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SWR-50RM

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THE PW RAPID

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  FT-40R
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- MIL-STD 810
- High Audio Output
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Readers' Letters

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Elaine Richards G4LPM takes a look at economical ways to set-up your radio station.

NEWS 1996
What's new in Amateur radio?

CLUB SPOTLIGHT
Is your club in the 'spotlight' this month?

RADIO DIARY
Plan your radio diary calendar with our list of dates.

MORE OUT OF THIN AIR
You're not ready for antenna work without a copy of this latest compendium of antenna information.

REVIEW - THE ADI AR-146 MOBILE TRANSCEIVER
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Ed Taylor WTSU compares RAE antenna questions from across the pond with our own.

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Mike Richards G4AJC updates you on the latest computing news.

VHF REPORT
David Butler G4ASK shows you how to monitor auroras using Magnetometers.

HF FAR & WIDE
Leighton Smart GW1SAI reports on recent h.f. band activity.

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Peter Shore presents his monthly look at international broadcasting.

FOCAL POINT
Graham Hankins G8EMX views the Amateur Television scene.

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Practical Wireless, April 1996
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 Department (both very helpful) with the result that a date was set for the rally. The PR ("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**

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 was that the RSVG 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 PR. 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 some 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, retiree, 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 undemonstrative 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 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 5AE. 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.**

**Workshop 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, stablestables) 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 I'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 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**

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Rob Mannion's viewpoint on the World of Amateur Radio
PW Reviews

Dear Sir

I read with interest the letter from Dave Wilkins GSHY 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 (XXL1) 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 revolution!

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 am 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 than 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

Editor’s comment: We will shortly be publishing an article featuring the comments and experiences of several TS-870S owners and why they bought the transceiver. Their experience will obviously reflect the fact that they 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 26/27 MHz s.s.b. transceivers. I currently own and use a converted 26/27 MHz 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 28/29 MHz!

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 28/29 MHz, they will remain converted, and used by licensed radio amateurs and will NOT be handed back into the hands of unlicensed 26/27 MHz 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 27 MHz 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 26/27 MHz multi-mode rigs will not stop sideband DXers operating on 26/27 MHz!

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 3.4 MHz.

While there is nothing that radio amateurs can do about the problem, surely, it would be better to allow amateurs to take illegal 26/27 MHz sets out of circulation and onto the legal 28/29 MHz 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 28/29 MHz rig, it would only go to a person who holds an amateur radio licence. No licence - no sale.

Leighton Smart GW0LBI
Mid-Glamorgan

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 28 MHz? I mean, if I have read it 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. rigs last summer?

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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

PW’s Postbag. If your letter is published you’ll win a prize.
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 490008) 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 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 didn’t 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 unimpairred 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 when doing 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 am reading your ‘practical’ articles and projects. I am glad PW has gone back to being ‘practical’.

Dr Alan Chin G1TOT

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 in mid January - 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 GOOAT

Kent

Editor’s comment: We’re very pleased that you found the ‘Year Planner’ to be useful. The PW team would be interested to hear from your readers on dates of publication and size. And of course, modestly 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!

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 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 GB1LD

(Test Engineer, Marconi Space UK)

Cheshire

Editor’s comment: Pleased to be of service Roger!
Installation Of RSGB President For 1996

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 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.

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) 652284 and should give all you devoted valve and vintage enthusiasts the perfect excuse to go further south-west into Cornwall for a holiday!

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 originally 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 Gwilliam-Rees (Vintange Services), 50 Meddon Street, Bideford, Devon EX39 2EQ. Tel: (01237) 424280 (evenings or answerphone daytime), 7 - 9pm Monday to Saturday or all day Sunday.

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.

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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 Millennium 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 Millennium Award.

If you would like full details of the Millennium Award then you are invited to contact Brian Morris G4KSR at 22 Bardell Avenue, Sandhills Estate, Headington, Oxford OX3 8ED. A full set of claim forms for existing book holders are available for £2 from G4KSR 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 supplied 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 Elektronieke 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: (01508) 503824.

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 headlining 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) 425265.
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 multimode but we'll see about that when it comes to prices! Next, I'd like 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 handheld. 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 handhelds, 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 handhelds that felt a great deal more solid than they looked. The design isn't that different from many other budget handhelds, 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.

Also when I was first licensed I was on the air with a home-made 'Slim Jim' antenna and a handheld 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 especially when you are ready for 144MHz.

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.
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 mantelpiece.

### 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 so you can spend some extra time on spell of weather, everything from snow through rain and hail to lovely sunny days.

There’s also been several low pressures which have worked 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 SO53 8BY. 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.

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

Compiled by Zoe Shortland

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**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, there was no single organisation catered for both. The Amateur Radio Caravan & Camping Club was the resulting solution!

The new club was able to offer (and still holds a Department of the Environment) Exemption Certificate, permitting members to 'play radio'. 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 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 (01752) 811208. Alan says that 'A' and 'B' 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.

---

**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 amend 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 based at 145.275MHz every morning. Our sympathies to Charles' family & friends. Ed.

---

**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 propaganda studies committee and another two are officers in the local repeater group. Other members have connections with scouting and guiding and Wakefield
G3INVIF's recent demonstration of JVFAX.

A new fascination is in SSTV/FAX as shown by the attendance at G3WRF's recent demonstration of JVFAX.

**Benelux QRP Club**

Shortly after the end of the Second World War, Belgium, The Netherlands and Luxembourg 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 transnational Benelux QRP Club - BQC - in 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 Luxembourg, 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 (0930UTC (0830 in the summertime period) and around 3.560MHz each Sunday morning from 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 PA6AGT.

& 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 G3WRF 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 beginner.

An impressive cubical quad made by PA0PPI at a camping weekend.

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

**Wakefield & District Radio Society**

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

Practical Wireless, April 1996
In the beginning there was a book.....

The name of that book was Out of Thin Air - and just when you thought it safe to return to your bookshelf we bring you a trailblazing NEW book.....

The new PW Publishing book More Out Of Thin Air leads on from where its very popular predecessor Out Of Thin Air broke new ground. But More Out Of Thin Air is not just a reprint...it's a brand new book packed with new ideas, antenna projects, and reference material at a very reasonable price!

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- Slim Jim Vertical Antenna for 144MHz
- A Five-Element Beam Antenna for 70MHz
- Antenna Ideas for the Novice
- Antenna Data
- A DX Vertical Antenna for 3.5MHz

If you enjoy designing, building and experimenting with antennas...you just can't afford to be without the essential book - More Out Of Thin Air. You're not ready for antenna work without it!

Copies of More Out Of Thin Air are available for just £6.95 plus £1 P&P (UK), £2 P&P (overseas) from the PW Book Service. However, this month subscribers can get their copy for £6.95 inc. P&P (UK) or £6.95 plus £1 P&P (overseas surface).

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The ADI AR-146 Mobile

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 aerial) 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 16mm 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!).

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 G4DUN 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 Bournemouth Airport, that the sun was due at 1305 on a particular day! With this information, armed with sunglasses (just in case!) and the sunroof 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 Q5s in both simplex and repeater mode, only using the medium and low power settings.

On a couple of occasions did I find it necessary to use the High power setting. One of those being access and chat through the Torquay Repeater GB3TR whilst stationary on Bournemouth's Sea Front! (That's approximately 160km or 100 miles practical Wireless, April 1996
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 1 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.

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 nut 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.

**Manufacturer's Specifications**

**General**

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>144 - 146MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
<td>F3E (f.m.)</td>
</tr>
<tr>
<td>Antenna impedance</td>
<td>50Ω</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-20°C to +60°C</td>
</tr>
<tr>
<td>Power requirements</td>
<td>13.8V d.c. (11.7 - 15.8V)</td>
</tr>
<tr>
<td>Ground</td>
<td>Negative</td>
</tr>
<tr>
<td>Maximum current drain</td>
<td>11A @ 13.8V</td>
</tr>
<tr>
<td>Dimensions</td>
<td>600mA</td>
</tr>
<tr>
<td>Weight</td>
<td>1.2kg</td>
</tr>
</tbody>
</table>

**Transmitter**

| Output power           | 50W(High), 10W(Medium), 5W(Low) |
| Modulation type        | Reactance |
| Spurious radiation     | <-60dB     |
| Microphone Impedance   | 600Ω       |

**Receiver**

| Circuity               | 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 |
| Squelch sensitivity    | -60dB: <24kHz |
| Output                 | 0.1μV        |
| External speaker       | (> 5% distortion):>2W into 8Ω |

**WIN!**

THE ADI AR-146 MOBILE TRANSCEIVER!

Next month you'll have the chance to WIN the AR-146 kindly donated by Jeff Stanton G6XYU of Waters & Stanton in our easy- to- enter competition. You'll need to keep this copy of PW handy, as we'll be asking three questions based on GUSKR's review.

DON'T MISS OUT - ORDER YOUR COPY OF THE MAY PRACTICAL WIRELESS TODAY!

ON SALE 11 APRIL 1996
'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 licensed 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.

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 antenna is the easiest, and is fed at one end. Sused 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-wave length 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 72 Q if the antenna is a half-wave length above the ground, or 50 Q 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 50 Q 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, 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
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-hand operation. Another is the VK2ABQ, a small two element beam. Both of these can be rotatable.

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.

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-hand 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.).

Multi-hand 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 rotor.

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

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 may be found in magazines such as PW.

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
Oscillator'. However, these are not usually very accurate 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 and a digital read-out receiver. The s.w.r. can be measured quite accurately using a Noise Bridge for reading frequency, and can give some misleading readings.

Acoustics

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 mast 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.

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

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-quad 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'!
SPECIAL PRIZE COMPETITION

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, Y017 OSY.), 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.

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' Wordssearch April 1996.

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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.

Practical Wireless, April 1996
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 3-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. 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!

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,

Table 1

<table>
<thead>
<tr>
<th>Freq (MHz)</th>
<th>Radiator (mm)</th>
<th>Stub (mm)</th>
<th>Gap (mm)</th>
<th>Feedpoint (mm)</th>
<th>coaxial 1/2&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>432.0</td>
<td>482</td>
<td>160</td>
<td>9</td>
<td>19</td>
<td>230</td>
</tr>
<tr>
<td>145.0</td>
<td>1443</td>
<td>480</td>
<td>28</td>
<td>59</td>
<td>660</td>
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<tr>
<td>51.0</td>
<td>4107</td>
<td>1366</td>
<td>80</td>
<td>189</td>
<td>1941</td>
</tr>
</tbody>
</table>

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

Dimensions for each band element.

Practical Wireless, April 1996
To measure the elements for each band, start at the tip of the antenna and measure down the 462mm 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 195MHz 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 holes 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 on to the next stage, adding the stubs themselves.

**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 use the ‘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 feedpoint (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 λ/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 sinks of vinegar when curing is ideal for this task, but any other type may need some heatshrink tubing around it to help).

**Conclusions**

The prototype now resides where it was first tested, which is at GB7PMB’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 ‘CW Twig’!

I would welcome any feedback regarding this antenna (G7NBP QTH or G7NBP @ G07PMB) 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!
TWO TUNED-ONE BOX!

By 'Tex' Swann GITEX

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

The SWR-50RM unit consists of two identical modules housed in a single enclosure. The left-hand switch is the power range choice, choosing either 15 or 60W for full power/s.w.r. range. The unit itself. The power/s.w.r. meter has two slide switches under the single meter. The power range choice is set on the left-hand switch, and the s.w.r. scale reading is set on the right-hand switch. 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.u.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 Cirit 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 a 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.u.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.

**Manufacturer's Specifications**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Range</td>
<td></td>
</tr>
<tr>
<td>Amateur Radio</td>
<td>140-150MHz</td>
</tr>
<tr>
<td>CB Radio v.h.f.</td>
<td>400-450MHz</td>
</tr>
<tr>
<td>Long range cordless phones v.h.f.</td>
<td>27MHz</td>
</tr>
<tr>
<td>Power range</td>
<td>0-60W (two ranges 0-15 and 0-60W)</td>
</tr>
<tr>
<td>SWR Range</td>
<td>1.0 - 5.0:1 (meter range)</td>
</tr>
<tr>
<td>Impedance matching</td>
<td>20 - 125Ω</td>
</tr>
<tr>
<td>Insertion Loss</td>
<td>&lt;0.5dB</td>
</tr>
<tr>
<td>Tolerance</td>
<td>± 10% at full scale</td>
</tr>
<tr>
<td>Dimensions</td>
<td>128(L) x 63(W) x 30(H)</td>
</tr>
<tr>
<td>Weight</td>
<td>26g (length includes sockets)</td>
</tr>
</tbody>
</table>

My thanks go to Waters & Stanton Electronics of 22 Main Road, Hockley, Essex SS5 4QS. Tel: (01702) 206835/204405, FAX: (01702) 205834, for the loan of the review SWR-50RM unit. They can supply it for £59.95.
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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 Hajo 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 shot 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 valve 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, PWIr 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 c.e. 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*, I 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 hand. 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 W5ZHC, 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.

Table 1

<table>
<thead>
<tr>
<th>Coil</th>
<th>Value</th>
<th>Core</th>
<th>Turns</th>
<th>Wire (dia in mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>8H</td>
<td>T6E-2</td>
<td>36</td>
<td>0.56(24.s.w.g.)</td>
</tr>
<tr>
<td>L2</td>
<td>4H</td>
<td>T6E-2</td>
<td>25</td>
<td>0.71(22.s.w.g.)</td>
</tr>
<tr>
<td>L3</td>
<td>2H</td>
<td>T6E-2</td>
<td>18</td>
<td>0.91(20.s.w.g.)</td>
</tr>
<tr>
<td>L5</td>
<td>1H</td>
<td>T6E-2</td>
<td>12</td>
<td>0.91(20.s.w.g.)</td>
</tr>
<tr>
<td>L6</td>
<td>0.5H</td>
<td>T6E-8</td>
<td>7</td>
<td>0.91(20.s.w.g.)</td>
</tr>
<tr>
<td>L7</td>
<td>0.25H</td>
<td>0.91mm 8g 12mm dia 12mm long</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L8</td>
<td>0.12H</td>
<td>0.91mm 8g 12mm dia 12mm long</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Inductors

See Table 1. The two balun cores are type BLN43-202 (JAB Electronic Components Order Code 4300301).

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.
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.

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).

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

Practical Wireless, April 1996
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 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 PI8, 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 wire antennas. 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 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 fm 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 Y017 0SY at a price of £161 plus £8 P&P.

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 effort 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 coxial with 'half inch' type ie. RG213 or UR67.

The matching network 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
ADI AR-146
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A POTENT CUBICAL-QUAD FOR 144MHz

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 resonance.

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.

Fig. 1: Overall diagram and dimensions of the G6VNT 144MHz cubical-quad antenna.
Practical Wireless, April 1996

were available at my local kite shop for around making kites are recommended. I found these dowelling, the Smm glass fibre rods used in weatherproofing will be required. So, instead of If the antenna is to be left permanently outside, the antenna weatherproofing

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 hairpin 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 S7 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!

Good luck and cheap DX!

Antenna Special

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.

PW
The PW RAPID Remote Antenna Pos

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.

Ready 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 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 Octal socket

<table>
<thead>
<tr>
<th>Location</th>
<th>Interconnections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wafer 1</td>
<td>0° 30° 60° 90° 120° 150°</td>
</tr>
<tr>
<td>Wafer 2</td>
<td>180° 210° 240° 270° 300° 330°</td>
</tr>
<tr>
<td>Octal base</td>
<td>8 7 6 5 1 2</td>
</tr>
<tr>
<td>l.e.d.</td>
<td>D1a D2a D3a D4a D5a D6a</td>
</tr>
<tr>
<td>Diodes</td>
<td>DTk D8k D9k D10k D11k D12k</td>
</tr>
</tbody>
</table>

Practical Wireless, April 1996
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 i.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° i.e.d. D7 cathode.

As D7's anode is returned to a positive supply via R1, this causes the 180° i.e.d. to illuminate. The 0° i.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 SI. 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° i.e.d. (D1).

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

Modifications To Switch

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

Next, remove the switch locating hall 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.

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 i.e.d. indicates on the correct positions.

That's it. Let's see you rotating RAPIDLY!

**Shopping List**

<table>
<thead>
<tr>
<th>Component</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semiconductors</td>
<td></td>
</tr>
<tr>
<td>Red i.e.d.</td>
<td>4</td>
</tr>
<tr>
<td>Green i.e.d.</td>
<td>8</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td></td>
</tr>
<tr>
<td>A 13A wall socket, 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.</td>
<td></td>
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</tbody>
</table>
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 lawn areas surrounding the verticals. (These lines disappeared in 10 to 14 days, due to really softens the soil. Despite this, the work was removed the soil).

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 tube 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!

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SEND SAE FOR CATALOGUE OF AMATEUR KITS AND BUILT UNITS

Practical Wireless, April 1996
A very enjoyable way to spend at least part of the day is to go fly a kite. But first, you have to find your kite! Building a kite is not 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 GOJVR 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 it's 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
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 kite's 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 end 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 airfields, 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.

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!

Carolyn G1ZPC, or John G0JVR of Cornish Kites may be contacted at: The Kiteshop, Meager 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!
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 pace. It didn't, in fact, work at all and eventually Loewenstein 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, if de Forest hadn't enough to occupy him, his New York past began to catch up with him. Maybe the bankruptcy sale hasn'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 sideline 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...
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 scientist who could see the repeater's potential. He was a man who could see the potential in the Audion, the first transistor.

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 was a man of integrity. He sold 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 broadcasting 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.

Better Advised

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First World War

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 resolute. 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 was able to stifle all 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.

As a result, an injunction was slapped on MWT to prevent them 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.

Cheerio from Charles, see you in July.
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Amateur Radio antenna installations are now available for the North and West London areas. Call for details.

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Spotlight on Staff
Steve Jelly G0WSJ (ex G6LRJ)
This month’s feature is on Steve Jelly, the person in charge of Data Comps. 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, PCs 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.

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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

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:


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 worldwide).
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 '6' 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 license? 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 WOUN, 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, 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 '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 on each 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 18ft 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 up '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, 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 as bands 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 WOUN's 'four square' array for 1.8MHz consisting of four towers, 160ft high, fed as verticals.

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

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

END
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, 2 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 number of floppy disks. If you want to access the boot sectors of floppy and hard disks.

Computer Tone-Burst

Dick Goodall GM0OQZ 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 750Hz 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 WS="GETS"
70 IF WS="Y" OR WS="y" THEN
80 CLS:RUN ELSE:PRINT "END"

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

Perhaps you have a few simple 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 CO 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're 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 ttd.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
Scatter Prediction Program Output.

interesting QRP design package. The program is called QRP Home Builder (filename qrphb1.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 Mosher's Coil program (filename coil.zip) is a useful add-on for the home constructor. This is a very simple BSC 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 Shareware Library in Crowborough such as the Public Domain and shareware software is either to check-out the extensive range of column. One of the best ways to reviews so keep an eye on the popular rigs on the market.

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 CO message, variable side-tone (650-950Hz) and dot/dash memories.

The CO 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 operators 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 G3Y 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 MicroContest 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 Pipes, 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 bbnc 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/-xxs. 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.oLau/-wiansw/. If you've spotted any good sites please drop me a line with the details.

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):
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For the printed literature just send a 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.

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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!

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 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.)

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 magnetometry 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.

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 V4T0267 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 magnetic 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 propagation 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 and 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 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 and 1800 UTC. 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 10.7MHz (24-hours) and on 3.575MHz (between 0600-0500UTC 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!


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 Maescod, Herefordshire HR2 0HP.

You can also contact me via packet radio @ GB7MDX or E-Mail via davbeu@mdlhrl.igw.bt.co.uk. Alternatively you can telephone me on (01873) 860679.

Table 1: Magnetometer References

<table>
<thead>
<tr>
<th>Reference</th>
<th>Date</th>
<th>Pages</th>
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<tbody>
<tr>
<td>ARRL QST</td>
<td>May 1988</td>
<td>Pages 40 and 152</td>
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<tr>
<td>ARRL Proc.</td>
<td>22nd Conference of the Central States VHF Society 1988</td>
<td>'Simple Magnetometers', by R. Wicker W4WD</td>
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<tr>
<td>Astronomy Now, January 1990</td>
<td>'A Jam Jar Magnetometer'</td>
<td></td>
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<tr>
<td>British Astronomical Association Observation Notice ON3, February 1983</td>
<td>'A Jam Jar Magnetometer', by H.R. Hatfield</td>
<td></td>
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<tr>
<td>British Astronomical Association Aurora Section Newsletter, July 1988</td>
<td>'A Twin Hall Effect Magnetometer', by D. J. Smillie GM4DJS</td>
<td></td>
</tr>
<tr>
<td>Radio Communication Magazine (RSG8), July 1986</td>
<td>Pages 521-522, 'A version of BAA Jam Jar Magnetometer', by M. Vincent G3UKV</td>
<td></td>
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</tbody>
</table>

Difficult To Receive

Unfortunately with h.f. propagation it is, as 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 00-1-808-335-4303. 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:


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 DXNWCY 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 10.7MHz (24-hours) and on 3.575MHz (between 0600-0500 UTC and 1600-1900 UTC).

Fig. 2: A method of measuring varying earth currents (see text).
Leighton Smart GW0LBI has some interesting news from a DX operator this month, along with your h.f. reports.

Starting this month's column off is a letter I received from Bob Perks 4S7RPG. Bob's UK call is G3REP, 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 0300 and 0030 UTC, transmitting on 1.82MHz CW, receiving between 1.827 - 1.832MHz.

I actually operate from the OTH 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 G3BD0 near Hastings. John has been operating on 1.8MHz exclusively. John's log includes s.s.b. with contacts with USA stations WB2ULI (Texas), N4BF (Ohio), WR1R (Missouri), K5DL (New Jersey), and K66C (California) as well as a contact with 5Y2AM in Tajikistan, all between 0700 and 0740 UTC. 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 Omnii V transceiver at 700W into various loop, vertical and G5RV antennas reports contacts with K1KI (USA) at 0600, E1193 (Spain), E0QEP (Aaland Island), Iku2KW (Italy) all around 2000 UTC.

Eric Masters GOKRT in Surrey, see Fig.1, is an avid QRP'er. He's shown around 2000UTC. He uses a Yaesu FT-747 and short wave receive antenna in the loft. He reports s.s.b. reception of JZ5Z (Japan) in contact with K0NY at 1804, K8KMB (USA) working 3Z1PEA in Poland at 02:04. He also heard VP2F (British Virgin Islands) working our very own GW0SGL at 05:14, V44K0 (St Kitts Island) working G40FY at 06:00, VY2AR (Australia) at 19:16, and finally H1LSJW (Korea) at 16:07 UTC.

The 7MHz Band

The 7MHz band log from Charlie Blake RS69034 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 1A0M (Venezuela) working 0W0S at 07:54, VY5AOK (Venezuela) working UT4LA in Ukraine at 08:40 UTC. He also reports PYOFZ (Fernando de Noronha Island) in contact with DKLMEV at 03:41, 7X2BK (Algeria) working 4V0JQ (Malaysia) in Asia. Charlie reports starting with 1.8MHz and John Heys G3BD0 has been closing shortly after dark lately”.

Don's log includes s.s.b. contacts with BV5BEC (Taiwan) at 10:20, C56MD (Gambia) at 09:06, EC2PP (Cuba) at 14:21, L24A/VP9 (South Shetland Islands) at 09:30 (QSL to L21KDF). He also worked 2L2A/2X (New Zealand) at 09:31, B1AAK/IP (Guatemala) at 05:41, 9K2RA. Don uses a TS-950 SDX transceiver, and a HB 33 3-element Yagi antenna.

From Skeven in West Glamorgan, Carl Mason GW0W5W managed c.w. contacts with FY7DB (Brasil) at 08:51, ZL3RG (New Zealand) at 08:06, JF2JW (Japan) at 08:03, VE3MR (Canada) at 18:05, 5M1NW (Zanzibar Island, Tanzania) at 13:07 UTC (QSL via 5M1NW). All G5RVs were achieved using 100W output and a G5RV antenna.

Eric GW0KRT took part in the G-QRP Club ‘Winter Sports’. He worked low power c.w. stations SC4L/R (Poland) at 11:11, HB9BUB (Switzerland) at 14:24, I5DK (Italy) at 14:06, O7MY (Slovakia) at 15:46, as well as W1HT (USA) at 1421 UTC for a new QRP country and continent.

Steve GW0SQL on the other hand ran up to 100W on s.s.b. into a TH7 beam at 07:30 in height. He lists contacts with VK3DCS (Australia), TA2CS (Turkey), A17CK (Qatar), VY2SK (India), SU1JR (Pakistan), HV2RL (Ghana) via 3G2KRA. He also worked 9M2JJ (Malaysia) via 3M3GDX, JX2ZP (Japan) at 11:00 UTC. He also reported high power contacts with 9Y0RC (Canada), T75FLC (Chad), 8P9EM (Barbados), N5EA (USA) and E4CBN (Canary Islands) all around 1600 UTC.

The 18 & 21MHz Bands

For 18 & 21MHz I'll start with Don G3DNF who reports working CBAGN (Baha) at 13:43, F5SHG (Guadeloupe Island) at 12:50, QSL to CBAGN (Central African Republic) at 12:30, QSL to DL5NW, and 5X4FF (Uganda) at 14:23 (QSL to KB4EKL), all on 18MHz. Ted G2HKU lists c.w. contacts with A71CW (Qatar) at 10:00, HX1BH (Panama) and 5N0/DK1MU (Nigeria) both at 1500 UTC on 18MHz. And for his report Eric GOKRT offers c.w. OQRP 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 it gratefully received. But alas, space is my only limitation! As usual, reports and information by the 15th of each month.

Leighton Smart GW0LBI, 33 Nant Gwny, Trelewis, Mid-Glamorgan, WA46 6DB. Tel: (0443) 411459. See you next time!
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.


More Funding Problems

There are still funding problems for other stations. The Voice of America (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 who's going on in the country, now filled with many US troops.

The programme's on every weekday at 1900UTC 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 2300UTC.

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 Emme Nicholson, the MF 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!


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 Wortschall transmitting station of Deutsche Welle in a cost-saving exercise, and the Jillich station, not far from DW's Cologne headquarters, will close next year.

However, DW is managing to hire out its transmitters. Radio Vinitus has just started to use one of the Jillich transmitters for its North American service at 0000UTC in Lithuanian followed by English at 0900. 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 broadcast 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 fur this month, so until we meet again in the next edition, good listening!
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) and fed from an up -converter (430MHz TV's with continuous tuning. When the microwave 'flea -market'.

The BATC stand will have some of its latest projects on demonstration, club p.c.b.'s for sale and back issues of CO-TV magazine.

Before going to Rally '96, be aware that older TV gear can be a big market. 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 G6GOM on (01786) 893935 or E-mail Mike at vhf-comm@g6gim.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/h omepages/ipawson The ‘Welcome’ page has hypertext links to eight other information topics, including how to join BATC. Alternatively Membership Secretary Dave Lawton GOANO can be E-mailed direct at 100946.1056@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 (01333) 614765. Sysop is Brian Kelly GW6BXW 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 Receiver 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 g6hnj@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.
Advertisements from traders for equipment that is illegal to possess, use or advertise 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 establish clear prices have been ‘cleared’ by the bank before parting with your equipment.

You should state clearly in your advert whether the equipment is "as new", "perfect condition", "good condition", "good reason for sale", "under guarantee", "with manual", "host of spares", "working", etc.

The Publishers of Practical Wireless also wish to point out that it is the responsibility of the buyer to ascertain the suitability of goods offered for purchase.

Please use the advertisement form on page 62.

Compiled by Zoe Shortland

Write your advertisement clearly in BLOCK CAPITALS up to a maximum of 30 words, plus state your contact details, and send it together with your payment of £10,00 for the first advert, additional space made payable to PW Publishing Ltd.

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Spacecraft A200 2m (144MHz) transceiver, boxed, manuals, immaculate condition, with battery, £250. Tel: (0956) 544202. G2FZU, Northants (01536) 522007.

Falkirk 510D 2m/70cm, perfect condition. £290. Tel: (0117-969) 1025. 637-1H, Bristol.

BC312A good order, seeking some 70s vintage, lot. £35. Tel: (01296) 720161. Wayne-Kerr universal bridge STM100, pre-set or any adapters to suit your needs. £112. Steve G8FAK, Bucks.

JVC GP-501S, £15. Tel: (0956) 544202. G2FZU, Northants (01536) 522007.

SLC101 automatic Morse speech processor, model ASP, £35. Tel: (0956) 544202. G2FZU, Northants (01536) 522007.

Exchange

360XV 20MHz Hewlett Packard inc. 16 colour monitoring for miniquadity Mono-Dual-band hand-held transp. £1000. Tel: (01296) 720161.

YAESU FT-706 handheld, £35. Tel: (0956) 544202. G2FZU, Northants (01536) 522007.

Collins Sx-5e wanted, £300-500. Tel: (0956) 544202. G2FZU, Northants (01536) 522007.

RAE 117L. Tel: 0117-969 1025. Glasgow. Tel: (0141) 562 4571.

RACAL 1722 damaged, all parts good, £25.00 exchange. Tel: 0117-969 1025. GC312A good order, seeking Racal 17L.Tel: 0117-969 1025. GC312A good order, seeking Racal 17L. Tel: 0117-969 1025. GC312A good order, seeking Racal 17L. Tel: 0117-969 1025. GC312A good order, seeking Racal 17L. Tel: 0117-969 1025. GC312A good order, seeking.

Dorchester. Tel: (01258) 357353.

Wanted

Avo coil winder and parts of, anything considered. Head phones for No. 52, R.I07, B40C and No. 89. Srs. Tel: (0117-969) 1025. Benham Associates, Cheltenham.

Avo coil winder or parts of, anything considered, also original head sets/mics for No. 88 sets. Complete set-up considered. Tel: (0117-969) 1025. Benham Associates, Cheltenham.

Eddystone receivers, models 570, EC10, ER35, EM34, 960, 890, 930, 870, 830 in particular, but any other models considered. Also any spare sets for spares to help out fellow constructors. Some doubles for sale. Peter, Survey. Tel: (0374) 282710.

Mini beam for 10-12MHz, s.s.b., std. £120. Tel: (01636) 380037. G311L, Cumnock.

Printer Star LC90 mono c/w cable for parallel operation, must be in good working order; also AVO coil winder and parts of. £300. Tel: (0181-844) 2173. Zoe Shortland, PW Bargain Basement, Arrowsworthy Court, Station Approach, Broadstone, Dorset BH18 8PW.

Write your advertisement clearly in BLOCK CAPITALS up to a maximum of 30 words, plus state your contact details, and send it together with your payment of £10.00 for the first advert, additional space made payable to PW Publishing Ltd.

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Please use the advertisement form on page 62.

For Sale

CR100, two for spares. £30. Tel: Exeter (03792) 722696.

Modern Amateur Electronics manual, in four volumes, mint condition, £45. G5ULJ, London. Tel: (0121) 749-4519.

New MFJ-2010 (144MHz) s.h.x. £36. Tel: (01905) 641759. 2m transceiver, condition very good, £20.00 o.n.o. Tel: (0905) 299000.

ITT marine transceiver (see working), very good, £20.00 o.n.o. Tel: (0121) 749-4519.

Eddystone model 689X communications receiver, practically new condition, £200, boxed with manuals and cables, £75. Tel: (01706139803. GOBJW, Rochdale.

Famous Collins 755/3C wanted, P/X offer. £550. Tel: Dorchester (01242) 510138. Steve, Cheltenham.

Famous Collins 75S-3C wanted, P/X offer. £550. Tel: Dorchester (01242) 510138. Steve, Cheltenham.

Hewlett Packard 386DX 20MHz, £200. Tel: (01905) 641759. 2m transceiver, condition very good, £20.00 o.n.o. Tel: (0905) 299000.

Heathkit transmitter (not working), very big and heavy, £25. Tel: (01905) 641759. 2m transceiver, condition very good, £20.00 o.n.o. Tel: (0905) 299000.

ITT marine transceiver (see working), very good, £20.00 o.n.o. Tel: (0121) 749-4519.

Kenwood TH-X8E 2m/70cm (144/430MHz) hand-held T/R/X, boxed as new with full CTSS, spare NCad, d.c., charger and carton, £235 o.n.o. Tel: (0114) 237871.

Kensington 7050 2m/70cm, £250. Lapto-PC 286 power wayubby portable laptop complete with software, manuals and software, £285. Harris win-10 10k antenna, £20. Tel: Cavis (01480) 903571.

Kenwood TS-110F 144MHz fm radio, £150. Tel: (0117) 776698. 2m transceiver, condition very good, £250. Tel: (0117) 776698. 2m transceiver, condition very good, £250. Tel: (0117) 776698.

Kenwood TS-209E transceiver, complete with DG5 digital read-out and manuals, boxed and in good condition, £250. G4YTL, Cheltenham. Tel: (01242) 750485.

Lafayette HF-30 RX, £50. £30. £45, Hydro. Walsall XCR 30-500 MHz with f.m. unit. £75. Tel: (01295) 750485. £30. £45, Hydro. Walsall XCR 30-500 MHz with f.m. unit. £75. Tel: (01295) 750485.

Laptop 302E twin floppy twin Uni-com, solid pack, £170. Tel: PRC 6 50MHz hand-held, £10. Tel: Kidderminster (01522) 743253.

Military h.f. man pack, comprising Philips callpack PCW200, 20W, 8000 channels, s.s.b. rack-set. Racal MA2430/2421 automatic Morse system, lightweight units, service manuals, handout, etc., £250 Tel: (01905) 2922696.

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JFvax/SSTV, HamComm, PktMon. 9FD/29FD TxD/Rx Interface, programs, manuals, pictures. £28.50. SASE leaflets. GBSSL (OTHR). Tel: 0161 566 0253.

Wanted

WANTED FOR CASH Valve and solid state communication receivers Pre-1990. Considering good condition. Non working considered. Also, most valves wanted for cash. Must be unused and boxed. CBS, 157 Dickson Road, Blackpool, Lancashire. Also, most magazines. Also, most valves wanted for cash. Must be unused and boxed. CBS, 157 Dickson Road, Blackpool, Lancashire.

For Sale

VINTAGE SERVICE DATA. circuits & manuals - for: HFI, Military, Radio, Television & car radio up to the 1960's. Free brochure. Tudor Guilliam-Rees, 50 Meldown Street, Sidford, North Devon EX9 2EQ. Tel: 01277 424296.

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