important** to get the holes square to the boom and if available, I recommend you use a drill stand to do this. I found it difficult to drill the boom holes at 90° to one another, so a little care is needed, otherwise the elements will look twisted.

The dowel rods will need a 1.5mm hole at each end to pass the 0.91mm enamelled copper wire through. Make sure they are in line and square with the rods. The dowel can then be pushed through the holes on the boom making the box kite construction. (The holes need to be a tight fit).

Antenna Weatherproofing

If the antenna is to be left permanently outside, weatherproofing will be required. So, instead of the dowelling, the 8mm glass fibre rods used in making kites are recommended. (I found these were available at my local kite shop for around £2 for 2.5m lengths).

I didn't use varnish on the dowel as it cracks with time and water gets in. This causes the elements to twist and give v.s.w.r. problems.

The rear element has a two way plastic electrical contact or terminal block at the bottom centre of the loop. The ends are scraped and pushed into the block and the screws tightened down.

On the other side of the block there's a 65mm hair-pin loop made from 0.91mm copper wire protruding from it. This forms the tuning stub.

The tuning stub length I used, provided optimum results. At the bottom centre of the front driven loop the wires are fed into the p.c.b. terminal block and tightened down.

As the antenna is balanced, some sort of balun is advisable. I achieved this by making a 40mm diameter two-turn loop of the RG58 coaxial cable, about 50mm before entering the p.c.b. (This was held in position by two cable ties as shown in Fig. 3).

The RG58 coaxial cable is fed upwards to the boom. Then I used a piece of tape (you can use a further cable tie) to hold it to the boom, thus preventing damage to the front element if the coaxial cable is pulled accidentally.

Setting-Up

When the antenna is assembled, you can start setting it up by placing it 2m up a pole in the garden away from trees and other objects. Next, with your transmitter on low power, adjust the 10pF trimmer for the lowest v.s.w.r., (standing clear of the antenna after each adjustment to see the true v.s.w.r.).

The matching unit p.c.b. and the components will all need to be waterproofed with clear bathroom sealant if the antenna is to be permanently installed outside. This stops the entry of moisture into the trimmer and other components.

Impressed With Results

I was generally impressed with the results from this antenna and used a Kenwood TS-751E for the tests. To start, I began the tests with an S9 signal on the front from a constant signal source at a distance of 30m.

Swinging the antenna round through 180° resulted in an S1 signal strength reading on the rear of the antenna. I considered this was not a bad front-to-back ratio for a 2-element cubical-quad!

When my standard HB9CV was plugged in, I obtained an S7 reading. With the cubical-quad it was S9+! (that was more than good enough for me). There were two small lobes, one either side of the beam, but they were nothing to worry about.

In my opinion, this antenna project makes an excellent high gain portable unit that fits in the boot of a car. It could also be the answer to the high rise apartment dweller, who may not be allowed external antennas

As a result I have had many memorable contacts under flat conditions from local DX spots. (The beam was used with a modest 25W). And the total cost of this highly effective antenna is only a few pounds.

Good luck and cheap DX! **PW**

ANTENNA SPECIAL

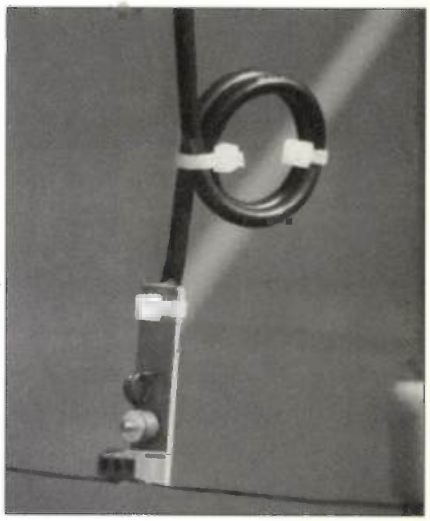


Fig. 3: Close-up view of the matching unit p.c.b. and balun installed on the antenna (see text).

Shopping List

One 1.5-10pF polyester film variable capacitor.
A suitable length of 50Ω coaxial cable (RG58 or similar).
Four 750mm lengths of 8mm wooden dowel or g.r.p. tubing.
One 300mm length of 22mm diameter aluminium tube.
Five metres of 0.91mm diameter enamelled copper wire.
Two two-terminal blocks (or sections of 'choc-block' electrical connectors).
One stub mast (at least 400mm long) and 90° clamp.

ANTENNA SPECIAL

The PW RAPID Remote Antenna Pos

By Peter Laitt G0IFQ

Peter Laitt-G0IFQ describes his basic lightweight antenna positioning indicator. It uses an easily obtained electric barbecue spit motor and is ideal for v.h.f. cubical quads...so get busy!

The 'RAPID' project came about because I had built a rigid version of the 144MHz cubical-quad antenna outlines in the *ARRL Antenna Handbook* (Chapter 13, page 13 refers). After I built it, I felt that some means of remote antenna positioning indicator would be useful!

Of course, there are numerous ways of achieving remote positioning indication. Most are extremely complex if an accuracy of a fraction of a degree is required.

But just a basic system, like mine, is adequate. It will give the operator some idea in which direction the antenna is receiving maximum radio frequency pick-up.

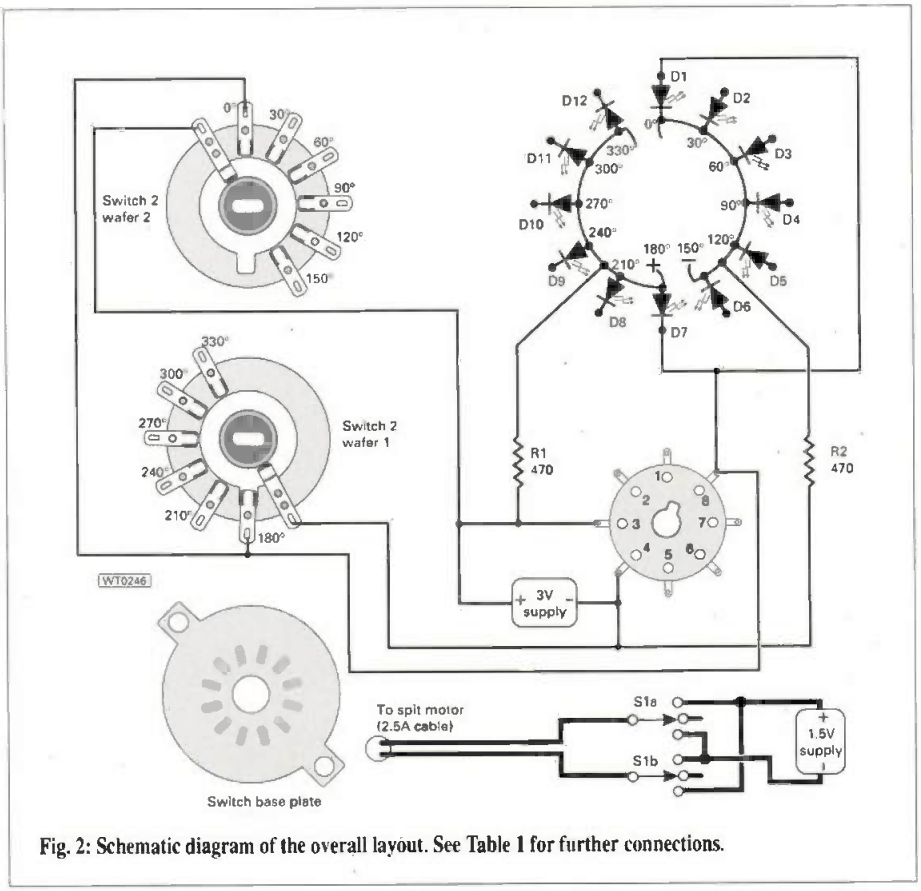


Fig. 2: Schematic diagram of the overall layout. See Table 1 for further connections.

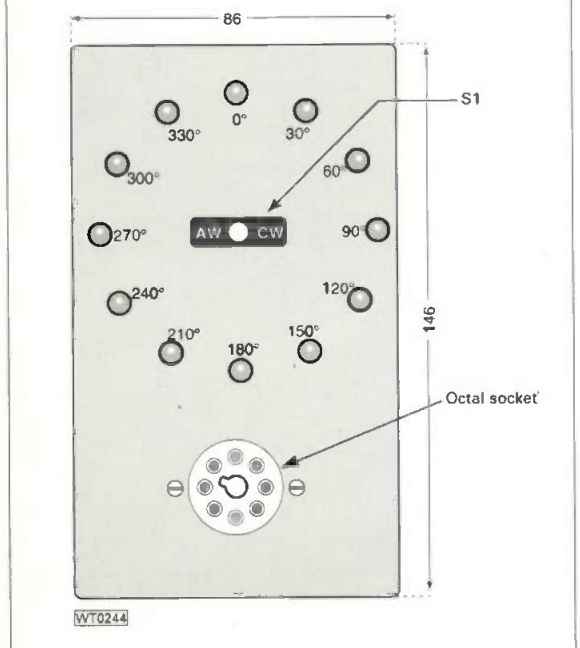


Fig. 1: The suggested layout of the control unit.

Readily Available

Readily available 12-position 'O A K' or similar wafer switches lend themselves to easy conversion giving a contact at approximately every 30°. But, for the PW RAPID project I've worked out a way of using two wafers of a double pole 6-way switch for the same purpose.

In the shack, at the controlling end, 12 l.e.d.s are terminated on a standard octal valve socket base. The layout I used is shown in **Fig. 1**. The l.e.d.s are mounted, positioned at every 30°, on a piece of insulating material (size to fit on a double 13A socket box).

To connect the l.e.d.s look at the diagram of **Fig. 2** and use the connections shown in **Table 1** at the same time. The common contacts can be made around the l.e.d.s, but the individual connections back to the octal base should be made with short flying leads.

The various interconnections within the box are accompanied by the battery supplies and antenna drive motor reversing switch. From the control box to the antenna head, two interconnecting cables are required to make the system work.

The first cable is a two wire, 2.5A cable for the motor supply of 1.5V. The second cable is an 8-core telephone type cable for bearing information and the supply for the switch wafers.

To drive the antenna head, and the wafers of the switch, I used a 'barbecue' spit rotation motor. I used this type of motor because it's a cheap and easily obtainable type, available from from most d.i.y. stores and garden centres.

Indicator Box

Let's now have a look at how the indicator box is used within the system. The battery supplies of 1.5 and 3V are assumed. The positive side of the 3V supply goes to pin 3 (of the octal socket) and the negative on pin 4.

From the octal socket pins, a negative supply is taken by one of the 8 wire cable leads to the

Table 1

Location	Interconnections					
Wafer 1	0°	30°	60°	90°	120°	150°
Wafer 2	180°	210°	240°	270°	300°	330°
Octal base	8	7	6	5	1	2
l.e.d.	D1a	D2a	D3a	D4a	D5a	D6a
Diodes	D7k	D8k	D9k	D10k	D11k	D12k

ition Indicator Device

ANTENNA SPECIAL

common contact of switch wafer 1. The positive supply for wafer 2 is taken by a second wire in the 8-wire cable. This leaves only six wires to carry the angular information of the 12 indicated antenna bearings.

The common cathode connections of D1-6 is taken via current limiting resistor R2 to the common point. These l.e.d.s display the 0 to 150° positions. A similar arrangement also runs, via R1, to the common anodes of the 180 to 330° display diodes.

The Circuit

Now let's take a look at the circuit. (Only one information wire is shown at 0° and 180°), but Table 1 has the other connections to be made. But I shall describe the circuit as it is shown in Fig 2.

As you can see switch 2 wafer 1 has a negative supply to the common contact. During the half rotation that one of wafer 1 contacts is connected to the common contact, wafer 2 is out of circuit.

The negative supply from the common contact through to the 180° contact is fed via one of the remaining six wires, to the octal socket. From there it goes to the 180° l.e.d. D7 cathode.

As D7's anode is returned to a positive supply via R1, this causes the 180° l.e.d. to illuminate. The 0° l.e.d. (D1) is also in circuit but has no effective supply, and so will not indicate.

Now imagine that the antenna is repositioned to a northerly direction by driving the motor clockwise or anti-clockwise via S1. The common contact of wafer 1 loses contact with all of the other wafer contacts.

The 0° contact on wafer 2 has a positive supply connected to it from the common contact of wafer 2. As I've described before, this supply is also fed to the octal socket and thence to the anode of the 0° l.e.d. (D1).

The cathode of D1 is returned to the negative of the 3V supply via R2 causing the 0° l.e.d. to indicate. The 180° l.e.d. is also in circuit, but this has no effective supply so will not indicate.

Modifications To Switch

Now I'll detail the modification that are required to the position switch S2. And you should start by disassembling the switch.

Next, remove the switch locating ball bearings and the spring along with its holder. This will allow switch shaft to rotate freely when it's located in the square drive from the spit motor.

Then when re-assembling the switch, wafer 1 should be placed nearest the mounting bush. Wafer 2 should be furthest away from the bush and placed behind wafer 1 in the same relative positions as shown.

A square steel nut or similar item should be shaped to fit the spit motor drive. Most of the motors have a square socket.

When you have the steel nut shaped to fit the socket, solder it to the shaft of Switch 2. The position chosen should enable it to locate in spit motor drive when the motor is secured to the base plate of the rotator.

The quad antenna I built was constructed of lightweight plastic tubing with 1.2mm (18s.w.g.) copper wire for both elements. I made no attempt at waterproofing the indicating device as I intended to mount it in the loft of my house.

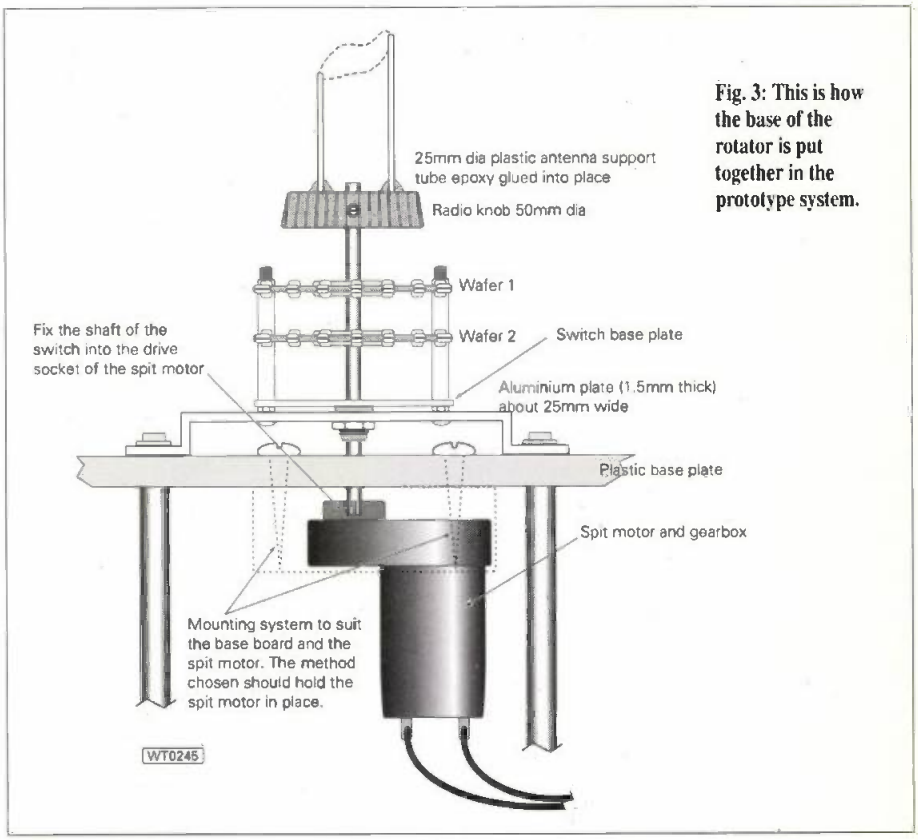


Fig. 3: This is how the base of the rotator is put together in the prototype system.

Setting Alignment

To start setting the alignment, it's best to do it with the antenna head visible from the control box position. Place the antenna assembly baseboard with the 0° contact on wafer 2 contact facing north. (A hand-held compass might be of assistance with finding this direction).

With the switch aligned to North, loosen the antenna mountings and realign the antenna with it pointing in a northerly direction. Retighten the antenna mounting components. The system is now aligned.

To check out the operation of the operate the turning switch S1 and verify that the antenna goes in the correct direction first. Then check the reverse direction, and finally allow a full rotation and check that each l.e.d. indicates on the correct positions.

That's it. Let's see you rotating **RAPIDIY**!

PW

Shopping List

Semiconductors

Red l.e.d.	4	D1, 4, 7 and 10 (Cardinal compass points)
Green l.e.d.	8	D2, 3, 5, 6, 8, 9, 11 and 12

Miscellaneous

A 13A wall socket box, an octal plug and socket, a suitable 'barbecue' spit motor, two single-pole 6-way wafers and the baseplate and shaft, Suitable lengths of 8-way signal and two way 2.5A wire, one 2-pole 3-way switch (or 2-pole 2-way biased centre-off), a 50mm dial knob, various sections of aluminium plate and insulated material to make the baseboard, nuts screws and washers to suit.

ANTENNA SPECIAL

AN EFFECTIVE EARTH SYSTEM

By Roy Ratcliffe GW3KZW

Roy Ratcliffe GW3KZW has been a keen 'low band' DXer for many years. Roy shares his experience in setting up a really good earth system of the type which brought him much success as G3KZW before he 'emigrated' to Wales!

During the course of experimenting with a variety of antennas, (end-fed, verticals, etc.) it became clear to me that the overall efficiency was poor. So, working on the basis that one piece of wire is much the same as any other piece of wire, there was no point replacing the wire. Bearing this in mind...just what was wrong?

At the time, the antenna system I was using consisted of a three vertical, phased array for 3.5MHz. Each vertical was a quarter wavelength.

I also used a quarter-wave vertical and an 'Inverted Vee', with the apex at 30m for 1.8MHz. My principal interest of course, was low band DXing. (In conjunction with each vertical, four quarter wave length radials were laid on the ground).

During the course of a 'where did I get it wrong?' discussion with the 'Station Manager' (my wife **Eunice**!), who is also licensed as **GW4XVZ** (at the time she was G4XVZ of course) she said "I think the problem is the earth system and I intend to do something about it". How prophetic that was to be!

Arriving Home

On arriving home the following evening, I was greeted with the sight of numerous lines cut into two lawned areas surrounding the verticals. (These lines disappeared in 10 to 14 days, due to normal mowing).

It transpired that Eunice had spent most of the day cutting slots into the lawns and dropping wire into them. All that remained to be done was connect the wires to a common earth connector.

On re-checking, the current in each vertical showed a marked increase. Things were moving in the right direction!

Further improvements then came under consideration. From this, it was decided to install a number of copper earth connections plus more radials.

The next stage required 10 lengths of 22mm diameter copper tubes, one and a half metre long. These were to provide a large surface area contact with ground.

Earth Tubes

Then we decided to install three earth tubes beneath each 3.5MHz vertical antenna. Accordingly, nine tubes were selected and prepared.

Four rows of holes were drilled in the length of the tube, starting approximately 50mm from the top. Additionally, a heavy cable (the thicker the better) was soldered on (a blowlamp will be required). The bottom ends were then flattened and cut to a point.

Anyone who has tried to hammer copper tube into the ground will be aware of the difficulties. It invariably bends!

The answer is don't try to hammer the tube from the surface. Give it a start in life.

Then came the stroke of luck that can often make a project. We were rambling round a 'car boot' sale and discovered one stallholder who was offering a selection of second-hand tools.

Two of the tools on offer were old fashioned auger drill bits, approximately 20mm diameter. These were purchased for 50p (money was no object!). *Editorial Note: An alternative is given in 'Antenna Workshop' PW September 1994 'Earth Rods Made Easy'.* **Editor.**

Weekend Work

The following weekend, work began. The first job was the fitting one of the auger bits with an extension. This was simply a three metre length of steel conduit. Next, at the base of one of the 3.5MHz verticals, the auger was drilled into the ground (initially by hand).

As drilling progressed, I used a 'Stillson' type of pipe wrench was fitted with a temporary tube extension on the handle. This was employed in order to provide the necessary grip and torque on the conduit.

Then, with my wife holding the conduit upright, the drilling proceeded (withdrawing the auger from the hole at regular intervals to remove the soil).

Incidentally, it helps to have a hosepipe running water into the top of the hole, as this really softens the soil. Despite this, the work was heavy and tedious, but we persevered until three holes were completed. (At three corners of a triangle, with the vertical antenna in the centre).

The same triangular configuration was applied to all three 3.5MHz vertical elements. The copper tubes were then pressed into the holes.

On completion, the heavy cable connections were pushed into a slot in the lawn and run to the common anchor point from where another heavy cable ran to the shack. (It's important to keep this wire as short as possible, for minimum resistance).

Finally, the 'common' connection was covered with petroleum jelly ('Vaseline' is suitable) to inhibit corrosion. This process is a little messy but it offers worthwhile protection.

Finishing Touch

The finishing touch is to fill all the copper tubes with inexpensive cooking salt, followed by lots of boiling water. This provides a low resistance contact between the tube and earth as the salt solution escapes from the holes in the tubes which are periodically 'topped up' with salt and boiling water.

A word of warning. Do not install any of the tubes in or near flower beds (salt solution is not known for its growth promotion qualities!). However, I saw no adverse effects on our lawns.

Checking the current in all three 3.5MHz vertical elements then showed another increase (things were looking even better!). But of course, the important factor is how it performs.

Noticeable Improvement

With the new system both transmit and receiving showed a noticeable improvement. It was particularly noticeable on both the 1.8MHz antennas.

The difference was so marked, that we incorporated three earth tubes into the 1.8MHz vertical. This produced another noticeable improvement, and generated further enthusiasm!

More radials of various lengths were then laid out. Additionally we installed four 'chicken' netting type wire radials. These were approximately 1.5m in length and half a metre wide and were connected to the common earth connector.

The improvements led to Eunice making daily contacts with the USA and regular contacts with New Zealand. (Using both the long and short paths and all on s.s.b.).

Our home-brew a.t.u. incorporates circuitry that monitors each current. The earth system can then be tuned for maximum current. (This ensures a low r.f. impedance, ie. low voltage at the a.t.u., reducing the possibility of r.f. feedback).

I must be honest and say that this system is not easy to install! On the other hand, for anyone who feels their antenna system would benefit from a boost, then the effort is worthwhile, irrespective of the type of antenna in use.

If I may borrow a phase from the 1930s...."The answer's in the ground". They knew a few things about **'practical wireless'** then, too!

PW

ANTENNA SPECIAL

FIVE AND NINE B

By Ron Wilson G3DSV

Ron Wilson G3DSV shows you how to combine amateur radio, fresh air and kites to make the day complete.

A very enjoyable way to spend at least part of the day is to go fly a kite. But first, you have find your kite! Building a kite is not at all difficult but finding materials that are durable enough to withstand winds and possibly rough handling certainly is.

A number of home-made kits met with fair success. Whilst on holiday in Cornwall however, I called in to see **John G0JVR** and **Carolyn G1ZPC** who run **Cornish Kites** in Mullion. They not only stock a staggering range with all the necessary accessories, but also make certain models themselves.

On John's advice, I purchased a Conyne Kite, although doubtless other types would be just as suitable. The Conyne kite, like all the other models, is made from the very tough tear-resistant spinnaker nylon and is very simple to put together, (just one fibreglass spreader to insert) and fly.

The Conyne Kite will fly by itself, but it needs a drogue (purchased with the Conyne), to be extremely stable. During one test flight, in a very light wind, it remained almost motionless for around 30 minutes or so at a height of about 80m.

Although just over a metre wide, the Conyne has very great lifting powers. Do not try flying one of them from fishing monofilament line, it can stretch 45kg (100lb) line if flying in a moderate wind.

Another reason for not using monofilament line is that its' very 'slippery' to hold. It's also very difficult to see and can cause severe cuts to the skin if great care is not taken.

You are strongly advised to use proper kite line and I would suggest at least 50kg breaking strain for safety. The standard length is 100 metres and should be adequate for the purpose.

You will require two winders, one for the kite line and one for the antenna wire. Winders can be purchased or made as the diagram **Fig. 2**. The antenna wire can easily get tangled, so do use a winder, it will also make packing away much easier.

If making your own winders, as shown in **Fig. 1**, use either a good quality hardwood or better still 10mm plywood for the sides. Do not use softwood as it is likely to split at the most inconvenient time. The handle should be made out of Ramin dowelling or short sections of broom handle if you have one spare.

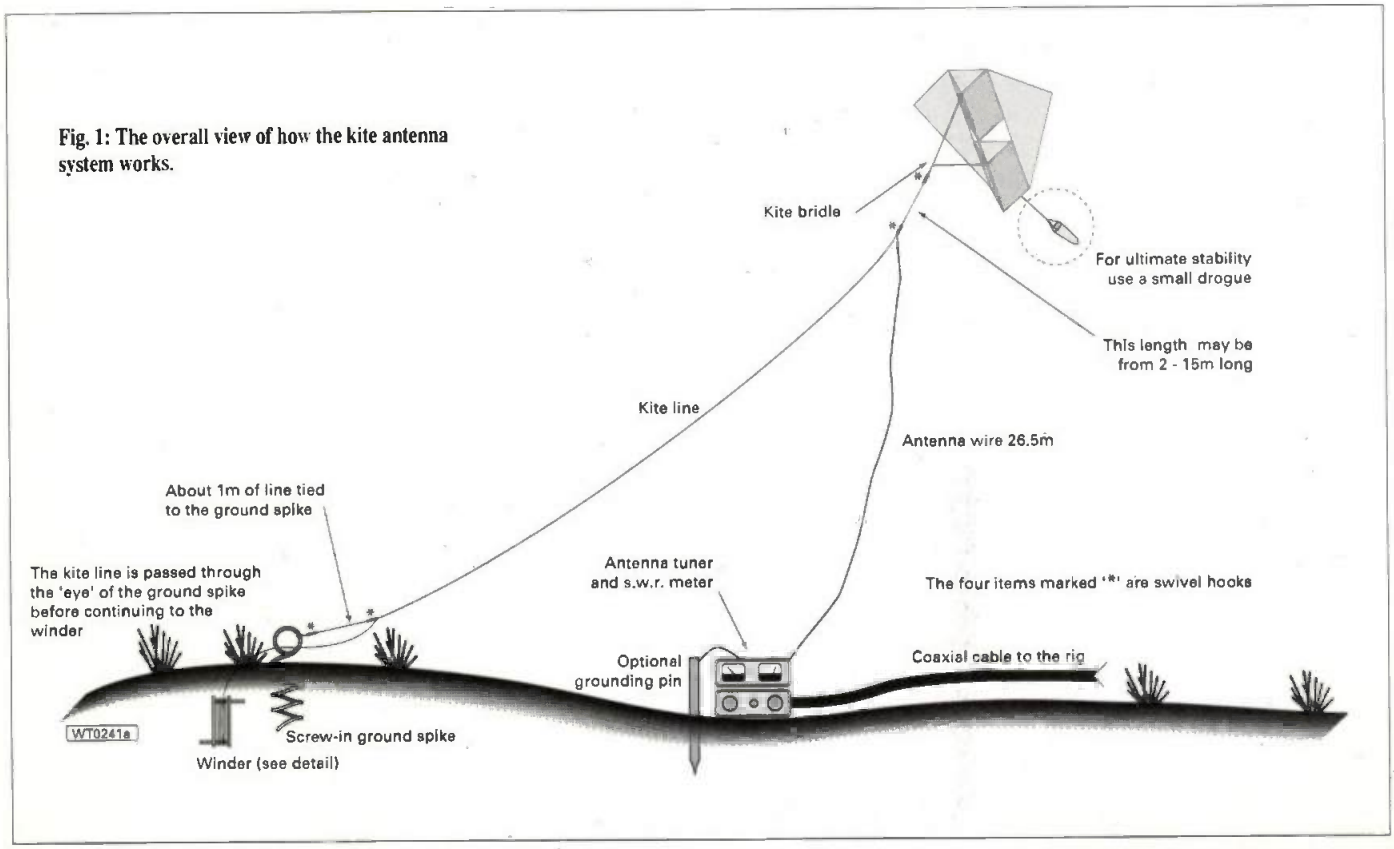
Which Antenna

Next came the decision as to what antenna to use. Random long wires nearly always cause problems on one band or another and really need a respectable earth to be at all effective.

Remembering my early days in amateur radio, I opted for the W3EDP. A simple but effective antenna 26m up to the kite from the a.t.u. and a counterpoise of 5.2m length, connected to the earth terminal of the a.t.u. and simply laid out along the ground. An earth pin or spike is a possible alternative to the counterpoise if required.

The antenna does not need to be vertical and in actual fact, appears to work best when at approximately 45° to the ground. I have so

Fig. 1: The overall view of how the kite antenna system works.



Y FORCE FOUR

far only used it on 3.5 and 7MHz for portable working, but from past experience, know it works well on 14, 21 and 28MHz. (Also I've found that the counterpoise is not needed on 3.5MHz).

My main interest is in QRP working, for which I use a C.M. Howes CT30 a.t.u. with a built-in v.s.w.r. meter. But almost any tuner and s.w.r. meter can be used.

The a.t.u. by Ben Nock, featured in *Practical Wireless* January 1995, would be ideal for 3.5 and 7MHz. A full treatise on the antenna appears in many books on antennas.

Next, take the kite flying line and fit it to the kites bridle with a swivel. The swivels are available from the kite supplier or any fishing tackle shop. Buy swivels with at least 100lb breaking strain to match the kite line.

Fit a similar swivel to the of antenna wire. For this wire I use multi-strand pvc covered copper wire and the same for the 5.2m counterpoise.

Approximately two metres or so below the bridle swivel, tie a secure loop in the kite line (this is where the antenna will be attached). Swivels will help prevent the antenna getting tangled. The particular kite mentioned lifts the antenna wire quite easily.

If the kite being used is well designed, it should only be necessary to turn your back to the wind and allow the kite to drift up. When it is clear of your head, attach the antenna and allow it to lift the length of wire, leaving enough of course to be attached to the a.t.u., make certain that there is a little slack in the antenna to allow for kite movement.

Anchoring Kite

At this point, make another secure loop in the line as anchoring the kite line is very important. It should be secured by a further separate line to say the towing eyes of the car. Though I prefer a separate method.

From caravanning and camping shops you can purchase a large screw type anchor which looks like a very large corkscrew. They are often used for securing dogs on their leads. The anchors have a large loop at the top, and to this, you should secure a length of line with yet another swivel.

With a good design you can at this stage forget the kite and get operating. Before landing the kite, remember to disconnect the antenna from the a.t.u. first!

Once you have established where to put the lower kite line securing loop, I suggest that after a trial flight in future you pass the kite line through the ground anchor loop first. In this way you will find it easier to lower the kite rather than struggling to just rely on winding it down with the kite reel. (If the wind is strong, you may well find it very difficult to bring the kite down unless you adopt this practice).

Remember, there are restrictions on flying kites close to air fields, particularly those operating low flying exercises. If in doubt, contact the airfield control tower (you will always find them only too willing to help), also please remember that flying kites from camping and caravan sites is often forbidden.

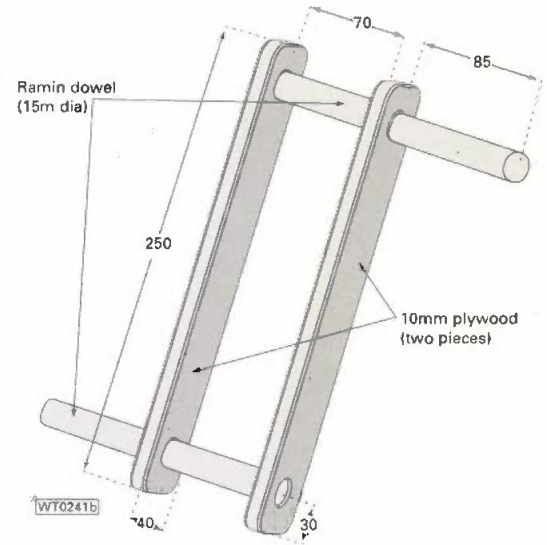


Fig. 2: Kite line winders, made in this format, ease winding the line in, or out. All dimensions are in millimetres.

Never, ever attempt to fly when there are storms around or even when there's one on its way. It is also unwise to fly when the air is very dry such as during hot weather.

Enormous static charges can build up on the kite and line. I have seen sparks jumping 150-200mm from an unearthed antenna. Your transceiver front-end will not like this sort of thing!

Of course, more complicated kites and likewise antennas can be used, but then I prefer the Keep It Simple Stupid (KISS) approach. The station can be set up and operating in about 15 minutes without any help. Stroke 'P' operating is great fun, especially if you operate QRP. You will be astonished at the reports you can get with just a few watts of c.w. or even s.s.b.

Remember, with QRP working, a 12V vehicle battery will give many hours of operating. Enjoy your kite flying and '/P' operating.

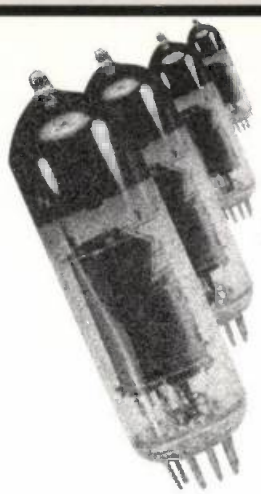
May your spirits be as high as your kite!

PW

Carolyn G1ZPC, or John G0JVR of Cornish Kites may be contacted at: The Kiteshop, Meaver Road, Mullion, Cornwall TR12 7DN. Tel: (01326) 240144

The *PW* team hope that you've enjoyed reading our 'Antenna Special' issue and trying the various projects. There's another treat coming next month when we present the *PW* 'Antenna Data Reference Chart' with the May magazine. Packed with antenna designs, dimensions, handy reference data and helpful hints...it's something you can't be without!

Valve & Vintage



By Charles Miller

It's time once again for Charles Miller to look after PW's 'wireless shop'. Charles asks if you're sitting comfortably.... as he's about to continue telling the story (with many devious characters) behind the early history of the radio valve.

Last time when it was my turn to look after the 'shop' in the January issue, I left off the story with de Forest newly arrived at the Federal Telegraph Company of San Francisco. In this episode I'll explain how he finally found fame and fortune.

Federal put de Forest and an assistant called van Etten to work on improving an early recording device called the Poulsen Telegraphone. To do this they needed to find some method of amplifying audio frequency (a.f.) signals.

In view of his track record, it may or may not have been de Forest's own idea to try to turn the Audion into an amplifier as well as a detector. Because by now other people were experimenting with it.

One of the other experimenters was Fritz Loewenstein. And in January 1912 he went to the American Telegraph & Telephone Company (AT&T) with a 'black box' saying it would amplify and repeat telephone conversations over long distances.

The 'amplifier' was just what AT&T needed and Loewenstein was asked to show its paces. It didn't, in fact, work all that well and eventually Loewenstien revealed that it contained not much more than one of the McCandless-made Audions and some batteries.

Important Box

What was important about the 'black box' though, was that it used negative grid bias for the first time.

Loewenstein applied for a patent on this idea, but it wasn't granted until over five years later, in July 1917. However, a lot can happen in five years.

Soon after the first meetings between Loewenstein and AT&T, the President of Federal Telegraph received a letter from an experimental engineer called John Hammond. It provided some reports on the 'black box'.

(To me, this sounds suspiciously like industrial espionage. It's reasonable to suppose that de Forest would have been shown this letter). Shortly afterwards the firm ordered 24 Audions from McCandless.

Meanwhile, as if de Forest hadn't enough to occupy him, his New York past began to catch up with him. Maybe the bankruptcy sale hadn't been quite above board, for in March 1912, de Forest received a visit from the police.

Fraudulent Purposes

Shortly afterwards, de Forest, the Ellsworth Company and three other individuals were indicted on charges of using the United States Mail for fraudulent purposes. (This was a handy 'catch-all' that often came in useful when more specific charges couldn't be brought!).

Unfortunately, de Forest had the worry of the impending trial hanging over his head for more than a year and a half. It took place in November 1913 but the verdict wasn't given until New Year's Day 1914.

All the defendants except de Forest and his patent lawyer were found guilty and drew either gaol sentences or heavy fines. The jury disagreed on a fourth charge against de Forest and this wasn't finally dropped until the following October.

Another Bombshell

Any relief he felt must have been short-lived because another bombshell was about to explode. And really, de Forest should have been more circumspect about his very first patent on the Audion.

American Marconi's Wireless Telegraphy Company (MWT), owners of Fleming's patents alleged that de Forest had infringed them and took out an injunction to restrain him. Fortunately the case didn't come to court for another two years, giving him a much-needed breathing space.

The de Forest resilience was now being put to its sternest test by this constant mental pressure just when he needed all his wits about him. It didn't let him down!

At last, de Forest and van Etten managed to devise a way of making the Audion amplify. For this they used audio-frequency transformers to couple several Audions in series.

How much of the success was due to de Forest and how much to Hammond's letter to the Federal president is another matter for speculation. In any case, it's likely that van Etten did the bulk of the work.

Amplifier's Oscillation

Another interesting sidelight on this work is that whilst de Forest and van Etten were experimenting, one of the amplifiers burst into oscillation. This was treated as an unwelcome nuisance which had to be stopped at all costs.

Nevertheless, the 'nuisance' was eventually useful! At a later date de Forest used his notes on the work involved to 'prove' that he had invented the Audion oscillator and the principle of reaction as a means to increase sensitivity!

While all the activity was going on, AT&T remained in the market for a really successful telephone repeater. It was then that another of those shadowy characters with whom de Forest always seemed to be getting

A group of interesting early miniature valves from 1925.

Five early valves including an old American type (second from right).

involved entered the scene.

The shadowy character was John Stone, an ex-employee of AT&T. And it was in August 1912 de Forest sent Stone a letter asking him to act as go-between for the sale of a telephone repeater.

The question of whether it was ethical for him to sell to a competitor an idea he'd developed in Federal Telegraph's laboratories doesn't seem to have exercised de Forest greatly.

A Mullard PM4 complete with original carton and characteristic curve information sheet from 1929.

In fact, de Forest told Stone that he could have a six month's option on buying the repeater, but only for use in wired telegraphy and telephony. This was clearly intended to leave the way clear for a separate deal for radio purposes.

Western Electric

Stone didn't go direct to AT&T. Instead, he went to Western Electric, its engineering subsidiary, offering them the device for not less than $50 000. His own commission on the job was to be a useful 10%.

In late October de Forest and Stone travelled east to demonstrate the repeater to some of Western Electric's engineers. The tests were far from completely successful.

But one of the scientists present could see the repeater's potential. He was Dr. Harold D. Arnold, a brilliant man who eventually transformed the Audion into a highly effective and reliable valve, yet his name is hardly known to the public.

On the strength of Arnold's recommendations AT&T handed over the $50 000. This amount was for the patent rights of the Audion for telephone repeater use.

It then transpired that de Forest was trying to sell something that wasn't his. This was because the patents still belonged to his old Radio Telephone Company.

It took nearly a year before a patent lawyer (a 'patient' patent lawyer?) working for AT&T managed to sort out the mess and the firm got its licence to use the device.

Dodgy Dealings

What Federal Telegraph thought of all the 'dodgy dealings' is not recorded. In any case, de Forest no longer had much use for that firm.

A year later de Forest sold AT&T non-exclusive rights to use the Audion in radio work for another $90 000. And for a while it seemed that he could hardly put a foot wrong.

Early in 1917 de Forest sold all his further interests in the Audion to AT&T for a cool $250 000! However, the phrase 'All further interests' seems to have been flexible terminology for de Forest, because he did keep a little something for himself as a nest-egg.

The rights he retained enabled him to carry on making and selling the Audion directly to end users. He sold to the US Government, to anyone using it for broadcasting entertainment and for broadcast receivers, and also to licence the Marconi Company to use it.

In fact, he sold to just about any other likely interested party. This small print was worth a fortune to de Forest, for between 1914 and 1918 he sold over 150 000 valves to the US. Government alone.

Another Firm

The money de Forest got from AT&T enabled him to set-up yet another firm. This was the de Forest Radio Telephone & Telegraph Company, with a laboratory and factory in the Bronx (a good long way from San Francisco where Federal was presumably still fuming!).

Then de Forest started to do things properly. He employed qualified scientists and engineers, and when McCandless closed down in early 1916 he started to make his own valves on the premises.

The valves used an improved filament designed by one Walter Hudson, which employed thin tantalum wire wound around tungsten wire. The de Forest Radio Telephone & Telegraph Co. bought the patent for this filament for an undisclosed sum but whatever it was, it was worth every penny.

To give him his due, de Forest now began to turn out worthwhile valves and equipment. The Hudson filament was used in a new valve called the 'Oscillon' especially designed to oscillate.

The 'Oscillon' made it possible to construct reasonably compact transmitters that could be used in aeroplanes as well as on the ground, the latter being very popular with American amateurs. It looked like plain sailing all the way now for de Forest, but as usual fate was waiting to give him a kick in the pants as the MWT action at last came to court.

Better Advised

No doubt MWT thought it was on to a winner, but it would have been better advised to turn a blind eye because de Forest's response was truculent. Litigation was no stranger to him, because by now he was himself taking action against various firms and individuals whom he accused of abusing his own patents.

Adopting the tactic that attack was the best form of defence, de Forest claimed that MWT itself was the guilty party by infringing his patents for a valve known as Type 'D'. The outcome of this probably surprised even himself, because a red-faced MWT was forced to admit that it had indeed stolen his ideas.

As a result, an injunction was slapped on MWT to prevent further infringement. But it was a hollow victory for de Forest! He in turn, was found guilty of using Fleming's patents and banned from making any more Audions.

The case went to appeal, but in early 1917 the original judgement was upheld. Thus, at one fell swoop, both company's valve activities were brought to a standstill.

In fact, MWT could have carried on making Fleming valves, but by this time they were obsolete and worthless. For his part, de Forest could see his lucrative sales to the US Government vanishing before his eyes. Yet once again fate relented and put him back on his feet again.

First World War

Not even his worst critic could accuse de Forest of starting the First World War. But it's certainly true that America's entry in April 1917 was providential from his point of view.

The Federal Government decided that the National Interest took precedence over the Courts and de Forest was given permission to resume making valves while the war lasted. The money started to flow in again.

The ban was re-imposed after the Armistice. But in 1919 a compromise was worked out by which MWT and de Forest assigned their patents to a third party, the O.B. Moorhead Company, which made valves for them.

As a face-saving exercise it was to a certain extent irrelevant, This was because by that time valves were being made by scores of firms in America and Europe.

For years afterwards de Forest continued to fight a losing battle against the competitors but in reality his monopoly position was gone forever. And by living on until 1961 de Forest experienced the irony of seeing the end as well as the beginning of the valve era.

What a fascinating story! Next time I'll look at some of the British and European valves used in the First World War and early broadcasting.

A selection of 'Tube' boxes, clearly demonstrating their origins in typical American style and presentation.

Cheerio from Charles, see you in July.

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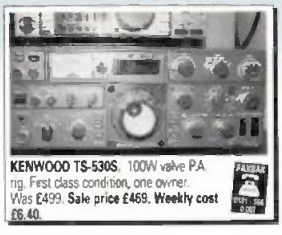
YAESU FT-290RMK1. 2.5W portable, ideal get into the hobby rig. **Was £249. Sale price £239.**



KENWOOD TS-530S. 100W valve P.A. rig. First class condition, one owner. Was £499. **Sale price £469. Weekly cost £6.40.**

KENWOOD TS-50S. 100W mobile. All mode gen. cov. RX. Was £699. **Sale price £669. Weekly cost £10.67.**

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KENWOOD TM-255E. 45W 2M multimode. Was £725. **Sale price £695. Weekly cost £12.81.**

KENWOOD TH-77E Good condition compact DualBander Handie. Was £299. **Sale price £249. Weekly cost £4.27.**

Spotlight on Staff

Steve Jelly G0WSJ (ex G6URJ)

This months feature is on Steve Jelly, the person in charge of Data Comms. Steve joined me almost a year ago and unlike Chris Taylor has far more hair. (In fact he's got more hair than all of us put together). The mind blowing world of Data is expertly handled by Steve who offers free advice relating to Packet, PC's and most things that require the use of a computer. The RSGB are just publishing his first book entitled "My first packet station" which will be available soon. Want to set up a packet station? Call Steve now.

KENWOOD TS-780 10Watt Dualband Base multimode, flywheel tuning, lovely example, 2 owners from new. Was £795. **Sale price £695. Weekly cost £10.67.**

ICOM IC-[illegible] boxed one, 100W H[illegible] with ATU, RRP £1649. **Sale price £1195. Weekly cost £21.35.**

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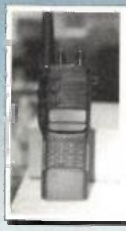

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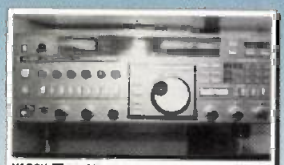
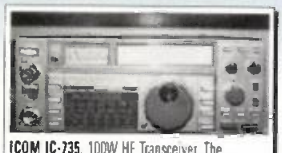


YAESU FT-767GX fully loaded 2/6/70. Was £1295. **Sale Price £1195. Weekly cost £21.35.**

YAESU FT-747GX 100W HF Transceiver. The starter rig for anyone. Was £549. **Sale price £529. Weekly cost £8.54.**

KENWOOD TS-50/AT-50. 100W Mobile HF. Brake new ground in 1994. All mode, general Cov. RX. Was £849. **Sale price £829.**



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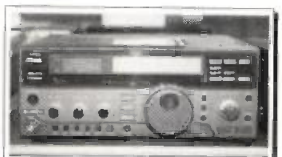
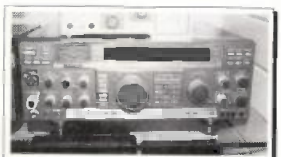


ICOM IC-728 100W HF Transceiver. Icom's answer to the TS-140S. Was £649. **Sale price £629. Weekly cost £10.67.**

YAESU FT-480R 10 watts all mode. If Yaesu still made them, we'd still sell 'em! Three to choose & all offered with full warranty. Was £369. **Sale price £349. Weekly cost £6.40.**



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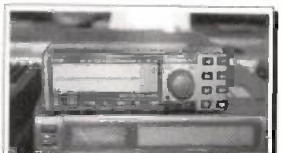

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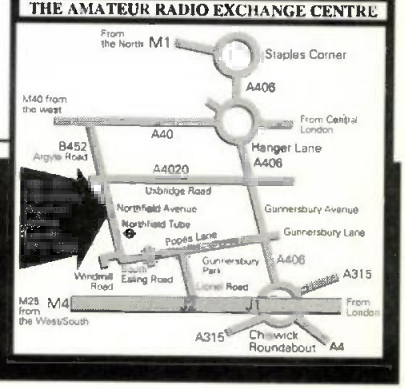

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SCENE USA

Ed Taylor WT3U, in keeping with PW's antenna theme, looks at some questions in the American licensing exams relating to antennas and compares them with the RAE. He also shows you some antenna photos of a US 'super station'.

Ed WT3U installs a new 144MHz vertical antenna on his house chimney.

Classes Of Licence

One of the most common topics raised by correspondents to 'Scene USA' is licensing exams. There is great interest in the tests that Americans have to pass, and what they get as a result.

It's difficult to compare the US and UK systems. Both have evolved over many years as a result of distinct requirements and philosophies.

The main difference is that Americans have an 'incentive' licensing system, where the privileges increase as more qualifications are achieved. Perhaps this results from the more competitive nature of American society as a whole.

There are six categories of US licence: Novice, No-code Technician, Technician-Plus, General, Advanced and Extra. Each level must be passed before moving on to the next.

I explained in January's Scene USA that the callsigns become shorter as the licensee passes more exams. Another advantage of the higher categories is that frequency allocations get larger.

Entry Level

The entry-level v.h.f./u.h.f. licence is No-code Technician, which corresponds roughly to our Class B licence. A candidate is required to pass the Novice and Technician exams, and these are often administered at the same session. There is no Morse test.

Success brings a licence to use all bands above 50MHz, with maximum licensed power (1500W p.e.p.). Many amateurs have been taking up this option since it was introduced a few years ago.

The most popular route for h.f. access is the General licence, which can be compared to our Class A. It allows complete coverage of v.h.f./u.h.f., plus full-power on all h.f. bands with some frequency restrictions.

The General licence is appropriate for those who want to work h.f. (but are not passionately interested in contests or DXing). There is a Morse test at 13w.p.m., with a fairly relaxed accuracy standard. (I will cover the General exam next time, with examples and my opinions).

Antenna Questions

Let's look at some of the antenna questions that you might find in a typical Novice/Technician exam, and find out the answers.

1: What is the approximate length (in feet) of a half-wavelength dipole for 3725kHz?
(a) 126ft
(b) 81ft
(c) 63ft
(d) 40ft

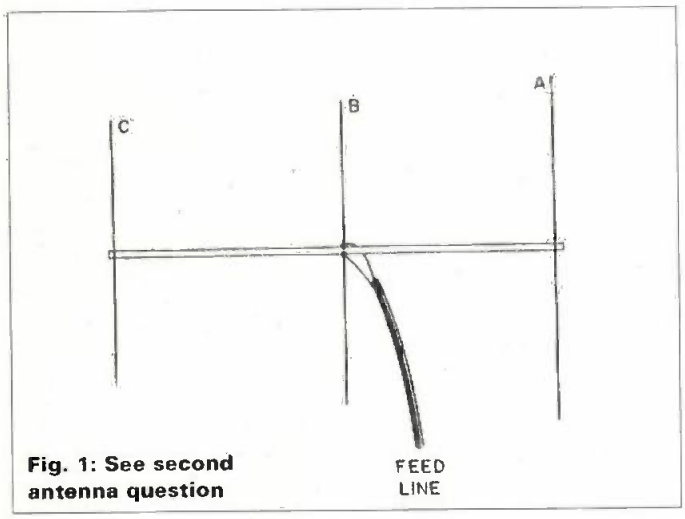


Fig. 1: See second antenna question

2: On the Yagi antenna shown in **Fig. 1**, what is the name of section C?
(a) Director
(b) Reflector
(c) Boom
(d) Driven element

3: A certain antenna has an impedance of 1000Ω on one band. What must you use to connect this antenna system to the 50Ω output on your transmitter?
(a) A balun
(b) An SWR bridge
(c) An impedance-matching device
(d) A low-pass filter

4: What is a Delta Loop Antenna?
(a) A variation of the cubical quad antenna, with triangular elements
(b) A large copper ring, used in direction finding
(c) An antenna system composed of three vertical antennas, arranged in a triangular shape
(d) An antenna made from several coils of wire on an insulating form

5: What is meant by the term Standing Wave Ratio?
(a) The ratio of maximum to minimum inductances on a feed line
(b) The ratio of maximum to minimum resistances on a feed line
(c) The ratio of maximum to minimum impedances on a feed line
(d) The ratio of maximum to minimum voltages on a feed line

6: You are using open-wire feed line in your amateur station. Why should you ensure that no one can come in contact with the feed line while you are transmitting?
(a) Because contact with the feed line while transmitting will cause a short circuit, probably damaging your transmitter.
(b) Because the wire is so small they may break it
(c) Because contact with the feed line while transmitting will cause parasitic radiation
(d) Because high RF voltages can be present on open-wire feed line

Answers And Comments

Most of the answers should be straightforward for anyone who has passed the Radio Amateurs Examination (RAE), they are:
1: **(a)**, 2: **(a)**, 3: **(c)**, 4: **(a)**, 5: **(d)**, 6: **(d)**.

I have tried to select questions which are representative of those encountered in an exam. However, most amateurs would probably say they are a little bit too easy.

Of course, something apparently obvious could be as difficult as Ancient Greek to a person with no technical education! For such a person, there is a great deal of material to learn, most completely unfamiliar.

Nevertheless, I suppose it is the thought of 1.5kW floating around which seems disturbing, would a lower power limit be more appropriate? In practice, the system does seem to work.

The success may be because activity usually begins with v.h.f. repeaters, and can develop in any number of different ways, most of which do not require high power operation. In fact, anyone who really wanted to use a kW at v.h.f. (or u.h.f.) would rapidly have to learn additional skills. Indeed, some of these skills cannot easily be tested.

Knowledge Of Antennas

Our own RAE also does not require extensive knowledge of antennas. This is unfortunate, although I imagine the authorities are primarily concerned with preventing interference. Their remit does not really include testing how to set-up a station with limited resources and space.

But building and using antennas efficiently can be critical in putting together a station. A newly-licensed amateur who does not know enough to radiate a decent signal will quickly become discouraged, and the main factor in transmitting a good signal is the antenna. I feel that a future revision of the RAE should put more emphasis on the construction and operation of common antenna systems.

International Amateur Radio Permit

An interesting new proposal to develop an International Amateur Radio Permit (IARP) has been doing the rounds here in the USA, which might have an impact on anyone who travels abroad. At the moment, amateurs who live in one of the CEPT countries (this includes the UK) may operate temporarily in any other CEPT country without formality.

The home licence is valid with the appropriate country prefix. So, you might hear a Belgian station signing G0/ON8KO while on a British holiday.

The new proposal is that the CEPT agreement be expanded dramatically, to include most of the world. You would not have to apply for a reciprocal licence, although you would definitely have to understand and abide by local regulations.

The new proposal would be of particular benefit to the USA. The national society, the ARRL, is solidly behind the move (ensuring it will get a good hearing world-wide).

Don't hold your breath as there are many issues to resolve, and it's likely to be several years before everything is settled. Still, it may not be too long before we pack our IARP as well as our International Driving Permit before setting off on a trip!

Operating In The USA

For the foreseeable future, operating in the USA by 'G' stations means applying in advance for a reciprocal licence. I would appreciate feedback from readers who have done this for a future report in 'Scene USA'.

Was there any difficulty in getting the reciprocal licence? How long did it take? What equipment did you use? Were there problems with customs? What bands did you use and how were you received by US amateurs?

Please write on this and any other topics to me, Ed Taylor WT3U, PO Box 261304, Denver, Colorado 80226, USA. Deadline for the July issue is the middle of April, 73 and I look forward to hearing from you. I'll deal with points raised by your letters in the July column.

Showing Antennas

I won't make a habit of showing you the unattainable in antennas. But you might like to see what a few stations have done here in furthering their amateur radio interests of working DX, contesting, or just chatting to their far-flung friends.

John Brosnahan W0UN, has bought 160 acres of land on the plains about 60 miles north-east of Denver in Colorado. He is not super-rich, but has acquired a large number of masts and towers (mostly second-hand) at modest prices.

John plans to put up an antenna system for every h.f., v.h.f. and u.h.f. band, each with a remote amplifier, although he admits to being about ten years behind in this ambition. Needless to say, amateur radio takes up a lot of his time and money!

The photograph **Fig. 2** shows his 1.8MHz array, in a winter photograph on a cold day. This is a 'four-square', which consists of four quarter-wave verticals, fed against an elevated radial system.

The towers are each 160ft high, and are in a square pattern of 145ft per side. By feeding the towers in various switchable phases, the antenna exhibits a steerable pattern to the four directions of the compass.

In **Fig. 3**, you can see John's lowest antenna. This is designed for use at higher angles of radiation on 21MHz, the wooden pole is from the same source that supplies electricity companies. The 16ft in the ground supports another 56ft above.

The highest tower, at 200ft, is shown in **Fig. 4**. This holds a 'six over six' array for 14MHz. John has tried several 3.5MHz wire antennas using the tower as a support, but is currently constructing a 3-element 3.5MHz Yagi, which will be put 'as high as it will go without falling down'!

The photograph **Fig. 5** (as used for this month's front cover background) is a spectacular view of two towers at sunrise. In the foreground is a 4-element beam for 7MHz, at 80ft.

Behind the 7MHz beam is a 170ft tower, holding (from the top)
four elements on 7MHz,
seven elements on 21MHz,
four elements on 7MHz

and another seven elements on 21MHz. The antennas for each band are fed in phase, providing enhanced low-angle radiation.

John's expanding selection of antennas is by no means the largest in the area, although it makes most UK set-ups look puny! The availability of land at reasonable cost, and the acquiescence of local authorities are major factors in allowing such big antenna farms to be constructed.

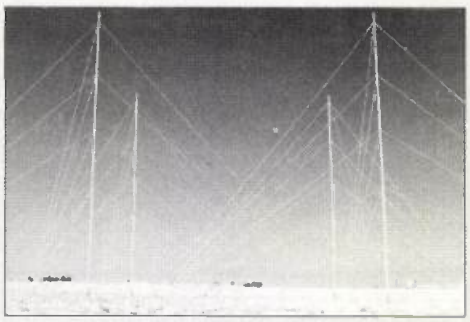


Fig. 2: John Brosnahan W0UN's 'four square' array for 1.8MHz consisting of four towers, 160ft high, fed as verticals.

Fig. 4: This 200ft tower holds a 'six over six' for 14MHz and is John's largest tower.

Fig. 5.

Fig. 3: The lowest antenna on W0UN's 60 acres is his eight-element single band array for 21MHz.

MIKE RICHARDS G4WNC

BITS&BYTES - COMPUTING IN RADIO

Mike Richards G4WNC reports on computer tone-burst, new products, provides an Internet update but starts off with a virus warning.

I've finally been hit by a computer virus! Fortunately it's not too hostile and can be very easily removed. The virus may be found on my **Reader's Offers Disks 1, 3** and **3a** that were received between January 6 and 24.

The particular virus lodges itself in the boot sector of both floppy and hard disks and can incur fairly random damage to your files. The virus is known as FORM-A and is easily detected and removed by most virus protection software.

I'm not sure how the virus arrived with me, but it was transferred to the offer disks when I rebuilt the software on the affected disks. I must have then forgotten to virus scan the disks - I've now learnt my lesson on that score!

If you don't have access to any virus protection software, I can supply a demonstration version of *McAfee's VirusScan* for DOS. I have included two batch files with the software that will configure VirusScan to check and clean the boot sectors of floppy and hard disks.

To do this just copy all the files to a new directory on your hard disk. Then log-on to that drive and type clean to fix the hard disk and Floppy to check and clean any number of floppy disks. If you want full instructions to access the program yourself, just type Scan.

For your copy of VirusScan just **send £1 and a sticky self-addressed label** to the address at the foot of the column.

Computer Tone-Burst

Dick Goodall GM0OGZ uses a trusty Trio TR2300 to chat through his local Black Isle repeater (**GB3BI**). However, the tone-burst packed-up years ago and he had been accessing the repeater by whistling into the microphone.

Although whistling was reasonably successful, Dick wanted a more professional solution. The answer was to make use of the tone generation facilities in his BBC Master 128 shack computer. This was done using a very simple Basic program as shown here:

10 REM 1750Hz Tone Generator
20 REM for BBC B and Master 128
30 CLS
40 SOUND 1,-15,184,10
50 PRINT "Do you wish to repeat the tone?";
60 W$=GET$
70 IF W$="Y" OR W$="y" THEN CLS:RUN ELSE:PRINT "END"

As you can see, this is a very simple solution to the problem.

Perhaps you have a few novel applications for computers in the shack. If so, please write with details so I can pass the tips to readers.

One idea could be to use your computer and soundboard to create the computer equivalent of a tape loop. This could then be used to save the old voice-box when operating contests or seeking out DX contacts.

It ought to be very easy to do. Just connect a microphone to the MIC in socket of the soundboard and run one of the many recording programs to capture your voice on hard disk.

It would be advisable to set the recording systems to mono and use a fairly low sampling rate of say, 11kHz. This ought to provide perfectly adequate sound quality whilst conserving disk space.

Once the CQ call has been recorded, you then require playback software that can be set to keep repeating the call. The connection to your transceiver could be made using the line-out jack on the soundboard.

If you've already successfully done this let me know the programs you've used and any problems you had getting the system to work effectively.

In The Shack

Judging by my post-bag lots of 'Bits & Bytes' readers have entered/expanded their computing set-ups and want ideas on how the computer can be used in the shack. Fortunately, help is at hand as there's a host of software available, lots of it written especially for the radio amateur. The best way to get you started is with a few specific examples of shareware programs.

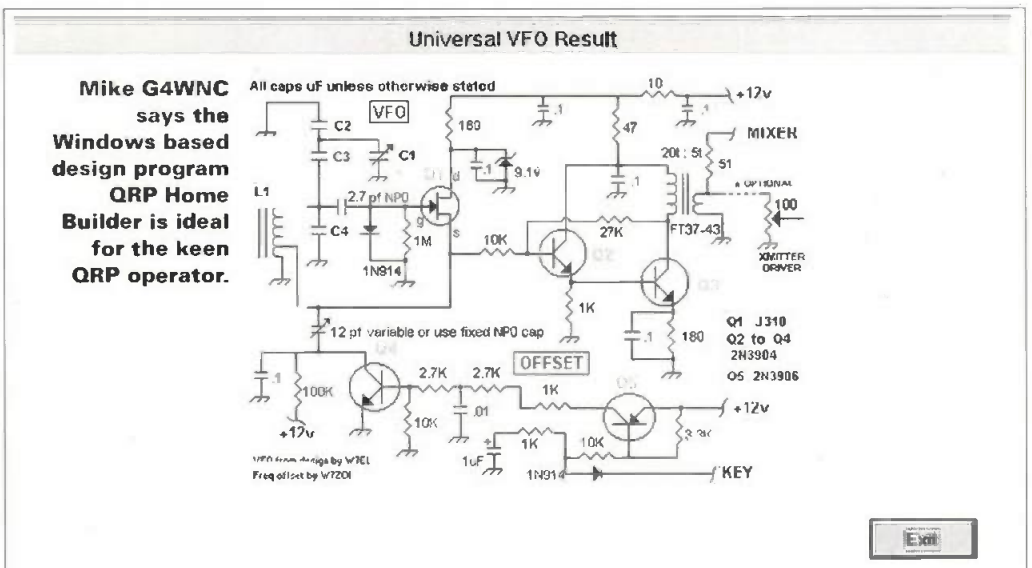
Let's start with a simple enquiry from **Hugh Dunne** of **Milton Keynes**. He has a load of valves that need sorting-out and wants to know if there's some kind of database he could use to ease the task.

Not only are there databases around but I came across a couple of handy equivalents programs. The first, called *Tube Database 3.0* (filename tdb3.zip) is a special cross-reference database that will list the equivalent of any valve type entered by the operator.

Hugh could find *Tube Database* extremely useful for grouping his valves into similar types and checking-out those odd ones. Whilst searching this out I also came across a transistor equivalent program called *Transistor Substitution Database* (filename tsd.zip). As you can guess, this does the same thing for transistors.

If it's just a simple database you need then *File Express* is a very good choice as it's easy to use and readily available. Whilst on the subject of technical programs, I've recently discovered a very

Mike G4WNC says the Windows based design program QRP Home Builder is ideal for the keen QRP operator.



Special Offers

Here's the full list of reader's offers with all the latest software. Please leave up to two weeks for delivery.

IBM PC Software (1.44Mb disks):

Disk A (Order Code **DKA**) - JVFAX 7.0, HAMCOMM 3.0 and WEFAX 3.2

Disk B (Order Code **DKB**) - DSP Starter plus Texas device selection software.

Disk C (Order Code **DKC**) - NuMorse 1.3.

Disk D (Order Code **DKD**) - UltraPak 4.0.

Disk E (Order Code **DKE**) - Mscan 1.3 and 2.0.**Printed**

Printed Literature

Beginners Utility Frequency List (Order Code **BL**).

Complex Signals Utility Frequency List (Order Code **AL**).

Decode Utility Frequency List (Order Code **DL**).

FactPack 1 Solving Computer Interference Problems (Order Code **FP1**).

FactPack 2 Decoding Accessories (Order Code **FP2**).

FactPack 3 Starting Utility Decoding (Order Code **FP3**).

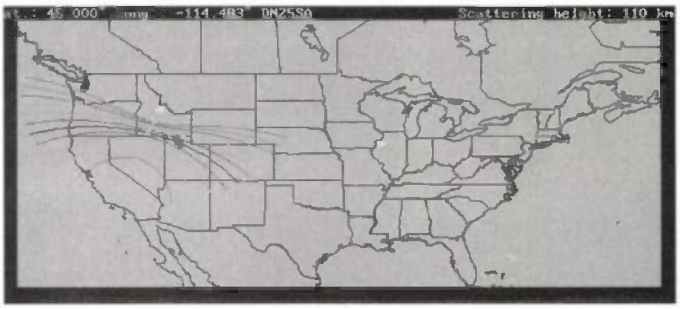
FactPack 4 JVFAX and HAMCOMM Primer(OrderCode **FP4**).

FactPack 5 On the Air with JVFAX and HAMCOMM(OrderCode **FP5**).

FactPack 6 Internet Starter (Order Code **FP6**).

For the printed literature just send a self addressed sticky label plus 50p per item (£1.50 for four, £2.50 for 7 and £3.00 for 9). For software send £1.00 per disk (£1.75 for 2, £2.50 for 3 or £3.00 for 4 and £3.75 for all 5) and a self addressed sticky label (don't forget I provide the disk!). Please make cheques payable to M. Richards.

Scatter Prediction Program Output.



interesting QRP design package.

The program is called *QRP Home Builder* (filename qrphp1.zip) and is a Windows based design package for the QRP operator. Included in the package are a coil builder, capacitor code reader, universal v.f.o., universal diplexer and a power converter.

If you've not got Windows, **Steve Mosheir's** *Coil program* (filename coil.zip) is a useful add-on for the home constructor. This is a very simple DOS based inductance calculator that will run on just about any PC from an Amstrad 1640 up!

If you look carefully at any range of amateur shareware you will find software tools available for just about any application from antenna design to complex intermodulation calculations. Another popular application for computers is to provide remote control of the rig. Again there are a host of programs for just about all the popular rigs on the market.

I will regularly cover a number of different applications with mini reviews so keep an eye on the column. One of the best ways to check-out the extensive range of shareware software is either to contact one of the major suppliers such as the **Public Domain and Shareware Library** in Crowborough or go on-line. If you opt for Internet access one of the best shareware sites around is Jumbo Software they have an excellent set of Web pages at **http://www.jumbo.com**

PIC Application

Do you remember the PIC application book I mentioned a couple of month's ago? Well, I've just received an E-mail from **Dave Reid** of **DR Computer Products** announcing some interesting new amateur radio products based on the PIC chip.

The first of these is the **Micro-Keyer** is a full iambic keyer built on a 25mm p.c.b. with many sophisticated features. The power requirements are extremely modest needing 4-15V d.c. with a standby current drain of just 1µA.

The use of such a small p.c.b. and flexible operating supply results in a unit that can easily be mounted inside most rigs. Included are a 10 second tune function, auto CQ message, variable side-tone (650-950Hz) and dot/dash memories.

The CQ message is a pre-programmed option so you have to specify this with your order. The operating speed can be adjusted from five to over 50 w.p.m., so it should suit all skill levels.

The Micro-Keyer looks very easy both to use and build and is available in a kit for just **£20** plus **£1 P&P.**

Next in line comes the **Micro-Tutor** which is also PIC based operates from 5 to 50 w.p.m. has variable side-tone and selectable character sets. The character sets can be set to letters, numbers, punctuation, abbreviations or any mix of these.

Micro-Keyer also supports the Farnsworth sending mode which gives increased inter-character spacing whilst maintaining the proper rhythm. The tutor is slightly more expensive at **£25** plus **£1** post and packing for the kit version.

Dave also reports a number of interesting developments for the future. The first is called **MicroRig** and is intended as a QSO practice aid. This simulates a receiver with built-in white noise and up to eight c.w. stations calling.

By connecting a standard paddle you will be able to work the stations and so practice picking signals out of the noise. MicroRig will also let you QSY up and down the band to speed or slow the QSOs. Dave admits that he's attempting to emulate the best features of *Dr DX* for the Commodore 64.

The final product is **MicroContester** which provides automatic storage of a number of contest phrases that can be sent at the press of a button. Dave is also intending to include auto RST and serial numbers - sounds very interesting.

For more details of these products contact **DR Computer Products** at **5 Bridge Court, 100 Bridge Road, Chertsey, Surrey KT16 8LX.**

Internet Update

Those active on the Internet may have noticed the BBC Networking Club has now closed. As a result I will be changing my E-mail address over the next month or so.

The good news is that Pipex, who supplied the network access for the BBC have agreed to provide club members with discounted membership of their DIAL service. They have also agreed to maintain the bbcnc E-mail addresses, at least until November '96.

As Pipex have provided a very reliable service over the past year I will probably take-up their offer. So my E-mail address will change to **??????@dial.pipex.com** - details to follow later.

Andy G7UEH contacted me to remind me that the **Brunel Amateur Radio Society** have their own Web page. The location is **http://www.brunel.ac.uk:8080/~xxsubars**. The site is growing rapidly and, at the time of writing, Andy was creating a large file of useful HTML links.

Another note came from **Richard VK2SKY** who recommends the Web page from the Wireless Institute of Australia. This has lots of data and links relating to amateur radio in Australia. The location for this site is **http://sydney.dialix.oz.au/~wiansw/** If you've spotted any good sites please drop me a line with the details.

Mike Richards G4WNC, 'Bits & Bytes', PO Box 1863, Ringwood, Hants BH24 3ZD. CompuServe 100411,3444; Internet mike.richards@bbcnc.org.uk

DAVID BUTLER G4ASR

VHF REPORT

David Butler G4ASR takes a look at various types of Magnetometers you can build and use to monitor auroras, so you're ready for when they arrive!

Last time I took a look at the mechanism that causes auroral backscatter propagation. Unfortunately due to lack of space (Editors comments in here!?) I was not able to describe the measuring instruments that you can build to detect disturbances in the earth's magnetic field. (*Given half a chance he'd fill the magazine! Editor*).

From my point of view the use of these instruments is primarily to give the v.h.f. operator a warning of imminent auroral conditions. However, a number of professional agencies use them to give announcements of the current state of the earth's magnetic field.

Others then use the data to provide forecasts of the reliability of h.f. communication links. Indeed, according to **John Devoldere ON4UN**, in his book *Low Band DXing* (ISBN 0-87259-466-1), the aurora is a very important factor in the long distance propagation mechanism on the 1.8 and 3.5MHz bands.

Negative Correlation

Mostly the 1.8 and 3.5MHz bands exhibit a negative correlation with increased geomagnetic activity. For example, it's generally assumed that propagation is better when the magnetic activity is quiet or very low.

However, ON4UN has noted occasions during intense auroral openings when l.f. band propagation has been excellent.

I would also particularly encourage operators of the 50MHz band to build one of the various instruments I'm going to describe. This is because this area of the spectrum has many different modes of propagation that are influenced by the state of the geomagnetic field.

So, although I'm writing this in the context of indicators for v.h.f. auroral openings, take note! Operators of every band from 1.8MHz to 1.3GHz may benefit from these techniques.

There are a number of reliable precursors to an auroral event. One of them is the huge electric currents that flow in the ionosphere and which significantly disturb the earth's magnetic field.

Magnetometer

A device that measures magnetic field strength is called a magnetometer. By using one of these you can see the changes and perhaps become your own propagation expert!

One example (of a number of different types of magnetometer) that can detect disturbances in the geomagnetic field is shown in the diagram **Fig. 1**.

In its simplest form the instrument is a bar magnet suspended in a jar of damping oil. Changes to the earth's magnetic field cause the bar magnet to slightly alter position.

A Hall-effect device located alongside the magnet detects the change. This, via an op-amp, displays the result on an indicating meter. (Component costs for this simple type of magnetometer should be less than £20).

Incidentally the Hall effect is the potential difference that develops across a metal (or semiconductor) placed in a magnetic field when an electric current flows in it. A Hall-effect device is normally a small integrated circuit (i.c.) whose output voltage changes linearly with increases in magnetic flux density.

Inherent Problem

An inherent problem though with the simple magnetometer is that it's sensitive to ferrous objects in the nearby locality. For example, it will detect passing motor vehicles up to 15m away, the 1040 express to Swindon and even 'refrigerator doors being opened. (It's also prone to changes in temperature, vibration and r.f. from transmitters).

The use of magneto-resistive sensors instead of Hall effect devices will produce a slightly more stable instrument. Although it will be far less sensitive to the effects of temperature it still possesses some of the undesirable characteristics previously described.

However, provided care is taken in locating either type of magnetometer away from vibration and nearby ferrous objects it will clearly indicate variations in the geomagnetic field.

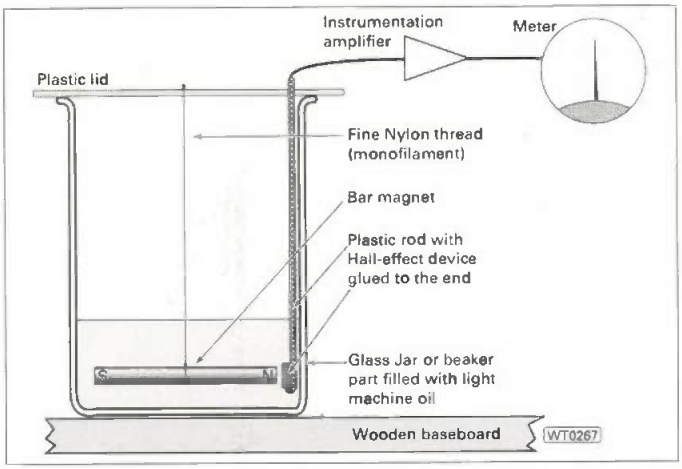


Fig. 1: A 'Jam Jar' magnetometer using a Hall Effect device (see text).

Professional Technique

A more professional technique which overcomes the problems is the fluxgate magnetometer. Although it's slightly more complicated to build, the instrument is very stable and the results are far more accurate.

The fluxgate magnetometer depends on the detection of saturation occurring in a magnetic material for its actions. Basically it consists of a transformer wound around a nickel-iron alloy core.

One winding functions as an excitation coil to saturate the core. The other winding acts as a pick-up coil producing a voltage proportional to the rate of change of magnetic flux linking it.

With the use of some relatively simple electronics it's possible to produce an output signal which is a function of the external geomagnetic field strength. This type of magnetometer is both small, highly accurate and portable.

Loops And Lines

Another method of magnetometery is to use inductive loops and long wire lines to measure magnetic flux by induced electromagnetic force (e.m.f.).

As you may be aware, the earth acts as an electrical generator as it rotates through its own magnetic field. This develops a voltage in the north-south direction which is affected by ionospheric disturbances.

You can measure the varying earth currents by burying two rods a minimum of 50m apart in a north-south direction. The diagram in **Fig. 2**, shows a simplified way of doing this.

The overhead ionospheric current develops a voltage in the ground. This can be amplified in a high gain d.c. amplifier and then fed to an indicating meter.

The advantage of this system is that it produces a relatively high signal, approximately 1mV for every one metre of electrode separation. It's also insensitive to local disturbances that affect the magnetic sensors in Jam Jar type magnetometers.

The disadvantage of course is that it requires at least 50m spacing between rods and ideally you should be aiming for a spacing in excess of 200m. (Mine for example is 240m long and uses the ground post of a tilt-over tower as one rod and a 4m length of steel pole as the other conductor).

Chart Recorder

Although the output from the magnetometers can be applied to a meter I would recommend that a chart recorder or other recording method is used. This is so that you can have a permanent record of geomagnetic events leading up to the auroral opening.

Some computers, like the BBC with its analogue port or a PC with an A-D converter (analogue to digital), are suitable for monitoring the magnetometers. To fully automate the system it's possible to program the computer to give an auroral warning when the geomagnetic deviation exceeds a preset value.

To help you decide which one of

these simple instruments to build, I've compiled a list of designs. The references, shown in **Table 1**, provide constructional details of various types of magnetometers using Hall effect i.c.s, magneto-resistive devices, flux-gate transducers and earth current measurement systems.

Let me know how you get on so I can pass on details to other readers. Best of luck!

But if you don't have the inclination to build a geomagnetic field strength detector then you can always use someone else's. How do you do that?

Well it's quite simple really! All you need to have is a s.w. or v.h.f. receiver and tune in to propagation broadcasts.

Propagation Broadcasts

One of the more well known of the propagations broadcasts emanates from the station **WWV**. Based at the Nation Bureau of Standards radio station in Colorado, North America it transmits on 2.5, 5, 10, 15, 20 and 25MHz.

The broadcast, at 18 minutes past each hour, gives details of solar and geomagnetic activity for both the preceding and coming 24 hours. It also gives two magnetic indices, the A-index and the Boulder K-index.

The geomagnetic A-index represents the severity of magnetic fluctuations occurring at local observatories. The figure quoted being that for the preceding 24-hours.

As far as auroral prediction is concerned, the figure you need to observe is the Boulder K-index. This value is given every 3-hours at 0000, 0300, 0600, 0900, 1200, 1500, 1800 and 2100UTC.

Pay particular attention to the figures given between 1200-2100UTC. (Incidentally the reason why it is called the Boulder K-index is because that is where it's calculated).

The K-index is given in the range from 0 to 9. The values of **0** and **1** represent quiet magnetic conditions and imply good h.f. radio propagation. Values between **2** and **4** represent unsettled to active magnetic conditions and correspond to less impressive (l.f. and h.f.) propagation.

A value of **5** represents minor storm conditions and may mean that a weak aurora might occur. Values from **6** (major storm), through **7** (severe storm) to **8** and **9** (very severe storm) should really set the alarm bells ringing!

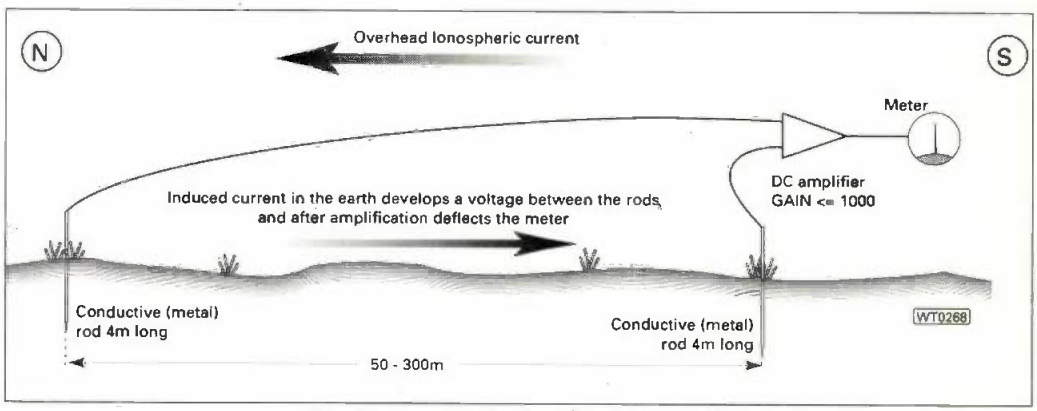


Fig. 2: A method of measuring varying earth currents (see text).

Difficult To Receive

Unfortunately with h.f. propagation as it is, at this stage of the solar cycle, it may be difficult to receive the WWV broadcasts reliably. But don't worry, as you can easily get the information from other sources.

One way is to telephone the WWV(H) station in Hawaii on **00-1-808-335-4363**. This gives recorded propagation information from 18 minutes past the hour.

A more cost effective method, if you have Internet access, is to access propagation pages on the World Wide Web. As a start you could try **http://holly.cc.uleth.ca/solar** or **http//www.ips.gov.au/rwc** or perhaps **http://user.itl.net/equinox** An even cheaper method is to log into your local DX Cluster via packet radio.

Once connected the command "sh/wwv" will show you the last five WWV announcements. This method though is of course dependent on other stations entering the data in the first instance.

Beacon Stations

Some amateur beacon stations audible in the UK also send propagation details. For example, the beacon station **DK0WCY** now has its own magnetometer connected into the automatic system.

The format is virtually the same as that from WWV with the exception that the K-Index is measured at Kiel, Northern Germany. The beacon transmits on 10.144MHz (24-hours) and on 3.5775MHz (between 0800-0900UTC and 1600-1900UTC).

Just A Few

So, I've just described a few examples of a number of ways of obtaining details of disturbances to the geomagnetic field. However, there is one other kind of auroral detector for which there is no equal...and that's getting on the v.h.f. bands, listening and then making some noise!

To help, I'm suggesting some further reading: *Radio Auroras* by Charlie Newton G2FKZ, ISBN 1-872309-03-8 or *The VHF/UHF DX Book* by Ian White G3SEK, ISBN 0-9520468-0-6 would be good ones to start with.

Deadline Time

It's deadline time, and as usual please send any news (to reach me by the end of the month) to: **Yew Tree Cottage, Lower Maescoed, Herefordshire HR2 0HP**.

You can also contact me via packet radio @ GB7MAD, the DX Cluster @ GB7DXC or E-Mail via **davebu@mdlhr1.igw.bt.co.uk**. Alternatively you can telephone me on **(01873) 860679**.

END

Table 1: Magnetometer References

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LEIGHTON SMART GW0LBI

HF FAR & WIDE

Leighton Smart GW0LBI has some interesting news from a DX operator this month, along with your h.f. reports.

Fig. 1: Avid 'QRPer' Eric Masters G0KRT has worked a new continent (USA) on 14MHz using low power, with his QRP-Plus transceiver during the G-QRP Club's 'Winter Sports' (see text).

Starting this month's column off is a letter I received from **Bob Parkes 4S7RPG**. Bob's UK call is **G3PEP**, and he tells me that he hopes to be active from Sri Lanka on the 1.8MHz band on Friday and Saturday nights from February through to April

Bob's times of operation are from 2000 onwards, and between 0000 and 0030UTC, transmitting on 1.82MHz ± QRM, and receiving between 1.827 - 1.832MHz.

Bob actually operates from the QTH of **Victor 4S7VK** using a Kenwood TS-430 at 100W output, into an inverted 'L' antenna up at about 18m. By the way, 4S7VK is better known as Radio Netherlands South Asia media correspondent on the Media Network programme".

Your Reports

I'll delve straight into your monthly reports starting with 1.8MHz and **John Heys G3BDQ** near Hastings. John has been operating on 1.8MHz exclusively.

John's reports list (all c.w.) contacts with USA stations WB2ULI (Texas), N4DB (Ohio), W0RI (Missouri), K2QIL (New Jersey), and AD6C (California) as well as a contact with EY8AM in Tadjikistan, all between 0700 and 0740UTC. John's 'Top Band' States score now stands at 44 States worked so far.

Meanwhile, **Ted Trowell G2HKU** on the Isle of Sheppey in Kent, using a Ten-Tec Omni V transceiver at 70W into various loop, vertical and G5RV antennas reports contacts with K1KI (USA) at 0600, EA1EH (Spain), OI0MEP (Aaland Island), OK1CZ (Czech Republic) and IK2UKW (Italy) all at around 2000UTC.

Eric Masters G0KRT in Surrey, see **Fig. 1**, is an avid QRP'er. He's shown using his 'QRP Plus rig and a 26m long modified W3EDP wire antenna. Eric reports low power c.w. contacts with DF3OL/QRP (Germany) at 18.57, EI5XW (Rep. of Ireland) at 2014, G0SWU/QRP in Sutton, and PA3AFF (Netherlands) at 2124UTC.

The 3.5MHz Band

As with 1.8MHz, conditions on the 3.5MHz band have been remarkably good of late. I was amazed recently to hear John 9G1BS (Ghana) coming in at a staggering 59+20db on 3.796MHz s.s.b. at 2245, (QSL via Box 3248 Accra, Ghana). This was as well as VP2VF (Tortula Island, British Virgin Is.) again on s.s.b. at 0044UTC, at S9 whilst I was only using a 15m 'short wire' receive antenna!

Now it's over to **Steve Locke GW0SGL** in Mountain Ash, Mid-Glamorgan who has been raring to get at the DX after a spell in hospital. Steve's been busy on 3.5MHz, working all 100W s.s.b. contacts with VP5JM (Turks & Caicos Islands), 7X2BK (Algeria), 9K2MU (Kuwait) QSL via WA4JTK, VO1EGH (Newfoundland), and W2HCW (USA) who put a 59 + 20db signal into Wales, all between 2100 and 0100UTC. Steve uses a simple half-wave dipole for the band, erected at 20m.

Robert Tanner (s.w.l.) from Quakers Yard in Mid-Glamorgan. Robert is currently studying for the Morse and RAE. He uses a Yaesu FT-747 and short wire receive antenna in the loft.

Robert reports s.s.b. reception of JJ8KGZ (Japan) working I8UDB in Italy at 1804, K9HMB (USA) working 3Z1PEA in Poland at 0024. He also heard VP2VF (British Virgin Islands) working our very own GW0SGL at 0112, V44KO (St. Kitts Island) working G4OFY at 0120, VK4BER (Australia) at 1916, and finally HL1SJW (Korea) at 1609UTC.

The 7MHz Band

The 7MHz band log from **Charlie Blake RS96034** in Milton Keynes was compiled during the early morning. Charlie, using a JRC NRD 525 receiver and 11m sloping wire, includes in his log, s.s.b. reception of 1A0KM (Sovereign Military Order of Malta) working Kevin G0OMS at 0758, and YV5AMC (Venezuela) working UT4LA in Ukraine at 0649UTC. He also reports PY0FZ (Fernando de Noronha Island) in contact with DL5MEV at 0741, 7X2BK (Algeria) working IV3BSU in Italy, and IS0OMH (Sardinia) in contact with G3LUW at 0748UTC.

Ted G2HKU found conditions on 7MHz generally poor. But he still managed contacts with YA9XL (Afghanistan) and K2NG (USA) at around 2100, plus ZB2AZ (Gibraltar) at 0700, and VK3RP (Australia) at 0900UTC, using just 70W of c.w.

The 14MHz Band

Don McLean G3NOF starts 14MHz with his monthly propagation report. Don says that "14MHz opened on the long path around 0800 to Australia and New Zealand, then later around 0900 to Asia. During the afternoons there were good signals from the west coast of North America, and the band has been closing shortly after dark lately".

Don's log includes s.s.b. contacts with BV8BC (Taiwan) at 1020, C53HG (Gambia) at 0926, CO2PF (Cuba) at 1741, LZ0A/VP8S (South Shetland Islands) at 0930 (QSL to LZ1KDP). He also worked ZL2AGX (New Zealand) at 0957, 8R1AK/P (Guyana) at 1054, 9L1PG (Sierra Leone) at 0959,ZW6C (Brazil) at 09.49, and 8P9EM (Barbados) at 1157UTC, QSL to G3VBL. Don uses a TS-950 SDX transceiver, and a HB 33 SP 3-element Yagi antenna.

From Skewen in West Glamorgan, **Carl Mason GW0VSW** managed c.w. contacts with PY1DUB (Brazil) at 0851, ZL3RG (New Zealand) at 0908, JF2IWW (Japan) at 0803, VE9MSR (Canada) at 1801, and 5H1HW (Zanzibar Island, Tanzania) at 1918UTC (QSL via I5JHW). All QSOs were achieved using 100W output and a G5RV antenna.

Eric G0KRT took part in the G-QRP Club 'Winter Sports'. He worked low power c.w. stations 3Z4JWR (Poland) at 1111, HA5BUB (Hungary) at 1424, I6DK (Italy) at 1406, OM7DX (Slovakia) at 1649, as well as W1HT (USA) at 1421UTC for a new QRP country and continent.

Steve GW0SGL on the other hand ran up to 100W on s.s.b. into a TH7 beam at 20m in height. He lists contacts with VK3DCS (Australia), TA2DS (Turkey), A71CX (Qatar), VU2DK (India), SU1JR (Cairo, Egypt) QSL via 9K2RA. He also worked 9M2JJ (Malaysia) QSL via SM0OEK, JX9ZP (Jan Mayen Island) QSL via Box 8099, Jan Mayen Island and DU9RG (Philippines).

Back to Ted G2HKU again who lists a 5W QRP c.w. contact with 3V8AS (Tunisia) at 1100. He also reported high power contacts with VY9ORC (Canada), TT/F5IDC (Chad), 8P9EM (Barbados), N6EA (USA) and EA8CN (Canary Islands) all around 1600UTC.

The 18 & 21MHz Bands

For 18 & 21MHz I'll start with Don G3NOF who reports working C6AGN (Bahamas) at 1343, FG5HR (Guadeloupe Island) at 12.50, QSL to F6BUM(!) TL8MS (Central African Republic) at 1230, QSL to DL6NW, and 5X4FF (Uganda) at 1423 (QSL to KB4EKY), all on 18MHz.

Ted G2HKU lists c.w. contacts with A71CW (Qatar) at 1000, HP1XBH (Panama) and 5N0/OK1MU (Nigeria) both at 1500UTC on 18MHz. And for his report Eric G0KRT offers c.w. QRP contacts with DF7RST in Berlin at 1506, and DK0GUB in Guben, for his activity on 21MHz.

Well that 'wraps it up' for this month. Thanks to our dedicated reporters who provide the material for this column.

I'm always inundated with information, and its gratefully received. But alas, space is my only limitation! As usual, reports and information by the 15th of each month to: **Leighton Smart GW0LBI, 33 Nant Gwyn, Trelewis, Mid-Glamorgan, Wales CF46 6DB. Tel: (01443) 411459.** See you next time!

PETER SHORE

BROADCAST ROUND-UP

Peter Shore has more interesting news from Canada, USA and the rest of the world of international broadcasting.

I reported last month that Radio Canada International (RCI) faced closure at the end of March. As we go to press in February, it seems that there is around an 80% chance that the station will remain on the air after a change of heart by the Canadian government.

The Foreign Minister seems to be something of a fan of RCI, and may well find some money to keep the international arm of the Canadian Broadcasting Corporation in business. One insider I spoke to at RCI's Montreal headquarters said that everything looked dismal just before Christmas when redundancy notices were handed to all staff. But within a couple of weeks morale improved as it looked as though there was at least a 50% chance the station would survive.

There was a sizeable campaign waged by listeners around the world who Faxed the Canadian Prime Minister's office in bulk, after his direct Fax number was publicised on the World Wide Web and in various DX publications. It could be this that helped to change opinion in government circles who were reluctant not to fund RCI.

Stay tuned to RCI's English service to Europe at: 0600-0630 on 6.05, 6.15, 9.74, 9.76 and 11.905; 1430-1500 on 9.555, 11.915, 11.935 and 15.325; 2100-2200 on 5.925, 5.995, 7.26, 9.805, 11.945, 13.65, 13.69, 15.15, 17.82 and 2200-2230 on 5.995, 7.26, 9.805, 11.705, 11.945 and 13.69MHz

More Funding Problems

There are still funding problems for other stations. The Voice of America's (VoA) budget is still not agreed as the bickering continues on Capitol Hill over funding the whole of the US government.

Many administrative staff were still laid off - or 'furloughed', as the Americans describe it - in January although programmes continue to be aired world-wide. Despite this continuing problem, VoA managed to start a new English language programme, *Dateline Bosnia*, to keep listeners informed about what's going on in the country, now filled with many US troops.

The programme's on every weekday at 1906UTC via VoA's transmitters beaming to Europe, the Middle East, Africa and the Pacific. It can also be heard on VoA Europe live and with a repeat at 2306UTC.

The BBC World Service faces cuts in the amount of money it has to run day-to-day services and in the amount it has to invest in new equipment. The government has reopened the strangely-named Triennium settlement, the three-year funding agreement between the Foreign Office, which pays for the World Service and the BBC, knocking cash from the next two years' budgets.

A debate in the House of Commons in January drew all-party support for the work of the World Service. This was used by **Emma Nicholson**, the MP who defected from the Conservative benches to the Liberal Democrats, as her maiden speech for her new party. The debate drew assurances from the British Foreign Secretary that he would do nothing to harm the BBC World Service, and would re-examine the situation if it looked as though language services would be harmed.

Some damage is already done, though. The BBC's French Service for Europe, distributed by satellite to commercial stations, closed down on New Year's Eve. It had been on the air since 1938, and was used by General de Gaulle during the days of the Second World War to inspire people in occupied France. The government denied that it had closed as a result of budget restrictions.

Other News

A note from Radio Romania International (RRI) says that the station now broadcasts in 17 languages. It has also got a new logo incorporating a hip-looking world band listener wearing dark glasses!

Radio Romania International (RRI) has got a new logo incorporating a hip-looking world band listener wearing dark glasses!

English is broadcast to Europe at: 0631-0640 on 7.105, 9.51, 9.57, 9.665 and 11.745; 1300-1400 on 11.94, 15.39 and 17.745; 1900-2000 on 6.105, 7.105, 7.195 and 9.51 and 2100-2200 on 5.955, 5.990, 7.105 and 7.195MHz

Every Saturday the RRI station broadcasts *DX Mailbag*, while on Mondays you can hear a special programme for radio amateurs. Thursdays is reserved for *Skylark* which features Romanian Folk Music.

Deutsche Welle (DW) closed its relay station in Malta in mid-January when its contract with the Maltese authorities expired. The DW programmes had been broadcast from Malta for 20 years.

Deutsche Welle will now be hiring time on the short wave transmitters of other countries in Europe, probably in a former communist state. In addition, medium wave (m.w.) capacity will be hired from another European country.

The Voice of America has stopped using the Wertachtal transmitting station of Deutsche Welle in a cost-saving exercise, and the Jülich station, not far from DW's Cologne headquarters, will close next year.

However, DW is managing to hire out its transmitters. Radio Vilnius has just started to use one of the Jülich transmitters for its North American service at 0000UTC in Lithuanian followed by English at 0030. Tune in on 5.91MHz. English to Europe is at 2000 and 2230 for thirty minutes on 9.71MHz direct from Lithuania.

Radio In Reach

We take it for granted that there is at least one radio set within easy reach of us whether we are in the car, bathroom, garden or kitchen, and maybe even at work.

It's sobering therefore to read the programme schedule from the Voice of Vietnam which extols the virtues of the 'communication organ of the Vietnamese government', and goes on to say that the government "...has approved a plan for national radio coverage in the 1995-2000 period...(and strives) to achieve a target of a radio set per family by the end of this century".

The Vietnamese station broadcasts in English to Europe at 1800, 1900 and 2030 on 9.84 and 15.01MHz. You can contact the station at **58 Quan Su Street, Hanoi. FAX: +84 4 261122.**

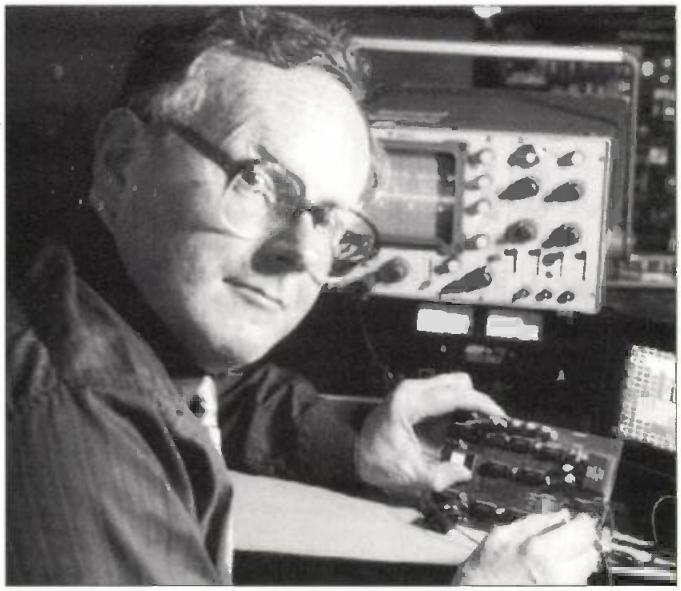
That is all for this month, so until we meet again in the next edition, good listening!

END

GRAHAM HANKINS G8EMX

FOCAL POINT

Graham Hankins G8EMX takes his bi-monthly look at the Amateur Television Scene.



Amateur Television enthusiasts will be converging south-east of Coventry at the end of next month. The British Amateur Television Club (BATC) will be holding its 'Rally '96' at the Sports Connexion, near Ryton, on Sunday April 28.

If you are looking for anything television, even a fully-equipped Outside Broadcast van, this is the place to probably find that elusive piece of kit. Ex - professional TV bits from precision vision mixer sliders to complete camera channels, loads of traders and an outdoor 'flea-market'.

Keep a look-out at the BATC rally for portable black and white TVs with continuous tuning. When fed from an up-converter (430MHz (70cm) up to around u.h.f. Ch36) these are ideal for 'searching the band' for ATV stations using 70cm.

Activity on 1250MHz is usually represented by the repeater groups. Sales of antennas, transmitter kits, p.c.b.s and software all help to fund the Groups' costs and maintain their particular repeater in service. Group members are keen to answer questions, too.

The BATC stand will have some of its latest projects on demonstration, club p.c.b.'s for sale and back issues of *CQ-TV* magazine.

Before going to Rally '96, be aware that older TV gear can be seriously big! You might find a nice little camcorder but an EMI 2001 studio camera will need two to lift it!

All Rally '96 enquiries should go to **Mike Wooding G6IQM** on **(01788) 890365** or **E-mail** Mike at **vhf-comm@g6iqm.demon.co.uk**

Hot News!

The BATC is now up and running with its own Web pages on the Internet. The NetScape location is **http://ourworld.compuserve.com/homepages/ipawson** The 'Welcome' page has hypertext links to eight other information topics, including how to join BATC. Alternatively Membership Secretary **Dave Lawton G0ANO** can be E-mailed direct at **100046.1056@compuserve.com**

If you have a modem but are not yet using the Internet, try accessing the BATC's own Bulletin Board System by dialling **(01633) 614765**. Sysop is **Brian Kelly GW6BWX** and the BBS provides all the usual facilities - latest ATV news, messages, upload/download. Non members can join the BATC via the BBS - just select the Questionnaire.

Surfing The 'Net

Surfing the Internet Worldwideweb for anything ATV, I came across the Solent Club for Amateur Radio and Television (SCART).

Ian Bennett G6HNJ writes: "Many of our members are active mostly on 1200MHz, but we also operate on 430MHz and 10GHz. Most of our equipment is home-brew and we have a range of kits designed to help home-construction.

"We have recently provided live TV coverage of several local events and are keen to participate anywhere that will put our skills and resources to practical use.

Ian continues: "We are currently building an ATV Repeater which should have its output on 1316MHz (24cm). Facilities will include a computer-generated menu and information system, recording and playback of input pictures, and a graph of the current local weather. The necessary licence has been approved by the RSGB and is now passing through the Radiocommunication Agency".

The SCART group meets on the first and third Tuesday each month at the **Royal British Legion Club, 366 Brook Lane, Park Gate, Southampton.** Ian can be E-mailed at **g6hnk@inside-info.co.uk**

Other News

Recent applications for 1250MHz licences have been put on hold until cases of r.f. interference (QRM) to flight control radars have been resolved. The *BATC Committee News* mentions that second harmonic of the 6MHz sound subcarrier may be the problem. The RSGB Repeater Management Group is to carry out more tests.

As you may have gathered, I am trying to include the practical side of Amateur Television in 'Focal Point'. We need news of more activity on all bands - 430MHz, 1250MHz and 10GHz. Higher bands too if you like!

Looking ahead, a 'Repeater Feature' will be published here in 'Focal Point' soon. Many ATV Groups have built some remarkable machines, providing a multitude of facilities. I will try to include a piece about each one in turn. So, come on ATV Groups, please send me your newsletters!

Finally, the BATC Summer Fun ATV Contest, from 1800 hrs Saturday June 8 until 1200 hrs Sunday June 9, should bring stations on all bands. Your scribe plans to be on-air portable during both dates, so take a look on 70cm and 24cm.

Frequently Asked Questions

Here we go with the answers to some Frequently Asked Questions (FAQ - internet jargon!). Some of the FAQ posed by many newcomers to ATV are:

FAQ: 'Why is a satellite receiver not the best way to receive 24cm ATV'?
A: Most domestic TV is expecting a relatively high input r.f. signal, coming from earth or orbiting transmitters. Also, the satellite service uses wide-deviation f.m. Amateur TV signals use less deviation and are usually much weaker, often needing pre-amps to achieve a locked picture. So a purpose-designed ATV receiver gives best results.

FAQ: 'Adding a tripler and amplifier to a 430MHz transmitter sounds tricky. Is there a simpler way onto 1250MHz'?
A: Yes! Build a transmitter which uses an oscillator running at the wanted output frequency. The microwave 'coils' or lines are etched into the p.c.b. You could probably pick up a kit at Rally '96!

Cheerio for now, keep those reports, repeater and simplex news, packet messages coming to me, Graham Hankins G8EMX, 11 Cottesbrook Road, Acocks Green, Birmingham B27 6LE or to G8EMX @ GB7SOL. 73 and P5 until June.

END

BARGAIN Basement

Compiled by Zoë Shortland

Advertisements from traders or for equipment that is illegal to possess, use or which cannot be licensed in the UK, will not be accepted. **No responsibility will be taken for errors.**

If you are selling equipment via Bargain Basement, it's in your interest to ensure that cheques have been 'cleared' by the bank before parting with your equipment.

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Please use the advertisement form on page 62

For Sale

CR100, two for spares. £30. Tel: Essex (01702) 522929.

Dressler 144MHz amp, 300W+ output, new 4CX250B, internal p.s.u., £350. BNOS 144MHz amp. 160W, £115. Hensen FS-210 s.w.r/p.w.r. meter, 200W max, 1.8-150MHz. J-beam 144MHz 17-ele Yagi, new driven element, £45. GW4VVX. Blackwood. Tel: (01495) 221533.

Eddystone model 680X communications receiver, practically new condition, g.w.o. with manual, £150. Regulated p.s.u. Lab 515, superb metering, 0-15V/0-10A, new condition, 16.5 x 5 x 8.5in, £50. Citizen 120D+ printer, boxed, instructions, as new, £90. No offers please, carriage extra. G2FZU, Notts. Tel: (01636) 813847.

Ex-Admiralty receiver from the Second World War, type B28 (CR100), 60-400kHz, 5-30MHz, complete with loudspeaker 230V mains, would deliver locally. £50 o.n.o. Runchman. 19 Pretoria Avenue, Midhurst, West Sussex GU29 9PP. Tel: (01730) 812500.

Famous Collins 75S/3C receiver, amateur h.f. bands, accepts crystals for other bands, solid state plug-in modules instead of seven valves. Filters for s.s.b./a.m., c.w., very clean, perfect condition, manual, spares, £650. Alan Sutherland. Poole. Dorset. Tel: (01202) 661196.

FDK multi 700 2m (144MHz) transceiver, mobile, boxed, manual, v.g.c., s.w.r./power meter, 3.5-150MHz. 8-element beam, v.g.c., folded dipole, 2 x p.s.u., 13.8V, 5 and 7A, ext. speaker, £190. Paul, Derby. Tel: (01332) 831219.

Few more Pye A200 linears, can modify, 2-4-6m. Coaxial relays, v.h.f./u.h.f., 12V. G. Barnes, Cheshire. Tel: (01260) 252287.

Four section midi Versatower, base station, rotator and Jaybeam h.f. tribander, buyer removes, £550. Tel: Dorchester (01305) 853408.

General coverage unit for home-brew, 500kHz to 30MHz in five ranges, r.f. mixer, oscillator, 15 Eddystone coils for f.e.t. or valve, 898 dial and 3 gang capacitor. £30. Tony, Worcester. Tel: (01905) 641759.

HF QRP rig, Mizuho MX7-S. 40m s.s.b./c.w. tcvr., two crystals covering s.s.b. part of band, complete with speaker/mic. and case, instructions. £175. Stefan G0BJW, Rochdale. Tel: (01706) 39803.

ITT marine transceiver (not working), very big and heavy, host of spares, valves, etc. Heathkit transmitter (not working), very big and heavy, host of spares, valves, etc., separate s.s.b. box (working??), exchange for s.w. radio or w.h.y.? Buyer must collect (too big and heavy to send). Mr D. Hamilton, 31 Richmond Terrace, Cumnock, Ayrshire, Scotland KA18 1DN.

Kenwood TH-78E 2m/70cm (144/430MHz) hand-held TX/RX, boxed as new with CTCSS, spare NiCad, d.c. lead, charger and eartalker mic., £325 o.n.o. Pete, Surrey. Tel: 0181-393 9115.

Kenwood TH-78E hand-held, CTCSS, extra memory, speaker microphone, soft case, charger, nickel hydride batteries with battery case, boxed, immaculate. £285. Hari windom 40-10m 1kW antenna, new, £40. Tel: Cambs (01480) 890571.

Kenwood TS-140 h.f. radio, good condition, eight months old, good reason for sale, still under guarantee. £590 o.n.o. Tel: Sheffield 0114-245 4579.

Kenwood TS-520SE transceiver, complete with DG5 digital read-out and manuals, boxed and in good condition. £250. G4XDL. Cheltenham. Tel: (01242) 510138.

Lafayette HE-30 RX, 0.5-30MHz. £45. Barlow Wadley XCR-30 0-30MHz with f.m. unit, £75. Yaesu FT-101E, £250. Laptop PC 8086 twin floppy twin com. suit Packet, £170. PRC-6 50MHz hand-held, £50. Tel: Kidderminster (01562) 743253.

Military h.f. man pack, comprising Phillips callpack PRC2000, 20W, 284000 channels, s.s.b. pack set, Racal MA4230/4231 automatic Morse system, lightweight mast, service manuals, handset, etc.. £250 o.v.n.o. Mark. Stoke on Trent (01973) 222696.

Modern Amateur Electronics manual, in four volumes, mint condition, £45. G3IJL. London. Tel: 0181-749 1454.

New MFJ 20m (14MHz) s.s.b. 12W transceiver, complete with microphone, boxed. £200 o.n.o. Unopened *1995 International Callbook*. £10. Receive converter for 10m, 6m (28/50MHz) i.f., £20 o.n.o. Terry. Wakefield. Tel: (01924) 823108.

***Practical Wireless* magazines**, complete set from 1972 to 1996. Also many *Short Wave Magazines* and *Radio Communication* magazines. Peter Kay, Clwyd. Tel: 0151-481 0662 (work) or (0370) 264559 (mobile).

Pye M4000 mobile telephone, v.h.f. high band, on the redundant BT system 4, complete unit, very clean and good condition. £25 o.n.o. Peter Kay, Clwyd. Tel: 0151-481 0662 (work) or (0370) 264559 (mobile).

R1155 and T1154 mains p.s.u., used by RAF for bench testing, one of each, £75 or both for £140. Wanted 38 set and p.s.u. for 19 Set MkIII. Tel: Lincs (01775) 766398 after 7pm.

RSGB Callbook '96, £6. Howes a.t.u., new, £25. Tel: Warwick (01295) 670749.

STC airband v.h.f. receiver/transmitter, model STR37A, 360 channels, 50kHz spacing, 28V, although receiver works on 12V. Some information. As used in military helicopters, £25 o.n.o. Peter Kay, Clwyd. Tel: 0151-481 0662 (work) or (0370) 264559 (mobile).

TNC AEA PK-12, boxed, manuals and cables. £75. Alinco D120 2m (144MHz) hand-held with charger, £75. PSU Yaesu FP-12 with built-in speaker, £30. Dipmeter Kenwood DM-81, all coils, etc.. £30. Linear amp Tokyo HY power HI-82V with pre-amp and mobile mount. £35. VHF rotator with control box, unused, £20. SWR and power meter Revex W520, 1.8-2000MHz, 200-2W, £25. Roy G4LJN, Dorset. Tel: (01202) 877915.

Versatower mobile mast, 10m high, four sections including head unit, winches and detachable base plate. £850. 4m (70MHz) tcvr AKD 4001, £100. Datong r.f. speech processor, model ASP, £55. Yaesu microphone MH-188, £12. Steve G8FAK, Bucks. Tel: (01296) 720161.

Wayne-Kerr universal bridge CT492, virtually new condition, full maintenance manual, has remedial fault, hence price. £35. Fully automatic a.c. voltage regulator, practically new, £40. Power 1500VA dual range 30/130 160/240V. No offers please. Carriage extra. G2FZU, Notts. Tel: (01636) 813847.

Yaesu FRG-7 receiver, 500kHz to 29.9MHz, s.s.b., a.m., c.w., a.c./d.c., mint condition, £75. Price includes antenna tuner, manual and four s.w.l. books. Tel: (01305) 825337 daytime or (01305) 824062 evenings.

Yaesu FT-101Z h.f. transceiver, six bands, s.s.b. and c.w. modes with fan and instruction manual, immaculate condition, £350 cash. o.n.o. Tel: Lincs (01406) 380037.

Yaesu FT-23R hand-held 2m (144MHz), perfect condition, extra battery packs/quick charger/hand mic., operating manual, leather case. £200 o.n.o. G7IYI, QTHR. Tel: Cirencester (01285) 750327 day/evenings.

Yaesu FT-ONE general coverge all-mode solid state transceiver, memory board, extra filters. Yaesu MH-1 mic., with up/down buttons, owners and service manuals, excellent condition, £740. G3RDG, NW London. Tel: 0181-455 8831 anytime.

Exchange

386DX 20MHz Hewlett Packard inc. 14in colour monitor for mint/quality Mono-Dual-band hand-held transportable. 2m/70cm (144/430MHz) f.m. or multi-mode MUST be packet compatible and complete with manuals, batteries, etc. Stephen G7VFY, NW London. Tel: (0956) 544202.

Collins 75S-3c wanted, P/X NRD-535, ECSS + BWC + 1.8kHz filter or sell. £1300. Mint Drake 2-C c/w SP-Q + new 15W s.w. (R4-C) v.g.c., £120. Bill, Glasgow. Tel: 0141-562 4571.

Racal 1772 damaged, all parts good, B40/C excellent condition. BC312A good order, seeking Racal 17L add-ons, s.s.b., freq., l.f., pre-set or any adapters to suit Racal 17L or w.h.y.? John, Staffs. Tel: (01538) 385735.

Wanted

AVO coil winder and parts of, anything considered. Head phones for No. 52, R107, B40C and No. 89 sets. C. Patterson, Middlesex. Tel: 0181-844 2173.

AVO coil winder or parts of, anything considered, also original head sets/mics for No. 88 sets. Complete set-up considered. Ted Patterson, 64 Harlington Road East, Feltham, Middlesex TW13 5BN. Tel: 0181-844 2173.

Eddystone receivers, models 1570, EC10, EB35, EM34, 960, 890, 930, 870, 870a in particular, but any other models considered. Also any scrap sets for spares to help out fellow constructors. Some doubles for sale. Peter, Surrey. Tel: (0374) 128170 anytime.

Mini beam for 10-12MHz, sell HD tower winch, new and unused. Tel: Northants (01536) 522007.

Printer Star LC90 mono c/w cable for parallel operation, must be in good working order, also mint condition, reasonably price. G3ZJH, Bristol. Tel: 0117-969 1025.

Racal Speedrace RTA191 receiver, TA349 linear 'picture frame' 19in rack cabinets. AT&E test gear. TDMS-6 and TSG-10. Seimans T-100 teleprinters, spares and tools. *Wireless World* magazines, 1950 to 1975. Nigel Boyd G0UGD,2 Church Close. Eastbourne, East Sussex BN20 9QY.

Slow Scan TV software for the BBC Master T. Carrigan. Rochdale. Tel: (01706) 373339.

Bargain Basement Apr '96

Classified Ads

To advertise on this page see booking form below.

Whilst prices of goods shown in advertisements are correct at the time of going to press, readers are advised to check both prices and availability of goods with the advertiser before ordering from non-current issues of the magazine.

Computer Software & Hardware

JVfax/SSTV, HamComm, PktMon. 9FD/25FD Tx/Rx Interface, programs, manuals, pictures. £28.50. SASE leaflets. G8SLB (QTHR). Tel: 0181 595-0823.

Wanted

WANTED FOR CASH Valve or solid state communication receivers Pre-1980. Preferably working and in good condition. Non working sets considered also domestic valve radios. Items of Government surplus wireless equipment and obsolete test equipment. Pre-1965 wireless and audio components and accessories. Pre-1975 wireless and TV books and magazines. Also, most valves wanted for cash. Must be unused and boxed. CBS, 157 Dickson Road, Blackpool, FY1 2EU. Tel: (01253) 751858 or Fax: (01253) 302979.

For Sale

VINTAGE SERVICE DATA, circuits & manuals – for: HiFi, Military, Radio, Television & car radio up to the 1960's. Free brochure. Tudor Gwilliam-Rees, 50 Meddon Street, Bideford, North Devon EX39 2EQ. Tel: 01237 424280.

TECHNICAL MANUALS, AR88, CR100, R210, HR0. £5 each. Circuits £1.50. Hundreds available. SAE list. Bentley, 27 De Vere Gardens, Ilford, Essex IG1 3EB. Tel: 0181-554 6631.

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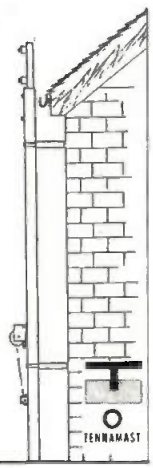

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Station Approach,
Broadstone,
Dorset BH18 8PW.
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1: We **cannot** deal with technical queries over the telephone.

2: We **cannot** give advice on modifications either to our designs, to commercial radio, TV or electronic equipment.

3: All letters asking for advice **must** be accompanied by a stamped self-addressed envelope (or envelope plus IRCs for overseas readers).

4: Make sure you describe the problem adequately, with as much detail as you can possibly supply.

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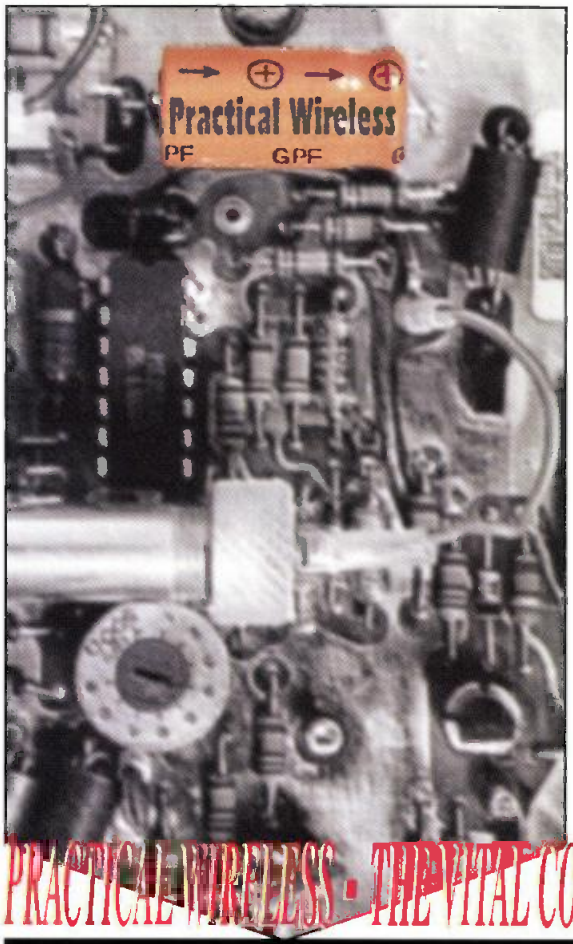

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