BUILD
The PW Rugby 7MHz SSB & CW Transmitter
The Suspend-A-Loop 144MHz Antenna
The QUIPP 3.5MHz Antenna

REVIEWED
Cushcraft R7000 Vertical Antenna

FEATURING
The Low Down On 73kHz

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The year was 1956. Electronic communication throughout the world was on the threshold of significant and remarkable change. Intrigued by the development of single-sideband radio theory, a young engineer and amateur radio experimenter painstakingly assembled an SSB transmitter. Word of his successful efforts spread quickly among his friends, and soon radio amateurs from all over the country were requesting transmitters just like it. Thus was born the first invention of JA1MP, founder of Yaesu. Though his key is now silent, in tribute to his leadership and exceptional contributions to the radio art, the FT-1000MP carries the memory of his call sign.

An HF Masterpiece, Combining the Best of Digital and RF design technology. The FT-1000MP.
9 EDITORS KEYLINES
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Just look at how much money you can save with our offer this month.

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Save £50 with our Cushcraft R7000 antenna offer.

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<td>Communications receiver</td>
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<td>with monitor + meter upgrades</td>
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Icom IC-738 100W HF transceiver with auto ATU gen/cov receive (ex-cond) .... £1100.00
Drake TR-7 100W HF transceiver gen/cov receive c/w matching PSU and external VFO (ex-cond) .. £799.00
Trio TS-7805 2M/70CM multimode base station c/w Adonis Desk Mic ..................£629.00
Trio TS-1205 100W 80-10M amateur band transceiver ..................£329.00
Yaesu FT-707 100W 80-10M amateur band transceiver c/w matching FP-707 PSU, FC-707 ATU, FY-707 and desk mic ........ £475.00

SAVE £269.00
Like many other Radio Amateurs, I've been very concerned with the continuing (often very ill-informed) media coverage regarding car 'radio keys' operating on the shared 430MHz band. The British 'tabloid' press and other aspects of the media have carried many stories on how amateur radio operators have 'jammed locks' and 'locked drivers out' of their cars.

Most of the stories are based on reports that the low power U.H.F. transmitters used to de-activate car alarm systems and unlock the vehicle as the driver approaches it are suffering from 'interference'. They have (so it's alleged) been overwhelmed by another transmitter operating on nearby frequencies. Unfortunately for Amateur Radio, the fact that we are ONE of the users of the band has been 'latched onto' by the media and we've often been blamed, (whether justly or unjustly I can't confirm).

Personally speaking, I've yet to witness any problem with a U.H.F. 'radio key'. However, it does appear to be from 'relevant sources' that there can be a problem. So, with this in mind (and in response to readers who've written to me on the subject), I wrote to Barry Maxwell, the Director of the Radiocommunications Agency's Radio Investigation Service. Barry's reply follows:

**Barry Maxwell Replies**

Barry Maxwell replies: 'Thank you for your letter of 3 July on the subject of interference to the operation of U.H.F. 'radio keys'. The Agency's position is that the industry was consulted when the 433MHz band was introduced for vehicle security systems some years ago and they were fully aware at the time of other services using these frequencies.

Vehicle security systems currently use the frequency band in the United Kingdom on a secondary basis. The 433MHz band is a harmonised European frequency which was introduced to cater for the specific needs of vehicles travelling through Europe.

The Agency recognises that interference may be caused to vehicle security systems by Amateur Radio beacons or repeaters, especially in remote areas. The Agency is working through the European routes available to try to find an alternative frequency on which vehicle security systems can operate. Until then, it is the responsibility of the manufacturers to develop equipment that is able to operate on a frequency band shared with other users. So, it appears from what Barry Maxwell has told us...that it's up to the manufacturers to solve the problem. Let's hope they do so soon!

**Trafficmate On The Move**

Another problem area for Amateur Radio operators (particularly U.H.F. mobile enthusiasts) - the 'Trafficmate' system is literally 'on the move'. This welcome news comes from a separate statement (from that of the 'radio keys') from the RA, received by PW in early July.

The 'Trafficmate' system (it uses roadside transmitters operating on 433.920MHz to provide up to date traffic information for "in car use" from specialist receivers) is to be moved from our 'shared' band within the next few years where it's been causing interference to other services, not just Amateur Radio (Don't forget...we're an 'unprotected service'). The RA's statement makes interesting reading, especially if you've read any of the press stories regarding the system:

The statement from the RA says: "Trafficmate are operating the 'Trafficmate' system on 433.920MHz at present and the system is required to comply with the spectrum management parameters of MPT 1340. This is a temporary frequency allocation and an alternative frequency has now been found for the 'Trafficmate' network. All 'Trafficmate' transmitters and receivers will be required to operate on the new alternative frequency after the 31st of December 1998."

From my point of view it seems that several mistakes have been made by 'other users' and those responsible for allocating frequencies for systems such as U.H.F. car 'radio keys' and equipment such as 'Trafficmate'. Unfortunately, the first could be laid at the door of the RA, but in fairness I don't think they have any choice! (It's an EEC matter and Barry Maxwell's statement makes it clear where they think the responsibility lays).

Secondly, I think that the biggest mistake has been made by the manufacturers of the equipment involved. They must surely realise that (in the case of the 'radio keys') a very low power transmitter with the necessary sensitive receiver can lead to problems with strong signals on adjacent channels?

But of course, I think the real difficulty is money...because in reality it's most likely the equipment is built to a price and not a specification. Let's hope everyone involved has learned a lesson!

**Zoe Needs Your Help!**

Our 'new' Mrs Zoe Crubb who compiles the PW 'Bargain Basement' section...needs YOUR help! The problem is that now the reader's advertisement section is free, many hundreds are arriving in the office and we're very busy preparing them for publication. Unfortunately though we're having a problem...in that many of the adverts can't be read or understood.

Unfortunately, an advert that cannot be understood by Zoe or any of the team who are radio amateurs, will be delayed in publication. There's absolutely no point whatsoever in PW publishing your advert if we can't decipher the details, telephone number or address!

Personally I think that many of the advert writers would be surprised to find that they've left out their name and details...so that even if we did have time to check them (bear in mind that it's a free service) we couldn't do so anyway. Another fact is that an increasing number of radio amateurs are 'Particulars Withheld' in the RSGB Calibook, so that in many cases another avenue of rescue is blocked.

So, to help you get the best out of the PW 'Bargain Basement' service. Zoe and the rest of the team (we all check and proof read the section) ask that you please ensure the following procedure has been carried out when you send an advert in.

PLEASE type or write your advert in BLOCK CAPITALS ONLY. Ensure that your address (Block capitals!) is supplied in full, with street number, postal town, county (and country if appropriate) and post code (for UK), postal numbering (Europe) and Zip code (for the USA). Please check your telephone number is correct (a surprising number of numbers supplied are incorrect) and lastly that we can understand your advert.

Ensure that you make it VERY clear whether your advert is a 'For Sale', 'Exchange' or a 'Wanted'. To be safe, it's best to send in adverts separately and make these categories error free. (Don't forget Zoe is dealing with hundreds at a time).

Although I'm sorry to stress this point again (it is the biggest cause of problems) please make sure you've made it very clear what it is you have for sale (whether home-brewed or professionally built) or what you want. If we can't understand your advert, I'm certain that other readers won't either!

You can also help everyone involved by using recognised abbreviations (such as v.g.e. for 'very good condition') and avoiding confusion by saying (for example) For Sale '144MHz folding cubical quad antenna with 10m of low loss coaxial cable. (The use of frequency terms rather than wavelength avoids confusion).

We're pleased PW readers are enjoying the 'Bargain Basement' service. But, to make sure you get the best results...please help us to help you!
Invisible Antennas
Dear Sir
I'm writing you a few lines about 'Flying the Flag' on invisible antennas, which I saw in PW July. I have a small garden and have been an s.w.l. for 60 years. I'm 72 and own an Eddystone 730/4 and a 62B receiver and I can pick-up Australia and all over the world using my wife's clothes line which is plastic coated steel wire, so I've no need for any flag poles! My garden is only 19 foot long so I have put up a double clothes line across the garden to keep my neighbours quiet - and it doubles as my antenna! R. Worledge Coventry

Morse Methods
Dear Sir
John Goodall is to be congratulated on his excellent article 'Morse Methods' in the July issue of PW. From practical experience I can fully endorse all he has written, having taught Morse for most of my life, first as an RAE examiner! One very good idea for increasing speed is to practice at a little slower than you can read, so that you are having to strain to write down 80 or 90% of the copy. This may well be tiring, but it really works, much quicker than if you only receive at a speed with which you are capable of writing 100% perfect copy! The exact opposite of when learning to play a musical instrument, do touch typing or write shorthand, where a slow and careful approach, aiming for 100% accuracy, is the ideal method. Strange but true! Douglas Byrne G3KPO Isle of Wight

Memories
Dear Sir
Your invitation, following Peter Reading's interesting letter (PW June), for memories of that period, has prompted this letter. I'm sure no apologies for name dropping! As one of Maurice Child's students attending The London Telegraph Training College, Earls Court, I was an avid reader of Practical Wireless and also Popular Wireless. Both magazines were featuring the work of Baird and his TV developments. Details for the construction of the 30-line discs receiver was described, and kits for parts were advertised by Peto-Scott.

Having already built the Scott-Taggart ST 600, (Kit supplied by Peto-Scott) I built up the disc receiver. I was able to receive a picture about the size of a large postage stamp, though it was difficult to keep in 'sync' with the transmitter.

At this time, a friend of my parents knew a man 'high up' at the BBC. An invitation was obtained to visit the BBC studio which was just up the road from Broadcasting House, to watch a live experimental transmission taking place. There I saw John Roake, Tessa Dean and Bertha Wilmot doing their stuff in a darkened studio, being enganged by a 30-line beam of light.

These experimental transmissions were put out by the BBC late at night, and I remember writing to PW suggesting that these transmissions could be recorded onto gramophone disc, so that we experimenters could play with our new toy during the day. My letter was published!

At the same time, I attended a short course on High Definition TV at the London Polytechnic and actually saw High Definition TV (120 lines, I think) being beamed by Baird from Crystal Palace to the Poly in Regent Street. About a couple of years later the BBC started its 405-line transmissions from Alexandra Palace. Then the war started! Thomas D. Crosland G4PNK Bedford

Editor's comment: Fascinating Thomas, thank you!

Dear Sir
With reference to your 'Reader's Memories' (June PW), Radio first came into my life as a lad of 13 years, befriended by an ex-in-tiner. What an earthy character! He fascinated me to the world of short waves. His home-built set needed an eliminator and an accumulator (to be recharged once a week). Years later at call-up, in 1949, I opted for radio as a trade. The RAP put me into radar and sent me on a six month course. In 1950, at Leeuward, I was given a 'Megger' and ordered to check the circuits of a Dakota. It was then that the RAF realism I was colour-blind, but still put me on a charge, of indiscipline (later dismissed).

Clearly a world of colour-coded components was not for me and by then, self-build became DIY and I was able to bend my energies into plumbing and central heating, building and even house electrics, where the three to four wiring colours were no problem. Then, approaching 65 years old. I picked up a copy of PW in the local library, scanning its pages looking for familiar names.

Where was Eddystone, Cosnor, Ecko, Radio Shack? Instead, estoteric names like Yassa. I thought Kenwood was a food mixer! What on earth is a scanner? What happened to Premier Radio and its kits for self-build radios at 55/- (£2.75) And, Morse seemed on the way out, if not already obsolete. Short waves had given way to satellites. But what I missed most (who, I should say) was the editorial by F. J. Cumm. Somewhat depressing also is the perception that the hobby seemed to have become one for the well-heeled. Or is there a branch of wireless that someone of modest means can enjoy?

Ron Pearsall Watford

Editor's comment: You can still enjoy home-brewing Ron, even though F. J. Cumm's Editorials are features of the past!

Tall Trees
Dear Sir
At the end of page 31, PW July 1996. G3XIZ says that 'Tall trees are not always just where you want them!' Personally, I'm eying up the sycamore shoots in my garden hedge with a view to moving them somewhere more in line with the GSRV... I'm a patient chap and happy to wait for them to grow up and become useful antenna supports.

Rather conveniently, one shoot chose a location, without any help from me, that is just where it will be able, in a year or so, to give valuable help in supporting the GSRV. Of course, sycamores tend to whip around in the breeze so I'll have to take precautions lest the GSRV be torn apart... Good fun, eh?

Ian Brothwell G4EAN

Parle Vousee Morse?
Dear Sir
Firstly may I congratulate you and your staff on production of such an entertaining and informative and sometimes amusing magazine. I never fail to collect it on the day of issue at the newsagents.

However, the one article that tends to be repeated often is the whinge on Morse test or no Morse test for the RAE Class A and entry into the h.f. band of communications. In the July issue the whinge was taken up by Steve G7POT from Castleford.

This whinge was much the same as the others and basically, after something for nothing. However, one of the main points of the Morse argument is regularly ignored, being that Morse is a language and an international language to boot.

I do not speak any foreign language, but I have been able to speak to Spanish, French, German, Dutch, Italian, Russian, Japanese and Arabic amateurs, need I go on? Morse is truly an international means of communication.

I would also say to Steve, doing a test is a small price to pay for entry to a language that allows contact with radio amateurs throughout the world. I was able to walk through my test in 1992 and owed this to the fact that I was RN trained.

I have trained others to get through their test and have been more than satisfied at the pleasure they have gained through being able to communicate in Morse code. The effort is well worth the pleasure gained from being a truly world wide communicator. After all, we are in the business of communicating. Jim Breigun GB7RKO Northants
Is There 6MHz 'CB?'

Dear Sir

Is there 45 Metre Band (6.5MHz) - CB In Some Countries? Having recently bought an FRG-100 receiver, I now spend more time listening away from the amateur bands than transmitting on them! There seems to be a 'Citizens Band' of some sort between 6.500 and 6.700MHz, which I thought was officially allocated to air radio.

You can hear many stations there on s.s.b./l.s.b. in French, German, Dutch, Italian and English. Many have Irish accents and give their QTH in the Republic.

Techniques seem to vary, some using amateur language and procedures, such as calling 'CQ 45 metres'. Some sound like radio professionals, but others seem ignorant both of radio technology and procedures. One oddity was reports given as '7 and 9'. Some rigs used have switched channels.

Is this band legal for CB or something like it in some countries, or are all the stations there pirates?

David H. Wright
Dorset

Editor's reply: Some users are legitimate. The Radiocommunications Agency are aware of the illegal activity and (as many readers already know from previous mentions in PW) the frequencies mentioned have attracted 'pirates' for many years, literally ever since surplus military (6 to 9MHz) equipment first became available.

Vintage Problems

Dear Sir

I was very interested to read the comments of Steve Pendlebury in the July 1996 issue of Practical Wireless with reference to vintage radio problems in 'Receiving You'.

One of the problems a restorer has with vintage valve equipment, both military and civilian types, is the important thing of trying to keep a near original appearance, faced with having to replace original, faulty components with brand new types which can spoil its original appearance.

I remember seeing a No. 19 Set, its outer appearance original, but the inside gutted and was fitted with a CB rig, fitted on the back of a private military collector's vehicle. Some people, well experienced in the art of restoration, have in some cases opened up the component, removing its faulty tubes and fitting a smaller, modern, components - re-sealing the ends (the component that comes to mind is the condenser). This, giving an original appearance, might be bordering on deception! (Only joking!)

I think there are two points that should be kept in mind when restoring/repairing vintage equipment, where possible, equipment, in my view, should be kept working. If components are replaced it is up the individual keeper/restorer, to decide on how to replace faulty components. It's not always essential to replace all of one type of component just because one is found faulty, but might save future problems.

It's also a good idea to keep a diary of what repairs, etc., have been done, this adds to its history and may help future keepers. I am sure (if we are honest) we've all fallen into the same trap ourselves which path they might save future problems.

I believe it's important to keep, where possible, the equipment in working order. But it is very difficult now to find any vintage valve equipment, etc., of any age, which has not had some of its components replaced with modern types of the day - the alternative is to leave well alone and use for display purposes for others to enjoy at a museum.

I will let readers decide for themselves which path they will follow, but myself, I enjoy the thought of vintage equipment working and restoring in my case military radio equipment to where possible, near to its original condition.

Andrew Humphreiss
Warwick
National Novice Contest

Poole Radio Society will be holding their Second National Novice Contest on Sunday 22nd September 1996 from 1400-1600 UTC. The contest is designed to give Novices an introduction to contests and the rules have been designed to be simple and easy to comply with and therefore encourage more people to have a go.

The general rules for the contest are as follows:

**Bands/Powers:** Contestants can use the 80 and 430 MHz bands and therefore use only those sections of the bands, modes and powers permitted by the Novice Licence and in accordance with the band plans. Those working c.w. operators are asked to ensure that they don’t send faster than the Novice Station.

**Sections:** There will be a single section for all Novices. Heeding encouragement in setting-up stations it is welcomed, subject to licence conditions and the same basic callsign should be used throughout the contest.

**Locations:** Stations can operate from up to two locations and may switch between locations as they wish. A location is defined as an area of land within a circle of 10 metres diameter.

**Exchange:** Each station may be contacted for points once on each band. Some indication of locations must be exchanged and usual reports should be exchanged for the mode being used (e.g. 57 on ‘phone). Serial numbers are not necessary but the time of each QSO must be logged accurately.

**Scoring:** Novices score 3 points per QSO. No points will be available for duplicate contacts, even a location change. No points will be available for QSOs through repeaters and there are no multipliers.

**Logs:** Completed logs should be sent to Colin Redwood G6MXL, 45A Lulworth Avenue, Poole, Dorset BH15 4DH and should arrive over the first weekend in October. Any recognisable paper log sheet will be accepted as long as it contains the time, band used, callsign of station worked, reports exchanged and location of station worked and points claimed for each QSO. Make sure you include your name, address, callsign and location details and that you add up your score for each band and in total. Check logs from listeners and transmitting stations are also welcome.

Winners: A small cup will be presented to the winning station on each band and overall. All entrants will receive an A4 certificate and a results summary. Make sure the names of each operator who requires a certificate. A special certificate will be also be awarded to the Novice station who submits the neatest hand written log.

So, what are you waiting for? Dust off that rig, find a location and get ‘contesting’!

Can You Help?

Jacques Cornet is looking for documentation on a CT554 quartz crystal unit test set. If you can help Jacques please contact him at Elkenaam, 22, B1640 Sint Genesius Rode, Belgium.

Do you have a copy of the schematic diagram for the Cambridge Audio Model PS80s stereo amplifier or know of a shop or company that could supply one? If so C. S. Ventour of 26 Hillcrest Drive, Battoon Lands, Marabella, Trinidad, West Indies would be pleased to hear from you.

Trafficmate On The Move

‘Trafficmate’, the U.H.F. based ‘in car’ traffic information system, which uses the 430MHz shared band and has been causing interference with the Amateur Radio Service, is on the move to a new frequency. The Radiocommunications Agency has announced that an alternative new frequency has been allocated and that ‘Trafficmate’ is to be moved by 1998.

In a separate statement, and in reply to questions addressed to him directly by Practical Wireless Editor Rob Mannion G3XFD on the continuing problems with U.H.F. car ‘radio keys’ being ‘blocked’ by other services (also on the 430MHz band), Barry Maxwell the Director of the RA’s Radio Investigation Service has Barry Maxwell the Director of the RA’s Radio Investigation Service has announced that an alternative new frequency has been allocated and that ‘Trafficmate’ is to be moved by 1998.

In his reply, Barry Maxwell clearly states that the RA’s opinion is the RA’s opinion and has been causing interference ‘Trafficmate., the U.H.F. based ‘in

New Catalogue

Waters & Stanton Electronics have available copies of the new Alinco catalogue. The A4 colour catalogue brings together the complete range of Alinco products. To get your free catalogue contact Waters & Stanton at 22 Main Road, Hockley, Essex SS5 4QS.

Tel: (01702) 206835.
Telecommunications Exhibition

The Kerry County Museum in Ireland is currently running an exhibition on the development of telecommunications and broadcasting, tracing the history of telegraphy, telephone, radio astronomy and information transmission systems. The exhibition, entitled Marconi to the Music of the Stars, has been put together with assistance from the Marconi Foundation, Radio Telifis Eireann, Telecom Eireann, The Science Museum, The National Museum of Film & Photography, The Museum for Technology & Work, Radio Kerry, Radio Gaeilge and The Irish Radio Transmitters Society.

On display at the Marconi exhibition are some early pieces of experimental equipment used by Marconi, early telephone sets, the first radio sets, television equipment and much more. Many of the great scientists such as Morse, Hertz, Bell, Baird and Edison are also featured within the exhibition displays.

An amateur radio station will be in operation throughout the duration of the exhibition and any licensed radio amateur who wishes to operate the station should contact Tom EDJHH at 010-35368 31967. The exhibition is open until the end of October.

Naughty Nought!

Last month we reported that Yaesu had launched a new dual-band mobile transceiver, unfortunately those editorial gremlins got in, sabotaged the story and pitched a nought! This resulted in us incorrectly labelling the new Yaesu rig as the FT-800R when it should have in fact been the FT-8000R! Apologies go to Yaesu UK and to all who may have been inconvenienced by the error.

May RAE Results - Could Do Better?

Did you take the RAE in May? If you did, you'll be interested to hear what the City & Guilds examiners thought of candidates efforts. But there's no need to worry because on the whole...your report is not too bad according to the statement issued by the C&G for the May 1996 examination!

General comments from the C&G for the May RAE are "Although some candidates found the paper difficult, generally candidates were well prepared. Again there was some evidence that benefit would be gained by greater use of practical demonstrations in courses of study for the examination. Knowledge of some of the fundamental measurements in an amateur station were lacking; for example, only 39% of the candidates knew how to measure the d.c. power input of a transmitter."

The C&G statement also reported that "Out of a total of 1378 candidates taking the paper, 1009 (73.2%) were successful". For further information and copies of the full detailed report on multiple choice Question Paper 7650-001, contact Roger Bone at C&G on 0171-294 2468 (Ext. 2766).

Radio In Newbury

For the past two years Axon Systems have traded as the Newbury branch of Lowe Electronics however, in late June the shop opened its doors to radio enthusiasts with its own name above the door. Axon Systems specialise in mobile communications and stock a wide range of radio equipment from manufacturers such as Icom, Kenwood, Yaesu and AOR.

Julian Swift-Hook G1DF1, Director of Axon has been involved in radio for over 25 years and is keen to ensure that amateurs and short wave listeners have access to a radio outlet in Newbury. Axon also stock components, offer a kit service for those with a 'shopping list' for particular projects and deal in GPS receivers, and marine and air band radios.

Axon Systems Radio Electronics can be contacted at 108 Bartholomew Street, Newbury, Berks RG14 5DT. Tel: (01635) 522122.

Web Site

MuTek Limited of PO Box 24, Long Eaton, Nottingham NG10 4QN have recently launched their very own World Wide Web site. So, if you'd like to contact them using the Internet the address is: http://ourworld.compuserve.com/homespages.mutek. Of course, if you don't have access to the Internet you can still contact MuTek by post or alternatively by calling 0115-972 9467.

To Change Or Not To Change?

As previously reported on these pages (May 1996 PW) the Radio Amateurs Examination (RAE) was due to take on a new format as from May 1997. However, following receipt of a letter from the City & Guilds stating that the changes had been postponed, the Newsdesk Editor Donna Vincent G7TZB contacted the Radio Society of Great Britain (RSGB) to find out exactly what decisions had been taken.

The official report from the RSGB is that although the Society supported the proposed revisions and supported the move in principle to modernise, reduce the cost to candidates and improve the RAE there were several aspects of the changes that they were concerned about. Therefore after consultation with the Radiocommunications Agency (RA) it was agreed that the changes should be put on hold and that further discussions between the RA, RSGB and City & Guilds be held.

Therefore the RAE will now continue in its current two paper multiple choice style until any changes are agreed. Candidates can rest assured that they will be given plenty of time to prepare for any changes which are introduced in the future.

The PW Newsdesk will bring you more news as soon as it's available.

Holiday Receiver Kit

The latest offering to come off the Howes production line is the DC2000 Receiver kit. The DC2000 has been designed to meet the needs of the Novice constructor and those seeking an effective, but low cost receiver suitable for portable and holiday use.

The receiver is a direct conversion type with integrated circuits for the double balanced mixer, audio preamplifier and loudspeaker driver stages.

It's claimed to have a high sensitivity (typically -118dBm, 0.31mV for 10dB signal to noise ratio M an SSB bandwidth). Band changing is done by means of plug-in band modules.

One band module is provided with each kit (3.5MHz is the standard, or to customers choice). Optional modules are available to cover all the h.f. amateur bands, 1.8 to 28MHz. Modules for other b.f. frequencies can also be used.

The DC2000 kit comes complete with a p.c.b. and all board mounted components to build the receiver mother board, plus the circuit board and components for one band module. Full instructions and technical support are included.

An optional hardware pack (HA22R) is also available to case the project. The DC2000 is interlinkable with other kits in the Howes range, including digital frequency display, 'S meter', narrow audio filter, transmitters, etc.

Both the DC2000 kit and the HA22R hardware are available from C.M. Howes Communications, Eydon, Daventry, Northants NN11 3PT. Tel: (01327) 260178. The DC2000 kit costs £22.90 and the HA22R, £18.90. Optional band module kits are £7.90 each. Postage & packing is £1.50 for kits, or £4.00 if hardware is ordered.
Summer Jobs

Hopefully, now August has arrived some more steady seasonal weather will have arrived too. The summer is an ideal time for doing all those outdoor jobs that you've been putting off and I don't mean mowing lawns, painting houses and the like!

If you have an outdoor antenna then the fixings and any ropes used to keep it in place should be checked for signs of wear and tear. It's all too easy to find your antenna in a heap during a winter gale otherwise.

Even something like a simple wire dipole can come to grief if the ropes holding it in place are perished. It can be difficult to think about winter when you are barbecuing and sunbathing, but the seasons do turn and now is the time to get on with the work.

Antenna connectors should be checked for signs of corrosion, you can re-waterproof all the joints during the warm dry weather with ease. Things like self-amalgamating tape are much easier to use in warm weather, as it is more pliable and adheres better to the connections.

Any external terminal blocks should be sprayed with silicone waterproof spray, even those that are inside plastic boxes. Obviously, if your antennas are mounted on the roof you need to take care that you do the job safely. Don't tackle repairs to roof mounted antennas on your own unless you are sure you can complete the task without endangering life and limb. In any case it's often wise to have someone else around, just in case of accidents.

Other jobs that can be tackled at this time of year is a bit of antenna experimentation. Changing antennas around in the wet and dark can't be much fun, so make the most of the fine weather.

Along with summer inevitably comes the odd thunderstorm and it's really important to ensure you're adequately prepared. Whilst there's very little you can do to protect your station against a direct hit, there are a number of precautions you can take to minimise damage.

The first and most basic precaution against lightning strikes is to completely disconnect your antenna when there's a storm about. As well as disconnecting the antenna it's also wise to ground it to a good external earth.

In addition to protecting against near misses antenna disconnection this can prevent static build-up from damaging your equipment. If you're unfortunate enough to live in one of the country's lightning belts you would be well advised to stick with antenna systems that maintain all elements at ground potential. If you don't, you could end up with static damage as the storm builds-up.

No doubt I am going to get into terrible trouble from both sides of the argument over this next item. But as I will be in trouble either way I may as well share it with you!

Michael Shread represents a group called ORACLE in the UK. Now ORACLE stands for Organisation Requesting Alternative licensing Through Code-Free Examinations. By now you are either tearing the pages out in disgust or cheering.

Anyway, the ORACLE group is a worldwide organisation that was formed in 1994 in New Zealand. They say that membership is open to all with an interest in Amateur Radio whether licensed or otherwise, who wish to open up the debate on Morse Code testing issues.

The ORACLE list fourteen reasons why they feel that countries should be allowed to choose how radio amateurs may qualify for an amateur radio licence. Having read through the list I can actually see what they mean in several cases, although that doesn't mean to say I am anti-Morse!

The Morse issue is a prickly subject and one that bothers many newcomers coming into the hobby. Quite often the thought of having to learn Morse puts people off from even trying. And I can quite understand, I would hate to have to try and learn a new "language" these days.

Anyway, if you think you would agree with their sentiment, you may like to find out more about ORACLE by writing to 15 Hadley Court, Abberbury, Huntly AB54 5TG. I'm not opening up the Morse-or-not-Morse debate, so please don't send me hundreds of outraged letters for or against!
Rag Chewers Delight - 3.5MHz!

Perhaps 'Rag Chewers Delight' is a rather unfair tag for the popular 3.5MHz or 80m band, but there is an element of truth. I have fond memories of my early radio days with hours spent listening to pearls of wisdom from old-timers on my ex-MOD receiver. Still, enough reminiscing, let's take a more detailed look at this band and how to get the best from it.

The precise frequency allocation for the band is 3.5 to 3.8MHz, however, in the US and some other countries, the band extends right up to 40MHz. One of the main reasons for the band's undeserved popularity is the reliable daytime national coverage.

Propagation during the day changes dramatically as the D layer fades and long distance communications becomes possible via the consolidated F layer. In good conditions at night the range extends a good way around the globe.

Rather like 'Top Band' (1.8MHz), this band suffers rather badly from atmospheric noise, which tends to restrict long distance night-time operation to the winter evenings. The amateur band-plan shows the range 3.5-3.6MHz as reserved for c.w. use, while RTTY and other data modes use 3.6MHz ±5kHz. The remaining band up to 3.8MHz is used almost exclusively for 'phone operation. To help those wanting to try DX operation the band-plan advises that 3.5 to 3.55MHz and 3.79-3.8MHz should be reserved for intercontinental working. You will also find that 3.635-3.65MHz is used by stations in the old Soviet republics for long range contacts.

Another classic feature of the 3.5MHz band are the regular Nets which are reserved for intercontinental working. You may even hear radio on it!

You will also find SSTV and FAX signals at 3.735MHz ±5kHz. The signal strength on the band is often so strong that you can log stations you wouldn't normally get on your equipment. You can even use a tape recorder or a phone to log the signals.

The band is used by the British Young Ladies Amateur Radio Association (3.688 or 3.70MHz on Mondays at 1915 local time; Royal Naval Amateur Radio Society; c.w. Net. 3.575MHz Monday-Friday at 1400 local time.

If you're learning Morse there's help at hand through the RSGB's GB2CW Morse practice sessions. These operate on 3.55MHz at 1830hrs Monday to Friday, 1200 and 1930 on Saturday plus 1000, 1200, 1400 and 1930hrs on Sundays.

So, you can see that 80 stations are a truly versatile and interesting band. It's certainly a good place to start if you're contemplating a single band rig as it's used by a large number of people over a wide range.

Charity Is RARE

Many radio amateurs get involved with charity work and raise funds in all kinds of ways for various good causes. The trouble is the rest of us rarely get to hear about it as these good people don't go around shouting about their good deeds.

I have recently heard about a group that are looking for new members to help with their work, they are called Radio Amateur Relief Expeditions (RARE). Back in 1991 a group of radio amateurs were asked to provide the communications for some 200 volunteers renovating different projects in Romania such as hospitals and orphanages. Since 1991, the RARE group has involved in renovating medical centres in remote villages in Romania. They have also escorted a relief convoy to Split in Yugoslavia and have been involved in a number of relief projects in Africa and Bangladesh. Other work done by RARE includes setting up camps for students in disadvantaged countries such as Africa and Bangladesh.

In January 1995 a small group from RARE went to Turnu Severin and met with local teachers. With local support they set up a camp in the area and 13 radio amateurs left the UK in two vehicles kindly loaned by The Rover Company. The 80 students in the camp were keen to learn about life in the UK and enjoyed the amateur radio workshop.

The project was so successful they have decided to repeat the event again this year. Even more venues are planned for 1997 and obviously they need people to staff each camp.

They are looking for people to organise sports, arts, walks or anything else that will interest young people between the ages of 10 and 18. These young people will be orphans, disabled or disadvantaged and therefore the camps give something to look forward to.

Membership of RARE is £7.50 a year, but they'll accept all the donations they can get. They are also looking for people who can spare the time (about two weeks a year) to help out at these camps. If you're interested in finding out more or would like to get involved contact: RARE at 1 Allfield Cottages, Condover, Shrewsbury SY5 7AP.

Fun-Phones In The Garden

By the time 'Novice Natter' appears it will be well into the long school holidays. So how about some summer fun in the garden with a bit of science thrown in? All you need are two old dynamic earphone inserts (from old telephones or surplus stalls at rallies) and some twin lead wire and you've got a really simple fun-phone. If you're still young enough to have a 'den' in the garden (when you grow up you have a shed or a garage to 'play' in) you'll be able to use the fun-phone to speak from the house to the 'den'.

All you do is link the earpieces together with the twin wire to provide very basic telephones. In effect you use them in the same fashion as the 'twin' and 'string' telephones. There's no bell...you just whistle or 'whoop' to call the other end.

You speak into the earphone and then listen through it in turn. Your voice causes the sound pressure waves to vibrate the diaphragm in the earpieces which then in conjunction with a magnet and coil (just like a very small intercom and see generator) develops a current which flows to the other earpiece. At the other end the varying current (representing your voice) is then turned back to (faint) sounds and you can talk for free! No batteries are needed, you don't have to turn it off and you've played with science!

Try it out and next time I'll describe how your fun-phone can work with one wire. And you may even hear radio on it!
Special Event Station GB5CR Rolls Again

Remember the Church's sponsored Cycle, Ride or Walk (CROW) from September '95? Well, on Saturday 14th September '96, it happens again all across England in around 25 counties, with cyclists riding from church-to-church to raise sponsorship money from their friends and colleagues. This will be collected together by the County Historic Churches Trust for restoration of endangered, but beautiful old buildings.

In 1995, Harry Hogg G3NMX set-up GB5CR with G3SLI and G001W at Greyfriars Church in the centre of Reading, Berkshire, and managed 135 QSOs, including GB2HCR at Harpsden Church, GB05BF, GB5WSL, GB2RSN, G0UXMP and GB5SH, which were all at churches with cyclists visiting/checking in.

There were some interesting QSOs between friends in some of the QSOs with these stations. Most of the contacts were on 80m (3.5MHz) with the local area covered on 2m (144MHz). Each contact was worth 1.11 in sponsorship, so you can calculate the cash raised by the station.

Operating from a tent in the churchyard can be draughty. It can be sunny, like National Field Day, but you also get questions from the uninhibited about cycles and Hertz, visits from the local press and people sheltering from the rain. All in all, quite good fun. Come September 14th this year, there will be another Cycle Ride in most of the counties of England and there will be opportunity to put you local church on the air, in the knowledge that there will be others doing the same. On the day GB5CR will be on 3.5 and 144MHz and G3NMX is seeking to expand the number of active churches hopefully with local sponsorship for contacts by the station.

If 10 or 12 special event stations take part on the day, it will be worth running an award for multi-church contacts. The Association of Christian Radio Amateurs and Listeners (WACRAL) has been of great assistance in previous years and many members will be on the bands that day.

If you'd like to know a bit more, then write to Harry Hogg G3NMX, QTHR or phone him on (01491) 872919.

Lighthouse Special Event

Back on May 3, the Banff & District Amateur Radio Club held its Annual General Meeting, at which it was recognised that the club had been extremely active in the last 12 months. This is despite the fact that the club is quite small, existing in a sparsely populated area of the UK, where potential new members are few and far between. However, the commitment and enthusiasm of the existing club members ensured a successful year.

In the last year, the club competed in three h.f. contests, National Field Day, Single Side Band Field Day and The Affiliated Societies Team Contest. In addition, this year the club intends to compete in the VHF Field Day as well.

The club operated four special event stations and perhaps the highlight of the year was the operation of the special event station located at Kinnaird Lighthouse, Fraserburgh. The argument still rages today on whether it was 50 or 51 steps to the radio shack from the ground floor, however, Mark McDermott, Club Secretary of the club, reckons that while carrying a table on your back and a reel of coaxial cable gripped between your teeth, it felt like 151 steps!

The station operated over a three day period and celebrated the 208th anniversary of the establishment of the light at Kinnaird Head, which was the first lighthouse in Scotland. On the second day of operation, the Young Lighthouse Keepers Club joined and exchanged greetings with other radio operators. They also had the opportunity to practice c.w. and examine the large collection of vintage radios which the club exhibited.

As a result of the operation of the four special event stations, the other three included Banff Academy School, The 1st Banff Scouts and The Robertson Road Resource Centre, the club gained nine new Novice hands that day.

Preparations have now started on next year's list of events and on Saturday 17 August the club will be holding its annual Super Surplus Sale. This event generates a great deal of interest in the North of Scotland, because of the lack of radio and equipment dealerships in the area.

Last year, people from the Orkneys, John O'Grouats and Aberdeen attended the sale. This year the club intends to make a day of it and, after the sale, hold a BBQ and social get-together.

The Banff & District Amateur Radio Club meet every first and third Friday of the month at Banff Castle Community Centre, Castle Street, Banff at 7.30pm. Further information can be obtained from Mark McDermott GM10WIB on (01346) 561432.

Club On Net

The Bristol Amateur Radio Club have news that they think they are the first UK radio club to have a page on the Internet. If not the first, then they certainly claim to be the first to have a page of such quality! You can access it at the following address: http://www.gifford.co.uk/-passim/barc.html

As most of you will now know, I am no longer a Miss, but a Mrs! Yes, I tied the knot with my husband Ian back on the 1st June 1996. It seems like a lifetime ago already!

Through the pages of 'Club Spotlight', I'd just like to say a big thank you all for your congratulations, whether by letter (accompanied with your club programme) or by phone. Thanks very much indeed.

All that's left for me to say is keep the news and those club magazines coming!
Practical Wireless, September 1996

RSGB.

Jackson and was one time present of the
Jackson later became Admiral Sir Henry
being sponsored by the RNARS Capt.
contacts made with GBOHC. These are
There will be a special QSL card for all
except 'Top Band' f I.8MHz) and also to
to frequencies. This was an invaluable aid in
chairman, brought along his antenna
cutting a set of nested dipoles to cover the
overlooks the river Lynher and
(Saltash Community School, Weard)
The site of the special event station
estuary near Saltash. HMS Defiance was
permanently moored in the Lynher
from HMS Defiance which was formed
Devonport Naval Base.

The highlight of the weekend came when club member Colin Kenyon received his new 'A' licence through the post on Saturday, thus enabling him to use the callsign MOACJ to contact GB IOCNL. He later attended the club and made his debut at 'special eventing', in the presence of the County Senior Examiner and the West Cornwall Regional Examiner Brian Stone G4BPS and his assistant Brian Coyne G4ODY.

Carolyn Rule MOADA, who took her test at the same session as Colin and received her new callsign the following week, was also in attendance.

New Premises

The West Kent Amateur Radio Club have recently suffered a serious set-back in so much as having its meeting venue completely gutted by fire. Unfortunately a great deal of equipment was lost in the blaze, which also made the building unsafe, so it has since been demolished.

However, the club has now moved to new premises in the Church Hall in North Street (off Prospect Road) Tunbridge Wells. Club meetings are as before, on the 1st and 3rd Friday of each month with the possible exception of August.

Any visitors or potential new members will be most welcome to any of the meetings and coffee or tea with biscuits are always available. Find out more from R. J. Taylor G3OHV on (01892) 664960.

Best Stand Award

At the Northbrook Amateur Radio, Electronics & Computing Exhibition, which was held in Blackpool, the Warrington Amateur Radio Club won the best stand award. The cup was presented to Novice club member Paul Mackie 2E1EDQ by RSGB President Peter Sheppard G4EJP.

The photograph displays the new club sweatshirts which, after vetting and approval by the Warrington Borough Council, incorporate the Warrington crest with the club's name and members' callsigns.

The club meets at Grappenhall Community Centre, where members have exclusive use of a shack and every effort is made to provide a talk or other organised activity exclusive use of a shack and every effort is made to provide a talk or other organised activity every week. More information can be obtained from Ron Davies GOWJX (Club Chairman) on 01925 763447 or from John Riley (Secretary) on 01925 762722.

Full Programme For Hoddesdon

Hoddesdon Radio Club has had a very full programme this year and a recent visit by Chris Taylor from Martin Lynch was very well supported. Six members visited the Dayton rally and followed this by attending the Grand Haven Club in Michigan and the Scarborough club in Toronto.

The club is sponsored by the Indian Mowd Radio Society in Volusia County - Florida - and about 50 copies of its magazine cross the Atlantic, courtesy of the Treasurer who has a house there. Future events include a visit by AKD Products, speakers on subjects include astronomy, beer and wine making and special events. An unusual feature is the amount of ladies who attend the club on a regular basis. For further details and a magazine, contact Don G3JNJ on 0181-292 3678.

Send your club information to Zoe Crab at the PW Offices.
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It's the time of year when all budding Radio Amateurs should be thinking about enrolling on a Radio Amateurs Examination course. To help you find one in your area we've put together a list of all the RAE, Novice RAE and Morse courses that we've been told about. The list is laid out alphabetically by college or centre.

Of course, the PW list is not exhaustive and there are many courses that are not mentioned here. For details of other courses that are running this year contact the City & Guilds at 1 Gilsipur Street, London EC1A 9DD. Tel: 0171-294 2468 or FAX: 0171-294 2400.

For more information on becoming a radio amateur contact the Radio Society of Great Britain on (01707) 659015 or if you have a query regarding licencing then get in touch with the Radiocommunications Agency on 0171-215 2150. Finally, don't forget that if you need test books to supplement your RAE learning the PW Book Store stocks a comprehensive range (see pages 83, 64, 65 & 66 of this issue). To order a book use the Order Form in this issue or call the Credit Card Hotline on (01202) 65930.

Don't forget if you're unable to get to a college or centre you can contact the Rapid Results College on 0181-947 2211 for details of correspondence courses.

Rounding-Up To The RAE

Avondale Centre, Chadle Heath, Stockport, Cheshire. Morse classes commencing early September. For more information contact the Avondale Centre on 0161-427 7733 or from the course tutor G3KAF on 0161-439 4952.

Buxley College, Tower Road, Belvedere, Kent DA1 4UA. An RAE course will commence September 1996 and will consist of evening classes made up of Morse Tuition, Transmitting Theory, Operational Procedures, Licence Regulations and Short Wave Receiving. The course will run until May 1997 in preparation for the May examinations, the cost of the course will be £79 and will be tutored by Colin Turner. For more information please telephone the Guidance & Admissions Centre on (01222) 44231 Ext. 3888 and leave your name, address and telephone number so an enrolment form can be sent to you.

Bradford College, Hanson School, Sutton Avenue, Five Lane Ends, Bradford 2, West Yorkshire. A Morse course commences on September 18 for a 30 week course on Wednesday evenings from 7 - 9pm. At the end of the course candidates will have reached the 12w.p.m. Morse Test standard. The tutor will be Vicky Turner G01110 and beginners are welcome. For information on enrolling etc., call Vicky Turner on (01274) 586882.

Balweave High School, Kirkcaldy, Scotland. The Glenrothes & Tutor will be Vicky Turner. The course candidates will run on Wednesday evenings for a 30 week course on Morse. For more information please telephone the College on 0161-439 4952.

The North Cheshire District Amateur Radio Club will be running an RAE class on Monday evenings starting at 7.30pm. A Morse class will run on Tuesday evenings at 7pm, both courses start late September. For more details on either course contact Ken Horne GM3YBO on (01932) 265789 after 7pm.

Henbury High School, Whitley Road, Macclesfield. An RAE course in preparation for the May 1997 exam begins on September 10 from 7 - 9pm. Enrolment for the course takes place at the Byles Park campus from September 2. Gordon Adams G3LEQ is the course tutor and more details can be obtained from him on (01656) 652652.

Keighley College, Cavendish Street, Keighley, West Yorkshire. Commencing on Sunday 16 an RAE course will run on Tuesday evenings from 7 - 9pm. Enrolment will be in the week commencing Wednesday September 4. The course tutor will be Ralph Turner G3VRX. More details are available by telephoning (01535) 618555 or (01274) 586882.

Kinglsham Community College, Houghton Regis, Dunstable, Bedfordshire. On the September 25 an RAE course will commence for those in the Luton, Bedfordshire area. The course tutor will be G3WLM. More details can be obtained by telephoning The Manager on (01522) 868258.

Murray Park Community School, Darley. An RAE and Novice RAE course will be running during evenings starting in September. Entry takes place on September 18 & 19th and more details can be obtained by calling the Murray Park Community School on (01332) 515022 or Frank Whitehead on (01332) 512080.

Newbury Technical College, Westh缇re. On September 12 an RAE course starts and will run on subsequent Thursdays from 7 - 9pm. A Morse Code for Amateurs course to reach 12w.p.m. starts on Tuesday 7 January 1997 from 7 - 9.30pm. Contact Newbury College on (01635) 35353 or Ray Oliver G3NDS on (01672) 870892 for more details.

Tile Hill College, Tile Hill Lane, Coventry CV4 9BU. Commencing September, RAE, Novice RAE and Morse courses. Contact Mike Dixon G4GHJ on (01203) 694200 Ext. 221 for more details.

Ridge Darnyers College, Marple, Stockport, Cheshire. RAE classes commencing early September. For more information contact the college on 0161-427 2362 or from the course tutor G3KAF on 0161-459 4952.

Swindon Technical College, Wiltsshire. On September 16 an RAE course starts and will run on subsequent Mondays from 7 - 9pm. Contact Swindon College on (01793) 493300 or Ray Oliver G3NDS on (01762) 870892 for more details.

World College, Brookhill, Harrow. An RAE course of 25 lectures starts on September 25 at 7pm and will run on Wednesday evenings thereafter. The lecturer for the course will be John GAUBB. All enquiries should be made to the college on 0181-420 8888.

Wigan & Leigh College, School of Engineering & Applied Science, Parson's Walk, Wigan WN1 1RS. An RAE course in preparation for the May 1997 examinations starts on September 9. Enrolment for the course is from August 27 to 29th inclusive between 6 - 8pm. Contact Janet Jolley on (01942) 501501 Ext. 2621 for further information.

Waol College, Egham, Surrey. Morse classes commencing on Wednesday September 4 from 7 - 9.30pm. Enrolment taking place on subsequent Mondays from 7 - 9pm. Contact Mike Dixon G4GHJ on (01203) 694200 Ext. 221 for more details.

A Morse course will be running RAE classes on Sunday evenings starting on September 8. The classes will run from 7 - 9pm with enrolment taking place on September 8 or any Sunday thereafter. Further details from Gordon Adams G3LEQ on (01565) 652652.

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Weald College, Bexley College, Kent Education College, Drookshill. Harrow. An RAE course of 25 lectures starts on September 25 at 7pm and will run on Wednesday evenings thereafter. The lecturer for the course will be John GAUBB. All enquiries should be made to the college on 0181-420 8888.

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So, what are you waiting for? Look at our list, pick a course and make sure your name is among the next batch of new licensees!
Have you ever felt that building a decent quality s.s.b. transmitter was probably rather difficult? Well the PW Rugby (named after the famous i.f. transmitter just up the A5 road from the old BBC short wave transmitter which has now closed down) sets out to dispel any such thoughts.

The PW Rugby is a straightforward transmitter and is constructed on a single printed circuit board (p.c.b.) and provides up to 10W p.e.p. output. You could get on the air with both s.s.b. and c.w. and enjoy the satisfaction of running home brewed equipment.

The Rugby has a front panel power control for c.w. So that you can run at true QRP levels, or a little higher for difficult conditions.

In use, the Rugby can be tuned either by a v.f.o. (not on the p.c.b.) or via a simple interface (to be described in a following issue) from the companion Daventry receiver. This gives transceive operation.

Altogether the Daventry receiver and Rugby transmitter provide a very fine rig for the serious QRP operator. Its 10W peak envelope power (p.e.p.) s.s.b. and 5W c.w. being the power limits for G-QRP club awards.

Mobile & Portable

Operation is from a nominal 13.8V d.c. supply, so the Rugby should be ideal for mobile and portable operation as well as the home station. Good S9 signal reports can quite easily be achieved with 10W and a decent mobile whip antenna on 7MHz. This is true even if the mobile whip is just mounted on a ground post in a small garden - as I can verify from personal experience.

There’s no large collection of ‘bells and whistles’ on the Rugby. But the circuitry is designed to provide a good quality, clean signal with repeatable results without the need for any fancy test equipment or high levels of technical skill.

Extras such as speech processing and Morse side-tone can be added quite readily, if you wish.

The Prototype

When I built the prototype I decided that I would like the Rugby to be housed in a slim case to sit underneath the Daventry receiver. It should therefore have the same ‘footprint’ as the Daventry and should bring its main tuning knob up to a more convenient height above the bench.

In effect, the transmitter unit ‘doubles-up’ as a stand for the receiver. This design requirement more or less determined the size of the Rugby p.c.b. The power level and the tuning arrangements were specified by the Editor, so all I had to do was come up with the circuitry!

As the Daventry receiver has a fairly high standard of spurious signal rejection, I felt I should stick to good figures for the transmitter too. So, 60dB down for spurious mixing products and 50dB for harmonics seemed like sensible numbers to aim for. The finished prototype met these without any problem.

Slim & Compact

As you can see from the heading photograph, the Rugby is quite slim and compact, without the p.c.b. being too crowded. There are only two front panel controls for the transmitter, c.w. power level and a c.w. transmit switch.

To transmit on s.s.b. you simply push the push to talk (p.t.t.) button on the microphone. There are no controls for this mode, the microphone gain is a preset control on the board. The third control on the front panel is the Independent Receiver Tuning (IRT) control for the Daventry.

You may wonder why the IRT was not on the receiver – the answer is simple. I did not know that the
magazine was going to commission a companion transmitter when I was asked to do the Daventry design!

Anyway, there are fewer controls on the transmitter. So from this point of view it makes more sense to have the IRT on this unit.

A five pin DIN socket on the back of the case takes care of all transmitter/receiver interconnections apart from the antenna feed. This is handled by a couple of SO239 sockets on the back of the unit with a relay switching the antenna over on change-over.

Standardising on SO239 r.f. connectors throughout a station has its benefits. But you must make sure you do not plug the receiver’s input into the transmitter’s output by mistake!

Circuit Description

The PW Rugby transmitter produces its s.s.b. signal by the ‘filter method’. In effect it’s virtually a mirror image of its companion ...the PW Daventry superhet receiver.

In the receiver, the 7MHz r.f. signal is filtered and converted to an intermediate frequency of 10.7MHz. It’s then passed through an s.s.b. filter, amplified and filtered to drive the antenna. (Well that’s what happens in simple terms – the process probably warrants a little more detailed explanation!)

There are also side issues. These include such as how to time the transmit/receive switching so that there’s no momentary ‘howl-round’ on change-over.

Audio Stages

Let’s now take a look at the audio stages. And I’ll start with the microphone input which is designed to suit a typical low impedance fist microphone.

Audio input from the microphone is filtered to remove any r.f. that it may have picked up by C1, R1 and C2. The audio is then amplified by Tr1, Tr2 and Tr3 to a suitable level (this is adjustable by the Mic gain preset control, R7) to drive the MC1496 double balanced modulator (IC1). The other input to the modulator is from the 10.7MHz crystal oscillator. Tr6. The output of IC1 is therefore a double sideband signal at 10.7MHz.

The balanced nature of the modulator cancels out most of the signal’s carrier (fine balance adjustment is provided by the preset, R32).

The signal is then passed through the crystal filter to remove one sideband (and a bit more of the carrier), leaving a proper s.s.b. signal on the filter’s output. It’s the upper sideband (u.s.b.) that’s selected by the filter because the signal frequencies are inverted to lower sideband (l.s.b.) later in the circuit when they are mixed down to 7MHz.

Mixer & RF Stages

Now it’s on to the mixer and r.f. stages. The u.s.b. signal is amplified by Tr7 and passed on to the mixer, Tr8 for conversion to the 7MHz band. (The other input to Tr8 is either derived from a separate v.f.o. or from the companion Daventry receiver for transceive operation).

The tunable signal at about 17.7MHz mixes with the 10.7MHz signal to produce the 7MHz output (17.7 - 10.7 = 7). Unfortunately, mixing processes always produce many other spurious products in addition to the one you want.

However, a careful choice of i.f. and v.f.o. frequencies helps to minimise the ‘sprogs’. In this respect the Rugby is pretty good. Good enough in fact, that a simple unbalanced mixer can be used, rather than a more complex double balanced device that would be needed with many other frequency schemes.

Despite what I’ve just said, the
mixer output still needs to be cleaned up somewhat. And four parallel tuned circuits with just the right amount of intercoupling achieve this.

The signal is now on the frequency band we require, with a spectral purity we can be proud of! All that remains is to boost the signal to the desired level, but making sure we don’t add too much distortion in the process!

**Driver Stages**

All the driver stages (Tr9 to Tr11) operate with plenty of r.f. negative feedback and standing current to ensure good linearity. The negative feedback also helps to reduce the gain variation between individual transistors.

The p.a. transistor, Tr12, operates with only a small quiescent current to keep the current consumption and heat dissipation reasonable. The bias current is stabilised for transistor temperature changes by the diode, D11, in thermal contact with the device.

Again, some r.f. negative feedback is employed to give some control over the p.a. stage’s gain and to improve linearity. The gain of this stage, and hence the output power level, can be altered a little by changing the value of R70.

The 100Ω component listed in the circuit will probably give a little less than the maximum 10W r.f. output. A slightly higher resistance will reduce the feedback and increase the power. However, the output power should not be raised above 10W, as this would overrun the transistor.

Impedance matching to the p.a. stage is provided by transformers T1 and T2. These transformers are of far less critical design for this 7MHz application than they would be for broad-band or higher frequency use.

You should be able to use almost any type of ferrite cores designed for h.f. bands p.a. use without too much performance variation in this circuit. Out of interest I tried some single hole p.a. beads, and they worked quite well.

**Note:** You must be careful to get the direction (phase) of the windings correct though. Again the p.a. r.f. choke, L14 is not very critical. Various ferrite core types could be tried.

**Transmitting CW**

When switching to transmitting on c.w., one of the two 10.7MHz carrier oscillator trimming capacitors, C18 is switched out of circuit. This is carried out by the action of D3 being turned off (via Tr4 from the c.w. TX terminal).

Switching off D3 brings the carrier frequency up by a nominal 800Hz. This provides the c.w. beat note and also brings it into the pass-band of the crystal filter.

Grounding of the c.w. TX terminal...
also turns on Tr5. This feeds current (the amount determined by the CW Power control, R25) through to unbalance the balanced mixer, IC1. This allows the carrier signal through, instead of suppressing it, as it does in s.s.b. transmission.

To prevent audio from the microphone modulating the transmitter whilst on c.w., the microphone amplifier is grounded. This is done at the AF Mute (Audio Frequency Mute) terminal by a set of contacts on the c.w. TX switch.

Crude but effective! It should save the embarrassment of being heard cursing your sending errors by anyone listening in a.m. mode!

**Transmit & Receive Logic**

Switching from receive to transmit and back again is not quite as simple as just pressing or releasing the button on a microphone may indicate. A number of technical things have to happen, and happen in the right sequence, if nasty noises are to be avoided!

If the transmission overlaps with the reception at all, you will certainly hear unwanted effects! It's also not a good idea for the transmission to either start or end with a momentary disconnection of the antenna. (p.a.) transistors tend to fail after a while if this happens.

The logic on the Rugby p.c.b. (Tr13 through Tr16) ensures that there's plenty of time for the receiver to mute, and that the antenna is switched to the transmitter's output before the transmission starts. It also ensures that the antenna is not switched away from the transmitter until the transmission is over.

You'll see from the circuit diagram that the antenna relay is fitted before the output filter so that the filter is also in circuit on receive. This adds to the front-end selectivity of the receiver (already very good if you're using the PW Daventry), but useful with many of today's wide-open receiver front ends.

If you find the transmit delay is a little long for your needs it can be adjusted. Reducing the capacitance of C68 will speed it up.

All in all, the Rugby is quite a straightforward transmitter, but it does have a reasonable level of technical sophistication. I hope its provision of s.s.b. as well as c.w. makes it a tempting enough project for you to think about clearing a small space on the bench, and getting the tools out!

So, get the tool box out and dust them off. Next month I'll describe the construction stages of the project and present the p.c.b. designs.

**Fig. 3: Transmit amplifiers, p.a. output filter and p.t.t. logic.**

**PART 2 CONTINUES NEXT MONTH**
Following several years of negotiation by the Radio Society of Great Britain (RSGB) the Radiocommunications Agency (RA) are now prepared to allow operation on a new low frequency (l.f.) amateur radio band.

The intention of this article is to make you aware of the terms and conditions under which the authorisation is issued. I'll also be covering the types of propagation modes and the typical communication distances that can be achieved.

And I'll also be giving you an introduction to the type of practices and techniques you will need to adopt for successful contacts on this new l.f. band.

Readers of my regular ‘VHF Report’ column may question why (and with what authority) I’m writing an article on the low frequency bands. But there’s no need to worry! Professionally, I was previously involved with low frequency r.f. engineering. Fortunately, I retained some of my previous links with engineers still working in this area of the spectrum and was able to quickly get back up to speed!

You can get going on l.f. with the Datong VLF converter (see text) and explore the new 73kHz band.

Authorisation to use the band is via a Notice of Variation (NoV) and will only be granted by the RA to Class A Amateur Radio licensees. Permit holders may use any mode of operation provided they stay strictly within the 2.8kHz wide band and do not cause interference to other users.

The NoV permits a maximum power level of 0dBW (1W) effective radiated power (e.r.p.) at the main address. Operation is allowed from a temporary location provided 7-days written notice is provided to the district Radio Investigation Service (RIS) Office. However, no mobile or maritime mobile operation is allowed.

Operational Problems

One of the operational problems that may be encountered on 73kHz is that there is, as yet, no harmonised l.f. amateur radio allocations. Two years ago an International Amateur Radio Union (IARU) paper suggested a shared allocation somewhere in the region of 190kHz.

In France, the national amateur radio society (REF) have recently been conducting experiments at 143kHz. They are proposing (as expected) a common European frequency around 143-144kHz.

Early this year there was a proposal to adopt a European Conference of Postal and Telecommunication (CEPT) administrations allocation around 140kHz. But this was rejected at a meeting in February.

However, it was agreed to consider (at its meeting in September) the possible use of either 132-140 or 148-149kHz. In the meantime the RA are issuing NoVs for the 73kHz band but there is a possibility that these may be withdrawn if a harmonised CEPT allocation is agreed in the future.

Process Applications

The RA have asked the RSGB to process and vet all applications for a 73kHz NoV. The appropriate form should be requested from: The Chairman, HF Committee, RSGB, Lamberts House, Cranborne Road, Potters Bar, Hertfordshire EN6 3JE.

On receipt of the form, you need to provide details of name, callsign, main address and whether you intend to operate from a temporary location. You also need to give details of transmission modes you are going to use and background information explaining the reason for the application and the intended uses of it.

The application is then forwarded to the HF Committee (via RSGB HQ) who consider the application before passing it through to the RA to issue the NoV.
The low frequency part of the Practical Wireless, September 1996 associated with propagation effects. Another aspect of l.f. propagation. Clearly an interesting and developing underground communication is transmission through solid rock. The antenna is eminently suitable for distance communication, this type of permeation through the ground by transmission from underground caves.

Frankly I was surprised at the level of interest in the underground operation. But after a little investigation it does seem that a small, but significant, number of experimenters are interested in this technology.

Indeed, there is already one society (Ref.1), the Cave Radio and Electronics Group (CREG). It's been formed for these enthusiasts.

The society, associated with the British Cave Research Association (BCRA), publish a quarterly journal. This includes details of latest radio system developments, meetings and local contacts.

Communications Underground

The use of l.f. is uniquely appropriate to caverns and those that wish to experiment with communications underground through rock. The practices are very different from those associated with long distance propagation.

The antennas used are based on magnetic induction techniques. And although not suitable for long distance communication, this type of antenna is eminently suitable for transmission through solid rock. Underground communication is clearly an interesting and developing aspect of l.f. propagation.

Another area that will provide considerable interest will be that associated with propagation effects. The low frequency part of the spectrum has characteristics quite unlike those of higher frequencies. Listening to other l.f. stations can be very rewarding. You'll find there's a remarkable correlation between the performance of these signals and propagation in the lower h.f. and v.h.f. range.

For example, stable amplitude and phase of signals (quiet conditions) are indicative of good transatlantic propagation on the 1.8 and 3.5MHz bands. Similarly, other known changes in the characteristics of l.f. signals will provide indications of auroral or Sp-E conditions on the v.h.f. bands.

Indeed one of the reasons I gave when applying for my NoV was to investigate propagation effects at l.f. and to make practical observations of D-layer enhancement following solar flare activity!

Earthquake Activity

It's interesting to note that in the United States some researchers use l.f. beacons (and other activity) as an aid to identifying precursors to earthquake activity. The monitoring of radio stations have detected frequency deviations and other electromagnetic anomalies before such events. Now I'm not suggesting in any way that this will be of use in the UK but you never know!

Other fields of investigation will include antenna design, new transmission techniques and receiver and transmitter development. And of course there's also the challenge of achieving long distance communication using inefficient, physically small antennas.

The 'challenge' is similar to the 'Everest effect'. You do it, not because it's easy, but because it's there! So as I've just described, the 'use' of an l.f. allocation can indeed be as diverse as many of the facets of amateur radio itself.

Propagation Modes

Before I describe the propagation modes involved, it will be useful to ascertain exactly where in the spectrum the l.f. band is situated. I've shown this in Table 1.

Depending on the frequency band, radio waves may be propagated through or along the surface of the earth, through the atmosphere or by reflection or scattering from natural or artificial reflectors. At e.l.f. and v.l.f., ground waves are propagated between the surface of the earth and the D-Layer for distances of several thousands of kilometres. This is often referred to as the earth-ionosphere waveguide mode.

At these very low frequencies the signals will penetrate into the ground, in some circumstances for hundreds of metres. At higher frequencies, the ground wave losses are so great that signals are generally propagated for only a few hundred kilometres.

Propagation at m.f., 1.8 or 3.5MHz consists of either ground wave or under certain conditions an ionospheric wave (sky wave) reflected from an ionised layer. The new 73kHz band lies in a 'no-man's-land' between v.h.f. and m.f. and will at times exhibit a mixture of propagation modes, both ground wave and sky wave.

Normally the only area of the ionosphere which will have any influence on propagation is the D-Layer. At 50-90 kilometres above the earth, this is the lowest of the ionospheric layers and exists only during daylight hours. The D-Layer

<table>
<thead>
<tr>
<th>Description</th>
<th>Abbreviation</th>
<th>Frequency</th>
<th>Wavelength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely Low Frequency</td>
<td>e.l.f.</td>
<td>3Hz-3kHz</td>
<td>100,000-100km</td>
</tr>
<tr>
<td>Very Low Frequency</td>
<td>v.l.f.</td>
<td>3-30kHz</td>
<td>100-10km</td>
</tr>
<tr>
<td>Low Frequency</td>
<td>l.f.</td>
<td>30-300kHz</td>
<td>10-1km</td>
</tr>
<tr>
<td>Medium Frequency</td>
<td>m.f.</td>
<td>300kHz-3MHz</td>
<td>1km-100m</td>
</tr>
<tr>
<td>High Frequency</td>
<td>h.f.</td>
<td>3-30MHz</td>
<td>100-10m</td>
</tr>
<tr>
<td>Very High Frequency</td>
<td>v.h.f.</td>
<td>30-300MHz</td>
<td>10-1m</td>
</tr>
</tbody>
</table>

Table 1: Showing bands, terminology and frequencies.
The Low Down on 73

reflects v.h.f. and l.f. waves, absorbs m.f. waves and weakens h.f. waves through partial absorption.

Important Factor

Although the propagation mode is of course a very important parameter in the ability to work long distances, there is one other factor associated with l.f. working that has probably an even greater influence. This is associated with the reception of natural noise, consisting of thermal noise, atmospheric noise and cosmic noise.

Of the sources I’ve mentioned, it’s atmospheric noise that has the greatest effect on the low frequency bands. In addition to this natural noise, consideration must also be made of man-made noise.

In general, man-made noise levels increase with decreasing frequency, although a specific source may not comply with this general rule. These noise sources usually determine the minimum detectable signal level in any receiver.

At v.h.f. and h.f., the ambient noise levels correspond to noise figures of typically 3-20dB. However, at l.f., atmospheric noise is dramatically higher, corresponding to noise figures of typically 90-150dB!

Hence, unlike v.h.f. operation, low noise amplifier performance is not usually a factor in the design of l.f. receivers. (Unless you live in the Arctic or Antarctic where atmospheric noise is extremely low).

The Antenna

It’s conventional amateur radio practice to use the same antenna for both transmitting and receiving. However, for operation on the 73kHz band this is not necessarily correct.

In the case of a transmitting antenna it’s true to say that a large, efficient antenna is always the best r.f. ‘amplifier’ you can get. On receive however, it’s a completely different matter.

Because of the inherent background noise at l.f. the task of a receiving antenna is not to produce a large signal but to produce a signal that has the greatest possible separation from the interference.

Given the high noise levels a very inefficient antenna, of only a few metres in length, will let atmospheric noise limit the receive sensitivity. Indeed, one of the penalties of using a ‘large’ transmitting antenna on receive is that the combined signal plus noise level is often too high for the receiver. This can cause overload problems requiring the use of attenuation ahead of the receiver input.

A suitable choice of receive antennas could be a frame antenna loop antenna (20 turns of wire on a 1 x1m frame tuned by a 1000pF variable capacitor) or even a length of wire a few metres above ground strung around a fence.

An active antenna using a short whip about 1m in length could also be used. This type of antenna incidentally consists of a short element with (normally wide-band) pre-amplification located in the base assembly. The advantage is that, being small, the antenna may be located in a preferred ‘quiet’ location away from interfering fields.

Operators who use the 1.8MHz band will need no reminding of the Beverage antenna which was originally designed for v.l.f. reception. It’s simplest form consists of a very long straight wire, mounted between 1 to 4m above ground, and terminated at the far end.

The Beverage antenna is an excellent receiving antenna. But you do need some ‘real estate’ (a lot of space!) to take full advantage of its low-noise and directional characteristics.

Problem Wavelength

For transmission, an efficient antenna is essential, the only problem is that at a frequency of 73kHz, the wavelength is 4.1km! This means that (for those of you struggling with

Continued on page 33

Suggested Reading

Antennas and Techniques for Low-Band DXing by John Devoldere ON4UN, Published by the ARRL.

VLF Radio Engineering by Arthur Watt. Published by Bell & Bain Ltd. 1967. (Out of print but highly recommended. Try your local library, they may well be able to get you a copy).
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W-30A 30 Amp 15V variable £119.95

FT -736R Fitted 2m & 70cms + 6m!
By Steve Locke GWOxG

Busy h.f. operator
Steve Locke GWOxG
has been trying out a
new version of a
popular vertical
antenna...very much
to his advantage!

Well Packaged
When it arrived, the first thing I
noticed was that the antenna was
well packaged. The entire contents
were enclosed within air - spaced
polythene wrapping, no doubt in
order to protect the aluminium
sections from the rigours of
transportation!

I decided almost immediately to
erect the antenna. Such was my
impatience to get cracking on
7MHz!

I found the antenna's double-
paged instruction booklets easy to
understand, with very detailed
diagrams. Everything was described
or shown in detail, right down to the
last nut and bolt, which no doubt
would be of great assistance to those
who are not so good at reading
diagrams, such as myself!

The antenna itself was even
supplied with warning labels for
overhead power lines. Also included
was a small sachet of grease for
sealing purposes, and even a small
rubber seal to cover the PL259 where
it connects to the antenna.

I was also supplied with a glossy-
finish information sheet, which gave
details of expected s.w.r. readings on
all bands. It covered the 7 - 28MHz,
(including WARC bands), and included close up photographs of the
R7000 matching network, and the
specifications.

Assembling The Antenna
Although I've never assembled a
vertical before, it took me just 40
minutes to finish assembling the
antenna itself. This operation, thanks
to the clear instructions, was quite
straightforward.

All the traps were marked clearly,
C1, C2, C3, etc., and were described
as 'slim silhouette cylindrical type'.
All materials used had that 'good
quality' feel, even down to the
stainless steel base screws.

The aluminium tubing used by
Cushcraft has double walls for extra
strength. Cushcraft also claim that
the antenna 'can stand up to 80 mile-
per - hour winds' (according to the
glossy information sheet which was
supplied). I must say that I found the
antenna heavier than I had expected,
(weight was
actually stated as
8.2kg).

I had also expected the antenna to lean
one way or the other when erected.
However, when I
came to install the
antenna, it sat at 90°
dead atop my tower
with help from my
friend Frank.

On The Air
After installing the R7000, I
connected it to my main transceiver,
a Kenwood TS - 940S and was ready
to go on air. Preliminary checks of
the s.w.r. revealed that the standing
wave ratio on the whole was
excellent, and the highest reading I
encountered was that of 2.5:1 on the
14MHz band.

On all other bands, the readings
varied between 1.1:1 and 1.6:1,
depending on what segment of the
band I was on at the time. It was in
fact, better than stated in Cushcraft's
own information sheet!

The good results more than proved
that the Pi - matching network does
indeed work very well! In fact, the
only band where I was required to
use the tuner was on 14MHz, and
then only if I ventured into the s.s.b.
section!

At this point, it may be worth
mentioning that I was initially very
impressed with the drop in
background noise level on the R7000
compared to my trap dipole on 7, 18,
and 24MHz. I have suffered to varying degrees with local background noise, sometimes up to S5, particularly on 7MHz.

Using the R7000, I discovered that the background noise had dropped significantly, to a mere S1. This of course, made operating on 7MHz much more pleasant, and certainly easier on the brain!

**Most Challenging**

I first used the R7000 on the band when I consider to be the most challenging from my point of view - 7MHz. Not having been a great user of this band, but having heard so much about the DX possibilities here, I was looking forward to putting the R7000 through its paces, both on s.s.b. and c.w.

On 7MHz after turning up, the DX conditions started to flow the GWOSGL way, especially on c.w. It provided me with many new DXCC countries on this band.

My total score on 7MHz while using the R7000 was 102 countries. These included: Australia, Saint Pierre and Miquelon Island, Guadeloupe, French Martinique, Brazil, Argentina, Azores Islands, Tanzania, Malaysia, Trinidad South Africa, Mongolia, and numerous European countries, which gave me WAC (Worked All Continents) in about three days!

Operation during daylight hours on 7MHz showed that the R7000's low angle radiation was more suited to DX work than 'inter - UK'. These signals at this time of day were at higher levels on my dipole antenna, but nevertheless, the R7000 still performed adequately enough for lengthy short - haul ragchews.

All told, my view of the R7000 on 'forty' is that it is an excellent DX antenna. It will, beyond the shadow of a doubt invariably suit the amateur who is restricted to a very small garden. As a vertical, the antenna requires very little space. And you could, in effect, actually locate it in the corner of your back yard!

As a DX antenna, it has great potential. As one who has solely relied on horizontal antennas, be they beams, long wires, dipoles, etc., I'm personally extremely impressed with the R7000. Not only as a DX antenna, but also with the standard of workmanship, ease of assembly, and erection.

I would have no difficulty in recommending the antenna to anyone, after using it myself. Indeed, I intend to purchase an R7000 to compliment my existing array of antennas, particularly for use on 7 and 18MHz. My only regret is that I've got to send this one back!

My thanks go to Waters & Stanton Electronics of 22 Main Road, Hockley, Essex SS5 4QS. Tel: (01702) 206835, FAX: (01702) 205843 for the loan of the review antenna which costs £399, plus £7 P&P. There is also an 3.5MHz add-on kit available, the R30, for £129.

**Countless Contacts**

On 10MHz the antenna performed equally well, giving me contacts with no less than 32 countries, with countless contacts with North America. Additionally, I managed some very good QRP (the little 'p' means less than 1W) contacts all over Europe during late afternoons and early evenings.

My 14MHz operation proved just as rewarding. Although I must admit, compared to my Hy-Gain TH7 -element tribander it was approximately 3 to 5 S points lower on all contacts.

I know that my comparison is unfair, as most stations on the h.f. bands use horizontal polarisation and there being a resultant loss of signal between vertical and horizontal antennas. Despite this I still feel that my findings are worth mentioning.

Having compared the vertical and the beam, I should mention I still worked all continents on 14MHz. I also worked 79 DXCC countries on both c.w. and s.s.b., although to be fair, I didn't operate on this band a great deal.

Countries worked on 14MHz included South Africa, USA, Senegal, Taiwan, China, Sri Lanka, Nepal, Chad. I also worked all over Europe, Australia, Japan and many others, mostly with good copy depending on prevailing propagation conditions.

I feel that its also worth mentioning that the background noise level on the 14MHz band (I do unfortunately, live in a very noisy r.f. environment) was considerably lower than I find while using my beam antenna. A vertical such as the R7000 may be the answer for many amateurs who, like myself, find themselves in noisy areas as far as r.f. is concerned.

**The 21MHz Band**

On the 21MHz band, despite the current low sunspot count, I managed to work a total of 28 DXCC countries using the R7000. These included Tanzania, Ghana, Zimbabwe, Cura, many EUs, the USA, and Anguilla amongst others.

Although signals on 21MHz were pretty mediocre most of the time, the R7000 coped very well. Even to the extent that American stations running up to 1kW who I received at S6, gave me reports of up to S9! I found this astounding, considering that when I operated on the band, openings of any significance were very few and far between!

**On 18MHz**

Along with 7MHz, another of the bands I looked forward to operating on was 18MHz. My TH7 beam antenna does not operate here, so reviewing the R7000 gave me a great opportunity to explore this band!

At first, I thought the band was dead. Very few signals were apparent, and those that I heard were very low in strength.

However, upon giving a long 'QO' call, I was immediately answered by a station in Anguilla! This heralded the onset of a long period of operating on 18MHz, often burning the midnight oil, especially working North American stations well into the early hours.

My expectations of the R7000 were far exceeded on the 18MHz band (to say the least!). Total number of DXCC countries here, using the R7000, stood at 35.

On the two highest h.f. bands, 24 and 28MHz, the R7000 worked well. But I must say that conditions, particularly on 28MHz, were far worse favoured only European contacts.

At the time of writing, it was the Sporadic 'E' season after all. And although I worked many EUs on both bands, I cannot at this stage give an opinion of the R7000's DX capabilities on 24 and 28MHz. That side, if the antenna performs as well on these two bands as it does on the others I've described, it will surely be a good antenna for DX on both 24 and 28MHz.

**Excellent DX Antenna**

My overall view (as you're probably guessed from the nature of this article) of the R7000 is that it's an excellent DX antenna. It will, beyond the shadow of a doubt invariably suit the amateur who is restricted to a very small garden.

As a vertical, the antenna requires very little space. And you could, in effect, actually locate it in the corner of your back yard!

As a DX antenna, it has great potential. As one who has solely relied on horizontal antennas, be they beams, long wires, dipoles, etc., I'd have no difficulty in recommending the antenna to anyone, after using it myself. Indeed, I intend to purchase an R7000 to compliment my existing array of antennas, particularly for use on 7 and 18MHz. My only regret is that I've got to send this one back!

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Trials & Tribulations
Of the RAE

By Patricia McVey G0PXJ

The article 'Move Over Darling' which appeared in the November 1994 issue of PW caused a certain amount of amusement in our QTH. There are many memories of the trials and tribulations of trying to come to grips with the basics needed for the Radio Amateurs Examination. It's a wonder the ON has any hair left after some of the frustrating hours spent with me trying to sort out the various components and their uses, (easy for him who had been using them for many years!).

Some of the exasperated expressions on his face were a sight to behold. But not being able, over the years, to join some of the very interesting conversations I was hearing, it was a case of getting stuck in so that I could be a part of all that was going on. 'Weaned over' I wasn't, left out and noisy I am!

Then came the c.w. which was definitely not fun, and trying to be dedicated and get the stuff under my belt. I decided to take all the necessary gear on holiday one year. My advice is don't!

Have you tried explaining to the security staff at an airport what an electronic Morse processor is and why you are carrying it around along with blocks of paper, various tapes and assorted pens and pencils? If you weren't going increasingly mad before you got to the airport, you were certainly well on the way afterwards!

Make My Mark

Having, as I thought, got the difficult bit behind me and a place in the 'A' team, I was all set to make my mark on the h.f. bands. I was wrong!

No one told me that the RAE was the easy bit and there was a great deal more to learn. I had not taken into account my husband's many years of 'hamming' (some 40 something years) and his insistence that I should get it right and sound like a 'proper' operator.

There followed a good many hours of further instruction on how to use and make the best of his equipment. How to use the a.r. and how to adjust the antenna (not an aerial as I thought?), how to tune the bands and home-in on other stations, how to use the transceiver facilities properly and how to make CQ calls on h.f. which, as we all know, are somewhat different to 144MHz CQs. All perfectly reasonable and proper, but frustrating when you're raring to go.

Right, he is now satisfied that I am coming to grips with all the knobs and levers and allows me to push the button. I am actually operating h.f. at last and having a great time. It really is a case of 'Move Over Darling'.

Change Transceiver

The first one in the shack gets to use the equipment. But then, (you've guessed it!) he changes the transceiver and I have another set of knobs and levers, bells and buttons to contend with!

One thing he didn't tell me, however, was how to locate the antenna to the DX station at the drop of a hat. Listening for the DX station to give their callsign sometimes takes a little while and that is when you can understand what is going on under the near hysterical calls from the pile-up.

Then a frantic look in the book to see 'which country', (assuming you hear a callsign), a further more frantic look at the great circle map for the best path, swing the beam and lo! he/she has gone. I haven't yet been able to home-in with the same speed and savour-fate of which he is capable and have consequently often missed a 'good one'.

Never mind, they are coming gradually. I have managed enough QSOs to obtain various awards including DXCC. But I have to confess that the impetus for award collecting has somewhat diminished lately.

Costly Activity

I fully understand that QSLing is a costly activity and for each station I really want an s.a.e. complete with 'green stamps' (US Dollar Bills) and/or IRCs is always sent, but there are many instances when a reciprocal QSL card is not returned. What do these stations do with the IRCs and dollar bills I send?

Then there are the occasions when all the conditions for an award are fulfilled, application sent together with the required amount of payment and no award is forthcoming. Reminders are sent to no avail and the award issuing authority does not even have the courtesy to send a postcard advising non-receipt or that you are the 47000th in line!

One of these days I might consider applying for my DXCC certificate, but I need to be more hopeful of a reaction than I am at the moment. This is my gripe for 1996, annoying but not important.

Marvellous Hobby

Having overcome the frustrations of the RAE and ignoring those of QSLing, amateur radio is a marvellous hobby, it's a great leveller of people, from highest to lowest. You never really know who you are talking to and it's well worth all those headache pills I had to buy!

I hope all the newcomers to amateur radio have the same amount of fun as I do. And to anybody who is thinking about it, I would say take the plunge and 'go for it'.

Patricia McVey G0PXJ

Looking for her own efforts, with the basics needed for passing the RAE.

Practical Wireless, September 1996
This month the Rev. George Dobbs G3RJV describes a variable crystal oscillator and a band-pass filter unit suitable for use with his 'Utility Receiver Board' and other applications.

It's amazing how many times the same circuit elements come up when I am testing new projects on my bench. To that end I keep a few utility circuit boards which can be quickly lashed into place until the final design takes shape. It saves a lot of time in the early stages of trying out new ideas.

Of their nature, these circuit boards are a simplification and compromise, but they can provide a rule of thumb guide before the tailored final circuits evolve. (Although it's not unknown for them to become the final circuit!).

Last month I described a 'Utility Receiver Board' designed to be an item of test equipment for monitoring signals. My version was driven by a signal generator to provide a simple monitor over a wide range of frequencies.

The board described last month is actually a direct conversion receiver, so it requires a local oscillator (LO) at the frequency to be monitored. My original use was monitoring signals from a single sideband (s.s.b.) generator at 9MHz. I found that the best way to provide a stable signal for the local oscillator was to build a simple variable frequency crystal oscillator (VXO).

**Utility VXO**

The circuit in Fig. 1, shows the 'Utility VXO', a variable frequency crystal oscillator built around a bipolar transistor. I used a BC108, but any similar transistor would serve the purpose.

A single feedback capacitor, 100pF, is used on the oscillator between the emitter and base. The output is taken from the base via a trim-pot to adjust the level.

The frequency is determined by the crystal. Placing a variable capacitor in series with the crystal will viarably shift the frequency upwards with the added capacitor.

Introducing some inductance in series with the coil and capacitor further increases the variable range. It can shift the frequency from slightly below to a little above the crystal frequency.

With a little care in choosing the variable capacitor and inductor a very useful swing of frequency can be attained. My variable capacitor was a scrap Polyvaricon which seemed to show a capacitance of something under 80pF on a capacitance meter.

This version of the oscillator, when used with a 9MHz crystal produced a swing between 8.9959 and 9.0020MHz. Enough to monitor both sidebands from my s.s.b. generator.

I also tried the oscillator with crystals in the 7MHz amateur band and again a useful swing was available. A 7.025MHz crystal could be made to oscillate in the range 7.0237 to 7.0283MHz. Attaching this to the utility receiver board can make a simple receiver to monitor the 7MHz band.

**Bandpass Filter**

The utility receiver board described last month has no input tuning. An add-on bandpass filter would be very useful if it's to be used to listen to radio signals and would also be helpful in its test equipment role.

I've shown the circuit of a variable bandpass filter in Fig. 2. With the values shown this filter tunes from about 3 to 15MHz which represents quite a useful range for many applications.

The filter consists of two tuned circuits (T1/C7a and L2/C7b) loosely 'top coupled' with a small value capacitor, C1. The inductors L1 and L2 are handwound on T50-2 toroid cores.

Inductor L1 has a link winding which offers a low impedance input. The other inductor, L2, offers a medium to high output impedance which will match the utility receiver or other input circuits.

Both tuned circuits are tuned by a ganged variable capacitor of the Polyvaricon type often found in scrap medium wave (often referred to as a.m.) transistor radios. These radios are readily available on the surplus market, from major component mail order houses or could be culled from junk boxes. The values of the larger ganged pair of capacitors, designed for medium and long wave tuning, are usually in the order of 200 to 250pF.

Although the filter is by no means the ultimate in bandpass selectivity, it's as good as many modern wide coverage synthesised receivers and transceivers!

Using the VXO above on 7MHz and the bandpass filter, I managed to achieve quite reasonable results with the utility receiver board. Both the...
VXO and the Bandpass Filter boards would make useful little circuits for other applications.

**Ugly Style**

I built the VXO and bandpass filter circuits using the 'ugly' style (as illustrated last month) on small pieces of blank printed circuit board material. This follows the usual convention of using the grounded components as anchor points for the other components in point to point construction.

'Ugly' construction calls upon a little ingenuity from the constructor. But the general idea is to follow the circuit connections. Have a go… it works!

**Selection Of Crystals**

I happen to have a selection of amateur band crystals which come of having built a whole range of simple QRP transmitters. I tried crystals for the 3.5, 7 and 10 MHz amateur bands with the Bandpass Filter board and managed to produce a quite decent receiver with the Utility Receiver board.

What's more to the point, is that using a 9 MHz crystal and the Bandpass Filter board, I was able to monitor my 9 MHz s.s.b. signals very well with the receiver. I've also used the bandpass filter in conjunction with an r.f. signal generator to monitor signals from home built oscillators.

Put these little boards on the shelf and pull them down when you need them. You won't be disappointed you made them!

PW

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**References**

(1) Details of CREG can be obtained by sending a 9 x 4in s.a.e. to: Mike Bedford G4AEE, 4 Holme House, Oakworth, Keighley, West Yorkshire BD22 0QY. Alternatively you could try their Web site at: http://www.sat.dumlee.ac.uk/~arb/creg/

---

**Low Down on 73, continued from page 26**

In the example I've quoted you would need to run 10W output to achieve UBW e.r.p. But there's no way you'll ever have an antenna that large.

A bit more practicable might be a 10m high tower but even so this would only have an efficiency of about -50dBd. (Now where can I find a 100kW amplifier to drive it?) Perhaps the BBC will let me use their Droitwich 198kHz transmitter?

In practice, the space limitations of most domestic situations will make it difficult to achieve as much as a few milliwatts of effective radiated power. Even when you're running many hundreds of watts input.

**Mode of Operation**

Virtually any mode of operation (except fast scan television) is allowed on the new frequency allocation. However, it's expected that narrow, low data rate modes will be used, both to allow many users to co-exist and to obtain useful ranges.

Wider modes, such as s.s.b., will need tighter filtering than normal. And interestingly I recall that the Datong r.f. speech clipper produced processed s.s.b. at a nominal carrier frequency of 60kHz. Perhaps this unit could be used as a basis for narrow-band s.s.b. experimentation? A transmitter output power of 400-500W would not be unreasonable and would be relatively easy to achieve using VMOS devices.

**Navy Receivers**

Surplus Royal Navy receivers, such as the B40, cover the I.F. bands and are readily available on the second-hand market. Additionally, a number of modern transceivers now include general coverage receive, many down as low as 30kHz.

The sensitivity of the receiver types I've mentioned may not be very high at the low frequencies. Fortunately though, the receiver only needs to be sensitive enough to hear the ambient noise level from the antenna.

Most communications receivers however have limited coverage of low frequencies. To overcome this a simple up-converter can be constructed which converts the I.F. band up to a higher frequency. This can then be tuned on a conventional communications receiver.

No matter which option you choose it will be essential to make use of narrow bandwidth, both I.F. and a.f. filters.

**Distances Achieved**

The distances achieved will be very much dependent on the system bandwidth. For example a very narrow-band 0.1Hz data system running UBW e.r.p. would probably have a range of about 1000km in daylight and up to 3000km at night.

However, 0.1Hz is barely communicating! Using an s.s.b. bandwidth you would be lucky to achieve 100km on the 73kHz band.

On a much higher frequency band, 160-190kHz. K1ROO claims to have made contacts over 400km. He was using a VN67AF v.m.o.s. amplifier running 1W into a 16m vertical antenna.

One idea that I had was to form an informal group, the PW 'Cowper' Club. One idea that I had was to form an informal group, the PW 'Cowper' Club. It will have the aim of exchanging news, ideas or maybe just to put you in contact with similar experimenters in your area. If you want more details of this or wish to pass on details of your I.F. activity please write to me at: Yew Tree Cottage, Lower Maescoed, Herefordshire HR2 0HP. You can also contact me via packet radio @ GB7MAJ, the DX Cluster @ GB7DXX or E-Mail via davbobs@madhr1.fgw.fat.co.uk.

So come and join, and enjoy getting the 'low down' on 73!
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By Kevin James G6VNT

Kevin James G6VNT describes a suspendable cubical quad loop for 144MHz that can be stowed in a small space. It's just the thing for the holiday villa!

My project this time is an extremely simple and inexpensive wire beam antenna, with about 5dBd gain. Although it's twice the size of a normal cubical quad loop, it also collapses down to two one metre (or so) pieces of dowelling, and a few wires.

The antenna is a bi-directional loop and can be suspended from a light shade in a room. It's also horizontally polarised, which makes it suitable for sideband (s.s.b.) use. Apart from being inexpensive, it is also very easy to make.

Square Loop

Referring to the drawing, Fig. 1, the antenna consists of a 1068mm square loop of insulated wire. I actually used some ordinary 5A single core lighting flex wire for my prototype.

My antenna idea is based on the standard cubical quad loop, which has a gain of about 1.4dB over a dipole. Note that, unlike the basic cubical quad loop, mine isn't a complete loop. The 75mm gaps at the top of the elements, are to stop uneven currents flowing in each side of the loop.

The loop shape is maintained by two dowel rods, one at the top and the other at the bottom. The wire is taped to the dowel at 150mm intervals with insulating tape. When the loop is suspended from the centre of the top dowel, a cubical quad loop is formed.

The antenna is fed with a 500mm piece of 300Ω twin cable at the bottom centre of the loop. This length of twin feeder forms a quarter-wave transformer.

Matching Problem

The two wavelength loop, unlike the standard (one wavelength) loop antenna, has a matching problem. Doubling the size has given a little extra gain, however it's done at the expense of increasing the feedpoint impedance.

At the feedpoint, the input impedance is several thousand ohms. It's obvious that we have to devise a matching arrangement to transform the high impedance to match the 50Ω output to be found on most transceivers.

I decided to carry out the matching transformation in two stages. First I used a 500mm length of 300Ω ribbon cable at the bottom of the loop. This length of twin feeder forms a quarter-wave transformer.

Supporting the loop antenna.

Support string at least 250mm long (with crocodile clip on the end)

Insulated 5A wire

Supporting string around pole

300Ω/ribbon feeder

Coaxial cable (50Ω)

to the transceiver

Balun made from two turns of RG58 Coaxial cable tied together

Fig. 2: A small p.c.b. gives stability to the join of the feeder and cable. The p.c.b. isn't a necessity as almost any insulating material will do (see text). Trimmer C1 is 10pF.

My project this time is an extremely simple and inexpensive wire beam antenna, with about 5dBd gain. Although it's twice the size of a normal cubical quad loop, it also collapses down to two one metre (or so) pieces of dowelling, and a few wires.

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I decided to carry out the matching transformation in two stages. First I used a 500mm length of 300Ω ribbon cable at the top of the loop. Then followed this by a trimmer capacitor.

The trimmer capacitor allows a final match down to 50Ω and I mounted mine on a small p.c.b. The p.c.b. is very simple, consisting of a piece of glass fibre single sided board some 50x12mm.

The board is only to provide a stable mounting for the trimmer and a tie point for the RG58 (see Fig. 2 for details). You don't have to make a p.c.b., a small piece of any insulating material will do.

Balun Needed

As the antenna is balanced and the coaxial feed is unbalanced, a balun is required in the line from the radio to the balanced loop. There are many forms of balun that could be used.

But I decided to use the easiest to create.
The easiest balun to create (at v.h.f./u.h.f. anyway) is just to coil the coaxial feed into a multi-turn loop. I found that two turns of the RG58 coaxial feed with an inside diameter of 40mm was adequate.

The balun was formed some 25mm from the p.c.b. and was kept in place with two cable ties. Although I used cable ties, you could of course use insulated tape or even string to hold the turns in place.

At the centre of the top dowel rod a 250mm length of string is tied with a crocodile clip on the free end. This clip is quite large, like those used in car battery chargers. This clip is the clamp used to suspend the antenna from any convenient horizontal item.

Don’t forget of course the loop should only be suspended from a structure capable of supporting the loop’s weight. The loop should also, as far as possible, be suspended away from metallic structures.

Setting-Up

Setting-up the antenna is very simple. After suspending the cubical quad away from metal objects, key up the radio on low power. Then adjust the trimmer capacitor until the lowest s.w.r. is obtained. On my prototype I could achieve an s.w.r. of 1:1.

It’s a bit fiddly trying to key up and adjust a moving cubical quad, some assistance will probably be required. I found the best way was to ask someone else to key up the radio.

I used this method, and all I had to do, while holding the coaxial cable just below the balun, was to adjust the trimmer using a plastic trimming tool. (A plastic trimming tool is definitely recommended for this operation).

Performance

The antenna performance is like a dipole and is bi-directional. That is to say it has a figure-of-eight polar response. In terms of gain it compared favourably with my standard HB9CV twin element beam. Unlike the beam antenna, it had the advantage of working equally well off the back as the front of the beam.

The Suspend-a-Loop also has the advantage of being bundled up and stuffed in a wardrobe. I’ve found that when used after rehanging the s.w.r. is unchanged. Its a great antenna for those who are not allowed external antenna’s, yet do not want an assembled array cluttering up the shack.

I am sure there are many out there who’ll find this a useful antenna, especially as it costs virtually nothing to make. It can be made literally from junk in the garage or the shack!

Steve Locke GW0SGL Worked The World & You Can Join Him With This Month’s Very Special Offer!

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A question about a transistor audio stage caused problems in a recent radio amateur examination (RAE). The examiners reported that 'Some candidates thought the main function of a collector resistor was to limit the current rather than to provide a load for the signal voltage'.

Have a look at Fig. 1 which shows four resistors that are connected directly to a transistor in an audio frequency (a.f.) amplifier stage. Incidentally, the transistor is an npn type.

Let's first deal with resistor $R_E$, between the emitter and the 0V rail (sometimes called 'ground' although it may not be 'grounded'). The value of this resistor is much smaller in value than the other three resistors.

So the emitter is almost at ground. When the transistor is connected in the way shown in this circuit of Fig. 1, it's said to be in the common-emitter configuration. The load resistor $R_L$ is connected between collector and the positive (+12V) supply. The voltage at the base of the transistor is fixed by the potential divider formed by $R_1$ and $R_2$.

Immediate Question

Immediately there is a question! What are the voltages and currents in the circuit when there is no signal coming in? The circuit of Fig. 2 has some typical values put in and gives you an indication.

It's usual to deal with voltages with reference to (w.r.t.) the 0V line unless

---

**Fig. 1:** The basic transistor biasing model.

**Fig. 2:** Adding a few typical values.

**Fig. 3:** The base voltage collector current graph.

**Fig. 4:** With a ±0.2V base drive the collector current swings ±1mA.

**Fig. 5:** The phase and voltage levels to be found at the input and output pins.

**Fig. 6:** Additional components to make a working amplifier. The 2kΩ resistor and 47pF capacitor reduce the power supply ripple that gets onto the output signal, but does alter the various voltage levels.
stated otherwise. The base of the transistor is biased at 1V above ground by R1 and R2. From the graph in Fig. 3, you can see that a base voltage (VB) of 1V gives rise to a collector current (IC) of 2mA.  

Now let us apply a signal at the input. The graph of Fig. 4, shows that by varying the input (shown horizontally) by ±0.2V, the collector current (IC) will vary between 3mA and 1mA (on the vertical axis).  

The variation in collector current gives rise to variations in the voltage developed across the load resistor (RL). Of course there are also variations in the emitter voltage, but we can ignore them for now.  

A total swing of 0.4V (peak-peak) at the input results in a total swing of 5V (peak-peak) at the output Fig. 5. As the output voltage is greater than the input voltage, we can say the stage has 'gain'.  

To calculate the voltage gain we divide the output voltage by the input voltage. So, the gain is 12.5 (5V/0.4V). In practice you would expect the gain to be higher than this, but I've chosen the values to keep the arithmetic simple.  

When the voltage at the input is on the increase, the output voltage decreases and vice versa: in other words, there is a 180° phase shift between input and output. For an ordinary audio stage this phase shift doesn't matter.  

Finally, Fig. 6 shows a practical circuit with the capacitors that I left out of the earlier diagram. The two 1pF capacitors are to isolate the voltage levels in previous and later stages. This allows each stage's biasing to be specifically set-up.  

The circuit illustrated is for small signals, such as in a microphone amplifier. If we want to draw power from an amplifier stage (to drive a loudspeaker, for example), then a different circuit is needed. But that's another problem!  

**Questions**  
**Now let's have a look at a few questions about the circuit!**  

**Q1** Which two resistors in Fig. 1 determine the voltage at the base of the transistor?  
(a) R1 and RL  
(b) R1 and R2  
(c) RL and RE  
(d) R2 and RE  

**Q2** The purpose of a coupling capacitor between the stages of a multi-stage amplifier is to:  
(a) provide a phase shift  
(b) improve the high frequency response  
(c) provide a suitable bias for the second stage  
(d) isolate the d.c. voltages in the two stages  

**Q3** In the complete amplifier stage shown in Fig. 6, the phase difference between the input and output waveforms is:  
(a) 90°  
(b) 180°  
(c) 270°  
(d) 360°  

**Q4** In Fig. 5 the main function of RL is to:  
(a) provide a load for the signal voltage  
(b) limit the current through the transistor  
(c) bias the emitter to the correct voltage  
(d) isolate the transistor from the rest of the circuit  

---  

**Murray Ward’s interesting article is only a small snippet of the RAE syllabus.**  

In our PW Book Store we carry a comprehensive range of books that are of great help to RAE and Novice RAE candidates. So, here’s a short list:  

- **Radio Amateurs’ Examination Manual** by George Benbow G3HB. This fifteenth edition is the definitive text for the full RAE course. 127 pages, £8.50.  
- **RAE Revision Notes** by George Benbow G3HB. A complimentary volume to his RAE manual. 99 pages, £4.99.  
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- **The Radio Amateurs’ Question & Answer Reference Manual** (fifth edition) by Ray Petri G0OAT. A comprehensive book covering the RAE syllabus subject by subject with sample questions in each section. There are over a thousand example questions in the 20+ sections. £13.95.  

For those contemplating taking the Novice RAE the following books will be of immense help:  

- **The Novice Licence Student’s Notebook** by John Case GW4HWR. It’s the official book for the Novice RAE candidate, but it would also be of use to anyone contemplating taking the RAE. 124 pages, £9.95.  
- **Training For The Novice Licence, A Manual For Instructors** by John Case GW4HWR. The Novice RAE syllabus is planned to be used on a one-to-one basis with the instructor. This book is, as the name suggests, for the instructor. 101 pages, £6.50.  
- **Revision Questions For The Novice RAE** by Esde Tyler G0AEC. A series of sample questions, with answers, in the style of the Novice RAE. This book should help calm fears of what to expect in the examination. 60 pages, £5.50.  
- **The Novice Radio Amateur Examination Handbook** (BP375) by Ian Poole G3YWX. Ian Poole is well known for his ability to take a technical subject and explain it in simple terms. This is a very good book to compliment the official handbooks. 150 pages, £4.95.
Can a wire antenna with half the normal span provide a satisfactory performance? The answer to this question is a definite 'Yes!' within the limits stated below.

I judged the performance of the QUIPP experimental 3.5MHz antenna against a full size vertical 3.5MHz loop, in use for some 15 years. The full sized loop is in the form of an upside down isosceles triangle standing on its apex feed point, which is about 4m above ground. The long side (39.5m) of the triangle runs (horizontally) E-W at a height of about 20.4m above ground.

Fig. 1: Dimensions for the QUIPP antenna for 3.5MHz. Made from slotted 30012 feeder with the extra conductor threaded through the slots.

I found that in comparison to the full size loop, the QUIPP experimental antenna, for 3.5MHz, was only one 'S-point' down on receive and less than two 'S-points' down on transmit. This performance I consider to be effective.

The QUIPP 3.5MHz antenna performance is within the limits I've mentioned at my location. The main problem with linear loading for wire antennas, probably the most efficient method, is the complication brought about by spacers and tensioning. My QUIPP 3.5MHz design overcomes the problems by utilising 300Ω slotted ribbon feeder with the additional element made from insulated wire. This additional element is interleaved, back and forth every 150mm or so through the slots in the ribbon.

The form of the QUIPP antenna and the dimensions are shown in the diagram Fig. 1. With the simple linear loading of this kind of antenna you will really appreciate that a 50% reduction in size is near to the maximum reduction that can be accommodated.

Please note however that in Fig. 1, the elements are shown separate only for clarity. In reality the longer elements are woven through the slots in the insulated material forming the web of the 300Ω twin feeder as shown.

The close spacing does not seem to degrade the performance to any significant extent. But as with many gains, there is however, a penalty! With normal linear loading it's usually reckoned that the total conductor length should be increased by up to about 20% at the design frequency. I've found that with the close spacing of the QUIPP the overall length increase is more of the order of 40%.

The performance of the QUIPP antenna falls within the limits specified when used as a horizontal doublet at 11m or as an inverted 'V' at 12m. In both cases fed with an approximate electrical half wavelength of 300Ω solid ribbon terminated in a 4:1 balun.

The balun I used is made by winding 15 bifilar turns of 2mm (16s.w.g.) insulated wire on a ferrite rod of about 150mm long. The ferrite rod I used is some 15mm diameter.

The specific inductance value (AL, the inductance value per number of turns) is given as being 70mH per thousand turns.

Antenna Bandwidth

The bandwidth of the QUIPP, assuming that means having an s.w.r. of less than 1.5:1, is in excess of 100kHz. The lowest s.w.r. figure of 1:1 occurs, on my prototype, at about 3.69MHz. This was against an original design frequency of 3.74MHz. Again I stress that these figures relate to my particular surroundings.

The calculated inductance of a straight wire of length 19.05m, (half a normal dipole length for the design frequency of 3.74MHz) is about 40μH. The measured inductance of half the span of the QUIPP linear loaded as shown, is about 23μH.
Bryan Wells G3MND describes the Quatt In a Pint Pot (*QUIPP*) - his effective and simple linear loaded, half sized antenna for 3.5MHz.

I’ve shown the power as 10-18 because this is the same as defining inductance in **Micro** (10-6) Henries and capacitance in **Pico** (10-12) Farads. So to find system resonance take values, where the product of inductance (defined in pH) and capacitance (defined in pF), give a figure of 1812.

It seems from the above that the reduction in system inductance is compensated for by a commensurate increase in system capacitance provided by the close spaced linear loading. Presumably this accounts for the relatively generous bandwidth and will mean that the system Q is also reduced.

**Other layouts**

You can try out other layouts if you don’t have space for a complete horizontal run of 21m including the support ropes. Have a look at the drawings of Figs 2, 3 and 4, where I’ve shown other possible layouts.

I’ve tried the three differing layouts with various degrees of success. The two forms shown in Fig. 3 and Fig. 4, of course ‘fire’ east-west. I’ve also used it in the inverted-V form mounted on one 13m pole in one corner of my garden with one sloping leg to the West and the other to the South.

In the inverted-V case where there is only 90° horizontally between the legs, the total space taken up is just over 10m square. If you have an especially small garden then you could combine the ‘drop-leg’ ideas of Fig. 3 or Fig. 4, but you will lose out on efficiency.

**Other Bands**

I discovered something else, and that is, in addition to 3.5MHz there were three other bands with a reasonable match to 50Ω. So on these bands I didn’t need an antenna matching unit.

Because the matching to three other bands may be a feature of my particular set-up (and may not be exactly repeatable) I won’t say which bands. But you may find something similar when you come to check out your system.

**Final Point**

One final point I must make. I’ve tried using the more usually illustrated linear loading method shown in Fig. 5 (this is written up in the ARRL Antenna Book - 16th edition, section 6-7).

I term the version shown in the ARRL book, the ‘twin opposed’ method. In my experiments I found that this format was significantly less effective compared with the simple version I’ve used for the QUIPP.

I hope that the 3.5MHz version will encourage those operators who do not have enough room for a full size antenna, or even perhaps for a G5RV, to have a go.
August 11: The 59th Annual Derby Motor Show kicks off at the Littleover Community Centre, Pastures Hill, Littleover, Derby. Doors open at 10.30am. The school is located off the A5250 (Burton Road) south of Derby, one mile south of the village of Littleover and the A511 Derby Ring Road. There will be a large flea market, tables by the hour, a wide range of radio and computer traders, monster radio & computer junk sale run by the society - with silly prices, famous monster radio & computer junk sale run by the society - with silly prices, famous

local Internet Access Provider. A bar and cafe will be available from 1pm. Free parking and talk-in on GIBIECR.

*September 1: The Bristol Radio Rally is being held at Brunel Centre, Temple Meads Station, Bristol. Doors open at 10.30am to 4pm (disabled 10.15am). Admission is £1. Refreshments available. Talk-in on S22. Further details from David Leech G7DHW on (01208) 413333.

*September 1: The Bristol Radio Rally is being held at Brunel Centre, Temple Meads Station, Bristol. Doors open at 10.30am to 4pm (disabled 10.15am). Admission is £1. Refreshments available. Talk-in on S22. Further details from David Leech G7DHW on (01208) 413333.

*August 11: Flight Refuelling ARS Hampton ’96 will take place at the Flight Refuelling Sports Ground, Merley, Wimborne, Dorset. The event will run from 10am to 5pm and will include the usual mix of traders, Bring & Buy, craft exhibitors, art boot sale and field events. Talk-in will be on S22. Richard Hogan G4VCO on (01202) 691021.

*August 16: Cockenzie & Port Seton Amateur Radio Club Radio Junk Night will take place from 1830 to 2130 in the Cockenzie & Port Seton Community Centre. There will be a bar, Bring & Buy, RSGB stand, special interest groups, parking for 300 cars, free cash draw every hour, children's activity room up to seven years, supervised by parent. Doors open at 10.15am and admission is £1, free for children. Talk-in on S22.Albert G7RZW on (01202) 691021.

*August 18: The Red Rose Rally is being held at Horwich Leisure Centre, Victoria Road, Horwich, Nr. Bolton of J6 M1. There will be a cafe, bar, Bring & Buy, RSGB stand, special interest groups, parking for 300 cars, free cash draw every hour, children’s activity room up to seven years, supervised by parent. Doors open at 10.15am and admission is £1, free for children. Talk-in on S22. Albert G7RZW on (01202) 692080.

*August 16: The 7th Great Eastern Rally is being held at the Car Park, Hardwick Narrows, Kings Lynn. Doors open at 10am (0945am for disabled visitors). There will be an outdoor car boot area, a spacious indoor area with national exhibitors, a Bring & Buy, talk-in on S22, free parking, refreshments on site, easy access for disabled. It is a good family day out with Sunday car boot nearby and close to Hunstanton Beach & Sandringham House. For bookings and information contact G0BMS on (01553) 766164 or at G0H7MDP or E-Mail: les@елеite.com.co.uk

*August 18: The Cardiff Amateur Radio & Computer Rally is to be held at The Star Sports & Recreation Centre, Splott, Cardiff (M4 J32). Doors open at 10.30am to 5pm. More details from Stuart Robinson G0WWMT on (01222) 613070.

*August 25: The Gallasheills and District Amateur Radio Society Open Day and rally will be held at a new and larger venue, The Volunteer Hall, St. John's Street, Galashiels from 11am to 4pm. There will be a Bring & Buy, refreshments and a raffle. Talk-in on S22. (01896) 850025 or (01896) 759814 (evenings only).

*August 25: The East Coast Amateur Radio & Computer Rally, Clacton Leisure Centre, Vista Road, Clacton-on-Sea. There will be major suppliers of radio equipment, antennas, second-hand gear, computers, computer software, accessories and electronics. There will also be a Bring & Buy sale and Internet demonstrations throughout the day by Ke-Connect, the

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ASA Ltd., Dept Y, Brook House, Torrington Place, London WC1E 7HN.
This month Ray Fautley G3ASG goes hunting in the attic to find space to put up trapped dipoles for use on at least two bands.

Trapped dipole antennas are variations on the simple doublet wire antenna. But there are two very useful advantages to be gained by the use of a trap dipole:

a) Resonant operation on more than one band. They also have a 50 - 70Ω feed point impedance (depending on height) for each band.
b) The total physical length of the antenna is less than that required for a full-size dipole for the lowest frequency band.

Commercial versions of trapped dipoles have been available for a long time, particularly for use on the 3.5 and 7MHz bands. Most amateurs will be acquainted with the arrangement shown in Fig. 1. The secret of operation lies in the design of the traps, which by the way are parallel tuned circuits.

For 3.5 & 7MHz

Let's consider the case of a 3.5/7MHz trapped dipole. At 7MHz the traps are in resonance so they have a very high impedance. In fact each trap operates as an open circuit.

Because to r.f. it seems to be just like an insulator, no r.f. energy can get into the outer parts of the antenna. The wire between the two traps becomes a full-size half-wave dipole resonant at 7MHz.

The extra bit of wire at each end have virtually no effect at 7MHz. So, now let's consider what happens at 3.5MHz?

At frequencies below 7MHz, such as 3.5MHz, the traps behave just like inductors, the reactance of which depend upon frequency and the inductors, the reactance of which is several times higher at 3.5MHz than at 7MHz. So, we have two antennas with a common feed point and similar feed point impedances.

Now, from what we should already know (we do know - don't we?) about tuned circuits, there are, theoretically at least, an infinite number of combinations of inductance (L) and capacitance (C) which would resonate at any single frequency.

Taking the single frequency (7MHz) for the trap, from calculations, charts or Abac's where we can look up a resonant combination. For instance, I've found that when:

- L = 0.1pH and C = 51.5pF
- or L = 5pH and C = 104pF
- or L = 10pH and C = 51.5pF
- or L = 20pH and C = 2.6pF

all give resonance at approximately 3.5MHz. So, how do we decide which actual values to use?

Since the value of the inductor has the greatest effect on the rest of the antenna, that's the component we'll concentrate on. Once we've settled on the inductance value, it's then just necessary to find the value of capacitance for resonance at 7MHz.

I'll try and ignore all the mathematical rigmarole so here's an easier design procedure for a two-band trap dipole. Remember, the overall length of the antenna must be less than that of a full-size half-wave dipole at the required lower frequency.

### Table 1

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<td>130</td>
<td>60</td>
</tr>
<tr>
<td>90</td>
<td>7200</td>
<td>5900</td>
<td>3200</td>
<td>2000</td>
<td>2300</td>
<td>1800</td>
<td>1500</td>
<td>970</td>
<td>580</td>
<td>290</td>
<td>130</td>
<td>60</td>
</tr>
</tbody>
</table>

### Symbols used:

- A is half the overall antenna length available (in metres)
- B is length from centre of antenna to trap (in metres)
- CT is the capacitance value for trap (in pF)
- FLF is the centre frequency of the lower band required (in MHz)
- FT is resonant frequency of trap (ie. centre frequency of higher band in MHz)
- L is physical length of full-size half-wave dipole for FLF (in metres)
- LT is inductance value for trap (in μH)
- X is the overall length of the complete antenna (in metres)

### Design Procedure

Now I'll go through the steps in the design procedure to create our individual trapped dipole.

1. Determine A from:
   \[ A = \frac{2A \times 100}{L} \]

2. Define FLF in MHz

3. Define FT in MHz

4. Determine L from:
   \[ L = \frac{142.6}{FLF} \]

   where L is in metres and FLF in MHz

5. Determine A' from:
   \[ A' = \frac{2A \times 100}{L} \]

6. Determine B' from:
   \[ B' = \frac{B \times 100}{A} \]

7. From Table 1 find XL for A and B with XL in Ω

8. From Table 1 find XL for A and B with XL in Ω

9. From XL determine Lo at FLF.

10. Determine LT from:
    \[ L_T = \frac{XL}{2 \times FT} \]

11. Determine CT from:
    \[ C_T = \frac{1}{4\pi^2 FT^2 L_T} \]

with FT in MHz and LT in μH

**In Table 1, the dashes (--) in the table mean that the value of XL would make the inductor value so high that the tiny capacitance value necessary for resonance would likely be lower than the coil's self-capacitance!**
Bit By Bit

I'm sure you think the process looks rather complicated, but taken bit by bit it's not so bad! So, just to illustrate how it works, here's a worked example.

The problem is:
Given a maximum antenna length of 11 m (that's the length of my attic!) I want to design a trap dipole for operation on the 10.1 MHz and 18 MHz amateur bands. The drawing Fig. 2, shows the basic layout of the antenna design, now I'll show you how I arrived at those figures.

By referring to the design procedure, we carry out the steps:

1. Determine A:
   \[ A = \frac{11}{2} = 5.5 \text{ metres} \]

2. Define FLF:
   \[ FLF = 10.125 \text{ MHz (band centre)} \]

3. Define PT:
   \[ PT = 18.118 \text{ MHz (near band centre)} \]

4. Determine L:
   \[ L = \frac{142.6}{10.125} \approx 14.084 \text{ m} \]

5. Determine A' :
   \[ A' = \frac{2 \times 5.5 \times 100}{78.1} = 14.084 \text{ m} \]

6. Determine B:
   \[ B = \frac{142.6}{2 \times 18.118} \approx 3.935 \text{ m} \]

7. Determine B' :
   \[ B' = \left( \frac{3.935 \times 100}{5.5} \right) \approx 71.55 \text{ m} \]

8. From Table 1 we look up the value for XL when A = 78, B = 72.
   It's shown as being about 600Ω.

9. Determine Lo at FLF:
   \[ L_0 = \frac{600}{2 \pi \times 10.125} \approx 9.43 \mu \text{H} \]

10. Determine LT:
    \[ L_T = \frac{9.43}{\left( \frac{10.125}{18.118} \right)^2} \approx 6.5 \mu \text{H} \]

11. Determine CT from LT and FT
    \[ C_T = \frac{10^6}{39.8 \times 18.118 	imes 18.118 \times 5.5 - 11.87 \mu \text{F}} \]

Follow The Rules

If you follow the above rules, it should be possible to design traps for other two-band antennas. The only limiting factor is that the overall length of the trap dipole antenna must be less than the length of a full-sized half-wave dipole at the lower of the two frequencies.

Practical Wireless, September 1996
It's Phil Cadman G4JCP's turn to look after the vintage wireless 'shop' this month. This month he's describing a popular one-valved set from the 1960s and the circuitry of valved receivers in a little more detail.

Hello again, it's good to be back...and I'm wondering how many of you tried the regenerative detector I described in my last column? Those of you that did probably found it none too satisfactory. The difficulty is in finding a tapping point on the coil which gives both good sensitivity and good audio quality.

Next time, I'll tell you how to modify the circuit to allow separate adjustment of the audio detection point and the amount of regeneration. All you'll need is an r.f. choke of around 1mH inductance, a 250pF variable capacitor and a short length of wire. No prizes for guessing what the modification will be.

Whilst still on the subject of coils, the PW hook service can supply an excellent little book on coil and transformer design. The title is Coil Design and Construction Manual (BP160) and it's published by Bernard Bahani.

Hear All Continents?

I recently received a letter asking for information about an 'HAC' model 'DX' receiver. Luckily, I still have one of these little sets stashed in my loft. For those of you who have never heard of 'HAC', the letters stood for 'Hear All Continents'. I always thought it rather an optimistic name for what was a one-valve radio.

The basic 'HAC' model 'DX' used a rather antique-looking battery valve which drove a pair of high-impedance headphones (S. G. Brown, of course!). An add-on audio stage was available but I seem to remember that it too only drove headphones. I suppose it did make the signals somewhat louder. I don't think I ever did 'hear all continents' on my set but I've no doubt it was possible. The manufacturers of the 'DX' had at least one other design. In its simplest form it was just another regenerative detector but it used a modern miniature valve. However, this set could be upgraded to give loudspeaker operation.

The 'HAC' radio sets were popular throughout the 1960s, advertisements regularly appearing in copies of Practical Wireless and Radio Constructor. I wonder, does anyone know what happened to the company?

Superhet Receivers

As promised, this time I'm going to talk a little about simple super-sonic heterodyne or 'superhet' receivers. Unlike tuned radio frequency (t.r.f.) sets, which do their r.f. amplification at the incoming signal frequency, a superhet uses a fixed, intermediate frequency. If you take a look at Fig. 1, you'll see that V1, is actually two valves in one - a triode-hexode. The triode section is wired as an r.f. oscillator - the 'local oscillator' (l.o.) and the hexode section looks as if it's just a straightforward r.f. amplifier. However, its third grid is internally connected to the grid of the triode section.

The hexode section of V1, is known as the 'mixer' or 'frequency changer'. It's constructed so as to make the r.f. signal from the l.o. mix with, or rather multiply, the wanted radio signal fed in at grid one. As if by magic, four frequencies now appear at the anode. First, there's the wanted radio signal. Then there's the l.o. frequency from the triode section. All quite obvious. But, two new frequencies put in an appearance!

One frequency is equal to the wanted frequency added to the l.o. frequency. The other frequency is equal to the difference between the wanted frequency and the l.o. frequency. These are, not surprisingly, known as the 'sum' and 'difference' frequencies.

The intermediate frequency transformer (i.f.t.) in the anode circuit of V1, is tuned to the difference frequency. You'll appreciate that this difference frequency has now become the intermediate frequency (i.f.) at which substantial amplification now takes place.

In most domestic valved radios the intermediate frequency is either 465 or 470kHz. But manufacturers have used frequencies ranging from 450kHz all the way up to 475kHz. Also, beware of very old radio sets and of communications receivers. They may have totally different intermediate frequencies!

Assuming an i.f. of 465kHz, it follows that the l.o. has to run 465kHz higher (or lower) than the frequency of the wanted signal. This is easy enough to achieve at one particular frequency but not so easy over say, the whole of the medium wave band. Keeping the l.o. and the input tuned circuit 465kHz apart is known as tracking.

In Fig. 1, the wanted frequency is done at a fixed, intermediate frequency. The basic 'HAC' model 'DX' used a rather antique-looking battery valve which drove a pair of high-impedance headphones (S. G. Brown, of course!). An add-on audio stage was available but I seem to remember that it too only drove headphones. I suppose it did make the signals somewhat louder.
tuned by L2, VC1 and TC1. The l.o. is tuned by L3, VC2, TC2 and P1. At any place on the dial these two tuned circuits should resonate exactly 465kHz apart. I say 'should', for they seldom do. Fortunately, a slight error is of little consequence but a large error most certainly is.

Enthusiasts of a 'twiddling' disposition are apt to go berserk on adjustable cores you find in a multi-banding superhet radio. Even in the single-band example shown in Fig. 1, there are no less than seven possible adjustments (not including VC1 and VC2).

You can imagine the mess you can get into if you're not sure of what you're doing. So, don't twiddle with a superhet unless you have a clear idea of what to do.

I'm not going to describe the alignment of a superhet, it's simply too involved to cover here. If you ever have need to align a superhet do try and get a copy of the manufacturers service information.

The service sheet will (hopefully) detail how you go about the alignment. Failing that, at least get a circuit diagram. In any event, only make one adjustment at a time and if in doubt - don't touch.

Two Tuned Circuits

An intermediate frequency transformer (i.f.t.) is nothing more than two tuned circuits mounted in close proximity to each other. The tuned circuits are usually inductively coupled by the rather obvious technique of winding the two coils on the same former.

In the good old days the tuned circuits consisted of fixed coils and variable capacitors. But the i.f.t.s you are most likely to come across will have fixed capacitors wired across coils which have an adjustable iron-dust cores.

Designing (and manufacturing) i.f.t.s is a little more involved than my description of them may suggest. The spacing, and hence the coupling between the two coils is critical and is usually the result of much trial and error.

The diagram, Fig. 2, shows the relative amplitude response of two tuned circuits in close proximity to each other. If they are spaced just right then you'll get a response like curve A when they are both tuned to 465kHz.

You may think that this curve is just what we want, but sadly, it isn't. Remember sidebands?

Radio broadcasts have sidebands that extend to at least 6kHz either side of the carrier frequency. Yet curve A shows that at just 3kHz from the peak the response is well down. The higher frequency sidebands will be heavily attenuated and so the demodulated audio will sound very muffled.

The trick is to physically move the tuned circuits a little closer together so that they become over-coupled. Unfortunately, it will not now be possible to get a single peak. And you'll find as one core is adjusted it will affect not only its own circuits resonant frequency but also the resonant frequency of the other tuned circuit.

If the designer of the i.f.t. has got it right a response like that of curve B can be achieved. It may look like a slice through a volcano but a whole lot more of those precious sidebands will get through making the demodulated audio sound much better.

In reality some radio manufacturers took the single-peaking approach while others preferred over-coupling. And when aligning a radio it's useful to know which method the manufacturer has chosen (hence my comments about the importance of getting hold of service data).

Of course, with practice it's possible to align almost any radio set even without a circuit diagram. However, until you attain those lofty heights you'd better read the manual!

Just two points going back to Fig. 1. The diode D1, demodulates the amplified i.f. signal. And components C8, R7 and C7 form a low-pass filter which stops the intermediate frequency from reaching the following audio stages.

By the way, for simplicity I've shown D1, as a thermionic diode. In reality, it's far more likely to be a thermionic diode. Sometimes it will be included in the i.f. amplifier valve, V2, or, more usually, it'll be within the following audio amplifier valve.

The diode, D1, also provides the negative automatic gain control (a.g.c.) voltage which is fed back to the mixer and i.f. amplifier (V2).

The stronger the received signal then the more negative will be the a.g.c. voltage and the lower the gain of V1 and V2.

The idea of a.g.c. is to keep the audio level constant no matter how strong or weak the received signal. More about a.g.c. another time.

More Complicated

Superhet receivers are more complicated to build than t.r.f. receivers. But they give more satisfactory results without the need for critical tuning adjustments whilst in use.

The problem in recent years has been the unavailability of new i.f. transformers (and r.f. coils) suitable for use in valved designs. The i.f.t.s available from the mail-order suppliers are optimised for use in semiconductor designs and, therefore, are not suited to the high impedances found in valve circuits.

Riding to our rescue is Ron Allwright, managing director of Denco (Clacton) Limited who has begun manufacture of selected Maxi-Q coils. Once again Denco are producing both r.f. coils and intermediate frequency transformers for use in valve designs.

Of course, you don't have to use new components. Surplus i.f.t.s sometimes turn up at junk sales and rallies. Very occasionally an advertisement will appear in a magazine. You should never pass up the opportunity to acquire a scrap radio if there is a chance of salvaging a set of coils and i.f.t.s (not to mention all the other useful bits).

Need To Check?

If you ever have need to check an i.f.t. I suggest you use the circuit shown in Fig. 3. You don't have to remove the i.f.t. from a chassis but do disconnect all the terminals and earth the radio chassis to the signal generator.

It's most important to leave the shielding can on the i.f.t. and connect it as shown. Use shielded cable for connections greater than a few inches and connect the 10pF capacitors as close as is reasonable to the terminals of the i.f.t.

The 10pF capacitors are very important. This is because the output capacitance of the signal generator and the input capacitance of the r.f. voltmeter (or oscilloscope) will appear in parallel with the fixed capacitors inside the i.f.t., and will affect the resonant frequencies of the tuned circuits.

However, some capacitance is acceptable as it will partly simulate the stray capacitances that are present in the normal working circuit. The capacitors don't have to be exactly 10pF but do try not to use less than 10pF or greater than 20pF.

You may need to use a signal generator with a fairly high output, 1V or more, to get a reasonable reading on the voltmeter. Then gently sweep the signal generator backwards and forwards between 400kHz and 550kHz (or around whatever frequency you think the i.f.t. is tuned) whilst looking for any movement on the voltmeter.

Once the resonant frequencies have been established tune the cores to maximise the peak. If the i.f.t. is off frequency, adjust the signal generator a little towards the desired frequency and re-tune the cores to move the peak in that direction.

Some cores are prone to move at the slightest touch, so before making any adjustments run a short length of cut rubber band down the hole in which the core travels. That will hold the core in position but still allow adjustments. Also, be warned and adjust the cores gently. They can be very brittle and prone to break (especially the older types).

Closing Time

Oh well it's closing time and once again I've to put the shutters up. So, until it's my turn in the shop again I'll say cheerio.

Remember, your letters and E-mails are most welcome, send them to me either via the PW offices, via E-mail to phil@oldpark.demon.co.uk or direct to me. Phil Cadman G4JCP at 21 Scotts Green Close, Scotts Green, Dudley, West Midlands DY1 2DX.

Cheerio from Phil, see you in December.
June Activity

So much for May, now I'll move on to reports of activity, or lack of them, on the 50MHz band during the month of June. After what seemed like a promising start to the season, the intensity of Sp-E openings took a nose dive.

Yes, there were openings nearly every day but the intensity and duration of them was definitely very much reduced compared to previous years. What I found interesting was the fact that a number of multi-hop openings to the Middle-East and North America still occurred.

It seemed to me land based openings dominated. Also during the month of May only a few distant 2-hop stations were heard in the UK.

Though the season was generally poor, I did manage to work a few distant stations via 2-hop Sp-E. On the 23rd of May I was able to work the stations of FP5EK, N4HSM/VP5 and W6JKVNP5. Work the stations of FP5EK, N4HSM/VP5 and W6JKVNP5. May 27, 28 and 29. Many keen DXers managed to work operators in VE and VP5 but the intensity and duration of these were generally very weak and of limited duration.

Some of the more hard to get European countries included HA, HB0, UX, LY, L2, TT, OY, UA, YL, YO, ZB and ZD. I also reported that the station of JX7DFA in beacon mode was heard on a number of occasions but that no other activity was noted.

Paul Southgate G3GIL/IDQ1 reports however that on May 20 at 2104UTC he was fortunate to work JX7DFA in beacon mode. Running 50W from an FT-650 transceiver into a home-made 8-element Yagi, he received a 55 report on s.s.b. Paul also heard the JW7SIX beacon located on Svalbard.

There were also a number of long distance openings during May to the African continent. Operators worked from the UK included CN, CT3, E8B, E9, T8BCE, ST5BN and reception of the ZOBVHF beacon. Also workable via 2-hop Sp-E were African stations such as 4X6UL, 5B4AAL and 7Z5CO.

Conditions were also very good to North America with three transatlantic openings occurring on May 27, 28 and 29. Many keen DXers managed to work operators in VE and W and a lucky few managed to work the stations of FP5EK, N4HSM/VP5 and W6JKVNP5.

Transatlantic Openings

Despite the generally poor Sp-E conditions there were a total of seven days when transatlantic openings were recorded between the UK and North America. These multi-hop Sp-E events took place on June 6, 7, 9, 10, 11, 16 and 20. Bob Mobile WA1OUB has been paying particular attention to transatlantic openings between North America and Europe this summer. He has been plotting openings on a daily chart with some interesting results.

Bob mentions that the (trip-hop) openings don't just pop up from nowhere. The Sp-E conditions seem to build up to a peak over a period of several days, fade away, and then a new cycle starts. The time period between Sp-E peaks is between 5-7 days. These results are similar to those noticed previously in the UK. There is a peak in intensity, then bang, it all disappears to re-start again with a small opening. The ionisation then builds in intensity over a few days, reaches a peak in maximum usable frequency (m.u.f.), then fades away, and then a new cycle starts.

The Windbreakers and Hadrats Contest Group show off their trophies presented to them at the 1996 RSGB VHF Convention.

Contacts with Asia

During June there were also the opportunity to make contacts with stations located in Asia. All of these were located in the Middle-East area and included 4X1IF, 4X6UL, 4Z4UL and 5B4AAL.

The beacons 5B4C4Y and ODS5IX were also heard in the UK on a number of occasions. It was also possible to contact stations in the African continent via single or double-hop Sp-E. These were all located on the northern edge of the continent and included CN2CC, CN8HB, CT3PT, E8BACW, E8B8PX, E8B1B and E8BIE.

One new station to look out for is 5A1A in Libya. He was reported to be working a number of stations in DL and OE on June 6. 5A1A in Libya. He was reported to be working a number of stations in DL and OE on June 6.

Somewhat further to the south the station of 9G1YR, located in Ghana, made his first 50MHz QSOs on June 3. At 1853UTC he contacted PA3DWO and later at 1922UTC he worked G3WOS. Although no contacts were made with the UK this is another station well worth looking out for in future openings.

Transatlantic Openings

There was a peak in intensity, then bang, it all disappears to re-start again with a small opening. The ionisation then builds in intensity over a few days, reaches a peak in maximum usable frequency (m.u.f.), then fades away, and then a new cycle starts.

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The Windbreakers and Hadrats Contest Group show off their trophies presented to them at the 1996 RSGB VHF Convention.
before it all collapses again.

Bob WA1OUB reports two time periods when there is an enhanced probability of making transatlantic contacts. The first, a minor peak, is between 1030-1200UTC. The highest probability is between 1800-2300UTC reaching a maximum peak at 2130UTC.

The first UK-North America opening of the month was on June 6 and was very much a weak and watery affair. Signals were in and out during the afternoon period with the VO12A beacon (50.039MHz) being heard by G6YMB (IN98) at 1200UTC, by G6YIN (IN93) at 1510UTC and by G6YIN (IN93) at 1630UTC.

Geoff Brown GJ4ICD (IN98) managed to work WA1OUB at 1359UTC and G6YIN (IN93) and KM1H at 2133UTC. But apart from those contacts I don't have any other reports.

Another series of events occurred on June 7 with some good propagation to the Turks and Caicos Islands. Among the lucky stations were the Turks and Caicos Island operating groups who were prepared to dig into the noise. The station of GJ4ICD worked both G6AIE (Bahamas) and KCA4UE/CJ (SL Lucia) at the very beginning of the event. Propagation then moved into the Caribbean area with a number of G, GJ and GW stations working W4VWHK (EM90), KJ4E (EL98), KQAPI (EL99) and W5UHUC (EM90). At my QTH (IO81) the station of KJ4E was peaking 599 at 1300UTC but nothing else was heard.

The next opening took place on June 10 but, although signals were at times peaking 58, it was very geographically selective. Only one station, VE1PZ (FN85), was worked during the period 1900-2030UTC.

At the end of the path, operators in IO81, IO74, IO80, IO81 and IO83 were known to have made contact with the VE1PZ Canadian station. On the following day, June 11, another opening to North America occurred.

This North America opening was far more extensive at the US end with many stations in the W1, W3, W4, W5 and VE1 call areas being worked. Activity in the UK was dismissly low however, possibly because the opening occurred between 2155 and 2300UTC on a Monday night.

An excellent opening, favouring stations in southern and central England took place on June 16 between 1715-2100UTC. The propagation was to island of Puerto Rico with the stations of KP4A and KP4EIT (FX58) working many UK operators in IN89, IO73, IO80, IO81, IO82, IO91, IO92 and IO93. The VO12A and CURURA (HV68) beacons were also heard during the period.

The last transatlantic opening of the month was on June 20, between 1730-1800UTC and surprisingly it was to Puerto Rico again. The two resident 50MHz operators, KP4A and KP4EIT, made a number of contacts with stations situated mainly in central England (IO80, IO81, IO82).

Perhaps conditions weren't so bad during June after all. With openings into Europe, Africa, Asia and North America and some choice DX such as OZ, O6, KP4, VE, V5S, 4L6 and 4X4 it made a number of operators very happy.

By the way, if you're wondering why you didn't hear much of this DX it could be because most contacts were made using c.w. Time and time again I've heard the comment 'I don't need c.w. because I'm a v.h.f. operator'. In my opinion this is completely wrong. If you are a v.h.f. operator and you want to catch those rare countries, you need c.w. because that's where the real DX is!

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The 144MHz Band

Last time I mentioned that a total of five Sp-E openings, on May 18, 19, 23, 24 and 27, had occurred on the 144MHz band. Some very good contacts had been made from the UK including stations located in I, LZ, OK, SP, UT, YD, YU and Z3.

Operators in the Greek call areas SV1, SV2, SV3, SV4 and SV6 were also worked. It was hoped that propagation via this mode would be frequent during the month of June but as already reported the Sp-E conditions were not very intense. As a consequence, only two openings, on June 7 and 23 were recorded in the UK.

But before I turn to reports of those openings I've an apology to make. I did mention previously that I always reckon that the Tuesday after the first weekend in June is statistically good for Sp-E propagation on the 144MHz band.

I hope not many people took annual leave like I did on June 4! Only to listen to white noise. There was some good tropo to D and EA but that's not the same as a good Sp-E opening! The Sp-E opening on June 7 started around 0935UTC with contacts being made from northern England into Italy. The station of 8MPO (LJ790) worked G6YIN and G8RSS (both in IO93) at this time.
Well, I'm writing this month’s column during one of the sunniest and warmest days we’ve had this summer. The temperature outdoors in my Welsh Valley is around 24°C! Listening to my newly acquired KWSBP, which I have no doubt is currently heating the shack up to considerably more than 24°C! I find very little to hear on the h.f. bands. I’ve always wondered whether weather conditions have an effect on h.f. propagation modes. I know that generally, propagation on the h.f. bands “dies off” to a certain extent during the summer months due to the position of the Sun relative to the Earth. But I wonder if any other readers have, like myself, considered if the prevailing weather has an added (and negative) effect on radio wave propagation?

Editorial note: Please see comment in ‘Keylines’, page 9, July PW, on this subject.

The G5RP Trophy

The June 1996 issue of the RSGB DX News carries news of the G5RP Trophy. This trophy is awarded to someone making rapid progress in DXing over the recent past - which only newcomers have the scope to do! The G5RP award isn’t limited to youngsters, or those newly licensed. The ‘DX bug’ can bite at any age, and even after many years of operating experience. Experienced DX operators are able, under this programme, to encourage DX operators by nominating an up-and-coming DXer for this award.

The Trophy is jointly awarded by the RSGB International HF & IOTA Committee and the RSGB HF Committee. It will be presented at the RSGB International HF & IOTA Convention on the 5th of October this year.

Nominations shall be sent to: F.C. Hardcombe G4BWP, Sandham, Bridge End Road, Red Lodge, Bury St. Edmunds, Suffolk IP28 8LQ, and must arrive no later than August the 30th. So if you know any budding DX operators who you would like to encourage, get your nominating pen out quickly!

DX News

The RSGB DX Newsheet says that Dave KC9HM hopes to be operating from Guinean Bissoo in mid August as J25J, on 7 to 28 MHz. You can QSL via KB8XN, and meanwhile, Joe KB2JF is resident on Belau Island, and uses s.s.b. around 14.222 MHz at 1115z, QSL to Box 66, Koror, Palau 96940.

An international team lead by Frank AK7O/CH2LLV and a group of ‘multi-multi’ style operation in early August on Midway Island (KH4) using c.w., s.s.b. and RTTY on all bands. (but with the emphasis on working Europe and Africa). QSL via KE7IZ.

And finally, Yoshi JA1UJT, and Ray G3NOM will be QRV from Palestine as Z6C/KH2Y and Z6C/G3NOM while delivering h.f., v.h.f. and u.h.f. gear to the Ministry of Communications and Ministry of Health. They’ll be training local operators to use them for emergency communications, but the length of their operation is not known at present.

Your Reports

I’ll start your reports with 1.8 and 3.5 MHz this time. But now summer is here ‘Top Band’ has gone to sleep! However, Eric Masters G0KRT in Worcester Park, Surrey, who uses a G0P Plus transceiver and a 28m long end-fed wire antenna, is still bashing away on 1.8 MHz. He reports 5W QRP c.w. contacts with G3KSH, G3WGV/P and G4FX/P all at around 2200UTC.

Yours truly, GWOLBI, is back on 3.5MHz this time, But now summer is only heating the shack up to a certain extent during the summer months due to the position of the Sun relative to the Earth. But I wonder if any other readers have, like myself, considered if the prevailing weather has an added (and negative) effect on radio wave propagation?

Editorial note: Please see comment in ‘Keylines’, page 9, July PW, on this subject.

The 7MHz Band

On to the 7MHz Band now and ‘thank goodness for forty’ I hear many h.f. operators say! (Well, those who like the band, that is!) I fall into the latter category I must admit, after having some great fun on this band in the past.

However noisy 7MHz is, it still carries a large amount of h.f. amateur traffic. Although it’s a case of ‘love it or hate it’ for many amateur radio operators, it really is surprising what can be worked on 7MHz even with a mediocre antenna, particularly on c.w. I remember working a string of US stations with just 5W of c.w. using the aluminum rain trough of my house as an antenna! Well the s.t.u. found I could load it up and eventually worked 3 continents with it!

Over to ‘early bird’ Ted Treweell G2KUK on the Isle of Sheppey in Kent now. Ted uses a Ten Tec 600 rig and a collection of G5RV, HF6 vertical and MFJ loop antennas, all using c.w. at 70W output. Ted’s report this month indicates that he’s had early morning contacts with PA9V (Aruba Island), 4C6AI (Ecuador), 633MR (Australia), and 152600 in Saudi Arabia, all at around 0500UTC.

Our Buckinghamshire s.w.l. reporter Charlie Blake RS6034 has also been ‘up with the larks’ on 7MHz lately. Charlie’s reports include s.s.b. reception of ZL1RG (New Zealand) working IK4DR in Italy at 0537, Grets HBSAARC (Switzerland) in contact with M0ACO at 0607.

Charlie also logged CE1CKA (Chile) working DL1HBW in Germany at 0559, Carlos Ti4CEF (Costa Rica) chatting with G3PMR at 0535, 8P6HG (Barbados) in contact with Dennis G0KFPN at 0529. Finally, there was SV8CBN (Greece) working F5UTE in France at 0507UTC.

Derek Brs-171057 has also been ‘earwigging’ on 7MHz. His s.w.l. log includes s.s.b. reception of H6SJA (Switzerland), A2P2E (Pakistan), PY2SLR (Brazil) ZP5WBM (Paraguay) and LUXG (Argentina), all at around 2300UTC.

Steve GWO5SL has given the
vertical antenna he's trying out a right bashing on 7MHz, and his log shows it too! Contacts on this band include FG3MR (Guadeloupe) at 0148, VK6ACY (Australia) at 0045, CU2AA (Azores Islands) at 0045, and LU4KU (Argentina) at 0045 all on 180 watts s.s.b.

Steve's c.w. operation accounted for VE3FN (Canada) at 0421, N4RP (USA) at 0222, C2ERP (Bolivia) at 0023. He also logged FM5BH (Martinique Island) at 2256, and UA9KM (Asian Turkey) at 0003UTC.

The 10MHz Band

Carl Mason GW0SVW of Skewen, in West Glamorgan uses a G5RV beam antenna (mounted at 15m) on 10MHz band to work EX7MA (Kingsztin) at 1831, SN9KW (Nigeria) at 1800, SV2A5PA (Mount Athos) at 1222, JR2SEN (Japan) at 1559. He also logged JT1BG (Mongolia) at 1801, SV1JU (Singapore) at 1645, HS1INGR (Thailand) at 1823, BA1CD (Peking, China) at 1543, HL1K1S (South Korea) at 1511, and X9AS (Macau) at 1833UTC.

T. Ibititon GW0TV operates: each evening between 1900 - 2000 on or around 7.020MHz c.w., or 14.035MHz c.w. using a Ten Tec Scout at 50 watts.

The 14MHz Band

Again, the 14MHz band is 'where it's at' for most of our reporters. And as usual I'm starting off with our Yeovilian OXer, Don Mclean G3NOF's report. Don reports that -"conditions on h.f. have not been very good during the day for DX. There's been alot of Sporadic 'E' on all bands with UK stations coming through at 59. The 14MHz band has been best for DX in the evenings from 1800 onwards with strong north Americans from around 2200."

Don's extensive list includes s.s.b. contacts with A71EM (Qatar) at 1716, A92FZ (Bahrain) at 2031 QSL to W3HCW, C5AGN (Green Turkey 8ay, Bahamas) at 2323UTC (QSL to KA1OIG), VU2AU (India) at 1810, and 4X4JU (Israel) at 1839UTC.

David Kennedy G7GWF listens: on 7MHz using a Howes Defex receiver and loft mounted wire antenna.

Gordon Foote G7NCR, who uses his monoband 20w receiver and a loft-mounted receive antenna. Gordon, as usual, sends a massive log, and it includes s.s.b. reception of 3VBBB (Taiwan) working G0DMS at 1645, 5A1A (Libya) in contact with G0WMT at 1700.

Gordon also logged 9K2HN (Kuwait) working RZ2CC in Russia at 1733, PY2CC in contact with RA3QSY (nice call) at 1836, UGRDWDX (Ukraine) in contact with G0RNH. Also heard were WR9DMS (USA) working $2HA in Slovenia at 2000, SV1JY (Singapore) in contact with 9AZD in Croatia at 1415, and finally J3GSI (Ghana) working LH1CU in Norway at 1434UTC.

It's back to G2Hku now, who has been wielding some pretty effective c.w. on 14MHz. He lists contacts with P3FV (Aruba Island) at 1900, and 9H1AZ (Malta) both at around 1500, while operating at 2000UTC gave him a contact with C88BB in Uruguay.

PW Listening & Operating Watch List

All times in UTC

Charlie Blake RS-96034 listens: 0500-0700 on 7.016MHz s.s.b. with an IRO 525 receiver & Slapping Wire antenna.

Steve Locke GW0ISGL operates: 1100-1500 most days around 14.180MHz s.s.b. using a Kenwood TS-940 & TH7 beam antenna, normally beaming to DC.

Don Mclean G3NOF operates: 1030 Saturdays on 3.685MHz on the ISVL Net or 1036 Sundays on the Yeovil ARC Net 3.685MHz s.s.b. using a Kenwood TS 950 & Trap Dipole antenna.

Leighton Smart GWIBL1 operates: Most Sundays (and some weekday evenings) at around 1000-1300 on 1.933 or 1.949MHz s.s.b. using a KW 2000B transceiver and a long wire Marconi antenna.

Reh Mannion G3XFD listens and operates: (weekdays & weekends) 1900-1930 3.7MHz 100W s.s.b., & 3.550 or 3.560MHz QRP c.w. using an Alinco DX-70 transceiver and Trap Dipole/Long Wire antennas. Also at 2300 on either 3.530, 3.560 or 7.025MHz (c.w.) or 3.7MHz s.s.b. Occasionally on 7.025MHz c.w. between 0100-0200.

Gordon Foote G7NCR listens: 1700-1930 & 2300-2200 (weekdays) and 1430-1630 (weekends) on 14.250MHz s.s.b. using a Howes Defex receiver and loft mounted wire antenna.

The 18 & 21MHz Bands

Up to the 18 and 21MHz bands now where Don G3NOF reports that -"18MHz has been poor during the day, although on a few days it opened to North America around 2200 then faded out. A few Japanese stations were heard around 1200UTC."

Don's long list contains contacts with CEBEIO (Chire) at 2013, H4CL (Ecuador) at 2240, JASXAE (Japan) at 2222, NZ6CQ9WV1 (Senegal) at 1841 QSL via PA3BUD, TJ1RA (Camerom) at 2228, TU4FF (Ivory Coast) at 0749 QSL via OH4SR, XE3VD (Mexico) at 2316, X960D (Macau) at 1303, ZS6UVU (Zimbabwe) at 1642, and YM22HCS (Asatic Turkey) at 0822UTC (QSL via Bureau).

On 18MHz, Ted G3KU worked 9J2B0 (Zambia), AI1FJU/LIL (Franz Josef Land) at 1500, while at 1900UTC he contacted 9J0DJSI in Sierra Leone. Finally for this month, over to Carl

GW0SVW who lists 21MHz c.w. contacts with DL2MF, 3R8FV (Mauritius) and E70W (Spain) all at around 1200UTC, while Eric G0KRT used his low power to contact YU1ACR (Serbia) at 1034, H92O (Hungary) at 1053, and OM3RAK (Slovakia) at 1602UTC.

Signing-Off

Well, another month has flown by and it's time to be signing-off! My grateful thanks to all reporters for your time and efforts.

I get many favourable comments over the air about the column, but always state that it's not my column... it's yours. Without your continued (and patient) support, it wouldn't be here at all! Hope to catch you on the air now I'm operational again!

As usual, reports and information by the 15th of each month to:
Leighton Smart GW0ISGL, 33 Neat Wyve, Trelewis, Mid-Glamorgans CF6 8DB, Wales. Tel: (01443) 811068.
POWER MODULE 24V 1/3" DC O/P 12/14V at 10 amps, curr. limit, stabilised tested. £28.50. BENCH POWER UNIT Mil version of Sol AS1492 240 1/3" O/P 0 to 48v DC stab and 0 to 5 amps constant current, in Mil style case. tested. £65. STORNO RS. Dash or Portable Low Band 60/80 Meg CQP6A12.5Kc chan. for 24V DC with 12 chan. on some crystals. £17.50 each or 2 for £30. RADAR PPI IND ex Navy all trimms 10" req DC supplies no info, fixed coil. £65. STATIC FREQ CONV 1/3" nom 24v DC O/P 115V 400/s 1/200 watts 1 phase sine wave stab, size 165x55" tested with connr. £95. WAVE METER HEATS. Absorption type Micrometer tuned with charts 0/P for 50/100 Ua. £11.50. 60mm die with mount. £25. LARGE HEAT SINKS. phase sine wave stab, size 10x5x5" tested with connr. £95. HEADS. RADAR PPI IND ex Navy all trimms 10" req DC supplies no info, fixed coil. £49.95.\n
INTERCOM UNITS. £5.50.

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A nyone who experiments with antennas knows that every design has its limitations. One of these limitations is bandwidth. No antenna can operate over an unlimited range of frequencies. Outside a given range an antenna’s performance will deteriorate (sometimes very quickly).

Most antennas used by amateurs have a relatively narrow bandwidth, usually just sufficient to accommodate one band. Although for the h.f. bands it may even be necessary to select either the s.s.b. or c.w. section of the band.

As many amateurs need to operate on several bands, multi-band antennas are popular, particularly for h.f. On multi-band antennas traps are widely used to isolate various sections of the antenna giving different effective lengths on different frequencies. Even so, the bandwidth of these antennas is limited and outside the specified bands the performance falls away.

Some antennas are designed for true wide band operation. Scanner users will be familiar with the discone antenna. Some discone antennas are able to operate over a frequency range of 10:1 which is ideal, enabling signals to be picked up over a wide range of frequencies without the need for a variety of antennas. Whilst these are ideal for receiving they are not particularly efficient for transmitting and are seldom used in this role.

A wide band antenna which is used for transmitting is known as the log periodic array. This is directional and often used in professional applications where antenna gain, directivity and a wide bandwidth are required.

Unfortunately, log periodic antennas are not widely used by amateurs. For their size they offer less gain than the more traditional trapped tri-band or multi-band beams. The true wide band nature of the log periodic is not usually required because amateurs can only transmit on a limited number of bands.

Antenna Bandwidth

The antenna bandwidth is the range of frequencies over which it can operate satisfactorily. Unfortunately this is vague because different people have different requirements for their antennas.

One antenna type may be used for a specialised receiving purpose for which one aspect of its performance is important. Others will be used for transmitting where another aspect is needed.

There are two main aspects of antenna performance, which usually determine the bandwidth. One is the standing wave ratio, and the other is the gain. Of these the most important to amateurs is usually the voltage standing wave ratio (v.s.w.r.), as the gain is normally less critical because it’s less frequency sensitive.

Within the setting-up instructions of most trap verticals and dipoles a plot of the v.s.w.r. is usually given. This is very important because if the v.s.w.r. rises too high then this can affect the transmitter.

As semiconductor devices are very sensitive to high frequencies where the transmitted power is not widely seen. For most h.f. antennas this is not applicable, but for v.h.f. and u.h.f. antennas, thicker conductors can make a difference.

A typical log periodic antenna array.

Levels of V.S.W.R. Most transmitter power amplifiers detect the levels of reflected power to protect the p.a. stage. When high levels of reflected power are detected the output from the transmitter is reduced to a safe level. Whilst this protects the transmitter it can also reduce the output power considerably.

To overcome output power reduction it’s necessary to ensure that the v.s.w.r. level is always kept as low as possible. Usually levels of 2:1 and less are considered acceptable, although if lower levels can be achieved this can sometimes help.

If an antenna is operated over a wide band of frequencies, changes will be seen in its polar diagram. This is particularly important for directive antennas where these changes will be more noticeable.

Where this is the governing factor the gain over a given operating range can be quoted. As this is rarely the most important factor for amateur communications this aspect is not widely seen.

Number Of Factors

There are a number of factors which can affect the bandwidth of an antenna. For example it’s found that compact antennas have a narrower bandwidth than full sized antennas. Trapped verticals are a common case in question where on the lower frequency bands the degree of loading from all the traps is greater, the bandwidth can be quite narrow.

Additionally a number of factors can help increase the bandwidth. The use of a folded dipole can help in this case.

It’s found that a folded dipole has a wider bandwidth than a normal dipole. As most v.h.f./u.h.f. Yagis use folded dipoles to give a good impedance match to the 50:1 coaxial cable this also has the advantage of increasing the bandwidth.

It’s also noted that decreasing the ratio of the length to thickness of the conductor can affect the bandwidth. For most h.f. antennas this is not applicable, but for v.h.f. and u.h.f. antennas, thicker conductors can make a difference.

A typical v.s.w.r. curve, note the much narrower bandwidth at the lower frequencies where the loading is greater.

That’s all for this month, next time I’ll be bringing this series to close by taking a look at the mysteries surrounding power supplies. Cheerio for now
Mike Richards G4WNC has this month's round-up of computing news which includes details of the new Internet Radio Guide in the Klingenfuss range.

This actually proved to be very informative, particularly the full index pages as I found them much easier to use when printed than on-screen. For me, the best way to use the guide was to search-out interesting sites/links, note them down, and then enter them in my WWW browser's bookmark file. You can then go on-line and quickly access the selected sites.

I found the guide to be very helpful in planning my on-line time and highlighting sites that I probably wouldn't have otherwise found. For details of availability contact the PW Book Service on (01202) 659930 who are selling the Internet Radio Guide for £30 plus P&P. My thanks to Joerg Klingenfuss for supplying the review copy.

Interference Tips

Barry Stone G6RSE has written an interesting letter explaining how he cured computer interference in his shack. He was suffering severe, 55, interference right throughout the h.f. spectrum.

Barry started with the advice in my FaciPack and discovered that the interference was still unbearable with just the computer base unit powered-up! He then tried just about everything he could think of to reduce the interference to manageable levels.

Trying to reduce the interference included changing screen resolution, earthing and even the addition of Tandy clip-on ferrites at each end of the mains lead - all to no avail. Just before he gave up he changed from his Pentium back to a 386PC. The interference was still unbearable.

That's all the computing news I have for you this month, so until next time cheerio and don't forget you can contact me at PO Box 1863, Ringwood, Hants BH24 3ZD or via the Internet at mike.richards@dial.pipex.com. Whatever's happening in your world is bound to be interesting. So, please send along all your news and views to Practical Wireless, 38 Brookside, Sevenoaks, Kent TN13 1QU. Tel: (01959) 569369.
reported last month that Johannesburg-based Channel Africa was to close following the South African Foreign Ministry’s decision to stop funding the broadcaster. A meeting of the South African cabinet on 13 June reversed that decision.

A press statement issued after the cabinet meeting said that the continuation of Channel Africa was supported, although it would be in a rationalised form. A cabinet sub-committee chaired by Thabo Mbeki, the deputy President, would report on financing and the format of Channel Africa by October this year.

Protests had been lodged by listeners’ and organisations across Africa and further afield. Amnesty International’s South African branch, the International Committee of the Red Cross and the United Nations Development Programme, all lobbied for the station to remain on the air. Senior staff from a number of major international broadcasters including Radio France International, BBC World Service and Voice of America wrote to Channel Africa saying how important it is to ensure that South Africa continues to have a voice in international radio.

Save World Service

In last month’s column I also described the changes to be made to the set-up of the BBC that would affect the World Service. Reaction to the plan has been extreme, with John Tusa, the former Managing Director of World Service, writing in the national press that it was ‘an act of gross vandalism’. He is helping to lead a campaign involving two of his predecessors, Austen Kirk and Gerald Mansell, to ‘save World Service’.

A lobby of parliament is due to take place as this magazine goes to press, and outside Bush House there is a growing display of flowers around a sign saying ‘R.I.P. World Service 1932-1996’. Around 500 staff gathered outside Bush House two weeks after the announcement of the restructuring to protest against the changes. Watch this column for more news!

Commercial Station

A new station has been launched by a well-known Danish DXer, Stig Hartvig Nielsen. The station Radio ABC is on the air each Sunday from 0800 to 1200UTC relayed from a 120kW transmitter in Kaliningrad, Russia. Stig is General Manager of Radio ABC, which is a successful commercial station in Denmark.

The ABC service has been operational since 1996, broadcasting on a number of f.m. frequencies in eastern, northern and central Jutland. The station reaches 300 000 listeners in Denmark.

The short wave operation is music-based, with the Danish Top 30 broadcast at 1000. Short wave enthusiasts can tune in to ABCDX Report at 1130 each Sunday.

The station transmits on the clear channel of 7.57MHz and welcomes reception reports from listeners. Write to PO Box 174, DK 8000 Randers, Denmark, or FAX to +45 86 40 55 22. Radio ABC has a WWW site, including a page relating to the short wave service. The URL is http://www.radieabc.dk

Radio Democrat International

Another new station on short wave is Radio Democrat International (RDI) beaming to Nigeria. The English language broadcasts are on the air for an hour a day at 0600-0630 on 11.90 and at 1500-1530 on 15.12MHz, a frequency used in the past by the Voice of Nigeria’s external service.

Radio Democrat International also plans to transmit at 2100UTC daily on 7.195MHz. The station uses the Moyerton transmitting station of Sentech, the South African Broadcasting Corporation’s transmission arm, and programmes are distributed from London by programmes made by parent Canadian Broadcasting Corporation’s domestic services.

One of these is Global Village which brings the ‘News of the World in the World of Music’ to listeners in Canada and world-wide, thanks to the short wave relays.

The programme has reported from 92 cities in 51 countries and includes everything from jazz music from the New Orleans Jazz Heritage Festival to regional music from the Celtic-Bohemian Witches Day Festival in the Czech Republic. You can tune in on Thursday at 2300UTC on 11.94 and 15.305MHz.

Radio Exterior de Espana is on the air every day at 2100UTC with an hour-long broadcast that includes 30 minutes of Spanish and international news, with the emphasis on Latin America, followed by Spanish press review, pop music and reports from Spain on the arts and science. At the weekend, news is shorter and is followed by Radio Club with listeners’ letters and record requests. Tune to 6.125 in Europe, or 11.775MHz in the Middle East and Africa. There is also a transmission to the Americas at 0000 for two hours on 9.54MHz.

That is all for this time round. Until next month, keep searching the bands for interesting stations and let me know if you find anything unusual. All letters to me c/o the PW Offices.

Middle East Stations

Finally this month we travel to the Middle East. The peace process seems to be hanging by an ever thinner thread as this edition of PW goes to press. It might be worth keeping an ear on some of the stations that broadcast from the region in English as events unfold. Here is a selection:

UAE Radio Dubai: 1030-1110; 1330-1400; 1600-1640 on 13.675, 15.395, 17.825, 21.650MHz
Radio Jordan: 1100-1200 and 1400-1630 on 11.94MHz
Radio Kuwait: 1800-2100 on 11.99MHz
Radio Damascus: 2005-2105 on 12.085, 15.995MHz

END
Several repeater groups now produce newsletters, something that I have always thought a good idea, especially for a group that is well-financed and well organised. However, it's an expensive thing to do, with postage and printing, etc., so it's not possible for all groups.

The Gloucester Group produce a monthly newsletter and incorporate both voice and data repeaters in the one group with an annual subscription to cover all repeaters. They are very well organised, packet-wise, with both 430 and 1296 MHz high-speed nodes, with BBS facilities at GB7GLO.

The users of GB7GLO are encouraged to use a password to access, using the one-time pad system. Each of the nodes has TCP/IP routing capabilities with GB7GLO providing TCP/IP BBS facilities. If you're interested in joining, or just require further information, then the Secretary is Richard Brown G8JVM who can be contacted on (01453) 884945.

The Ridgeway Repeater Group is organised in much the same way as the Gloucester Group, but produces a yearly newsletter, which is still quite adequate for such a service. The main BBS for the Ridgeway group is GB7SDN.

The links for GB7SDN are presently operating from GB9RG, but will soon change to GB7NW and will also hopefully go from 1200baud to 9600baud. There are two voice repeaters as well and one membership covers all repeaters.

It's worthwhile remembering that repeaters are not provided by an ethereal being, nor by the RSGB, or indeed by Paul Daniels! However, I suspect that, just like here in Norfolk, each area has their own 'non-contributors', which is the polite expression to use! If all amateurs contributed to their own local repeater groups, more and better services would be possible.

Help Wanted

I received a telephone call from Tom Polain G7TBW. He would like to chat to somebody using an MFJ-1278B.

Modern.

Tom is not on packet (as he has a problem!) but can be reached by writing to 22 Hilltop Avenue, Hockley, Essex SS5 6BN or by telephoning (01702) 230662. The computer Tom is trying to use the TNC with is the Amiga 1200, so if anybody can help, I'm sure Tom would be very pleased to hear from you.

Highlander BBS

Information has reached me of a landline service should anybody wish to use this method. One known as the Highlander BBS and is available by dialling either (01452) 384547 or (01452) 384762.

There are over 6000 amateur radio related files for user download with most amateur related newsgroups from Fidonet, Hamnet, Mercury, etc.

The syssops are also hoping to build an area devoted to Radio Societies, Clubs and SATcom interest groups.

If any secretaries would like to have their club listed in the Highlander database, then please send full details, name of club, meeting place, times, interests, Novice support and a contact name and 'phone number.

In addition to all of this, there are also more than 58,000 files covering DDS, Windows, Computer groups and so on. Various addresses are available to contact the sysop: markt@esoftc.demon.co.uk mark.trotman@esoftc.sussex.co.uk

On GB7GLO you can also telephone him on 1017041 535947. There are two voice repeaters as well and one membership covers all repeaters.

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Mark your envelope Practical Wireless PCB Service.

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You should state clearly in your advert whether the equipment is professionally built, home-built or modified.

The Publisher of Practical Wireless also wish to point out that all photos will only be published at our discretion and are non-returnable.

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Wireless also wish to point out that all photos will only be published at our discretion and are non-returnable.

Free adverts? Yes it’s true! As of now, all adverts will be FREE of charge, to readers and subscribers.

Now’s your chance to send in a photograph of your equipment (a good idea if it’s really unusual) to accompany your advert. Please note that all photos will only be published at our discretion and are non-returnable.

When sending in your advert, please write clearly in BLOCK CAPITALS up to a maximum of 30 words, plus state your contact details. Please use the order form at the bottom of the page.

Adverts are published on a first come, first served basis. All queries to Zoe on (01202) 659910.

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Michael

Practical Wireless, September 1996
On these two pages are eight books from the PW Book Store, which we’ve selected to ‘profile’. There should be something here to suit all tastes, if not don’t worry, this will be a monthly feature.

Getting Started in Practical Electronics BP345
Owen Bishop

Getting Started in Practical Electronics is ‘billed’ as an ideal book for beginners and is just one of the many books in the Babani range. This 198 page book is divided into two parts.
Part A deals with the essentials of electronics construction and covers Components, Ohms Law, Basic circuits, Putting Things Together and Trouble Shooting, while Part B contains 30 electronics projects which includes things like a Transistor Tester, Fire Alarm, Voltmeter Probe and even a Lie Detector! All the projects should be within the capability of the beginner and are sorted into those for the absolute beginner, those easily built after gaining a little experience and those offering more of a challenge.
This book would be useful for anyone embarking on the journey into the electronics world or would perhaps be a use aid for those studying for the Radio Amateurs Examination. Priced at only £4.95, Getting Started In Practical Electronics is a cheap and extremely useful book to have on your shelf.

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Simple GPS Navigation
Mik Chinery

Global Positioning Systems (GPS) are certainly not a new idea but it’s only recently that people have realised the full potential of using one. This book explains GPS and whilst it’s written by a technical marine author it should set you up to wander capably around the world’s oceans, deserts and airways.
Contained within its 96 pages are 15 chapters which cover everything from an Introduction through Initial Programming and Waypoint Navigation to Advanced Functions and Applications. So, if you’re wanting to understand the technical jargon and find out more about the often baffling world of GPS then make sure you add this book to your list when you place that order.
Simple GPS Navigation is available for £9.95.
The ARRL Handbook For Radio Amateurs 1996

If you were to only have one general book in your amateur radio library, The ARRL 1996 Handbook is most likely to be the book because it is so comprehensive and readable. Updated every year The Handbook, as its known throughout the world is undoubtedly the most comprehensive text book, manual and compendium available for the hobby. In fact, to really appreciate the book, you have to see it to appreciate what it covers in its 1000 plus pages.

The new 1996 offerings include: Power supplies, 144MHz amplifiers (including a 'brick' p.a. stage to boost your hand-held transceiver's output to either 25 or 50W) and a 1.2kW linear! There's also in-depth coverage of PACTOR II, a loop antenna for 28MHz, a copper J-pole antenna for 144MHz and many more projects and ideas.

Build a 'junk box satellite receiver, multi-band QRP transceiver with plug-in modules and an interesting e.i.f. project. Digital signal processing is available to the home-brewer with an 18-mode project (including DTMF and CTCSS decoding.

Finally, for the first time the Handbook comes with a computer disk (IBM-PC) containing Windows-based parts suppliers list (expanded from the book) with data available in more than 200 categories. The disk also includes applications software: Pi network design, shortened dipole design, solenoidal coil design, SSTV. An aid to find true north, active filter design.

At just £25 for over 1000 pages can you afford to Not to have this book in your library?

The ARRL Antenna Book

The ARRL Antenna Book follows on from the ARRL Handbook and also fits into the 'If you're only going to have one book...this is it' category. This amazingly comprehensive manual covers the world of antennas and is literally 'The Antenna Handbook'.

Within its 800 plus pages, antennas and propagation for the amateur radio enthusiast are covered in an exemplary and comprehensive fashion. The chapters dealing with antenna fundamentals and theory are (deservedly so) considered to be the best available in the world.

If you're interested in the growing 'sport' of amateur radio direction finding (DF Hunts) there's an interesting chapter just for you! Filled with interesting projects to back-up the informative theory and principle aspects, The Antenna Book also comes with a program disk suitable for IBM compatible PCs.

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All in all, The ARRL Antenna Book provides a (very readable) 'complete' antenna anthology for anyone who wants to learn more about and enjoy working with antennas and is good value at £21.95.

The ARRL Antenna Compendium Volume 4

Radio amateurs around the world love experimenting with antennas and P4 readers prove that time and again with the interest they show in the subject. This is the fourth in the popular series of collected antenna articles and projects covering simple ideas for home-brewing right down to heavy-weight technical articles.

Included with Volume 4 is an IBM compatible disk with specialised software covering: antenna radiation pattern programs, a mobile antenna analysis and design program for whips, a v.h.f./u.h.f. propagation analysis over real terrain program and many more. Also included is computerised impedance matching from Peter Dodd G3LDO, the well known antenna specialist and former P4 'Antenna Workshop' author.

This comprehensive book is available for £15.50, why not order yours today?

Your Packet Companion (ARRL)

Steve Ford WB8IMY

There's a tremendous continuing (and growing) interest in amateur radio packet operation. The ARRL's Your Packet Companion introduces you to the exciting digital communications mode. Aimed at the beginner the book uses easy-to-understand language and an entertaining style of approach.

Within its 130 odd pages you'll learn how to assemble your own packet radio station, use your computer/terminal to chat with other packet operators, learn how to get the most out of bulletin boards, send and receive packet mail and hunt DX with packet clusters. You'll also be guided through advanced networking systems including ROSE, TexNet and TCP/IP.

There's also a reference section to help you locate equipment, other books and software. It's all aimed at getting you going on packet the painless way and at £5.95 it should be within affordable reach too!
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